

PROGRAMME REGULATIONS & CURRICULUM

2025-29

PRESIDENCY SCHOOL OF COMPUTER SCIENCE AND ENGINEERING

BACHELOR OF TECHNOLOGY (B.TECH.) IN ARTIFICIAL INTELLIGENCE AND DATA SCIENCE



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Program Regulations and Curriculum 2025-2029

BACHELOR OF TECHNOLOGY (B.Tech.) in Artificial intelligence and Data Science

based on Choice Based Credit System (CBCS) and Outcome Based Education (OBE)



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1. Vision & Mission of the University and the School / Department

1.1 Vision of the University

To be a Value-driven Global University, excelling beyond peers and creating professionals of integrity and character, having concern and care for society.

1.2 Mission of the University

- Commit to be an innovative and inclusive institution by seeking excellence in teaching, research and knowledge-transfer.
- Pursue Research and Development and its dissemination to the community, at large.
- Create, sustain and apply learning in an interdisciplinary environment with consideration for ethical, ecological and economic aspects of nation building.
- Provide knowledge-based technological support and services to the industry in its growth and development.
- To impart globally-applicable skill-sets to students through flexible course offerings and support industry's requirement and inculcate a spirit of new-venture creation.

1.3 Vision of Presidency School of Computer Science and Engineering

To be a value based, practice-driven School of Computer Science and Engineering, committed to developing globally-competent Engineers, dedicated to transforming Society.

1.4 Mission of Presidency School of Computer Science and Engineering

- Cultivate a practice-driven environment with a contemporary Learning-pedagogy, integrating theory and practice.
- Attract and nurture world-class faculty to excel in Teaching and Research, in the field of Core Computer Science and Engineering.
- Establish state-of-the-art facilities for effective Teaching and Learningexperiences.
- Promote Interdisciplinary Studies to nurture talent and impart relevant skillsets for global impact.
- Instill Entrepreneurial and Leadership Skills to address Social, Environmental, and Community-needs.

2. Preamble to the Program Regulations and Curriculum

This is the subset of Academic Regulations and it is to be followed as a requirement for the award of B. Tech degree.

The Curriculum is designed to take into the factors listed in the Choice Based Credit System (CBCS) with focus on Industrial Based Project Learning, Industrial Training, and Internship to enable the students to become eligible and fully equipped for employment in industries, choose higher studies or entrepreneurship.

In exercise of the powers conferred by and in discharge of duties assigned under the relevant provision(s) of the Act, Statutes and Academic Regulations of the University,



the Academic Council hereby makes the following Regulations.

3. Short Title and Applicability

- a. These Regulations shall be called the Bachelor of Technology Degree Program Regulations and Curriculum 2025-2029.
- b. These Regulations are subject to, and pursuant to the Academic Regulations.
- c. These Regulations shall be applicable to the ongoing Bachelor of Technology Degree Programs of the 2025-2029 batch, and to all other Bachelor of Technology Degree Programs which may be introduced in future.
- d. These Regulations shall supersede all the earlier Bachelor of Technology Degree Program Regulations and Curriculum, along with all the amendments thereto.
- e. These Regulations shall come into force from the Academic Year 2024-2025.

4. Definitions

In these Regulations, unless the context otherwise requires:

- a. "Academic Calendar" means the schedule of academic and miscellaneous events as approved by the Vice Chancellor;
- b. "Academic Council" means the Academic Council of the University;
- c. "Academic Regulations" means the Academic Regulations of the University;
- d. "Academic Term" means a Semester or Summer Term;
- e. "Act" means the Presidency University Act, 2013;
- f. "AICTE" means All India Council for Technical Education;
- *g.* "Basket" means a group of courses bundled together based on the nature/type of the course;
- *h.* "BOE" means the Board of Examinations of the University;
- *i.* "BOG" means the Board of Governors of the University;
- *j.* "BOM" means the Board of Management of the University;
- *k.* "BOS" means the Board of Studies of a particular Department/Program of Study of the University;
- *I.* "CGPA" means Cumulative Grade Point Average as defined in the Academic Regulations;
- *m.* "Clause" means the duly numbered Clause, with Sub-Clauses included, if any, of these Regulations;
- n. "COE" means the Controller of Examinations of the University;
- o. "Course In Charge" means the teacher/faculty member responsible for developing and organizing the delivery of the Course;
- *p.* "Course Instructor" means the teacher/faculty member responsible for teaching and evaluation of a Course;
- q. "Course" means a specific subject usually identified by its Course-code and Coursetitle, with specified credits and syllabus/course-description, a set of references, taught by some teacher(s)/course-instructor(s) to a specific class (group of students) during a specific Academic Term;
- *r.* "Curriculum Structure" means the Curriculum governing a specific Degree Program offered by the University, and, includes the set of Baskets of Courses along with minimum credit requirements to be earned under each basket for a degree/degree



with specialization/minor/honours in addition to the relevant details of the Courses and Course catalogues (which describes the Course content and other important information about the Course). Any specific requirements for a particular program may be brought into the Curriculum structure of the specific program and relevant approvals should be taken from the BOS and Academic Council at that time.

- *s.* "DAC" means the Departmental Academic Committee of a concerned Department/Program of Study of the University;
- t. "Dean" means the Dean / Director of the concerned School;
- u. "Degree Program" includes all Degree Programs;
- v. "Department" means the Department offering the degree Program(s) / Course(s)
 / School offering the concerned Degree Programs / other Administrative Offices;
- w. "Discipline" means specialization or branch of B.Tech. Degree Program;
- *x.* "HOD" means the Head of the concerned Department;
- *y.* "L-T-P-C" means Lecture-Tutorial-Practical-Credit refers to the teaching learning periods and the credit associated;
- z. "MOOC" means Massive Open Online Courses;
- aa. "MOU" means the Memorandum of Understanding;
- *bb.* "NPTEL" means National Program on Technology Enhanced Learning;
- cc. "Parent Department" means the department that offers the Degree Program that a student undergoes;
- *dd.* "Program Head" means the administrative head of a particular Degree Program/s;
- ee. "Program Regulations" means the Bachelor of Technology Degree Program Regulations and Curriculum, 2025-2029;
- ff. "Program" means the Bachelor of Technology (B.Tech.) Degree Program;
- gg. "PSCSE" means the Presidency School of Computer Science and Engineering;
- hh. "Registrar" means the Registrar of the University;
- *ii.* "School" means a constituent institution of the University established for monitoring, supervising and guiding, teaching, training and research activities in broadly related fields of studies;
- *jj.* "Section" means the duly numbered Section, with Clauses included in that Section, of these Regulations;
- *kk.* "SGPA" means the Semester Grade Point Average as defined in the Academic Regulations, 2021;
- *II.* "Statutes" means the Statutes of Presidency University;
- *mm.* "Sub-Clause" means the duly numbered Sub-Clause of these Program Regulations;
- nn. "Summer Term" means an additional Academic Term conducted during the summer break (typically in June-July) for a duration of about eight (08) calendar weeks, with a minimum of thirty (30) University teaching days;
- oo. "SWAYAM" means Study Webs of Active Learning for Young Aspiring Minds.
- pp. "UGC" means University Grant Commission;
- qq. "University" means Presidency University, Bengaluru; and
- rr. "Vice Chancellor" means the Vice Chancellor of the University.



5. Program Description

The Bachelor of Technology Degree Program Regulations and Curriculum 2025-2029 are subject to, and, pursuant to the Academic Regulations. These Program Regulations shall be applicable to the following ongoing Bachelor of Technology (B.Tech.) Degree Programs of 2025-2029 offered by the Presidency School of Computer Science and Engineering (PSCS):

- 1. Bachelor of Technology in Computer Science and Engineering, abbreviated as CSE
- 2. Bachelor of Technology in Computer Science and Technology (Big Data), abbreviated as CBD
- 3. Bachelor of Technology in Computer Science and Engineering (Block Chain), abbreviated as CBC
- 4. Bachelor of Technology in Computer Science and Technology (Dev Ops), abbreviated as CDV
- 5. Bachelor of Technology in Computer Science and Engineering (Cyber Security), abbreviated as CCS
- 6. Bachelor of Technology in Computer Science and Engineering (Internet of Things), abbreviated as CIT
- 7. Bachelor of Technology in Computer Science and Engineering (Data Science), abbreviated as CSD
- 8. Bachelor of Technology in Computer Science and Technology, abbreviated as CSG
- 9. Bachelor of Technology in Information Science and Technology, abbreviated as IST
- 10. Bachelor of Technology in Computer Science and Information Technology, abbreviated as CSI
- 11. Bachelor of Technology in Computer Science and Engineering (Networks), abbreviated as CSN
- 12. Bachelor of Technology in Computer Engineering, abbreviated as COM
- 13. Bachelor of Technology in Information Science and Engineering, abbreviated as ISE and
- 14. Bachelor of Technology in Computer Science and Engineering (Artificial Intelligence and Machine Learning) abbreviated as CAI
- 15. Bachelor of Technology in Robotics and Artificial Intelligence Engineering, abbreviated as RAI
- 16. Bachelor of Technology in Artificial Intelligence and Data Science Engineering, abbreviated as AID

5.1 These Program Regulations shall be applicable to other similar programs, which may be introduced in future.

5.2 These Regulations may evolve and get amended or modified or changed through appropriate approvals from the Academic Council, from time to time, and shall be binding on all concerned.

5.3 The effect of periodic amendments or changes in the Program Regulations, on the students admitted in earlier years, shall be dealt with appropriately and carefully, so as to ensure that those students are not subjected to any unfair situation whatsoever, although they are required to conform to these revised Program Regulations, without any undue favour or considerations

6. Minimum and Maximum Duration



- 6.1 Bachelor of Technology Degree Program is a Four-Year, Full-Time Semester based program. The minimum duration of the B.Tech. Program is four (04) years and each year comprises of two academic Semesters (Odd and Even Semesters) and hence the duration of the B.Tech. program is eight (08) Semesters.
- 6.2 A student who for whatever reason is not able to complete the Program within the normal period or the minimum duration (number of years) prescribed for the Program, may be allowed a period of two years beyond the normal period to complete the mandatory minimum credits requirement as prescribed by the concerned Program Regulations and Curriculum. In general, the permissible maximum duration (number of years) for completion of Program is 'N' + 2 years, where 'N' stands for the normal or minimum duration (number of years) for completion of the concerned Program as prescribed by the concerned Program Regulations and Curriculum.
- 6.3 The time taken by the student to improve Grades/CGPA, and in case of temporary withdrawal/re-joining (Refer to Clause 16.1Error! Reference ource not found. of Academic Regulations), shall be counted in the permissible maximum duration for completion of a Program.
- 6.4 In exceptional circumstances, such as temporary withdrawal for medical exigencies where there is a prolonged hospitalization and/or treatment, as certified through hospital/medical records, women students requiring extended maternity break (certified by registered medical practitioner), and, outstanding sportspersons representing the University/State/India requiring extended time to participate in National/International sports events, a further extension of one (01) year may be granted on the approval of the Academic Council.
- 6.5 The enrolment of the student who fails to complete the mandatory requirements for the award of the concerned Degree (refer Section 19.0 of Academic Regulations) in the prescribed maximum duration (Sub-Clauses 18.1 and 18.2 of Academic Regulations), shall stand terminated and no Degree shall be awarded.

7 Programme Educational Objectives (PEO)

After four years of successful completion of the program, the graduates shall be able to:

PEO 1: Demonstrate proficiency as a Computer Engineering professional, applying technical knowledge and skills effectively in various engineering fields.



PEO 2: Become a teaching and research professional in the areas of Computer Science and Engineering, engaging in lifelong learning to stay at the forefront of the field.

PEO 3: Contribute as a key member of a consultancy team in the Computer Science and Engineering industry, providing expert solutions to complex problems.

PEO 4: Emerge as an entrepreneur in the fields of Computer Science and related areas, creating innovative solutions and businesses.

8 Programme Outcomes (PO) and Programme Specific Outcomes (PSO)

8.1 Programme Outcomes (PO)

On successful completion of the Program, the students shall be able to:

- **PO1. Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- **PO2. Problem Analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- **PO3. Design/Development of Solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- **PO4. Conduct Investigations of Complex Problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- **PO5.** Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- **PO6.** The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- **PO7.** Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- **PO8. Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.



- **PO9.** Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- **PO10.** Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- **PO11. Project Management and Finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- **PO12. Life-Long Learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

8.2 Program Specific Outcomes (PSOs):

On successful completion of the Program, the students shall be able to:

- **PSO 1** Demonstrate comprehensive knowledge of artificial intelligence and data science to describe foundational concepts, explore computational challenges, and apply theoretical and algorithmic principles in the design and development of intelligent and dependable systems.
- **PSO2** Employ software engineering practices, AI/ML algorithms, and domain knowledge to design and implement intelligent applications, preparing students for careers in advanced technology roles, research, innovation, entrepreneurship, or further academic pursuits.
- **PSO3** Apply data engineering and machine learning techniques for collecting, preprocessing, analyzing, and deploying structured and unstructured data using databases, cloud infrastructures, and AI platforms to enable efficient, scalable, and automated decision-making systems.

9 Admission Criteria (as per the concerned Statutory Body)

The University admissions shall be open to all persons irrespective of caste, class, creed, gender or nation. All admissions shall be made on the basis of merit in the qualifying examinations; provided that forty percent of the admissions in all Programs of the University shall be reserved for the students of Karnataka State and admissions shall be made through a Common Entrance Examination conducted by the State Government or its agency and seats shall be allotted as per the merit and reservation policy of the State Government from time to time. The admission criteria to the B.Tech. Program is listed in the following Sub-Clauses:

9.1 An applicant who has successfully completed Pre-University course or Senior Secondary School course (+2) or equivalent such as (11+1), 'A' level in Senior School Leaving Certificate Course from a recognized university of India or outside or from Senior Secondary Board or equivalent, constituted or recognized



by the Union or by the State Government of that Country for the purpose of issue of qualifying certificate on successful completion of the course, may apply for and be admitted into the Program.

- 9.2 Provided further, the applicant must have taken Physics and Mathematics as compulsory subjects in the Pre-University / Higher Secondary / (10+2) / (11+1) examination, along with either Chemistry / Biology / Electronics / Computer Science / Biotechnology subject, and, the applicant must have obtained a minimum of 45% of the total marks (40% in case of candidates belonging to the Reserved Category as classified by the Government of Karnataka) in these subjects taken together.
- 9.3 The applicant must have appeared for Joint Entrance Examinations (JEE) Main / JEE (Advanced) / Karnataka CET / COMED-K, or any other State-level Engineering Entrance Examinations.
- 9.4 Reservation for the SC / ST and other backward classes shall be made in accordance with the directives issued by the Government of Karnataka from time to time.
- 9.5 Admissions are offered to Foreign Nationals and Indians living abroad in accordance with the rules applicable for such admission, issued from time to time, by the Government of India.
- 9.6 Candidates must fulfil the medical standards required for admission as prescribed by the University.
- 9.7 If, at any time after admission, it is found that a candidate had not in fact fulfilled all the requirements stipulated in the offer of admission, in any form whatsoever, including possible misinformation and any other falsification, the Registrar shall report the matter to the Board of Management (BOM), recommending revoking the admission of the candidate.
- 9.8 The decision of the BOM regarding the admissions is final and binding.

10 Lateral Entry / Transfer Students requirements

10.1 Lateral Entry

The University admits students directly to the second year (3rd Semester) of the B.Tech. Degree program as per the provisions and/or regulations of the Government of Karnataka pertaining to the "Lateral Entry" scheme announced by the Government from time to time. Further, the general conditions and rules governing the provision of Lateral Entry to the B.Tech. Program of the University are listed in the following Sub-Clauses:

10.1.1 Admission to 2nd year (3rd Semester) of the B.Tech. Degree program shall be open to the candidates who are holders of a 3-year Diploma in Engineering (or equivalent qualification as recognized by the University), who have secured not less than fortyfive percentage (45%) marks in the final year examination (5th and 6th Semesters of the Diploma Program) in the appropriate branch of Engineering. Provided that,



in case of SC / ST and OBC candidates from Karnataka the minimum marks for eligibility shall be forty percent (40%).

- 10.1.2 Provided further that, candidates seeking Lateral Entry may be required to complete specified bridge Courses as prescribed by the University. Such bridge Courses, if any, shall not be included in the CGPA computations.
- 10.1.3 All the existing Regulations and Policies of the University shall be binding on all the students admitted to the Program through the provision of Lateral Entry.
- 10.1.4 The Course requirements prescribed for the 1st Year of the B.Tech. Program shall be waived for the student(s) admitted through Lateral Entry and the duration of the B.Tech. Program for such students is three (03) years, commencing from the 3rd Semester (commencement of the 2nd Year) of the B.Tech. Program and culminating with the 8th Semester (end of the 4th Year) of the B.Tech. Program.
- 10.1.5 Provided that, if a Lateral Entry student misses any mandatory program specific courses that are typically offered in the 1st year (1st or 2nd semesters), then those courses must be cleared by the students as soon as possible, preferably during the Summer Term.
- 10.1.6 The existing Program Regulations of the concerned Program to which the student is admitted through the provision of Lateral Entry shall be binding on the student with effect from the 3rd Semester of the Program. i.e., the Program Structure and Curriculum from the 3rd to 8th Semesters of the Program concerned shall be binding on the student admitted through Lateral Entry. Further, any revisions / amendments made to the Program Regulations thereafter, shall be binding on all the students of the concerned Program.
- 10.1.7 All the Courses (and the corresponding number of Credits) prescribed for the 1st Year of the concerned B.Tech. Program shall be waived for the student(s) admitted to the concerned B.Tech Program through Lateral Entry. Further, the *Minimum Credit Requirements* for the award of the B.Tech. Degree in the concerned Program shall be prescribed / calculated as follows:

The **Minimum Credit Requirements** for the award of the Bachelor of Technology (B.Tech.) Degree prescribed by the concerned Bachelor of Technology Degree Program Regulations and Curriculum, 2025-2029, minus the number of Credits prescribed / accepted by the Equivalence Committee for the 1st Year (1st and 2nd Semesters) of the B.Tech. Program.

For instance, if the *Minimum Credit Requirements* for the award of the Bachelor of Technology (B.Tech.) Degree as prescribed by the Regulations for B.Tech. in Artificial Intelligence and Data Science is "N" Credits, and, if the total credits prescribed in the 1st Year (total credits of the 1st and 2nd Semesters) of the Program concerned is "M" Credits, then the *Minimum Credit Requirements* for the award of the B.Tech. in Computer Science and Engineering for a student who joins the Program through the provision of the Lateral Entry, shall be "N – M" Credits.



10.1.8 Further, no other waiver except the Courses prescribed for the 1st year of the B.Tech. Program of the University shall be permissible for students joining the B.Tech. Program through the provision of Lateral Entry.

10.2 Transfer of student(s) from another recognized University to the 2nd year (3rd Semester) of the B.Tech. Program of the University

A student who has completed the 1st Year (i.e., passed in all the Courses / Subjects prescribed for the 1st Year) of the B.Tech/B.E/B.S., Four-Year Degree Program from another recognized University, may be permitted to transfer to the 2nd Year (3rd Semester) of the B.Tech. Program of the University as per the rules and guidelines prescribed in the following Sub-Clauses:

- 10.2.1 The concerned student fulfils the criteria specified in Sub-Clauses 10.1.1, 10.1.2 and 10.1.3.
- 10.2.2 The student shall submit the Application for Transfer along with a nonrefundable Application Fee (as prescribed by the University from time to time) to the University no later than July 10 of the concerned year for admission to the 2nd Year (3rd Semester) B.Tech. Program commencing on August 1 on the year concerned.
- 10.2.3 The student shall submit copies of the respective Marks Cards / Grade Sheets / Certificates along with the Application for Transfer.
- 10.2.4 The transfer may be provided on the condition that the Courses and Credits completed by the concerned student in the 1st Year of the B.Tech. / B.E. / B.S. Four Degree Program from the concerned University, are declared equivalent and acceptable by the Equivalence Committee constituted by the Vice Chancellor for this purpose. Further, the Equivalence Committee may also prescribe the Courses and Credits the concerned students shall have to mandatorily complete, if admitted to the 2nd Year of the B.Tech. Program of the University.
- 10.2.5 The Branch / Discipline allotted to the student concerned shall be the decision of the University and binding on the student.

11 Change of Branch / Discipline / Specialization

A student admitted to a particular Branch of the B.Tech. Program will normally continue studying in that Branch till the completion of the program. However, the University reserves the right to provide the option for a change of Branch, or not to provide the option for a change of Branch, at the end of 1st Year of the B.Tech. Program to eligible students in accordance with the following rules and guidelines framed by the University from time to time.

- 11.1 Normally, only those students, who have passed all the Courses prescribed for the 1st Year of the B.Tech. Program and obtained a CGPA of not less than 6.50 at the end of the 2nd Semester, shall be eligible for consideration for a change of Branch.
- **11.2** Change of Branch, if provided, shall be made effective from the commencement of the 3rd Semester of the B.Tech. Program. There shall be



no provision for change of Branch thereafter under any circumstances whatsoever.

- **11.3** The student provided with the change of Branch shall fully adhere to and comply with the Program Regulations of the concerned Branch of the B.Tech. Program, the Fee Policy pertaining to that Branch of the B.Tech. Program, and, all other rules pertaining to the changed Branch existing at the time.
- **11.4** Change of Branch once made shall be final and binding on the student. No student shall be permitted, under any circumstances, to refuse the change of Branch offered.
- **11.5** The eligible student may be allowed a change in Branch, strictly in order of *inter se* merit, subject to the conditions given below:
- 11.5.1 The actual number of students in the 3rd Semester in any particular Branch to which the transfer is to be made, should not exceed the intake fixed by the University for the concerned Branch;
- 11.5.2 The actual number of students in any Branch from which transfer is being sought does not fall below 75% of the total intake fixed by the University for the concerned Branch.

The process of change of Branch shall be completed within the first five days of Registration for the 3^{rd} Semester of the B.Tech. Program.

12 Specific Regulations regarding Assessment and Evaluation (including the Assessment Details of NTCC Courses, Weightages of Continuous Assessment and End Term Examination for various Course Categories)

- 12.1 The academic performance evaluation of a student in a Course shall be according to the University Letter Grading System based on the class performance distribution in the Course.
- 12.2 Academic performance evaluation of every registered student in every Course registered by the student is carried out through various components of Assessments spread across the Semester. The nature of components of Continuous Assessments and the weightage given to each component of Continuous Assessments (refer Clause 8.8 of Academic Regulations12.5) shall be clearly defined in the Course Plan for every Course, and approved by the DAC.
- 12.3 Format of the End-Term examination shall be specified in the Course Plan.
- 12.4 Grading is the process of rewarding the students for their overall performance in each Course. The University follows the system of Relative Grading with statistical approach to classify the students based on the relative performance of the students registered in the concerned Course except in the following cases:
 - Non-Teaching Credit Courses (NTCC)
 - Courses with a class strength less than 30

Absolute grading method may be adopted, where necessary with prior approval



of concerned DAC.

Grading shall be done at the end of the Academic Term by considering the aggregate performance of the student in all components of Assessments prescribed for the Course. Letter Grades (Clause 8.10 of Academic Regulations) be awarded to a student based on her/his overall performance relative to the class performance distribution in the concerned Course. These Letter Grades not only indicate a qualitative assessment of the student's performance but also carry a quantitative (numeric) equivalent called the Grade Point.

•	Credit	Percenta	enta CA Mid-Term		d-Term	End	l-term				1		
S. No	re [L-T- P-C]	ge/ Marks	Theo ry	o Pra ca	cti The al ory	Practic al	The ory	Pract ical	Pr e	ct	10 	ta	Exam Conducted by
1	3-0-0-3	Percenta ge	25%	, -	25%	-	50 %	-		-		0	Mid-Term & End
		Marks	50	-	50	-	100	-		•	20	0	Term by COL
2 2	2022	Percenta ge	12.5 %	0 12. %	50 12.5 0%	12.50%	25 %	25%	-		10 %	0	Mid-Term & End Term by CoE *
	2-0-2-3	Marks	25	25	5 25	25	50	50		-	20	0	Except for full stack courses
3	1-0-4-3	Percenta ge	-	25	% 10%	40%	5%	20% -		-	10 %	0	Mid-Term & End
		Marks	-	25	5 10	40	5	25		-	10	0	Term by School
4	2-0-4-4	Percenta ge	12.5 %	0 12. %	50 10%	15%	20 %	30%		-	10 %	0	*Mid-Term & End
		Marks	25	25	5 20	30	40	40 60 - 200		0	Term by COE		
5	0-0-4-2	Percenta ge	-	50	% -	-	-	-	50	9%	10 %	0	Project evaluated by IC at School
		Marks	-	50	D -	-	-	-	5	0	10	0	level
6	0-0-2-1	Percenta ge	-	100)% -	-	-	-		-	10 %	0	Only CA at School
		Marks	•	10	0 -	-	-	-		-	10	0	Level
7	3-0-2-4	Percenta ge	12.50 %	0 12. %	50 15%	10%	30 %	20%		-	10 %	0	Mid-Term & End
		Marks	25	25	5 30	20	60	40		-	20	0	Term by COE
8	2-0-0-2	Percenta ge	25 %	-	25%	-	50 %	-	-	- 100			Mid-Term & End
		Marks	50	-	50	-	100	-	-	20	0		Term by COE

12.5 Assessment Components and Weightage

*CSE3426-Front End Full stack development

CSE3427-Java Full Stack Development

- CSE3428-.Net Full Stack development
- The exact weightages of Evaluation Components shall be clearly specified in the concerned PRC and respective Course Plan.
- Normally, for Practice/Skill based Courses, without a defined credit structure (L– T–P) [NTCC], but with assigned Credits (as defined in Clause 5.2 of the Academic Regulations), the method of evaluation shall be based only on



Continuous Assessments. The various components of Continuous Assessments, the distribution of weightage among such components, and the method of evaluation/assessment, shall be as decided and indicated in the Course Plan/PRC. The same shall be approved by the respective DAC.

12.6 Minimum Performance Criteria:

12.6.1 Theory only Course and Lab/Practice Embedded Theory Course

A student shall satisfy the following minimum performance criteria to be eligible to earn the credits towards the concerned Course:

- a. A student must obtain a minimum of 30% of the total marks/weightage assigned to the End Term Examinations in the concerned Course.
- b. The student must obtain a minimum of 40% of the AGGREGATE of the marks/weightage of the components of Continuous Assessments, Mid Term Examinations and End Term Examinations in the concerned Course.

12.6.2 Lab/Practice only Course and Project Based Courses

The student must obtain a minimum of 40% of the AGGREGATE of the marks/weightage of all assessment components in the concerned Course.

12.6.3 A student who fails to meet the minimum performance criteria listed above in a Course shall be declared as "Fail" and given "F" Grade in the concerned Course. For theory Courses, the student shall have to re-appear in the "Make-Up Examinations" as scheduled by the University in any subsequent semester, or, re-appear in the End Term Examinations of the same Course when it is scheduled at the end of the following Semester or Summer Term, if offered. The marks obtained in the Continuous Assessments (other than the End Term Examination) shall be carried forward and be included in computing the final grade, if the student secures the minimum requirements (as per Clauses 12.6.1 and 8.9.2 of Academic Regulations) in the "Make-Up Examinations" of the concerned Course. Further, the student has an option to re-register for the Course and clear the same in the summer term/ subsequent semester if he/she wishes to do so, provided the Course is offered.

13 Additional clarifications - Rules and Guidelines for Transfer of Credits from MOOC, etc. – Note: These are covered in Academic Regulations

The University allows students to acquire credits from other Indian or foreign institutions and/or Massive Open Online Course (MOOC) platforms, subject to prior approval. These credits may be transferred and counted toward fulfilling the



minimum credit requirements for the award of a degree. The process of transfer of credits is governed by the following rules and guidelines:

- 13.1 The transfer of credits shall be examined and recommended by the Equivalence Committee (Refer ANNEXURE B of Academic Regulations) and approved by the Dean Academics.
- 13.2 Students may earn credits from other Indian or foreign Universities/Institutions with which the University has an MOU, and that MOU shall have specific provisions, rules and guidelines for transfer of credits. These transferred credits shall be counted towards the minimum credit requirements for the award of the degree.
- 13.3 Students may earn credits by registering for Online Courses offered by *Study Web of Active Learning by Young and Aspiring Minds* (SWAYAM) and *National Program on Technology Enhanced Learning* (NPTEL), or other such recognized Bodies/ Universities/Institutions as approved by the concerned BOS and Academic Council from time to time. The concerned School/Parent Department shall publish/include the approved list of Courses and the rules and guidelines governing such transfer of credits of the concerned Program from time to time. The Rules and Guidelines for the transfer of credits specifically from the Online Courses conducted by SWAYAM/ NPTEL/ other approved MOOCs are as stated in the following Sub-Clauses:
 - 13.3.1 A student may complete SWAYAM/NPTEL/other approved MOOCs as mentioned in Clause 13.3 (As per Academic Regulations) and transfer equivalent credits to partially or fully complete the mandatory credit requirements of Discipline Elective Courses and/or the mandatory credit requirements of Open Elective Courses as prescribed in the concerned Curriculum Structure. However, it is the sole responsibility of the student to complete the mandatory credit requirements of the Discipline Elective Courses and the Open Elective Courses as prescribed by the Curriculum Structure of the concerned Program.
 - 13.3.2 SWAYAM/NPTEL/ other approved MOOCs as mentioned in Clause 13.3 (As per Academic Regulations) shall be approved by the concerned Board of Studies and placed (as Annexures) in the concerned PRC.
 - 13.3.3 Parent Departments may release a list of SWAYAM/NPTEL/other approved MOOCs for Pre-Registration as per schedule in the Academic Calendar or through University Notification to this effect.
 - 13.3.4 Students may Pre-Register for the SWAYAM/NPTEL/other approved MOOCs in the respective Departments and register for the same Courses as per the schedule announced by respective Online Course Offering body/institute/ university.



- 13.3.5 A student shall request for transfer of credits only from such approved Courses as mentioned in Sub-Clause 13.3.2 above.
- 13.3.6 SWAYAM/NPTEL/other approved MOOCs Courses are considered for transfer of credits only if the concerned student has successfully completed the SWAYAM/NPTEL/other approved MOOCs and obtained a certificate of successful/satisfactory completion.
- 13.3.7 A student who has successfully completed the approved SWAYAM/NPTEL/ other approved MOOCs and wants to avail the provision of transfer of equivalent credits, must submit the original Certificate of Completion, or such similar authorized documents to the HOD concerned, with a written request for the transfer of the equivalent credits. On verification of the Certificates/Documents and approval by the HOD concerned, the Course(s) and equivalent Credits shall have forwarded to the COE for processing of results of the concerned Academic Term.
- 13.3.8 The credit equivalence of the SWAYAM/NPTEL/other approved MOOCs are based on Course durations and/or as recommended by the Course offering body/institute/university. The Credit Equivalence mapped to SWAYAM/ NPTEL approved Courses based on Course durations for transfer of credits is summarized in Table shown below. The Grade will be calculated from the marks received by the Absolute Grading Table 8.11 in the Academic Regulations.

Tabl Cr	Table 2: Durations and Credit Equivalence for Transfer of Credits from SWAYAM-NPTEL/ other approved MOOC Courses									
SI. No. Course Duration Credit Equivalence										
1	4 Weeks	1 Credit								
2	8 Weeks	2 Credits								
3	12 Weeks	3 Credits								

- 13.3.9 The maximum permissible number of credits that a student may request for credit transfer from MOOCs shall not exceed 20% of the mandatory minimum credit requirements specified by the concerned Program Regulations and Curriculum for the award of the concerned Degree. The University shall not reimburse any fees/expense; a student may incur for the SWAYAM/NPTEL/other approved MOOCs.
- 13.4 The maximum number of credits that can be transferred by a student shall be limited to forty percent (40%) of the mandatory minimum credit requirements specified by the concerned Program Regulations and Curriculum for the award of the concerned Degree. However, the grades obtained in the Courses transferred from



other Institutions/MOOCs, as mentioned in this Section (13.0), shall not be included in the calculation of the CGPA.

13.5 Mandatory Non-Credit Course Completion Requirements: All mandatory non-credit courses shall be satisfactorily completed by the student as part of the degree requirements. These courses will be evaluated and awarded letter grades based on the following criteria:

> S (Satisfactorily Completed): Awarded when the student successfully completes all prescribed course requirements.

> NC (Not Completed): Awarded when the student fails to meet the prescribed course requirements.

A student receiving an NC grade must reappear for and complete the course in accordance with the guidelines prescribed by the University.

In the case of non-taught and non-credited mandatory courses—where students are advised to undertake learning through MOOC platforms—there shall be a clearly defined Course Catalogue and a corresponding Course Plan. The Course Plan shall outline the assessment components, which will form the basis for evaluation.

14. Structure / Component with Credit Requirements Course Baskets & Minimum Basket wise Credit Requirements

The B.Tech. in Artificial Intelligence and Data Science Program Structure (2025-2029) totaling 160 credits. Table 3 summarizes the type of baskets, number of courses under each basket and the associated credits that are mandatorily required for the completion of the Degree.

Table Sumn	Table 3: B.Tech in Artificial Intelligence and Data Science 2025-2029:Summary of Mandatory Courses and Minimum Credit Contribution from various Baskets										
SI. No.	Baskets	Credit Contribution									
1	Humanities and Social Sciences including Management Courses (HSMC)	10									
2	Basic Science Courses (BSC)	24									
3	Engineering Science Courses (ESC)	22									



Table 3: B.Tech in Artificial Intelligence and Data Science 2025-2029:
Summary of Mandatory Courses and Minimum Credit Contribution from
various BasketsSI.Credit
Cantribution

No.	Baskets	Contribution
4	Professional Core Courses (PCC)	64
5	Project Work (PRW)	<mark>16</mark>
6	Professional Elective Courses (PEC)	<mark>18</mark>
7	Open Elective Courses (OEC)	<mark>06</mark>
8	Mandatory Courses (MAC)*	<mark>0</mark>
	Total Credits	160 (Minimum)

* Please refer to Table 3.8, (where the number '8' corresponds to the serial number of the Mandatory course basket.)

In the entire Program, the practical and skill based course component contribute to an extent of approximately 61% out of the total credits of 160 for B.Tech. in Artificial Intelligence and Data Science program of four years' duration.

15. Minimum Total Credit Requirements of Award of Degree

As per the AICTE guidelines, a minimum of 160 credits is required for the award of a B.Tech. degree.

16.Other Specific Requirements for Award of Degree, if any, as prescribed by the Statutory Bodies,

- 16.1 The award of the Degree shall be recommended by the Board of Examinations and approved by the Academic Council and Board of Management of the University.
- 16.2 A student shall be declared to be eligible for the award of the concerned Degree if she/he:
 - a. Fulfilled the Minimum Credit Requirements and the Minimum Credits requirements under various baskets;
 - b. Secure a minimum CGPA of 4.50 in the concerned Program at the end of the Semester/Academic Term in which she/he completes all the requirements for the award of the Degree as specified in Sub-Clause Error! Reference source not found. of Academic egulations;
 - c. No dues to the University, Departments, Hostels, Library, and any other such Centers/ Departments of the University; and
 - d. No disciplinary action is pending against her/him.



17.ulum Structure – Basket Wise Course List (not Semester Wise) List of Courses Tabled – aligned to the Program Structure (Course Code, Course Name, Credit Structure (LTPC), Contact Hours, Course Basket, Type of Skills etc., as applicable).

Baskets
HSMC - Humanities and Social Sciences (including Management courses) (HSMC)
BSC - Basic Science Courses
ESC - Engineering Science Courses
PCC - Professional Core Course
PEC - Professional Elective Courses
OEC - Open Elective Courses
EEC - Employment Enhancement Courses
MAC - Mandatory Course

Tabl List	Table 3.1: List of Humanities and Social Sciences including Management Courses (HSMC)											
SI. No.	Course Code	Course Name	L	т	Р	Credits	Contact Hours	Type of Skill	Pre- requisite			
1	ENG1900	English for Technical Communication	2	0	0	2	2	S	Nil			
2	DES1146	Introduction to Design Thinking	1	0	0	1	1	F	Nil			
3	ENG2501	Advanced English	2	0	0	2	2	S	Nil			
4	FIN1002	Essentials of Finance	3	0	0	3	3	S	Nil			
5	APT4005	Aptitude for Employability	0	0	<mark>2</mark>	<mark>1</mark>	<mark>2</mark>	<mark>AT</mark>	<mark>Nil</mark>			
6	PPS3018	Preparedness for Interview	0	0	2	1	<mark>2</mark>	<mark>SS</mark>	<mark>Nil</mark>			
		Total	8	0	4	10	12					

Tabl	Table 3.2: List of Basic Science Courses (BSC)										
SI. No.	Course Code	Course Name	L	т	Ρ	Credits	Contact Hours	Type of Skill	Pre- requisite		
1	MAT2301	Calculus and Differential Equations	3	1	0	4	4	F	Nil		



2	PHY2501	Optoelectronics and Quantum Physics	3	0	0	3	3	F	Nil
2		Optoelectronics and					n	с	Nil
5	PHY2504	Quantum Physics Lab	0	0	2	1	Z	1	
4			-			_	4	F	Nil
	MA12402	Probability and Statistics	3	1	0	4			
5		Chemistry of Smart					З	s	Nil
5	CHE2501	Materials	3	0	0	3)	5	
c		Chemistry of Smart					ſ	c	NU
0	CHE2502	Materials Lab	0	0	2	1	Z	3	INII
7		Linear Algebra and					л	ENA	NU
	MAT2303	Vector Calculus	3	1	0	4	4	LIVI	INII
0		Calculus and Differential					Λ	Б	Nil
ð	MAT2301	Equations	3	1	0	4	4	Г	INII
		Total	18	4	4	24	26		

Tabl	Table 3.3: List of Engineering Science Courses (ESC)											
SI. No.	Course Code	Course Name	L	т	Р	Credit s	Contact Hours	Type of Skill	Pre- requisite			
1	MEC1006	Engineering Graphics	2	0	0	2	2	S	Nil			
2	CSE1500	Computational Thinking using Python	2	0	2	3	4	S	Nil			
3	ECE2022	Digital Design	2	0	0	2	2	F/S	Nil			
4	ECE2052	Digital Design Lab	0	0	2	1	2	F/S	Nil			
5	CIV1200	Foundations of Integrated Engineering	2	0	0	2	2	S	Nil			
6	EEE1200	Basics of Electrical and Electronics Engineering	3	0	0	3	3	F/S	Nil			
7	EEE1250	Basics of Electrical and Electronics Engineering Lab	0	0	2	1	2	F/S	Nil			
8	ECE1511	Design Workshop	1	0	2	2	3	S/EM	Nil			
9	CSE2264	Essentials of AI	3	0	0	3	3	S/EM	Nil			
10	CSE2265	Essentials of AI Lab	0	0	2	1	2	S/EM	Nil			
11	CSE2274	Competitive Programming and Problem Solving	0	0	4	2	4	S/EM	Nil			
	Total 1 0 14 22 29											



	Table 3.4: List of Program Core Courses (PCC)												
S. No	Cours e Code	Course Name	L	т	Ρ	с	Conta ct Hours	Type of Skills/ Focus	Pre- requisites/ Co- requisites				
1	CSE2000	Problem Solving using C	2	0	0	2	2	S	Nil				
2	CSE2001	Problem Solving using C Lab	0	0	4	2	4	S	Nil				
3	CSE2051	Data Communication and Computer Networks	3	0	0	3	3	s	Nil				
4	CSE2278	Data Structures and Analysis of Algorithm	3	1	0	4	4	S	Nil				
5	CSF2279	Data Structures and Analysis of Algorithm Lab	0	0	2	1	2	S	Nil				
6	CSD1712	Statistical Foundations of Data Science	3	0	0	3	3	S	MAT2402				
7	CSD1713	Statistical Foundations of Data Science Lab	0	0	2	1	2	s	MAT2402				
8	CSE2055	Object Oriented Programming Using Java	3	0	0	3	3	S/EM	Nil				
9	CSE2056	Object Oriented Programming Using Java Lab	0	0	2	1	2	S/EM	Nil				
10	CSD2002	Introduction to Data Science	3	0	0	3	3	F	NIL				
11	CSE2058	Web Technologies	3	0	0	3	3	S/EM	Nil				
12	CSE2059	Web Technologies Lab	0	0	2	1	2	S/EM	Nil				
13	CSE2060	Database Management Systems	3	0	0	3	3	S	Nil				
14	CSE2061	Database Management Systems Lab	0	0	2	1	2	S	Nil				
15	AID2007	Exploratory Data Analysis	2	0	0	2	2	S	Nil				
16	AID2008	Exploratory Data Analysis Lab	0	0	2	1	2	S	Nil				
17	AID2009	big Data Technologies	3	0	0	3	3	S	Nil				
18	AID200 2	Big Data Technologies	3	0	0	3	3	S	Nil				
19	AID2003	Machine Learning for Intelligent data Science	3	0	0	3	3	S/EM	Nil				
20	AID2004	Machine Learning Lab for Intelligent data Science	0	0	2	1	2	S/EM	Nil				
21	CSE2069	Operating Systems	3	0	0	3	3	S	Nil				



			. —						•
22	CSD2009	Data Handling and Visualization	2	0	0	2	2	S/EM	Nil
23	CSD2010	Data Handling and Visualization Lab	0	0	4	2	2	S/EM	Nil
24	CSE2071	Software Design and Development	3	0	0	3	3	S	Nil
25	AID2501	Deep Learning and Reinforcement Learning	3	0	0	3	3	S	CSE2064
26	AID2502	Generative AI and Prompt Engineering	3	0	0	3	3	S	CSE2064
27	AID2503	Natural Language Understanding and Analytics	3	0	0	3	3	S/EM	CSE1500
28	AID2504	Natural Language Understanding and Analytics Lab	0	0	2	1	2	S/EM	CSE1500
Total No. of Credits						64			

18.Practical / Skill based Courses – Internships / Thesis / Dissertation / Capstone Project Work / Portfolio / Mini project

	Table 3.5 : List of course in Project Work basket (PRW) S No Course Code Course Name T P C												
S.No	Course Code	Course Name	L	Т	Р	С							
1	CSE7000	Internship				2							
2	CSE7100	Mini Project				4							
3	CSE7300	Capstone Project	-	-	-	10							
			Tot	al No. of	Credits	16							

Practical / Skill based Courses like internship, project work, capstone project, research project / dissertation, and such similar courses, where the pedagogy does not lend itself to a typical L-T-P-C Structure as defined in Clause 5.1 of the Academic Regulations, are simply assigned the number of Credits based on the quantum of work / effort required to fulfill the learning objectives and outcomes prescribed for the concerned Courses. Such courses are referred to as Non-Teaching Credit Courses (NTCC). These Courses are designed to provide students with hands-on experience and skills essential for their professional development. These courses aim to equip students with abilities in problem identification, root cause analysis, problem-solving, innovation, and design thinking through industry exposure and project-based learning. The expected outcomes are first level proficiency in problem solving and design thinking skills to better equip B.Tech. graduates for their professional careers. The method of evaluation and grading for the Practical / Skill based Courses shall be prescribed and approved by the concerned Departmental Academic Committee (refer Annexure A of the Academic Regulations). The same shall be prescribed in the Course Handout.



18.1 Internship

A student may undergo an Internship for a period of 4-6 weeks in an industry / company or academic / research institution during the Semester Break between 4th and 5th Semesters or 6th and 7th Semesters, subject to the following conditions:

- 18.1.1 The Internship shall be in conducted in accordance with the Internship Policy prescribed by the University from time to time.
- 18.1.2 The selection criteria (minimum CGPA, pass in all Courses as on date, and any other qualifying criteria) as applicable / stipulated by the concerned Industry / Company or academic / research institution for award of the Internship to a student;
- 18.1.3 The number of Internships available for the concerned Academic Term. Further, the available number of internships shall be awarded to the students by the University on the basis of merit using the CGPA secured by the student. Provided further, the student fulfils the criteria, as applicable, specified by the Industry / Company or academic / research institution providing the Internship, as stated in Sub-Clause 18.1.2 above.
- 18.1.4 A student may opt for Internship in an Industry / Company or academic / research institution of her / his choice, subject to the condition that the concerned student takes the responsibility to arrange the Internship on her / his own. Provided further, that the Industry / Company or academic / research institution offering such Internship confirms to the University that the Internship shall be conducted in accordance with the Program Regulations and Internship Policy of the University.
- 18.1.5 A student selected for an Internship in an industry / company or academic / research institution shall adhere to all the rules and guidelines prescribed in the Internship Policy of the University.

18.2 Mini Project

A student may opt to do a Project Work for a period of 4-6 weeks in an Industry / Company or academic / research institution or the University Department(s) as an equivalence of Internship during the Semester Break between 4th and 5th Semesters or 6th and 7th Semesters or during the 5th / 6th / 7th Semester as applicable, subject to the following conditions:

18.2.1 The Project Work shall be approved by the concerned HOD and be carried out under



the guidance of a faculty member.

18.2.2 The student may do the project work in an Industry / Company or academic / research institution of her / his choice subject to the above mentioned condition (Sub-Clause 18.2.1). Provided further, that the Industry / Company or academic / research institution offering such project work confirms to the University that the project work will be conducted in accordance with the Program Regulations and requirements of the University.

18.3 Capstone Project

A student may undergo a Capstone Project for a period of 12-14 weeks in an industry / company or academic / research institution in the 7^{th} / 8^{th} Semester as applicable, subject to the following conditions:

- 18.3.1 The Capstone Project shall be in conducted in accordance with the Capstone Project Policy prescribed by the University from time to time.
- 18.3.2 The selection criteria (minimum CGPA, pass in all Courses as on date, and any other qualifying criteria) as applicable / stipulated by the concerned Industry / Company or academic / research institution for award of the Capstone Project to a student;
 - 18.3.3 The number of Capstone Project available for the concerned Academic Term. Further, the available number of Capstone Project shall be awarded to the students by the University on the basis of merit using the CGPA secured by the student. Provided further, the student fulfils the criteria, as applicable, specified by the Industry / Company or academic / research institution providing the Capstone Project, as stated in Sub-Clause 18.3.2 above.
 - 18.3.4 A student may opt for Capstone Project in an Industry / Company or academic / research institution of her / his choice, subject to the condition that the concerned student takes the responsibility to arrange the I Capstone Project on her / his own. Provided further, that the Industry / Company or academic / research institution offering such Capstone Project confirms to the University that the Capstone Project shall be conducted in accordance with the Program Regulations and Capstone project Policy of the University.
 - 18.3.5 A student selected for a Capstone Project in an industry / company or academic / research institution shall adhere to all the rules and guidelines prescribed in the Capstone Project Policy of the University.

18.4 Research Project / Dissertation

A student may opt to do a Research Project / Dissertation for a period of 12-14 weeks in an Industry / Company or academic / research institution or the University Department(s) as an equivalence of Capstone Project, subject to the



18.4.1 The Research Project / Dissertation shall be approved by the concerned HOD and be carried out under the guidance of a faculty member.

The student may do the Research Project / Dissertation in an Industry / Company or academic / research institution of her / his choice subject to the above mentioned condition (Sub-Clause 18.4.4). Provided further, that the Industry / Company or academic / research institution offering such Research Project / Dissertation confirms to the University that the Research Project / Dissertation work will be conducted in accordance with the Program Regulations and requirements of the University.

19.List of Elective Courses under various Specializations / Stream Basket

Type of Skill

F - Foundation

S - Skill Development

EM – Employability

EN – Entrepreneurship SS-Soft Skills AT-Aptitude Training

Course Caters to

GS - Gender Sensitization ES - Environment and sustainability HP - Human values and Professional Ethics

Table 3.6 : Professional Electives Courses/Specialization Tracks – Minimum of 9 credits is to be earned by the student in a particular track and overall 18 credits.												
Track	1 - Machir	e Learning a	nd Artificial Intelligence	(ML	. & A	d)						
S.No		Course Code	Course Name	L	т	Ρ	С	C.H	Type of Skill	Pre Requisite		
PEC	Sem V	CSD3416	Probabilistic Modelling for Machine Learning	3	0	0	3	3	F	MAT2402		
L		CSD3405	Text Mining and Analytics	2	0	2	3	4	EM	CSE2264		
PEC-II	SemVI	CSE3426	Front End Full Stack Development*	2	0	2	3	S/ EM		CSE2258		
PEC	Som VI	CSE3427	Java Full Stack Development*	2	0	2	3	S/ EM		CSE2259		
III	Selli VI	CSE3428	.Net Full Stack Development*	2	0	2	3	S/ EM		CSE2258		
PEC - IV		CSD3412	Graph Analytics	3	0	0	3	3	EM	MAT2303		
PEC- IV	Sem	CSD3415	NextGen Predictive Analytics	2	0	2	3	4	EM	CSD2011		
PEC - V	VII	CSD3406	Business Intelligence and Analytics	3	0	0	3	3	EM	CSD2009		
PEC - VI		CSD3411	Cybersecurity and Data Privacy	3	0	0	3	3	EM	-		



Track	2 - Busine	ess Analytics	ytics and Data Visualization										
S.No		Course Code	Course Name	L	т	Р	с	C.H	Type Skill	of	Pre Requis	site	
PEC 1	Sem V	CSD3413	Data Visualization and Dashboards	3	0	0	З	3	S		CSD20	009	
ILC I	Jein V	CSD3402	Web Data Analytics	2	0	2	3	4	EM		CSE15	500	
PEC-II	SemVI	CSE3426	Front End Full Stack Development*	2	0	2	3	S/ EM			CSE22	258	
PEC	C M	CSE3427	Java Full Stack Development*	2	0	2	3	S/ EM			CSE22	259	
Ш	Sem VI	CSE3428	.Net Full Stack Development*	2	0	2	3	S/ EM			CSE22	258	
PEC - IV		CSD3404	E-Business and Marketing Analytics	2	0	2	3	4	EM		CSD20	002	
PEC- IV	Sem	CSD3410	IoT and Sensor Data Analysis	3	0	0	3	3	EM		CSE10)14	
PEC - V	VII	CSD3409	Financial Data Analysis	2	0	2	3	4	EM		CSD20	002	
PEC - VI		CSD3401	Business Continuity and Risk Analysis for Data Science	3	0	0	3	3	EM		CSD20	002	
Track	3 – Comp	utational Matl	hematics and Statistics		I								
S.No		Course Code	Course Name	L	т	Р	с	C.H	Type Skill	of	Pre Requis	site	
		CSD3407	Statistical Inference	3	0	0	3	3	S/ El	Ч	MAT24	.02	
PEC 1	Sem V	CSD3414	Statistics-Driven Data	2	0	2	3	4	S /	EM	MAT24	.02	
PEC-II	SemVI	CSE3426	Front End Full Stack Development*	2	0	2	3	4	S/	EM	CSE225	8	
PEC	Sem VI	CSE3427	Java Full Stack Development*	2	0	2	3	4	S/	EM	CSE225	9	
III	Jeni VI	CSE3428	.Net Full Stack Development*	2	0	2	3	4	S /	EM	CSE225	8	
PEC -		CSD3408	Data Mining and Warehousing	З	0	0	3	3	EM		CSE15	510	
IV		CSD2006	Edge AI and IoT Analytics	3	0	0	3	3	EM				
PEC- IV	Sem VII	CSD3417	Scientific Computing for Intelligent Systems	3	0	0	3	3	EM		CSE15	500	
PEC - V		CSD3403	Optimization for Data Science	2	0	2	З	4	F		MAT10	003	
		CSD3418	Feature Engineering and	3	0	0	3	3	EM		CSE15	500	
PEC - VI		0000410	Model Optimization										
VI VI Track	4 Intell	igent Syst	ems and Robotics	5									
PEC - VI Track S.No	4 Intell	igent Syst	cems and Robotics	5			L	т	Ρ	С	C.H		
PEC - VI Track S.No	4 Intell	igent Syst Course Code CSD3431	Course Name Expert Systems	S			L	T 3 0	P 0	C 3	С.Н 3	EM	
PEC - VI Track S.No PEC 1	sem V	igent Syst Course Code CSD3431 CSD3433	Course Name Expert Systems Computational Inter Research	s ellig	enc	ce	L 3	T 3 0	P 0	С 3	С.Н 3 3	EM EM	



								2	S /	CSE2
PEC	Sem	CSE3427	Java Full Stack Development	2	0	2	3	5	EM	259
III	VI							2	S /	CSE2
		CSE3428	.Net Full Stack Development	2	0	2	3	5	EM	258
PEC		CSD342	Cognitive Polatics	3	0	0	ç	3		CSE
-IV		9	Cognitive Robotics	5	0	0	5	5		1500
PEC-		CSD343	Autonomous Navigation and	2	0	0	0	2		CSE
IV	Sem	0	Vehicles	3	0	0	3	3		1506
PEC	VII	CSD343	Digital Health and Imaging	2	0	0	2	2		CSD
-V		4	Digital Health and Imaging	3	0	0	3	3		1716
PEC		CSD343	Quantum Computing and AL	2	0	0	2	2		CSE
-VI		2	Quantum Computing and Ai	3	0	0	3	3		1500

Track 05: Special Basket

11 acr	ob. opeciai i	JUSICE								
1	CAI3427	Language Models for Text Mining+		2	0	2	3	4	S/E M	CSE2264
2	CAI3428	Practical Deep Learning with TensorFlo	w+	2	0	2	3	4	S/E M	CSE2264
3	CAI3429	Deep Learning Techniques for Compute Vision+	S/E M	MAT240 2						
Trac	k -6 Mandat	ory Non-Credited Course (** Offered f	for La	ntera	ıl Eı	ntry	stu	dents i	n higher :	semester
wher	ever applica	ble in MOOC mode)							-	
1	LAW7601	Indian Constitution **	0	0	0	0		-	F	Nil
2	CHE7601	Environmental Studies **	0	0	0	0		-	F	Nil
3	CIV7601	Universal Human Values and Ethics **	0	0	0	0		-	F	Nil
4	PPS1025	Industry Readiness Program - I	0	0	2	0		2	SS	Nil
5	PPS1026	Industry Readiness Program - II	0	0	2	0		2	SS	Nil
6	APT4002	Introduction to Aptitude	0	0	2	0		2	AT	Nil
7	APT4004	Aptitude Training - Intermediate	0	0	2	0		2	AT	Nil
8	APT4006	Logical and Critical Thinking	0	0	2	0		2	AT	Nil
*Mandatory for Students selected for Tech Mahindra and Capgemini										
** Of	** Offered for Lateral Entry students in higher semester wherever applicable in MOOC mode									
+Mar	ndatory for St	udents Selected for Samsung Innovation	Camp	us						

20.List of Open Electives to be offered by the School / Department (Separately for ODD and EVEN Semesters.

Type of Skill

- F Foundation
- S Skill Development
- EM Employability
- EN Entrepreneurship

Course Caters to

- GS Gender Sensitization
- ES Environment and sustainability
- HP Human values and Professional Ethics

Baskets

HSMC - Humanities and Social Sciences (including Management courses) (HSMC)

BSC - Basic Science Courses

ESC - Engineering Science Courses

PCC - Professional Core Course

I



PEC - Professional Elective Courses

OEC - Open Elective Courses

EEC - Employment Enhancement Courses

MAC - Mandatory Course

Table 3.7: Open Elective Courses Baskets: Minimum Credits to be earned from this Basket is 06											
Course Code	Course Name	L	Т	Р	С	Type of Skill/ Focus	Course Caters to	Pre- requisites/ Co- requisites	Anti- requisites	Future Courses that need this as a Prerequisite	
Chemistry Ba	nsket										
CHE1003	Fundamentals of Sensors	3	0	0	3	S	ES	-	-	-	
CHE1004	Smart materials for IOT	3	0	0	3	S	ES	-	-	-	
CHE1005	Computational Chemistry	2	0	0	2	S	ES	-	-	-	
CHE1006	Introduction to Nano technology	3	0	0	3	S	ES	-	-	-	
CHE1007	Biodegradable electronics	2	0	0	2	S	ES	-	-	-	
CHE1008	Energy and Sustainability	2	0	0	2	S	ES	-	-	-	
CHE1009	3D printing with Polymers	2	0	0	2	S	ES	-	-	-	
CHE1010	Bioinformatics and Healthcare IT	2	0	0	2	S	ES	-	-	-	
CHE1011	Chemical and Petrochemical catalysts	3	0	0	3	S	ES	-	-	-	
CHE1012	Introduction to Composite materials	2	0	0	2	S	ES	-	-	-	
CHE1013	Chemistry for Engineers	3	0	0	3	S	ES	-	-	-	
CHE1014	Surface and Coatings technology	3	0	0	3	S	ES	-	-	-	
CHE1015	Waste to Fuels	2	0	0	2	S	ES	-	-	-	
CHE1016	Forensic Science	3	0	0	3	S	ES	-	-	-	
Civil Enginee	ring Basket										
CIV1001	Disaster mitigation and management	3	0	0	3	S	-	-	-	-	
CIV1002	Environment Science and Disaster Management	3	0	0	3	FC	-	-	-	-	
CIV2001	Sustainability Concepts in Engineering	3	0	0	3	S	-	-	-	-	



CIV2002	Occupational Health and Safety	3	0	0	3	S	-	-	-	-
CIV2003	Sustainable Materials and Green Buildings	3	0	0	3	EM	-	-	-	-
CIV2004	Integrated Project Management	3	0	0	3	EN	-	-	-	-
CIV2005	Environmental Impact Assessment	3	0	0	3	EN	-	-	-	-
CIV2006	Infrastructure Systems for Smart Cities	3	0	0	3	EN	-	-	-	-
CIV2044	Geospatial Applications for Engineers	2	0	2	3	EM	-	-	-	-
CIV2045	Environmental Meteorology	3	0	0	3	S	-	-	-	-
CIV3046	Project Problem Based Learning	3	0	0	3	S	-	-	-	-
CIV3059	Sustainability for Professional Practice	3	0	0	3	EN	-	-	-	-
Commerce Ba	asket									
COM2001	Introduction to Human Resource Management	2	0	0	2	F	HP/GS	-	-	-
COM2002	Finance for Non Finance	2	0	0	2	S	-	-	-	-
COM2003	Contemporary Management	2	0	0	2	F	-	-	-	-
COM2004	Introduction to Banking	2	0	0	2	F	-	-	-	-
COM2005	Introduction to Insurance	2	0	0	2	F	-	-	-	-
COM2006	Fundamentals of Management	2	0	0	2	F	-	-	-	-
COM2007	Basics of Accounting	3	0	0	3	F	-	-	-	-
Computer Sc	ience Basket									
(not to be offe	ered for Computer	Scie	nce	and	Enş	gineering stu	idents)			
CSE2002	Programming in Java	2	0	2	3	S/EM	-	-	-	-
CSE2003	Social Network Analytics	3	0	0	3	S	GS	-	-	-
CSE2004	Python Application Programming	2	0	2	3	S/ EM	-	-	-	-
CSE2005	Web design fundamentals	2	0	2	3	S/ EM/EN	-	-	-	-
Design Baske	t									
DES1001	Sketching and Painting	0	0	2	1	S	-	-	-	-

	REACH GREATER HEIGHTS				U	LIIU		A CHARGE WE		
DES1002	Innovation and Creativity	2	0	0	2	F	-	-	-	-
DES1121	Introduction to UX design	1	0	2	2	S	-	-	-	-
DES1122	Introduction to Jewellery Making	1	0	2	2	S	-	-	-	-
DES1124	Spatial Stories	1	0	2	2	S	-	-	-	-
DES1125	Polymer Clay	1	0	2	2	S	-	-	-	-
DES2001	Design Thinking	3	0	0	3	S	-	-	-	-
DES1003	Servicability of Fashion Products	1	0	2	2	F	ES	-	-	-
DES1004	Choices in Virtual Fashion	1	0	2	2	F	ES, GS, HP	-	-	-
DES1005	Fashion Lifestyle and Product Diversity	1	0	2	2	F	ES, GS, HP	-	-	-
DES1006	Colour in Everyday Life	1	0	2	2	F	ES	-	-	-
DES2080	Art of Design Language	3	0	0	3	S	-	-	-	-
DES2081	Brand Building in Design	3	0	0	3	S	-	-	-	-
DES2085	Web Design Techniques	3	0	0	3	S	-	-	-	-
DES2089	3D Modeling for Professionals	1	0	4	3	S	-	-	-	-
DES2090	Creative Thinking for Professionals	3	0	0	3	S	-	-	-	-
DES2091	Idea Formulation	3	0	0	3	S	-	-	-	-
Electrical an	d Electronics Baske	et								
EEE1002	IoT based Smart Building Technology	3	0	0	3	S	-	-	-	-
EEE1003	Basic Circuit Analysis	3	0	0	3	S	-	-	-	-
EEE1004	Fundamentals of Industrial Automation	3	0	0	3	S	-	-	-	-
EEE1005	Electric Vehicles & Battery Technology	3	0	0	3	S	-	-	-	-
EEE1006	Smart Sensors for Engineering Applications	3	0	0	3	S	-	-	-	-
Electronics a	nd Communication	Bas	sket							
ECE1003	Fundamentals of Electronics	3	0	0	3	F	-	-	-	-
ECE1004	Microprocessor based systems	3	0	0	3	F	-	-	-	-
ECE3089	Artificial Neural Networks	3	0	0	3	S	-	-	-	-



ECE3097	Smart Electronics in Agriculture	3	0	0	3	F/EM	-	-	-	-
ECE3098	Environment Monitoring Systems	3	0	0	3	F/EM	-	-	-	-
ECE3102	Consumer Electronics	3	0	0	3	F/EM	-	-	-	-
ECE3103	Product Design of Electronic Equipment	3	0	0	3	S/F/ EM / EN	-	-	-	-
ECE3106	Introduction to Data Analytics	3	0	0	3	F/EM	-	-	-	-
ECE3107	Machine Vision for Robotics	3	0	0	3	F/EM	-	-	-	-
English Bask	et									
ENG1008	Indian Literature	2	0	0	2	-	GS/ HP	-	-	-
ENG1009	Reading Advertisement	3	0	0	3	S	-	-	-	-
ENG1010	Verbal Aptitude for Placement	2	0	2	3	S	-	-	-	-
ENG1011	English for Career Development	3	0	0	3	S	-	-	-	-
ENG1012	Gender and Society in India	2	0	0	2	-	GS/ HP	-	-	-
ENG1013	Indian English Drama	3	0	0	3	-	-	-	-	-
ENG1014	Logic and Art of Negotiation	2	0	2	3	-	-	-	-	-
ENG1015	Professional Communication Skills for Engineers	1	0	0	1	-	-	-	-	-
DSA Basket										
DSA2001	Spirituality for Health	2	0	0	2	F	HP	-	-	-
DSA2002	Yoga for Health	2	0	0	2	S	HP	-	-	-
DSA2003	Stress Management and Well Being	2	0	0	2	F	-	-	-	-
Kannada Bas	ket									
KAN1001	Kali Kannada	1	0	0	1	S	-	-	-	-
KAN1003	Kannada Kaipidi	3	0	0	3	S	-	-	-	-
KAN2001	Thili Kannada	1	0	0	1	S	-	-	-	-
KAN2003	Pradharshana Kale	1	0	2	2	S	-	-	-	-
KAN2004	Sahithya Vimarshe	2	0	0	2	S	-	-	-	-
KAN2005	Anuvadha Kala Sahithya	3	0	0	3	S	-	-	-	-
KAN2006	Vichara Manthana	3	0	0	3	S	-	-	-	-
KAN2007	Katha Sahithya Sampada	3	0	0	3	S	-	-	-	-



KAN2008	Ranga Pradarshana Kala	3	0	0	3	S	-	-	-	-
Foreign Lan	guage Basket									
FRL1004	Introduction of French Language	2	0	0	2	S	S	-	-	-
FRL1005	Fundamentals of French	2	0	0	2	S	S	-	-	-
FRL1009	Mandarin Chinese for Beginners	3	0	0	3	S	S	-	-	-
Law Basket										
LAW1001	Introduction to Sociology	2	0	0	2	F	HP		-	-
LAW2001	Indian Heritage and Culture	2	0	0	2	F	HP/GS		-	-
LAW2002	Introduction to Law of Succession	2	0	0	2	F	HP/GS		-	-
LAW2003	Introduction to Company Law	2	0	0	2	F	HP		-	-
LAW2004	Introduction to Contracts	2	0	0	2	F	HP	-	-	-
LAW2005	Introduction to Copy Rights Law	2	0	0	2	F	HP	-	-	-
LAW2006	Introduction to Criminal Law	2	0	0	2	F	HP	-	-	-
LAW2007	Introduction to Insurance Law	2	0	0	2	F	HP	-	-	-
LAW2008	Introduction to Labour Law	2	0	0	2	F	HP	-	-	-
LAW2009	Introduction to Law of Marriages	2	0	0	2	F	HP/GS	-	-	-
LAW2010	Introduction to Patent Law	2	0	0	2	F	HP	-	-	-
LAW2011	Introduction to Personal Income Tax	2	0	0	2	F	HP	-	-	-
LAW2012	Introduction to Real Estate Law	2	0	0	2	F	HP	-	-	-
LAW2013	Introduction to Trademark Law	2	0	0	2	F	HP	-	-	-
LAW2014	Introduction to Competition Law	3	0	0	3	F	HP	-	-	-
LAW2015	Cyber Law	3	0	0	3	F	HP	-	-	-
LAW2016	Law on Sexual Harrassment	2	0	0	2	F	HP/GS	-	-	-
LAW2017	Media Laws and Ethics	2	0	0	2	F	HP/GS	-	-	-
Mathematics	Basket									
MAT2008	Mathematical Reasoning	3	0	0	3	S	-	-	-	-



MAT2014	Advanced Business Mathematics	3	0	0	3	S	-	-	-	-
MAT2041	Functions of Complex Variables	3	0	0	3	S	-	-	-	-
MAT2042	Probability and Random Processes	3	0	0	3	S	-	-	-	-
MAT2043	Elements of Number Theory	3	0	0	3	S	-	-	-	-
MAT2044	Mathematical Modelling and Applications	3	0	0	3	S	-	-	-	-
Mechanical B	Basket								•	
MEC1001	Fundamentals of Automobile Engineering	3	0	0	3	F	-	-	-	-
MEC1002	Introduction to Matlab and Simulink	3	0	0	3	S/EM	-	-	-	-
MEC1003	Engineering Drawing	1	0	4	3	S	-	-	-	-
MEC2001	Renewable Energy Systems	3	0	0	3	F	ES	-	-	-
MEC2002	Operations Research & Management	3	0	0	3	F	-	-	-	-
MEC2003	Supply Chain Management	3	0	0	3	S/ EM/ EN	-	-	-	-
MEC2004	Six Sigma for Professionals	3	0	0	3	S/EM	-	-	MEC2008	-
MEC2005	Fundamentals of Aerospace Engineering	3	0	0	3	F	-	-	-	-
MEC2006	Safety Engineering	3	0	0	3	S/EM	ES	-	-	-
MEC2007	Additive Manufacturing	3	0	0	3	F/EM	-	-	-	-
MEC3069	Engineering Optimisation	3	0	0	3	S/EM	-	-	-	-
MEC3070	Electronics Waste Management	3	0	0	3	F/S	ES	-	-	-
MEC3071	Hybrid Electric Vehicle Design	3	0	0	3	S/EM	ES	-	-	-
MEC3072	Thermal Management of Electronic Appliances	3	0	0	3	S/EM	-	-	-	-
MEC3200	Sustainable Technologies and Practices	3	0	0	3	S/EM	-	-	-	-
MEC3201	Industry 4.0	3	0	0	3	S/EM	-	-	-	-
Petroleum Ba	sket									
PET1011	Energy Industry Dynamics	3	0	0	3	FC	ES	-	NIL	-



PET1012	Energy Sustainability Practices	3	0	0	3	FC	ES	-	NIL	-
Physics Basket										
PHY1003	Mechanics and Physics of Materials	3	0	0	3	FC / SD				
PHY1004	Astronomy	3	0	0	3	FC				
PHY1005	Game Physics	2	0	2	3	FC / SD				
PHY1006	Statistical Mechanics	2	0	0	2	FC				
PHY1007	Physics of Nanomaterials	3	0	0	3	FC				
PHY1008	Adventures in nanoworld	2	0	0	2	FC				
PHY2001	Medical Physics	2	0	0	2	FC	ES			
PHY2002	Sensor Physics	1	0	2	2	FC / SD				
PHY2003	Computational Physics	1	0	2	2	FC				
PHY2004	Laser Physics	3	0	0	3	FC	ES			
PHY2005	Science and Technology of Energy	3	0	0	3	FC	ES			
PHY2009	Essentials of Physics	2	0	0	2	FC				
Management Basket- I										
MGT2007	Digital Entrepreneurship	3	0	0	3	S/EM/EN	-	-	-	-
MGT2015	Engineering Economics	3	0	0	3	S	-	-	-	-
MGT2023	People Management	3	0	0	3	S/EM/ EN	HP	-	-	-
Management Basket- II										
MGT1001	Introduction to Psychology	3	0	0	3	F	HP	-	-	-
MGT1002	Business Intelligence	3	0	0	3	EN	-	-	-	-
MGT1003	NGO Management	3	0	0	3	S	-	-	-	-
MGT1004	Essentials of Leadership	3	0	0	3	EM/ EN	GS/HP	-	-	-
MGT1005	Cross Cultural Communication	3	0	0	3	S/EM/ EN	HP	-	-	-
MGT2001	Business Analytics	3	0	0	3	S/ EM/EN	-	-	-	-
MGT2002	Organizational Behaviour	3	0	0	3	F	HP	-	-	-
MGT2003	Competitive Intelligence	3	0	0	3	S	-	-	-	-
MGT2004	Development of Enterprises	3	0	0	3	S/EM/EN	-	-	-	-
MGT2005	Economics and Cost Estimation	3	0	0	3	S/EM	-	-	-	-


MGT2006	Decision Making Under Uncertainty	3	0	0	3	S	-	-	-	-
MGT2008	Econometrics for Managers	3	0	0	3	S	-	-	-	-
MGT2009	Management Consulting	3	0	0	3	S/EM/EN	-	-	-	-
MGT2010	Managing People and Performance	3	0	0	3	S/EM/EN	HP/GS	-	-	-
MGT2011	Personal Finance	3	0	0	3	F	-	-	-	-
MGT2012	E Business for Management	3	0	0	3	S/EM	-	-	-	-
MGT2013	Project Management	3	0	0	3	EN / EM	GS/HP/ES	-	-	-
MGT2014	Project Finance	3	0	0	3	EN / EM	HP	-	-	-
MGT2016	Business of Entertainment	3	0	0	3	EM/ EN	-	-	-	-
MGT2017	Principles of Management	3	0	0	3	S/EM/ EN	-	-	-	-
MGT2018	Professional and Business Ethics	3	0	0	3	S/EM/ EN	HP	-	-	-
MGT2019	Sales Techniques	3	0	0	3	S/EM/ EN	HP	-	-	-
MGT2020	Marketing for Engineers	3	0	0	3	S/EM/ EN	HP	-	-	-
MGT2021	Finance for Engineers	3	0	0	3	S/EM/ EN	HP	-	-	-
MGT2022	Customer Relationship Management	3	0	0	3	S/EM/ EN	HP	-	-	-
Media Studie	es Basket									
BAJ3050	Corporate Filmmaking and Film Business	0	0	4	2	EM	HP	-	-	-
BAJ3051	Digital Photography	2	0	2	3	EM	HP	-	-	-
BAJ3055	Introduction to News Anchoring and News Management	0	0	2	1	EM	-	-	-	-

Table 3.8 : List of Mandatory Courses (MAC)									
S.No	Course Code	Course Name	L	Т	Р	С			
1	CHE7601	Environmental Studies			0				
2	LAW7601	V7601 Indian Constitution 0							
3	CIV7601	CIV7601 Universal Human Values and Ethics 0							
4	PPS1025	25 Industry Readiness Program - I 0 0 2 0							
5	PPS1026	Industry Readiness Program - II	0	0	2	0			
6	APT4002	Introduction to Aptitude	0	0	2	0			
7	APT4004	Aptitude Training - Intermediate	0	0	2	0			
8	APT4006	Logical and Critical Thinking	0	0	2	0			
			Total	No. of C	Credits	0			



21.List of MOOC Courses

21.1 Presidency University students are given the opportunity to study abroad in International Universities through a selection process coordinated by the Office of International Affairs (OIA). Such selected students need to complete their credits for the semester that they are abroad in the following way:

- 21.1.1. The student needs to study and complete School Core and Program Core Courses in offline mode only.
- 21.1.2. Massive Open Online Course (MOOC) courses maybe given for Open Elective and Discipline Elective Courses. These courses need to be approved by the concerned BOS and Academic Council from time to time.
- 21.1.3. SWAYAM/NPTEL/ other approved MOOCs shall be approved by the concerned Board of Studies and placed in the concerned PRC.
- 21.1.4. Student shall register for these courses in the ERP of Presidency University.
- 21.1.5. For these MOOC courses faculty coordinators are identified. These faculty should have undergone similar MOOC courses and therefore should be familiar with the mode of class conduction, types of assessments and evaluation procedures.
- 21.1.6. Study materials shall be provided to the students as video lectures shared by the MOOCs Coordinator(s), or the students may access the approved MOOCs Portal directly. The mode of class conduction is determined by the MOOCs coordinator(s) as detailed in the Course Catalogue and Course Plan.
- 21.1.7. The question paper shall be prepared by the MOOCs coordinator(s).
- 21.1.8. Students write the exams in online mode. These exams are scheduled and conducted by the School.
- 21.1.9. Results are evaluated by School and given to the Office of the Controller of Examinations (CoE).
- 21.1.10. The details of the duration, credits and evaluation are given below:

SI#	Duration	Credits	Evaluation
1.	12 weeks	3	Continuous Assessment –50 Marks Mid Term –50 Marks End Term-100 Marks
2.	8 weeks	2	Mid Term-50 Marks End Term-100 Marks
3	4 weeks	1	End Term-100 Marks

21.2	21.2 List of MOOC – B.Tech. in Artificial Intelligence and Data Science							
Tab Dur	Table 3.9: MOOC Professional Elective Courses for B.Tech. (AID)Duration is 4 weeks (01 credit) / 8 weeks (02 credits) / 12 weeks (03 credits)							
SI.	Course Code	Course NameLTPCContact Hourse						
1	CSE3111	Artificial Intelligence: Search Methods for Problem Solving	3	0	0	3	3	
2	CSE3112	Privacy and Security in Online social media	3	0	0	3	3	
3	CSE3113	Computational Complexity	3	0	0	3	3	
4	CSE3114	Deep Learning for Computer Vision	3	0	0	3	3	
5	CSE3115	Learning Analytics Tools	3	0	0	3	3	
6	CSE502	Technical Skills in JAVA	0	0	6	3	6	
7	CSE503	Technical Skills in Python	0	0	6	3	6	
8	CSE504	Comprehensive Technical Skills	0	0	1	5	1	
9	CSE505	The Joy of Computing Using Python	3	0	0	3	3	



10	CSE3119	Coding Skills in Python	3	0	0	3	3
11	CSE3121	Parallel Computer Architecture	3	0	0	3	3
12	CSE3124	Games and Information	3	0	0	3	3
13	CSE3140	Introduction to Industry 4.0 and Industrial Internet of Things	3	0	0	3	3
14	CSE3142	Affective Computing	3	0	0	3	3
15	CSE3196	Foundations of Cyber Physical Systems	3	0	0	3	3
16	CSE3197	Getting Started with Competitive Programming	3	0	0	3	3
17	CSE3198	GPU Architectures and Programming	3	0	0	3	3
18	CSE3199	Artificial Intelligence: Knowledge Representation and Reasoning	3	0	0	3	3
19	CSE3200	Programming in Modern C++	3	0	0	3	3
20	CSE3201	Circuit Complexity Theory	3	0	0	3	3
21	CSE3202	Basics of Computational Complexity	3	0	0	3	3
22	CSE3212	Introduction to Computer and Network Performance Analysis using Queuing	1	0	0	1	1
23	CSE3213	C Programming and Assembly Language	1	0	0	1	1
24	CSE3214	Python for Data Science	1	0	0	1	1
25	CSE3215	Software Conceptual Design	1	0	0	1	1
26	CSE3117	Industrial Digital Transformation	3	0	0	3	3
27	CSE3118	Blockchain for Decision Makers	3	0	0	3	3
28	CSE3349	Technology for Lawyers	3	0	0	3	3
29	CSE3430	Deep Learning for Natural Language Processing	3	0	0	3	3
30	CSE3431	Machine Learning for Engineering and Science Applications	3	0	0	3	3
31	CSE3432	Algorithms in Computational Biology and Sequence Analysis	3	0	0	3	3
32	CSE3433	Introduction to Large Language Models (LLMs)	3	0	0	3	3
33	CSE3434	Quantum Algorithms and Cryptography	3	0	0	3	3

21.3 MOOC - Open Elective Courses for B. Tech. in Artificial Intelligence and Data Science

Table	Table 3.10: MOOC Open Elective Courses							
Open	Open Elective Courses Duration is 4 weeks (01 credit)/ 8 weeks (02 credits)/ 12 weeks (03							
credi	ts)		1	1				
SI.								
No.	Course code	Course Name	L	Т	Ρ	С		
1	BBA2022	Supply Chain digitization	3	0	0	3		
2	BBA2021	E Business	3	0	0	3		
3	BBB2016	Business Analytics for Management Decisions	3	0	0	3		
4	BBB2015	Artificial Intelligence for Investments	3	0	0	3		
5	MEC3001 *	Design and Development of Product	1	0	0	1		
6	ENG3004 **	Perspectives of Neurolinguistics	1	0	0	1		
7	PPS4009 ***	Working in Contemporary Teams	1	0	0	1		
8	MGT3001	Data Analysis and Decision Making	3	0	0	3		
Note	Note :							
* MEC3001 is offered to the students who had 1 credit shortage because of implementation of CBCS								
syste	m during their 1	st year.						

** ENG3004 is offered to the students who had 2 credits shortage along with the MEC3001 because of implementation of CBCS System during their 1st year.



*** PPS4009 is offered to only International students in place of Interview Preparedness course of their batch mates.

22. Recommended Semester Wise Course Structure / Flow including the Programme / Discipline Elective Paths / Options

SI. No.		Course Name	L	т	Р	Credi ts	Conta ct Hours	Typ e of Skill	Pre- requisi te	Bask et
Semester	1 - PHY Cycl	e	15	1	8	19	24			
1	MAT230 1	Calculus and Differential Equations	3	1	0	4	4	F	Nil	BSC
2	PHY250 1	Optoelectronics and Quantum Physics	3	0	0	3	3	F	Nil	BSC
3	MEC100 6	Engineering Graphics	2	0	0	2	2	S	Nil	ESC
4	ENG190 0	English for Technical Communication	2	0	0	2	2	S	Nil	HSM C
5	CSE150 0	Computational Thinking using Python	2	0	2	3	4	S	Nil	ESC
6	ECE202 2	Digital Design	2	0	0	2	2	F/S	Nil	ESC
7	DES114 6	Introduction to Design Thinking	1	0	0	1	1	F	Nil	HSM C
8	PHY250 4	Optoelectronics and Quantum Physics Lab	0	0	2	1	2	F	Nil	BSC
9	PPS1025	Industry Readiness Program – I	0	0	2	0	2	S	Nil	MAC
10	ECE205 2	Digital Design Lab	0	0	2	1	2	F/S	Nil	ESC
Semester 2 - CHE Cycle		17	1	1 2	22	30				
1	MAT240 2	Probability and Statistics	3	1	0	4	4	F	Nil	BSC
2	CHE760 1	Environmental Studies	0	0	0	0	0	F	Nil	MAC
3	CIV1200	Foundations of Integrated Engineering	2	0	0	2	2	S	Nil	ESC
4	CHE250 1	Chemistry of Smart Materials	3	0	0	3	3	S	Nil	BSC
5	CSE200 0	Problem Solving using C	2	0	0	2	2	S	Nil	PCC
6	ENG250 1	Advanced English	2	0	0	2	2	S	Nil	HSM C
7	EEE120 0	Basics of Electrical and Electronics Engineering	3	0	0	3	3	F/S	Nil	ESC
8	LAW100 7	Indian Constitution and Professional Ethics for Engineers	1	0	0	0	1	F	Nil	MAC
9	CSE200 1	Problem Solving using C Lab	0	0	4	2	4	S	Nil	PCC
10	CHE250 2	Chemistry of Smart Materials Lab	0	0	2	1	2	S	Nil	BSC
11	PPS1026	Industry Readiness Program – II	0	0	2	0	2	S	Nil	MAC
12	EEE125 0	Basics of Electrical and Electronics Engineering Lab	0	0	2	1	2	F/S	Nil	ESC



13	ECE151 1	Design Workshop	1	0	2	2	3	S/E M	Nil	ESC
Semeste			18	1	6	23	26			
r 3 1	MAT230						Л	FМ	Nil	BSC
1	3 CSE225	Linear Algebra and Vector Calculus Data Communication and Computer	3	1	0	4	4	EIVI		BSC
2	1	Networks	3	0	0	3	3	S	Nil	PCC
4	CSE227 8	Data Structures and Analysis of Algorithm	3	1	0	4	4	S	Nil	PCC
5	CSE227 9	Data Structures and Analysis of Algorithm Lab	0	0	2	1	2	S	Nil	РСС
6	CSD1712	Statistical Foundations of Data Science	3	0	0	3	3	S	MAT24 02	PCC
7	CSD1713	Statistical Foundations of Data Science Lab	0	0	2	1	2	S	MAT24 02	РСС
8	CSE2255	Object Oriented Programming Using Java	3	0	0	3	3	S/E M	Nil	PCC
9	CSE2256	Object Oriented Programming Using Java Lab	0	0	2	1	2	S/E M	Nil	PCC
10	CSD2002	Introduction to Data Science	3	0	0	3	3	F	NIL	PCC
11	CIV7601	Universal Human Values	0	0	0	0	0	F	Nil	MAC
12	APT4002	Introduction to Aptitude	0	0	2	0	2	AT	Nil	MAC
Semeste r 4			14	1	8	22	23			
1	MAT240 4	Discrete Mathematics	3	1	0	4	4	F	Nil	BSC
2	CSE2258	Web Technologies	3	0	0	3	3	S/E M	Nil	PCC
3	CSE2259	Web Technologies Lab	0	0	2	1	2	S/E M	Nil	PCC
4	CSE2260	Database Management Systems	3	0	0	3	3	S	Nil	PCC
5	CSE2261	Database Management Systems Lab	0	0	2	1	2	S	Nil	PCC
6	AID2007	Exploratory Data Analysis	2	0	0	2	2	S	Nil	PCC
7	AID2008	Exploratory Data Analysis Lab	0	0	2	1	2	S	Nil	PCC
8	CSE226 4	Essentials of AI	3	0	0	3	3	S/E M	Nil	ESC
9	CSE226 5	Essentials of AI Lab	0	0	2	1	2	S/E M	Nil	ESC
10	FIN1002	Essentials of Finance	3	0	0	3	3	S	Nil	HSM C
11	APT4004	Aptitude Training-Intermediate	0	0	2	0	2	AT	Nil	MA C
Semeste r 5			17	0	8	23	25			
1	AID2009	big Data Technologies	3	0	0	3	3	S	Nil	PCC
2	AID200 2	Big Data Technologies	3	0	0	3	3	S	Nil	PCC
3	AID2003	Machine Learning for Intelligent data Science	3	0	0	3	3	S/E M	Nil	РСС
4	AID2004	Machine Learning Lab for Intelligent	0	0	2	1	2	S/E M	Nil	PCC
5	CSE226	Operating Systems	3	0	0	3	3	S	Nil	РСС
7	CSD2009	Data Handling and Visualization	2	0	0	2	2	S/E M	Nil	PCC
					-					

HAL.	PRESID	ENCY	50
GAIN MORE KNOWLEDGE REACH GREATER HEIGHTS	UNIVE	RSITY	YEARS

8	CSD2010	Data Handling and Visualization Lab	0	0	4	2	2	S/E M	Nil	PCC
9	CSEXX VV	Drofessional Elective L	2	0	0	3	3	S/E	Nil	PEC
10	CSE700		5	0	0	3	0	S/E	Nil	PRW
11	0 APT400		0	U	U	2	2	S/E	Nil	HSM
Semeste	6	Logical and Critical Thinking	0 21	0	2	1 25	29	IVI		C
r 6 1	CSE227						3	s	Nil	РСС
-	4	Software Design and Development	3	0	0	3	•	J		
	AID2501	Deep Learning and Reinforcement Learning	3	0	0	3	3	S	CSE206 4	РСС
2	AID2502	Generative AI and Prompt Engineering	3	0	0	3	3	S	CSE206 4	PCC
3	AID2503	Natural Language Understanding and	3	0	0	3	3	S/E M	CSE150	PCC
4	AID2504	Natural Language Understanding and	0		2	1	2	S/E	CSE150	PCC
5	AID2504	Competitive Programming and	0		2	1	4	S/E	Nil	ESC
	CSE2224	Problem Solving	0	0	4	2		IVI		
6	CSEXX XX	Professional Elective – II	3	0	0	3	3	S	Nil	PEC
7	CSEXX XX	Professional Elective – III	3	0	0	3	3	S	Nil	PEC
8	XXXXX XX	Open Elective – I	3	0	0	3	3	S	Nil	OEC
9	APT4005	Aptitude for Employability	0	0	2	1	2	S	Nil	HSM C
Semeste r 7			12	0	0	16	12			
1	CSEXX XX	Professional Elective – IV	3	0	0	3	3	S	Nil	PEC
2	CSEXX XX	Professional Elective – V	3	0	0	3	3	S	Nil	PEC
3	CSEXX XX	Professional Elective – VI	3	0	0	3	3	S	Nil	PEC
4	XXXXXX	Open Elective – II	3	0	0	3	3	S	Nil	OEC
5	CSE710	Mini Project	0	0	0	<u> </u>	0	S	Nil	PRW
6	PPS3018	Preparedness for Interview	0	0	2	1	2	SS	Nil	HSM
Semeste			0	0	0	10	0			L
r 8							-			
1	CSE730 0	Capstone Project	0	0	0	10	0	S/E M	Nil	PRW
			11 4	5	5 6	160	174			_

Course Catalogue

Course Code:	urse Title: CSD1	11 Data Handling and Visualization		0	1
CSD1711	Lab		P- C		
CSD1/11	pe of Course: Prog	ram Core			



Version No.	
Course Pre- requisites	
Anti-requisites	
urse Description	This lab-oriented course provides practical exposure to data acquisition, preprocessing, analysis, and visualization techniques using modern tools and platforms. Students will learn to work with structured and unstructured datasets, perform data cleaning, transformation, and derive insights using descriptive and inferential statistical techniques. The course emphasizes hands-on experience with data visualization libraries and tools to create meaningful graphical representations that support data-driven decision-making.
Course Objective	1. To introduce students to the fundamental concepts of data handling, including data
	 acquisition, cleaning, and transformation. To provide hands-on experience with tools and libraries used for data manipulation and visualization. To develop the ability to perform exploratory data analysis and derive meaningful insights from datasets
	 4. To equip students with the skills to create effective visual representations of data for communication and decision-making.
	5. To encourage the use of real-world datasets in solving practical problems through data visualization techniques.
ourse Out Comes	On successful completion of the course the students shall be able to: CO1: Implement cleaning and transforming structured and unstructured data using Python libraries, and apply data abstraction and validation techniques to prepare data for analysis. CO2: Apply appropriate visualization techniques—scalar, vector, matrix, and network- based—along with visual variables and layout manipulations to effectively represent complex and multidimensional data. CO3: Analyze and visualize domain-specific datasets, such as those from finance, healthcare, and marketing, using suitable visualization strategies tailored to time-oriented, spatial, textual, and multivariate data. CO4: Implement visualizations for real-time streaming data by following best practices in streaming analysis, and present dynamic insights through responsive and interactive visual dashboards.
urse Content:	
Module 1: Data I	Handling and Preparation

- 1. **Program 1**: Collect structured and unstructured data from online sources (CSV, JSON, API, etc.) and load it using Python.
- 2. **Program 2**: Explore and summarize datasets using NumPy and pandas (head, describe, info, etc.).
- 3. **Program 3**: Perform data cleaning: handle missing values using mean/median/mode/drop strategies.
- 4. **Program 4**: Perform data transformation: normalization, encoding categorical data, and feature scaling.
- 5. **Program 6**: Demonstrate task and data abstraction with a case study (e.g., customer dataset), and validate using statistical summaries.

Module 2: Data Visualization Techniques



- 6. **Program 6**: Visualize scalar and point data using line charts, bar charts, and scatter plots (matplotlib/seaborn).
- 7. **Program 7**: Apply vector visualization techniques (e.g., quiver plots or flow fields).
- 8. **Program 8**: Use heatmaps and matrix visualizations to display correlation matrices or similarity scores.
- 9. **Program 9**: Visualize hierarchical data using tree maps or dendrograms.
- 10. **Program 10**: Create network graphs for social or connectivity datasets using networkx and visualize them.
- 11. **Program 11**: Apply visual variables (color, shape, size) and map interactions to adjust views (zoom, filter, etc.).

Module 3: Visual Analysis of Data from Various Domains

- 12. **Program 12**: Time-series analysis and visualization for stock market data using line plots, moving averages, etc.
- 13. **Program 13**: Visualize spatial data using geopandas or folium (e.g., crime rate by district, COVID-19 map).
- 14. **Program 14**: Text data visualization using word clouds, word frequency histograms, or topic modeling visualization.
- 15. **Program 15**: Visualize multivariate data from a real-world case (e.g., healthcare: patient records with multiple attributes).

Module 4: Visualization of Streaming Data

- 16. **Program 16**: Demonstrate streaming data analysis techniques (e.g., rolling averages, anomaly detection).
- 17. **Program 17**: Final mini-project: Design and present a complete streaming data visualization solution with annotations and user interaction.

Text Book

- 1. Dr. Ossama Embarak, "Data Analysis and Visualization Using Python", Apress, (2018)
- 2. Wes McKinney "Python for Data Analysis" Edition: 3rd Edition (2022)
 - Publisher: O'Reilly Media

ferences

R1 : "Interactive Data Visualization for the Web" by Scott Murray- Edition: 2nd Edition (2017)- Publisher: O'Reilly Media

alogue prepa	redby	S.Saravana Kumar						
commended of Studies or	by the Board							
te of Appr Academic Co	oval by the ouncil							
ourse Code: SE1510	Course Title: Da Type of Course:	tabase Management Systems Theory	L-T-P-C	3	0	0	3	



Version No.								
Course Pre- requisites	Foundational understanding of data types, data structures, basic programming knowledge familiarity with operating systems and file management. Basic knowledge of set theory, logic and discrete mathematics to understand relational algebra and query formulation.							
Anti-requisites	NIL							
Course Description	This course introduces the foundational principles of database management systems, including data models, schemas, and architectures. This course provides a solid foundation on the relational model of data and the use of relational algebra. It develops skills in SQL for data definition, manipulation, and control, enabling students to construct and execute complex queries. The course also introduces the concept of object oriented and object relational databases and modern database technologies like NoSQL . The also course allows the students to gain insights into data storage structures and indexing strategies for optimizing query performance.							
Course Objective	The objective of the course Management Systems and at	The objective of the course is to familiarize the learners with the concepts of Database Management Systems and attain Employability through Problem Solving Methodologies.						
Course Out Comes	 On successful completion of the course the students shall be able to: 1. Describe the fundamental elements of relational database management systems. [Understand] 2. Examine databases using SQL query processing and Optimization. [Apply] 3. Design simple database systems applying the normalization constraints and demonstrate the database transaction processing, recovery, and security. [Apply] 							
Course Content:				נייקאר				
Module 1	Introduction to Database Modelling and Relational Algebra(Understand)	Assignment	Problem Solving	10 Sessions				
Topics: Introduction to Da Data isolation pro Relationship (ER) N Relational Algebra joins), and division	Topics: Introduction to Database: Schema, Instance, 3-shema architecture, physical and logical data independence, Data isolation problem in traditional file system, advantages of database over traditional file systems. Entity Relationship (ER) Model, ER Model to Relational Model, Examples on ER model. Relational Algebra with selection, projection, rename, set operations, Cartesian product, joins (inner and outer							
Module 2	Fundamentals of SQL and Query Optimization (Apply)	Assignment	Programming	11 Sessions				
Topics: SQL Database Querying, DDL, DML, Constraints, Operators, Set Operators, Aggregate Functions, Joins, Views, Procedures, Functions and Triggers. Database programming issues and techniques: Embedded SQL, Dynamic SQL; SQL / PSM and NoSQL. Query Optimization: Purpose, transformation of relational expressions, estimating cost and statistics of expression, choosing evaluation plans, linear and bushy plans, dynamic programming algorithms.								
Module 3	Relational Database Design & Transaction Management (Apply)	Assignment	Problem Solving	12 Sessions				



Topics:

Relational database design: Problems in schema design, redundancy and anomalies, Normal Forms based on Primary Keys-(1NF,2NF, 3NF), Boyce-Codd Normal Form, Multi valued Dependency (Fourth Normal Form), Join Dependencies (Fifth Normal Form), lossy and lossless decompositions, Database De-normalization.

Transaction Management: The ACID Properties; Transactions and Schedules; Concurrent Execution of Transactions; Lock- Based Concurrency Control; Performance of locking; Transaction support in SQL; Introduction to crash recovery; 2PL, Serializability and Recoverability; Lock Management; The write-ahead log protocol; Check pointing; Recovering from a System Crash; Media Recovery; Other approaches and interaction with concurrency control.

(Apply) Assignment Case study 12 sessions

Topics:

Advanced topics: Object oriented database management systems, Deductive database

management systems, Spatial database management systems, Temporal database management systems, Constraint database management systems.

New database applications and architectures such as Data warehousing, Multimedia, Mobility, NoSQL, Native XML databases (NXD), Document-oriented databases, Statistical databases.

Targeted Application & Tools that can be used:

Application Area: Relational database systems for Business, Scientific and Engineering Applications. Tools/Simulator used: MySQL DB for student practice.

Also demonstration of ORACLE DB on object-relational database creation and JDBC connection.

- 1. Problem Solving: Constructing ER-Diagrams for a given real time requirements, Normalizing the databases, querying the databases using relational algebra.
- 2. Programming: Implementation of any given scenario using MySQL.

Text Books:

- T1. Elmasri R and Navathe S B, "Fundamentals of Database System", Pearson Publication, 7th Edition, 2018.
- T2. RamaKrishna & Gehrke, "Database Management Systems" 3rd Edition, 2018, McGraw-Hill Education.
- T3. W. Lemahieu, S. vanden Broucke and B. Baesens, "Principles of Database Management: Practical Guide to Storing, Managing and Analyzing Big and Small Data", Cambridge University Press, 2018.

References

R1 Avi Silberschatz, Henry F. Korth, S. Sudarshan, "Database System Concepts", McGraw-Hill ,7th Edition, 2019.

R2 M. Kleppmann, "Designing Data-Intensive Applications: The Big Ideas Behind Reliable, Scalable, and Maintainable Systems", O'Reilly, 2017.

Topics relevant to development of "FOUNDATION SKILLS": S - Skill Development: Relational database design using ER- Relational mapping, Implementation of given database scenario using MYSQLDB.

Topics relevant to development of Employability: Develop, test and implement computer databases, creatingsophisticated, interactive and secure database applications

Topics relevant to "HUMAN VALUES & PROFESSIONAL ETHICS": Nil

Course Code:CSE 7100	Course Title: Mini Project Type of Course:	L- T-P- C	0	0	0	4	
Version No.	1.0						
Course Pre- requisites	Knowledge and Skills related to all the course	Knowledge and Skills related to all the courses studied in previous semesters.					
Anti-requisites	NIL						



Course Description	Students observe science and technology in action, develop an awareness of the method of scientific experimentation, and often get an opportunity to see, study and operate sophisticated and costly equipment. They also learn about the implementation of the principles of management they have learnt in class, when they observe multidisciplinary teams of experts from engineering, science, economics, operations research, and management deal with techno-economic problems at the micro and macro levels. Finally, it enables them to develop and refine their language, communication and inter-personal skills, both by its very nature, and by the various evaluation components, such as seminar, group discussion, project report preparation, etc. The broad-based core education, strong in mathematics and science and rich in analytical tools, provides the foundation necessary for the student to understand properly the nature of real-life problems. The students have options to pursue this course as either Project Work and Dissertation at the university, or Project Work in an Industry/Company/Research Laboratory, or Internship Program in an Industry/Company.
Course Objectives	The objective of the course is to familiarize the learners with the concepts of Professional Practice and attain Employability Skills through Experiential Learning techniques.
Course Outcomes	 On successful completion of this course the students shall be able to: Identify the engineering problems related to local, regional, national or global needs. (Understand) Apply appropriate techniques or modern tools for solving the intended problem. (Apply) Design the experiments as per the standards and specifications. (Analyze) Interpret the events and results for meaningful conclusions. (Evaluate) Appraise project findings and communicate effectively through scholarly publications. (Create)
Catalogue prepared by	Dr. Sampath A K
Recommended by the Board of Studies on	
Date of Approval bythe Academic Council	

Course Code:	Course Title: Competitive Programming and					
CSE2510	Problem Solving	L-T-P-C	0	0	4	2
	Type of Course: Program Core					
Version No.	1.0					
Course Pre-requisites	NIL					
Anti-requisites	NIL					
Course Description	The Competitive Programming and Problem	Solving cou	rse e	quips	stude	nts with
	efficient problem-solving skills for coding con	mpetitions a	nd re	al-wor	ld cha	allenges.
	Starting with brute-force solutions, students	s learn to o	optimi	ize tin	ne an	d space
	complexity using advanced techniques like dyn	amic prograi	mming	g, gree	dy alg	orithms,
	and backtracking. Hands-on practice on platfor	ms like Code	Chef a	nd Co	defor	es helps



	tackle problems involving number theory, data structures, and algorithmic paradigms.						
	By understanding CP constraints and fostering a strategic mindset, students gain the						
	confidence to excel in competitions, technical interviews, and practical applications.						
Course Out Comes	On successful completion of the course the students shall be able to:						
	CO1 : Understanding the issues of online platforms and Competitive Programming (CP)						
	and developing brute force coding for commonly asked CP problems.						
	CO2 : Analyzing the space and time complexity of brute force solutions and designing						
	efficient solutions.						
	CO3 : Evaluating the applicability of suitable algorithmic approaches to solve relevant						
	CP problems.						
	CO4: Creating efficient solutions of CP problems using the learnt algorithmic						
	approaches.						
Course Objective	The objective of the course is to familiarize the learners with the concepts						
	of Competitive Programming and Problem Solving and attain Skill Development						
	through Experiential Learning techniques.						

Module 1: Introduction to Competitive Programming

Overview of Efficient Coding for Problem Solving and CP: Introduction to competitive programming (CP); revisit of complexity analysis; introduction to online platforms such as codechef, codeforces etc and online submission; constraints during CP, online testing process and common errors such as TLE; use of STL

Module 2: Number Theory for Problem-Solving

Use of Number Theory for problem-solving: reducing time/space complexity of brute force coding solution of Sieve Method, Inverse Module, Euclidian Method of factorization; efficient coding for Permutation Combination; XORing based and pattern-based solutions.

Module 3: Optimizing Time & Space Using Sequential Storage

Coding for Optimizing time and Space using Sequential Storage: two pointer approach; problem-solving using arrays and strings such as rotation on sorted arrays, duplicate removal, string matching algorithms; Kadane's algo, stacks, priority-queues and hashing based efficient coding; median based problems and alternate solutions.

Module 4: Non-Linear Data Structures

Applying Non-Linear Data Structures for real-life problems: design of efficient solutions for problems such as finding loops in a linked list, memory efficient DLL, block reversal in LL; problem solving using trees and binary trees, Catalan numbers, applications of graphs, spanning tree and path algos for CP problems with reduced time/space complexity.

Module 5: Problem Solving using Advanced Topics

CP Problem Solving using Advanced Topics: concept of disjoint sets and their efficient representation, algorithmic approaches such as Greedy, Backtracking, Dynamic Programming and applying them for CP problems using bottom-up dynamic programming.

List of Laboratory Tasks:

- 1. You are given the finishing times of 'N' runners in a marathon. Write a program to find the runner who finished in the third position. **Focus:** Basic data structures (arrays), sorting algorithms (e.g., insertion sort, selection sort), and basic input/output.
- In the same marathon, you are given the finishing times of 'N' runners and their bib numbers. Write a
 program to efficiently find the top 10 runners and their corresponding bib numbers. Focus: Efficient
 sorting algorithms (e.g., merge sort, quick sort), data structures like priority queues, and optimizing for
 large datasets.
- 3. A library maintains a list of books with their unique IDs. Write a program to check if a given book ID is present in the library. Focus: Searching algorithms (linear search), basic data structures (arrays or lists).
- 4. The library wants to implement a system to quickly find books by their titles. Suggest an efficient data structure (e.g., a hash table or a trie) and explain how to implement it to achieve fast book lookups. Focus: Understanding the trade-offs between different data structures, choosing the most appropriate data structure for a specific problem, and implementing efficient search operations.



- An online store sells products with different prices. Write a program to calculate the total cost of a given list of products. Focus: Basic arithmetic operations, working with arrays or lists to store product prices.
- 6. The online store offers discounts based on the total purchase amount. Design an algorithm to efficiently calculate the final cost of an order, considering different discount rules (e.g., percentage discounts, fixed amount discounts, tiered discounts). Focus: Algorithmic design, conditional statements, handling complex scenarios with multiple rules, and potentially using dynamic programming techniques for optimization.
- 7. You are given two integers, 'a' and 'm'. Calculate 'a' raised to the power 'm' modulo a large prime number 'p'. **Focus:** Basic modular arithmetic operations (modular exponentiation), understanding the modulo operator.
- 8. In a secure communication system, you need to efficiently compute the modular exponentiation for very large values of 'm'. Implement and analyze the efficiency of the binary exponentiation algorithm for this task. Focus: Efficient algorithms for modular exponentiation (binary exponentiation), time complexity analysis, and understanding the importance of efficient algorithms in cryptography.
- 9. You have a deck of 'N' cards. Calculate the total number of possible hands of size 'K' that can be drawn from the deck. **Focus:** Basic combinatorics (combinations), factorial calculations.
- 10. In a card game, you need to calculate the probability of drawing certain combinations of cards (e.g., a pair, a three-of-a-kind) from a shuffled deck. Design an efficient algorithm to calculate these probabilities. Focus: Advanced combinatorics (permutations and combinations with repetitions), probability calculations, and optimizing calculations to avoid overflows.
- You are given a network of devices represented as a graph. Determine if there is a path between two given devices in the network. Focus: Graph traversal algorithms (depth-first search or breadth-first search).
- 12. In a secure network, you need to detect and isolate compromised devices. Design an algorithm that efficiently identifies devices that exhibit anomalous behavior (e.g., unusual traffic patterns) using XOR-based techniques for data comparison and pattern matching. Focus: Applying XOR operations for data comparison and pattern recognition, understanding the properties of XOR (e.g., commutative, associative), and designing algorithms for network anomaly detection.
- 13. You are given an array representing the speeds of cars on a highway. Find the minimum time required for all cars to pass a certain point. **Focus:** Basic array traversal, finding the minimum element in an array.
- 14. In a more realistic scenario, cars have different lengths. Implement a two-pointer approach to simulate the movement of cars and determine the minimum time for all cars to pass a given point. Focus: Twopointer technique, simulating real-world scenarios with arrays, optimizing time complexity.
- 15. Given a string, find the number of occurrences of a specific substring within the string. **Focus:** Basic string manipulation, string matching (brute-force approach).
- 16. Implement the KMP (Knuth-Morris-Pratt) string matching algorithm to efficiently find all occurrences of a given pattern within a large text document. Focus: Advanced string matching algorithms, understanding the concept of the "next" array in KMP, optimizing for large input sizes.
- 17. An online auction platform receives bids for different items. Implement a data structure (e.g., a priority queue) to efficiently track the highest bid for each item. Focus: Priority queues, insertion and extraction operations on priority queues, basic implementation of a priority queue using an array or a suitable library.
- 18. The auction platform needs to handle a large number of bids concurrently. Design and implement a system that efficiently processes bids, updates the highest bid for each item, and handles potential race conditions. Focus: Concurrent data structures and algorithms, thread safety, handling race conditions, optimizing for high-throughput scenarios.
- 19. A social network can be represented as a graph where users are nodes, and connections between users are edges. Write an algorithm to find if two given users are connected in the network. Focus: Graph traversal algorithms (depth-first search or breadth-first search), basic graph representation (adjacency list or adjacency matrix).
- 20. In a large social network, efficiently finding the shortest path between two users is crucial. Implement Dijkstra's algorithm to find the shortest paths between users in the network, considering edge weights



(e.g., representing the strength of connections). **Focus:** Shortest path algorithms (Dijkstra's algorithm), graph algorithms with weighted edges, optimizing for large graphs.

- 21. A file system can be modeled as a tree structure. Implement a function to traverse the file system and print the names of all files and directories. Focus: Tree traversal algorithms (depth-first search or breadth-first search), basic tree representation (using nodes and pointers).
- 22. Design and implement a file system that supports efficient operations like creating directories, deleting files, and finding files based on their names or paths. Consider using a combination of tree structures and hash tables for efficient indexing and searching. Focus: Designing and implementing file system structures, using multiple data structures together, optimizing for common file system operations.
- 23. An online shopping cart can be represented as a tree, where each node represents an item or a category of items. Write an algorithm to calculate the total price of all items in the shopping cart. Focus: Tree traversal, calculating sums within a tree structure.
- 24. Implement a system that allows customers to apply discounts and coupons to their shopping carts. Consider using a combination of trees and other data structures (e.g., hash tables) to efficiently apply discounts and calculate the final price. Focus: Applying discounts and promotions to tree-like structures, efficient implementation of discount rules, optimizing for complex pricing scenarios.
- 25. In a social network, users can form groups. Given a list of friendships, determine if all users in a specific group are connected (directly or indirectly) through friendships. Focus: Disjoint set union (DSU) data structure, basic connectivity checks.
- 26. Design an efficient algorithm to find the minimum number of new friendships needed to connect all users in the social network into a single, connected component. Focus: Applying DSU for finding connected components, greedy algorithms, optimization for minimizing connections.
- 27. A treasure hunt involves a series of clues leading to the final treasure. Given a list of possible paths and their associated costs, find the cheapest path to reach the treasure. Focus: Greedy algorithms (e.g., Dijkstra's algorithm for shortest paths), basic graph representation.
- 28. In a more complex treasure hunt, there are time constraints associated with each path. Design an algorithm to find the fastest path to the treasure while considering both path costs and time constraints.

Focus: Combining greedy approaches with other techniques (e.g., priority queues), handling multiple constraints, optimizing for time-critical scenarios.

- 29. In a simplified chess game with only rooks, determine the minimum number of moves required for a rook to reach a specific target square on an empty board. Focus: Breadth-first search (BFS) on a graph (the chessboard), basic graph traversal.
- 30. In a more realistic chess game with multiple pieces and obstacles, implement a minimax algorithm with alpha-beta pruning to determine the best move for a player. Focus: Game tree search, minimax algorithm, optimization techniques like alpha-beta pruning, handling complex game states.

Targeted Application & Tools that can be used:

- 1. C or C++ Compiler (g++): The standard compiler for CP. Familiarize students with compilation flags (e.g., -O2 for optimization).
- 2. IDE (Integrated Development Environment): Code:: Blocks, Visual Studio, CLion, or similar IDEs. These provide debugging capabilities, code completion, and other helpful features.
- Online Judges (CodeChef, Codeforces, LeetCode, HackerRank): Essential for practicing and submitting solutions.
- 4. Debugger (gdb): Crucial for understanding code execution and finding bugs. Origin, excel and Mat lab soft wares for programming and data analysis.
- Number Theory Libraries: Some libraries provide pre-built functions for number theory operations (though often it's better to implement them yourself for learning).
- 6. Wolfram Alpha: A useful tool for verifying number theory calculations and exploring concepts.
- 7. String Libraries: Familiarize students with the string manipulation functions available in C++.
- 8. **Graph Visualization Tools:** Tools like Graphviz can be helpful for visualizing graphs and understanding graph algorithms.
- 9. **DP Debugging Techniques:** Practice debugging DP solutions, as they can be complex. Visualizing the DP table can be helpful.



Text Books:

- 1. Guide to Competitive Programming: Learning and Improving Algorithms Through Contests" (3rd Edition), Antti Laaksonen, springer, 2024
- 2. "Data Structures and Algorithms in Java: A Project-Based Approach" Dan S. Myers, Cambridge University Press

Reference Books:

- 1. Data Structures and Algorithmic Thinking with Python/C++/Java", Narasimha Karumanchi, 5th Edition, Career Monk, 2017.
- 2. Introduction to Algorithms, <u>Thomas H. Cormen</u> (Author), <u>Charles E. Leiserson</u> (Author), <u>Ronald L.</u> <u>Rivest</u>, fourth edition April 2022

Web Resources

1. https://nptel.ac.in/courses/106106231

2.

Project work/Assignment: Mention the Type of Project /Assignment proposed for this course

Assessment Type

- Midterm exam
- Assignment (review of digital/ e-resource from PU link given in references section mandatory to submit screen shot accessing digital resource.)
- Quiz
- End Term Exam
- Self-Learning

Course Code: CSD3417	Course Title: Scientific Computing for Intelligent Systems Type of Course: Discipline Elective/ Theory Only Course
Version No.	2.0
Course Pre- requisites	
Anti-requisites	NIL
Course Description	This course introduces the fundamentals of scientific computing techniques tailored for intelligent systems. It covers numerical methods, data-driven modeling, optimization, and high-performance computing frameworks. Emphasis is placed on applying computational strategies to AI, machine learning, and large- scale simulation problems.
Course Objective	The objective of the course is to familiarize the learners with the concepts of Data Mining and attain Employability through Problem Solving Methodologies
Course Out Comes	 Upon successful completion of this course, students will be able to: 1. Apply numerical techniques to solve scientific and engineering problems. 2. Develop and optimize intelligent algorithms using scientific computing methods. 3. Implement data-driven and model-based solutions in real-world intelligent systems. 4. Utilize parallel and high-performance computing tools to handle computational complexity.



Course Conten	t:				
Module 1	Fundame Computir	ntals of Scientific	Assignment	Data Collection	10 Sessions
Topics: Floating approx	g point arith mation, and	metic and error an numerical differe	alysis, Matrix o ntiation/integra	perations and linear alge tion	bra, Interpolation,
Module 2	Solving Solving Solving Solving Nur	cientific Problems merical Methods	Quiz	Problem Solving	10 Sessions
Topics: Numer differer	cal solutions	s to linear and non ns	-linear equatior	ns, Eigenvalue problems,	Ordinary and partial
Module 3	Intelligen Computa	t Systems and tional Modeling	Assignment	Problem Solving	10Sessions
Topics: Basics o Data-di	of intelligent iven modeli	systems and soft ng techniques for	computing, Com simulations	nputational modeling in i	ntelligent applications,
Module 4	High-Per Parallel C	formance and computing for Al	Assignment	Problem Solving	10 Sessions
Introdu Tensori 1.	ction to HPC Flow, PyTorc "Numerica	C frameworks (MPI h), Case studies in Analysis" by Rich	, OpenMP, CUD scientific applic	A), Scientific computing cations of AI and machine nd J. Douglas Faires, Ceng	libraries (NumPy, SciPy, e learning gage Learning, 11th
2.	Edition, 202 " Scientific 2nd Edition	22. C omputing: An Int , 2018.	roductory Surv	ey" by Michael T. Heath,	McGraw Hill Education,
Refere R1 "Pyt O'Reilly R2 "Par 2021.	nces: hon for Data Media, 3rd allel and Hig	a Analysis: Data Wi Edition, 2022. gh-Performance Co	rangling with Pa omputing" by Rc	ndas, NumPy, and IPytho bert Robey and Yuliana 2	on" by Wes McKinney, Zamora, O'Reilly Media,
Additic	nal web-bas	sed resources:			
W1. <u>ht</u> and Teo W2.htt fd3049 &db=nl Topics Employ compo	tps://online chniques, Jia ps://puniver a98f0393e96 ebk <u>https://</u> relevant to " ability Skills nent mentio	courses.swayam2. wei Han, Michelin sity.informaticsglc 53521dbd%40redis <u>nptel.ac.in/course</u> EMPLOYABILITY SI through Participat ned in the course l	ac.in/cec20_cs1 e Kamber and Ji bal.com:2284/e &bdata=JnNpd <u>s/105105157</u> (ILLS": Data M ive Learning tec nandout.	<u>2/preview</u> Text book of I an Pei, Morgan Kaufm host/detail/detail?vid=7 GU9ZWhvc3QtbGl2ZQ% ining Techniques, FP Gro chniques. This is attained	Data Mining: Concepts nann Publishers, 2012. '&sid=e2d7362a- 3d%3d#AN=377411 wth for developing through the assessment
Catalogue prepared by		Shaik Salma Begu	n		



Recommended		
by the Board of		
Studies on		
Date of Approval		
by the Academic		
Council		
	•	

	Course Title: F	eature Enginee	ring and Model			3	0	0	3
Course Code:	Optimization				ТРС				
CSD3418	Type of Cours	e: Discipline Eleo	ctive/ Theory Onl	у	L- 1-F- C				
	Course								
Version No.		2.0							
Course Pre-									
requisites									
Anti-		NIL							
requisites									
		This course pro	vides a deep dive	into t	he technic	ques of tr	ansfo	rming r	aw data
	into valuable inputs for machine learning models through effective feature							ture	
Course		engineering. It	explores strategie	es for t	feature sel	lection, t	ransfo	rmatio	n,
Description		dimensionality	reduction, and hy	/perpa	arameter t	uning. En	nphas	is is pla	ced on
		model optimiza	tion techniques i	ncludi	ng regular	ization, e	ensem	ble met	thods, and
		automated mad	chine learning pip	elines	j.				
Course		The objective o	f the course is to	famili	arize the le	earners w	vith th	e conce	epts of
Objective		Data Mining an	d attain Employa	bility t	hrough Pr:	oblem Sc	olving	Method	dologies
		Upon successfu	l completion of t	his cou	urse, stude	ents will b	oe able	e to:	
		5. Apply v	arious feature en	iginee	ring techn	iques to j	prepro	ocess ar	nd
		transfo	rm data effective	ly.					
Course Out		6. Evaluat	e and optimize m	, nachin	e learning	models i	using a	advance	d tuning
Comes		and selection techniques							
		7 Integrate feature angingering and model entimization strategies into							
		7. Integrate reature engineering and model optimization strategies into							
		comple	te machine learn	ing pip	pelines.				
Course									
Content:									
content.									
	Introduction t	o Feature						10.0	
Module 1	Engineering		Assignment		Data Coll	ection		10 Ses	sions
Торіс	cs:				I				
Unde	erstanding data	types and qualit	v. Missing value	handli	ng. outlier	detectio	on. end	coding o	categorical
varia	bles. Feature so	aling and norma	alization techniqu	les	0,		,	0	
	,	0	·						
	Feature Select	tion and							
Module 2	Extraction		Quiz		Problem	Solving		10 Ses	ssions
Tonic	<u>.</u>			1				1	
Filto	r wrapper and	embedded met	hods. Principal C	omno	nent Analy	sis (PCA)		t-SNF	Feature
impo	rtance and inte	rpretability in m	iodels	empo			,,	C 511L)	· cuture
		. p. ctability in fi							
Module 3	Model Ontimi	zation	Assignment		Prohlem	Solving		105000	sions
	Prisaci opunn		r sooronnente	1					



		Techniques									
	Topics	:	aina (Crid Caarab	Dondono Coorek	Deve			tion			
	strate	gies, Regulariza	ation techniques	(L1, L2, ElasticNo	et)	esian Optimization), Cro	iss-valida	ition			
Module 4	ŀ	Advanced Tecl AutoML	hniques and	Assignment	ch, Bayesian Optimization), Cross-validation Net) Problem Solving 11 Sess teractions, Ensemble learning and stacking, arn, H2O.ai, TPOT) cal Approach for Predictive Models", Author: I aylor & Francis Group, Year: 2019 n", Author: Soledad Galli, Publisher: Packt ems, Challenges", Editors: Frank Hutter, Lars Year: 2021 y Burkov, Publisher: True Positive Inc., Year: 2 s12/preview Text book of Data Mining: Conce Jian Pei, Morgan Kaufmann Publishers, 20 y/ehost/detail/detail?vid=7&sid=e2d7362a- odGU9ZWhvc3QtbGl2ZQ%3d%3d#AN=377412 Wining Techniques, FP Growth for developing echniques. This is attained through the andout.	Sessions					
	Featur Introd	e generation u uction to Auto	using domain kno ML frameworks (wledge and inte e.g., AutoSklear	ractio n, H20	ns, Ensemble learning a D.ai, TPOT)	nd stack	ing,			
	3.	Feature Engi	neering and Sele	ction: A Practica	l Appr	oach for Predictive Mo	dels",Aut	hor: Max			
		Kuhn, Kjell Jo	ohnson, Publisher	r: CRC Press, Tay	lor &	Francis Group, Year: 20	19				
	4.	"Hands-On F	eature Engineeri	ng with Python"	, Auth	or: Soledad Galli, Publis	her: Pacl	kt			
	Publishing, Year: 2020										
	Poforoncos										
	Neiere	ences.									
	R1 "A	utomated Ma	chine Learning: N	/lethods. Systen	ns. Ch	allenges". Editors: Fran	k Hutter.	Lars			
	Kottho	off, Joaquin Va	nschoren, Publish	ner: Springer, Ye	ar: 20	21	,				
		<i>,</i>	,								
	R2 "M	achine Learnii	ng Engineering",	Author: Andriy I	Burkov	, Publisher: True Positi	ve Inc., Ye	ear: 2020			
	Additi	onal web-base	ed resources:								
,	W1. h	ttps://onlinec	ourses.swavam2.	ac.in/cec20_cs1	2/pre	view Text book of Data	Mining: (Concepts			
	and Te	chniques, Jiaw	vei Han, Michelin	e Kamber and Ji	an Pei	, Morgan Kaufmann	Publisher	rs, 2012.			
1	W2.ht	tps://punivers	ity.informaticsglc	bal.com:2284/e	host/	, detail/detail?vid=7&sid	=e2d736	2a-			
	fd3049	9a98f0393e96	3521dbd%40redi	s&bdata=JnNpd	GU9Z	Whvc3QtbGl2ZQ%3d%3	d#AN=37	77411			
	&db=r	nlebk <u>https://n</u>	ptel.ac.in/course	s/105105157							
	Topics	relevant to "E	MPLOYABILITY SI	KILLS": Data Mi	ning T	echniques, FP Growth	for develo	oping			
	Emplo	yability Skills t	hrough Participat	ive Learning tec	hniqu	es. This is attained thro	ugh the				
	assess	ment compon	ent mentioned in	the course han	dout.						
			1								
Catalogue	e		Shaik Salma Begu	um							
prepared	by										
Recomme	ended										
by the Bo	ard										
of Studie	s on										
Date of											
Approval	by										
the Acade	emic										
Council			1								

Course Code: CSE1505	Course Title: Web Technologies Laboratory Type of Course: Program core lab course	L-T- P- C	0	0	2	1
Version No.	1.0					
Course Pre- requisites	Database Management Systems-CSE3156	Database Management Systems-CSE3156				
Anti-requisites	NIL					
Course Description	This course highlights the comprehensive introduction to scripting languages that are used for creating web-based applications.					



	The associated laboratory provides an opportunity to implement the				
	concepts and enhance critical thinking and analytical skills.				
Course Objective	The objective of the course is to familiarize the learners with the concepts of Web Technology and attain Skill Development through				
Course	On successful completion of this course the students shall be able to:				
Course	On successful completion of this course the students shall be able to.				
Outcomes	LO1: Implement web-based application using client-side scripting languages. (Apply)				
	CO2 : Apply various constructs to enhance the appearance of a website. (Apply)				
	CO3: Apply server-side scripting languages to develop a web page linked to a database (Apply)				
Course Content:					

Course content.

List of Laboratory Tasks:

Experiment No. 1: Demonstration of XHTML features

Level 1: Demonstration of various XHTML Tags (Level 1)

Level 2: Design and develop static web pages for an online Book store (Level 2).

Experiment No. 2: Application of CSS in web designing

Level 1: Design a document using XHTML and CSS to create a catalog of items for online electronic shopping.

Level 2: Create and save XML document for students' information and display the same using cascaded style sheet.

Experiment No. 3: Application of PHP in web designing.

Level 1: Write a PHP program to read the personal information of a person such as first name, last name, age, permanent address, and pin code entered by the user into a table created in MySQL. Read the same information from the database and display it on the front end.

Level 2: Using PHP develop a web page that accepts book information such as ISBN number, title, authors, edition, and publisher and store information submitted through the web page in MySQL database.

Experiment No. 4: Building a website.

Build a website for organizing an International Conference. The conference website must be able to collect the author's details and upload a file.

Targeted Application & Tools that can be used: Xampp web server to be used to demonstrate PHP.

Project work/Assignment:

Assignments are given after completion of each module which the student need to submit within the stipulated deadline.

Textbook(s):

1] Robert. W. Sebesta, "*Programming the World Wide Web*", Pearson Education, 9th Edition, 2016. 2]Paul Deitel, Harvey Deitel, Abbey Deital, "Internet & World Wide Web How to Program", Fifth Edition, Pearson Education, 2021.

3]CSS Notes for Professionals, ebook available at https://books.goalkicker.com/CSSBook/ (Retrieved on Jan. 20, 2022)

4]Deitel, Deitel, Goldberg,"*Internet & World Wide Web How to Program*", Fifth Edition, Pearson Education, 2021.

Reference Book(s):

R1. Randy Connolly, Ricardo Hoar, "Fundamentals of Web Development", Pearson Education India,

1st. Edition.2016.

R2. Jeffrey C. Jackson, "Web Technologies: A Computer Science Perspective", Pearson Education, 1st Edition, 2016.

Additional web-based resources

W1. W3schools.com



W2. Developer.mozilla.org/en-US/docs/Learn

W3. docs.microsoft.com

W4. informit.com/articles/ The Relationship Between Web 2.0 and Social Networking

https://presiuniv.knimbus.com/user#/home

Topics related to development of "FOUNDATION":

Web, WWW, Web browsers, Web servers, Internet. CSS, PHP.

Designing the website for healthcare.

The objective of the course is to familiarize the learners with the concepts of Web Technology and attain Skill Development through Experiential Learning techniques.

Course Code:	urse Code: Course Title: Web Technologies 2-0-0-2							
CSE1504	Type of Course: Program core		L- T-P- C					
	Theory Only							
Version No.	2.0							
Course Pre-	NIL							
requisites								
Anti-requisites	NIL							
Course Description	This course highlights the basic web design using Hypertext Markup Language and Cascading Style Sheets. Students will be trained in planning and designing effective web pages by writing code using current leading trends in the web domain, enhancing web pages with the use of page layout techniques, text formatting, graphics, images, and multimedia. The focus is on popular key technologies that will							
	help students to build Internet- and web-based applications that interact with other applications and with databases							
Course Objective	The objective of the course is to familiarize the learners with the concepts of Web Technology and attain Skill Development through Experiential Learning							
Course	On successful completion of t	his course the stud	dents shall be a	able to:				
Outcomes	 CO1: Implement web-based application using client-side scripting languages. (Application level) CO2: Apply various constructs to enhance the appearance of a website. (Application level) CO3: Illustrate java-script concepts to demonstration dynamic web site(Application level) CO4: Apply server-side scripting languages to develop a web page linked to a 							
Course Content:								
Module 1	Introduction to XHTML	Quizzes and Assignments	Quizzes on var features of XH simple applica	rious TML, tions	8 Sessions			
Topics:								
Basics: Web, W	WW, Web browsers, Web serve	ers, Internet.						
XHTML: Origins	and Evolution of HTML and XH	TML: Basic Syntax,	Standard XHTI	ML Docu	ment			
Structure, Basic	lext Markup, Images, Hyperte	xt Links, Lists, Tabl	es, Forms, Fran	nes, Syn	tactic			
Differences bet	ween HTML and XHTML.		Comprohensis					
Module 2	Advanced CSS	Quizzes and assignments	based Quizzes assignments; Application of	and CSS in	8 Sessions			
Topics:	I	1	Persigning web	rubes				



CSS: Introduction to CSS, Defining & Applying a style, Creating style sheets, types of style sheet, selectors, CSS font properties, border properties, Box model, opacity, CSS pseudo class and pseudo-elements.

Advanced CSS: Layout, Normal Flow, Positioning Elements, Floating Elements, Responsive Design, CSS Frameworks XML: Basics, demonstration of applications using XML

Vodule 3 JavaScript	Quizzes and assignments	Application of JavaScript for dynamic web page designing	7 Sessions
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Topics:

JavaScript: Introduction to JavaScript, Basic JavaScript Instructions, Functions, Methods & Objects, Decisions and Loops, Document Object Model, Event handling, handling window pop-ups, JavaScript validation.

Modulo 4	RHR - Application Loval	Quizzes and	Application of PHP in	7 Sossions
woulle 4	FHF – Application Level	assignments	web designing	/ 363510115

Topics:

PHP: Introduction to server-side Development with PHP, Arrays, \$GET and \$ POST, \$_Files Array, Reading/Writing Files, PHP Classes and Objects, Working with Databases, SQL, Database APIs, Managing a MySQL Database. Accessing MySQL in PHP.

Targeted Application & Tools that can be used:

Xampp web server to be used to demonstrate PHP.

Project work/Assignment:

Assignments are given after completion of each module which the student need to submit within the stipulated deadline.

Textbook(s):

1] Robert. W. Sebesta, "*Programming the World Wide Web*", Pearson Education, 8th Edition, 2015. 2] *CSS Notes for Professionals*, ebook available at https://books.goalkicker.com/CSSBook/ (Retrieved on Jan. 20, 2022)

3] Deitel, Deitel, Goldberg,"*Internet & World Wide Web How to Program*", Fifth Edition, Pearson Education, 2021.

References

1] Randy Connolly, Ricardo Hoar, "Fundamentals of Web Development", Pearson Education India, 1st. Edition.2016.

2] Jeffrey C. Jackson, "Web Technologies: A Computer Science Perspective", Pearson Education, 1st Edition,2016.

Topics related to development of "FOUNDATION":

Web, WWW, Web browsers, Web servers, Internet.

CSS, PHP.

Designing for healthcare.

for Skill Development through Experiential Learning techniques. This is attained through assessment component mentioned in course handout.

E-References

pu.informatics.global, https://sm-nitk.vlabs.ac.in/

urse Code: 03403	urse Title: Optimization Techniques for Data Science of Course: Theory Integrated	-Р-С		3
rsion No.				
urse Pre-requisites	MAT 1001			
ti-requisites				



arse Description	This course provides a comprehensive introduction to optimization techniques with a strong focus on their applications in data science and machine learning. Students will explore the mathematical foundations of optimization, including convexity, duality, and gradient-based methods, and apply them to solve real-world problems involving regression, classification, clustering, and neural network training. The course covers both unconstrained and constrained optimization, delves into modern algorithms like stochastic gradient descent and Adam, and introduces advanced topics such as non-convex optimization and hyperparameter tuning. Through a blend of theory, algorithmic development, and hands-on coding assignments, students will gain the skills needed to formulate and solve optimization problems critical to effective data-driven decision making.							
urse Objectives	The objective of the course is to data science and attain Experie	The objective of the course is to familiarize the learners with the concepts of Optimization for lata science and attain Experiential Learning and Problem Solving techniques.						
Jrse Out Comes	 On successful completion of this 1. Describe the fundamental constraints on the fundamental of the second stochastic gradient descent models. [Remember] 3. Apply constrained optimization solve problems in support scenarios. [Apply] 4. Evaluate and implement optimization, hyperparame science workflows [Apply] 	s course the studen oncepts of optimiza ember] nstrained optimizat t, and quasi-Newto on techniques, inclu t vector machines advanced optimiz ter tuning, and me	its shall be able to: ation, including convexity, tion algorithms such as gra on methods for solving ma ading KKT conditions and du and resource-constrained zation methods—includin staheuristic approaches—ir	gradients, and adient descent, achine learning uality theory, to d data science g non-convex n practical data				
urse Content:								
dule 1	undations of Optimization	ignment		16 Sessions [L-8 + P-8]				
pics: Introduction to O Mathematical Fou Convex sets and Conditions.	ptimization in Data Science - T ndations: Vectors, Norms, Gradie functions -Optimization Proble	ypes of Optimizati ents, Hessians - Lin em Formulation- F	on Problems: Convex vs. near Algebra essentials for First-order and Second-or	Non-convex - optimization - der Optimality				
dule 2	constrained Optimization Techniques	ignment		16 Sessions [L-8 + P-8]				
bics: Gradient Descent a RMSProp, Adam. Strategies- Conver	and Variants - Stochastic Gradien Newton's Method and Quasi-New gence Analysis.	t Descent (SGD)- N vton Methods (BFC	/ini-batch Gradient Descen GS, L-BFGS) - Line Search	t - Momentum, and Step Size				
dule 3	nstrained Optimization and Duality	iz		16 Sessions [L-8 + P-8]				
bics: grange Multipliers Theory: Lagrangi Optimization in Su	- Karush-Kuhn-Tucker (KKT) C an Dual, Strong/Weak Duality- apport Vector Machines (SVM).	Conditions- Convex Quadratic Progran	Optimization with Const oming (QP), Linear Progr	traints- Duality ramming (LP)-				

Course Coue. CSE7000	Type of Course:	L- 1-F- C		2
Version No.	1.0			



dule 4	vanced Topics and Applications in Data Science	ni Project		12 Sessions [L-6 + P-6]		
Topics: Non-convex Optimization in Deep Learning -Optimization landscapes of neural networks - Saddle points and local minima -Bayesian Optimization-Hyperparameter Tuning (Grid Search, Random Search, BO)-Optimization in Clustering (e.g., k-means)-Large-scale and Online Optimization-Metaheuristic Methods: Genetic Algorithms, Simulated Annealing.						
List of Laboratory	r Tasks:					
Sheet 1: Implement objective functions and gradients using NumPy Visualization of convex functions and gradient descent paths						
Sheet 2: Optimization of logistic regression, linear regression Comparative study of different optimizers on benchmark datasets						
Sheet 3:						
Use of CVXPY for so	olving constrained optimization pr	roblems				
Shoot 4:	n quadratic programming					
Hyperparameter of	otimization for ML models using C	Optuna				
plement a basic neur	al network optimizer from scratcl	h				
Targeted Applicati	on & Tools that can be used: Go	ogle Colab				
ject work/Assignme	ent: Mention the Type of Project	/Assignment propo	sed for this course			
1] Programming:	problem solving and implement i					
2] Real-world dat	a science problem involving optim	nization	rtechniques.			
rt Book						
1] Stephen Boyd Press	and Lieven Vandenberghe "Conve	ex Optimization",	1st Edition (2004), Cambri	dge University		
 2] Jorge Nocedal 3 3] Sébastien Bube 4] Suvrit Sra, Seba MIT Press. 	and Stephen J. Wright "Numerica eck "Convex Optimization: Algorit astian Nowozin, and Stephen J. Wr	l Optimization" 2nc hms and Complexit right "Optimization	l Edition (2006), Springer. γ", 1st Edition (2015), Now for Machine Learning" 1st	Publishers. Edition (2011),		
F Book Link						
1. <u>htt</u>	ps://web.stanford.edu/~boyd/cv	xbook/bv_cvxbook.	<u>pdf</u>			
2. <u>htt</u>	ps://www.math.uci.edu/~qnie/Pu	ublications/Numeric	calOptimization.pdf			
3. <u>htt</u>	ps://sbubeck.com/Bubeck15.pdf	ticle/files/96/7f/bf0	-1fff400004dEfd8d17-7bE	dE/c0foccd1		
4. <u>f58</u>	Ba-40ca-8e2e-720d276be00c.pdf	.icle/iiles/80/71/010	a111455554u51u6u17a7b5			
Web Links:						
1 Taskasla	Freehlad Learning - NDTEL - ffree		insticution for Data Caises "	Duef During l		
I. Technology Bivani IIT	/ Enabled Learning - NPTEL offers a Delhi.	as course on "Optim	ization for Data Science" by	/ Prof. Pravesh		

Course Pre- requisites Knowledge and Skills related to all the courses studied in previous semesters.



erences

- 1] R. Fletcher , Practical Methods of Optimization" 2nd Edition (2021)- Wiley-Interscience publishers
- 2] Amir Beck "First-Order Methods in Optimization" 1st Edition (2017), SIAM-Society for Industrial and Applied Mathematics publishers.

Topics relevant to a	levelopment of "Skill Development":
Formulating optimiz	zation problems from real-world scenarios.
Catalogue	Dr.S.Saravana Kumar
prepared by	
Recommended	
by the Board of	
Studies on	
Date of Approval	
by the Academic	
Council	
Anti-requisites	NIL
Course Descriptio	Students observe science and technology in action, develop an awareness of the method of scientific experimentation, and often get an opportunity to see, study and operate sophisticated and costly equipment. They also learn about the implementation of the principles of management they have learnt in class, when they observe multidisciplinary teams of experts from engineering, science, economics, operations research, and management deal with techno-economic problems at the micro and macro levels. Finally, it enables them to develop and refine their language, communication and inter-personal skills, both by its very nature, and by the various evaluation components, such as seminar, group discussion, project report preparation, etc. The broad-based core education, strong in mathematics and science and rich in analytical tools, provides the foundation necessary for the student to understand properly the nature of real-life problems.
Course Objectives	The objective of the course is to familiarize the learners with the concepts of Professional Practice and attain Employability Skills through Experiential Learning techniques.
	 On successful completion of this course the students shall be able to: 1. Identify the engineering problems related to local, regional, national or global needs. (Understand)

Course Outcomes	2.	Apply appropriate techniques or modern tools for solving the intended problem. (Apply)
	3.	Design the experiments as per the standards and specifications. (Analyze)
	4.	Interpret the events and results for meaningful conclusions. (Evaluate)

Course Code: CSD3414	Course Title: Statistics-Driven Data Science Type of Course: Discipline Elective/ Theory Only Course	, L- T-P- C	2	0	2	3
Version No.	2.0					
Course Pre- requisites						
Anti-requisites	NIL					



Course Descript	tion	This course of application in complex data visualization, problem solvi	This course offers a comprehensive introduction to statistical methods and their application in data science. Students will learn to explore, analyze, and interpret complex datasets using statistical reasoning. Emphasis is placed on data visualization, statistical modeling, inference, and hypothesis testing for real-world problem solving.					
Course	Objective	The objective Mining and at	The objective of the course is to familiarize the learners with the concepts of Data Mining and attain Employability through Problem Solving Methodologies					
Course (Comes	Out	8. Apply explo 9. Const 10. Interp suppo	Apply statistical concepts and methods for data preprocessing, exploration, and analysis. Construct and validate predictive models using statistical techniques. Interpret data insights using visualization and statistical inference to support data-driven decisions.					
Course	Content:							
Module	1	Foundations of Statistic for Data Science	^{cs} Assignment	Data Collection	10 Sessions			
	Topics: Descriptiv Estimatio	e statistics, probability on and confidence interva	distributions, Sampliı als	ng techniques, Central Limit	Theorem,			
Module	2	Statistical Inference and Hypothesis Testing	d Quiz	Problem Solving	10 Sessions			
	Topics: Parametri tests, mul	c and non-parametric to tiple testing corrections	ests, p-values, t-tests	, ANOVA, chi-square tests, E	rror types, power of			
Module	3	Regression and Statistic Modeling	cal Assignment	Problem Solving	10Sessions			
	Topics: Linear and diagnostic	l logistic regression, Mo s and multicollinearity	del selection and reg	ularization (Lasso, Ridge), A	ssumptions			
Module	. 4	Advanced Topics in Statistical Data Science	Assignment	Problem Solving	10 Sessions			
·	Time serie learning a	es analysis and forecasti nd unsupervised techni	ng, Bayesian statistic ques (clustering, PCA	s and decision theory, Introd)	duction to statistical			
	Text Book 1. "Prac Editic 2. "An I Witte	tical Statistics for Data on, O'Reilly Media, 2020 ntroduction to Statistic	Scientists" by Peter). al Learning: with Ap obert Tibshirani, 2nd	Bruce, Andrew Bruce, and P plications in R" by Gareth Ja Edition, Springer, 2021 .	eter Gedeck, 2nd ames, Daniela			
	3. "The El 2nd Editic	ements of Statistical Le	arning" by Trevor Ha ected Reprint).	stie, Robert Tibshirani, and	Jerome Friedman,			



References
R1 "Practical Statistics for Data Scientists: 50+ Essential Concepts Using R and Python" Authors: Peter Bruce Andrew Bruce and Peter Gedeck Publisher: O'Beilly Media Edition: 2nd Edition, 2020
R2 "An Introduction to Statistical Learning: with Applications in R", Authors: Gareth James, Daniela Witten, Trevor Hastie, Robert Tibshirani, Publisher: Springer, Edition: 2nd Edition, 2021
Additional web-based resources
W1. <u>https://onlinecourses.swayam2.ac.in/cec20_cs12/preview</u> Text book of Data Mining: Concepts
and Techniques, Jiawei Han, Micheline Kamber and Jian Pei, Morgan Kaufmann Publishers, 2012.
W2.https://puniversity.informaticsglobal.com:2284/ehost/detail/detail?vid=7&sid=e2d7362a-
fd3049a98f0393e963521dbd%40redis&bdata=JnNpdGU9ZWhvc3QtbGl2ZQ%3d%3d#AN=377411
&db=nlebk
https://nptel.ac.in/courses/105105157
Topics relevant to "EMPLOYABILITY SKILLS": Data Mining Techniques, FP Growth for developing
Employability Skills through Participative Learning techniques. This is attained through the assessmen
component mentioned in the course handout.
Catalogue Shaik Salma Begum
prepared by
Recommended
by the Board of
Studies on
Date of Approval
by the Academic
Council

urse Code: CSD1713	Course Title: Statistical Foundations for Data Science Lab pe of Course: Discipline elective Lab Integrated	Г-Р-С	0			1	
rsion No.							
urse Pre- requisites							
ti-requisites	-						
urse Description	This course provides an in-depth introduction to stat methods, and algorithms for data science. Topics i learning, sparse regression, generalized linear mod learning, deep learning, covariance learning, fact analysis, and more. The course emphasizes the app methods using mathematical statistics and real-world	istics and r nclude mu lels, super tor models plicability data sets.	nachine ltiple re vised a s, princ and lim	learn egress nd un ipal itatio	ning sion, nsup com ons o	theory, kernel ervised ponent f these	
urse Objectives	se Objectives The objective of the course is to familiarize the learners with the concepts of Statistic Foundations for Data Science and attain Employability through Participati Learning techniques.						
urse OutComes	Learningtechniques.On successful completion of this course, students can expect to achieve the following outcomes:CO1: Understand the rise and significance of Big Data in various fields such as Biological Sciences, Health Sciences, Computer and Information Sciences, Economics and Finance, Business and Program Evaluation, Earth Sciences, and Astronomy. [Understand]CO2: Develop a strong foundation in multiple linear regression and the Gauss- Markov theorem. [Apply]CO3: Apply linear regression with random design and partial linear regression. [Apply]						



CO4: Apply the power method and learn about factor models and structured covariance learning. [Apply] **Course Content:** No. of Sessions: 15 (30 hours) **List of Programs** Experiment 1: Use big data to predict patient outcomes. Experiment 2: Predict stock market trends using big data. Experiment 3: Segment customers based on purchasing behavior. Experiment 4: Apply statistical learning techniques to high-dimensional data. Experiment 5: The Gauss-Markov Theorem Experiment 6: Statistical Tests - Weighted Least-Squares Experiment 7: Box-Cox Transformation Experiment 8: Ridge Regression - Bias-Variance Tradeoff Experiment 9: Ridge Regression Solution Path - Kernel Ridge Regression Experiment 10: Debias of Regularized Regression Estimators Experiment 11: Inference in Generalized Linear Models (GLMs) Experiment 12: Partial Linear regression Experiment 13: Power Method: To implement the Power Method for finding the largest eigenvalue and corresponding eigenvector. Experiment 14: Factor model and high-dimensional PCA Experiment 15: Hierarchical clustering **Targeted Application & Tools that can be used:** Torch, Google Colaboratory, Spider, Jupiter Notebook **Project work/Assignment: Mention the Type of Project /Assignment proposed for this course** Sentiment analysis of Facebook and Twitter data Dataset resource link: https://www.kaggle.com/datasets **REFERENCE MATERIALS: Textbook(s): T1** Fan, J., Li, R., Zhang, C.-H., and Zou, H. (2020). Statistical Foundations of Data Science. CRC Press. T2 Wainwright, M. J. (2019). High-dimensional statistics: A non-asymptotic viewpoint. Cambridge University Press. **Reference Book(s):** R1. James, G., Witten, D., Hastie, T.J., Tibshirani, R. and Friedman, J. (2013). An Introduction to Statistical *Learning with Applications in R*. Springer, New York. R2. Hastie, T.J., Tibshirani, R. and Friedman, J. (2009). The elements of Statistical Learning: Data Mining, Inference, and Prediction (2nd ed). Springer, New York.

R3. Buehlmann, P. and van de Geer, S. (2011). *Statistics for High-Dimensional Data: Methods, Theory and Applications*. Springer, New York.

<u>R1</u>: Fan, J., Li, R., Zhang, C.-H., and Zou , Statistical Foundations of Data Science. CRC Press.

E book link

R2: W. N. Venables, D. M. Smith and the R Core Team, <u>https://cran.r-roject.org/doc/manuals/R-intro.pdf</u>, October, 2022



eb resources:

W1. <u>https://www.youtube.com/playlist?list=PLOU2XLYxmsIK9qQfztXeybpHvru-TrqAP</u> <u>https://presiuniv.knimbus.com/user#/</u>

Catalogue	
prepared by	
Recommended	BOS NO: 17 th. BOS held on 22/12/22
by the Board	
of	
Studies on	
Date of	Academic Council Meeting No.x , Dated xx/xx/23
Approval	
by the	
Academic	
Council	

Course Code:	urse Title: Statistical Foundations for Data Science		
CSD1712	no of Courses Theory	I-P-C	0 3
Version No	pe of Course: Theory		0 5
Course Pre- requisites	NIL		
Anti-requisites	-		
Course Description	This course provides an in-depth introduction to statistic methods, and algorithms for data science. Topics inclu- learning, sparse regression, generalized linear models learning, deep learning, covariance learning, factor analysis, and more. The course emphasizes the applic methods using mathematical statistics and real-world d	cs and machine learnin ude multiple regressio , supervised and unsu models, principal co ability and limitations ata sets.	g theory, n, kernel pervised mponent of these
Course Objective	e objective of the course is to familiarize the learners Foundations for Data Science and attain Employabili techniques.	with the concepts or ty through Participat	f <mark>Statistical</mark> ive Learning
Course Out Comes	 On successful completion of the course the students shale 1) Understand the rise and significance of Big Data in Sciences, Health Sciences, Computer and Information Finance, Business and Program Evaluation, Earth Sciences, Develop a strong foundation in multiple linear regret theorem. 3) Apply linear regression with random design and part 4) Apply the power method and learn about factor mod learning. 	Il be able to: various fields such as H on Sciences, Economic ciences, and Astronomy ssion and the Gauss-M tial linear regression. els and structured cova	Biological s and y. arkov ariance
urse Content:			
dule 1	Introduction signment	gramming	No. of



Classes:10

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To	nice
10	pics.

Introduction to bigdata, Rise of Big Data and Dimensionality in -Biological Sciences , Health Sciences , Computer and Information Sciences, Economics and Finance, Business and Program Evaluation, Earth Sciences and Astronomy - Impact of Big Data - Impact of Dimensionality, Computation of Noise Accumulation, Spurious Correlation, Statistical theory - Aim of High-dimensional Statistical Learning.

Τ

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dule 2	Itiple Linear Regression	signment	gramming	No. of Classes:12			
Topics:							
Multiple Linear R Cox Transformation Multiple Covariate Interpretation - Ri Elements of gener squares, Deviance to Nonparametric	egression, The Gauss-Markov Theorem, on, Model Building and Basis Expansion es, Ridge Regression - Bias-Variance Tra dge Regression Solution Path - Kernel Ri ralized linear models, Maximum likelihoo e and Analysis of Deviance, Regularizatio Modeling.	Statistical Tests - W s, Polynomial Regr adeoff - Penalized L dge Regression, Ex od, Computing ML on parameters, Refit	Veighted Least-Squa ression - Spline Reg east Squares - Baye ponential family 23 E: Iteratively reweig ted Cross-validation	ares , Box- ression , sian 1 5.1.2 ghed least h, Extensions			
dule 3	erence in linear regression	signment	gramming	No. of Classes:14			
Inference in linear the noise level, In of linear hypothes information, Line Inference via pena semi-LD decompo	Inference in linear regression - Debias of regularized regression estimators, Choices of weights, Inference for the noise level, Inference in generalized linear models, Desparsified Lasso, Decorrelated score estimator - Test of linear hypotheses, Numerical comparison - Asymptotic efficiency 345 7.3.1 Statistical efficiency and Fisher information, Linear regression with random design, Partial linear regression, Gaussian graphical models - Inference via penalized least squares, Sample size in regression and graphical models, General solutions, Local semi-LD decomposition, Data swap, Gradient approximation						
dule 4	ncipal Component Analysis	signment	gramming	No. of Classes:9			
pics: Principal Component Analysis -Introduction to PCA , Power Method , Factor Models and Structured Covariance Learning , Factor model and high-dimensional PCA-Cluster Analysis - K-means clustering , Hierarchical clustering , Model-based clustering , Spectral clustering , Data-driven choices of the number of clusters , Variable Selection in Clustering , Sparse K-means clustering , Sparse model-based clustering , Sparse Mixture of Experts Model, Correlation Screening, Generalized and Rank Correlation Screening, Nonparametric Screening, Sure Screening and False Selection.							
rgeted Application	a & Tools that can be used:						
ols: Torch, Google C	Colaboratory, Spider, Jupiter Notebook						
kt Book	nent.						
TextBook(s): T1 Fan, J., Li, R., T2 Wainwright, I Press.	 trextBook TextBook(s): T1 Fan, J., Li, R., Zhang, CH., and Zou, H. (2020). Statistical Foundations of Data Science. CRC Press. T2 Wainwright, M. J. (2019). <i>High-dimensional statistics: A non-asymptotic viewpoint</i>. Cambridge University Press. 						



R1. James, G., Witten, D., Hastie, T.J., Tibshirani, R. and Friedman, J. (2013). *An Introduction to Statistical Learning with Applications in R*. Springer, New York.

R2. Hastie, T.J., Tibshirani, R. and Friedman, J. (2009). *The elements of Statistical Learning: Data Mining, Inference, and Prediction* (2nd ed). Springer, New York.

R3. Buehlmann, P. and van de Geer, S. (2011). *Statistics for High-Dimensional Data: Methods, Theory and Applications*. Springer, New York.

Book link

<u>R1</u>: Fan, J., Li, R., Zhang, C.-H., and Zou , Statistical Foundations of Data Science. CRC Press.

E book link

R2: W. N. Venables, D. M. Smith and the R Core Team, <u>https://cran.r-roject.org/doc/manuals/R-intro.pdf</u>, <u>October,2022</u>

eb resources:

W1. <u>https://www.youtube.com/playlist?list=PLOU2XLYxmsIK9qQfztXeybpHvru-TrqAP</u> <u>https://presiuniv.knimbus.com/user#/</u>

Topics relevant to "EMPLOYABILITY SKILLS": - Asymptotic efficiency 345 7.3.1 Statistical efficiency and Fisher information, Linear regression with random design, Partial linear regression for developing Employability Skills through Participative Learning techniques. This is attained through assessment component mentioned in course handout..

Catalogue	
prepared by	Ms.Radhika Sreedharan
Recommended	
by the Board of	
Studies on	
Date of	
Approval by	
the Academic	
Council	

urse Code:CSD170 3	urse Title: Introduction to Data Science pe of Course: Program Core	?-C	3)	0	3
rsion No.						
ti-requisites						
urse Description	This course offers a comprehensive introducti Students will explore the data science lifecycle through cleaning, exploratory analysis, visuali is placed on using Python-based tools (Panda perform real-world data tasks. The course foste driven decision-making essential for modern d	on to the c, beginn zation, a as, Numl rs critica lata scier	e interdis ing with and basic Py, Matp Il thinkin ace roles	scipl data pre- plotli g, sta	inary f acquis dictive b, Sea atistica	Tield of Data Science. Sition and progressing modeling. Emphasis born, Scikit-learn) to I reasoning, and data-



u usarsebjaatie es	Tesentreleuce programmi	ng fordomenselencel w	orkflow of Data Science	ce 2					
CSD1501	To import practical experience with Python tools used in data analysis								
Version No.	To develop understanding of data exploration, transformation, and visualization techniques								
Course Pre-									
requisites	CO1: Describe the stages of the data science lifecycle and tools used								
A Otimeg uisites	CO2: Perform data wrangling, cleaning, and exploratory analysis with Python								
urse Description	Confise Contents: Confise And Designed and the content of the con								
urse Content:	knowledge to a wide range	knowledge to a wide range of Data Analytics. R is now considered one of the most popular							
	roductions tools in the wo	ning students with pro-	owledge based	10 Hours					
ourse Objective	Scienceau-based course eq								
Syntax, Variable Colab, Working studies from hea	bata Science Delimitions a es, Dudentspysil Conto hm with watant Dibrardes. Nich Ithcate, mursee, and social and dimensionality reduc	where Applications, Dat ds. objecting teals work integrating and Pandas Basics machine learning algo the drawing R.	A Science Lifecycle, P ndiataset Supyter Noteb s, Real-world applicatio rithms including regre	vition for Data Scienc data Araconda; Obog ons of Data Science (cas ssion, classification,	;le ;le .se				
dule 2	ta W the end of the court ta W ranging and analytics workflows usin Exploration	rse, students will dev signment ig R and RStudio.	elop, implement, and plementation	evaluate end-to-end 12 Hours					
DataFrames and Transformation:	Sorting, Filtering, Merging Sorting, Filtering, Merging Transformations.	Cleaning: Missing Va Deaning: Missing Va Dinal R scripts to mana g, Grouping,Feature E	, students will be able lues, Duplicates, Data ge data types, structur ngineering Basics, Ex	to: Type Conversion, Da es, and apply basic ploratory Data Analys	ita sis				
(EDA): Descrip	tive Statisticalize and expl	bre dutiliers Detection 2	2 Handpiyr; drawlyging	eaningtur insignts. (e	g.,				
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dule 3	ta COArsexate on ini-pudje Corobiemi sotiving using r	rtis demonstrating an e playen/Assignset sit	alytical thinking and d plementation	ata-driven II Hours					
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Introduction to I Line Charts, Ba rse Content: Creating Dashbo	Data Visualization: Importai r Charts, Histograms, Boxj pards using Plotly or Stream	nce & Principles,Visua plots, Pairplots, Heatn lit (Intro), Data Storvo	alization with Matplotli naps, KDE plots, and a elling: How to Present l	b and Seaborn advanced visualization Data Insights Effective	ns, elv				
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Introduction to I Line Charts. Ba Creating Dashbo , Project: Create t of Laboratory Ta 1. Introduction dule 4 Setting to Basic R. Descriptive Stati Hypothesis Lest d. Working e. Printing 2. Working with Introduction to Data Structures modeling on a rea a. Vectors b. Matrices (book(s) Lists and Title: Pytheosfo McKinney Publ 3. Data Visualiza forences: Installin b.1. Title: Appl 4. Data Transfor 3. Introduct b. Sciectin c. Groupin	Data Visualization: Importan r Charts, Histograms, Boxy bards using Plotly or Stream an interactive EDA dashbo asks: o R and RStudio Fouction to Statistics & o R and the statistics of the statistics and displaying data ation Overview: Logistic R directory in R, Loading and ope Fouctory in R , Loading and ope Fouctor Analysis: Data Wran isher: O'Reilly Media Edit ation with ggplot2 g and loading ggplot2 statistics folios fouctor for Statistical L iter of color of Statistical L iter of color of Statistical L o and summarizing data	nce & Principles, Visua plots, Pairplots, Heatm lit (Intro), Data Storyto ard m paper/Assignment e, Variance, Standard I ence Intervals, Correla nents. Ston Regression d francling data in R acy, Confusion Matr erations ngling with Pandas, Na tion: 3rd Edition, 2023 eiphotstsantOhistogration with Media, 2nd Editi Cathy O'Neil, Rachel earning with Applicati atta	alization with Matplotli maps, KDE plots, and a elling: How to Present I plementation Deviation, Probability E tion and Causation, Int ix, Precision, Recall, ix, Precision, Recall, <i>umPy, and Jupyter</i> , Au and <i>Concepts</i> , Authors: P on (2021) Schutt, Publisher: O'H fons in R, Authors: Gar ger, 2nd Edition (2021)	b and Seaborn advanced visualization Data Insights Effective 12 Hours Basics and Distributions roduction to Regression Case Study: Predictive thor: Wes Peter Bruce, Andrew Reilly Media eth James, Daniela	ns, ly s, on: ve				



Catalogue	Dr.Saira Banu
prepared by	
Recommende	
d by the	
Board of	
Studies on	
Date of	Academic Council Meeting No.
Approval by	
the Academic	
Council	
5. Introduction to	o Machine Learning with R
a. Installin	g and loading necessary packages
b. Splitting	g data into training and testing sets
d Model e	y a simple machine rearring model
6 Correlation ar	ad covariance
a. Find the	correlation matrix.
b. Plot the	correlation plot on dataset and visualize giving an overview of relationships among data on
iris data	
7. Regression m	odel - Create a regressionmodel for a given dataset
8. Implement	the multiple regression model for the given dataset.
9. Principal Co	mponent Analysis - Perform PrincipalComponent Analysis(PCA) using R
10. Implement	k-NearestNeighbors (kNN) classification using R
11. Evaluate the	performance of NaiveBayes classifier usingR.
12. Evaluate the	performance of the Decision Tree classifier using R.
13. Evaluate the	performance of Random Forest Classifier using R.
14. Mini Project	- Applying R programming skills to areal-world dataset
a. Data cl	eaning, visualization, analysis, and interpretation
b. Presen	tation of findings
geted Application	n & Tools that can be used
Tools: RStudio /	Google Colab
Project work/As	ssignment:
ignment:	
ring the course, s	tudents would need to do coding assignments to learn to train and use different models.
Sample coding a	assignments include:
alysis of Sales Re	port of a Clothes Manufacturing Outlet.
mcast Telecom Co	onsumer Complaints.
Web Data Ansly	rsis
, kt Book :	
1) Hands-On Pro	paramming with R: Write Your Own Functions and Simulations. Author: Garrett
Grolemund. Put	blisher: O'Reilly Media, Year: 2023
2) R for Data Sci	ience: Import, Tidy, Transform, Visualize, and Model Data, Authors: Hadley Wickham.
Mine Çetinkaya	-Rundel, Garrett Grolemund, Publisher: O'Reilly Media, Edition: 2nd Edition, 2023.
	· · · · · · · · · · · · · · · · · · ·

Course Code: CSE 3035	urse Title: R Programming For Data Science of Course: Theory Only -Program Core	- P- C	3	3
Version No.				
Course Pre- requisites				
Anti-requisites				



AID 17101702 urse Description of people southeory of data analytics in R will be the								
core concepts and techniques of data analytics in R will help the	dongsin the course, capping with advanced techniques through case studies. Mastering the							
Version No.	students to apply their							
Courso Pre- Basic programming (Python/Java/R), Linear Algebra, Probability & analytics tools in the world.	Statistics, Intro to Data							
Ourse Objective The objective of the course is to familiarize the learners wit	the concepts of R							
Anti-requising solution of the second attain skill be and attain skill be and attain skill be a second attain skill be a	through Experiential							
1 nio <mark>ugus ing seeiyseysing in an an</mark>	nsylines scoreits to hear the second memory of the second memory of the second memory and the second memory							
urse Description inverting deserving set and statistic to strate working systems, the description in the set of the set o	apaltersection gothodadmine							
learning langed of the line works and the state of the st	tione through as a start as the start as a start as a start of the sta							
ourse Objective into edge partite and tevel appendix the appendix the providence of	digging applications across							
urse Description domains mesh generation of the start of	nd hands-on practice, the							
course of mphasizes, model interpretability alethical stills and real-work	danning classificationsing							
Scikit-learn TensorFlow and PyTorch, to build robust scalable mo	e engineering, and							
decision-making. By the end of the course, learners will be equipped	o design, implement, and							
evaluate machine learning pipelines within intelligent data science system	tems, making them well-							
prepared for roles in data science, applied AL and analytics	to							
ourse Objective 1 e objective of the course is to familiarize the learners with the concepts or Intelligent Data Sciencey and attain Employability through Participat	f Wiaching Learning for ive Learning techniques.							
uliopicant Comes CO2. renorm data preprocessing, reature engineering, and moder of the second address overfatting, and	bias.							
Introduction to R. Overview of data analysis, working with directory in S. Loading a Under stand and applied with the second standard of the pixel in the second standard of the pixel of the second Data Visualization with ggplot2, Data Transformation with oplyr.	d handling data in R, anning within							
Module 2 2. Designy Data: Apatysis t supervised learning models to Studye rea	l-world in ttel\$iessio ns							
urse Content: system problems.								
Exploring a new-dataset. Anomalies in numerical data. Visualizing relations between	chniques to enhance							
Assumptions of Linear Regression, Validating Linear Assumption, Missing Values, Co	variation, Patterns							
and Models, ggPlot2 Calls i le applications.	omain-specific							
Module 3 gression Analysis Ling Project	10 Sessions							
Data Preprocessing and encoding outlier detection and								
Cleaning Cle	erression, Non-Linear							
Regression, Regression, Analysis with Multiple Variables, Cross Validation, Principal	Component Analysis,							
Introduction to Machine Learning in the context of Intelligent Data Scient	- Types of Learning: Factor Analysis.							
Supervised, Unsupervised, Senn-supervised, Kennorcement- Model evaluation Module 4 Project Project Vortitit	101 metrics (Accuracy, 12 Sessions]							
Exploratory Data ics validation and Model Selection Data melistricher tions in a stillions hips signodiata et	coding feature scaling							
Introduction, Different types of Classificationations is Regression Support Nector	Machines, K-Neatest							
Neighbors Naïve Bayes Classifier, Decision Tree Classification, Random Forest Classi	fication, Evaluation.							
dule Textupervised Learning for Smart Systems								
Linear and Logistic Regression - Decland, Kior Data Science Hilbort Hay, Hay Model Data, O'Reilly Media, 2017. Implement and Bompare Accuracy, Light GB Model Projugation Metrices Linear Science in R. Data Analysis Visualization, an Feedforward and Backpropagation-Hypethanaoioss diassiger Still Search, Ra for the Data Scientist, APress, 2022	Networks: Basics of Modelling Hoom Search, Bayesian							
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	hoselong : D							
dule 3 Intelligent Anta Brocessing and Feature Engineering stone Beberting begins with An Smarts Day Office Sing Structure Determines Anise Herdinger Aliesing and Engineering alses in Automated Feature Stores Introduction to Feature Stores	a Imputation) - Feature raction- Dimensionality							



fe	rences	5	.			
Mod	lule 15	Аф	Decision Frees and tuidies	piointerpretable and ensemble piointerpretable and ensemble	r a ct Sæsision esScience	
		wit	Handom Forests	. 2020.		
	Intel	lidre	ned antai Nainneai Irin Stanarta Hai	theaver R'A Wildis Pase prediction patient	monitoring) - Finan	de
		fro	Gradient Boesting oring)	Analy boosting models; and twatting of	urn prodiction) Sm	
	(6.6.	, 11a	(XGBOOSt /drightGBM)	narameters for netformance	um prediction)- Sma	μı
V	Vebites	NO CÁ	cest (e.g., traitie torceasting, e	nergy optimization).		_
	Text	Bat	bs://machinelearningmind.com/	2019/10/27/assumptions-of-linear-regressi	on-how-to-validate-	
	1	. an	Hitelligent Systems for Machin	he Learning: A Modern Approach to Auto	omated AI"	
	27	htţ	ps://www.geeksforgeeks.org/machi	ne-learning-model-evaluation with Ovin,	ichon Springer	
	3.	hť	ps://www.geeksforgeeks.org/r-p	programming for data-science/	isher. Springer	
	4.	ht	pauled Edition (20	23).ISBN: 9783031325843		
	5.	htt	ps://nptel.ac.in/courses/106102	064		
	8		k-Nearest Neighbors (k-	Build k-NN models for classification		
	Topics	rele	vant to "SKILL DEVELOPMENT":	Regress of Shire Store is the state of the second state of the sec	pment through	
	Experie	entia	al Learning techniques. This is at	tained through assessment component men	tioned in course	
	fenda	uets		<u> </u>		
	1	. /	lice Zheng and Amanda Case	Train a simple feedforward neural	arning: Principles ar	ad
	9		Neural Network (FFNN)	network with backpropagation in		
]	echniques for Data Scientists	Kerastatony Totobdition (2018)-Publishe	er: O'Reilly Media	
	H	,	Nationhan M. Diskon "Detter	Decognition and Machine Learning "List	ition. 1st Edition	
	∥ 4	. (inistophet M. Dishop Pattern	I Recognition and Machine Learning Ed		
	10	(2006) Publisher: Springer	Use GliusealChUV,		
	10		Hyperparameter I uning	RandomizedSearchCV, or Optuna for		
	3	6. k	Cevin P. Murphy "Machine Le	affinge! APPfolzabinistic Perspective" Edit	ion: 1st Edition	
		(2012) Publisher: MIT Press			
		(Dimensionality			
	14	I. Y	oshua Bengio, and Aaron Co	urvine Deep Learning by fan Goodfell	ow, Edition: 1st	
		-	Reduction	visualization and preprocessing.		
		Ŀ	dition (2016) Publisher: MIT	Press		
	5	K F	oster Provost and Tom Fawce	tt "Data Science for Business' What You	Need to Know abo	nt
	10	• •	Autoencoders for	Use autoencoders for unsupervised		
	12	Ι	Pareavlinengeandingta-Analytic	Flainking "tEdition: 1st Edition (2013) P	ublisher: O'Reilly	
		N	India.			
		P	Aedia.			
			Data Annotation and	Explore and use tools like Label		
	13		Labeling Tools	Studio, CVAT for supervised data		
				labeling.		
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	6	5. N	Binart Application dastion	BMAchidiseaseningdiction model		
	∥ 14		Study I – Healthcare	(e.g., diabetes, heart disease).		
	<u>h</u>	ittps	://npte1.ac.1n/courses/106/106/	106106202/		
	7	<u>.</u>	oogle Machine Learning Cras	h Course		
	∥ ′	• •				
	15	ittps	: Meaclopenication Casemac	himplement trang petection or traffic		
			Study II – Finance / Io I	forecasting with real-world datasets.		
	ŭ ∎). (_r oursera – Machine Learning (by Andrew Ng (Supervised Models)	J	
	h	ittps	://www.coursera.org/learn/ma	chine-learning		
		-				4
	Text B	ook				
	1.Han	ds-(On Machine Learning with So	cikit-Learn, Keras, and TensorFlow,Au	thor: Aurélien	
	Géron	, P u	blisher: O'Reilly Media,Edit	ion: 3rd Edition, Year: 2023, ISBN: 9781	098125974	
	Торі	cs r	elevant to "EMPLOYABILITY	SKILLS": Data Preprocessing (Missing	data handling, encodin	ıg,
	scalin	ng)-	Dimensionality Reduction Tech	iniques (PCA, t-SNE, Autoencoders) for de	veloping Employabili	ty
	Skill	s th	rough Participative Learning	techniques. This is attained through	assessment compone	nt
	ment	tion	ed in course handout.		-	



Catalogue	Dr.S.Saravana Kumar
prepared by	
Recommended	
by the Board of	
Studies on	
Date of	
Approval by	
the Academic	
Council	

Course Code:	urse Title: R Programming	For Data Science	e		3			3
CSE 3035	e of Course: Theory Only -	Program Core		- P- C				
Version No.								
Course Pre- requisites	L							
Anti-requisites								
ourse Description	This course is designed to provide the core concepts of data analytics in the R environment. Initially train them with basic R, then progressively increase the difficulty as they move along in the course, capping with advanced techniques through case studies. Mastering the core concepts and techniques of data analytics in R, will help the students to apply their knowledge to a wide range of Data Analytics. R is now considered one of the most popular analytics tools in the world.							
ourse Objective	The objective of the council programming For Data Structure Council Programming For Data Structu	The objective of the course is to familiarize the learners with the concepts of R Programming For Data Science and attain Skill Development through Experiential Learning techniques.						
ourse Out Comes	On successful completion of this course the students shall be able to: CO1: Summarize the R functions effectively to perform fundamental data analysis. [Understand] CO2: Apply suitable statistical methods to interpret diverse types of data [Apply] CO3:Illustrate Regression analysis on provided datasets [Apply] CO4: Demonstrate analytical and evaluative skills in machine learning classification [Apply]							
urse Content:								
Module 1	roduction TO R	ignment	a Collec	tion/Interpreta	ation		12 Se	essions
Topics: Introduction to F Data Visualizatio	R, Overview of data analysis, on with ggplot2, Data Transfe	, Working with o	directory	in R, Loading a	and ha	and	ling dat	ta in R,
Module 2	loratory Data Analysis	ding Assignment		Case Study			11 Se	essions
bics: Exploring a new Assumptions of and Models, ggP	dataset, Anomalies in nume Linear Regression, Validating lot2 Calls.	rical data, Visua g Linear Assump	alizing re otion, Mis	lations betwee ssing Values, C	en vari ovaria	abl Itio	es, n, Patte	erns
Module 3	gression Analysis	ding Assignment		Project			10 Se	essions
pics:								
ntroduction, Type	s of Regression Analysis Mo	dels, Linear Reg	ression, S	Simple Linear I	Regres	sio	n, Non	-Linear



Regression, Regression Analysis with Multiple Variables, Cross Validation, Principal Component Analysis,						
		ŀ	Destaut	Factor Analysis.		
IVIOU	ssification	IZ	Project	12 Sessions		
Dics:						
Introdu	uction, Different types of C	Classification, Logistic Regr	ession, Support Vector Mac	hines, K-Neatest		
Neighb	oors, Naïve Bayes Classifier,	Decision Tree Classification	n, Random Forest Classificati	on, Evaluation.		
Text Bo	pok					
4.	Hadley Wickham and Garr Model Data, O'Reilly Medi	ett Grolemund, R for Data S a, 2017.	cience Import, Tidy, Transfor	m, Visualize, and		
5.	 Thomas Mailund, Beginning Data Science in R, Data Analysis, Visualization, and Modelling for the Data Scientist, APress, 2022. 					
6.	Gareth James Daniela Witt	en Trevor Hastie Robert Tik	shirani, An Introduction to St	atistical		
	Learning Gareth James Da	niela Witten Trevor Hastie F	obert Tibshirani with Applica	tions in R,		
	Springer, 2017.					
^f erences						
3.	Nina Zumel and John Mour	nt Foreword By Jeremy How	ard and Rachel Thomas, Pract	ical Data Science		
	with R, MANNING SHELTER	R ISLAND, 2020.				
4.	Dr. Bharati Motwani, "Dat	Analytics using R", Wiley,	2019.			
Web resources:						
6.	 https://machinelearningmind.com/2019/10/27/assumptions-of-linear-regression-how-to-validate- and-fix/ 					
7.	7. https://www.geeksforgeeks.org/machine-learning-model-evaluation/					
8.	https://www.geeksforgeel	ks.org/r-programming-for-d	ata-science/			
9.	https://r4ds.had.co.nz/					
10.	https://nptel.ac.in/courses	5/106102064				
Topics	relevant to "SKILL DEVELO	MENT": Regression model	classifier for Skill Developme	ent through		
Experie	ential Learning techniques.	This is attained through ass	essment component mention	ed in course		
handou	ut.	0	,			

Course Code:	urse Title: R Programming For Data Science		0			2
CSD1501	e of Course: Theory Only	- P- C				
Version No.						
Course Pre- requisites	L					
Anti-requisites						
urse Description	This course is designed to provide the core concepts of data analytics in the R environment. Initially train them with basic R, then progressively increase the difficulty as they move along in the course, capping with advanced techniques through case studies. Mastering the core concepts and techniques of data analytics in R, will help the students to apply their knowledge to a wide range of Data Analytics. R is now considered one of the most popular analytics tools in the world.					
ourse Objective	This lab-based course equips students with practical skills in R programming for statistical computing and data analysis. Students will work hands-on with real-world datasets to perform data preprocessing, visualization, and modeling. The course covers key machine learning algorithms including regression, classification, and dimensionality reduction using R. By the end of the course, students will develop, implement, and evaluate end-to-end analytics workflows using R and RStudio					


	After successful completion of the lab course, students will be able to:
	CO1: Develop foundational R scripts to manage data types, structures, and apply basic
	transformations.
	CO2: Visualize and explore data using geplot2 and dplyr, drawing meaningful insights.
ourse Out Comes	CO3: Implement and evaluate regression, classification, and dimensionality reduction
	models using P
	10001: Evenute mini prejects demonstrating analytical thinking and data driven
	co4. Execute mini-projects demonstrating analytical thinking and data-driven
	problem-solving using real-world datasets.
urse Content:	
	•
t of Laboratory Tas	SKS:
1. Introduction to	R and RStudio
a. Setting up	o R and RStudio
b. Basic R s	yntax and data types
c. Arithmeti	c operations in R
d. Working	with variables and assignments.
e. Printing a	nd displaying data
2. Working with c	lirectory in R, Loading and handling data in R
Data Structures in	
a. Vectors: c	creating, indexing, and operations
b. Matrices	and arrays
c. Lists and	data frames
d. Factors a	nd character vectors
e. Basic data	a manipulation and exploration
3. Data Visualizat	tion with ggplot2
a. Installing	and loading ggplot2
b. Creating	scatter plots, bar plots, line plots, and histograms
c. Customiz	ing plot aesthetics and themes
d. Faceting	and combining plots
4. Data Transform	hation with dplyr.
a. Introducti	on to dplyr package
b. Selecting	, filtering, and arranging data
c. Grouping	and summarizing data
d. Joining at	id merging data sets
5. Introduction to	Machine Learning with R
a. Installing	and loading necessary packages
D. Splitting (ata into training and testing sets
C. Building	a simple machine learning model
d. Model ev	aluation and prediction
6. Correlation and	covariance
a. Find the c	correlation matrix.
D. Plot the C	orrelation plot on dataset and visualize giving an overview of relationships among data on
$\frac{1}{7}$ Decreasion as	del Create e recorrectemente del far e since detecat
7. Regression mo	del - Create a regressioninodel for a given dataset
8. Implement th	ne multiple regression model for the given dataset.
9. Principal Com	ponent Analysis - Perform PrincipalComponent Analysis(PCA) using R
10. Implement k	-NearestNeighbors (kNN) classification using R
11. Evaluate thep	erformance of NaiveBayes classifier usingR.
12. Evaluate the p	performance of the Decision Tree classifier using R.
13. Evaluate the p	performance of Random Forest Classifier using R.
14. Mini Project -	Applying R programming skills to areal-world dataset
c. Data cle	aning, visualization, analysis, and interpretation
d. Presenta	ation of findings
	U ⁻

geted Application & Tools that can be used



Tools: RStudio / Google Colab Project work/Assignment:

ignment:

ring the course, students would need to do coding assignments to learn to train and use different models. Sample coding assignments include:

alysis of Sales Report of a Clothes Manufacturing Outlet.

mcast Telecom Consumer Complaints.

Web Data Anslysis

t Book :

1) Hands-On Programming with R: Write Your Own Functions and Simulations, Author: Garrett Grolemund, Publisher: O'Reilly Media, Year: 2023

2) *R for Data Science: Import, Tidy, Transform, Visualize, and Model Data,* Authors: Hadley Wickham, Mine Çetinkaya-Rundel, Garrett Grolemund,Publisher: O'Reilly Media,Edition: 2nd Edition, 2023.

Course Code:	Course T	Title: St	atistical Inference a	and Modeling						
CSD3407	Type of C	Course	:1] Program Core		L-1	Г-Р-С	3	0	0	3
Version No.		1.0								
Course Pre- requisites		Intro Calcu	duction to Probabilit lus II	ty						
Anti-requisites		NIL								
Course Description		This of and r both theor comp unde statis mear	This course introduces students to the principles and methods of statistical inference and modeling. Topics include estimation, hypothesis testing, confidence intervals, and both parametric and non-parametric models. Emphasis is placed on understanding theoretical foundations and applying statistical models to real-world data through computational tools. The course aims to build a strong conceptual and practical understanding of inference and modeling to prepare students for more advanced statistical and data science coursework. Students will learn how to analyze data, draw meaningful conclusions, and build predictive models using statistical techniques.							
Course Objective		The c Infer	The objective of the course is to familiarize the learners with the concepts of Statistica Inference and Modeling for Employability through Problem Solving Methodologies.							
Course Out Comes		On su 1. 2. 3. 4.	 On successful completion of this course the students shall be able to: 1. Apply sampling and estimation procedures to appropriately use and construe complex data. (Understand) 2. Design experiments by ANOVA and determine the existence of a statistically significant difference among several groups means. (Apply) 3. Develop appropriate regression models to predict the desired parameters. (Apply) 4. Apply non-parametric tests for uncertain distributions and decision analysis to identify feasible and viable decision alternatives. (Apply) 							
Course Content:										
Module 1	SAMPLIN TESTING	NG AN	D ESTIMATION, HYP	POTHESIS	Assignr	nent			14	Hours
Random vs Non-random sampling, Errors in sampling, Central Limit Theorem, Types of estimates, Estimating population mean using z and t statistics, Confidence interval estimation, Maximum likelihood estimation. Procedure for Hypothesis testing, Two tailed and one tailed Hypothesis testing, Type 1 and Type 2 errors, Hypothesis testing using z and t statistics, Chi-square test										



urse Code:	urse Title: Computational T	hinking using			2	2	
E1500			I-P-C	2)	2	3	
	pe of Course. ESC						
rsion No.							
urse Pre- requisites							
ti-requisites	L						
urse Description	The course efficiently introduce loops, functions, lists, strings, a then discusses dynamic progra usage. In terms of data structur classes, and objects for constru- binary search.	es fundamental i and tuples throug mming like hand res, the course co cting user-define	deas inclu gh some in dling exce overs Pyth ed datatyp	iding con nspiring ptions a on dictiones like li	nditiona exampl nd file onaries, inear an	als, les. It Id	
urse Object	The objective of the course is Computational Thinking using Participative Learning technique	to familiarize the g Python and att es.	e learners ain Skill [with the Developi	e concer <mark>nent</mark> th	ots of rough	
urse Out Comes	 On successful completion of th 5) Describe algorithmic solution 6) Explain data types and ope 7) Demonstrate control struction 8) Apply the data structures for 9) Demonstrate the file operation 	e course the stuc ons for basic com rators. (Understa ures and Functio or the given data ions. (Apply)	lents shall nputing is and) ns. (Apply) (Apply)	be able sues (U y)	to: nderstar	nd)	
urse Content:	•						
odule 1	Computational Thinking And Problem Solving	signment	ogran	nming	6 Ses	sions	
Topics: Fundamentals of Computing– Identification of Computational Problems Algorithms, building blocks of algorithms (statements, state, control flow, functions), notation (pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion). Illustrative problems: find minimum in a list, insert a card in a list of sorted cards, guess an integer number in a range, Towers of Hanoi							
odule 2	tatypes, Expressions, Statements	signment	ogran	nming	essio	ns	
Topics: Python inter string , and operators, co the values of	preter and interactive mode,del list; variables, expressions, s mments; Illustrative programs: n variables, distance between tw ntrol flow Functions Strings	bugging; values tatements, tuple exchange the val to points.	and types e assignn lues of tw	s: int, flo nent, pr o variab	oat, boc ecedenc les, circ	olean, ce of culate	
Julie 3	nitor now, runctions, Strings	pigimient	pgran	mmg	essi0	115	



Topics:

Conditionals:Boolean values and operators, conditional (if), alternative (if else), chained conditional (if-elif-else); Iteration: state, while, for, break, continue, pass; Fruitful functions: return values, parameters, local and global scope, function composition, recursion; Strings: string slices, immutability, string functions and methods, string module; Lists as arrays. Illustrative programs: square root, gcd, exponentiation, sum an array of numbers, linear search, binary search.

odule 4	ts, Tuples, Dictionaries	signment	gramming	essions
• • • •				

pics:

ts: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing- list comprehension; Illustrative programs: simple sorting, histogram, Students marks statement, Retail bill preparation.

odule 5	es	signment	ogramming	essions

es and exceptions: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, packages; Illustrative programs: word count, copy file, Voter's age validation, Marks range validation (0-100).

ject work/Assignment:

- 1. Assignment 1 on (Module 1 and Module 2)
- 2. Assignment 2 on (Module 3 and Module 4 & 5)

Text Book

- 1. Paul Deitel and Harvey Deitel, "Python for Programmers", Pearson Education, 1st Edition, 2021
- 2. Eric Matthes, Python Crash Course,: A Hands-On, Project-Based Introduction to Programming, 3rd Edition, 2023

References

- 1. Allen B. Downey, "Think Python: How to Think like a Computer Scientist", 2nd Edition, O'Reilly Publishers, 2016.
- 2. Karl Beecher, "Computational Thinking: A Beginner's Guide to Problem Solving and Programming", 1st Edition, BCS Learning & Development Limited, 2017.

Web Resources

W1. <u>https://onlinecourses.nptel.ac.in/noc20_cs70/preview</u>

Topics relevant to development of "Employability": Data structures using python. **Topics relevant to "PROFESSIONAL ETHICS":** Naming and coding convention for simple programs using python.

Course Code: CSE2000	Course Title: Program Solving Using C Type of Course: Theory	L- T-P-C	2	0	0	2
Version No.	1.0					
Course Pre-requisites	NIL					
Anti-requisites	NIL					



Course Description	The course i to develop I learning the to any othe	is designed to provic logics which will help basic programming r language in future.	de complete p them to cr constructs t	know reate p hey ca	ledge of C langua programs and ap an easily switch o	age. Students will be able plications in C. ACAlso by ver
Course Object	The objectiv Using C and	e of the course is to f attain Employability	familiarize th through Pro	ne lear oblem	ners with the con Solving Methodc	cepts of Problem Solving logies.
Course Outcomes	On successf	ul completion of thi	s course the	stude	ents shall be able	to:
	1. Wr	ite algorithms and to	o draw flowc	harts	for solving proble	ms
	2. Der constru	monstrate knowledg icts	ge and deve	elop si	mple application	s in C programming
	3. Dev	velop and implemen	t application	ns usin	g arrays and strin	gs
	4. Dec	compose a problem	into functior	ns and	develop modula	r reusable code
	5. Sol	ve applications in C u	using structu	ires ar	nd Union	
	6. Des	sign applications usir	ng Sequentia	al and	Random Access F	ile Processing.
course content.						
Module 1	Introductior	n to C Language	Quiz	F	Problem Solving	6 Sessions
Topics:	_1				-	
Introduction to Progra	mming – Alg	orithms – Pseudo C	ode - Flow (Chart -	– Compilation –	Execution – Preprocessor
Directives (#define, #i	include, #unc	def) - Overview of (C – Constan	nts, Va	ariables and Data	a types – Operators and
Expressions – Managi	ng Input and	d Output Operations	s – Decision	Maki	ng and Branchin	g - Decision Making and
Looping.						
Module 2	Introductior	n to Arrays and String	gs Quiz	F	Problem Solving	6 Sessions
Topics:						
Arrays: Introduction –	One Dimensic	onal Array – Initializa	tion of One [Dimen	sional Arrays – Ex	ample Programs – Sorting
(Bubble Sort, Selection	Sort) – Searc	ching (Linear Search)	- Two Dimer	nsiona	l Arrays – Initializ	ation of Two Dimensional
Arrays. Example Progra	ams – Matrix	operations. Strings:	Introduction	n – De	claring and Initia	lizing String
Variables – Reading Str	ings from Ter	rminal – Writing Strir	ng to Screen	– Stri	ng Handling Func	tions.
Module 3	Functions ar	nd Pointers	Quiz	F	Problem Solving	6 Sessions
Topics:						
Functions: Introductio	n – Need for	User-defined functio	ons – Elemen	nts of l	Jser-Defined Fun	ctions: declaration,
definition and functior	ı call–Categor	ries of Functions – Re	ecursion. Po i	inters	: Introduction – D	eclaring Pointer
Variables – Initializatio	n of Variables	s – Pointer Operators	s – Pointer A	rithm	etic – Arrays and	Pointers – Parameter
Passing: Pass by Value,	, Pass by Refe	rence.				

Course Code: CSE2001	Course Title: Program Solving Using C Lab Type of Course: Lab	L- T-P-C	0	0	4	2	
Version No.	1.0						
Course Pre-requisites	NIL						
Anti-requisites	NIL						
Course Description	The course is designed to provide complete knowledge of C language. Students will be able to develop logics which will help them to create programs and applications in C. ACAlso by learning the basic programming constructs they can easily switch over to any other language in future.						



Course Object	The objective of the course is to familiarize the learners with the concepts of Problem Solving Using C and attain Employability through Problem Solving Methodologies.						
Course Outcomes	On successful completion of this course the students shall be able to:						
	1. Write algorithms and to draw flowcharts for solving problems						
	2. Demonstrate knowledge and develop simple applications in C programming						
	constructs						
	3. Develop and implement applications using arrays and strings						
	4. Decompose a problem into functions and develop modular reusable code						
	5. Solve applications in C using structures and Union						
	6. Design applications using Sequential and Random Access File Processing.						
Course Content:							

List of Practicals:

Lab Sheet 1: 10 Sessions

Program 1: Sum of Two Numbers

Program 2: Find the Greatest of Three Numbers

Program 3: Check Even or Odd using Conditional Operator

Program 4: Print Multiplication Table using Loop

Program 5: Count Digits in a Number using While Loop

Program 6: Demonstration of Preprocessor Directives

Program 7: Simple Calculator using Switch Case

Lab Sheet 2: 10 Sessions

Program 1: Check Whether a Number is Positive, Negative or Zero

Program 2: Find the Sum of First N Natural Numbers

Program 3: Check Whether a Number is Prime or Not

Program 4: Find Factorial of a Number

Program 5: Reverse a Number

Program 6: Simple Number Guessing Game

Lab Sheet 3: 10 Sessions

Program 1: Linear Search in a One-Dimensional Array

Program 2: Bubble Sort on an Integer Array

Program 3: Matrix Addition (2D Arrays)

Program 4: Count Vowels in a String

Program 6: Selection Sort on an Array

Lab Sheet 4: 10 Sessions

Program 1: Sum of Two Numbers Using User-Defined Function

Program 2: Factorial Using Recursion

Program 3: Swap Two Numbers Using Call by Value (No Swap)

Program 4: Swap Two Numbers Using Call by Reference (With Swap)

Program 5: Pointer Basics - Access and Modify Variable via Pointer

Program 6: Accessing Array Elements Using Pointers

Lab Sheet 5: 10 Sessions

Program 1: Basic Structure Usage

Program 2: Input and Display Array of Structures

Program 3: Array Inside Structure (Student Marks)

Program 4: Structure with Nested Structures (Date of Birth)

Program 5: Union Example and Member Access

Lab Sheet 6: 10 Sessions

Program 1: Write to a File (Text Mode) Program 2: Read from a File (Text Mode) Program 3: Append Data to a File



Program 4: Count Characters, Words and Lines in a File Program 5: Write and Read Structure to/from a Binary File Program 6: Random Access in File (Update a Record)

Text Book(s):

E. Balaguruswamy, "Programming in ANSI C", 8th Edition, 2019, McGraw Hill Education, ISBN: 978-93-5316- 513-0.

Reference Book(s):

- 1. Yashwant Kanetkar, Let us C, 17th Edition, BPB Publications, 2020.
- 2. ReemaThareja, "Programming in C", Oxford University Press, Second Edition, 2016.
- 3. Kernighan, B.W and Ritchie, D.M, "The C Programming language", Second Edition, Pearson Education, 2015
- 4. Schildt Herbert, "C: The Complete Reference", Tata McGraw Hill Education, 4th Edition, 2014.
- 5. Stephen G. Kochan, "Programming in C", Addison-Wesley Professional, 4th Edition, 2014.

Web Links and Video Lectures:

- 1. https://nptel.ac.in/courses/106/105/106105171/
- 2. https://archive.nptel.ac.in/courses/106/104/106104128/

Catalogue preparedby	Dr.S.Saravana Kumar
Recommended by theBoard of Studies on	
Date of Approval by the Academic Council	

Course Code:	Course Title: CSE2255 - Ob	ject Oriented		3	0	0	3	
CSF2255	Programming Using Java		L-T- P- C					
0012200	Type of Course: Theory - PC	C						
Version No.	2.0							
Course Pre-	Nil							
requisites								
Anti-requisites	Nil							
Course Description	This course introduces the core concepts of object-oriented programming. This course has theory and lab component which emphasizes on understanding the implementation and application of object-oriented programming paradigm. It helps the student to build real time secure applications by applying these concepts and also for effective problem solving. The students interpret and understand the need for object oriented programming to build applications.							
Course Objective	The objective of the course is to familiarize the learners with the concepts of Problem- Solving using JAVA and attain SKILL DEVELOPMENT through EXPERIENTIAL LEARNING techniques							
Course Out Comes	 On successful completion of the course the students shall be able to: CO1: Describe the basic programming concepts. [Understand] CO2: Apply the concept of classes, objects and methods to solve problems. [Application] CO3: Apply the concept of arrays and strings. [Appy] CO4: Implement inheritance and polymorphism building secure applications. [Apply] CO5: Apply the concepts of interface and error handling mechanism. [Apply] 							
Course Content:								
Module 1	Basic Concepts of Programming and Java	Assignment S	roblem olving			9 Ses	ssions	
Topics: Introduction	to Principles of Programm	ning: Process of Prob	lem Solving	, Java p	rogran	ı stru	cture,	



Download Eclipse IDE to run Java programs, Sample program, Data types, Identifiers, Variables, Constants in java, Operators, Assignments and Expression, Basic Input/ Output functions, Control Statements: Branching and Looping.

10				
Module 2	Classes, objects, methods	Assignment	Problem	10 Sessions
	and Constructors	Assignment	Solving	

Topics: Classes, Objects and Methods: Introduction to object Oriented Principles, defining a class, adding data members and methods to the class, access specifiers, instantiating objects, reference variable, accessing class members and methods.

Static Polymorphism: Method overloading, constructors, constructor overloading, this keyword, static keyword, Nested classes, Accessing members in nested classes.

Modulo 2	Arrays, String and String	Accianmont	Problem	8 Sessions
would 5	buffer	Assignment	Solving	

Topics: Arrays: Defining an Array, Initializing & Accessing Array, Multi –Dimensional Array, Array of objects. String: Creation & Operation. String builder class, methods in String Buffer.

Module 4	Inheritance and Polymorphism	Assignment	Problem Solving	10 Sessions
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Topics: Inheritance: Defining a subclass, Types of Inheritance, super keyword. Dynamic Polymorphism: Method overriding. Final keyword: with data members, with member functions and with class. Abstract keyword: with data members, with members, with member functions and with class, Exception handling.

Module 5	Input & Output Operation in Java	Assignment	Problem Solving	8 Sessions
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Input/output Operation in Java(java.io Package), Streams and the new I/O Capabilities, Understanding Streams, working with File Object, File I/O Basics, Reading and Writing to Files, Buffer and Buffer Management, Read/Write Operations with File Channel, Serializing Objects, Observer and Observable Interfaces.

Text Book

T1 Herbert Schildt, "The Complete Reference Java 2", Tata McGraw Hill Education, 11th Edition, 2019.

References

R1. Cay S Horstmann and Cary Gornell, "CORE JAVA volume I-Fundamentals", Tenth Edition, Pearson 2015.

R2: James W. Cooper, "Java TM Design Patterns – A Tutorial", Addison-Wesley Publishers.4th Edition, 2000.

R3. E. Balagurusamy, "Programming with Java", Tata McGraw Hill Education, 6th Edition, 2019.

E book link R1: <u>http://rmi.yaht.net/bookz/core.java/9780134177373-Vol-</u> <u>1.pdf</u>

E book link R2: Java(tm) Design Patterns: A Tutorial([PDF] [7qmsenjl97t0] (vdoc.pub)

Web **resources**

ps://youtube.com/playlist?list=PLuOW_9III9agS67Uits0UnJyrYiXhDS6q

ps://puniversity.informaticsglobal.com:2229/login.aspx

Topics relevant to development of "Skill Development":

- 1. Static Polymorphism
- 2. Method overloading, constructors
- 3. constructor overloading
- 4. this keyword
- 5. static keyword and Inner classes
- 6. Inheritance and Polymorphism.

for **Skill Development** through **Experiential Learning** techniques. This is attained through assessment component mentioned in course handout.



Course Code:	Course Title: CSE2256 - Object Oriented							
COURSE COUE.	Programming Using Java Lab		L-T- P- C	0	0	4	2	
CJEAAAA	Type of Course: Lab - PCC							
Version No.	2.0							
Course Pre-	CSEXXXX – Problem Solvin	g Using C						
requisites								
Anti-requisites	Nil							
Course Description	This course introduces the core concepts of object-oriented programming. This course has theory and lab component which emphasizes on understanding the implementation and application of object-oriented programming paradigm. It helps the student to build real time secure applications by applying these concepts and also for effective problem solving. The students interpret and understand the need for object oriented programming to build applications.							
Course Objective	The objective of the course i Solving using JAVA and attain	s to familiarize the le n SKILL DEVELOPME	earners with t NT through E	the cond XPERIE	cepts (NTIAL	of Pro LEAF	blem- NING	
	On sussessful completion of t	the course the stude	sta aball ba ak	la tai				
Course Out Comes	 CO1: Demonstrate basic programming concepts. [Apply] CO2: Apply the concept of classes, objects and methods to solve problems. [Application] CO3: Apply the concept of arrays and strings. [Appy] CO4: Implement inheritance and polymorphism building secure applications. [Apply] CO5: Apply the concepts of interface and error handling mechanism [Apply] 							
Course Content:								
Module 1 Basic Concepts of Programming and Java		Assignment	Problem Solving		:	L2 Se	ssions	

Download Eclipse IDE to run Java programs, Sample programs on Data types, Identifiers, Variables, Constants in java, Operators, Assignments and Expression, Basic Input/ Output functions, Control Statements: Branching and Looping.

Modulo 2	Classes, objects, methods	Accignment	Problem	14 Sessions
would z	and Constructors	Assignment	Solving	

Problem solving using Classes, Objects and Methods: defining a class, adding data members and methods to the class, access specifiers, instantiating objects, reference variable, accessing class members and methods. Use Static Polymorphism: Method overloading, constructors, constructor overloading, this keyword, static keyword, Nested classes, Accessing members in nested classes.

Module 3	Arrays, String and String buffer	Assignment	Problem Solving	10 Sessions				
Using Arrays and Str	Ising Arrays and Strings · Defining an Array Initializing & Accessing Array Multi – Dimensional Array Array							

Using Arrays and Strings : Defining an Array, Initializing & Accessing Array, Multi –Dimensional Array, Array of objects. String: Creation & Operation. String builder class, methods in String Buffer.

Modulo	Inheritance ar	d	cianmont	Dr	oblom Colui	ing 12	2 Sessions
Wodule 4	Polymorphism	I AS	Assignment			IIIg	
Inheritance: D	efining a subclass,	Types of Inherita	ance, super	keyword.	Dynamic	Polymorphism	n: Method

overriding. Final keyword: with data members, with member functions and with class. Abstract keyword: with data members, with class, Exception handling.

Module 5	Input & Output Operation in Java	Assignment	Problem Solving	12 Sessions				
nnut/output Operation in Java(java in Package) Streams and the new I/O Canabilities Understanding								

Streams, working with File Object, File I/O Basics, Reading and Writing to Files, Buffer and Buffer Management, Read/Write Operations with File Channel, Serializing Objects, Observer and Observable Interfaces.

P1: Programming Exercises on Basic Concepts.

LEVEL 1: Discuss about datatypes and variables.

LEVEL 2: Demonstrate a simple java program



P2: Programming Exercises on Basic Concepts. LEVEL 1: Discuss about datatypes and variables. LEVEL 2: Demonstrate a simple java program P3: Programming Exercises on operators, expressions based on a given scenario. LEVEL 1: Explain operators, expressions. LEVEL 2: Demonstrate operators P4: Programming Exercises Command Line Arguments based on a given scenario. LEVEL 1: Explain command line arguments LEVEL 2: Demonstrate command line arguments P5: Programming Exercises on basic Input/ Output functions and Control Statements: Branching LEVEL 1: Explain Input/ Output functions LEVEL 2:Demonstrate Control Statements: Branching P6: Programming Exercises on Control Statements: Looping LEVEL 1: Explain variour loops. LEVEL 2:Demonstrate Control Statements: Looping P7: Programming Exercises on Creating Objects, classes on a given scenario. LEVEL 1: Illustrate class, object and methods. LEVEL 2: Execute java program using class and objects P8: Programming Exercises on Adding methods and Constructors to the class based on a given scenario. LEVEL 1: Illustrate methods and constructors LEVEL 2: Execute java program using methods and constructors P9: Programming Exercises on methods based on a given scenario. LEVEL 1: Illustrate method overloading LEVEL 2: Apply method overloading for the given scenario. P10: Programming Exercises on methods based on a given scenario. LEVEL 1: Illustrate constructors overloading LEVEL 2: Apply constructor overloading for the given scenario P11: Programming Exercises on methods for static members bassed on a given scenario. LEVEL 1: Benefits of usage static members LEVEL 2: Usage of Static Members for the given scenario P12: Programming Exercises on static methods based on a given scenario. LEVEL 1: Benefits of usage static methods LEVEL 2: Usage of Static Methods for the given scenario. P13: Programming Exercises on nested Classes based on a given scenario. LEVEL 1: Benefits of usage nested classes LEVEL 2: Apply the concept of usage of nested classes for the given scenario P14: Programming Exercises on Arrays and its built-in functions based on a given scenario. LEVEL 1: Illustrate one dimensional arrays and its functions. LEVEL 2: Demonstrate programs with single-dimensional arrays and operations. P15: Programming Exercises on Arrays and its built-in functions based on a given scenario. LEVEL 1: Illustrate multi dimensional arrays and its functions. LEVEL 2: Demonstrate programs with multi-dimensional arrays and operations. P16: Programming Exercises on String Class and its built-in functions based on a given scenario. LEVEL 1: Explain about String class and String methods. LEVEL 2: Execute simple java applications for String and StringBuffer operations P17: Programming Exercises on String Buffer Class and its built-in functions based on a given scenario. LEVEL 1: Explain about StringBuffer class and String methods. LEVEL 2: Execute simple java applications for String and StringBuffer operations P18: Programming Exercises on String Builders and its built-in functions based on a given scenario. LEVEL 1: Explain about String Builders. LEVEL 2: Execute java applications for String Builders P19: Programming Exercises on single, multi level Inheritance and super keyword based on given scenario. LEVEL 1: Explain single and multi level inheritance.

LEVEL 2: Demonstrate simple applications for the different types of inheritance



P20: Programming Exercises hierarchical Inheritance and super keyword based on given scenario. LEVEL 1: Explain hierarchical inheritance. LEVEL 2: Demonstrate simple applications for hierarchical inheritance P21: Programming Exercises on Overriding. LEVEL 1: Differentiate method overloading and method overriding. LEVEL 2: Demonstrate simple program with dynamic method dispatch. P22: Programming Exercises on Final based on given scenario. LEVEL 1: Implement programs using concept of final. LEVEL 2: Use final keyword for the given problem P23: Programming Exercises on Abstract keyword based on given scenario. LEVEL 1: Implement programs using concept of Abstract. LEVEL 2: Use abstract keyword for the given problem P24: Programming Exercises on Interface based on a given scenario. LEVEL 1: Differentiate abstract class about interface LEVEL 2: Implement interfaces in the given problem P25: Programming Exercises on Exception Handling based on a given scenario. LEVEL 1: Explain exception handling LEVEL 2: Solve the given problem using exception handling mechanism. P26: Programming Exercises on Character Stream Classes based on a given scenario. LEVEL 1: Explain Character Stream Classes LEVEL 2: Solve the given problem using Character Stream Class. P27: Programming Exercises on Read/Write Operations with File Channel based on a given scenario. LEVEL 1: Explain Read/Write Operations with File Channel LEVEL 2: Solve the given problem using Read/Write Operations with File Channel. P28: Programming Exercises on Read/Write Operations with File Channel based on a given scenario. LEVEL 1: Explain Read/Write Operations with File Channel LEVEL 2: Solve the given problem using Read/Write Operations with File Channel. P29: Programming Exercises on Read/Write Operations with File Channel based on a given scenario. LEVEL 1: Explain Read/Write Operations with File Channel LEVEL 2: Solve the given problem using Read/Write Operations with File Channel. P30: Programming Exercises on Read/Write Operations with File Channel based on a given scenario. LEVEL 1: Explain Read/Write Operations with File Channel LEVEL 2: Solve the given problem using Read/Write Operations with File Channel. Targeted Application & Tools that can be used : JDK /Eclipse IDE/Visual Studio Code / net Beans IDE. Text Book

T1 Herbert Schildt, "The Complete Reference Java 2", Tata McGraw Hill Education, 11th Edition, 2019. **References**

R1. Cay S Horstmann and Cary Gornell, "CORE JAVA volume I-Fundamentals", Tenth Edition, Pearson 2015.

R2: James W. Cooper, "Java TM Design Patterns – A Tutorial", Addison-Wesley Publishers.4th Edition, 2000.

R3. E. Balagurusamy, "Programming with Java", Tata McGraw Hill Education, 6th Edition, 2019.

E book link R1: <u>http://rmi.yaht.net/bookz/core.java/9780134177373-Vol-</u> 1.pdf

E book link R2: Java(tm) Design Patterns: A Tutorial([PDF] [7qmsenjl97t0] (vdoc.pub)

Web **resources**

ps://youtube.com/playlist?list=PLuOW_9llI9agS67Uits0UnJyrYiXhDS6q

ps://puniversity.informaticsglobal.com:2229/login.aspx

Topics relevant to development of "Skill Development":



- 1. Static Polymorphism
- 3. Method overloading, constructors
- 4. constructor overloading
- 5. this keyword
- 6. static keyword and Inner classes
- 7. Inheritance and Polymorphism.

for **Skill Development** through **Experiential Learning** techniques. This is attained through assessment component mentioned in course handout.

Course Code: CSE2251	Course Title: Data Commu Computer Networks Type of Course: Theory / P	nications and	L- T-P- C	3	0	0	3			
Version No.	1.0		·	•						
Course Pre- requisites										
Anti-requisites	NIL									
Course Description	The objective of this course is to provide knowledge in data communications and computer networks, its organization and its implementation, and gain practical experience in the installation, monitoring, and troubleshooting of LAN systems. The associated laboratory is designed to implement and simulate various networks using Cisco packet tracer, NS2. All the lab exercises will focus on the fundamentals of creating multiple networks, topologies and analyzing the network traffics.									
Course Objective	The objective of the course is to familiarize the learners with the concepts of Data Communications and Computer Networks and attain Employability through Problem Solving Methodologies.									
Course Outcomes	On successful completion of the course, the students shall be able to: 1] Ilustrate the Basic Concepts Of Data Communication and Computer Networks. 2] Analyze the functionalities of the Data Link Layer. 3] Apply the Knowledge of IP Addressing and Routing Mechanisms in Computer Networks. 4] Demonstrate the working principles of the Transport layer and									
Course Content:										
Module 1	Introduction and Physical Layer- CO1	Assignment	Problem Solvin	ng		7 Ses	sions			
Introduction to Com Topologies, Transm Physical Layer -An Multiplexing and Sp	Introduction to Computer Networks and Data communications, Network Components – Topologies, Transmission Media –Reference Models -OSI Model – TCP/IP Suite. Physical Layer -Analog and Digital Signals – Digital and Analog Signals – Transmission - Multiplexing and Spread Spectrum.									
Module 2	Reference Models and Data Link Layer – CO2	Assignment	Problem Solvin	ng		7 Ses	sions			
Data Link Layer - E Flow Control and E Protocols, CSMA/C	Data Link Layer - Error Detection and Correction – Parity, LRC, CRC, Hamming Code, Flow Control and Error Control, Stop and Wait, ARQ, Sliding Window, Multiple Access Protocols, CSMA/CD, CSMA/CA, IEEE 802.3, IEEE 802.11 Ethernet									
Module 3	Network Layer –CO3	Assignment	Problem Solvin	ng		10 Se	ssions			
Notuce 5 Problem Solving To Sessions Network Layer Services - Network Layer Services, Switching Techniques, IP Addressing methods- IPv4 IPV6 – Subnetting. Routing, - Distance Vector Routing – RIP-BGP-Link State Routing –OSPF-Multi cast Routing-MOSPF- DVMRP – Broad Cast Routing. EVPN-										



VXLAN, VPLS	, ELAN.							
Module 4	Transport and Application Layer -	Assignment	Problem	10 Sections				
	CO3	Assignment	Solving	10 Sessions				
Transport Layer	s - Connection managemer	t - Flow control - R	etransmission, UDP, TCP,					
congestion contr	ol, - Congestion avoidance	e (DECbit, RED)						
The Application	Layer: Domain Name Sys	tem (DNS), Domain	Name Space, SSH, FTP,					
Electronic Mail	(SMTP, POP3, IMAP, MI	ME) - HTTPSN	MP, Web Services, Virtual					
Networking.								
Targeted Appli NS2.	cation & Tools that can b	e used: Cisco Packe	t Tracer, Wireshark, and					
Case Study/Assi	gnment: Choose and analy	ze a network from ar	y organization/Assignment	proposed for this course in				
CO1-CO4								
Problem Solving	g: Choose and appropriate of	devices and impleme	nt various					
network concept	S.							
Programming: S	imulation of any network u	using NS2.						
Text Book(s):								
 1. 1. Behrouz A. Tata McGraw-H 	Forouzan, "Data Commun ill, 2017.	nications and Networ	king 5E", 5 th Edition,					
2. Andrew S Tar	nenbaum, Nick Feamster &	amp; David J Wethe	rall, "Computer					
Networks" Sixth	Edition, Pearson Publicat	ion, 2022						
Reference (s):								
1.References								
1. "Computer 1	Networking: A Top-Down	n Approach", Eight	h Edition, James F. Kuro	se, Keith W. Ross, Pearson				
publication, 202	1.							
2. William Stall	ings, Data and Computer (Communication, 8th	Edition, Pearson Education,	2007.				
3. Larry L. Pete	rson and Bruce S. Davie: C	Computer Networks -	- A Systems Approach, 4th	Edition, Elsevier, 2007.				
E- Resources:								
1. https://archive	.nptel.ac.in/courses/106/105	/106105183/						
2. http://www.npt	telvideos.com/course.php?id	=393						
3. <u>https://www.yo</u>	3.https://www.youtube.com/watch?y=3DZLItfbqtQ							

- 4.https://www.youtube.com/watch?v= fIdQ4yfsfM 5. https://www.digimat.in/keyword/106.html 6. https://puniversity.informaticsglobal.com/login

e: CSE1504	Course Title: Web Technologies Type of Course: Program core Theory	L-T- P- C	2	0 0	2			
Version No.	1.0				l			
Course Pre- requisites								
Anti-requisites	NIL							
Course Description	This course highlights the comprehenused for creating web-based application The associated laboratory provides a enhance critical thinking and analytic	This course highlights the comprehensive introduction to scripting languages that are used for creating web-based applications. The associated laboratory provides an opportunity to implement the concepts and enhance critical thinking and analytical skills.						



Course The objective of the course is to familiarize the learners with the concepts of We					oncepts of Web		
Object	ive	<mark>Tech</mark>	Technology and attain <mark>Skill Development</mark> through <mark>Experiential Learning</mark> techniques.				
Course Outcor	e mes	On sı	uccessf	ful completion of this co	urse the students shall be able t	0:	
		CO1: (App	Implei ly)	ment web-based applica	tion using client-side scripting lar	nguages.	
		CO2 :	Apply	various constructs to en	hance the appearance of a websi	te. (Apply)	
	CO3: Apply server-side scripting languages to develop a web page linked to a database. (Apply)						
Course	e Content:						
Modul	e 1	Introduction XHTML	i to	Quizzes and Assignments	Quizzes on various features of XHTML, simple applications	20 Sessions	
	Basics: We	b, WWW, We	b brow	vsers, Web servers, Inter	net.		
	XHTML: Or Text Marku XHTML, De	igins and Evol ıp, Images, Hy emonstration	ution c /pertex of app	of HTML and XHTML: Bas It Links, Lists, Tables, For lications using XHTML fo	ic Syntax, Standard XHTML Docur ms, Frames, Syntactic Differences r Responsive web pages.	nent Structure, Basic s between HTML and	
Modul	e 2	Advanced CS	5 5	Quizzes and assignments	Comprehension based Quizzes and assignments; Application of CSS in designing webpages	20 Sessions	
	Advanced Layouts, Ap	CSS: Layout, N oproaches to (Normal CSS Lay	Flow, Positioning Eleme yout, Responsive Design,	nts, Floating Elements, Construc CSS Frameworks	ting Multicolumn	

XML: Basics, Demonstration of applications using XML with XSLT.					
Module 3	PHP – Application Level	Quizzes and assignments	Application of PHP in web designing	20 Sessions	
PHP: Introduct	tion to server-side D	evelopment with PHP	, Arrays, Superglobal Arrays, \$GET a	ind \$ POST,	
\$_SERVER Arra	SERVER Array, S_Files Array, Reading/Writing Files, PHP Classes and Objects, Object Oriented Design,				
Working with Databases, SQL, Database APIs, Managing a MySQL Database. Accessing MySQL in PHP,					
Applications.					



List of Laboratory Tasks:

Experiment No. 1: Demonstration of XHTML features

Level 1: Demonstration of various XHTML Tags (Level 1)

Level 2: Design and develop static web pages for an online Book store (Level 2).

Experiment No. 2: Application of CSS in web designing

Level 1: Design a document using XHTML and CSS to create a catalog of items for online electronic shopping.

Level 2: Create and save XML document for students' information and display the same using cascaded style sheet.

Experiment No. 3: Application of PHP in web designing.

Level 1: Write a PHP program to read the personal information of a person such as first name, last name, age, permanent address, and pin code entered by the user into a table created in MySQL. Read the same information from the database and display it on the front end.

Level 2: Using PHP develop a web page that accepts book information such as ISBN number, title, authors, edition, and publisher and store information submitted through the web page in MySQL database.

Experiment No. 4: Building a website.

Build a website for organizing an International Conference. The conference website must be able to collect the author's details and upload a file.

Targeted Application & Tools that can be used: Xampp web server to be used to demonstrate PHP.

Project work/Assignment:

Assignments are given after completion of each module which the student need to submit within the stipulated deadline.

Textbook(s):

1] Robert. W. Sebesta, "*Programming the World Wide Web*", Pearson Education, 9th Edition, 2016. 2]Paul Deitel, Harvey Deitel, Abbey Deital, "Internet & World Wide Web How to Program", Fifth Edition,

Pearson Education, 2021.

3]CSS Notes for Professionals, ebook available at https://books.goalkicker.com/CSSBook/ (Retrieved on Jan. 20, 2022)

4]Deitel, Deitel, Goldberg,"Internet & World Wide Web How to Program", Fifth Edition, Pearson

Education, 2021.

Reference Book(s):

- **R1.** Randy Connolly, Ricardo Hoar, "Fundamentals of Web Development", Pearson Education India, 1st. Edition.2016.
- **R2.** Jeffrey C. Jackson, "Web Technologies: A Computer Science Perspective", Pearson Education, 1st Edition, 2016.

Additional web-based resources

W1. W3schools.comW2. Developer.mozilla.org/en-US/docs/LearnW3. docs.microsoft.com



W4. informit.com/articles/ The Relationship Between Web 2.0 and Social Networking <u>https://presiuniv.knimbus.com/user#/home</u>

Topics related to development of "FOUNDATION":

- 1. Web, WWW, Web browsers, Web servers, Internet.
- 2. CSS, PHP.
- 3. Designing the website for healthcare.

The objective of the course is to familiarize the learners with the concepts of Web Technology and attain Skill Development through Experiential Learning techniques.



PRESIDENCY UNIVERSITY

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Itgalpur, Rajankunte, Yelahanka, Bengaluru – 560064

Course Code: CSE1505	Course Title: Web Technologies Lab Type of Course: Program core lab course	L-T- P- C	0	0 2	1
Version No.	1.0				
Course Pre- requisites					
Anti-requisites	NIL				
Course Description	This course highlights the comprehensive in used for creating web-based applications. The associated laboratory provides an oppo enhance critical thinking and analytical skill	This course highlights the comprehensive introduction to scripting languages that are used for creating web-based applications. The associated laboratory provides an opportunity to implement the concepts and enhance critical thinking and analytical skills.			
Course Objective	The objective of the course is to familiarize t Technology and attain Skill Development thr	the learners rough <mark>Experio</mark>	with the <mark>ential Le</mark>	e concepts of <mark>earning</mark> techni	<mark>Web</mark> ques.



Course Outcomes	ourse On successful completion of this course the students shall be able to:					
outcomes	CO1: Implement web-based application using client-side scripting languages. (Apply)					
	CO2 : Ap	ply various constructs t	o enhance the appearance of a websit	:e. (Apply)		
	CO3: Apply server-side scripting languages to develop a web page linked to a databas (Apply)					
Course Conto	ent:					
Module 1	Introduction to XHTML Features	Quizzes and Assignments	Quizzes on various features of XHTML, simple applications	8 Sessions		
Stand and s	dard XHTML Document	Structure, Basic Text I	Markup such as headings, paragraphs,	lists, tables, forms,		
Module 2	CSS Styling	Quizzes and assignments	Comprehension based Quizzes and assignments; Application of CSS in designing webpages	10 Sessions		
Appl ^ı desig	y CSS3 to style HTML el gn principles.	ements, including layo	ut techniques, color schemes, typogra	phy, and responsive		



XML: Basics, Demonstration of applications using XML with XSLT.				
Module 3	PHP – Application Level	Quizzes and assignments	Application of PHP in web designing	12 Sessions

PHP: Introduction to server-side Development with PHP, Arrays, Superglobal Arrays, \$GET and \$ POST, \$_SERVER Array, \$_Files Array, Reading/Writing Files, PHP Classes and Objects, Object Oriented Design, Working with Databases, SQL, Database APIs, Managing a MySQL Database. Accessing MySQL in PHP, Applications.

List of Laboratory Tasks:

Experiment No. 1: Demonstration of XHTML features

Level 1: Demonstration of various XHTML Tags (Level 1) Level 2: Design and develop static web pages for an online Book store (Level 2).

Experiment No. 2: Application of CSS in web designing

Level 1: Design a document using XHTML and CSS to create a catalog of items for online electronic shopping.

Level 2: Create and save XML document for students' information and display the same using cascaded style sheet.

Experiment No. 3: Application of PHP in web designing.

Level 1: Write a PHP program to read the personal information of a person such as first name, last name, age, permanent address, and pin code entered by the user into a table created in MySQL. Read the same information from the database and display it on the front end.

Level 2: Using PHP develop a web page that accepts book information such as ISBN number, title, authors, edition, and publisher and store information submitted through the web page in MySQL database.

Experiment No. 4: Building a website.

Build a website for organizing an International Conference. The conference website must be able to collect the author's details and upload a file.

Targeted Application & Tools that can be used: Xampp web server to be used to demonstrate PHP.

Project work/Assignment:

Assignments are given after completion of each module which the student need to submit within the stipulated deadline.



Textbook(s):

1] Robert. W. Sebesta, "*Programming the World Wide Web*", Pearson Education, 9th Edition, 2016. 2]Paul Deitel, Harvey Deitel, Abbey Deital, "Internet & World Wide Web How to Program", Fifth Edition,

Pearson Education, 2021.

3]CSS Notes for Professionals, ebook available at https://books.goalkicker.com/CSSBook/ (Retrieved on Jan. 20, 2022)

4]Deitel, Deitel, Goldberg,"Internet & World Wide Web How to Program", Fifth Edition, Pearson

Education, 2021.

Reference Book(s):

- **R1.** Randy Connolly, Ricardo Hoar, "Fundamentals of Web Development", Pearson Education India, 1st. Edition.2016.
- **R2.** Jeffrey C. Jackson, "Web Technologies: A Computer Science Perspective", Pearson Education, 1st Edition, 2016.

Additional web-based resources

- W1. W3schools.com
- W2. Developer.mozilla.org/en-US/docs/Learn
- W3. docs.microsoft.com

W4. informit.com/articles/ The Relationship Between Web 2.0 and Social Networking https://presiuniv.knimbus.com/user#/home

Topics related to development of "FOUNDATION":

- 4. Web, WWW, Web browsers, Web servers, Internet.
- 5. CSS, PHP.
- 6. Designing the website for healthcare.

he objective of the course is to familiarize the learners with the concepts of Web Technology and attain Skill Development through Experiential Learning techniques.



Course Code:	Course Title: Database Mana	agement Systems						
CSE2260	Type of Course: Theory only	- PCC		L-T-P-C	3	0	0	3
Version No.	1.0			•				
Course Pre- requisites	Foundational understanding familiarity with operating sys and discrete mathematics to	of data types, data tems and file mana understand relatio	a structures, gement. Basio onal algebra a	basic progr cknowledg nd query fo	amm e of s ormu	ning set t Ilatio	knov heor on.	vledge, y, logic,
Anti-requisites	NIL							
Course Description	This course introduces the foundational principles of database management systems, including data models, schemas, and architectures. This course provides a solid foundation on the relational model of data and the use of relational algebra. It develops skills in SQL for data definition, manipulation, and control, enabling students to construct and execute complex queries. The course also introduces the concept of object oriented and object relational databases and modern database technologies like NoSQL . The also course allows the students to gain insights into data storage structures and indexing strategies for optimizing guoru performance.							
Course Objective	The objective of the course Management Systems and at	is to familiarize t ttain Employability	he learners v through Prol	vith the co plem Solvir	ncep ng M	ots c ethc	of Da odolo	tabase gies.
Course Out Comes	 On successful completion of the course the students shall be able to: 5. Describe the fundamental elements of relational database management systems. [Understand] 6. Examine databases using SQL query processing and Optimization. [Apply] 7. Design simple database systems applying the normalization constraints and demonstrate the database transaction processing, recovery, and security. [Apply] 8. Interpret the generat of advanced databases and its applications. [Apply] 							
Course Content:								
Module 1	Introduction to Database Modelling and Relational Algebra(Understand)	Assignment	Problem S	olving		10 5	Sessio	ons
Topics: Introduction to Database: Schema, Instance, 3-shema architecture, physical and logical data independence, Data isolation problem in traditional file system, advantages of database over traditional file systems. Entity Relationship (ER) Model, ER Model to Relational Model, Examples on ER model. Relational Algebra with selection, projection, rename, set operations, Cartesian product, joins (inner and outer joins), and division operator. Examples on Relational Algebra Operations.								
Module 2	Fundamentals of SQL and Query Optimization (Apply)	Assignment	Program	nming		11	Sessi	ions



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Topics:
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SQL Database Querying, DDL, DML, Constraints, Operators, Set Operators, Aggregate Functions, Joins, Views, Procedures, Functions and Triggers.

Database programming issues and techniques: Embedded SQL, Dynamic SQL; SQL / PSM and NoSQL. **Query Optimization:** Purpose, transformation of relational expressions, estimating cost and statistics of expression, choosing evaluation plans, linear and bushy plans, dynamic programming algorithms.

Module 3	Relational Database Design & Transaction Management (Apply)	Assignment	Problem Solving	12 Sessions
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Topics:

Relational database design: Problems in schema design, redundancy and anomalies, Normal Forms based on Primary Keys-(1NF,2NF, 3NF), Boyce-Codd Normal Form, Multi valued Dependency (Fourth Normal Form), Join Dependencies (Fifth Normal Form), lossy and lossless decompositions, Database De-normalization.

Transaction Management: The ACID Properties; Transactions and Schedules; Concurrent Execution of Transactions; Lock- Based Concurrency Control; Performance of locking; Transaction support in SQL; Introduction to crash recovery; 2PL, Serializability and Recoverability; Lock Management; The write-ahead log protocol; Check pointing; Recovering from a System Crash; Media Recovery; Other approaches and interaction with concurrency control.

Module 4	Advanced DBMS Topics (Apply)	Assignment	Case Study	12 Sessions
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Topics:

Advanced topics: Object oriented database management systems, Deductive database

management systems, Spatial database management systems, Temporal database management systems, Constraint database management systems.

New database applications and architectures such as Data warehousing, Multimedia, Mobility, NoSQL, Native XML databases (NXD), Document-oriented databases, Statistical databases.

Targeted Application & Tools that can be used:

Application Area: Relational database systems for Business, Scientific and Engineering Applications. Tools/Simulator used: MySQL DB for student practice.

Also demonstration of ORACLE DB on object-relational database creation and JDBC connection.

- 3. Problem Solving: Constructing ER-Diagrams for a given real time requirements, Normalizing the databases, querying the databases using relational algebra.
- 4. Programming: Implementation of any given scenario using MySQL.

Text Books:

- T1. Elmasri R and Navathe S B, "Fundamentals of Database System", Pearson Publication, 7th Edition, 2018.
- T2. RamaKrishna & Gehrke, "Database Management Systems" 3rd Edition, 2018, McGraw-Hill Education.
- T3. W. Lemahieu, S. vanden Broucke and B. Baesens, "Principles of Database Management: Practical Guide to Storing, Managing and Analyzing Big and Small Data", Cambridge University Press, 2018.

References

 R1 Avi Silberschatz, Henry F. Korth, S. Sudarshan, "Database System Concepts", McGraw-Hill ,7th Edition, 2019.
 R2 M. Kleppmann, "Designing Data-Intensive Applications: The Big Ideas Behind Reliable, Scalable, and Maintainable Systems", O'Reilly, 2017.



Topics relevant to development of "FOUNDATION SKILLS": S - Skill Development: Relational database design using ER- Relational mapping, Implementation of given database scenario using MYSQLDB. Topics relevant to development of Employability: Develop, test and implement computer databases, creatingsophisticated, interactive and secure database applications Topics relevant to "HUMAN VALUES & PROFESSIONAL ETHICS": Nil

urse Code:	Course Title: Essential	s of Artificial Intelligence	e	D C	2			2
CSE2264	Type of Course: Progra	m Core Course -Theory		-P-C	3			3
sion No.								
urse Pre-requisites	NIL							
i-requisites								
urse Description	This course introduces the student first learn knowledge-based log uncertainty in AI, as w Classifier and Hidden M Topics: Uninformed se satisfaction, logic, Firs Markov Model (HMM)	s the student to the ba ns the various search r ic representations. Af well as approaches to s Markov Models. Parch, Heuristic search, I t Order Resolution, Pro	sics of a methods fter tha solve suc Local sea bability,	rtificial inte for proble t, the stu ch challeng arch, Adver Naïve Baye	elligenc em-solv ident v ges such sarial se es Class	e. In ing, f vill le n as f earch ifier,	this follov earn Naïve , Cor and	course, wed by about Bayes nstraint Hidden
urse Objectives	The objective of the co techniques.	The objective of the course is EMPLOYBILITY of student by using EXPERIENTIAL LEARNING techniques.						
urse OutComes	On successful complet 1. Explain differe 2. Implement va 3. Prove, by reso 4. Solve sequence	 On successful completion of this course the students shall be able to: 1. Explain different methods of searching, proving, and analysis in AI [Understand] 2. Implement various graphical and adversarial search algorithms. [Apply] 3. Prove, by resolution, different situations using First Order Logic [Apply] 4. Solve sequence labeling problems using HMM [Apply] 						
Course Content:								
dule 1	rch Methods for Problem-Solving	blem-Solving Tests	TEL Assig	gnments		S	essio	No. of ns: 13
Introduction – Hist Formulation of Sea First Search, Dept Single-Source Sho Uninformed Searc Search, A* Search	tory of AI, Agents and Er arch Problems; Data Stru th First Search, Uniforn rtest Path), Iterative Dee ch Algorithms. Heuristic and weighted A* Search	nvironment, Types of Al actures used in Searchin n Cost Search, General epening Depth-First Sea Search Algorithms – Hen n.	and Lea ng. Uninf lized Uni rch, Tim uristics a	arning. Stat ormed Sear iform Cost e and Spac and Admiss	e Space rch Algo Search e Comp ibility, (e Sear rithm (a.k lexity Greec	rch; (n s – E .a Di / Ana ly Be	General Breadth Jkstra's Alysis of St-First



dule 2	vanced Search Methods	blem-Solving Tests	TEL Assignments	No. of Sessions: 12
Local Search – Lo	L Dcal Search. Hill Climbir	l Ig. Genetic Algorithms	G. Gradient Descent. Adve	ersarial Search –
Minimax Search,	Alpha-Beta Pruning, Ic	leal Ordering. Constra	i nt Satisfaction – Constr	aint Satisfaction
Problems Definition	ons and Examples – Ma	p Colouring, N Queens	s, Cryptarithmetic, Genera	alized CSP; Back-
tracking Heuristics	s; Arc Consistency and Pa	th Consistency		
dule 3	wledge-Based Logic Representation	comated Theorem Proving using FOL Resolution	TEL Assignments	No. of Sessions: 10
Propositional Logi	c – Syntax and Semant	ics of Propositional Lo	gic. Logical connectives.	Inference Rules.
Conjunctive and D	isjunctive Normal Forms	s. First Order Logic – Sy	ntax and Semantics of Pro	positional Logic.
Logical connective	es. Inference Rules. Con	junctive and Disjunctiv	ve Normal Forms. Resolut	ion – Resolution
Principle. Proposit	ional and First Order Res	solution. Applications fo	or solving story problems ι	ising Resolution
dule 4	certainty in Al	presenting problems as HMM	TEL Assignments	No. of Sessions: 06
Algorithm. Applica Introduction to De Targeted Applicati 1. Implementat 2. Implementat	ations of Sequence Labe ep Learning – Artificial N on & Tools that can be us ion of a shortest-path fir ion of a sequence labele	ing in Natural Languag eurons, Activation Func sed: nder using different sea r using Viterbi Algorithi	ge Processing (Eg. Part-of- ctions, Multilayer Perceptr arch algorithms. m.	Speech Tagging). on.
ject work/Assignme 1. Group proje	ent: Mention the Type of ct on one of the topics m	Project /Assignment pro nentioned above (Eg. Ad	oposed for this course dversarial search).	
tbook(s):				
 Stuart Ru Educatio Lavika Go Elaine Ri Science F 	ussel and Peter Norvig. A n. 2022. oel. A <i>rtificial Intelligence</i> ch, Kevin Knight and Shiv Press. 2024.	rtificial Intelligence: A N : Concepts and Applicat vashankar B Nair. Artific	Modern Approach. 4 th Editi tions. 1 st Edition. Wiley. 20 cial Intelligence. 4 th Edition	on. Pearson 21. . MedTech
erences:				
 Deepak Kher Munesh Cha 2018. George Luge Pearson Edu 	nani. A First Course in Ar ndra Trivedi. A Classical r. Artificial Intelligence: S cation. 2021.	tificial Intelligence. 1 st E Approach to Artificial I Structures and Strategie	Edition. 6 th Reprint, 2018. <i>ntelligence</i> . 2 nd Edition. Kh es for Complex Problem So	anna Publishers. <i>lving</i> . 6 th Edition.
hlinks				
1. NPTEL Co <u>https://np</u>	urses: Mausam (IIT Delh otel.ac.in/courses/10610	ii), "An Introduction to 2220.	Artificial Intelligence" Linl	«:



2.	Shyamant	a M. Hazarika (IIT Guwahati), "Fundamentals of Artificial Intelligence".			
	Link: https://nptel.ac.in/courses/112103280. Useful for the full course.				
3.	Deepak Khemani (IIT Madras), "Artificial Intelligence: Search Methods for Problem-Solving".				
	Link: <u>https</u>	s://nptel.ac.in/courses/106106226. Useful for Module 1 and 2			
4.	Deepak Kł	nemani (IIT Madras), "Artificial Intelligence: Knowledge Representation and Reasoning".			
	Link: <u>https</u>	s://nptel.ac.in/courses/106106140. Useful for Module 3.			
5.	Deepak Kł	nemani (IIT Madras), "AI: Constraint Satisfaction". Link:			
	https://np	tel.ac.in/courses/106106158. Useful for Module 2.			
Catalog	gue	Dr. Sandeen Albert Mathias			
prepare	ed by				
Recom	mended				
by the	Board of	BOS NO: SOCSE 2 nd BOS held on 17/03/25			
Studies	on				
Date of	f Approval				
by the Academic Academic Council Meeting No 21, Dated 17/03/25		Academic Council Meeting No 21, Dated 17/03/25			
Counci	I				

urse Code:	Course Title: Essentials of AI Lab					
CSE2265	e of Course: Program Core Course - Lab	-P-C	0			T
sion No.						
urse Pre-requisites	NIL					
i-requisites						
arse Description	This course introduces the student to the basics of artificial intelligence. In this course, the student first learns the various search methods for problem-solving, followed by knowledge-based logic representations. After that, the student will learn about uncertainty in AI, as well as approaches to solve such challenges such as Naïve Bayes Classifier and Hidden Markov Models. Topics: Uninformed search, Heuristic search, Local search, Adversarial search, Constraint satisfaction, logic, First Order Resolution, Probability, Naïve Bayes Classifier, and Hidden Markov Model (HMM)					course, wed by about Bayes nstraint Hidden
urse Objectives	The objective of the course is EMPLOYBILITY of student by using EXPERIENTIAL LEARNING techniques.				ARNING	
urse OutComes	On successful completion of this course the students shall be able to: 1. Explain different methods of searching, proving, and analysis in AI [Understanc 2. Implement various graphical and adversarial search algorithms. [Apply]					stand]



	 Prove, by resolution, different situations using First Order Logic [Apply] Solve sequence labeling problems using HMM [Apply]
Course Content:	No. of Sessions: 15 (30 hours)
Experiment No. 1: F	File Handling
Level 1: Read text f	iles using Python
Level 2: Parse text	files using Python
Experiment No. 2: I	mplementation of Graph Representations
Level 1: Implement	graph representations by taking input from the console
Level 2: Implement	graph representations by taking input from files.
Level 1: Implement Level 2: Implement graphs	uninformed search algorithms – BFS and DFS – on unweighted graphs. uninformed search algorithms – Uniform Cost Search and Dijkstra's SSSP – on weighted
Experiment No. 5: I	mplementation of Heuristic Search Algorithms
Level 1: Calculate t	he upper-bounds of admissible heuristics using Dijkstra's SSSP.
Level 2: Implement	Greedy Best-First Search and A* Search Algorithms.
Experiment No. 6 &	a 7: Implementation of Adversarial Search
Level 1: Implement	a Game Tree
Level 2: Perform Al	pha-Beta Pruning and Ideal Ordering
Experiment No. 8 &	a 9: Implementation of a CSP Solver
Level 1: Implement	a CSP solver to solve a cryptarithmetic problem
Level 2: Implement	a CSP solver for map colouring
Experiment No. 10:	Using Python Packages for CSP
Level 1: Implement	a CSP solver for Sudoku
Level 2: Implement	a CSP solver for Addoku
Experiment No. 11:	Implement a Family Tree Parser
Level 1: Perform lo	gic programming using logpy.
Level 2: Implement	a family tree parser
Experiment No. 12	& 13: Implement a Decision Maker
Level 1: Implement	a Minesweeper solver
Level 2: Implement	a Battleship solver
Experiment No. 14	& 15: Hidden Markov Model

Level 1: Implement a generic HMM



Level 2: Build a PoS Tagger using a HMM with the Brown Corpus and the Universal Dependencies Tagset. Targeted Application & Tools that can be used: 3. Google Colab 4. Python IDEs like PyCharm Project work/Assignment: Mention the Type of Project /Assignment proposed for this course The course is a lab-based course with all the assessments centrally evaluated. Every experiment consists of two sessions. The first session involves exploring a solution to the problem. The second session involves solving a particular problem. tbook(s): 1. Stuart Russel and Peter Norvig. Artificial Intelligence: A Modern Approach. 4th Edition. Pearson Education. 2022. 2. Prateek Joshi and Alberto Artasanchez. Artificial Intelligence with Python. 2nd Edition. Packt. 2020. erences: 1. Deepak Khemani. A First Course in Artificial Intelligence. 1st Edition. 6th Reprint, 2018. 2. Munesh Chandra Trivedi. A Classical Approach to Artificial Intelligence. 2nd Edition. Khanna Publishers, 2018. Catalogue Dr. Sandeep Albert Mathias prepared by Recommended by the Board of BOS NO: SOCSE 2nd BOS held on 17/03/25 Studies on **Date of Approval** by the Academic Academic Council Meeting No 21, Dated 17/03/25 Council





GAIN MORE KNOWLEDGE REACH GREATER HEIGHTS

Approved by AICTE, New Delhi

Itgalpur, Rajankunte, Yelahanka, Bengaluru – 560064

	Τ				
	1	0	0	2	1
Foundational understanding of data types, basic programming knowledge, operating systems and file management.					
NIL					
The Database Management Systems (DBMS) Laboratory is designed to provide students with hands-on experience in database design, implementation, and management using SQL and database management tools such as MySQL. The lab complements theoretical concepts learned in database courses by allowing students to practice database creation, querying, and optimization techniques. The DBMS Lab enables students to develop industry-relevant skills in database management, preparing them for careers in software development, data engineering, and database administration . The objective of the course is to familiarize the learners with the concepts of Database Management Systems and attain Employability through Problem Solving Methodologies.					
 On successful completion of the course the students shall be able to: 9. Demonstrate the database concepts, practice, and SQL queries. [Apply] 10.Design and implement database schemas while applying normalization techniques to optimize structure. [Apply]] 11.Develop and implement stored procedures, triggers, and views for automation and efficiency. [Apply] 12.To Design and build database applications for real world problems. [Apply] 					
ıs. [Ap	Ар	p	pl	ply]	ply]

List of Laboratory Tasks:

Create Employee, Student, Banking and Library databases and populate them with required data. Do the following experiments of different lab sheets on those databases.

Labsheet-1 [3 Practical Sessions]

Experiment No 1: [1 Session]

1. To study and implement the different language of Structured Query Language.

Level 1: Perform operations using Data Definition Language and Data Manipulation Language commands including different variants of SELECT on Student DB.

Level 2: Identify the given requirements; valid attributes and data types and Perform DDL and DML operations on a given scenario. [Banking Databases]

Experiment No. 2: [2 Sessions]

2. To study and implement the concept of integrity constraints in SQL.

Level 1: Create tables on Banking database using PRIMARY KEY, NOT NULL, UNIQUE, FOREIGN KEY and demonstrate the working of relational, logical, pattern matching, BETWEEN, IS NULL, IN and NOT IN Special Operators on Student Database.

Level 2: Enforce different types of data and referential integrity constraints. Then try queries with special operators based on the student database. [Banking Database].

Labsheet-2 [3 Practical Sessions]

Experiment No. 3: [1 Session]

3. Implement complex queries in SQL.

Level 1: Implement the conjugate of GROUP BY, ORDER BY and aggregate functions on Banking Database. Level 2: Implement MySQL DB queries on library database using appropriate clauses and aggregate functions. Also order the data either in ascending and descending order using corresponding clause. [Library databases].



Experiment No. 4: [2 Session]

4. To study and implement different types of Set and Join Operations [2 Slots] Level 1: Demonstrate different types of Set Operations (UNION, UNION ALL, INTERSECT, MINUS) and Join Operations (INNER JOINS, OUTER JOINS, CROSS JOIN, NATURAL JOIN) on two or more tables of Airline Database. Level 2: Use Set and Join operations to retrieve the data from two or more relations(tables) as per the given

scenario. [Airline Database]

Labsheet-3 [2 Practical Sessions]

Experiment No. 5: [2 sessions]

5. To study and implement Views, and Procedures in MySQL DB.

Level 1: Implement MySQL Views, and Procedures in ORACLE DB on Employee database.

Level 2: Analyze the requirement and construct views, and Procedures on Mini Project Domain. [Banking Database]

Labsheet-4 [2 Practical Sessions]

Experiment No. 6: [2 Sessions]

6. To study and implement Functions, and Triggers in MySQL DB.

Level 1: Implement Oracle Functions and Triggers in Oracle on Employee database.

Level 2: Analyze the requirement and construct Functions and Triggers. [Supply chain Database]

Labsheet-5 [2 Practical Sessions]

Experiment No. 7: [2 Sessions]

7. To study and implement Functions, and Triggers in MySQL DB.

Level 1: Implement Oracle Functions and Triggers in Oracle on Employee database.

Level 2: Determine the requirement and construct Functions and Triggers. [Supply chain Database]

Labsheet-6 [4 Practical Sessions]

Experiment No. 8: [2 Sessions]

8. To implement the concept of forms and reports.

Level 1: Implement the concept of forms and reports.

Level 2: Examine the schema relationship.

Experiment No. 9: [2 Sessions]

9. Create the database using the given schema. (Flight Management)

Level 1: Implement a relational database based on the provided schema for the Flight Management system, including the creation of tables, relationships, and constraints.

Level 2: Demonstrate schema relationships by defining primary and foreign keys to ensure data integrity within the Flight Management database.

Labsheet-7 [4 Practical Sessions]

Experiment No. 10: [2 Sessions]

10. Create the database using the given schema. (Company database)

Level 1: Implement the database schema by defining tables, relationships, and constraints according to the given Company Database schema.

Level 2: Demonstrate the schema's relationships and data integrity by creating and linking tables as per the specified requirements.

Experiment No. 11: [2 Sessions]

11. Create the database using the given schema. (Student Library)

Level 1: Implement forms and reports based on the provided Student Library database schema, ensuring effective data entry and reporting mechanisms.

Level 2: Demonstrate the schema relationships within the Student Library database, demonstrating how these relationships influence the creation and functionality of forms and reports.

Labsheet-8 [1 Sessions]

12. Design a mini project based on the databases such as Inventory Management System, University Management System, Hospital Management System, etc.

Level 1: Implement the real time database.

Level 2: Analyze the working of database in real time.



Targeted Application & Tools that can be used:

Application Area: Relational database systems for Business, Scientific and Engineering Applications. Tools/Simulator used: MySQL DB for student practice.

Also demonstration of ORACLE DB on object-relational database creation and JDBC connection.

Percentage of changes in this version: 50% of changes from earlier version. New topics are highlighted in italic.

- 5. Problem Solving: Constructing ER-Diagrams for a given real time requirements, Normalizing the databases, querying the databases using relational algebra.
- 6. Programming: Implementation of any given scenario using MySQL.

Text Books:

- T1. Elmasri R and Navathe S B, "Fundamentals of Database System", Pearson Publication, 7th Edition, 2018.
- T2. RamaKrishna & Gehrke, "Database Management Systems" 3rd Edition, 2018, McGraw-Hill Education.
- T3. W. Lemahieu, S. vanden Broucke and B. Baesens, "Principles of Database Management: Practical Guide to Storing, Managing and Analyzing Big and Small Data", Cambridge University Press, 2018.

References

 R1 Avi Silberschatz, Henry F. Korth, S. Sudarshan, "Database System Concepts", McGraw-Hill ,7th Edition, 2019.
 R2 M. Kleppmann, "Designing Data-Intensive Applications: The Big Ideas Behind Reliable, Scalable, and Maintainable Systems", O'Reilly, 2017.

Topics relevant to development of "FOUNDATION SKILLS": S - Skill Development: Relational database design using ER- Relational mapping, Implementation of given database scenario using MYSQLDB.

Topics relevant to development of Employability: Develop, test and implement computer databases, creatingsophisticated, interactive and secure database applications

Topics relevant to "HUMAN VALUES & PROFESSIONAL ETHICS": Nil

Course Code: CSE2269	Course Title: Operating Systems		3	0	0	3
	Type of Course: Program Core and Theory Only	L-T- P- C				
Version No.	1.0					
Course Pre- requisites	Nil					
Anti-requisites	NIL					
Course Description	This course introduces the concepts of operating a structure and its design and implementation. It co- internal algorithms such as process scheduling, sy and recovery and memory management. The solving, systems programming ability and case s	ystem operat overs the class ynchronizatio course also e tudies.	ions ical n, d enha	s, op ope eadl nce	erating erating locks d s the p	system systems etection problem
Course Object	The objective of the course is to familiarize Operating Systems and attain Employab Methodologies.	the learners fility through	witl h I	n th Prol	e conc olem	cepts of Solving



Course Out	On successful con	npletion of the course	the students shall be able to:	
Comes	[] Describe the fu	indamental concepts o	of operating Systems and case st	udies.
	2] Demonstrate v	arious CPU schedulin	g algorithms[Application]	
	3] Apply various	tools to handle synch	ronization problems.[Application	on]
	4] Demonstrate d	eadlock detection and	recovery methods [Application	n]
Course	5] mustrate vario	bus memory managem	ent techniques.[Application]	
Content:				
	Introduction to			
Module 1	Operating System	Assignment	Programming	9 Hours
Topics:				~ ~ ~ ~ ~ ~
Introduction to C	DS, Operating-Syst	em Operations, Opera	iting System Services, , System	Calls and its
OS design and ir	nplementation Ope	en-source operating system	its types, Linkers and Loaders,	Overview of
	Process	Assignment/Case		11 11
Module 2	Management	Study	Programming/Simulation	11 Hours
Topics:			~ ~	
Process Concept	, Operations on Pr	ocesses, Inter Process	Communication, Communication	on in client-
Libraries. Threa	ding Issues. Proce	ss Scheduling– Basic	concepts. Scheduling Criteria	Scheduling
Algorithms: FCF	FS, SJF, SRTF, RR	and Priority.	concepts, senerating enterna	, seneduling
	-	-		
	Process			44.77
Module 3	Synchronization	Assignment	Programming	11 Hours
Topics:	and Deaulocks			
The Critical-Sec	tion Problem- Pete	erson's Solution, Svnc	chronization hardware. Semaph	ores. Classic
Problems of Syn	chronization with S	Semaphore Solution-1	Producer-Consumer Problem, R	eader-Writer
problems, Dinin	ng Philosopher's P	roblem, . Introduction	n to Deadlocks, Necessary co	onditions for
deadlock, Resou	rce allocation Gra	ph, Methods for har	ndling deadlock: Deadlock Pre	evention and
Implementation, Deadlock	Deadlock Avoida	nce and Implementat	ion, Deadlock detection & Re	covery from
Module 4	Memory Management	Assignment	Programming/Simulation	10 Hours
Topics:	rvianagement			
Introduction to	Memory Manag	ement, Basic hardw	vare-Base and Limit Register	rs, Memory
Management Un	it(MMU), Dynamie	c loading and linking,	Swapping, Contiguous and Nor	n-Contiguous
Memory Allocat	tion, Segmentation	, Paging - Structure	of the Page Table – Virtual 1	Memory and
Demand Paging	– Page Faults an	d Page Replacement	Algorithms, Copy-on-write, A	Allocation of
Introduction to F	ile system manage	ment: File System Inte	erface (access methods, director	v structures).
File system impl	ementation.			<i>y sei a e cai e s)</i> ,
Targeted Applie	cation:			
Application are	a is traffic manage	ement system, bankii	ng system, health care and ma	ny more
systems where 1	n there are resour	ces and entities that	use and manage the resources	•
Software Tools:	1			
Oracle Virtu	al Box/VMWare V	irtualization software	[Virtual Machine Managers]. U	sed to install
and work on	multiple guest Ope	erating Systems on top	o of a host OS.	
1 . 1 D	• 1 .• 0• .• .		1. 1. 1 1.	
Intel Process	sor identification ut	ility: This software is	used to explain about multi-cor	e rog Chingot
information	technologies sunn	orted by the processor	etc.	res, empset
Project work/As	ssignment			
Demonstrat	e process concepts	s in LINUX OS.		
Simulation	of CPU scheduling	algorithms.		



Develop program to demonstrate use of Semaphores in threads. Develop program to demonstrate use of deadlock avoidance algorithms. Develop program to demonstrate use of page replacement algorithms. Simulation of memory allocation strategies [first fit, best fit and worst fit].

Text Book

Silberschatz A, Galvin P B and Gagne G, "Silberschatz's Operating System Concepts", Paperback, Global Edition Wiley, 2019

References

Silberschatz A, Galvin P B and Gagne G, "Operating System Concepts", 10th edition Wiley, 2018.

William Stallings, "Operating Systems", Ninth Edition, By Pearson Paperback, <u>1 March 2018</u>.

Sundaram RMD, Shriram K V, Abhishek S N, B Chella Prabha, "Cracking the Operating System skills", Dreamtech, paperback, 2020

Remzi H. Arpaci-Dusseau Andrea C. Arpaci-dusseau, "Operating Systems: Three Easy Pieces, Amazon digital Services", September 2018.

E-resources/Weblinks

https://www.os-book.com/OS9/

https://pages.cs.wisc.edu/~remzi/OSTEP/

https://codex.cs.yale.edu/avi/os-book/OS10/index.html

Course Code: CSE7000	Course Title: Internship Type of Course:	L- T-P- C	-	-	-	2
Version No.	1.0					
Course Pre- requisites	Knowledge and Skills related to all the course	es studied in	prev	ious s	emeste	ers.
Anti-requisites	NIL					
Course Description	Students observe science and technology in act method of scientific experimentation, and often g operate sophisticated and costly equipment implementation of the principles of management observe multidisciplinary teams of experts from operations research, and management deal with micro and macro levels. Finally, it enables them to communication and inter-personal skills, both by evaluation components, such as seminar, g preparation, etc. The broad-based core education, and rich in analytical tools, provides the found understand properly the nature of real-life proble	tion, develop get an opportu t. They als they have lea n engineering techno-econ o develop and vits very natu group discus , strong in ma lation necessa	an a unity of so le rnt in a, scie omic l refin re, an ssion, thema ary fo	warer to see arn class, nce, e probl e their d by t proj atics a or the	ess of study about when t conom ems at r langua the vari ect rej and scie studen	the and the hey ics, the age, ious port ence t to
Course Objectives	The objective of the course is to familiarize the learners with the concepts of Professional Practice and attain Employability Skills through Experiential Learning techniques.					
Course Outcomes	 On successful completion of this course the stude 1. Identify the engineering problems relate needs. (Understand) 2. Apply appropriate techniques or mod problem. (Apply) 3. Design the experiments as per the stand 4. Interpret the events and results for mean 	ents shall be a ed to local, re- lern tools fo ards and spe- ningful conclu	ble to giona or sol cificat usions	: I, nati ving ions. 5. (Eva	onal or the in (Analyz aluate)	global tended ze)



Catalogue prepared by	Mr. Md Ziaur Rahman
Recommended by	
the Board of Studies	
on	
Date of Approval	
bythe Academic	
Council	

Course Code:	Course Title: Software Desig	n and Developr	nent			
CSE2271	Type of Course: School Core	[Theory Only]		L-T- P- C	3	-0-0-3
Version No.	1.0				1	
Course Pre-requisites	NIL					
Anti-requisites	NIL					
Course Description	The objective of this course is process and principles. The course covers software re implementation and testing a The course covers software q	s to provide the equirement eng aspects of softw uality, configura	fundamentals ineering proces are system dev ation managem	concepts o sses, syste elopment aent and n	of Software em analysis naintenanc	e Engineering , design, e.
Course Objectives	The objective of the course is Software Engineering and at techniques.	to familiarize tl tain Skill Develo	ne learners witl opment throug	h the conc h Participa	cepts of ative Learn	ing
Course Out Comes	On successful completion of f 1] Describe the Software Eng 2] Identify the requireme application(Comprehension) 3] Understand the Agile Princ 4] Apply an appropriate plan in software(Application)	this course the s ineering princip ents, analysis ciples(Knowledg ning, scheduling	tudents shall b les, ethics and p and appropria e) g, evaluation a	e able to: process m ate desig nd mainte	odels(Knov n models enance prir	wledge) for a given nciples involved
Module 1	Introduction to Software Engineering and Process Models (Knowledge level)	Quiz				10 Hours
Introduction: Need for Softw Engineering Practice-Essence of Models: Waterfall Model – Cla	vare Engineering, Professiona of Practice, General Principles assical Waterfall Model, Iterat	I Software Devel Software Devel ive Waterfall Mo	elopment, Soft opment Life Cy odel, Evolution	ware Eng cle ary model	ineering E	thics, Software ototype.
Module 2	Software Requirements, Analysis and Design (Comprehension level)	Assignment	Development of for a given sce	of SRS doc nario	cuments	12 Hours
Requirements Engineering: E Specification (SRS), Requireme and Swim lane diagram. CASE s Design: Design concepts, Arch	liciting requirements, Function ant Analysis and validation. Re support in Software Life Cycle, itectural design, Component b	onal and non- quirements mod Characteristics based design, Us	Functional required delling- Introdu of CASE Tools, A ser interface de	uirements Iction to U Architectu Issign.	s, Software se Cases, A re of a CAS	Requirements Activity diagram E Environment.
Module 3	Agile Principles & Devops (Knowledge level)	Quiz		-		10 Hours



Agile: Scrum Roles and activities, Sprint Agile software development methods - Scaling, User Stories, Agile estimation techniques, Product backlogs, Stake holder roles, Dynamic System Development Method. Devops: Introduction, definition, history, tools.

Software Testing and Module 4 Maintenance (Application Level)	Assignment	Apply the testing concepts using Programing	13 Hours
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Software Testing-verification and validation, Test Strategies - White Box Testing, Black box Testing. Automation Tools for Testing.

Software Quality Assurance-Elements of software quality assurance, SQA Tasks, Goals and Metrics, Software configuration management- SCM process, SCM Tools (GitHub).

Maintenance- Characteristics of Software Maintenance, Software Reverse Engineering, Software Maintenance Process Models.

Targeted Application & Tools that can be used: Selenium, GitHub, CASE Tools

Text Book

1. Roger S. Pressman, "Software Engineering – A Practitioner's Approach", VII Edition, McGraw-Hill, 2017.

2. Bob Hughes, Mike Cotterell, Rajib Mall, "Software Project Management", VI Edition, McGraw-Hill, 2018.

References

- 1. Rajib Mall, "Fundamentals of Software Engineering", VI Edition, PHI learning private limited, 2015.
- 2. Ian Sommerville, "Software Engineering", IX Edition, Pearson Education Asia, 2011.
- 3. Agile Software Development Principles, Patterns and Practices.1st Edition, Wiley, 2002

Topics Relevant to "Skill Development: Balck box Testing, White box Testing, Automated Testing for Skill development through Participative Learning Techniques. This is attained through assessment mentioned in the course handout

urse Code: 22274	urse Title: Competitive Programming and Problem Solving pe of Course: Program Core	-P-C	D	D		
rsion No.						
urse Pre-requisites						
ti-requisites						
arse Description	The Competitive Programming and Problem Solu efficient problem-solving skills for coding compet Starting with brute-force solutions, students lea complexity using advanced techniques like algorithms, and backtracking. Hands-on practice Codeforces helps tackle problems involving num algorithmic paradigms. By understanding CP con mindset, students gain the confidence to ex interviews, and practical applications.	ving cou citions ar arn to o dynamic on platt ber theo straints scel in	rse equind real optimizion forms forms forms forms and for compe	uips s -worle e tim ramm like C ta str ta str sterin etitior	tuder d cha e and ing, odeC uctur g a s is, te	nts with llenges. d space greedy hef and res, and trategic echnical
urse Out Comes	On successful completion of the course the studer CO1 : Understanding the issues of online platform (CP) and developing brute force coding for commo	nts shall ns and C only aske	be able ompet d CP p	e to: itive F roblei	rogra ms.	amming



	CO2 : Analyzing the space and time complexity of brute force solutions and designing efficient solutions.CO3 : Evaluating the applicability of suitable algorithmic approaches to solve
	relevant CP problems. CO4: Creating efficient solutions of CP problems using the learnt algorithmic approaches.
urse Objective	The objective of the course is to familiarize the learners with the concepts of Competitive Programming and Problem Solving and attain Skill Development through Experiential Learning techniques.

dule 1: Introduction to Competitive Programming

erview of Efficient Coding for Problem Solving and CP: Introduction to competitive programming (CP); revisit of complexity analysis; introduction to online platforms such as codechef, codeforces etc and online submission; constraints during CP, online testing process and common errors such as TLE; use of STL

dule 2: Number Theory for Problem-Solving

of Number Theory for problem-solving: reducing time/space complexity of brute force coding solution of Sieve Method, Inverse Module, Euclidian Method of factorization; efficient coding for Permutation Combination; XORing based and pattern-based solutions.

dule 3: Optimizing Time & Space Using Sequential Storage

ling for Optimizing time and Space using Sequential Storage: two pointer approach; problem-solving using arrays and strings such as rotation on sorted arrays, duplicate removal, string matching algorithms; Kadane's algo, stacks, priority-queues and hashing based efficient coding; median based problems and alternate solutions.

dule 4: Non-Linear Data Structures

blying Non-Linear Data Structures for real-life problems: design of efficient solutions for problems such as finding loops in a linked list, memory efficient DLL, block reversal in LL; problem solving using trees and binary trees, Catalan numbers, applications of graphs, spanning tree and path algos for CP problems with reduced time/space complexity.

dule 5: Problem Solving using Advanced Topics

Problem Solving using Advanced Topics: concept of disjoint sets and their efficient representation, algorithmic approaches such as Greedy, Backtracking, Dynamic Programming and applying them for CP problems using bottom-up dynamic programming.

of Laboratory Tasks:

- 1. You are given the finishing times of 'N' runners in a marathon. Write a program to find the runner who finished in the third position. **Focus:** Basic data structures (arrays), sorting algorithms (e.g., insertion sort, selection sort), and basic input/output.
- 2. In the same marathon, you are given the finishing times of 'N' runners and their bib numbers. Write a program to efficiently find the top 10 runners and their corresponding bib numbers. **Focus:** Efficient sorting algorithms (e.g., merge sort, quick sort), data structures like priority queues, and optimizing for large datasets.
- 3. A library maintains a list of books with their unique IDs. Write a program to check if a given book ID is present in the library. Focus: Searching algorithms (linear search), basic data structures (arrays or lists).



- 4. The library wants to implement a system to quickly find books by their titles. Suggest an efficient data structure (e.g., a hash table or a trie) and explain how to implement it to achieve fast book lookups. Focus: Understanding the trade-offs between different data structures, choosing the most appropriate data structure for a specific problem, and implementing efficient search operations.
- 5. An online store sells products with different prices. Write a program to calculate the total cost of a given list of products. **Focus:** Basic arithmetic operations, working with arrays or lists to store product prices.
- 6. The online store offers discounts based on the total purchase amount. Design an algorithm to efficiently calculate the final cost of an order, considering different discount rules (e.g., percentage discounts, fixed amount discounts, tiered discounts). Focus: Algorithmic design, conditional statements, handling complex scenarios with multiple rules, and potentially using dynamic programming techniques for optimization.
- 7. You are given two integers, 'a' and 'm'. Calculate 'a' raised to the power 'm' modulo a large prime number 'p'. **Focus:** Basic modular arithmetic operations (modular exponentiation), understanding the modulo operator.
- 8. In a secure communication system, you need to efficiently compute the modular exponentiation for very large values of 'm'. Implement and analyze the efficiency of the binary exponentiation algorithm for this task. **Focus:** Efficient algorithms for modular exponentiation (binary exponentiation), time complexity analysis, and understanding the importance of efficient algorithms in cryptography.
- 9. You have a deck of 'N' cards. Calculate the total number of possible hands of size 'K' that can be drawn from the deck. **Focus:** Basic combinatorics (combinations), factorial calculations.
- 10. In a card game, you need to calculate the probability of drawing certain combinations of cards (e.g., a pair, a three-of-a-kind) from a shuffled deck. Design an efficient algorithm to calculate these probabilities. Focus: Advanced combinatorics (permutations and combinations with repetitions), probability calculations, and optimizing calculations to avoid overflows.
- 11. You are given a network of devices represented as a graph. Determine if there is a path between two given devices in the network. **Focus:** Graph traversal algorithms (depth-first search or breadth-first search).
- 12. In a secure network, you need to detect and isolate compromised devices. Design an algorithm that efficiently identifies devices that exhibit anomalous behavior (e.g., unusual traffic patterns) using XOR-based techniques for data comparison and pattern matching. **Focus:** Applying XOR operations for data comparison and pattern recognition, understanding the properties of XOR (e.g., commutative, associative), and designing algorithms for network anomaly detection.
- 13. You are given an array representing the speeds of cars on a highway. Find the minimum time required for all cars to pass a certain point. **Focus:** Basic array traversal, finding the minimum element in an array.
- In a more realistic scenario, cars have different lengths. Implement a two-pointer approach to simulate the movement of cars and determine the minimum time for all cars to pass a given point.
 Focus: Two-pointer technique, simulating real-world scenarios with arrays, optimizing time complexity.
- 15. Given a string, find the number of occurrences of a specific substring within the string. **Focus:** Basic string manipulation, string matching (brute-force approach).
- 16. Implement the KMP (Knuth-Morris-Pratt) string matching algorithm to efficiently find all occurrences of a given pattern within a large text document. **Focus:** Advanced string matching algorithms, understanding the concept of the "next" array in KMP, optimizing for large input sizes.
- 17. An online auction platform receives bids for different items. Implement a data structure (e.g., a priority queue) to efficiently track the highest bid for each item. **Focus:** Priority queues, insertion and extraction operations on priority queues, basic implementation of a priority queue using an array or a suitable library.



- 18. The auction platform needs to handle a large number of bids concurrently. Design and implement a system that efficiently processes bids, updates the highest bid for each item, and handles potential race conditions. Focus: Concurrent data structures and algorithms, thread safety, handling race conditions, optimizing for high-throughput scenarios.
- 19. A social network can be represented as a graph where users are nodes, and connections between users are edges. Write an algorithm to find if two given users are connected in the network. **Focus:** Graph traversal algorithms (depth-first search or breadth-first search), basic graph representation (adjacency list or adjacency matrix).
- 20. In a large social network, efficiently finding the shortest path between two users is crucial. Implement Dijkstra's algorithm to find the shortest paths between users in the network, considering edge weights (e.g., representing the strength of connections). **Focus:** Shortest path algorithms (Dijkstra's algorithm), graph algorithms with weighted edges, optimizing for large graphs.
- 21. A file system can be modeled as a tree structure. Implement a function to traverse the file system and print the names of all files and directories. **Focus:** Tree traversal algorithms (depth-first search or breadth-first search), basic tree representation (using nodes and pointers).
- 22. Design and implement a file system that supports efficient operations like creating directories, deleting files, and finding files based on their names or paths. Consider using a combination of tree structures and hash tables for efficient indexing and searching. **Focus:** Designing and implementing file system structures, using multiple data structures together, optimizing for common file system operations.
- 23. An online shopping cart can be represented as a tree, where each node represents an item or a category of items. Write an algorithm to calculate the total price of all items in the shopping cart. Focus: Tree traversal, calculating sums within a tree structure.
- 24. Implement a system that allows customers to apply discounts and coupons to their shopping carts. Consider using a combination of trees and other data structures (e.g., hash tables) to efficiently apply discounts and calculate the final price. **Focus:** Applying discounts and promotions to tree-like structures, efficient implementation of discount rules, optimizing for complex pricing scenarios.
- 25. In a social network, users can form groups. Given a list of friendships, determine if all users in a specific group are connected (directly or indirectly) through friendships. **Focus:** Disjoint set union (DSU) data structure, basic connectivity checks.
- 26. Design an efficient algorithm to find the minimum number of new friendships needed to connect all users in the social network into a single, connected component. **Focus:** Applying DSU for finding connected components, greedy algorithms, optimization for minimizing connections.
- 27. A treasure hunt involves a series of clues leading to the final treasure. Given a list of possible paths and their associated costs, find the cheapest path to reach the treasure. **Focus:** Greedy algorithms (e.g., Dijkstra's algorithm for shortest paths), basic graph representation.
- 28. In a more complex treasure hunt, there are time constraints associated with each path. Design an algorithm to find the fastest path to the treasure while considering both path costs and time constraints.
- **Focus:** Combining greedy approaches with other techniques (e.g., priority queues), handling multiple constraints, optimizing for time-critical scenarios.
 - 29. In a simplified chess game with only rooks, determine the minimum number of moves required for a rook to reach a specific target square on an empty board. **Focus:** Breadth-first search (BFS) on a graph (the chessboard), basic graph traversal.
 - 30. In a more realistic chess game with multiple pieces and obstacles, implement a minimax algorithm with alpha-beta pruning to determine the best move for a player. **Focus:** Game tree search, minimax algorithm, optimization techniques like alpha-beta pruning, handling complex game states.

geted Application & Tools that can be used:


- 1. C or C++ Compiler (g++): The standard compiler for CP. Familiarize students with compilation flags (e.g., -O2 for optimization).
- 2. IDE (Integrated Development Environment): Code:: Blocks, Visual Studio, CLion, or similar IDEs. These provide debugging capabilities, code completion, and other helpful features.
- 3. Online Judges (CodeChef, Codeforces, LeetCode, HackerRank): Essential for practicing and submitting solutions.
- 4. Debugger (gdb): Crucial for understanding code execution and finding bugs. Origin, excel and Mat lab soft wares for programming and data analysis.
- 5. Number Theory Libraries: Some libraries provide pre-built functions for number theory operations (though often it's better to implement them yourself for learning).
- 6. Wolfram Alpha: A useful tool for verifying number theory calculations and exploring concepts.
- 7. **String Libraries:** Familiarize students with the string manipulation functions available in C++.
- 8. **Graph Visualization Tools:** Tools like Graphviz can be helpful for visualizing graphs and understanding graph algorithms.
- 9. **DP Debugging Techniques:** Practice debugging DP solutions, as they can be complex. Visualizing the DP table can be helpful.

t Books:

- 1 Guide to Competitive Programming: Learning and Improving Algorithms Through Contests" (3rd Edition), *Antti Laaksonen, springer, 2024*
- 2 "Data Structures and Algorithms in Java: A Project-Based Approach" Dan S. Myers, Cambridge University Press

Reference Books:

- 1. Data Structures and Algorithmic Thinking with Python/C++/Java", *Narasimha Karumanchi*, 5th *Edition, Career Monk, 2017.*
- 2. Introduction to Algorithms, <u>Thomas H. Cormen</u> (Author), <u>Charles E. Leiserson</u> (Author), <u>Ronald L.</u> <u>Rivest</u>, fourth edition April 2022

Web Resources

1. https://nptel.ac.in/courses/106106231

2.

ject work/Assignment: Mention the Type of Project /Assignment proposed for this course

Assessment Type Midterm exam Assignment (review of digital/ e-resource from PU link given in references section mandatory to submit screen shot accessing digital resource.) Quiz End Term Exam

Self-Learning



Course Code:CSE 7100	Course Title: Mini Project Type of Course:	L- T-P- C	0	0	0	4	
Version No.	1.0		1				
Course Pre- requisites	Knowledge and Skills related to all the courses studied in previous semesters.						
Anti-requisites	NIL						
Course Description	Students observe science and technology in action, develop an awareness of the method of scientific experimentation, and often get an opportunity to see, study and operate sophisticated and costly equipment. They also learn about the implementation of the principles of management they have learnt in class, when they observe multidisciplinary teams of experts from engineering, science, economics, operations research, and management deal with techno-economic problems at the micro and macro levels. Finally, it enables them to develop and refine their language, communication and inter-personal skills, both by its very nature, and by the various evaluation components, such as seminar, group discussion, project report preparation, etc. The broad-based core education, strong in mathematics and science and rich in analytical tools, provides the foundation necessary for the student to understand properly the nature of real-life problems. The students have options to pursue this course as either Project Work and Dissertation at the university, or Project Work in an Industry/Company.						
Course Objectives	The objective of the course is to familiarize the lear Practice and attain Employability Skills through	rners with the Experiential I	conc Learni	epts o ng te	of Profe chnique	essional es.	
Course Outcomes	 On successful completion of this course the students shall be able to: Identify the engineering problems related to local, regional, national or global needs. (Understand) Apply appropriate techniques or modern tools for solving the intended problem. (Apply) Design the experiments as per the standards and specifications. (Analyze) Interpret the events and results for meaningful conclusions. (Evaluate) Appraise project findings and communicate effectively through scholarly publications. (Create) 						
Catalogue prepared by	Dr. Sampath A K						
Recommended by the Board of Studies on							
Date of Approval bythe Academic Council							



Course Code:CSE 7300	Course Title: Capstone Project Type of Course:	L- T-P- C	0	0	0	10		
Version No.	1.0	I						
Course Pre- requisites	Knowledge and Skills related to all the course	Knowledge and Skills related to all the courses studied in previous semesters.						
Anti-requisites	NIL	IL						
Course Description	Students observe science and technology in action, develop an awareness of the method of scientific experimentation, and often get an opportunity to see, study and operate sophisticated and costly equipment. They also learn about the implementation of the principles of management they have learnt in class, when they observe multidisciplinary teams of experts from engineering, science, economics, operations research, and management deal with techno-economic problems at the micro and macro levels. Finally, it enables them to develop and refine their language, communication and inter-personal skills, both by its very nature, and by the various evaluation components, such as seminar, group discussion, project report preparation, etc. The broad-based core education, strong in mathematics and science and rich in analytical tools, provides the foundation necessary for the student to understand properly the nature of real-life problems. The students have options to pursue this course as either Project Work and Dissertation at the university, or Project Work in an Industry/Company/ Research Laboratory, or Internship Program in an Industry/Company.							
Course Objectives	The objective of the course is to familiarize the lear Practice and attain Employability Skills through	rners with the Experiential I	conc Learni	epts o ng te	f Profe chnique	ssional es.		
Course Outcomes	 On successful completion of this course the students shall be able to: Identify problems based on societal /research needs. (Understand) Apply Knowledge and skill to solve societal problems in a group. (Apply) Develop interpersonal skills to work as member of a group or leader. (Apply) Analyze the inferences from available results through theoretical / Experimental / Simulations. (Analyze) Analyze the impact of solutions in societal and environmental context for sustainable development. (Analyze) Improve in written and oral communication. (Create) Demonstrate capabilities of self-learning in a group, which leads to lifelong learning. (Understand) 							
Catalogue prepared by	Dr. Sampath A K							
Recommended by the Board of Studies on								
Date of Approval bythe Academic Council								



Course Code: CSE3427	Course Title: .N	NET Full Stack Develop	oment	L- T-P- C	2-0-2-3
Version No.	1.0				
Course Pre-	Nil				
requisites					
Anti-requisites	CSE3151 Java F	ull Stack Developmen	t		
Course	This advanced l	evel course enables stu	idents to perf	orm full st	ack development
Description	using .NET, wit for Full Stack technology. In technologies/too successful com career in full-st solving skills as	th emphasis on employ development is base this course, the foc ols like C#, ASP.NF pletion of this course ack development. The s part of this course.	ability skills. d on either us is on usi ET, Entity F , the student students sha	The key t Java tech ng .NET Trameworl shall be ll develop	echnologies used nology or .NET and the related c Core, etc. On able to pursue a o strong problem-
Course Objectives	The objective of DotNET FULL Experiential Lea	of the course is to fa STACK Development arning techniques.	miliarize the : and attain	learners Employ	with the concepts of ability Skills through
Course Outcomes	On successful c 1] Practice the 2] Show web a 3]Solve simple	ompletion of the cou use of C# for develop pplications using Entit web applications that	rse the stude ing a small a cy Framewor t use SQL and alon a Full St	nts shall oplication k. [Applic I ASP.NET	be able to: [Application] ation] [Application]
Course Content:					
Module 1	C# Programming for Full Stack Development	Project	Programmir	ng	10 Sessions
Topics:					I
.NET Framework Fr arrays and collect statements, Mana Properties, Auto In methods, Sealed threading, Data va exceptions, Workin Assignment: Deve	undamentals, Visions, Working w ging program flomplemented, Dec Classes/Methonalidation and working with Files, Un lop a small applit	sual Studio IDE Fundar with variables, operato ow and events, Workin elegates, Anonymous ds, Partial Classes/M orking with data colle it Testing – Nunit fran cation for managing li	nentals, C# La ors, and expr ng with classe Methods an lethods, Asy ections inclue nework brary using C	anguage F ressions, I es and me d Anonyn ynchronou ding LINQ #.	eatures, Working with Decision and iteration ethods, OOP concepts, nous Types, Extension us programming and , Handling errors and
Module 2	Entity Framework Core 2.0	Project	Programmir	ng	06 Sessions
Topics: Entity Framework Querying the EDM Advanced Operation Assignment: Deve	Core 2.0 Code ; Working With S ons; Performanc lop an applicatic	e First Approach; Int Stored Procedures; Ad e Optimization; Data A on for managing HR po	roduction Tc vanced Entit Access with A llicies of a de	Entity F y Framew DO.NET partment	ramework and EDM; ork - DbContext [EF6];
Module 3	ASP.NET	Project	Programmir	ng	06



Sessions

Topics:

ASP.NET Core, ASP.Net Core 3.1 MVC, ASP.NET Core Middleware and Request pipeline, Review of SQL using MS SQL, Working With Data In Asp.Net, Razor View Engine, State Management In Asp. Net MVC & Layouts;

Assignment: Develop a web application to mark entry/exit of guests in a building.

Module 4	ASP.NET	Project	Programming	08 Sessions
— ·				

Topics:

Introduction To Models, Validations In Asp.Net MVC, Authentication and Authorization In Asp.Net MVC, Advanced Asp. Net MVC - Ajax Action Link In MVC, Advanced Asp.Net MVC - Ajax Forms In MVC, Microsoft Testing Framework – Unit Testing the .NET Application

Assignment: Develop a software tool to do inventory management in a warehouse.

Targeted Application & Tools that can be used:

Application Area is to Design and Analyzing the efficiency of Algorithms. This fundamental course is used by all application developers.

Professionally Used Software: Visual Studio

Project work/Assignment:

- 1. Problem Solving: Design of Algorithms and implementation of programs.
- 2. Programming: Implementation of given scenario using .NET.
- 3. Assignment: Case study on Web sites development

Text Book:

- T1. Fender, Young, "Front-end Fundamentals", Leanpub, 2015
- T2. Valerio De Sanctis, "ASP.NET Core 5 and Angular: Full-stack web development with .NET 5 and Angular 11", 4th Edition, Packt, 2021.

References

- R1. Benjamin Perkins, Jon D. Reid, "Beginning C# and .NET", Wiley, 2021 Reid, 2021.
- R2. Piotr Gankiewicz, "Full Stack .NET Web Development", Packt Publishing, 2017.
- R3. Tamir Dresher, Amir Zuker, Shay Friedman, "Hands-On Full-Stack Web Development with ASP.NET Core", Packt Publishing, 2018.
- R4. Dustin Metzgar, "Exploring .NET core with microservices, ASP.NET core, and Entity Framework Core", Manning, 2017.

Topics relevant to development of "Employability": C#, ASP.NET & SQL for developing Employability **Skill Development** through **Experiential Learning** techniques.. This is attained through assessment component mentioned in course handout.

Course Code: CSE3428	Course Title: Java Full Stack Development	L- T-P- C	2-0-2-3
Version No.	1.0		



no en licitor						
Anti-requisites	CSF3152_NFT	Full Stack Develo	onment			
Anti-requisites	This advanced			1. davial anno 4		
Course Description	I his advanced using Java, wi for Full Stack technology. In technologies/to Core, etc. On s pursue a caree problem-solvin	th emphasis on each th emphasis on each development is this course, th pols like Java EE successful comple r in full-stack de ng skills as part o	bles students to perform full stac mployability skills. The key tec s based on either Java techno he focus is on using Java, a E, Java Persistence, Hibernate, etion of this course, the student evelopment. The students shall of this course.	hnologies used blogy or .NET nd the related Maven, Spring shall be able to develop strong		
Course	This course is	This course is designed to improve the learners' EMPLOYABILITY SKILLS by				
Objectives	using PROBL	EM SOLVING N	Aethodologies.			
Course Outcomes	5 On successful 1] Practice the 2] Show web a 3] Solve simpl 4] Apply conce 5] Employ aut [Applicatio	completion of the suse of Java for f applications usin e applications us epts of Spring to comation tools ling	ne course the students shall be full stack development [Applica g Java EE. [Application] sing Java Persistence and Hiber develop a Full Stack applicatio ike Maven, Selenium for Full S	able to: ation] nate [Application] n. [Application] Stack development.		
Course Content:		-				
Module 1	Introduction	Project	Programming	03 Sessions		
Topics: Review of Java; Ao tools.	dvanced concep	ts of Java; Java g	enerics; Java IO; New Features	of Java. Unit Testing		
Module 2	Java EE Web Applications	Project	Programming	05 Sessions		
Topics:	. _					
Introduction to E Management witl ServletContext, Se JSP; Complete Ap	LCIIPSE & Tomc h JSP; JSP Stanc ession, Cookies; p - Integrating J	at; JSP Fundame lard Tag Library Request Redirec DBC with MVC Ap	entals; Reading HTML form D - Core & Function Tags; Servlet tion Techniques; Building MVC pp	ata with JSP; State API Fundamentals; App with Servlets &		
Assignment: Deve	elop an applicat	ion for managing	HR policies of a department.			
Module 3	Java Persistence using JPA and Hibernate	Project	Programming	06 Sessions		
Topics:						
Fundamentals of Caching, Perform Locking & Version database using JP Assignment: Desi housing society	Java Persisten ance and Conc ning; Entity Rela QL and Criteria gn and develop	ce with Hiberna urrency; First & ationships, Inher API (JPA) a website that ca	te; JPA for Object/Relational I Second Level Caching, Batch I itance Mapping & Polymorphic an actively keep track of entry-e	Mapping, Querying, Fetching, Optimistic c Queries; Querying exit information of a		
Module 4	Spring Core	Project	Programming	10 Sessions		
Topics:	1	1	I			
I T		Dest DECT AD		1 11 ' 0 '		
Spring Core, Spri	ng MVC, Spring	g Bool REST AP	71; Understanding Spring Frame	work; Using Spring		



Programming); Implementing Spring Security; Developing Spring REST API; Using Spring Boot for Rapid Development

Assignment: Develop a software tool to do inventory management in a warehouse.

Module 5	Automation tools	Project	Programming	06 Sessions
L .				

Topics:

Introduction to Automation Tools; Apache Maven: Maven Fundamentals, Software Setup -Commandline and Eclipse, pom.xml and Directory Structure, Multi-Module Project Creation, Scopes, Dependency Management, Profiles; Functional/BDD Testing using Selenium, Selenium Fundamentals and IDE, Selenium WebDriver, Installation and Configuration, Locating WebElements, Driver Commands, WebElement Commands

Assignment: Illustrate the use of automation tools in the development of a small software project. Targeted Application & Tools that can be used:

Application Area is to Design and Analyzing the efficiency of Algorithms. This fundamental course is used by all application developers.

Professionally Used Software: Eclipse, NetBeans, Hibernate, Selenium, Maven, GIT.

Project work/Assignment:

1. Problem Solving: Design of Algorithms and implementation of programs.

2. Programming: Implementation of given scenario using Java.

Text Book:

T1. Fender, Young, "Front-end Fundamentals", Leanpub, 2015

References

R1. Soni, Ravi Kant. "Full Stack AngularJS for Java Developers: Build a Full-Featured Web Application from Scratch Using AngularJS with Spring RESTful.", Apress, 2017.

R2. Mardan, Azat. "Full Stack JavaScript: Learn Backbone.js, Node.js and MongoDB.", Apress, 2015

Course Code: CSE3426	Course Title: Front-end Full Stack Development	L- T-P- C	2-0-2-3		
Version No.	1.0				
Course Pre-requisites	Nil				
Anti-requisites	NIL				
Course Description	This intermediate course enables students to development, with emphasis on employability technologies and architectures that enables the st front-end. On successful completion of this cour pursue a career in full-stack development. The problem-solving skills as part of this course.	perform fr skills. The udent to des se, the stude students sl	ont-end full stack course covers key sign and implement ent shall be able to hall develop strong		
Course Objectives	This course is designed to improve the learners' EMPLOYABILITY SKILLS by using PROBLEM SOLVING Methodologies.				
Course Outcomes	On successful completion of the course the studer 1] Describe the fundamentals of DevOps and [Comprehension] 2] Illustrate development of a responsive web. [Ap 3] Apply concepts of Angular.js to develop a web f 4] Apply concepts of Angular.js to develop a web f	nts shall be a Front-end oplication] ront-end. [A ront-end. [A	ble to: full stack development. pplication] pplication]		



Course Content:				
Module 1	Fundamentals of DevOps and Web	Project	Programming	04 Sessions
	Development	5	5 5	

Topics:

Introduction to Agile Methodology; Scrum Fundamentals; Scrum Roles, Artifacts and Rituals; DevOps – Architecture, Lifecycle, Workflow & Principles; DevOps Tools Overview – Jenkins, Docker, Kubernetes.

Review of GIT source control. HTML5 – Syntax, Attributes, Events, Web Forms 2.0, Web Storage, Canvas, Web Sockets; CSS3 – Colors, Gradients, Text, Transform

Assignment: Develop a website for managing HR policies of a department.

Module 2	Responsive web design	Project	Programming	03 Sessions

Topics:

BootStrap for Responsive Web Design; JavaScript – Core syntax, HTML DOM, objects, classes, Async; Ajax and jQuery Introduction

Assignment: Design and develop a website that can actively keep track of entry-exit information of a housing society.

Topics:

Setting up Development & Build Environment: Node.js and NPM; Introduction to TypeScript; Working with OOP concepts with TypeScript; Angular Fundamentals; Angular CLI; Introduction to TypeScript; Debugging Angular applications; Components & Databinding in Depth; Angular Directives; Using Services & Dependency Injection; Angular Routing; Observables; Handling Forms in Angular Apps; Output transformation using Pipes; Making Http Requests; Authentication & Route Protection; Dynamic Components; Angular Modules & Optimizing Angular Apps; Deploying an Angular App; Angular Animations; Adding Offline Capabilities with Service Workers; Unit Testing in Angular Apps (Jasmine, Karma).

Assignment: Develop a software tool to do inventory management in a warehouse.

Module 4	Fundamentals of React.js	Project	Programming	15 Sessions

Topics:

Overview of React.js.; Reactive Programming; React Components; Render Method; Virtual DOM and Bandwidth Salvation; Two Distinct Ways of Initializing a React Class; States & Life Cycles; Component Mounting; Node.js & NPM; JSX Walkthrough; React Testing.

Assignment: Develop a web-based application to book movies/events (like bookmyshow).

Targeted Application & Tools that can be used:

Application Area is to Design and Analyzing the efficiency of Algorithms. This fundamental course is used by all application developers.

Professionally Used Software: GCC compiler.

Project work/Assignment:

- 1. Problem Solving: Design of Algorithms and implementation of programs.
- 2. Programming: Implementation of given scenario using Java.

Text Book:

- T1. Fender, Young, "Front-end Fundamentals", Leanpub, 2015
- T2. Northwood, Chris, "The Full Stack Developer: Your Essential Guide to the Everyday Skills Expected of a Modern Full Stack Web Developer", APress, 2018



References:

- R1. Flanagan D S, *"Javascript : The Definitive Guide"* 7th Edition. 7th ed. O'Reilly Media; 2020.
- R2. Alex Libby, Gaurav Gupta, and Asoj Talesra. "Responsive Web Design with HTML5 and CSS3 Essentials", Packt Publishing, 2016
- R3. Duckett J Ruppert G Moore J. *"Javascript & Jquery : Interactive Front-End Web Development.";* Wiley; 2014.
- R4. Greg Sidelnikov, *"React.js Book_ Learning React JavaScript Library"*, 1 edition, Scratch-River Tigris LLC 2016
- R5. Web Reference:

https://www.youtube.com/watch?v=JGNTYXkVCVY&list=PLd3UqWTnYXOkTSBCBNyyhxo_jxlY_uTWA&in dex=2

urse Code:	Course Title: Calculus and						
AT2301	Differential Equations		Г- Р- С	8	L)	4
ncion No	Type of Course:BSC						
rsion 1NO.							
urse e-requisites	Basic Concepts of Limits, Differentiation, Integration (PU level)						
ti-requisites	NIL	NIL					
urse Description	mathematics, statistics and operations research. In this course, students can be able to build upon the foundations of calculus established to greatly enhance their repertoire of theory and practice in these areas. The application of calculus and differential equations in the description and modelling of real-world problems will also be considered. This unit will extend the problem-solving skills, range of knowledge and use of techniques in differential and integral calculus. The course focuses on the concepts of Calculus and Differential Equations with reference to specific engineering problems. The course is of both conceptual and analytical type in nature.						
urse Objective	The goal of the course Calculus and Differential Equations is to facilitate the students with a concrete foundation of differential calculus and to solve the first and higher-order ordinary differential equations enabling them to acquire the knowledge of these mathematical tools						
urse Out Comes	On successful completion of the co	ourse th	he students sha	ıll be	able	e to:	
	 Apply the knowledge of calculus to solve problems related to polar curves and its applications in determining the bentness of a curve. Apply the principles of integral calculus to evaluate integrals. Learn the notion of partial differentiation to calculate rate of change of multivariate functions and solve problems related to composite functions and Jacobian. Solve first-order linear/nonlinear ordinary differential equations angletically using standard methods 						
urse Content:							
dule 1	ferential Calculus						
Polar Coordinates, pola pedal equations, curva Limit, continuity and normal line; Maxima, divergence.	ar curves, angle between radius vector ture and radius of curvature. partial derivatives, directional deriv minima and saddle points; Method	or and the vatives of Lag	the tangent, an , total derivat grange multipl	gle b ive; ' iers;	etwe Tang Gra	en tv gent j dient	vo curves, plane and , curl and
Evolutes and involutes their properties; Applie	Evolutes and involutes; Evaluation of definite and improper integrals; Beta and Gamma functions and their properties; Applications of definite integrals to evaluate surface areas and volumes of revolutions.						



Rolle's theorem, Mean value theorems, Taylor's and Maclaurin theorems with remainders; Indeterminate forms and L'Hospital's rule; Maxima and minima.
dule 3 Ifivariable Calculus
Multiple Integration: Double integrals (Cartesian), change of order of integration in double integrals, Change of variables (Cartesian to polar), Applications: areas and volumes, Center of mass and Gravity (constant and variable densities); Triple integrals (Cartesian), orthogonal curvilinear coordinates, Simple applications involving cubes, sphere and rectangular parallelepipeds; Scalar line integrals, vector line integrals, scalar surface integrals, vector surface integrals. Theorems of Green, Gauss and Stokes
dula 1 forential Equations
Definition, types of Differential Equations, Applications, Variable Separable, Homogeneous, Exact, linear and Bernoulli's equations, Euler's equations, Equations not of first degree: equations solvable for p, equations solvable for x and Clairaut's type. Linear differential equations of second and higher order with constant coefficients - Non-Homogeneous term of the type $Q(x) = e^{ax}$, Sin ax, Cosax, $e^{ax}v(x)$, $x^nv(x)$ - Method of variation of parameters.
geted Application & Tools that can be used:
ferential calculus is used extensively in science and engineering. It can solve problems related to motion, velocity, acceleration, angles of incline or curve on a surface, etc. ferential Equations are used to model the behavior of electromagnetic fields, including in the design of antennas, microwave ovens, and other devices. Biology: PDEs are used to model biological processes, such as the spread of diseases and the development of biological tissues.
ols Used: Python.
signment:
1. Select any one simple differential equation pertaining to the respective branch of engineering, identify the dependent and independent variable – Obtain the solution and compare the solution sets by varying the values of the dependent variable.
kt Book
 Erwin Kreyzig, Advanced Engineering Mathematics, John Wiley and sons, Inc.10th Edition B. S. Grewal (2017), Higher Engineering Mathematics by, 44th Edition, Khanna Publishers.
ferences:
1. Victor Henner, Tatyana Belozerova, Mickhail Khenner, Ordinary and Partial Differential Equations, CRC Press, Edition, 2013.
2. Walter Ledermann, Multiple integrals, Springer, 1st edition
3. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
4. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
E-resources/ Web links:
1. <u>https://presiuniv.knimbus.com/user#/viewDetail?searchResultType=ECATALOGUE_BASED</u>
&unique_id=EBSCO95_30102024_103205
2. <u>https://presiuniv.knimbus.com/user#/viewDetail?searchResultType=ECATALOGUE_BASED</u> <u>&unique_id=EBSCO95_30102024_106839</u>
3. <u>https://presiuniv.knimbus.com/user#/viewDetail?searchResultType=ECATALOGUE_BASED</u> &unique_id=EBSCO95_30102024_61605
4. <u>https://presiuniv.knimbus.com/user#/viewDetail?searchResultType=ECATALOGUE_BASED</u>
5 https://www.moth.hkust.edu.hk/.magion/mo006_0607E.html
5. <u>https://www.math.ikust.edu.ik/~maqiai/ina000_000/1.ittini</u> 6. https://www.cou.edu.eu/study.et.cou/units/meth1005/2022/
0. Intps://www.scu.edu.au/study-at-scu/umits/matn1005/2022/
pics relevant to SKILL DEVELOPMENT: The course focuses on the concepts of calculus and differential equation with reference to specific engineering problems. The course is of both conceptual and analytical type in nature through Problem solving. This is attained through the assessment component mentioned in course handout.



urse Code:	Course Title: Optoelectronics and Quantum					1	
v2504	Physics Lab	-P-C	h	h			
	e of Course: BSC		Ĩ	Ĩ			
rsion No.							
urse Pre-requisites	-						
ti-requisites							
	The laboratory provides an opportunity to	validata tha		conto	. + 2	aht and	
urse Description	enhances the ability to use the concepts for technological applications. The laboratory tasks aim to develop following skills: An attitude of enquiry, confidence and ability to tackle new problems, ability to interpret events and results, observe and measure physical phenomena, select suitable equipment, instrument and materials, locate faults in systems.						
urse Out Comes On successful completion of the course the students shall be able to:							
	CO1: To understand electrical and optical prope	rties of mater	rials				
CO2: Interpret the results of various experiments to verify the concepts us optoelectronics and advanced devices.						used in	
urse Objective	The objective of the course is to familiarize t Applied Physics for Computer Science Cluster "a <u>Experiential Learning</u> techniques	the learners within the learners within the learners with the learners withelearners with the learners with the learners	with <mark>I Dev</mark>	the c <mark>elopr</mark>	conce <mark>ment</mark>	pts of " through	
rel 2: propagation of e Experiment NO 2: To size of lycopodium p rel 1: Determination o rel 2: Finding the part	errors in addition, subtraction, multiplication and div o determine the wavelength of semiconductor diode owder using diffraction. If Wavelength of Laser ticle size of lycopodium powder.	<i>v</i> ision. e Laser and to	estii	mate	the p	particle	
eriment No. 3: To d	letermine the proportionality of Hall Voltage, magr	netic flux den	sity a	and th	he po	plarity of	
rel 1: To determine the rel 2:	ne proportionality of Hall Voltage and magnetic flux he polarity of Charge carrier.	density					
Experiment No. 4: To conditions.	o study the I-V characteristics of a given zener diode	in forward a	nd re	verse	e bias		
el 1: To study I –V voltage.	characteristics of the given Zener diode in reverse	bias and to	detei	rmine	e brea	ak down	
el 2: To study I –V ch forward resistance.	aracteristics of the given Zener diode in forward bia	s and to dete	rmine	e kne	e volt	tage and	
Experiment No. 5: To	o study input and output characteristics of a given T	ransistor.					
rel 1: 10 determine the	Imput resistance of a given transistor. Input transfer characteristics and transistor parameters	ers of a given	tran	sisto	r		

Experiment No. 6: Determination of Fermi energy and Fermi temperature of a given metal and bimetallic Page **11** of



wire.

Level 1: Determination of Fermi energy and Fermi temperature of given metal wire.

Level 2: Determination of Fermi energy and Fermi temperature of given bimetallic wire.

periment No. 7: To study the I-V characteristics and I-R characteristics of a solar cell as a function of the irradiance.

el 1: To study the I-V characteristics

el 2: I-R characteristics of a solar cell as a function of the irradiance.

eriment No. 8: Calculate the numerical aperture and study the losses that occur in optical fiber cable. .

- el 1: Calculate the numerical aperture.
- el 2: study the losses that occur in optical fiber cable.

eriment No. 9: Plotting I-V characteristics in forward and reverse bias for LEDs Determination of knee voltage.

el 1: Plotting I-V characteristics in forward and reverse bias for LEDs

el 2: Determination of knee voltage.

eriment No. 10: Determination of Stefan's constant and verification of Stefan-Boltzmann Law.

- el 1: Determination of Stefan's constant
- el 2: Verification of Stefan-Boltzmann Law.

eriment No. 11: Determination of dielectric constant of given materials.

- el 1: Determination of Stefan's constant
- el 2: compare the obtain results with other materials

eriment No. 12: determine the wavelength of monochromatic light, such as sodium light, using Newton's rings. el 1: Determination of wavelength

el 2: determine the radius of curvature of the Plano-convex lens.

geted Application & Tools that can be used:

1. Areas of application are optoelectronics industry, Solar panel technologies, quantum computing software, electronic devices using transistors and diodes, memory devices, endoscopy, SQUIDS in MRI, Advanced material characterizations using SEM and STM.

2. Origin, excel and Mat lab soft wares for programming and data analysis.

ject work/Assignment: Mention the Type of Project /Assignment proposed for this course						
Assessment Type						
•	Midterm exam					
•	Assignment (review of digital/ e-resource from PU link given in references section -					
<mark>ma</mark>	ndatory to submit screen shot accessing digital resource.)					
•	Quiz					
•	End Term Exam					
•	Self-Learning					
1. Prepare a com	prehensive report on non-conventional energy resources in Karnataka and their pros and					
cons.						



2. Write a report on importance of quantum entanglement in supercomputers.

urse Code:	Course Title: Optoelectronics and C	luantum						
Y2501	Physics		-P-C	3	0			
	e of Course: BSC							
rsion No.								
urse Pre-requisites								
ti-requisites								
urse Description	The purpose of this course is to enal working and applications of optoeled appreciate the applications of adva course develops the critical thinking	ble the st ctronic de anced mic and analy	udents to un vices and to croscopy an rtical skills.	nderstar develop d quant	d the fui the basi um com	ndame c abili puters	entals, ties to s. The	
urse Out Comes	On successful completion of the cour	rse the stu	udents shall	be able	to:			
	CO1: To understand the concepts of electrical conducting properties of metal, semiconductor and superconductivity.							
	CO2: To understand the principles of quantum mechanics.							
	CO3: Discuss the quantum concepts used in quantum computers.							
	CO4: Explain the applications of lasers and optical fibers in various technological fields.							
urse Objective	The objective of the course is to fam Physics for Computer Science Clust quantum mechanics and computation	iiliarize th er "and to on.	e learners w o attain the	vith the basic k	concepts nowledg	of "A e relat	pplied ted to	
urse Content:								
dule 1	ctrical Conductivity Of Solids And Semiconducting Devices	ignment	a co effi sola	llection ciency ar cells.	on of Sess i	ions		
Topics: Classificati	on of materials based on bandgap,	Fermi e	energy and	Fermi l	evel, Fei	rmi le	vel in	
semiconductors, Law p-n junctions, Zener (of mass action, Electrical conductivity diode, Solar cells, I-V characteristics, a	of a semiond LEDs	conductor, H	all effec	t, Supero	conduc	ctivity,	
dule 2	antum Mechanics	ignment			Sessi	ions		
Topics: Introduction, de-Broglie hypothesis, Heisenberg's uncertainty principle- statement and physical significance. Wave function-properties and physical significance. Schrodindger's time independent wave equation, Probability density and normalization of wave function. Wave Function in Ket Notation: Matrix form of wave function, Identity operator, Determination of I 0> and I 1>, Pauli Matrices and its operations on 0 and 1 states, Mention of Conjugate and Transpose, Unitary Matrix U, Examples: 2x2 Matrices and their multiplication (Inner Product), Probability, Orthogonality								
dule 3	antum Computing	m paper	nina qua con	ntum 1puters.	on Sessi	ions		



Topics: Introduction to quantum computing, Moore's law & its end, Differences between classical and quantum computing, Concept of Qubit and its properties, . Representation of qubit by Bloch sphere, Quantum Gates: Single Qubit Gates: Quantum Not Gate, Pauli Z Gate, Hadamard Gate, Phase Gate (or S Gate), T Gate. Multiple Qubit Gates: Controlled gate - CNOT Gate, (Discussion for 4 different input states). Representation of Swap gate, Controlled - Z gate, Toffoli gate. Problems.

dule 4 e	ers And Optical Fibers	m paper	e study medical applications Lasers.	on of	Sessions
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Topics: Interactions of radiations with matter, expression for energy density of a system under thermal equilibrium in terms of Einstein's coefficients, conditions for LASER action using Einstein's coefficients, Characteristics of laser, conditions and requisites of laser, Principle of optical fibers, Numerical aperture and acceptance angle (Qualitative), Attenuation, Applications: Point to point communication with block diagram, application of optical fibers in endoscopy.

geted Application & Tools that can be used:

1. Areas of application are optoelectronics industry, Solar panel technologies, quantum computing software, electronic devices using transistors and diodes, memory devices, endoscopy, SQUIDS in MRI, Advanced material characterizations using SEM and STM.

2. Origin, excel and Mat lab soft wares for programming and data analysis.

ject work/Assignment: Mention the Type of Project /Assignment proposed for this course

<mark>Assessment Type</mark>

- Midterm exam
- Assignment (review of digital/ e-resource from PU link given in references section mandatory to submit screen shot accessing digital resource.)
- Quiz
- End Term Exam
- Self-Learning
- 1. Prepare a comprehensive report on non-conventional energy resources in Karnataka and their pros and cons.

2. Write a report on importance of quantum entanglement in supercomputers.

t Book

- 1. Engineering Physics by Avadhanalu, Revised edition, S. Chand Publications, 2024.
- 2. Quantum Computation and Quantum Information, Michael A. Nielsen & Isaac L. Chuang, Cambridge Universities Press, 2010 Edition

References:

1. Elementary Solid state Physics: Principles and Applications by M.A. Omar, 1st Edition, Pearson Publications, 2002.

- 2. Principles of Quantum Mechanics by R Shankar, 2nd edition, springer Publications, 2011.
- 3. Optoelectronics: An Introduction by John Wilson and John Hawkes, 3rd edition, Pearson Publications, 2017.
- 4. Engineering Physics by Gaur and Gupta, Dhanpat Rai Publications, 2012.
- 5. Introduction to Quantum Mechanics, David J <u>Griffiths</u>, Cambridge University Press, 2019



E-Re	sourses:
1.	https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=553045&site=ehost-
live	
2.	https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=833068&site=ehost-
live	
3.	https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=323988&site=ehost-
live	
4.	https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=1530910&site=ehost-
live	
5.	https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=486032&site=ehost-
live	

Topics relevant to "SKILL DEVELOPMENT": Fundamentals of materials, Lasers and optical fibers. for Skill Development through Participative Learning Techniques. This is attained through the Assignment/ Presentation as mentioned in the assessment component in course handout.

Course Code: MEC1006	Course Title: Eng Type of Course: S	ineering Graphics School Core & Theory C	Only	L- T-P-	2	0	0	2	
Version No.	1.2			C					
Course Pre- requisites	NIL								
Anti-requisites	NIL								
Course Description	The course is des It is introductor create engineerin and solids and is	he course is designed with the objective of giving an overview of engineering graphics. is introductory in nature and acquaints the students with the techniques used to reate engineering drawings. The course emphasizes on projection of points, lines, planes nd solids and isometric projections.							
Course Objective	The objective of the course is to familiarize the learners with the concepts of "Engineering Graphics" and attain SKILL DEVELOPMENT through Problem solving methodologies.								
Course Outcomes	 On successful completion of this course the students shall be able to: (1) Demonstrate competency of Engineering Graphics as per BIS conventions and standards. (2) Comprehend the theory of projection for drawing projections of Points, Lines and Planes under different conditions. (3) Prepare multiview orthographic projections of Solids by visualizing them in different positions. (4) Prepare pictorial drawings using the principles of isometric projections to visualize abiasts in three dimensions. 								
		Course Conten	t:						
Module 1	Introduction to Drawing	Assignment	Standard tech	nical drav	wing		02 Ses	sions	



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Introduction, drawing instruments and their uses, relevant BIS conventions and standards, Lettering, Line conventions, dimensioning, Selection of drawing sheet size and scale.

[02 Hours: Comprehension Level]

Module 2Orthographic projections ofAssignmentProjection methods Analysis10 Sessions	Module 2	Orthographic As	ssignment	Projection methods Analysis	10 Sessions
--	----------	-----------------	-----------	-----------------------------	-------------



Points,
Straight Lines
and Plane
Surfaces

Topics:

Introduction, Definitions – Elements of projection and methods of projection, Planes of projection,

reference line and conventions adopted. First angle and third angle projections. Projection of Points in all 4 quadrants.

Projections of Straight Lines (located in first quadrant/first angle projection only): True and apparent lengths, true and apparent Inclinations to reference planes. (No application problems). Projection of Plane surfaces (First angle projection): Regular plane surfaces – triangle, square, rectangle, pentagon, hexagon and circle – in different positions inclined to both the planes using change of position method only.

[10 Hours: Application Level]

Orthographic Module 3 Projections o Solids	Assignment	Multi-view drawing Analysis	10 Sessions

Topics:

Introduction, Projection of right regular prisms, pyramids, cone, hexahedron and tetrahedron in different positions (Problems resting on HP only and First angle projection).

[10 Hours: Application Level]

Module 4	Isometric Projections of Solids (Using isometric scale only)	Assignment	Spatial Visualization	8 Sessions
----------	--	------------	-----------------------	------------

Topics:

Introduction, Isometric scale, Isometric projections of right regular prisms, cylinders, pyramids, cones and their frustums, spheres and hemispheres, hexahedron (cube), and combination of 2 solids, conversion of orthographic view to isometric projection of simple objects.

[8 Hours: Application Level]

Text Book:

1.N. D. Bhatt, "Engineering Drawing: Plane and Solid Geometry," Charotar Publishing House Pvt. Ltd.

References:

1. K.R. Gopalakrishna, "Engineering Graphics", Subhash Publishers, Bangalore.

2. D. M. Kulkarni, A. P. Rastogi, A. K. Sarkar, "Engineering Graphics with AutoCAD," Prentice Hall.

3. D. A. Jolhe, "Engineering Drawing with Introduction to AutoCAD," Tata McGraw Hill.

Web resources:

https://nptel.ac.in/courses/112103019

Topics relevant to "SKILL DEVELOPMENT": Projection in first and third angle for SKILL DEVELOPMENT through Problem Solving methodologies. This is attained through the assessment component mentioned in the course handout.



ENG1900	English for Technical	Communication		L- T- P- C	2	0	0			
Version No.	1.0				I					
Course Pre- requisites										
Anti-requisites	NIL									
Course Description	This course enhances the technical communication skills of BTech students, focusing on clarity, precision, and conciseness in academic and professional settings. Students will learn to differentiate between general and technical communication, analyze technical content, develop structured writing skills, and deliver effective presentations. Through interactive activities such as TED Talk analyses, report writing, and presentation practice, the course provides hands-on experience for real-world applications. By the end, students will be equipped to communicate complex technical information effectively in various professional contexts.									
Course Outcomes	On successful completion of the course the students shall be able to:									
	 Differentiate between general and technical communication. Explain key reading comprehension techniques to enhance understanding of technical texts. Write clear, concise, and well-structured technical reports and documents. Deliver technical presentations and implement peer feedback for continuous improvement. Explain ethical practices in digital communication for professional use. 									
Course Content: 1	Theory									
Module 1	Technical communication	Quiz	Liste	ening		9 F	lours			
Introduction to Co	ommunication									
Technical vs. Gene	eral Communication									
Characteristics of	technical communication									
Importance of cla	rity, precision, and objectiv	ity								
Activity: • Watchin	g TFD Talks/videos to ident	ify differences in tech	nical and ge	eneral vocabular	v					
Module 2	Technical Reading	Assignment	Rea	ding	<u>,</u>	12 Ho	urs			
Reading Compr	ehension									
Note making &	Notetaking									
Content Analys	is									
Activity:										



Read	Reading technical articles and answering comprehension questions							
• Note	e making techniques							
Module 3	Technical Writing	Assignment	Writing	12hours				
Paragraph Writing								
Structure of a parag	raph (topic sentence, su	pporting details, cohere	ence)					
Report Writing								
Structure of technic	al and project reports (In	ntroduction, Methods, I	Results, Discussion)					
Activity:	Activity:							
Writing a structured paragraph on a technical topic								
• Writ	ing project reports							

Module	: 4	Professional Presentation	Presentation	Speaking	12Hour s
Introdu	ction to Pres	entation Skills			
Prepariı	ng a Presenta	ation			
•	Structuring Designing e	; content (Introduction, Bo effective slides (Text. visua	ody, Conclusion) al aids, readability, and imp	pact)	
Deliveri	ing a Present	ation			
•	Engagemer Conviction,	nt techniques, Storytelling , commitment, generating	;, narration, pitching ideas ; interest through enthusia	handling Q&A sm	
Demons	stration & Pra	actice			
•	Giving pres Evaluating	entations on topics based and providing peer feedba	l on their academic interes ack	t	
Activi	ity:				
•	Analyze a r	eal-world engineering issu	ue and present solutions us	sing a structured approach.	
Targete	d Applicatio	n & Tools that can be used	<mark>d:</mark> YouTube, Instagram, Qu	ill Bot, Grammarly, & Padlet	
Referen	ices:	<u> </u>			
Text bo	oks:				
1.	Gupta, R.C.	. Technical Communication	n. 2nd ed., Cambridge Univ	ersity Press, 2021.	
2. Poforor	Lannon, Jol	hn M., and Laura J. Gurak.	Technical Communication	. 15th ed., Pearson, 2022.	
1.	Gerson, Sha Pearson, 20	aron J., and Steven M. Ge 020.	rson. Technical Communica	ation: Process and Product.	9th ed.,
2.	Lannon, Jol	hn M., and Laura J. Gurak.	Technical Communication	. 15th ed., Pearson, 2022.	
3.	Markel, Mi	ke, and Stuart A. Selber. T	echnical Communication.	13th ed., Bedford/St. Martir	ı's, 2020.
Web Re	sources:				
1.	https://ow	I.purdue.edu/owl/subject	_specific_writing/technica	l_writing.	
2.	https://jou	rnals.ieeeauthorcenter.ie	ee.org/.		
3.	https://ww	w.stc.org/.			
4.	<u>https://ocv</u>	v.mit.edu/.https://www.t	ed.com/talks.		
Topics F	Relevant to "	employability": Teamwo	rk and Collaboration, Critic	al Thinking and Problem- Sc	lving
Topics F	Relevant to "	Human Values and Profes	ssional Ethics": Critical reas	soning, Inclusivity and Fairne	ess

urse Code: E2022	urse Title: Digital Design pe of Course: ESC	- T-P- C	2	D	0	2
rsion No.	D					
urse Pre- [1] Elements of Electronics/Electrical Engineering, 2] Basic concepts of number representation, Boolean Algebra						
ti-requisites	-					

urse Description	The purpose of this course is to enable the students to appreciate the fundamentals of digital logic circuits and Boolean algebra focusing on both combinational and sequential logic circuits. The course emphasizes on minimization techniques for making canonical and low-cost digital circuit implementations. This course deals with analysis and design of digital electronic circuits. The course also creates a foundation for future courses which includes Computer Architecture, Microprocessors, Microcontrollers, and Embedded Systems etc. The course enhances the Design, Implementation and Programming abilities through laboratory tasks.								
	to verify the theoretical knowle	to verify the theoretical knowledge.							
urse Objective	Digital Design and attain the SKILL DEVELOPMENT through EXPERIENTIAL LEARNING.								
urse Outcomes	On successful completion of this course the students shall be able to: i. Describe the concepts of number systems, Boolean algebra and logic gates.								
	ii. Apply minimization	on techniques	to simplify Boolean e	expressions.					
	iii. Demonstrate the	Combinationa	al circuits for a given	logic					
	iv. Demonstrate the	Sequential ar	nd programmable log	jic circuits					
urse Content:									
dule 1	ndamentals of Number systems- Boolean algebra and digital logic	plication Assignment	ta Analysis task)6 classes					
bics: Review of Numb functions and sir and P <u>OS- Univer</u>	per systems and logic gates, Nu nplifications, two, three, four var sal Gates (NAND & NOR) Impler	mber base co iable K-Maps- nenta <u>tions. In</u>	nversions, Overview Don't care condition troducti <u>on to HDL.</u>	of Boolean s- Both SOP					
dule 2	Boolean function simplification	plication Assignment	ta Analysis task	08 Classes					
pics: Introduction to Subtractor, Magi Decoders, Encod	Combinational circuits, Analy nitude comparator, Parity genera lers and Priority Encoders, HDL N	rsis, Design ator and check Models of coml	procedure, Binary er, Multiplexers-Den pinational circuits.	Adder and nultiplexers,					
dule 3	Combinational Logic circuits:	plication Assignment	gramming Task & Data Analysis task	08 Classes					
bics: Introduction to s and equations, e of finite state ma	equential circuits, Storage eleme excitation table, Analysis of clock achines - Registers & Counters.	nts: latches ar ked sequential HDL Models of	nd flip flops, Characte circuits, Mealy & Mo f Sequential circuits.	eristic tables pore Models					
rgeted Application & Tools that can be used: jital electronics is the foundation of all modern electronic devices such as cellular phones, MP3 players, laptop computers, digital cameras, high definition televisions, Home Automation, Communication in systems in industries Professionally Used Software: HDL/VHDL/Verilog HDL/ OOPS									
Text Book(s): 1. Ma edition	Text Book(s): 1. Mano, M. Morris and Ciletti Michael D., "Digital Design", Pearson Education, 6 th edition								
2. Th	iomas L. Floyd "DIGITAL LOGIC	DESIGN″ , Pea	arson Education, fou	irth edition.					
Reference(s): Reference Book(s): R1. Jain, R. P., " <i>Modern Digital Electronics",</i> McGraw Hill Education (India), 4 th Edition									
R2. Roth, Ch Learning, 7 th	narles H., Jr and Kinney Larry	L., " <i>Fundameı</i>	ntals of logic Design	", Cengage					

Luition	
Online Resources (studymaterial	s (e-books, notes, ppts, video lectures etc.): <u>Book Free Download</u> z.in)
1. eB Education	book1: Mano, M. Morris and Ciletti Michael D., "Digital Design", Pearson
2. {[PDF] Digital Design By M. Morris Mano, Michael D Ciletti Book Free Download
} 3. eB DIGITAL 4. NF 5. Di 6. La <u>CircuitVerse - Di</u> <u>Learn Logisim</u> <u>Digital Design</u>	Book2:Floyd "DIGITAL LOGIC DESIGN" fourth edition- ePub, eBook- [PDF] LOGIC DESIGN FOURTH EDITION FLOYD abri.engenderhealth.org. PTEL Course- <u>NPTEL :: Electrical Engineering - NOC:Digital Electronic Circuits</u> gital Logic Design PPT <u>Slide 1 (iare.ac.in)</u> b Tutorial: <u>Multisim Tutorial for Digital Circuits - Bing video</u> <u>gital Circuit Simulator online</u> <u>Beginners Tutorial Easy Explanation! - Bing video</u> <u>5: LOGISIM Tutorial & Demo</u>
<pre>/. https://pres E-content:</pre>	iuniv.knimbus.com/user#/home
1. Z. Communi Mechatro 10.1109/	Xin-Li and W. Hong-Ying, "The Application of Digital Electronics in Networking cation," 2016 Eighth International Conference on Measuring Technology and nics Automation (ICMTMA), 2016, pp. 684-687, doi: ICMTMA.2016.168.
2. Ar DipayanB Shahjaha Informati	encoding technique for design and optimization of combinational logic circuit hadra;Tanvir Ahmed Tarique;Sultan Uddin Ahmed;Md. n;KazuyukiMurase2010 13th International Conference on Computer and on Technology (ICCIT)
3. A. for Patch 2021, pp.	Matrosova and V. Provkin, "Applying Incompletely Specified Boolean Functions Circuit Generation," 2021 IEEE East-West Design & Test Symposium (EWDTS), 1-4, doi: 10.1109/EWDTS52692.2021.9581029.
4. A. Trojan Ci <i>(EWDTS)</i>	Matrosova, V. Provkin and E. Nikolaeva, "Masking Internal Node Faults and rcuits in Logical Circuits," <i>2019 IEEE East-West Design & Test Symposium</i> , 2019, pp. 1-4, doi: 10.1109/EWDTS.2019.8884434.
Topics relevant f Flops, Counters a This is attained t	to "SKILL DEVELOPMENT": Adders, Multiplexers, Decoders / Encoders; Flip- and Registers for Skill Development through Experiential Learning techniques. phrough assessment component mentioned in course handout.
Catalogue	Dr. G. Muthupandi
prepared by	
Recommended	
by the Board	
of Studies on	
Date of	
Approval by	
the Academic	
Council	

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urse Code: urs E2052 pe	se Title: Digital Design Lab of Course: Theory & Integrated Laboratory	h					
		P	J		2	1	
rsion No							
ISIOIT NO. Urso Pro-	1]Elements of Electronics/Electrical Engineering.	1 Bas	ic co	ncept	s of		
requisites	number representation, Boolean Algebra] Duo		, neep			
ti-requisites	-						
urse Description The purpose of this course is to enable the students to apprecia fundamentals of digital logic circuits and Boolean algebra focusing of combinational and sequential logic circuits. The course emphasiz minimization techniques for making canonical and low-cost digital implementations. This course deals with analysis and design of electronic circuits. The course also creates a foundation for future c which includes Computer Architecture, Microprocessors, Microcontroller Embedded Systems etc. The course enhances the Design, Implement and Programming abilities through laboratory tasks. The assoc laboratory provides an opportunity to verify the theoretical knowledge							
urse Objective	The objective of the course is to familiarize the le Digital Design and attain the SKILL DEVELOPME LEARNING.	NT th	s wit iroug	h the gh EX	conce PERIE	pts of NTIAL	
urse Outcomes	On successful completion of this course the studer i. Implement various universal gate circuits using logic gates. ii. Implement various combinational a using logic gates.	 On successful completion of this course the students shall be able to: i. Implement various universal gates and Boolean functions circuits using logic gates. ii. Implement various combinational and sequential logic circuits using logic gates. 					
urse Content:							
t of Laboratory Tasks: periment N0 1: Verify the Logic Gates truth table yel 1: By using Digital Logic Trainer kit yel 2: By using Analog devices like RPS, Volt meter, Resistors and ICs periment No. 2: Verify the Boolean Function and Rules yel 1: By using Digital Logic Trainer kit yel 2: By using Digital Logic Trainer kit yel 2: By using Analog devices like RPS, Volt meter, Resistors and ICs periment No. 3: Design and Implementations of HA/FA yel 1: By using basic logic gates and Trainer Kit yel 2: By using Universal logic gates and Trainer Kit periment No. 4: Design and Implementations of HS/FS yel 1: By using basic logic gates and Trainer Kit periment No. 5: Design and Implementations of combinational logic circuit for specification yel 1: Specifications given in the form of Truth table yel 2: Specification should be extracted from the given scenario periment No. 6: Study of Flip flops periment No. 7: Design and Implementations of sequential logic circuit for specifications yel 1: Carcifications given in the form of Truth table						ons	

vel 1: Gate level Modeling
vel 2: Behavioral Modeling
periment No.9: HDL coding for basic sequential logic circuit
vel 1: Gate level Modeling
vel 2: Behavioral Modeling
geted Application & Tools that can be used:
jital electronics is the foundation of all modern electronic devices such as cellular phones, MP
players, laptop computers, digital cameras, high definition televisions, Home Automation
Communication in systems in industries
fessionally Used Software: HDL/VHDL/Verilog HDL/ OOPS
Text Book(s):
3. Mano, M. Morris and Ciletti Michael D., " <i>Digital Design"</i> , Pearson Education, 6 ^t
edition
4. Inomas L. Floyd "DIGITAL LOGIC DESIGN", Pearson Education, fourth edition
Reference(s):
Reference Book(s):
R1. Jain, R. P., "Modern Digital Electronics", McGraw Hill Education (India), 4th Edition
R2. Roth, Charles H., Jr and Kinney Larry L., "Fundamentals of logic Design", Cengage
Learning, 7 th
Edition
Online Resources (e-books, notes, ppts, video lectures etc.); Book Free Download
(studymaterialz in)
7 eBook1: Mano M Morris and Ciletti Michael D "Digital Design" Pearso
Education.
8. {[PDF] Digital Design By M. Morris Mano, Michael D Ciletti Book Free Download
}
9. eBook2:Floyd "DIGITAL LOGIC DESIGN" fourth edition- ePub, eBook- [PDF
DIGITAL LOGIC DESIGN FOURTH EDITION FLOYD abri.engenderhealth.org.
10. NPTEL Course- <u>NPTEL :: Electrical Engineering - NOC:Digital Electronic Circuits</u>
11. Digital Logic Design PPT <u>Slide 1 (iare.ac.in)</u>
12. Lab Tutorial: <u>Multisim Tutorial for Digital Circuits - Bing video</u>
CircuitVerse - Digital Circuit Simulator online
Learn Logisim Beginners Tutorial Easy Explanation! - Bing video
Digital Design 5: LOGISIM Tutorial & Demo
/. https://presiuniv.knimbus.com/user#/home
E-content:
5. Z. XIN-LI and W. Hong-Ying, The Application of Digital Electronics in Networking
Mechatronics Automation (ICMTMA) 2016 nn 684-687 doi
10.1109/ICMTMA.2016.168.
6. An encoding technique for design and optimization of combinational logic circui
DipayanBhadra;Tanvir Ahmed Tarique;Sultan Uddin Ahmed;Md
Shahjahan;KazuyukiMurase2010 13th International Conference on Computer and
Information Technology (ICCIT)
7. A. Matrosova and V. Provkin, "Applying Incompletely Specified Boolean
Functions for Patch Circuit Generation," 2021 IEEE East-West Design & Test Symposium
(EWDIS), 2021, pp. 1-4, doi: 10.1109/EWDIS52692.2021.9581029.
8. A. Matrosova, V. Provkin and E. Nikolaeva, "Masking Internal Node Faults and Training Circuits in Logical Circuits," 2010, ICEC, Cast West, Design, & Test, Circuits
(EWDTS) 2019 nn 1-4 doi: 10 1100/EWDTS 2019 8884434
(LWDIS), 2015, pp. 1 +, 001. 10.1105/LWDIS.2015.0004454.
Topics relevant to "SKILL DEVELOPMENT": Adders, Multiplexers, Decoders / Encoders; Flip

Flops, Counters and Registers for Skill Development through Experiential Learning techniques.
This is attained through assessment component mentioned in course handout.

Cou rse Cod e: DE S11 46	Course Title: Introduction to Design Thinking Type of Course: Theory	L-T-P- C	1	0	0	1
Ver sion No.	1.0					
Cou rse Pre - req uisi tes	NIL					
Ant i- req uisi tes	NIL					
Cou rse Des crip tion	The course aims to introduce students to the f Thinking and will learn to apply Design Think course emphasizes empathy, creativity, and co successful engineering practice.	undamenta king metho ollaboratio	ll principles a odologies to 1 n, equipping	and processe real-world c students wi	es of Design hallenges. 7 th essential	n The skills for
Cou rse Obj ecti ve	This course is designed to develop and familian and attain Entrepreneurship by using Participa	arize the le ative Learn	arners with t <mark>iing</mark> techniqu	he concepts es.	of creating	; thinking
Cou rse Out com es	 On successful completion of the course the strain 1) Understand the concept and importance 2) Differentiate between traditional problem 3) Identify the core stages of the Design 7 	udents shal e of Desig lem-solving Thinking p	ll be able to: n Thinking. g and Design rocess.	Thinking.		

Cou rse Con tent : Mo dul	All assignmen e-resource dat Introduction to Design	nts and projects must be develop tabase – JSTOR, EBSCO, Libra Visual journal, book of essays, context-specific	ed using thry OPAC,	ne reference materials available from NPTEL Videos, etc. Visual output generation, by Visual Journal and narrative	n the PU 3 hours
e 1	Thinking	assignment/project		development.	
	Topic 1) Defini 2) Under	tion and Introduction to Design stand the Design Thinking Proce	Thinking ess		
Mo	Design	Visual journal, book of		Visual output generation, by	12
dul	Thinking in	essays, context-specific		visual journal and narrative	hours
e 2	Action	assignment/project		development.	
	 Topics: Introduction to the steps of Design Thinking Process Understand use cases of Design thinking Design Thinking and Research Tools pertaining to Consumer Tech., Home Tech., Personal Tech., Auto Tech. or Extended Reality. Targeted Application & Tools that can be used: Design ideation tools like Miro, SCAMPER etc. Research Tools for Human Centric Design using forecasting tools like WGSN Feedback tools like Google Forms, etc. 				
	Text Book Thinking Des Database: eBo https://punive ae2e- a9c06dc06d8o References	ign by S Balaram. New Delhi [I ook Collection (EBSCOhost) rsity.informaticsglobal.com:228 c%40redis&bdata=JnNpdGU9Z	ndia]: Sago <u>4/ehost/de</u> <u>Whvc3Qth</u>	e Publications Pvt. Ltd. 2010. eBoo tail/detail?vid=6&sid=18ab1f43-1f oG12ZQ%3d%3d#AN=354920&db=	k., <u>92-4d02-</u> <u>=nlebk</u>
	Design Think Schuman. 202 <u>https://punive</u> <u>a0d6-</u>	ing by Clarke, Rachel Ivy. Serie 20. eBook., Database: eBook Co rsity.informaticsglobal.com:228	s: Library llection (E <u>2/ehost/de</u>	Futures, Vol. 4. Chicago: ALA Nea BSCOhost) tail/detail?vid=4&sid=c80a7d79-ed	ıl- <u>a4-4b7e-</u>

$\underline{afafe437962b\%40 redis\&bdata=JnNpdGU9ZWhvc3QtbGl2ZQ\%3d\%3d\#AN=2433506\&db=nlebk}{}$
The Pocket Universal Methods of Design: 100 Ways to Research Complex Problems, Develop
Innovative Ideas, and Design Effective Solutions by Bruce Hanington; Bella Martin. Minneapolis:
Rockport Publishers. 2017. eBook., Database: eBook Collection (EBSCOhost)
https://puniversity.informaticsglobal.com:2282/ehost/detail/detail?vid=11&sid=f086b8c2-260e-
<u>4caa-8c48-</u>
d732c21a7724%40redis&bdata=JnNpdGU9ZWhvc3QtbGl2ZQ%3d%3d#AN=1638693&db=nlebk
What Is Design Thinking and Why Is It Important? By Rim Razzouk and Valerie Shute - Review of
Educational Research, Vol. 82, No. 3 (September 2012), pp. 330-348 (19 pages), Published by:
American Educational Research Association
https://puniversity.informaticsglobal.com:2054/stable/23260048?Search=yes&resultItemClick=true
$\underline{\&} searchText = design + thinking \\ \&searchUri = \% \\ 2Faction \\ \% \\ 2FdoBasicSearch \\ \% \\ 3FQuery \\ \% \\ 3Ddesign \\ \% \\ 2FdoBasicSearch \\ \% \\ 3FQuery \\ \% \\ 3Ddesign \\ \% \\ 2FdoBasicSearch \\ \% \\ 3FQuery \\ \% \\ 3Ddesign \\ \% \\ 2FdoBasicSearch \\ \% \\ 3FQuery \\ \% \\ 3Ddesign \\ \% \\ 2FdoBasicSearch \\ \% \\ 3FQuery \\ \% \\ 3Ddesign \\ \% \\ 2FdoBasicSearch \\ \% \\ 3FQuery \\ \% \\ 3Ddesign \\ \% \\ 2FdoBasicSearch \\ \% \\ 3FQuery \\ \% \\ 3Ddesign \\ \% \\ 3FQuery \\ \% \\ 3FQuery \\ \% \\ 3Ddesign \\ \% \\ 3FQuery \\ 3$
Bthinking%26so%3Drel&ab_segments=0%2FSYC-6168%2Ftest&refreqid=fastly-
default%3Acb1be24976e25734cb5fc13a8af6fdfb&seq=1#metadata_info_tab_contents
Abductive Thinking and Sensemaking: The Drivers of Design Synthesis by John Kolko, Design
Issues, Vol. 26, No. 1 (Winter, 2010), pp. 15-28 (14 pages), Published by: The MIT Press
https://puniversity.informaticsglobal.com:2054/stable/20627839?Search=yes&resultItemClick=true
$\underline{\&} searchText = design + thinking \\ \& searchUri = \\ \% 2 Faction \\ \% 2 FdoBasicSearch \\ \% 3 FQuery \\ \% 3 Ddesign \\ \% 2 FdoBasicSearch \\ \% 3 FQuery \\ \% 3 Ddesign \\ \% 2 FdoBasicSearch \\ \% 3 FQuery \\ \% 3 Ddesign \\ \% 2 FdoBasicSearch \\ \% 3 FQuery \\ \% 3 Ddesign \\ \% 2 FdoBasicSearch \\ \% 3 FQuery \\ \% 3 Ddesign \\ \% 2 FdoBasicSearch \\ \% 3 FQuery \\ \% 3 Ddesign \\ \% 2 FdoBasicSearch \\ \% 3 FQuery \\ \% 3 Ddesign \\ \% 2 FdoBasicSearch \\ \% 3 FQuery \\ \% 3 Ddesign \\ \% 3 FQuery \\ \% 3$
Bthinking%26so%3Drel&ab_segments=0%2FSYC-6168%2Ftest&refreqid=fastly-
default%3A0b89336ea274d63c010536b01316d7bb&seq=1#metadata_info_tab_contents
Designerly Ways of Knowing: Design Discipline versus Design Science by Nigel Cross, Design
Issues, Vol. 17, No. 3 (Summer, 2001), pp. 49-55 (7 pages), Published by: The MIT Press
https://puniversity.informaticsglobal.com:2054/stable/1511801?Search=yes&resultItemClick=true&
$\underline{searchText} = \underline{design} + \underline{thinking\&searchUri} = \% 2Faction\% 2FdoBasicSearch\% 3FQuery\% 3Ddesign\% 2Btimes and a second secon$
hinking%26so%3Drel&ab_segments=0%2FSYC-6168%2Ftest&refreqid=fastly-
default%3A0d5b607b163f60876ca973ed90e22b1c&seq=1#metadata_info_tab_contents

				1	1	r
urse Code: PPS 1025	Course Title: Industry Readiness Program – I (Audited Course)	L- T - P- C	0	0	2	0
	Type of Course: Practical Only Course					
Version No.	1.0					
Course Pre- requisites	 Students are expected to unde Students should have desire an learn. 	rstand Basic En Id enthusiasm t	glish. o involv	ve, parti	cipate	and
Anti-requisites	NIL					
Course Description	This course is designed to enable students to set SMART goals, form professional & personal ethics for success and learn various email writing techniques. The course will benefit learners in presenting themselves effectively through various activities and learning methodologies.					
Course Objective	The objective of the course is to familia "Employability for Young Professionals PARTICIPATIVE LEARNING techniques.	rize the learne " and attain SK	rs with ILL DEV	the cor /ELOPM	icepts IENT th	of Irough
Course Out						
Comes	On successful completion of this course	the students s	hall be	able to	:	
	CO 1 Define their career goals					
	CO 2 Practice ethical habits for better ca	areer success				
	CO3 Demonstrate effective email writing techniques					
Course Content						

Module 1	Goal Setting & Grooming	Classroom activities	10 Hours		
Topics: SMART Goals, formal grooming through self-introduction activity					
Activity: Real wo	rld scenarios				
Module 2	Habit Formation	Role plays	10 Hours		
Topics: Professiona	l and Personal ethics for success and	d activity-based practice			
Activity: Students t	o present 2 min video on building pro	ofessional ethics			
Module 3	Email Etiquettes	Individual and group presentation	10 Hours		
Topics: Types of p	rompts to generate effective or des	ired results for email etiquettes			
Activity: Individual	student presenting various search	prompts			
Faculty: L&D					
Targeted Applicatio	on & Tools that can be used:				
1. TED Talks	Links				
3 Activities	LITIKS				
Assignment propos	sed for this course				
Assignment 1: SMART Goal					
Assignment 2: AI to	ols for prompt search				
Continuous Individual Assessment					
Module 1: Presenta	ation				
Module 2: Activity	based assessment				
Nodule 3: Class assessment					

The topics related to skill development:

Students acquire knowledge on SMART goals, implement grooming standards, practice ethical behavior in class and campus, acquire hands-on experience to use AI tools to get search prompts for desired email etiquettes.

Catalogue prepared by	Faculty of L&D
Recommended	BOS held on
by the Board of	
Studies on	
Date of	Academic Council Meeting held on
Approval by the	
Academic Council	

	Course Title: Probability and Statistics		2	0	0	2	
Course Code:	Type of Course:1] School Core	L-1- P- C	5	0	U	5	
MAT2402							
Version No.	1.0						
Course Pre-requisites	MAT2301	MAT2301					
Anti-requisites	NIL	NIL					
Course Description	The course introduces the conce	pts of probabili	ty theo	ory an	d stat	istical	
	analysis, covering how to col	lect, organize,	inter	pret,	and	draw	
	inferences from data using n	nathematical r	nodels	to	under	stand	
	randomness and uncertainty, wit	randomness and uncertainty, with applications across various fields like					
	science, engineering, economics,	and social scie	nces.				
Course Objective	The objective of the course is to	equip student	s with t	the fo	ounda	tional	
	knowledge of probability theory	knowledge of probability theory and statistical methods, enabling them					
	to collect, analyze, interpret data	to collect, analyze, interpret data, and make informed decisions based					
	on the likelihood of events occur	on the likelihood of events occurring in various situations, often applied					
	across different fields like science	e, engineering,	and bu	siness	5.		
Course Out Comes	On successful completion of the	course the stud	lents sh	nall be	able	to:	
	CO1 - be able to compute condition	CO1 - be able to compute conditional probabilities directly and using				ing	
	Bayes' theorem, and check for independence of events.						
	CO2 - be able to set up and work	CO2 - be able to set up and work with discrete & continuous random					
	variables; in particular, to unders	variables; in particular, to understand the Bernoulli, binomial,					
geometric, Poisson distributions, uniform, norm		al, and	ехро	nentia	al		

	distributions.			
	CO3 - Identifying different types of data relationships (linear,			
	polynomial, exponential, logarithmic).			
	CO4 - be able to use specific significance tests, including z-test, t-test			
	(one- and two-sample), and	chi-squared test	0 /	
Course Content:		•		
Module 1	Basic Probability		(6 Classes)	
Probability of an Event	, multiplication rule, combinations,	permutations, Additior	Law, Multiplication	
Law, Conditional Probal	oility, Bayes's Theorem and Problems		•	
Module 2	Random Variables and Bivariate Distributions	Assignment	(15 Classes)	
Random Variables (di	screte and continuous), Probabilit	y Mass/Density Funct	tions, Mathematical	
Expectations, discrete	probability distributions - Binomial d	istribution, Poisson dis	stribution, geometric	
distribution, Continuou	s uniform distribution - exponentia	l distribution, normal	distribution, gamma	
distribution.				
Bivariate distributions a	and their properties, distribution of	sums and quotients, c	conditional densities,	
Bayes' rule.				
Module 3	Curve Fitting & Statistical Methods		(13 Classes)	
Curve Fitting (Straight Li	ine (y = a + bx), Parabola (y = a + bx + c	x ²), Exponential Curves	$(y = ae^{bx}, y = ab^{x} and$	
y = ax ^b)				
Measures of Central ter	ndency, Moments, skewness and Kurt	osis, Correlation - Karl	Pearson's coefficient	
of correlation and rar	nk correlation (with & Without rep	petition, Multiple Cori	relation - Problems.	
Regression analysis - lin	es of regression. Multiple regression	Problems		
negression analysis in	es of regression, maniple regression	- FIODIEIIIS.		
Modulo 4	Joint Probability Distribution and	Assignment	(1E Classes)	
Module 4	Joint Probability Distribution and Sampling Theory	Assignment	(15 Classes)	
Module 4 Joint Probability distribu	Joint Probability Distribution and Sampling Theory ution for two discrete random variabl	Assignment es, expectation and cov	(15 Classes) variance.	
Module 4 Joint Probability distribu Random sampling, sam	Joint Probability Distribution and Sampling Theory ution for two discrete random variabl pling distributions, Standard Error, Ty	Assignment es, expectation and cov pe I & Type II errors, To	(15 Classes) variance. esting of Hypothesis,	
Module 4 Joint Probability distribu Random sampling, sam Test of significance - La	Joint Probability Distribution and Sampling Theory ution for two discrete random variabl pling distributions, Standard Error, Ty arge sample test for single proportio	Assignment es, expectation and cov pe I & Type II errors, To on, difference of propo	(15 Classes) variance. esting of Hypothesis, ortions, single mean,	
Module 4 Joint Probability distribu Random sampling, sam Test of significance - La difference of means, an	Joint Probability Distribution and Sampling Theory ution for two discrete random variabl pling distributions, Standard Error, Ty arge sample test for single proportion d difference of standard deviations, T	Assignment es, expectation and cov pe I & Type II errors, To on, difference of propo est for single mean, diff	(15 Classes) variance. esting of Hypothesis, prtions, single mean, ference of means and	
Module 4 Joint Probability distribut Random sampling, samp Test of significance - La difference of means, and correlation coefficients,	Joint Probability Distribution and Sampling Theory ution for two discrete random variabl pling distributions, Standard Error, Ty arge sample test for single proportion d difference of standard deviations, To test for ratio of variances - Chi-squar	Assignment es, expectation and cov pe I & Type II errors, To on, difference of propo est for single mean, diff e test for goodness of f	(15 Classes) variance. esting of Hypothesis, ortions, single mean, erence of means and fit and independence	
Module 4 Joint Probability distribut Random sampling, samp Test of significance - La difference of means, and correlation coefficients, of attributes.	Joint Probability Distribution and Sampling Theory ution for two discrete random variabl pling distributions, Standard Error, Ty arge sample test for single proportion d difference of standard deviations, To test for ratio of variances - Chi-squar	Assignment es, expectation and cov pe I & Type II errors, To on, difference of propo est for single mean, diff e test for goodness of f	(15 Classes) variance. esting of Hypothesis, ortions, single mean, ference of means and fit and independence	
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Module 4 Joint Probability distribut Random sampling, sam Test of significance - La difference of means, and correlation coefficients, of attributes. Targeted Application & The contents of this cou- formulations, Problem S	Joint Probability Distribution and Sampling Theory Lation for two discrete random variable pling distributions, Standard Error, Ty arge sample test for single proportion d difference of standard deviations, To test for ratio of variances - Chi-squar Tools that can be used: Larse has direct applications in most of Solution and system Design.	Assignment es, expectation and cov pe I & Type II errors, To on, difference of propo est for single mean, diff the test for goodness of f	(15 Classes) variance. esting of Hypothesis, ortions, single mean, ference of means and fit and independence courses for problem	
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Module 4 Joint Probability distribut Random sampling, sam Test of significance - La difference of means, and correlation coefficients, of attributes. Targeted Application & The contents of this cour formulations, Problem S Tools Used: R software Assignment: Select any one tify the dependent and ing the values of the de Text Book 1. Ronald .E. Wall Statistics for Engineers a 2. B. S. Grewal (20	Joint Probability Distribution and Sampling Theory Ution for two discrete random variable pling distributions, Standard Error, Ty arge sample test for single proportion d difference of standard deviations, Te test for ratio of variances - Chi-squar Tools that can be used: urse has direct applications in most of Solution and system Design. (Open Source) simple differential equation pertaining d independent variable – Obtain the pendent variable. pole, Raymond. H. Myers, Sharon. L and Scientists", Pearson Education, D 17), Higher Engineering Mathematics	Assignment es, expectation and cov pe I & Type II errors, Tron, difference of propo est for single mean, diff e test for goodness of f of the core engineering ng to the respective br solution and compare Myers, and Keying E. elhi-9th edition, 2012.	(15 Classes) variance. esting of Hypothesis, ortions, single mean, ference of means and fit and independence courses for problem ranch of engineering, the solution sets by Ye, "Probability and na Publishers.	
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3. Douglas C. Montgomery & George Runger, Applied Statistics and Probability for Engineers, , Wiley Publications

E-resources/ Web links:

https://presiuniv.knimbus.com/user#/viewDetail?searchResultType=ECATALOGUE_BASED&uni id=EBSCO95_30102024_10427 https://presiuniv.knimbus.com/user#/viewDetail?searchResultType=ECATALOGUE_BASED&uni id=EBSCO95_30102024_100198 https://nptel.ac.in/courses/109104124 https://nptel.ac.in/courses/111106051 https://nptel.ac.in/courses/111102137 https://www.math.hkust.edu.hk/~maqian/ma006_0607F.html https://www.scu.edu.au/study-at-scu/units/math1005/2022/ Presidency University's Knimbus library URL is: presiuniv.knimbus.com

Topics relevant to SKILL DEVELOPMENT: The course focuses on the concepts of Vector calculus and Linear Algebra with reference to specific engineering problems. The course is of both conceptual and analytical type in nature through Problem Solving. This is attained through the assessment component mentioned in the course handout.

urse Code:	vironmental Studies					
E7601	e of Course: MOOC course	- P- C				
		ntact hours				
urse Pre- requisites	NIL	1				
ti-requisites	-					
urse Description	This course is designed to improve the learners' SKILL DEVELOPMENT by using PATICIPATIVE LEARNING techniques. This course aims to familiarize students with fundamental environmental concepts and their relevance to business operations, preparing them to address forthcoming sustainability challenges. It is designed to equip students with the knowledge and skills needed to make decisions that account for environmental consequences, fostering environmentally sensitive and responsible future managers. This course is designed to cater to Environment and Sustainability					
urse jective	The objective of the course is 'SKILL DEVELOPMENT' of the student by using 'PARTICIPATIVE LEARNING' techniques			VE		
 On successful completion of this course the students shall be able to: Describe the issues related to natural resources, ecosystems and biodiversity Identify environmental hazards affecting air, water and soil quality Recognize the importance of healthy environment and finding the sustainable m 		e met	hods	to		
	protect the environment 4. Convert skills to address immediate environmental concerns through change environmental processes, policies, and decisions			iges	in	
urse Content:						
dule 1	derstanding Environment, Natural Resources, and Sustainability					
bics: ssification of natu conservation. Wi ncept of sustainal SDGs; Sustainabl energy security,	aral resources <mark>, issues related to Population growth</mark> and their overutilizentation and their overutilizentation and source. Effect of human activition in a source is a source of human activition in the source of	zation, and st ies on natura challenges a ervation, Des	rate; I reso and s alina	gies fe ource: strate; ation -	or th s. <mark>gies 1</mark> – typ	eir <mark>for</mark> es,
dule 2	systems, Biodiversity, and Sustainable Practices					
ics: Ecosystems and ecosystem services: Various natural ecosystems, Major ecosystem types in India and their basic characteristics; forests, wetlands, grasslands, agriculture, coastal and marine; Ecosystem services- classification and their significance. The importance of biodiversity, Types of biodiversity, Biodiversity and Climate Change, the threats it faces, hotspots, and the methods used for its conservation. Strategies for in situ and ex situ conservation, mega diverse nation.						
dule 3	rironmental Pollution, Waste Management, and Sustainable Development					
pics: Types of pollutio and their impact Causes of polluti particular focus of	on- Chemical, - Biological, Biomedical, <mark>noise</mark> , <mark>air</mark> , water, <mark>soil</mark> , thermal, rac s on society. Urbanization and Urban environmental problems; effects on, such as global climate change, ozone layer depletion, the greenhou	lioactive and s, and mitiga use effect, and	mari tion. d acio	ne po d rain	ollutio	on, ha

Sustain	able Materials and Technologies: Biodegradable and compostable materials, Recycled and reclaimed			
materia	ais (E-waste management), Sustainable manufacturing processes.			
dule 4	ial Issues, Legislation, and Practical Applications			
oics:				
<mark>Overvie</mark>	ew of key environmental legislation and the judiciary's role in environmental protection, including the Water			
(Prever	ntion and Control of Pollution) Act of 1974, the Environment (Protection) Act of 1986, and the Air (Prevention			
and Co	ntrol of Pollution) Act of 1981. Hazardous waste Rule 1989, Biomedical Waste handling 1998, Fly Ash Rule 1999,			
Nunici	Inicipal Solid Waste Rule 2000, Battery Rules 2001, E- Waste Rules 2011, Plastic waste management Rules 2016, Instruction Demolition waste Rules 2016, National Biodiversity Action Plan (NBAP)			
Maior	onstruction Demonstron waste Rules 2016 National Biodiversity Action Plan (NBAP) Jajor International Environmental Agreements: Convention on Biological Diversity (CBD) The Biological Diversity			
(Amen	Tajor International Environmental Agreements: Convention on Biological Diversity (CBD), the Biological Diversity			
Agreen	nent.			
Major	International organisations and initiatives: United Nations Environment Programme (UNEP), United Nations			
Educat	ional, Scientific and Cultural Organization (UNESCO), Intergovernmental Panel on Climate Change (IPCC).			
geted A	pplication & Tools that can be used:			
olication	areas are Energy, Environment and sustainability			
ols: Onli	ne Tools – NPTEL and Swayam.			
j <mark>ect wo</mark>	rk/Assignment:			
sessmer	nt Type			
•	Online exams (MCQs) will be conducted by the department of Chemistry			
line Link	*.			
<mark>1)</mark>	Lecure by Dr. Samik Chowdhury, Dr. Sudha Goel, NPTEL course: Environmental Science, https://nptel.ac.in/courses/109105203, 2024.			
2)	Lecture by Dr. Padmavati, Dr Narendran Thiruthy, NPTEL Course: Biodiversity Protection, Farmers and Breeders Rights, https://nptel.ac.in/courses/129105008, 2024.			
ther sou	irce links are available in below Resources link.			
t Book				
1.	G. Tyler Miller and Scott Spoolman (2020), Living in the Environment, 20 th Edition, Cengage Learning, USA			
2.	Poonia, M.P. Environmental Studies (3rd ed.), Khanna Book Publishing Co.			
3.	Bharucha, E. Textbook of Environmental Studies (3rd ed.) Orient Blackswan Private Ltd.			
4.	Dave, D., & Katewa, S. S. Text Book of Environmental Studies. Cengage Learning India Pvt Ltd.			
5.	Rajagopalan, R. Environmental studies: from crisis to cure (4th ed.). Oxford University Press.			
6.	Basu, M., & Xavier Savarimuthu, S. J. Fundamentals of environmental studies. Cambridge University Press.			
7.	Roy, M. G. Sustainable Development: Environment, Energy and Water Resources. Ane Books.			
8.	Pritwani, K. Sustainability of business in the context of environmental management. CRC Press.			
9.	Wright, R.T. & Boorse, D.F. Environmental Science: Toward A Sustainable Future (13th ed.). Pearson.			
erence l	Books			
1.	Varghese, Anita, Oommen, Meera Anna, Paul, Mridula Mary, Nath, Snehlata (Editors) (2022), Conservation through Sustainable Use: Lessons from India. Routledge.			
2.	William P. Cunningham and Mary Ann Cunningham (2020), Principles of Environmental Science: Inquiry & Applications, 9 th Edition, McGraw-Hill Education, USA.			
3.	Richard A. Marcantonio, Marc Lame (2022). Environmental Management: Concepts and Practical Skills.			
А	Manahan S.F. (2022) Environmental Chemistry (11th ed.) CRC Press			
 http:	://doi.org/10.1201/9781003096238			
۰۰۲ps د	Theodore M K and Theodore Louis (2021) Introduction to Environmental Management 2 nd Edition CPC			
э.	Press			

Resources:

- 1. https://nptel.ac.in/courses/109105203
- 2. https://archive.nptel.ac.in/courses/120/108/120108004/
- 3. <u>https://nptel.ac.in/courses/127105018</u>
- 4. <u>https://onlinecourses.nptel.ac.in/noc23_lw06/preview</u>
- 5. <u>https://onlinecourses.swayam2.ac.in/ini25_bt02/preview</u>
- 6. https://archive.nptel.ac.in/courses/120/108/120108002/
- 7. <u>https://onlinecourses.swayam2.ac.in/ini25_bt02/preview</u>
- 8. https://nptel.ac.in/courses/102104088
- 9. https://nptel.ac.in/courses/124107165
- 10. https://nptel.ac.in/courses/109106200
- 11. https://archive.nptel.ac.in/content/storage2/courses/120108004/module1/lecture1.pdf
- 12. <u>https://onlinecourses.swayam2.ac.in/nou25_ge19/preview</u>
- 13. <u>https://onlinecourses.swayam2.ac.in/ini25_hs01/preview</u>
- 14. http://kcl.digimat.in/nptel/courses/video/105105184/L32.html

15. <u>https://nptel.ac.in/courses/105105169</u>

Topics relevant to Skill Development:

- 1. An attitude of enquiry.
- 2. Write reports

topics related to Environment and Sustainability :

topics in theory component are relevant to Environment and Sustainability.

Catalog	Faculty members of the Department of Chemistry							
prepared by								
Recommended								
by the Board								
of Studies on								
Date of								
Approval by								
the Academic								
Council								
arse Code:	arse Title: Foundations o	f Integrated Engineeri		2	0	0	2	
---	--	---	-------------------	-----------	---------------	---------	--------	--
1200	e of Course: Theory Only	/	L- I-F-C	2	0	U	Z	
rsion No.								
urse Pre-requisites	NIL							
ti-requisites	•							
urse Description	This interdisciplinary co principles and practices a solving, sustainability, a electrical, and IT system to address global challer smart infrastructure, solutions. Topics include planning, renewable er cultivates a holistic un safety, and ethical deci multidisciplinary project	This interdisciplinary course introduces first-year engineering students to foundational principles and practices across key engineering domains, emphasizing real-world problem- solving, sustainability, and ethical innovation. Students explore how civil, mechanical, electrical, and IT systems intersect with emerging technologies like IoT, AI, and geomatics to address global challenges. Through case studies, learners gain deeper understanding of smart infrastructure, prototyping mechanical/electronic systems, and securing IT solutions. Topics include bioinformatics for environmental monitoring, GIS-enabled urban planning, renewable energy integration, and cybersecurity fundamentals. The course cultivates a holistic understanding of engineering's role in sustainable development, safety, and ethical decision-making, preparing students to contribute meaningfully to multidisciplinary projects in a technology-driven world.						
aise Objective	techniques.		t of student by	using ru	nticipa		u	
urse Outcomes	 On successful completion of this course the students shall be able to: 1] Recall key principles of Agile, DevOps, and bioinformatics used in interdisciplinary engineering contexts. 2] Explain the role of GIS, LiDAR, and sustainable materials in designing smart infrastructure and disaster management systems. 3] Describe core components of mechanical systems and their real-world applications. 4] Describe the functionality of IoT-enabled wearable devices, embedded systems, and renewable energy integration in smart grids. 5] List foundational IT concepts such as cloud computing architectures, cybersecurity 							
urse Content:								
dule 1	Indations of Engineering Practice	ignment	e studies		ess	sions		
al-world problem-solving u domain project, Engineer erging Fields: Automation, tainability & Safety: Circula	using data logic and prac ing Ethics & Environmenta and Introduction to bioin ar economy principles, car	ctical applications, Coll al Impact formatics and its applic bon footprint analysis.	aboration and	l Innovat	ion th	irough	multi-	
dule 2	Geomatics	ignment	icle Review		ess	sions		
art Infrastructure & Geomatics: GIS mapping, LiDAR, drone surveys for urban planning, Geospatial data analysis for disaster management. tainable Construction: 3D-printed structures, self-healing concrete, Digital twins for infrastructure monitoring.								
dule 3	chanical Engineering in Action	ignment & Quiz	a Collection		ess	sions		
/anced Manufacturing: Collaborative robots (cobots), additive manufacturing and 3D printing, Reverse engineering and prototyping. ergy Systems: Solar/wind energy harvesting, piezoelectric applications.								
dule 4	ctrical & Electronics Engineering	ignment & Quiz	a Collection	on a	nd ess	sions		
art Devices & Systems: Em	bedded systems, Wearab	le technology, Edge co	mputing and h	ardware	platfo	rms		
rgy Innovations: EV chargi	ng infrastructure, wireless	s power transfer, Smar	t grid integratio	on with r	<u>en</u> ewa	bles.		
dule 5	idamentals of IT	gnment & Quiz	se studies			6 Sessi	ons	

e IT Topics: Networking basics, Cloud computing

ersecurity & Data: Encryption, phishing prevention, zero-trust models, Database management.

erging Tech: Blockchain for supply chains, AI/ML basics, IoT integration with cloud platforms

geted Application & Tools that can be used:

blication Areas include Interdisciplinary problem-solving, Smart city planning, disaster management, Robotics prototyping, renewable energy systems, Wearable health tech, smart grids, Secure cloud systems.

ls: 3D Printers, Autocad, Tinkercad, ArcGIS / QGIS, Arduino/Raspberry Pi

t Book:

- 1. William Oakes & Les Leone, "Engineering Your Future: An Introduction to Engineering", Oxford University Press, 9th Edition, 2021
- 2. Barry F. Kavanagh, "Introduction to Geomatics", Pearson, 5th Edition, 2021
- Ian Gibson, David Rosen, & Brent Stucker, "Additive Manufacturing Technologies", Springer, 3rd Edition, 2021
- 4. Sudip Misra, "The Internet of Things: Enabling Technologies, Protocols, and Use Cases", Wiley, 2nd Edition, 2022
- 5. James Kurose & Keith Ross, "Computer Networking: A Top-Down Approach", Pearson, 8th Edition, 2020

erences

- 1. Supratim Choudhuri, "Bioinformatics for Beginners: Genes, Genomes, and Molecular Evolution", Academic Press, 1st Edition, 2023,
- 2. Robert McGinn, "The Ethical Engineer: Contemporary Concepts and Cases", Princeton University Press, 1st Edition, 2020
- 3. Charles J. Kibert, "Sustainable Construction: Green Building Design and Delivery", Wiley, 5th Edition, 2022
- 4. Anthony M. Townsend, "Smart Cities: Big Data, Civic Hackers, and the Quest for a New Utopia", W.W. Norton & Company, 1st Edition, 2020
- 5. David Buchla, "Renewable Energy Systems: A Smart Energy Systems Approach", Pearson, 2nd Edition, 2023
- 6. Charles Platt, "Make: Electronics: Learning Through Discovery", Make Community, 3rd Edition, 2021
- 7. Charles J. Brooks, Christopher Grow, & Philip Craig, "Cybersecurity Essentials", Wiley, 2nd Edition, 2021

b-resources:

1. Post-parametric Automation in Design and Construction

https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=1155197&site=ehost-live

2. Smart Cities : Introducing Digital Innovation to Cities

https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=1993146&site=ehost-live

3. Innovation Energy: Trends and Perspectives or Challenges of Energy Innovation

https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=2323766&site=ehost-live

4. Additive Manufacturing: Opportunities, Challenges, Implications

https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=1134464&site=ehost-live

Catalogue prepared by	Dr. Nakul Ramanna, Dr. Rajiv Ranjan Singh, Mr. N. Gopalakrishnan, Mr. Ajay H A
Recommended by the	
Board of Studies on	
Date of Approval by	
the Academic Council	

urse Code: E2502	Course (CSE a	e Title: Chemistry of Smart nd Allied)	Materials Lab	-P- C	D	1				
	e of Co	urse: Laboratory course- Ba	asic science course							
rsion No.										
urse Pre-requisites	ore und posses bases, instrur studer to esse	bre undertaking this Chemistry of Smart Materials Lab course, students are expected to possess foundational knowledge of chemistry, including an understanding of acids and bases, metals and metal ions, oxidizing and reducing agents, various types of instrumental analysis, and the proper use of laboratory glassware. Additionally, students should be familiar with handling chemicals and glassware safely and adhering to essential laboratory safety precautions.								
ti-requisites	-									
urse Description	The la chemic experi lecture learnir This co	The laboratory course aims to develop experimental skills and apply fundamental chemical principles to address chemistry-related problems in engineering. The experiments are carefully designed to complement the theoretical concepts covered in lectures, providing hands-on experience to deepen understanding and reinforce learning. This course is designed to cater to Environment and Sustainability.								
Course Objective	The o of DEVEL	The objective of the course is to familiarize the learners with the concepts of "Chemistry of Smart Materials Lab" and attain SKILL DEVELOPMENT through EXPERIENTIAL LEARNING techniques								
urse Outcomes (COs)	On suc CO1: r for qua CO2: e using l CO3: throug CO4: purific	 On successful completion of the course, students shall be able to: CO1: recognize the basic techniques and instrumentation used in chemistry laboratories for quantitative analysis. CO2: estimate the presence of acids and metal ions in domestic and industrial waste using laboratory techniques. CO3: review the experimental results and demonstrate improved experimental skills through hands-on laboratory techniques such as experimental setups for synthesis, 								
urse Content:	Total 3	30 sessions								
periment 1		perimental	a Collection		Analysis Interpret	and ation				
termination of strer	ngth of s	trong acid in battery electro	olyte using conductome	tric sensors.						
periment 2 perimenta		perimental	a Collection		Analysis Interpr	and etation				
imation of iron fron	n e-wast	e using Electrochemical sen	isors.							
periment 3 perimental		a Collection		Analysis Interpr	and etation					
termination of pKa	of organ	ic acid of battery electrolyte	e using pH sensor.							
periment 4	_	erimental	a Collection		Analysis Interpr	and etation				
Estimation of copper from PCBs by using colorimeter (Optical Sensor).										

eriment 5	erimental	a Collection		alysis and Interpretation				
nductometric estimation of	mixture of acids in Recycling	g process of E-	waste.					
eriment 6	erimental	a Collection		alysis and Interpretation				
termination of viscosity co property).	ermination of viscosity coefficient of a given organic liquid using Ostwald's Viscometer (viscoelastic property).							
eriment 7	erimental	a Collection		alysis and Interpretation				
Recovery of valuable meta	ls (copper) from e- waste by	/ lodometric til	tration.					
eriment 8	perimental	a Collection		alysis and Interpretation				
imation of iron in electronic	devices using Std. Potassiu	m permangana	te solution.					
periment 9	erimental		a Collection	Analysis				
me photometric estimation	of sodium (Battery Recyclin	g- Optical Sens	sor).					
eriment 10	erimental		a Collection	Analysis				
thesis of conducting polyan	iline for gas sensor applicat	ions (Demonst	ration experin	nent).				
eriment 11	perimental	a Collection		Analysis				
en synthesis of nanomateri	als (Demonstration experim	ient).						
periment 12	erimental	a Collection		Analysis				
Recovery of valuable meta	ls from e- waste by eletrole	ss method (De	monstration e	xperiment).				
v 8 experiments will be conc	lucted out of 12							
ntinuous Internal Assessme	nt:							
Midterm exam								
Experimental Evalu	uation							
Viva-voce								
Endterm exam								
tt Book 1. Lab manual for En Delhi (2022)	gineering chemistry by B. R	amadevi and I	P. Aparna, S. (Chand Publications, New				
2. Vogel's text book o	of practical organic chemistr	y 5th edition						
3. Inorganic Quantita	itive analysis by A.I. Vogel, E	LBS Publication	ns.					
4. College Practical C	hemistry by V.K. Ahluwalia,	Narosa Publica	ations Ltd. Nev	w Delhi				
erences 1. Engineering Chemis Edu-creation Publishing	stry Laboratory Manual (E	nglish, Paperl	back, Dr Man	ioj Kumar Solanki),				
E-resources:								
1. <u>https:</u>	://books-library.net/files/	download-pd	f-ebooks.org	-kupd-679.pdf				
Video Links:	Video Links:							
I. <u>https://wwv</u>	v.youtube.com/watch?v=gd	<u>1YQr-/4sw</u>						
2. <u>https://www</u>	v.youtube.com/watch?v=w\	<u>/J8WQax0rQ</u>						
3. <u>https://wwv</u>	v.youtube.com/watch?v=aV	<u>VwEGCNtKwk</u>						
4. <u>https://www</u>	v.youtube.com/watch?v=Jh	<u>Bs_8DrPYo</u>						

5.	https://www.youtube.com/watch?v=5bFAx2b_6A8
6.	https://www.youtube.com/watch?v=_IVVZnAFfrM
7.	https://www.youtube.com/watch?v=BBhuXOh9vOM
8.	https://www.youtube.com/watch?v=j-nW3Jhc794
e topics related All the experi attained throu	to Skill Development ments are relevant to Skill Development through Experiential Learning Techniques. This is ugh assessment component mentioned in course handout.
Catalogue prepared by	Faculty members of Chemistry
Recommende	d d
by the Board	of
Studies on	
Date of Appre	oval
by the Acade	nic
Council	

arse Code: E2501	urse Title: Chemistry of Smart Materials	(CSE and Allied)	- P- C	D	3					
	e of Course: Theory only-Basic sciences	course								
rsion No.										
urse Pre- requisites	Fundamental knowledge of organic and inorganic chemistry									
ti-requisites										
urse Description	The objective of the course is to introduc	e the students to conce	pts and application	ons of c	hemistry					
	of smart materials. The course also aims to enhance the knowledge of smart materials associated with memory system, display devices, , sensors, energy devices and environment. It will also cultivate an ability to identify chemistry in each of smart engineered materials and interpret solutions for the challenges connected to memory, display, energy, smart, green and sustainable technologies. It targets to strengthen the fundamental concepts behind chemistry of smart materials and then builds an interface with their industrial applications.									
urse	The objective of the course is 'SKILL DEVE	LOPMENT' of the stude	ent by using Partic	<mark>cipative</mark>	elearning					
jective	techniques.									
urse Outcomes	On successful completion of this course	the students shall be a	ble to:							
	1) Relate the knowledge of chemist functionalities and properties	try to computational a	approaches to id	entify ı	materials					
	2) Recognize and interpret solutions for green and sustainable technologies	or the challenges conne	ected to memory	, displa	y, smart,					
	 Explain the quality parameters of e sensors. 	engineering materials a	ssociated with e	nvironn	nent and					
	4) Interpret the knowledge of sustain	able chemistry for E- w	vaste managemer	nt.						
	5) Analyse the importance of various e	electrochemical source	s in energy syster	ns.						
urse Content:										
dule 1	mputational Chemistry	Assignment	ta Collection and analysis	09 cl	asses					
bics: Fundamental interactions: Bo hydrogen bond optimization by	l particles of atom – their mass, charge and nded and non-bonded interactions. Chen ing, Density functional theory. 3D co Molview. Chemical Databases: Chemoinfo	location – atomic num nistry of weak interact -ordinate generation rmatics, MSDS	ber and mass nur ions – van der V for small molec	nber, S Vaals f ules, g	tabilizing orce and geometry					
f- learning topics:	Scope, cost and efficiency of computation	nal modeling.								
dule 2	terials for Memory and Display Systems	Assignment	ta Collection and analysis	Cla	19 Isses					
Topics: Memory -transfer and F manufacturing o Display Systems Liquid crystals for diode and light e	Systems : Introduction, classification of e Resistor, types of materials - organic, of semiconductor chips. It photo and electroactive materials, materials or LCD-Liquid crystals display, Basics of LED emitting electrochemical cells.	lectronic memory devi polymeric and hybri erials for display -Princi OLED-organic light er	ces- Transistor, ca id materials, an iple, Properties a nitting	apacito d app	r, charge lications, lications:					
Seij- learning to	pics: Green computing: Biocomposite base	ea memory devices	to Collection and							
dule 3	Devices	Assignment	a collection and analysis	09 Cl	asses					
pics: Nanomateria	als- Introduction, classification based on o	dimensionality, quantu	im confinement.	Size de	ependent					
properties, Synt	hesis, Properties of CNT and Graphene ar	nd their application as	Materials for da	ta ana	lysis and					
packaging -RFID	and IONT.									
Sensors: Introdu	uction, types, Principle and applications	s- electrochemical ser	isor: nanomateri	als for	sensing					
applications - Gl	ucose, voc sensing.									

Self-learning top	Self-learning topics: Fullerene, biomolecules in sensing, Strain sensors							
dule 4	Sustainable Materials and Development	Quiz/Seminar	ta Collection and analysis	09 Classes				
bics: E waste: In Hydrometallurgy	troduction, E waste Hazards, E- waste	management, Recov	ery of precious	metal- Cu by				
Green Chemistry	r: Fundamentals and 12 principles with exa	mples, Carbon footpri	nt and sequestrati	on				
Sustainable Che	mistry: -Introduction to Biomaterials- PL/	A, polymers in bio-	compatible and k	bio-degradable				
materials - Poly(:	3-hydroxybutyrate-co-3-hydroxyvalerate) F	PHBV, synthesis and ap	plications in drug	delivery.				
Self-learning top								
dule 5	ergy Science	Quiz/Seminar	analysis	Classes				
pics: Battery tech	nology:Fundamentals of electrochemist	try, Introduction to e	lectrochemical sto	orage devices:				
battery (Lithium- Types - EDLC, pse	ion battery- LiMnO ₂ , LiCoO ₂ , metal air batte eudo and asymmetric capacitor.	eries- LiO_2) and superca	apacitors-Introduc	tion, Principle,				
Photovoltaics: S	olar cells - Construction and working p	rinciple; types- Inorga	inic, Organic and	quantum dot				
sensitized (QDSS	C's).							
Self -learning top	bics: Battery technology for e-mobility, Gre	een nydrogen						
geted Application	1 & Tools that can be used:			1.11.				
plication areas are	Data storage and analysis, logistics, Biome	edicine, Energy, Enviro	nment and sustair	hability				
bls: Molview, chei	mdraw, excel etc							
ject work/Assign	ment:							
sessment Type								
Midterm	exam							
Assignme screensh	ent (review of digital/ e-resource from PU not accessing the digital resource.)	link given in reference	s section - manda	tory to submit				
Quiz/Stu	dent Seminar							
End Tern	n Exam							
Self-leari	ning							
rt Book								
10. Wiley, "E	Engineering Chemistry", Wiley.							
11. G.A. Ozir Chemistr	n and A.C. Arsenault, Nanochemistry: A c ry, 2009	chemical approach to	nanomaterials, Ro	oyal Society of				
erence Books								
1. Functional and ISBN: 978-036-72	d smart materials, Chander Prakash, Sunpr 27-510-5.	eet Singh, J. Paulo Dav	im, 2020, CRC Pre	ss,				
2. E-waste recycl Abdullah M. Asir	ling and management: present scenarios a i. 2019, Springer, Vol. 33. ISBN: 978-3-030-	nd environmental issue 14186-8.	es, Khan, Anish, ar	nd				
Essentials of com Sons. ISBN: 978-0	nputational chemistry: theories and model 0-470-09182-1.	s, Christopher J Crame	r, 2013, John Wile	y &				
3. Energy storage A. L. Sharma, Ani	e and conversion devices: Supercapacitors, il Arya. 2021, CRC press, 1st edition, ISBN: 9	, batteries and hydroel 178-1-003-14176-1.	ectric cells, Anura	g Gaur,				
4. Fundamentals Ltd., 8th, ISBN: 97	of analytical chemistry: An introduction, E '8-0-495-55828-6	Oouglas A. Skooget etal	l., 2004 Thomson /	Asia pte				
5. Functional and	d smart materials, Chander Prakash, Sunpr	eet Singh, J. Paulo Dav	im, 2020, CRC Pre	ss,				
ISBN: 978-036-72	27-510-5.							
6. Electrical and S. L., Alvi, P. A., 8	electronic devices, circuits and materials: 1 & Subramaniam, U, 2021, John Wiley & Sor	Fechnological challenge ns, ISBN: 978-03675642	es and solutions. T 261.	ripathi,				
7. F. Jensen, Intr	roduction to Computational Chemistry, 3rd	edition, Wiley, 2017.						
1 https://presiu	niv knimbus com/user#/searchresult2sear	chld=computational%3	Ochemistry & +-1	73805497014				
2		unu-computational/02	-ochemistry&_t=1	, 3003437014				
- 2. <u>https://presiu</u> 95_30102024_48	niv.knimbus.com/user#/viewDetail?search 8504	ResultType=ECATALO	<u>GUE_BASED&uniq</u>	ue_id=EBSCO				
3. https://presiu	niv.knimbus.com/user#/viewDetail?search	ResultType=ECATALO	<u>GUE_BASED&uniq</u>	ue_id=EBSCO				

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 30102024_147967

 4. https://presiuniv.knimbus.com/user#/viewDetail?searchResultType=ECATALOGUE_BASED&unique_id=EBSCO

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 30102024_130301

 5. https://presiuniv.knimbus.com/user#/viewDetail?searchResultType=ECATALOGUE_BASED&unique_id=EBSCO

 95
 30102024_87297

 6. https://presiuniv.knimbus.com/user#/viewDetail?searchResultType=ECATALOGUE_BASED&unique_id=EBSCO

 95
 30102024_67006

 7. https://presiuniv.knimbus.com/user#/viewDetail?searchResultType=ECATALOGUE_BASED&unique_id=EBSCO

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 30102024_137261

 8. https://presiuniv.knimbus.com/user#/viewDetail?searchResultType=ECATALOGUE_BASED&unique_id=EBSCO

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 30102024_137261

 8. https://presiuniv.knimbus.com/user#/viewDetail?searchResultType=ECATALOGUE_BASED&unique_id=EBSCO

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 Il Sets

 topics in theory component are relevant to Environment and Sustainability.

Catalog	Faculties of Department of Chemistry
prepared by	
Recommended	PU/SOE/CHE/BOS-0x/20xx-2x
by the Board	BOS held on 00/00/2x
of Studies on	
Date of	th Academic council
Approval by	
the Academic	
Council	

<u> </u>						
This course is designed to equip students to enhance their communication abilities in Listening, Speaking, Reading, and Writing. The curriculum covers interpersonal communication principles, the art of speech writing and delivery (including impromptu speaking), strategic approaches to critical reading, the identification of logical fallacies, and persuasive writing. Furthermore, the course will introduce students to the potential of AI tools and the techniques of prompt engineering to elevate their communication skills in the digital age. Upon course completion, students will be well-prepared to communicate						
n to ang eff to ev	iddress fective valuate ues and					
	abilinterperimpral fall poter ion slowmmu					

dule 1		undations Effective Commun	of ication	se Studies/ Role play	oss-Cultural Competency	12 Classes
pics:		Commun	leation			
•	Fundamentals	s of Interper	sonal Co	mmunication		
•	Verbal, Non-	verbal. and	Paraverba	d communication.		
•	Cultural dime	ensions theo	rv (Hofst	ede's Cultural Dimensions).		
•	Active Listen	ing Technic	iues			
•	Common Erro	ors in Comr	nunicatio	n		
Activit	ies:			-		
•	Instagram/Yo	uTube Voc	abulary A	ctivity		
•	Charades with	th a Twist	/Tone an	d Emotion Experiment/Mix	ked Messages Challenge/R	ole Reversal
dule 2	Conversation	stering	Speech	M	blic Speaking Confidence	12 Classes
pics:		Denvery			commune	
•	Introduction t	o Prompt E	ngineerin	σ		
•	Speech Prepa	ration and (Drganizat	8 Ion		
•	Techniques fo	or Effective	Impromr	tu Speaking		
•	Practice Spee	ech Deliver	v v	ta spoaning		
Activit	ies:	en Denver.	y			
•	Speech Writin	ng				
•	Impromptu S	peech				
dule 3		itical Read Logical A	ing and nalysis	orksheet	itical Thinking and Analysis	12 Classes
Topics	:					
•	Critical Read Recognizing	ing Strategi Emotional N	ies: Conte Manipulat	extualizing, Figurative Languion, Analysing Visuals	uage, Evaluating Logic of a	n Argument,
•	Recognizing Hominem, St	Logical Fai raw Man, E	llacies: S Bandwago	lippery Slope, False Dilemn n, No True Scotsman, Red H	na, Post Hoc, Hasty Generation Herring, Appeal to Authority	alization, Ad , Sunk Cost,
Activit	ies:	orunee				
•	Critical Read	ing Worksh	eet/Identi	fying Bias in News Articles		
dule 4		riting I Argumen	Effective ts	signment	ar and Coherent Writing	lasses
pics:						
•	Understandin	g Critical W	/riting			
•	Building Arg	uments (Pat	hos, Etho	s, Logos)		
• Ac	Techniques fo tivities:	or Persuasio	n			
•	Causes or Eff	ects/Appeal	Mash-U	p/Debates on Controversial T	opics	
•	Opinion Writ	ing				
rgeted Gramm	Application &	& Tools th	at can l	e used: Quizziz, Chatgpt,	Gemini, Youtube, Instagra	m, Quillbot,
ferences						
	1. Adler, R. Oxford U	B., Rodma niversity Pr	nn, G., & ess.	DuPré, A. (2019). Understa	unding human communicatio	on (14th ed.).
	2. Moore, B	. N., & Parl	ker, R. (20	020). Critical thinking (13th e	ed.). McGraw-Hill Education	1.
	3. Hamilton	, C. (2020).	Commun	icating for success (2nd ed.).	Routledge.	
	4. Ting-Too	mey, S., &	Dorjee, T	. (2018). Intercultural compet	tence: A model for teaching a	and assessing

cross-cultural communication. *Journal of Intercultural Communication*, 47(2), 213–229. https://doi.org/10.1016/j.jicc.2018.03.004

5. <u>https://www.ted.com/</u>

Topics Relevant to "employability": Teamwork and Collaboration, Critical Thinking and Problem-Solving					
Topics Relevant to "	Human Values and Professional Ethics": Critical reasoning, Inclusivity and Fairness				
Catalogue					
prepared by	Dr. Tychicus David, Dr. Jayalakshmi E				
Recommended by	^h BoS, 8 th January 2025				
the Board of					
Studies on					
Date of Approval					
by the Academic					
Council					

	urse Title: Basics of	Electrical and Electronics			<u> </u>				
Course Code:	Engineering.		L-T-P-C		3				
EEE1200	be of Course: Professi	onal Core - Theory							
rsion No.			11	1 1	<u> </u>				
urse Pre-requisites	NIL								
ti requisites									
unce Description	This is a fundamental	Course which is designed to know	ow the use of basi	cs of ele	ectrical				
urse Description	and electronics engine	eering principles occurs in vari	ous fields of Eng	ineering	y. The				
	course emphasises on	the characteristics and applicat	tions of electrical	and ele	ctronic				
	devices. The course al	lso emphasizes on the working,	analysis and desig	gn of ele	ectrical				
	circuits using both act	tive & passive components. Ad	ditionally, this co	ourse cr	eates a				
	foundation for the fut	foundation for the future courses such as Electrical machines, power system, power							
	electronics Linear Integrated Circuits, Analog Communication and Digital								
	Communication etc.								
urse Objective	The objective of the c	course is to familiarize the learn	hers with the conc	epts of	Basics				
	of Electrical and Ele	ectronics Engineering and atta	in Skill Develop	ment t	hrough				
	Participative Learni	ng techniques.	4a aholl ho ohlo 4						
urse Outcomes	On successful complete	of Floatnicel Engineering to com	its shall be able t	.0: 	ام ما				
	1. Apply basic laws	of Electrical Engineering to con	npute voltage, cu	rrents a	na				
	Other parameters	s in the circuits.	ring in the charge	torictio	of				
	2. Discuss various fu	avises and their applications	ring in the charac	teristics	5 OT				
		evices and their applications.	C t :	ef Dľ	To and				
	5. Summarize the	operations of different blasin	ig configurations	OI BJ	is and				
	A Discuss the perfo	rmance characteristics and an	plications of vario		trical				
	4. Discuss the perio			us elec	.iicai				
unce Contents	Machines.								
arse Content:	Introduction to								
dulo 1	Electrical Circuits	ignment/Quiz	merical solving	A Soco	ions				
			Task	10 5655	10115				
DC Circuits: Concept of (L Circuit and Network, T	vpes of elements. Network Red	duction Technique	es- Seri	ies and				
parallel connections of re	sistive networks, Star-	-to-Delta Transformations, Me	esh Analysis, No	dal Ar	nalysis,				
Numerical examples.	,				,				
AC Circuits: Fundamentals	s of single phase circuits	s - Series RL, RC and R-L-C Ci	rcuits, Concept of	factive	power,				
reactive power and Power f	actor, Numerical examp	les.							
Introduction to three phase	e system and relation	between line and phase value	es in Star & Delt	ta conn	ection,				
Numerical examples.	Т		1	1					
dule 2	niconductor and	ignment/ Ouiz	mory Recall	Sessio	ns				
	Diode applications		based Quizzes	1	. 1				
Mass Action Law, Charge	biodo Economico Change	inductor, Types of SC, Juncti	on diodes -Ideal	and pr	actical				
characteristics and its appli	cations like voltage regu	lator	iis like recuriers,	Zellel	uloue,				
characteristics and its appin	ngistors and its		mory Pocall						
dule 3	Applications	ignment/ Quiz	hased Ouizzes	0 Sess	ions				
nsistor characteristics Curre	ent components BIT C	onfigurations (CB_CC_CE_cc	nfigurations) and	l their	current				
gains Operating point Bia	sing Fixed Bias and lo	ad line analysis Single Stage	amplifier IFET	(Constr	uction				
principal of Operation and Volt –Ampere characteristics) Pinch- off voltage Comparison of RIT and FFT									
MOSFET (Construction, principal of Operation and symbol). MOSFET characteristics in Enhancement and									
Depletion modes.	1 I	• • • • • • • • • • • • • • • • • • •							
	Fundamentals of		merical solving	G •					
aule 4	ctrical Machines	ignment/ Quiz	Task	Sessio	15				
Electrical Machines: Sing	le phase transformers: p	principle of operation and EMF	equation, Numer	ical exa	mples.				
DC Motor: principle of operation, Back EMF, torque equation, Numerical examples. AC Motor: Principle operation									

of Induction Motors and its Applications.

f-Learning Topics:

oping and clamping circuits, Stabilization Techniques, Voltage divider bias and its stability factor, Multistage amplifier, Darlington pair.

Special Machines: Introduction to special electrical machines and its applications.

geted Application & Tools that can be used:

Targeted Applications: Application Area includes all electrical and electronic circuits (power supply unit, regulator unit, embedded devices, hardware electronics etc.). The students will be able to join a profession which involves basics to high level of electronic circuit design.

Professionally Used Software: Multisim/ P Spice

ides these software tools hardware equipment such as Multimeters, Function Generators, Power Supplies, Oscilloscopes etc., can be used to perform component/circuit testing and analysis..

ject Work/ Assignment:

1. Article review: At the end, of course an article topic will be given to an individual or a group of students. They need to refer the library resources and write a report on their understanding about the assigned article in appropriate format.

2. Presentation: There will be a group presentation, where the students will be given a topic. They will have to explain/demonstrate the working and discuss the applications for the same.

3. Case Study: - At the end of the course students will be given a 'real-world' application based circuits like Power Amplifier, Signal/Function Generator etc. as a case study. Students will be submitting a report which will include Circuit Diagrams, Design, Working Mechanism and Results etc. in appropriate format

t Book(s):

- 1. Kothari D. P. & Nagrath I. J., "Basic Electrical and Electronics Engineering", Tata McGraw-Hill
- 2. Education
- 3. Theraja B.L. and Theraja A.K., "A Textbook of Electrical Technology: Basic Electrical Engineering" in S.I. System of Units, 23rd ed., New Delhi: S. Chand, 2002.
- 4. A.P.Malvino, Electronic Principles,7thEdition, Tata McGraw Hill,2007
- 5. J. Millman, C. C. Halkias and C. D. Parikh, "Millman's Integrated Electronics", McGraw Hill Education, 2nd Edition.
- 6. Basics of Electrical & Electronics Laboratory Manual.

erence Book (s):

- 1. John Hiley, Keith Brown and Ian McKenzie Smith, "HUGHES Electrical and Electronic Technology", 10th Edition (Indian Edition published by Dorling Kindersley), Pearson, 2011
- 2. Samarajit Ghosh, "Fundamentals of Electrical and Electronics Engineering", 2nd Edition, Prentice Hall India, 2007.
- 3. K Uma Rao, A Jaya Lakshmi, "Basic Electrical engineering" IK International publishing house Pvt. Ltd
- 4. R. L. Boylestad and L. Nashelsky, "Electronic Devices and Circuit Theory", Pearson Education India 7th Edition.
- 5. A K. Maini, V. Agrawal, "Electronic Devices & Circuits", Wiley, 2nd Edition
- 6. A.S Sedra, K. C. Smith, "Microelectronic Circuits", Oxford University Press, 6th Edition **Online Resources (e-books, notes, ppts, video lectures etc.):**
- 1. <u>https://presidencyuniversity.linways.com</u>
- 2. https://www.digimat.in/nptel/courses/video/108105112/L01 "Fundamentals of Electrical Engineering-Basic Concepts, Examples"
- 3. Seminar Topic: https://nptel.ac.in/courses/108/105/108105153/ "Electrical Measurements"
- 4. Video lectures on "Electronic Devices" by Prof. Dr. A. N. Chandorkar, IIT Bombay http://www.satishkashyap.com/2013/03/video-lectures-on-electron-devices-by.html
- 5. Video lectures on "Analog Electronics" by Prof. S.C. Dutta Roy, IIT Delhi

https://nptel.ac.in/courses/108/102/108102095/

6. Video lectures on "Diodes", by Prof. Chitralekha Mahanta, IIT Guwahati, https://nptel.ac.in/courses/117/103/117103063/		
E-content:		
1. "Introduction to Electric	cal Machines https://nptel.ac.in/courses/108/102/108102146/"	
MY. Kao, H. Kam and C. in IEEE Electron Device	Hu, "Deep-Learning-Assisted Physics-Driven MOSFET Current Voltage Modeling," e Letters, vol. 43, no. 6, pp. 974-977, June 2022, doi: 10.1109/LED.2022.3168243	
https://ieeexplore-ieee-org-re	esiuniv.knimbus.com/document/9758727	
2. F. Bonet, O. Aviñó-Salv	vadó, M. Vellvehi, X. Jordà, P. Godignon and X. Perpiñà, "Carrier	
Concentration Analysis in 1.2 vol. 43, no. 6, pp. 9 presiuniv.knimbus.com/	2 kV SiC Schottky Diodes Under Current Crowding," in IEEE Electron Device Letters, 938-941, June 2022, doi: 10.1109/LED.2022.3171112. https://ieeexplore-ieeeorg- /document/9764749	
3. M. Chanda, S. Jain, S. I Power Application," in pp. 2782-2790, Dec. 20	De and C. K. Sarkar, "Implementation of Subthreshold Adiabatic Logic for Ultralow- IEEE Transactions on Very Large Scale Integration (VLSI) Systems, vol23, no. 12, 15.	
https://ieeexplore.ieee.org/do	ocument/7018053	
4. R. Raut and O. Ghasem	i, "A power efficient wide band trans-impedance amplifier in submicron	
CMOS integrated circuit teo Systems and TAIS	chnology," 2008 Joint 6th International IEEE Northeast Workshop on Circuits and A Conference, 2008, pp. 113-116, doi: 0.1109/NEWCAS.2008.4606334.	
https://ieeexplore.ieee.o	rg/document/4606334	
Topics relevant to "SKILL	DEVELOPMENT : Performing suitable experiments to compute the electric circuit	
parameters, performance op	eration of machines, and operation of semiconductor devices for Skill Development	
through Participative Learn	ning techniques. This is attained through assessment component mentioned in course	
plan.		
Catalogue prepared by	Dr. Ajay Kumar Maurya	
Recommended by the		
Board of Studies on		
Date of Approval by the		
Academic Council		

urse Code EEE1250	urse Title: Basics of Electrical and Electronics Engineering Laboratory pe of Course: Professional Core - Laboratory					
rsion No.						
urse Pre- requisites						
ti-requisites						
urse Description	This fundamental laboratory provides an opportunity to validate the concepts taught in the basics of electrical and electronics engineering and enhances the ability to visualize real system performance, using both hardware and simulation tools.					
urse Objective	The objective of the course is to familiarize the learners with the concepts of Basics of Electrical and Electronics Engineering and attain Skill Development through Experiential Learning techniques.					
sic skill sets required for the laboratory:						
	The students shall be able to develop:					
	1) An attitude of enquiry.					
	2) Confidence and ability to tackle new problems.					
	3) Ability to interpret events and results.					
	4) Ability to work as a leader and as a member of team.					
	5) Assess errors and eliminate them.					
	6) Observe and measure physical phenomenon.					
	7) Write Reports.					
	8) Select suitable equipment, instrument and materials.					
	9) Locate faults in systems.					
	10) Manipulative skills for setting and handling equipment.					
	11) The ability to follow standard test procedures.					
	12) An awareness of the need to observe safety precautions.					
	13) To judge magnitudes without actual measurement.					
	On successful completion of the course the students shall be able to:					
	1. Apply basic laws of Electrical Engineering to compute voltage, currents, and					
	other parameters in the circuits.					
urse Out Comes	2. Demonstrate the working of electrical machines to observe performance characteristics.					
	3. Demonstrate the working of electronic circuits to obtain the V-I					
	 4. Sketch the characteristics and waveforms relevant to standard electrical and electrical electrical and electronic elevants. 					
unce Contents						
	t of Loboratory Tooks					
	EXAMPLE 1 EXAMPLE 1 CONTRACT CONTRACT CONTRACT CONT					
	Level 1: Study and Verify KVL and KCL for the given electrical Circuit.					
	Level 2: For the same circuit considered in level 1,					
	perform the simulation using NI					
LabVIEW/Multisim/MATLAB.						
	Experiment No 2: Analyse AC series circuits – RL, RC and RLC.					
	Level 1: Conduct an experiment to perform and verify the impedance, current					
	and power of Series KL and KC circuits					
	of RLC series circuits					
	Experiment No 3: Calculation of power and power factor of the given AC					
	Circuit.					

Level 1: Conduct an experiment to measure the power and power factor for	
given resistive load.	
Level 2: Conduct an experiment to measure the power and power factor for given inductive load.	
Experiment No 4: Perform the experiments on given Transformer.	
Level 1: Verify the EMF equation of a transformer and compute the voltage	
transformation ratio.	
Level 2: Study the effect of load on the secondary side of the transformer and	
verify the EMF equation under load conditions.	
Experiment No 5: Load test on DC shunt motor	
Level 1: Conduct load test on DC shunt motor and find its efficiency at differen	ι
Level 2: Conduct load test on DC shunt motor and plot the performance	
characteristics	
periment 6: Study of PN-Junction Diode Characteristics in Forward and Rever	se
Bias Conditions.	50
vel 1: Carry out an experiment to plot VI Characteristics and hence find the cut-	in
voltage on forward characteristics for the Silicon P-N Junction diode.	
vel 2: Carry out an experiment to plot VI Characteristics of Zener diode and hence	ce
find the zener voltage on reverse characteristics for the Silicon P-N Junction zene	er
diode.	
periment No. 7: To observe the output waveform of half wave and full wave rectifi	er
circuit and compute ripple factor and efficiency	
vel 1: Identify the components required for a rectifier circuit, rig up the circuit, ar sketch the output waveforms without filter.	ıd
vel 2: Rig up the rectifier circuit with RC filter, observe the output waveform determine the efficiency and ripple factor.	s,
periment 8: To construct clipping and clamping circuits for different reference voltages and to verify the responses.	ce
vel 1:Identify the components required for building a Clipper / Clamper circuit. Results up the circuit according to the circuit diagram given and sketch the output waveform.	ig ut
vel 2: Given a sinusoidal input of 10 V p-p, implement a positive / negative clipped with output clipped at 2 V.	er
periment 9: To calculate various parameters of emitter follower circuit using BJ	Т
vel 1: Identify the components required to implement an emitter follower circuit	it.
Rig up the circuit and observe the variations in output waveform with respect	to
the variations in input waveform.	
vel 2: Determine the values of Z_{in} input impedance and Z_{out} output impedance for	or
Emitter Follower.	
periment 10: To Implement RC Coupled amplifier using a BJT and sketch the	ne
frequency response.	
vel 1: Identify the components required to implement an RC coupled amplified	er
circuit. Rig up the circuit and sketch the frequency response.	
Level 2: From the frequency response curve determine the value of the mid bar gain and the bandwidth	ıd
gain and the ballowidth.	
general Applications: Application Area includes all electrical and electronic circuits (newer suppl	1.,

Targeted Applications: Application Area includes all electrical and electronic circuits (power supply unit, regulator unit, embedded devices, hardware electronics etc.). The students will be able to join a profession which involves basics to high level of electronic circuit design.

Professionally Used Software: Multisim/ P Spice

sides these software tools hardware equipment such as Multimeters, Function Generators, Power

	\cap \cdot	1		A
miles	Uscilloscopes etc - cs	an ne lised to perform	component/circuit tes	$\sin \sigma$ and analysis
phob		an de abea to periorm	component/encut tel	and analysis.

urse Material

1. Basics of Electrical and Electronics Engineering Laboratory Manual, Presidency University, Bengaluru.

xt Book:

2. Kothari D. P. & Nagrath I. J., "Basic Electrical and Electronics Engineering", Tata McGraw-Hill

Reference Books:

- 3. John Hiley, Keith Brown and Ian McKenzie Smith, "HUGHES Electrical and Electronic Technology", 10th Edition (Indian Edition published by Dorling Kindersley), Pearson,2011
- 4. Samarajit Ghosh, "Fundamentals of Electrical and Electronics Engineering", 2nd Edition, Prentice Hall India, 2007.
- 5. K Uma Rao, A Jaya Lakshmi, "Basic Electrical engineering" IK International publishing house Pvt. Ltd
- 6. R. L. Boylestad and L. Nashelsky, "Electronic Devices and Circuit Theory", Pearson Education India 7th Edition.
- 7. A K. Maini, V. Agrawal, "Electronic Devices & Circuits", Wiley, 2nd Edition
- 8. A.S Sedra, K. C. Smith, "Microelectronic Circuits", Oxford University Press, 6th Edition

Online Learning Resources:

- 9. https://presidencyuniversity.linways.com
- 10. https://www.digimat.in/nptel/courses/video/108105112/L01 "Fundamentals of Electrical Engineering-Basic Concepts, Examples"
- 11. Video lectures on "Diodes", by Prof. Chitralekha Mahanta, IIT Guwahati, <u>https://nptel.ac.in/courses/117/103/117103063/</u>

Topics relevant to "SKILL DEVELOPMENT": All the experiments which are listed are for **Skill Development** through **Experiential Learning Techniques**. This is attained through the assessment component mentioned in course handout.

Catalogue prepared by	Dr. Ajay Kumar Maurya
Recommended	
by the Board of	
Studies on	
Date of	
Approval by the	
Academic	
Council	





Presidency University Act, 2013 of the Karnataka Act No. 41 of 2013 | Established under Section 2(f) of UGC Act, 1956 Approved by AICTE, New Delhi



Itgalpur, Rajankunte, Yelahanka, Bengaluru – 560064

Course Code: LAW1007	Course Title: Indian Constitution and Professional Ethics for Engineers Type of Course: TheoryL-T- P-C1
Version No.	
Course Prerequisite s	
Anti-requisites	NIL
Course Description	The purpose of this course is to introduce the students to the theory, concepts and practice of Constitution of India which is the law of the land. Further, the course aims at acquainting the students with basic approaches and methodologies to analyse and decide on the ethical dilemma in the field of engineering. The course is both conceptual and analytical. The course develops critical thinking skills by augmenting the student's ability t comprehend the conceptual and legal framework of Constitution of India. Ethics and values are very beautifully weaved into the tapestry of the Indian Constitution. Therefore, the course provides an introduction to the essential theoretical basis of engineering ethics and its application through a range of industry relevant topics as responsibility for safety and risks, responsibility of employers, rights of engineers etc.
Course	1. To introduce the students to the conceptual framework of Constitution of
Objective	India and engineering ethics.
	2. To enhance the practical knowledge on responsibility of engineering
	professionals as citizens of India.
	3. To acquaint the student with the relevant contemporary issues
	surrounding constitutional values and professional ethics.
	 To orient the students about the ethical concepts and frameworks enabling them to identify the codes and moral values relevant to the professional world.

Course Outcomes	On successful completion of this course the students shall be able:
	1. To understand foundational Indian constitutional law concepts and values.
	2. To identify the different pillars of democracy and their functions.
	3. To analyse the role of the engineers' responsibility in ensuring safety of the society and the employer.

Module 1	Introduction to the Indian Constitution	Knowledge	Quiz	5 Classes
Course Content:				

Meaning of Constitution, Constitutional Law and Constitutionalism, India before and after adoption of Constitution, Preamble, Salient Features, Concept and Relevance of Fundamental Rights, Fundamental Duties and Directive Principles of State Policy in brief.

Federalism, Union and State Executive, Parliament and State Legislature, Union and State Judiciary, Amendment of the Constitution

Module 3	Engineering Ethics	Analysis	Presentation conceptual understanding problem based scena	on and rios	5 Classes
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Scope & Aims of Engineering & Professional Ethics, Code of Ethics as defined in the website of Institution of Engineers (India), Profession, Professionalism, and Professional Responsibility, Conflicts of Interest, Engineering Standards, the impediments to Responsibility, IPRs (Intellectual Property Rights), Necessity of responsible experimentation ,Case Studies on Challenger, Chernobyl, and Boeing. Project work/Assignment: Quiz on Fundamental Rights, Short Essay on Judicial Activism in India, Problem based assignments of engineering ethics.

Resources:

- 1. M.P. Jain, Indian Constitutional Law, 8th Edition, Lexis Nexis, 2022.
- 2. M.W.Martin and R. Schinzinger, Ethics in Engineering, 4thEdition, McGraw Hill Education, 2015.

References:

- 1. Durga Das Basu, Commentary on the Constitution of India, 9th Edition, Lexis Nexis, 2019.
- 2. Rowan, John, and Zinaich Jr., Ethics for the Professions, Wadsworth, 2003.
- 3. R.C. Sekhar, Ethical Choices in Business, Response Books, Sage Publications, 1997.

Catalogue prepared by	School of Law
Recommended	
by the Board of	
Studies on	

Date of	
Approval by the	
Academic	
Council	

Course Code: PPS 1026	Course Title: Industry Readiness Program – II (Audited Course) Type of Course: Practical Only Course	L- T - P- C	0	0	2	0
Version No.	1.0			•		•
Course Pre- requisites	 Students are expected to und Students should have desire a learn. 	erstand Basic En	glish. o involv	ve, parti	cipate	and
Anti-requisites	NIL					



Private University Estd. in Karnataka State by Act No. 41 of 2013

Course Description	This course is designed to enable students learn styles of communication, team building and use empathy in leadership. The course will benefit learners in preparing themselves effectively through various activities and learning methodologies.	
Course Objective	The objective of the course is to familiarize the learners with the concepts of "Industry Readiness for Young Professionals" and attain SKILL DEVELOPMENT through PARTICIPATIVE LEARNING techniques.	
Course Out Comes	On successful completion of this course the students shall be able to: CO 1 Apply different communication skills for success in workplace CO 2 Practice team building skills for career success CO3 Demonstrate ethical leadership skills in workplace	
Course Content		



Private University Estd. in Karnataka State by Act No. 41 of 2013 Y =

1

Module 1	Effective Communication	Classroom activities	10 Hours			
Topics: Practice effe	ective communication skills (Verbal, N	Non-verbal, Written and Visual)				
Activity: Use soci	al media prompts to prepare self-ir	ntroduction videos				
Module 2	Team Building	Group Activity	10 Hours			
Topics: Skills of an effective team player						
Activity: Student gr	oup activity to build class networking	3				
Module 3	Leadership	Case study	10 Hours			
Topics: Types of le	adership, using empathy in leaders	hip				
Activity: Individual	presentation by students on corpo	rate leaders.				
Faculty : L&D						
Targeted Application 4. TED Talks 5. You Tube	on & Tools that can be used: Links					
6. Activities						
Assignment propos	ed for this course					
Assignment 1: One	minute reel					
Assignment 2: Tean	n building assignment					
Continuous Individu	ual Assessment					
Module 1: L-S-R-W	Module 1: L-S-R-W class assessment					
Module 2: Team Pre	esentation					
Module 3: Individua	al Assessment					

The topics related to skill development:							
Students acquire I themselves to be le their time in the un	knowledge on effective communication skills, team building skills and how to prepare eaders in workplace using empathy and implement various skill sets during the course of iversity.						
Catalogue prepared by	Faculty of L&D						
Recommended	BOS held on						
by the Board of							
Studies on							
Date of	Academic Council Meeting held on						
Approval by the							
Academic Council							

urse Code: ECE1511	urse Title: Design V	Workshop		Т-Р- С	1	0	
rsion No.							
urse Pre-requisites	NIL						
ıti-requisites	L						
urse Description	This course is desig	gned to provide an i	in-depth	understand	ling o	of Ard	uino,
	microcontrollers Ra	aspberry pi and the	ir applic	ation in var	ious	real tiı	ne
	projects involving s	sensors. Throughou	it the cou	urse, studen	ts wi	ll lear	n the
	fundamentals of Ar	fundamentals of Arduino and Raspberry Pi programming and gain hands-					
	on experience with a wide range of sensors. Students will explore how to						
	connect and interface sensors with Arduino and Raspberry Pi boards, read						
	sensor data, and use it to control various output devices This course is						
	suitable for beginners who are interested in exploring the world of						
	electronics and developing practical applications using Arduino, Raspberry						
	Pi and sensors.						
urse Objective	The objective of the course is Employability Skills of student by using PARTICIPATIVE LEARNING techniques						
urse Outcomes	 On successful completion of the course the students shall be able to Explain the main features of the Arduino & the Raspberry Pi prototype board. 2) Demonstrate the hardware interfacing of the peripherals to Arduino and Raspberry Pi system. Understand the types of sensors and its functions Demonstrate the functioning of live projects carried out using Arduino and Raspberry Pi system. 						
urse Content:							
odule 1	Basic concepts of Microcontrollers	Hands-on	Interfa Analys	cing Task ar is	nd	3 Ses	sions
pics: Introduction to Ard platform features, C Board, API's , Intro variables, Arduino Platforms.	pics: Introduction to Arduino, ESP and Node MCU Pin configuration and architecture, Device and platform features, Concept of digital and analog ports, Familiarizing with Arduino Interfacing Board, API's, Introduction to Embedded C and Arduino platform, Arduino Datatypes and variables, Arduino i/o Functions, Arduino Communications, Arduino IDE, Various Cloud Platforms.						ce and rfacing es and Cloud
odule 2	nsory Devices no	ls-on	erfacing Analysi	Task s	and	essi	ons

duino Sensors: Humidity Sensor, Temperature Sensor, Water Detector / Sensor, PIR Sensor, Ultrasonic Sensor, Connecting Switches and actuators, sensor interface with Arduino. roduction to 3D Printer: 3D Printer technology and its working Principles, Applications. Introduction to online Simulators: Working with AutoCAD/Fusion 360 Simulator.

odule 3 roduction to Micro python nds-on erfacing Task and Analysis bessions	
--	--

pics:

roduction to MicroPython, Comparison with other programming languages, Setting up the MicroPython development environment, Basics of MicroPython syntax and structure.

dula 1	orking witl	nds on	erfacing	Task	acciona
Juule 4	Raspberry-pi	nus-on	and Anal	ysis	10115

roduction to raspberry pi boards, pin-diagram, different types of raspberry pi boards and its application, LED and switch control. Mastering Modules, Setup Raspberry - PuTTY SSH,VNC Viewer to interface with more complicated sensors and actuators. Various Libraries and its functions.

b: Name of the Experiments:

1. Introduction Lab 1:

Level 1: Overview on Arduino based Micro-controller, and sensors.

Level 2: Interfacing of Arduino and ESP boards with sensors and other components.

2. Lab 2: Smart Plant Monitoring

Level 1- Push button-controlled LED.

Level 2- Automatic Irrigation and monitoring System using Arduino

3. Lab 3: Robotics with Arduino.

Level 1- Servo Motor control using Arduino

Level 2: DC Motor Control Using Arduino for Robotics.

4. Lab 4: Environmental pollution using ESP.

Level 1 - IoT based air Pollution Monitoring System.

Level 2- IoT Based water pollution system

5. Introduction Lab for raspberry pi:

Level 1: Overview on Different Raspberry Pi Boards, and sensors.

Level 2: Configuring the Raspberry Pi and Interfacing with sensors and other components.

- 6. Lab 7: Raspberry Pi based Object Detection using TensorFlow and OpenCV.
- 7. Lab 8: Speech Recognition on Raspberry Pi for Voice Controlled Home Automation.
- 8. Lab 9: Design the website using HTML and CSS, and host the website on Raspberry Pi.

9. Introduction Lab for 3D printing:

Overview of 3D printing. Design of 3D structure using the CAD. Understand the steps of fabrication of simple rectangular box using 3D printer.

- 10. Lab 10: Design and print of Hollow Cylindrical structure using 3D CAD and 3D printer.
- 11. Lab 11 Demonstration of Jetson nano board and its capability. (OPTIONAL)
- 12. Lab 12: Revision
- 13. Lab 13: Revision

14. Lab 14: Mini Project

15. Lab 15: Mini Project Evaluation.

Topics: Types of Arduino boards, Thonny Python, Python IDLE, sensors, 3D Printer

rgeted Application & Tools that can be used:

plication Area:

me Automation, Environmental Monitoring, Agriculture and Farming, Industrial Automation, Internet of Things (IoT), Robotics, Wearable Devices, Security Systems, Education and Learning. These are just a few examples of the many application areas where Arduino, Raspberry Pi and sensors can be applied. The flexibility and affordability of Arduino, and Raspberry Pi combined with the wide range of sensors available, allow for endless possibilities in creating innovative projects.

ofessionally Used Software: Students can use open SOURCE Software's Arduino IDE and Tincker CAD, Thonny Python, Python IDLE etc.

ject work/Assignment:

1. Projects: At the end of the course students will be completing the project work on solving many real time issues.

2. Book/Article review: At the end of each module a book reference or an article topic will be given to an individual or a group of students. They need to refer the library resources and write a report on their understanding about the assigned article in appropriate format. <u>Presidency University Library Link</u>.

Presentation: There will be a presentation from interdisciplinary students group, where the students will be given a project on they have to demonstrate the working and discuss the applications for the same

xtbook(s):

- 1. Monk Simon "Programming Arduino: Getting Started with Sketches", Mc Graw Hill Publications Second Edition
- 2. Monk Simon "Raspberry Pi Cookbook: Software and Hardware Problems and Solutions", Publisher(s): O'Reilly Media, Inc. ISBN: 9781098130923 fourth Edition.

ferences

ference Book(s)

1. Neerparaj Rai "Arduino Projects for Engineers" BPB publishers, first edition, 2016.

2. Ryan Turner "Arduino Programming " Nelly B.L. International Consulting Ltd. first edition, 2019.

3. Charles Bell Micro Python for the Internet of Things: A Beginner's Guide to Programming with Python on Microcontrollers" by" Edition 1, 2017, ISBN 978-1-4842-3123-4

4. Stewart Watkiss "Learn Electronics with Raspberry Pi " Apress Berkeley, CA . second edition, 2020. ISBN 978-1-4842-6348-8

5. Jo Prusa, "Basic of 3D printing", Prusa Research, 3rd edition.

6. <u>Volker Ziemann</u>, "A Hands-On Course in Sensors Using the Arduino and Raspberry Pi (Series in Sensors)", CRC Press, 1st Edition. 2018.

line Resources (e-books, notes, ppts, video lectures etc.):

- 1. Arduino trending Projects < <u>https://www.https://projecthub.arduino.cc/</u>>
- 2. Introduction to Arduino < <u>https://onlinecourses.swayam2.ac.in/aic20_sp04/preview></u>
- 3. Case studies on Wearable technology< <u>https://www.hticiitm.org/wearables></u>

- 4. Raspberry-pi Projects < <u>https://magpi.raspberrypi.com/articles/category/tutorials/</u>>
- 5. Introduction to internet of things< <u>https://nptel.ac.in/courses/106105166></u>

ontent:

- 1. Cattle Health Monitoring System Using Arduino and IOT (April 2021 | IJIRT | Volume 7 Issue 11 | ISSN: 2349-6002)
- 2. M H Hemanth Kumar, Ravi Pratap Singh, Nishu Sharma, Pragya Singh" IOT BASED SMART SECURITY SYSTEM USING ARDUINO" 2021 JETIR August 2021, Volume 8, Issue 8.
 - 3. R. Maheswar, P. Jayarajan, S. Vimalraj, G. Sivagnanam, V. Sivasankaran and I. S. Amiri, "Energy Efficient Real Time Environmental Monitoring System Using Buffer Management Protocol," 2018, pp. 1-5, doi: 10.1109/ICCCNT.2018.8494144. https://ieeexplore.ieee.org/document/8494144.
 - 4. Yaser S Shaheen, Hussam., " Arduino Mega Based Smart Traffic Control System ," December 2021 Asian Journal of Advanced Research and Reports 15(12): 43-52, 2021(15(12): 43-52, 2021):15(12): 43-52, 2021.
- 5. Basil, Eliza Sawant, S.D. "IoT based traffic light control system using Raspberry Pi " DOI 10.1109/ICECDS.2017.8389604
- 6. Supriya S, 2Dr. Aravinda " Green leaf disease detection and identification using Raspberry Pi https://www.irjet.net/archives/V9/i8/IRJET-V9I847.
- 7. Dr. E.N. Ganesh., "Health Monitoring System using Raspberry Pi and IOT" DOI: http://dx.doi.org/10.13005/ojcst12.01.03

pics relevant to development of "SKILL": System design for achieving Sustainable Development Goals.

00013.	
Catalogue	Dr Ashutosh Anand
prepared by	
Recommended by	S NO:
the Board of	
Studies on	
Date of Approval	ademic Council Meeting No dated on
by the Academic	
Council	

Course Code: MAT2303	Course Title: Linear Algebra & Vector Calculus Type of Course:1] School Core	L-T- P- C	3	1	0	4
Version No.	1.0					
Course Pre-requisites	Basic Concepts of Limits, Differenti	Basic Concepts of Limits, Differentiation, Integration, Matrices (PU Level)				
Anti-requisites	NIL	NIL				
Course Description	This course explores the fundam operations within the context of integration, while applying these to transformations, and geometric in applications in fields like physics, include vector algebra, matrix oper gradients, divergence, curl, line in theorems of vector calculus like Divergence Theorem.	This course explores the fundamental concepts of vectors, matrices, and operations within the context of calculus, including vector differentiation integration, while applying these tools to solve problems related to linear sy transformations, and geometric interpretations in higher dimensions, ofte applications in fields like physics, engineering, and computer graphics; key include vector algebra, matrix operations, determinants, eigenvalues, eigenv gradients, divergence, curl, line integrals, surface integrals, and the fundation theorems of vector calculus like Green's Theorem, Stokes' Theorem, an Divergence Theorem.				d their on and stems, en with topics rectors, mental nd the

Course Objective	The course is intended to deve Matrices, Linear Algebra and disciplines. This course is to manipulate vectors in multid	Matrices, Linear Algebra and Vector Calculus which are useful to all engineering disciplines. This course is to equip students with the ability to understand and manipulate vectors in multidimensional space, apply matrix operations to solve					
	systems of linear equations, ar	nd utilize concepts like g	gradients, divergence, and curl				
	to analyze physical phenomena	a, all while developing a	strong foundation for applying				
	these tools in various scientifi	c and engineering field	s like physics, mechanics, and				
	computer graphics.						
Course Out Comes	On successful completion of th	ne course the students s	hall be able to:				
	CO1 - Use matrix methods a	nd certain techniques	to solve the system of linear				
	equations and to find eigen va	alues, eigen vectors of a	a matrix to check whether it is				
	diagonalizable.	-					
	CO2 - Understand the abstract	CO2 - Understand the abstract notions of vector space and dimensionality of it.					
	CO3 - find the matrix represe	CO3 - find the matrix representation of a linear transformation given bases of th					
	relevant vector spaces.		-				
	CO4 - Learn different notion	s of vector and scalar	fields with their properties.				
	Understanding the major theo	rems (Green's, Stokes',	Gauss') and some applications				
	of these theorems.	, , ,	, ,,				
Course Content:							
Module 1	Systems of Linear Equations		6. Classes)				
Systems of Linear Equa	tions. Matrices and Elementary Bow Ope	erations. Echelon forms	Matrix operations, invertible				
matrices. Determinants	and their properties. Cramer's Rule, I	U-decomposition, Appl	ications of Systems of Linear				
Fountions	, and then properties, eramer's hare, E		feations of systems of Enear				
Modulo 2	Vector Space	Assignment	(OClasses)				
Linear Combinations ar	d Linear Independence Vectors in n.P.		Linear Independence Vector				
Energy Definition of a	Voctor Space, Subspaces, Pasis and Dim	", Linear Combinations,	A Change of Pasis Orthogonal				
bases and orthogonal p	relations	ension, coordinates and	change of basis, Orthogonal				
			(45 La atoma a)				
			(15 lectures)				
Linear Transformations,	Algebra of transformations, The Null Spa	ace and Range, Isomorp	onisms, Matrix Representation				
of Linear Transformatio	ns, Similarity Eigenvalues and Eigenvecto	rs, Eigen values and Eige	en vectors, Diagonalization.				
Inner Product Spaces, I	ne Dot Product on R [®] and Inner Product S	paces, Orthonormal Bas	ses, Orthogonal Complements,				
Application: Least Squal	res Approximation, Diagonalization of Syn	nmetric Matrices,					
Application: Quadratic F	·orms.						
Singular Value Decompo	osition: Singular values, computing singul	ar value decomposition	, and introduction to principal				
Nodule 4	Vector Calculus	Assignment	(15 lectures)				
Vector & Scalar Function	ons and Fields, Derivatives, Curve, Arc le	ength, Curvature & Tor	sion, Gradient of Scalar Field,				
Directional Derivative,	Divergence of a Vector Field, Curl of a	Vector Field, Physical i	nterpretation, solenoidal and				
irrotational vector fields	S. Problems.						
Line Integrals, Path Inc	lependence of Line Integrals, Green's T	heorem in the plane,	Surface Integrals, Divergence				
Theorem of Gauss, Stok	es`s Theorem.						
Targeted Application &	Tools that can be used:						
Solve systems o	f linear equations using various methods	including Gaussian and	Gauss Jordan elimination and				
inverse matrices.							
Perform matrix	algebra, invertibility, and the transpose a	ind understand vector a	lgebra in R ⁿ .				
Determine relat	tionship between coefficient matrix inve	rtibility and solutions to	b a system of linear equations				
and the inverse matri	ices.						
Find eigenvalue	s and eigenvectors and use them in appli	cations.	6				
Find the dimension	sion of spaces such as those associated w	ith matrices and linear t	ransformations.				
Understand rea	I vector spaces and subspaces and apply	their properties.					
Compute inner	products in a real vector space and comp	ute angle and orthogon	ality in inner product spaces.				
Create orthogo	nal and orthonormal bases: Gram-Schmi	idt process and use bas	ses and orthonormal bases to				
solve application pro	olems.	6 1 1 1 1 1					
Prove basic resu	lits in linear algebra using appropriate pro	por-writing techniques s	such as linear independence of				
vectors; properties o	t subspaces; linearity, injectivity and sub	jectivity of functions; a	na properties of eigenvectors				
and eigenvalues.							

Assi	ign	m	eı	nt:
	· • • •		_	

Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding applications of Linear Algebra and Vector Calculus to engineering applications – The faculty will allocate chapters/ parts napters to groups of students so that the entire syllabus of Linear Algebra and Vector Calculus is covered.

Text Book

- 1. Gilbert Strang, Linear Algebra and its applications, Wellesley-Cambridge Press, U.S.; 6th edition.
- 2. B. S. Grewal (2017), Higher Engineering Mathematics by, 44th Edition, Khanna Publishers.

References:

- 1. Introduction to Linear Algebra with Application, Jim Defranza, Daniel Gagliardi, Tata McGraw-Hill
- 2. Elementary Linear Algebra, Applications version, Anton and Rorres, Wiley India Edition.
- 3. Advanced Engineering Mathematics, Erwin Kreysig, Wiley Publication.
- Elementary Linear Algebra, Ron Larson, Cengage Learning .
- 5. Linear Algebra and its Applications, David C. Lay, Pearson Education.

E-resources/ Web links:

1. <u>https://presiuniv.knimbus.com/user#/viewDetail?searchResultType=ECATALOGUE_BASED&unique_id=EBSCO</u> 95 30102024 9607

2. <u>https://presiuniv.knimbus.com/user#/viewDetail?searchResultType=ECATALOGUE_BASED&unique_id=EBSCO</u> 95 30102024 143156

3. <u>https://presiuniv.knimbus.com/user#/viewDetail?searchResultType=ECATALOGUE_BASED&unique_id=CUSTO</u> M PACKAGE_EBSCO_29052023_270975

4. <u>https://presiuniv.knimbus.com/user#/viewDetail?searchResultType=ECATALOGUE_BASED&unique_id=EBSCO</u> 95_30102024_94555

95_30102024_94555

5. <u>https://presiuniv.knimbus.com/user#/viewDetail?searchResultType=ECATALOGUE_BASED&unique_id=EBSCO</u>

95_30102024_243864

- 6. <u>https://presiuniv.knimbus.com/user#/viewDetail?searchResultType=ECATALOGUE_BASED&unique_id=EBSCO</u> 95 30102024 224531
- 7. NPTEL Video Lectures Matrices and Linear Algebra:
- 8. https://nptel.ac.in/courses/111106051/
- 9. NPTEL Video Lectures Differential Equations:
- 10. https://nptel.ac.in/courses/111106100/
- 11. NPTEL Vector Calculus:
- 12. https://nptel.ac.in/courses/111/105/111105122/
- 13. https://www.math.hkust.edu.hk/~maqian/ma006_0607F.html
- 14. https://www.scu.edu.au/study-at-scu/units/math1005/2022/

Topics relevant to SKILL DEVELOPMENT: The course focuses on the concepts of Vector calculus and Linear Algebra with reference to specific engineering problems. The course is of both conceptual and analytical type in nature through Problem Solving. This is attained through the assessment component mentioned in the course handout.

Course Code: MAT2404	Course Title: Discrete Mathematics Type of Course:1] School Core	L-T- P- C	3	1	0	4	
Version No.	1.0						
Course Pre-requisites	MAT2302						
Anti-requisites	NIL						
Course Description	The course explores the study of discrete (not continuous), focus theory, combinatorics, and nu computer science fields like cryptography; it covers topics s relations, functions, counting prin foundation for analyzing discre	The course explores the study of mathematical structures that are fundame discrete (not continuous), focusing on concepts like set theory, logic, theory, combinatorics, and number theory, with applications primar computer science fields like algorithms, software development, cryptography; it covers topics such as propositional logic, proof techn relations, functions, counting principles, and basic graph algorithms, provi foundation for analyzing discrete problems and structures within corr					

	science.							
Course Objective	The main objective of	of the course	is that students should l	earn a particular set of				
	mathematical facts	mathematical facts and how to apply them. It teaches students how to the						
	logically and mathe	ematically th	nrough five important	themes: mathematical				
	reasoning, combinat	torial analysi	s, discrete structures, alg	gorithmic thinking, and				
	applications and me	odeling. A s	uccessful discrete mathe	ematics course should				
	carefully blend and b	balance all fiv	ve themes.					
Course Outcomes	On successful compl	On successful completion of the course the students shall be able to:						
	CO1 - Explain logical	sentences th	nrough predicates, quanti	fiers and logical				
	connectives.							
	CO2 - Deploy the cou	CO2 - Deploy the counting techniques to tackle combinatorial problems						
	CO3 - Comprehend t	the basic prin	ciples of set theory and c	lifferent types of				
	relations.							
	CO4 - Apply differer skills	nt types of s	tructures of trees for de	veloping programming				
Course Content:								
Module 1	Fundamentals of Logic			(10 Classes)				
Basic Connectives and Trut	h Tables, Propositional Logic, Ar	pplications of	Propositional Logic, Prop	ositional Equivalences,				
Predicates and Quantifiers	Nested Quantifiers, Rules of In-	ference, Intro	oduction to Proofs, Proof	Methods and Strategy.				
Module 2	Principle of Counting		Assignment	(15 Classes)				
The Well Ordering Principle	– Mathematical Induction							
The Basics of Counting. Per	mutations and Combinations. B	inomial Coef	ficients and Identities. Ge	neralized Permutations				
and Combinations. Genera	ting Permutations and Combina	ations						
Advanced Principle Counti	ng: The Principle of Inclusion ar	nd Exclusion.	Generalizations of the P	rinciple. Derangements				
– Nothing is in its Right Pla	ce. Rook Polynomials.	,						
Module 3	Relations and Functions			(10 Classes)				
Cartesian Products and P	Relations Eurotions One-to-C	Dne Onto E	unctions The Pigeon-ho	le Principle Eurotion				
Composition and Inverse F	unctions	one, onto r		ne rincipie, runction				
Relations Properties of R	alations. Computer Recognition	n – Zero-One	Matrices and Directed	Granhs Partial Orders				
Lattice Hasse Diagrams Fo	uivalence Relations and Partiti	ions						
	Recurrence Relations and Gen	erating						
Module 4	Functions			(10 Classes)				
Homogeneous and inhomo	geneous recurrences and their	r solutions - s	solving recurrences using	generating functions -				
Repertoire method - Pertu	rbation method - Convolutions	- simple man	ipulations and tricks.	0				
Module 5	Graph Theory & Algorithms or	n Networks	Assignment	(15 Classes)				
Definitions and basic resul	ts - Representation of a graph	by a matrix a	and adiacency list - Trees	s - Cycles - Properties -				
Paths and connectedness -	Sub graphs - Graph Isomorphis	m - Operatio	ns on graphs - Vertex and	ledge cuts - Vertex and				
edge connectivity, Euler ar	d Hamilton Paths, Shortest-Pat	ths.		0				
Tree - Definitions, Properti	es, and Examples, Routed Trees	s, Binary sear	ch tree, Decision tree, sp	anning tree: BFS, DFS.				
Algorithms on Networks - S	shortest path algorithm- Dijikst	ra's algorithn	n, Minimal spanning tree	- Kruskal algorithm and				
Prim's algorithm.				-				
Targeted Application & Too	ols that can be used:							
Discrete mathematics pro	vides the mathematical found	dations for m	nany computer science	courses including data				
structures, algorithms, dat	abase theory, automata theory	, formal lang	uages, compiler theory,	computer security, and				
operating systems.								
Assignment:								
Assignment 1: Log	ic Equivalences and Predicate of	calculus.						
Assignment 2: Equ	ivalence Relations and Lattices	S						
Assignment 3: Rec	urrence Relations							
Text Book								
1. Kenneth H. Rosen,	"Discrete Mathematics and its	Applications	", McGraw-Hill,s 8th Editi	on,2019.				
2. Harary – Graph Th	eory, Addison-Wesley Publishin	ng Company.						
References:								
1. Arthur Gill, "Applie	d Algebra for Computer Science	e", Prentice H	Hall.					
2. K.D. Joshi, "Discret	e Mathematics", Wiley Eastern	Ltd.						

3.	Ralph. P. Grimaldi.,	"Discrete and Combinatorial Mathematics: An Applied Introduction", 4th Edition, Pearsor
Edι	ucation Asia.	

E-resources/ Web links:

https://presiuniv.knimbus.com/user#/viewDetail?searchResultType=ECATALOGUE_BASED&unique_id=EBSCO 80102024_54588

https://presiuniv.knimbus.com/user#/viewDetail?searchResultType=ECATALOGUE_BASED&unique_id=EBSCO 80102024_375

https://www.math.hkust.edu.hk/~maqian/ma006_0607F.html https://www.scu.edu.au/study-at-scu/units/math1005/2022/

Topics relevant to SKILL DEVELOPMENT: The course focuses on the concepts of calculus and differential equation with reference to specific engineering problems. The course is of both conceptual and analytical type in nature through Problem solving. This is attained through the assessment component mentioned in course handout.

urse Code: AT2301	Course Equatio Type of	Title: Calculus and Differential ns Course : BSC	Г-Р-С	3	1	0	4	
rsion No.				•		·		
urse Pre-requisites								
ti-requisites	L							
urse Description	Calculus statistics foundati practice descripti will exte different Different of both o	Calculus and differential equations are used ubiquitously throughout mathematics, statistics and operations research. In this course, students can be able to build upon the foundations of calculus established to greatly enhance their repertoire of theory and practice in these areas. The application of calculus and differential equations in the description and modelling of real-world problems will also be considered. This unit will extend the problem-solving skills, range of knowledge and use of techniques in differential and integral calculus. The course focuses on the concepts of Calculus and Differential Equations with reference to specific engineering problems. The course is						
urse Objective	The goal with a c order or mathema	The goal of the course Calculus and Differential Equations is to facilitate the students with a concrete foundation of differential calculus and to solve the first and higher- order ordinary differential equations enabling them to acquire the knowledge of these methamatical tools						
urse Out Comes	 On successful completion of the course the students shall be able to: 1. Apply the knowledge of calculus to solve problems related to polar curves and its applications in determining the bentness of a curve. 2. Apply the principles of integral calculus to evaluate integrals. 3. Learn the notion of partial differentiation to calculate rate of change of multivariate functions and solve problems related to composite functions and Jacobian. 4. Solve first-order linear/nonlinear ordinary differential equations analytically using standard methods. 					d its riate sing		
urse Content:								
dule 1 Polar Coordinates, j pedal equations, cur	ferential polar curv vature and	Calculus es, angle between radius vector and th radius of curvature.	e tangent, angle	betwo	(1 een tv	0 Clas vo cu:	sses) rves,	
line; Maxima, minin	d partial d	erivatives, directional derivatives, total derivatives, total dle points; Method of Lagrange multipl	derivative; Tang liers; Gradient, cu	ent pl arl and	ane a d dive	nd no rgenc	rmal æ.	
dule 2	egral Cal	culus	Assignment		(1	0 Cla	sses)	
Evolutes and involu properties; Applicat theorem, Mean value L'Hospital's rule; Ma	tes; Evaluations of de etheorems and	ation of definite and improper integrals finite integrals to evaluate surface area s, Taylor's and Maclaurin theorems with minima.	; Beta and Gamn is and volumes o h remainders; Ind	na fun f revo leterm	ction lution inate	s and 1s. Ro forms	their olle's s and	
odule 3	ıltivariab	le Calculus			(10) lecti	ires)	

Multiple Integration: Double integrals (Cartesian), change of order of integration in double integrals, Change of variables (Cartesian to polar), Applications: areas and volumes, Center of mass and Gravity (constant and variable densities); Triple integrals (Cartesian), orthogonal curvilinear coordinates, Simple applications involving cubes, sphere and rectangular parallelepipeds; Scalar line integrals, vector line integrals, scalar surface integrals, vector surface integrals, Theorems of Green, Gauss and Stokes.

dule 4	ferential Equations	Assignment	(15 lectures)
Definition, types of	Differential Equations, Applications, Variable S	eparable, Homogene	ous, Exact, linear
and Bernoulli's equ	ations, Euler's equations, Equations not of fi	rst degree: equation	s solvable for p,
equations solvable for	or y, equations solvable for x and Clairaut's type.		

Linear differential equations of second and higher order with constant coefficients - Non-Homogeneous term of the type $Q(x) = e^{ax}$, Sin ax, Cosax, $e^{ax}v(x)$, $x^nv(x)$ - Method of variation of parameters.

geted Application & Tools that can be used:

ferential calculus is used extensively in science and engineering. It can solve problems related to motion, velocity, acceleration, angles of incline or curve on a surface, etc.

ferential Equations are used to model the behavior of electromagnetic fields, including in the design of antennas, microwave ovens, and other devices. Biology: PDEs are used to model biological processes, such as the spread of diseases and the development of biological tissues.

ols Used: Python.

ignment:

Select any one simple differential equation pertaining to the respective branch of engineering, identify the dependent and independent variable – Obtain the solution and compare the solution sets by varying the values of the dependent variable.

xt Book

- 3. Erwin Kreyzig, Advanced Engineering Mathematics, John Wiley and sons, Inc.10th Edition
- 4. B. S. Grewal (2017), Higher Engineering Mathematics by, 44th Edition, Khanna Publishers.

ferences:

- 5. Victor Henner, Tatyana Belozerova, Mickhail Khenner, Ordinary and Partial Differential Equations, CRC Press, Edition, 2013.
- 6. Walter Ledermann, Multiple integrals, Springer, 1st edition
- 7. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
- 8. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.

E-resources/ Web links:

- 7. <u>https://presiuniv.knimbus.com/user#/viewDetail?searchResultType=ECATALOGUE_BASED&unique_id=EBSCO95_30102024_103205</u>
- 8. <u>https://presiuniv.knimbus.com/user#/viewDetail?searchResultType=ECATALOGUE_BASED&unique_id=EBSC095_30102024_106839</u>
- 9. <u>https://presiuniv.knimbus.com/user#/viewDetail?searchResultType=ECATALOGUE_BASED&unique_id=EBSCO95_30102024_61605</u>
- 10. <u>https://presiuniv.knimbus.com/user#/viewDetail?searchResultType=ECATALOGUE_BASED&un_ique_id=EBSCO95_30102024_134719</u>
- 11. https://www.math.hkust.edu.hk/~maqian/ma006_0607F.html
- 12. https://www.scu.edu.au/study-at-scu/units/math1005/2022/

pics relevant to SKILL DEVELOPMENT: The course focuses on the concepts of calculus and differential equation with reference to specific engineering problems. The course is of both conceptual and analytical type in nature through Problem solving. This is attained through the assessment component mentioned in course handout.





Approved by AICTE, New Delhi **Course Title: Optoelectronics and Quantum Physics Lab** urse Code: P-C e of Course: BSC Y2504 sion No. urse Prerequisites ti-requisites The laboratory provides an opportunity to validate the concepts taught and enhances the ability to use the concepts for technological applications. The laboratory tasks aim to develop urse Description following skills: An attitude of enquiry, confidence and ability to tackle new problems, ability to interpret events and results, observe and measure physical phenomena, select suitable equipment, instrument and materials, locate faults in systems. On successful completion of the course the students shall be able to: CO1: To understand electrical and optical properties of materials urse Out Comes CO2: Interpret the results of various experiments to verify the concepts used in optoelectronics and advanced devices. The objective of the course is to familiarize the learners with the concepts of "Applied Physics for Computer Science Cluster "and attain Skill Development through Experiential Learning urse Objective techniques of Laboratory Tasks: Experiment No. 1: Experimental errors and uncertainty using excel Level 1: Calculation of accuracy and precision of a given data el 2: propagation of errors in addition, subtraction, multiplication and division. Experiment NO 2: To determine the wavelength of semiconductor diode Laser and to estimate the particle size of lycopodium powder using diffraction. el 1: Determination of Wavelength of Laser el 2: Finding the particle size of lycopodium powder. eriment No. 3: To determine the proportionality of Hall Voltage, magnetic flux density and the polarity of Charge carrier. el 1: To determine the proportionality of Hall Voltage and magnetic flux density el 2: To determine the polarity of Charge carrier. Experiment No. 4: To study the I-V characteristics of a given zener diode in forward and reverse bias conditions. el 1: To study I – V characteristics of the given Zener diode in reverse bias and to determine break down voltage. el 2: To study I –V characteristics of the given Zener diode in forward bias and to determine knee voltage and forward resistance. Experiment No. 5: To study input and output characteristics of a given Transistor. el 1: To determine the input resistance of a given transistor. el 2: To determine current transfer characteristics and transistor parameters of a given transistor. Experiment No. 6: Determination of Fermi energy and Fermi temperature of a given metal and bimetallic





wire.

Level 1: Determination of Fermi energy and Fermi temperature of given metal wire.

Level 2: Determination of Fermi energy and Fermi temperature of given bimetallic wire.

eriment No. 7: To study the I-V characteristics and I-R characteristics of a solar cell as a function of the irradiance.

el 1: To study the I-V characteristics

el 2: I-R characteristics of a solar cell as a function of the irradiance.

eriment No. 8: Calculate the numerical aperture and study the losses that occur in optical fiber cable. .

- el 1: Calculate the numerical aperture.
- el 2: study the losses that occur in optical fiber cable.

eriment No. 9: Plotting I-V characteristics in forward and reverse bias for LEDs Determination of knee voltage.

- el 1: Plotting I-V characteristics in forward and reverse bias for LEDs
- el 2: Determination of knee voltage.

eriment No. 10: Determination of Stefan's constant and verification of Stefan-Boltzmann Law.

- el 1: Determination of Stefan's constant
- el 2: Verification of Stefan-Boltzmann Law.

eriment No. 11: Determination of dielectric constant of given materials.

- el 1: Determination of Stefan's constant
- el 2: compare the obtain results with other materials

eriment No. 12: determine the wavelength of monochromatic light, such as sodium light, using Newton's rings.

- el 1: Determination of wavelength
- el 2: determine the radius of curvature of the Plano-convex lens.
- geted Application & Tools that can be used:
- 3. Areas of application are optoelectronics industry, Solar panel technologies, quantum computing software, electronic devices using transistors and diodes, memory devices, endoscopy, SQUIDS in MRI, Advanced material characterizations using SEM and STM.
- 4. Origin, excel and Mat lab soft wares for programming and data analysis.

ject work/Assignment: Mention the Type of Project /Assignment proposed for this course

Assessment Type

- Midterm exam
- Assignment (review of digital/ e-resource from PU link given in references section mandatory to submit screen shot accessing digital resource.)
- Quiz
- End Term Exam
- Self-Learning

repare a comprehensive report on non-conventional energy resources in Karnataka and their pros and cons. Write a report on importance of quantum entanglement in supercomputers.





Presidency University Act, 2013 of the Karnataka Act No. 41 of 2013 | Established under Section 2(f) of UGC Act, 1956 Approved by AICTE, New Delhi



urse Code: Y2501	Course Title: Optoelectronics ar of Course: BSC	nd Quantum Phys	sics	P-C	3	0	0	3	
rsion No.			·				1		
urse Pre- requisites									
ti-requisites									
urse Description	The purpose of this course is to enable the students to understand the fundamentals, working and applications of optoelectronic devices and to develop the basic abilities to appreciate the applications of advanced microscopy and quantum computers. The course develops the critical thinking and analytical skills.								
urse Out	On successful completion of the	course the stude	nts shall b	e able	to:				
Comes	CO1: To understand the concepts and superconductivity.	s of electrical co	nducting p	propert	ies of n	netal, s	emicon	ductor	
	CO2: To understand the principle	s of quantum me	echanics.						
	CO3: Discuss the quantum conce	epts used in quar	itum comp	outers.					
	CO4: Explain the applications of I	asers and optical	fibers in v	various	techno	logical	fields.		
urse Objective	The objective of the course is to for Computer Science Cluster "an and computation.	familiarize the le d to attain the ba	arners wit isic knowle	h the d dge re	concept lated to	s of "A quant	pplied F um mec	hysics hanics	
urse Content:									
dule 1	ctrical Conductivity of Solids and Semiconducting Devices	ignment	ta collecti of solar o	on on ells.	efficie	ncy Se	ssions		
Topics: Clas semiconductor p-n junctions, 2	sification of materials based on s, Law of mass action, Electrical co Zener diode, Solar cells, I-V charac	bandgap, Ferr nductivity of a so teristics, and LEE	ni energy emicondu Os	and I ctor, Ha	ermi l all effec	evel, F t, Supe	ermi le ercondu	evel in ctivity,	
dule 2	antum Mechanics	ignment				Se	ssions		
Topics: Introdu significance. equation, Prob of wave function 1 states, Mention (Inner Product)	uction, de-Broglie hypothesis, H Wave function-properties and ph ability density and normalization c on, Identity operator, Determinatic on of Conjugate and Transpose, Un), Probability, Orthogonality	eisenberg's unc nysical significan of wave function. on of I 0> and I 1 itary Matrix U, Ex	ertainty p ce. Schro Wave Fu L>, Pauli M camples: 2	orincipl dindge nction latrices x2 Mat	e-stat r's time in Ket N and its rices an	ement inder lotation opera d their	and p pendent n: Matri tions or multipl	hysical wave x form 0 and ication	
dule 3	antum Computing	m paper	ninar compute	on rs.	quant	^{um} Se	ssions		
Topics: Introd computing, Single Qubit Ga Qubit Gates: Co Controlled - Z g	uction to quantum computing, Mod Concept of Qubit and its propertie ates: Quantum Not Gate, Pauli Z G ontrolled gate - CNOT Gate, (Discus gate, Toffoli gate. Problems.	ore's law & its en s, . Representati ate, Hadamard G sion for 4 differe	d, Differer on of qubi Gate, Phase nt input st	ces be t by Blo e Gate ates). F	tween c och sph (or S Ga Represe	lassica ere, Qu ate), T ntatior	l and qu uantum Gate. M n of Swa	antum Gates: ultiple p gate,	
dule 4	ers And Optical Fibers	m paper	e study application	on ons of l	med Lasers.	lical Se	essions		



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Topics: Interactions of radiations with matter, expression for energy density of a system under thermal equilibrium in terms of Einstein's coefficients, conditions for LASER action using Einstein's coefficients, Characteristics of laser, conditions and requisites of laser, Principle of optical fibers, Numerical aperture and acceptance angle (Qualitative), Attenuation, Applications: Point to point communication with block diagram, application of optical fibers in endoscopy.
geted Application & Tools that can be used:
 Areas of application are optoelectronics industry, Solar panel technologies, quantum computing software, electronic devices using transistors and diodes, memory devices, endoscopy, SQUIDS in MRI, Advanced material characterizations using SEM and STM.
6. Origin, excel and Mat lab soft wares for programming and data analysis.
ject work/Assignment: Mention the Type of Project /Assignment proposed for this course
Assessment Type
Midterm exam
 Assignment (review of digital/ e-resource from PU link given in references section - mandatory to submit
screen shot accessing digital resource.)
• Quiz
 End Term Exam
 Self-Learning
repare a comprehensive report on non-conventional energy resources in Karnataka and their pros and cons.
Write a report on importance of quantum entanglement in supercomputers.
t Book
3. Engineering Physics by Avadhanalu, Revised edition, S. Chand Publications, 2024.
4. Quantum Computation and Quantum Information, Michael A. Nielsen & Isaac L. Chuang, Cambridge
Universities Press, 2010 Edition
References:
1. Elementary Solid state Physics: Principles and Applications by M.A. Omar, 1 st Edition, Pearson
Publications, 2002.
6. Principles of Quantum Mechanics by R Shankar, 2 nd edition, springer Publications, 2011.
7. Optoelectronics: An Introduction by John Wilson and John Hawkes, 3 rd edition, Pearson Publications,
2017.
8. Engineering Physics by Gaur and Gupta, Dhanpat Rai Publications, 2012.
9. Introduction to Quantum Mechanics, David J <u>Griffiths</u> , Cambridge University Press, 2019
E-Resourses:
<u>https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=553045&site=ehost-live</u>
<u>https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=833068&site=ehost-live</u>
8. <u>https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=323988&site=ehost-live</u>
9. <u>https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=1530910&site=ehost-live</u>
10. https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=486032&site=ehost-live
Topics relevant to "SKILL DEVELOPMENT": Fundamentals of materials, Lasers and optical fibers.
for Skill Development through Participative Learning Techniques. This is attained through the Assignment/

Presentation as mentioned in the assessment component in course handout.



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Itgalpur, Rajankunte, Yelahanka, Bengaluru – 560064

								1
Course	Course Title: E	ngineering Graphics						
Code:	Type of Course	: School Core & Theo	ory Only	L- T-P- C	2	0	0	2
MEC1006								
Version No.	1.2							
Course Pre-	NIL							
requisites								
Anti-requisites	NIL							
	The course is o	designed with the obje	ective of giv	ing an ove	erviev	of e	ngine	ering
Course	graphics. It is	introductory in natu	ire and acc	quaints th	e stu	dents	s with	the
Description	techniques us	ed to create enginee	ering drawi	ngs. The	course	e emp	ohasize	es on
	projection of p	oints, lines, planes and	d solids and	isometric	proje	ction	s.	
	The objective of	of the course is to fami	liarize the le	earners wi	th the	e con	cepts	
Course Objective	of "Engineering	g Graphics" and attain	SKILL DEVE	LOPMENT	throu	igh Pr	oblem	า
_	solving method	dologies.				-		
	On successful c	ompletion of this cour	se the stude	ents shall b	be ab	e to:		
	1. Demonstrat	te competency of Engi	neering Gra	phics as pe	er BIS	conve	ention	s
	and standa	and standards.						
	2. Compreher	2. Comprehend the theory of projection for drawing projections of Points.						
	Lines and Pl	anes under different c	onditions.					
	3. Prepare mu	Iltiview orthographic p	projections of	of Solids b	y visu	alizin	g ther	n in
Course	different po	ositions.						
Outcomes	4. Prepare pictorial drawings using the principles of isometric projections to							
	visualizeob	jects in three dimensic	ons.					
Course Content:								
Module 1	Introduction	Assignment	Standard t	echnical d	rawir	g 02	2 Sessi	ions
	to Drawing							
Topics:								
Introduction, drav	wing instrument	s and their uses, releva	ant BIS conv	entions ar	nd sta	ndarc	ls,	
Lettering, Linecor	nventions, dime	nsioning, Selection of (drawing she	et size and	d scal	2.		
	Orthographic							
	projections of							
	Delinte							

Module 2	Straight Lines and Plane Surfaces	Assignment	Projection methods Analysis	10 Se
Taalaa				

Topics:

Introduction, Definitions – Elements of projection and methods of projection, Planes of projection,

reference line and conventions adopted. First angle and third angle projections. Projection of Points inall 4 quadrants.

Projections of Straight Lines (located in first quadrant/first angle projection only): True and apparent lengths, true and apparent Inclinations to reference planes. (No application problems). Projection of Plane surfaces (First angle projection): Regular plane surfaces – triangle, square, rectangle, pentagon, hexagon and circle – in different positions inclined to both the planes using change of position method only.
GAIN MORE KNOWLEDGE REACH GREATER HEIGHTS	PRESII	DENCY 13 of the Karnataka Act No. 41 of 2 Approved by AICTE.	UNIVERSIT	956 PREVIEWEY HARAF			
Module 3	Orthographic Projections of Solids	Assignment	Multi-view drawing Analysis	10 Sessions			
Topics: Introduction, Projection of right regular prisms, pyramids, cone, hexahedron and tetrahedron in different positions (Problems resting on HP only and First angle projection).							
Module 4	Isometric Projections of Solids (Using isometric scale only)	Assignment	Spatial Visualization	8 Sessions			
Topics: Introduction, Isometric scale, Isometric projections of right regular prisms, cylinders, pyramids, cones and their frustums, spheres and hemispheres, hexahedron (cube), and combination of 2 solids, conversion of orthographic view to isometric projection of simple objects. [8 Hours: Application Level]							
References: 4. K.R. Gopalakris	hna, "Engineering	Graphics", Subhash Pu	blishers, Bangalore.				
6. D. A. Jolhe, "En	A. P. Rastogi, A. R	s with Introduction to A	Graphics with AutoCAD," Prentice	e Hall.			
Web resources: https://nptel.ac.ir	n/courses/112103	<u>8019</u>					
Topics relevant to " Problem Solving me handout.	SKILL DEVELOPMEN thodologies. This is	IT": Projection in first and attained through the ass	third angle for SKILL DEVELOPMENT essment component mentioned in th	through e course			



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HEAVE UNEATER DEPUTIO	Approved by Arone, New Dellin	Contract of the local division of the local
Catalogue	Dr Yuvaraja Naik	
prepared by		
Recommended		
by the Board of	BOS NO: 19 th BOS held on 5 th July 2024	
Studies on		
Date of Approval		
by the Academic	24 th Academic Council Meeting held on 03/08/2024	
Council		



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Itgalpur, Rajankunte, Yelahanka, Bengaluru – 560064

ENG1900	English for Technical Co	ommunication	L- T- P- C	2	0	0	2		
Version No.	1.0			•					
Course Pre- requisites									
Anti-requisites	NIL								
Course Description	This course enhances the technical communication skills of BTech students, focusing on clarity, precision, and conciseness in academic and professional settings. Students will learn to differentiate between general and technical communication, analyze technical content, develop structured writing skills, and deliver effective presentations. Through interactive activities such as TED Talk analyses, report writing, and presentation practice, the course provides hands-on experience for real-world applications. By the end, students will be equipped to communicate complex technical information effectively in various professional contexts.								
Course Outcomes	 On successful completion of the course the students shall be able to: Differentiate between general and technical communication. Explain key reading comprehension techniques to enhance understanding of technical texts. Write clear, concise, and well-structured technical reports and documents. Deliver technical presentations and implement peer feedback for continuous improvement. Explain ethical practices in digital communication for professional use 								
Course Content	: Theory								
Module 1	Technical communication	Quiz	Listening	9 Ho	ours				
Introduction to Communication Technical vs. General Communication Characteristics of technical communication Importance of clarity, precision, and objectivity Activity: • Watching TED Talks/videos to identify differences in technical and general vocabulary									
Module 2	Technical Reading	Assignment	Reading	12 -	lours				
Reading Com Note making	Defension & Notetaking	1		I					



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Content Analysis

Activity:

- Reading technical articles and answering comprehension questions
- Note making techniques

Module 3	Technical Writing	Assignment	Writing	12hours
Paragraph W	riting			
Structure of a	paragraph (topic sentence	e, supporting details,	coherence)	
Report Writin	g			
Structure of t	echnical and project repor	ts (Introduction, Met	hods, Results, Discus	sion)
Activity:				
•	Writing a structured parag	graph on a technical t	opic	
•	Writing project reports			



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	Professional	_	Speaking			
Module 4	Presentation	Presentation	эреакінд	12Hours		
Introduction to	Presentation Skills					
Preparing a Pres	sentation					
 Structu 	ring content (Introduction	, Body, Conclusion)				
 Designi 	ng effective slides (Text. vi	sual aids, readability, and	d impact)			
Delivering a Pre	sentation					
 Engage 	ment techniques, Storytel	ing, narration, pitching i	deas handling Q&A	١		
Convict	ion, commitment, generat	ing interest through enth	nusiasm			
Demonstration	& Practice					
Giving	presentations on topics ba	sed on their academic in	terest			
Evaluating and providing peer feedback						
Activity:						
Analyze	a real-world engineering	issue and present solutio	ons using a structu	red approach.		
Targeted Applic	cation & Tools that can be	used: YouTube, Instagra	m. Quill Bot. Gram	marly, & Padlet.		
References:						
Text books:						
3. Gupta, R.C.	. Technical Communication	. 2nd ed., Cambridge Un	iversity Press, 202	1.		
4. Lannon, Jo	hn M., and Laura J. Gurak.	Technical Communicatio	<i>n.</i> 15th ed., Pearso	on, 2022.		
Reference Book	(S:					
4. Gerson, Sh Pearson, 20	aron J., and Steven M. Ger 020.	son. Technical Communi	cation: Process and	d Product. 9th ed.,		
5. Lannon, Jo	hn M., and Laura J. Gurak.	Technical Communicatio	n. 15th ed., Pearso	on, 2022.		
6. Markel, Mi	ke, and Stuart A. Selber. Te	echnical Communication.	. 13th ed., Bedford	/St. Martin's, 2020.		
Web Resources	:					
5. https://ow	I.purdue.edu/owl/subject_	_specific_writing/technic	al_writing.			
6. https://jou	rnals.ieeeauthorcenter.iee	e.org/.				
7. https://ww	w.stc.org/.	1 <i>b</i> 1				
8. <u>https://ocv</u>	w.mit.edu/.https://www.te	ea.com/talks.				
Topics Relevant t	co "employability": Teamwo	ork and Collaboration, Cr	itical Thinking and	Problem- Solving		
Topics Relevant t	o "Human Values and Profes	ssional Ethics": Critical rea	isoning, Inclusivity	and Fairness		

VEARS





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Itgalpur, Rajankunte, Yelahanka, Bengaluru – 560064

			r		1	1	T	
urse Code:	urse Title: Computational Thinki	ng using Python						
E1500	pe of Course: ESC		Г-Р-С	2	þ	2	3	
rsion No.								
urse Pre- l requisites								
ti-requisites	L							
urse DescriptionThe course efficiently introduces fundamental ideas including conditionals, loops, functions, lists, strings, and tuples through some inspiring examples. It then discusses dynamic programming like handling exceptions and file usage. In terms 								
urse Object Thinking using Python and attain Skill Development through Participative Learning techniques.								
urse ComesOutOn successful completion of the course the students shall be able to: 10) Describe algorithmic solutions for basic computing issues (Understand) 11) Explain data types and operators. (Understand) 12) Demonstrate control structures and Functions. (Apply) 13) Apply the data structures for the given data. (Apply) 14) Demonstrate the file operations. (Apply)								
urse Content:								
odule 1	Computational Thinking And Problem Solving	signment	ogran	nming		6 Sess	sions	
Topics: Fundamental blocks of algo programming (iteration, rec cards, guess a	ls of Computing– Identification of prithms (statements, state, control f g language), algorithmic problem s cursion). Illustrative problems: find an integer number in a range, Towa	of Computational flow, functions), r olving, simple str l minimum in a li ers of Hanoi	Problems notation (p ategies for ist, insert a	s Algo seudo develo card :	rithn code oping in a l	ns, buil , flow c g algori ist of so	lding hart, thms orted	
dule 2	tatynes Expressions Statements	signment	orar	nmina		ession	<u> </u>	
Topics: Python interpreter and interactive mode, debugging; values and types: int, float, boolean, string , and list; variables, expressions, statements, tuple assignment, precedence of operators, comments; Illustrative programs: exchange the values of two variables, circulate the values of n variables, distance between two points.								
odule 3	ntrol flow, Functions, Strings	signment	ogran	nming		ession	S	
<u>Topics:</u> Conditionals:Boolean values and operators, conditional (if), alternative (if else), chained conditional (if-elif-else); Iteration: state, while, for, break, continue, pass; Fruitful functions: return values, parameters, local and global scope, function composition, recursion; Strings: string slices, immutability, string functions and methods, string module; Lists as arrays. Illustrative programs: square root, gcd, exponentiation, sum an array of numbers, linear search, binary search.								
odule 4	sts, Tuples, Dictionaries	signment	ograr	nming		ession	S	

pics:

ts: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing- list comprehension; Illustrative programs: simple sorting, histogram, Students marks statement, Retail bill preparation.

odule 5	es	signment	ogramming	essions

es and exceptions: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, packages; Illustrative programs: word count, copy file, Voter's age validation, Marks range validation (0-100).

ject work/Assignment:

- 3. Assignment 1 on (Module 1 and Module 2)
- 4. Assignment 2 on (Module 3 and Module 4 & 5)

Text Book

- 3. Paul Deitel and Harvey Deitel, "Python for Programmers", Pearson Education, 1st Edition, 2021
- 4. Eric Matthes, Python Crash Course,: A Hands-On, Project-Based Introduction to Programming, 3rd Edition, 2023

References

- 3. Allen B. Downey, "Think Python: How to Think like a Computer Scientist", 2nd Edition, O'Reilly Publishers, 2016.
- 4. Karl Beecher, "Computational Thinking: A Beginner's Guide to Problem Solving and Programming", 1st Edition, BCS Learning & Development Limited, 2017.

Web Resources

W2. <u>https://onlinecourses.nptel.ac.in/noc20_cs70/preview</u>

Topics relevant to development of "Employability": Data structures using python. **Topics relevant to "PROFESSIONAL ETHICS":** Naming and coding convention for simple programs using python.

urse Code:	urse Title: Digital Design		L- Т-Р- С	2	h	0	2
E2022	pe of Course: ESC			2	5	0	2
rsion No.	[1] Elemente of Electronics /Electrical Engineering 2] Desig concerts of						
urse Pre- requisites	number representation, Boolean Algebra						
ti-requisites							
urse Description	The purpose of this course is to enable the students to appreciate the fundamentals of digital logic circuits and Boolean algebra focusing on both combinational and sequential logic circuits. The course emphasizes on minimization techniques for making canonical and low-cost digital circuit implementations. This course deals with analysis and design of digital electronic circuits. The course also creates a foundation for future courses which includes Computer Architecture, Microprocessors, Microcontrollers, and Embedded Systems etc. The course enhances the Design, Implementation and Programming abilities through laboratory tasks. The associated laboratory provides an opportunity to verify the theoretical knowledge						
urse Objective	The objective of the course is to Digital Design and attain the S LEARNING.	o familiarize t SKILL DEVEL	the learners OPMENT thro	with ough	the EXF	conce PERIE	pts of NTIAL
urse Outcomes	 On successful completion of this course the students shall be able to: v. Describe the concepts of number systems, Boolean algebra and logic gates. vi. Apply minimization techniques to simplify Boolean expressions. vii. Demonstrate the Combinational circuits for a given logic viii. Demonstrate the Sequential and programmable logic circuits 						
urse Content:							
dule 1	ndamentals of Number systems- Boolean algebra and digital logic	olication Assignment	ta Analysis t	ask		06 cla	sses
bics: Review of Numb functions and sir and POS- Univer	per systems and logic gates, Nur nplifications, two, three, four vari sal Gates (NAND & NOR) Implem	mber base co iable K-Maps- nentations. Ir	onversions, C Don't care c Itroduction to)verv ondi o HD	view tions L.	of Bo s- Bot	olean h SOP
dule 2	Boolean function p simplification	olication Assignment	ta Analysis t	ask		08 C	asses
pics:	· · · · · · · · · · · · · · · · · · ·						
Introduction to	Combinational circuits, Analys	sis, Design	procedure,	Bina	ry	Adder	and
Subtractor, Mag	nitude comparator, Parity genera	tor and check	ker, Multiplex	ers-	Dem	ultiple	exers,
dule 3	Combinational Logic circuits:	lication Assignment	gramming Data Analys	Task	8. 8. .sk	08 C	asses
pics: Introduction to sequential circuits, Storage elements: latches and flip flops, Characteristic tables and equations, excitation table, Analysis of clocked sequential circuits, Mealy & Moore Models of finite state machines - Registers & Counters. HDL Models of Sequential circuits. rgeted Application & Tools that can be used: gital electronics is the foundation of all modern electronic devices such as cellular phones, MP3 players, laptop computers, digital cameras, high definition televisions, Home Automation, Communication in systems in industries Professionally Used Software: HDL (VHDL (Verilog HDL (
OOPS Text Book(s):					-		
5. Mano, M.	Morris and Ciletti Michael D., "D	igital Design"	, Pearson Ed	ucat	ion,	6 th ed	ition
6. Thomas L	Floyd "DIGITAL LOGIC DESIGN	I", Pearson	Education, fo	urth	edit	ion.	
Reference(s):							

Reference Book(s): R1. Jain, R. P., "Modern Digital Electronics", McGraw Hill Education (India), 4th Edition R2. Roth, Charles H., Jr and Kinney Larry L., "Fundamentals of logic Design", Cengage Learning, 7th Edition Online Resources (e-books, notes, ppts, video lectures etc.): Book Free Download (studymaterialz.in) 13. eBook1: Mano, M. Morris and Ciletti Michael D., "Digital Design", Pearson Education. 14. {[PDF] Digital Design By M. Morris Mano, Michael D Ciletti Book Free Download } 15. eBook2: Floyd "DIGITAL LOGIC DESIGN" fourth edition- ePub, eBook- [PDF] DIGITAL LOGIC DESIGN FOURTH EDITION FLOYD | abri.engenderhealth.org. 16. NPTEL Course- NPTEL :: Electrical Engineering - NOC: Digital Electronic Circuits 17. Digital Logic Design PPT Slide 1 (iare.ac.in) 18. Lab Tutorial: Multisim Tutorial for Digital Circuits - Bing video CircuitVerse - Digital Circuit Simulator online Learn Logisim Beginners Tutorial | Easy Explanation! - Bing video Digital Design 5: LOGISIM Tutorial & Demo 19. https://presiuniv.knimbus.com/user#/home E-content: 9. Z. Xin-Li and W. Hong-Ying, "The Application of Digital Electronics in Networking Communication," 2016 Eighth International Conference on Measuring Technology and Mechatronics Automation (ICMTMA), 2016, pp. 684-687, doi: 10.1109/ICMTMA.2016.168. 10. An encoding technique for design and optimization of combinational logic circuit DipayanBhadra;Tanvir Ahmed Tarique;Sultan Uddin Ahmed;Md. Shahjahan;KazuyukiMurase2010 13th International Conference on Computer and Information Technology (ICCIT) 11. A. Matrosova and V. Provkin, "Applying Incompletely Specified Boolean Functions for Patch Circuit Generation," 2021 IEEE East-West Design & Test Symposium (EWDTS), 2021, pp. 1-4, doi: 10.1109/EWDTS52692.2021.9581029. 12. A. Matrosova, V. Provkin and E. Nikolaeva, "Masking Internal Node Faults and Trojan Circuits in Logical Circuits," 2019 IEEE East-West Design & Test Symposium (EWDTS), 2019, pp. 1-4, doi: 10.1109/EWDTS.2019.8884434. Topics relevant to "SKILL DEVELOPMENT": Adders, Multiplexers, Decoders / Encoders; Flip-Flops, Counters and Registers for Skill Development through Experiential Learning techniques.

This is attained through assessment component mentioned in course handout.

Course Code:	Course Title: Introd	uction to Design						
DES1146	Thinking		L-T-P- C	1	0	0		1
	Type of Course: The	eory						
Version No.	1.0							
Course Pre-	NIL							
	NII							
Anti-requisites								
Course	Ine course aims to	Introduce students to	o the funda	amentai king mot	principies	s and pr	oces	ses of
Description		hallongos. The course emphasizes empathy creativity and collaboration, equipping						
Description	students with esser	ntial skills for successf	ful enginee	ering prac	ctice.	ation, c	.զար	ping
	This course is desig	ned to develop and fa	amiliarize	the learn	ers with t	the cond	cept	s of
Course	creating thinking ar	nd attain <mark>Entrepreneu</mark>	<mark>ırship</mark> by u	sing Part	icipative	Learnin,	g	
Objective	techniques.							
	On successful comp	letion of the course t	he studen	ts shall b	e able to	:		
Course	4) Understand	the concept and imp	ortance of	Design T	hinking.			
Outcomes	5) Differentiate	e between traditional	problem-	solving a	nd Desigr	n Thinki	ng.	
	6) Identify the	core stages of the De	sign Think	ing proce	ess.			
Course Content:	All assignments and	l projects must be de	veloped us	sing the r	eference	materi	als a	vailable
	from the PU e-reso	urce database – JSTO	R, EBSCO,	Library C	PAC, NP	IEL VIde	eos,	etc.
		hook of essays	Visual ou	itnut gan	oration h	av.		
Module 1	Introduction to	context-specific	Visual Io	urnal and	l narrativ	e i	3 ho	urs
	Design Thinking	assignment/proje	developr	nent.			0 110	415
		ct						
Торіс						·		
3) Definition	and Introduction to	Design Thinking						
4) Understar	nd the Design Thinkin	g Process						
		Visual journal,	Manalan					
Modulo 2	Design Thinking in	DOOK OF ESSAYS,	visual iou	itput gen	eration, i	by	17 h	ourc
Woulle 2	Action	assignment/proje		nont	lidiidtiv	e	12 11	ours
		ct	ucvciopi	nent.				
Topics:			L					
4) Introducti	on to the steps of De	sign Thinking Process	i					
5) Understar	nd use cases of Design	n thinking						
6) Design Th	inking and Research	Fools pertaining to Co	onsumer T	ech., Ho	me Tech	., Perso	nal	Tech. ,
Auto Tech	i. or Extended Reality							
Targeted Applica	tion & Tools that car	he used:						
5) Design ide	eation tools like Miro	. SCAMPER etc.						
6) Research	Tools for Human Cen	tric Design using fore	casting to	ols like W	/GSN			
7) Feedback	tools like Google For	ms , etc.	-					
8) Expert Leo	ctures							
1. Text Bool						、 <u>-</u> ·	-	
2. Thinking [Design by S Balaram. I	New Delhi [India]: Sag	e Publicat	ions Pvt.	Ltd. 2010). eBook	k., Da	atabase:
3. https://puu	iversity informaticso	lobal.com:2284/ehost	t/detail/det	ail?vid=6	5 sid=18	Sab1f43	-1f9′	2-4d02-
<u>ae2e-</u>	<u> </u>						//	
<u>a9c06dc0</u>	5d8c%40redis&bdata	=JnNpdGU9ZWhvc3	QtbGl2ZC	<u>2%3d%3</u>	d#AN=35	54920&	db=1	<u>nlebk</u>

- 1. Design Thinking by Clarke, Rachel Ivy. Series: Library Futures, Vol. 4. Chicago: ALA Neal-Schuman. 2020. eBook., Database: eBook Collection (EBSCOhost)
- 3. The Pocket Universal Methods of Design: 100 Ways to Research Complex Problems, Develop Innovative Ideas, and Design Effective Solutions by Bruce Hanington; Bella Martin. Minneapolis: Rockport Publishers. 2017. eBook., Database: eBook Collection (EBSCOhost)

https://puniversity.informaticsglobal.com:2282/ehost/detail/detail?vid=11&sid=f086b8c2-260e-4caa-8c48d732c21a7724%40redis&bdata=JnNpdGU9ZWhvc3QtbGl2ZQ%3d%3d#AN=1638693&db=nlebk

4. What Is Design Thinking and Why Is It Important? By Rim Razzouk and Valerie Shute - Review of Educational Research, Vol. 82, No. 3 (September 2012), pp. 330-348 (19 pages), Published by: American Educational Research Association

https://puniversity.informaticsglobal.com:2054/stable/23260048?Search=yes&resultItemClick=true&search Text=design+thinking&searchUri=%2Faction%2FdoBasicSearch%3FQuery%3Ddesign%2Bthinking%26s o%3Drel&ab_segments=0%2FSYC-6168%2Ftest&refreqid=fastly-

default%3Acb1be24976e25734cb5fc13a8af6fdfb&seq=1#metadata_info_tab_contents

5. Abductive Thinking and Sensemaking: The Drivers of Design Synthesis by John Kolko, Design Issues, Vol. 26, No. 1 (Winter, 2010), pp. 15-28 (14 pages), Published by: The MIT Press

https://puniversity.informaticsglobal.com:2054/stable/20627839?Search=yes&resultItemClick=true&search Text=design+thinking&searchUri=%2Faction%2FdoBasicSearch%3FQuery%3Ddesign%2Bthinking%26s 0%3Drel&ab_segments=0%2FSYC-6168%2Ftest&refreqid=fastly-

default%3A0b89336ea274d63c010536b01316d7bb&seq=1#metadata_info_tab_contents

 Designerly Ways of Knowing: Design Discipline versus Design Science by Nigel Cross, Design Issues, Vol. 17, No. 3 (Summer, 2001), pp. 49-55 (7 pages), Published by: The MIT Press

https://puniversity.informaticsglobal.com:2054/stable/1511801?Search=yes&resultItemClick=true&search Text=design+thinking&searchUri=%2Faction%2FdoBasicSearch%3FQuery%3Ddesign%2Bthinking%26s 0%3Drel&ab_segments=0%2FSYC-6168%2Ftest&refreqid=fastly-

default%3A0d5b607b163f60876ca973ed90e22b1c&seq=1#metadata_info_tab_contents

Course Code: PPS 1025	Course Title: Industry Readiness Progra (Audited Course) Type of Course: HSMC	am – I L- T - P- C	0	0	2	0			
Version No.	1.0	1.0							
Course Pre- requisites	NIL	NIL							
Anti- requisites	NIL	NIL							
Course Description	This course is designed to enable students to set SMART goals, form Professional & personal ethics for success and learn various email writing techniques. The course will benefit learners in presenting themselves effectively through various activities and learning methodologies.								
Course Objective	The objective of the course is to familiarize the learners with the concepts of "Employability for Young Professionals" and attain SKILL DEVELOPMENT through PARTICIPATIVE LEARNING techniques.								
Course Out Comes	On successful completion of this course the students shall be able to: CO 1 Define their career goals CO 2 Practice ethical habits for better career success CO3 Demonstrate effective email writing techniques								
Course Content									
Module 1	Goal Setting & Grooming C	lassroom activitie	s		10 Hoi	irs			
Topics : SMART Activity: Real w	Goals, formal grooming through self-introdu orld scenarios	iction activity							
Module 2	Habit Formation F	ole plays			10 Hou	irs			
Topics: Professi	onal and Personal ethics for success and ac	tivity-based pract	ice	I					
Module 3	Email Etiquettes	sional ethics ndividual and gro presentation	ир		10 Hoi	irs			
Topics: Types c Activity: Individ	of prompts to generate effective or desired	l results for email mpts	etiquet	tes					
Faculty: L&D									

Targeted Application & Tools that can be used:

- 7. TED Talks
- 8. You Tube Links
- 9. Activities

Assignment proposed for this course

Assignment 1: SMART Goal

Assignment 2: AI tools for prompt search

Continuous Individual Assessment

Module 1: Presentation

Module 2: Activity based assessment

Module 3: Class assessment

The topics related to skill development:

Students acquire knowledge on SMART goals, implement grooming standards, practice ethical behavior in class and campus, acquire hands-on experience to use AI tools to get search prompts for desired email etiquettes.

Course Code:	Course Title: Probability and Statistics			2	0	0	2
MAT2402	Type of Course: BSC		L-1-P-C	5	U	U	3
Version No.	1.0						
Course Pre-							
requisites							
Anti-requisites							
Course Description	The course introduces the concepts of probability theory and statistical analysis, covering how to collect, organize, interpret, and draw inferences from data using mathematical models to understand randomness and uncertainty, with applications across various fields like science, engineering, economics, and social sciences.						
Course Objective	The objective of the course is to equip students with the foundational knowledge of probability theory and statistical methods, enabling them to collect, analyze, interpret data, and make informed decisions based on the likelihood of events occurring in various situations, often applied across different fields like science, engineering, and business.						
Course Out Comes	 On successful completion of the course the students shall be able to: Be able to compute conditional probabilities directly and using Bayes' theorem, and check for independence of events. Be able to set up and work with discrete & continuous random variables; in particular, to understand the Bernoulli, binomial, geometric, Poisson distributions, uniform, normal, and exponential distributions. Identifying different types of data relationships (linear, polynomial, exponential, logarithmic). Be able to use specific significance tests, including z-test, t-test (one- and two-sample), and chi-squared test 						
Course Content							
Module 1	Basic Probability				(6 Clas	ses)
Probability of a	n Event, multiplication rule, combinations,	permu	tations, Addit	tion Lav	v, Mu	ltiplica	ation
Law, Conditiona	l Probability, Bayes's Theorem and Problem	ns.					
Module 2	Random Variables and Bivariate	Assigr	nment		(1	5 Clas	ses)
Distributions Random Variables (discrete and continuous), Probability Mass/Density Functions, Mathematical Expectations, discrete probability distributions - Binomial distribution, Poisson distribution, geometric distribution, Continuous uniform distribution - exponential distribution, normal distribution, gamma distribution. Bivariate distributions and their properties, distribution of sums and quotients, conditional							
Module 3	Curve Fitting & Statistical Methods				(1	3 Clas	ses)
Curve Fitting (St	traight Line (y = a + bx), Parabola (y = a + bx)	x + cx ²)	, Exponential	Curves	(y = a	е ^{ьх} , у	= ab×
and $y = ax^b$	Measures of Central tendency, Moments,	skewn	ess and Kurt	osis, Co	orrela	tion -	Karl
Pearson's coef	ficient of correlation and rank correlation	on (wi	th & Witho	ut repe	tition	, Mu	tiple
Correlation - Pro	oblems. Regression analysis - lines of regres	sion, N	Iultiple regree	ssion - P	roble	ms.	
Module 4	Joint Probability Distribution and Sampling Theory	Assigr	nment		(1	5 Clas	ses)
Joint Probability	v distribution for two discrete random varia	bles, ex	pectation and	d covari	ance.		

Random sampling, sampling distributions, Standard Error, Type I & Type II errors, Testing of Hypothesis, Test of significance - Large sample test for single proportion, difference of proportions, single mean, difference of means, and difference of standard deviations, Test for single mean, difference of means and correlation coefficients, test for ratio of variances - Chi-square test for goodness of fit and independence of attributes.

Targeted Application & Tools that can be used:

The contents of this course has direct applications in most of the core engineering courses for problem formulations, Problem Solution and system Design.

Tools Used: R software (Open Source)

Assignment:

2. Select any one simple differential equation pertaining to the respective branch of engineering, identify the dependent and independent variable – Obtain the solution and compare the solution sets by varying the values of the dependent variable.

Text Book

- 1. Ronald .E. Walpole, Raymond. H. Myers, Sharon. L Myers, and Keying E. Ye, "Probability and Statistics for Engineers and Scientists", Pearson Education, Delhi-9th edition, 2012.
- 2. B. S. Grewal (2017), Higher Engineering Mathematics by, 44th Edition, Khanna Publishers.

References:

- 1. Miller and Freund, Probability and Statistics for Engineers, Pearson Education Ltd.
- 2. Erwin Kreyzig, Advanced Engineering Mathematics, John Wiley and sons, Inc.10th Edition.
- 3. Douglas C. Montgomery & George Runger, Applied Statistics and Probability for Engineers, , Wiley Publications

E-resources/ Web links:

- 1. <u>https://presiuniv.knimbus.com/user#/viewDetail?searchResultType=ECATALOGUE_BASED&uniqu</u> <u>e_id=EBSC095_30102024_10427</u>
- <u>https://presiuniv.knimbus.com/user#/viewDetail?searchResultType=ECATALOGUE_BASED&uniqu</u> <u>e_id=EBSC095_30102024_100198</u>
- 3. https://nptel.ac.in/courses/109104124
- 4. https://nptel.ac.in/courses/111106051
- 5. https://nptel.ac.in/courses/111102137
- 6. <u>https://www.math.hkust.edu.hk/~maqian/ma006_0607F.html</u>
- 7. https://www.scu.edu.au/study-at-scu/units/math1005/2022/
- 8. Presidency University's Knimbus library URL is: presiuniv.knimbus.com

Topics relevant to SKILL DEVELOPMENT: The course focuses on the concepts of Vector calculus and

Linear Algebra with reference to specific engineering problems. The course is of both conceptual and analytical type in nature through Problem Solving. This is attained through the assessment component mentioned in the course handout.

urse Code:	vironmental Studies	Т-Р-С						
IE7601	pe of Course: MOOC course	ntact hours	ntact hours					
urse Pre- requisites	NIL		1	1				
ti-requisites	L							
urse Description	This course is designed to improve the learners' SKILL DEVELOPMENT by using PATICIPATIVE LEARNING techniques. This course aims to familiarize students with fundamental environmental concepts and their relevance to business operations, preparing them to address forthcoming sustainability challenges. It is designed to equip students with the knowledge and skills needed to make decisions that account for environmental consequences, fostering environmentally sensitive and responsible future managers. This course is designed to cater to Environment and Sustainability							
urse jective	The objective of the course is 'SKILL DEVELOPM 'PARTICIPATIVE LEARNING' techniques	ENT' of the s	tude	ent by	y usi	ng		
urse Outcomes	 On successful completion of this course the students shall be able to: 5. Describe the issues related to natural resources, ecosystems and biodiversity 6. Identify environmental hazards affecting air, water and soil quality 7. Recognize the importance of healthy environment and finding the sustainable methods to protect the environment 8. Convert skills to address immediate environmental concerns through changes in environmental processes, policies, and decisions 							
urse Content:								
dule 1	derstanding Environment, Natural Resources, and Sustainability							
pics: ssification of natu their conservation resources. ncept of sustainan strategies for conservation, De Economy.	pics: ssification of natural resources, issues related to Population growth and their overutilization, and strategies for their conservation. Water, air, soil, mineral, energy and food source. Effect of human activities on natural resources. ncept of sustainability- Sustainable Development Goals (SDGs)- targets and indicators, challenges and strategies for SDGs; Sustainable practices in managing resources, including deforestation, water conservation, Desalination – types, energy security, and food security issues, Life Cycle thinking and Circular Economy.							
dule 2	psystems, Biodiversity, and Sustainable Practices							
pics: Ecosystems and ecosystem services: Various natural ecosystems, Major ecosystem types in India and their basic characteristics; forests, wetlands, grasslands, agriculture, coastal and marine; Ecosystem services-classification and their significance. The importance of biodiversity, Types of biodiversity, Biodiversity and Climate Change, the threats it faces, hotspots, and the methods used for its conservation. Strategies for in situ and ex situ conservation, mega								
dule 3	vironmental Pollution, Waste Management, and Sustainable Development							
pics: Types of pollu	tion- Chemical - Biological Biomedical noise air wate	· soil thermal	rad	ioacti	ive a	nd		

Types of pollution- Chemical, - Biological, Biomedical, noise, air, water, soil, thermal, radioactive and marine pollution, and their impacts on society. Urbanization and Urban environmental problems; effects,

and mitigation.

Causes of pollution, such as global climate change, ozone layer depletion, the greenhouse effect, and acid rain, with a particular focus on pollution episodes in India. Importance of adopting cleaner technologies; Solid waste management;

Sustainable Materials and Technologies: Biodegradable and compostable materials, Recycled and reclaimed materials (E-waste management), Sustainable manufacturing processes.

dule 4	cial Issues, Legislation, and Practical Applications		

pics:

Overview of key environmental legislation and the judiciary's role in environmental protection, including the Water (Prevention and Control of Pollution) Act of 1974, the Environment (Protection) Act of 1986, and the Air (Prevention and Control of Pollution) Act of 1981. Hazardous waste Rule 1989, Biomedical Waste handling 1998, Fly Ash Rule 1999, Municipal Solid Waste Rule 2000, Battery Rules 2001, E- Waste Rules 2011, Plastic waste management Rules 2016, Construction Demolition waste Rules 2016 National Biodiversity Action Plan (NBAP)

Major International Environmental Agreements: Convention on Biological Diversity (CBD), The Biological Diversity (Amendment) Act, 2023, United Nations Framework Convention on Climate Change (UNFCCC); Kyoto Protocol; Paris Agreement.

Major International organisations and initiatives: United Nations Environment Programme (UNEP), United Nations Educational, Scientific and Cultural Organization (UNESCO), Intergovernmental Panel on Climate Change (IPCC).

rgeted Application & Tools that can be used:

plication areas are Energy, Environment and sustainability

ols: Online Tools – NPTEL and Swayam.

ject work/Assignment:

sessment Type

• Online exams (MCQs) will be conducted by the department of Chemistry

line Link*:

- 3) Lecure by Dr. Samik Chowdhury, Dr. Sudha Goel, NPTEL course: Environmental Science, https://nptel.ac.in/courses/109105203, 2024.
- 4) Lecture by Dr. Padmavati, Dr Narendran Thiruthy, NPTEL Course: Biodiversity Protection, Farmers and Breeders Rights, https://nptel.ac.in/courses/129105008, 2024.

ther source links are available in below Resources link.

xt Book

- **12.** G. Tyler Miller and Scott Spoolman (2020), Living in the Environment, 20th Edition, Cengage Learning, USA
- 13. Poonia, M.P. Environmental Studies (3rd ed.), Khanna Book Publishing Co.
- 14. Bharucha, E. Textbook of Environmental Studies (3rd ed.) Orient Blackswan Private Ltd.
- 15. Dave, D., & Katewa, S. S. Text Book of Environmental Studies. Cengage Learning India Pvt Ltd.
- 16. Rajagopalan, R. Environmental studies: from crisis to cure (4th ed.). Oxford University Press.
- 17. Basu, M., & Xavier Savarimuthu, S. J. Fundamentals of environmental studies. Cambridge University Press.
- 18. Roy, M. G. Sustainable Development: Environment, Energy and Water Resources. Ane Books.
- 19. Pritwani, K. Sustainability of business in the context of environmental management. CRC Press.
- **20.** Wright, R.T. & Boorse, D.F. Environmental Science: Toward A Sustainable Future (13th ed,). Pearson.

erence Books

6. Varghese, Anita, Oommen, Meera Anna, Paul, Mridula Mary, Nath, Snehlata (Editors) (2022), Conservation through Sustainable Use: Lessons from India. Routledge.

- 7. William P. Cunningham and Mary Ann Cunningham (2020), Principles of Environmental Science: Inquiry & Applications, 9th Edition, McGraw-Hill Education, USA.
- 8. Richard A. Marcantonio, Marc Lame (2022). Environmental Management: Concepts and Practical Skills. Cambridge University Press.
- 9. Manahan, S.E. (2022). Environmental Chemistry (11th ed.). CRC Press. https://doi.org/10.1201/9781003096238
- **10.** Theodore, M. K. and Theodore, Louis (2021) Introduction to Environmental Management, 2nd Edition. CRC Press

Resources:

- 16. <u>https://nptel.ac.in/courses/109105203</u>
- 17. https://archive.nptel.ac.in/courses/120/108/120108004/
- 18. https://nptel.ac.in/courses/127105018
- 19. <u>https://onlinecourses.nptel.ac.in/noc23_lw06/preview</u>
- 20. https://onlinecourses.swayam2.ac.in/ini25_bt02/preview
- 21. https://archive.nptel.ac.in/courses/120/108/120108002/
- 22. <u>https://onlinecourses.swayam2.ac.in/ini25_bt02/preview</u>
- 23. https://nptel.ac.in/courses/102104088
- 24. https://nptel.ac.in/courses/124107165
- 25. https://nptel.ac.in/courses/109106200
- 26. <u>https://archive.nptel.ac.in/content/storage2/courses/120108004/module1/lecture1.pdf</u>
- 27. https://onlinecourses.swayam2.ac.in/nou25_ge19/preview
- 28. https://onlinecourses.swayam2.ac.in/ini25_hs01/preview
- 29. http://kcl.digimat.in/nptel/courses/video/105105184/L32.html
- **30.** <u>https://nptel.ac.in/courses/105105169</u>

Topics relevant to Skill Development:

- 3. An attitude of enquiry.
- 4. Write reports

e topics related to Environment and Sustainability :

topics in theory component are relevant to Environment and Sustainability.

urse Code:	urse Title: Foundations of Integra	ted Engineering	TDC	2	0	0	C
1200	e of Course: ESC		L- 1-P- C	Z	0	0	Z
rsion No.							
ırse Pre-	NIL						
requisites							
ti-requisites	-						
urse Description	and practices across key engineering domains, emphasizing real-world problem-solving, sustainability, and ethical innovation. Students explore how civil, mechanical, electrical, and IT systems intersect with emerging technologies like IoT, AI, and geomatics to address global challenges. Through case studies, learners gain deeper understanding of smart infrastructure, prototyping mechanical/electronic systems, and securing IT solutions. Topics include bioinformatics for environmental monitoring, GIS-enabled urban planning, renewable energy integration, and cybersecurity fundamentals. The course cultivates a holistic understanding of engineering's role in sustainable development, safety, and ethical decision-making, preparing students to contribute meaningfully to multidisciplinary projects in a technology-driven world.						
Irse Objective	The objective of the course is skill development of student by using Participative Learning techniques.						
urse Outcomes	Outcomes On successful completion of this course the students shall be able to: 1] Recall key principles of Agile, DevOps, and bioinformatics used in interdisciplinary engineering contexts. 2] Explain the role of GIS, LiDAR, and sustainable materials in designing smart infrastructure and disaster management systems. 3] Describe core components of mechanical systems and their real-world applications. 4] Describe the functionality of IoT-enabled wearable devices, embedded systems, and renewable energy integration in smart grids. 5] List foundational IT concepts such as cloud computing architectures, cybersecurity threats, and blockbein energiantiane.						
urse Content:							
dule 1	Indations of Engineering Practice	ignment ie st	udies		ess	sions	
al-world problem domain project, erging Fields: Aut tainability & Safe	-solving using data logic and prac Engineering Ethics & Environment omation, and Introduction to bioin ty: Circular economy principles, ca	ctical applications, Collabo al Impact formatics and its applicatic rbon footprint analysis.	ration and Ir n	novat	ion th	rough	multi-
dule 2	il Engineering & Geomatics	ignment icle	Review		ess	sions	
art Infrastructure disaster manage tainable Construc en Innovations: N	& Geomatics: GIS mapping, LiDA ment. tion: 3D-printed structures, self-he let-zero energy buildings, rainwate	R, drone surveys for urban ealing concrete, Digital twir er harvesting systems.	planning, Ge is for infrastru	ospati ucture	al data monit	a analy oring.	sis for
dule 3	chanical Engineering in Action	ignment & Quiz a Co	ollection		ess	sions	
vanced Manufactu and prototyping. ergy Systems: Sola mechanics: Prostl	uring: Collaborative robots (cobot r/wind energy harvesting, piezoele	s), additive manufacturing ectric applications. ifecycle.	and 3D print	ing, R	everse	engin	eering
dule 4	ctrical & Electronics Engineering	ignment & Quiz	Collection ualization	a	nd ess	sions	
art Devices & Syst	ems: Embedded systems, Wearab	le technology, Edge compu	iting and hard	dware	platfor	ms	
ergy Innovations:	EV charging infrastructure, wireles	s power transfer, Smart grid	d integration	with re	enewa	bles.	
dule 5	damentals of IT	ignment & Quiz	studies			5 Sessi	ons

e IT Topics: Networking basics, Cloud computing

persecurity & Data: Encryption, phishing prevention, zero-trust models, Database management.

erging Tech: Blockchain for supply chains, AI/ML basics, IoT integration with cloud platforms

geted Application & Tools that can be used:

plication Areas include Interdisciplinary problem-solving, Smart city planning, disaster management, Robotics prototyping, renewable energy systems, Wearable health tech, smart grids, Secure cloud systems.

ols: 3D Printers, Autocad, Tinkercad, ArcGIS / QGIS, Arduino/Raspberry Pi

t Book:

- 6. William Oakes & Les Leone, "Engineering Your Future: An Introduction to Engineering", Oxford University Press, 9th Edition, 2021
- 7. Barry F. Kavanagh, "Introduction to Geomatics", Pearson, 5th Edition, 2021
- 8. Ian Gibson, David Rosen, & Brent Stucker, "Additive Manufacturing Technologies", Springer, 3rd Edition, 2021
- 9. Sudip Misra, "The Internet of Things: Enabling Technologies, Protocols, and Use Cases", Wiley, 2nd Edition, 2022

10. James Kurose & Keith Ross, "Computer Networking: A Top-Down Approach", Pearson, 8th Edition, 2020

erences

- 8. Supratim Choudhuri, "Bioinformatics for Beginners: Genes, Genomes, and Molecular Evolution", Academic Press, 1st Edition, 2023,
- Robert McGinn, "The Ethical Engineer: Contemporary Concepts and Cases", Princeton University Press, 1st 9. Edition, 2020
- 10. Charles J. Kibert, "Sustainable Construction: Green Building Design and Delivery", Wiley, 5th Edition, 2022
- 11. Anthony M. Townsend, "Smart Cities: Big Data, Civic Hackers, and the Quest for a New Utopia", W.W. Norton & Company, 1st Edition, 2020
- 12. David Buchla, "Renewable Energy Systems: A Smart Energy Systems Approach", Pearson, 2nd Edition, 2023
- 13. Charles Platt, "Make: Electronics: Learning Through Discovery", Make Community, 3rd Edition, 2021
- 14. Charles J. Brooks, Christopher Grow, & Philip Craig, "Cybersecurity Essentials", Wiley, 2nd Edition, 2021

b-resources:

- 5. Post-parametric Automation in Design and Construction
- https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=1155197&site=ehost-live
- 6. Smart Cities : Introducing Digital Innovation to Cities
- https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=1993146&site=ehost-live
- 7. Innovation Energy: Trends and Perspectives or Challenges of Energy Innovation
- https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=2323766&site=ehost-live
- 8. Additive Manufacturing: Opportunities, Challenges, Implications

https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=1134464&site=ehost-live

urco Codo	urse Title: Chemistry of Smort	Matariala				
urse Code:	urse fitte: Chemistry of Smart	waterials	L-T- P- C	О		3
	be of course: Theory - BSC					<u> </u>
rsion No.						
urse Pre-						
ti requisites						
ti-requisites						
urse Description	applications of chemistry of smart materials. The course also aims to enhance the knowledge of smart materials associated with memory system, display devices, , sensors, energy devices and environment. It will also cultivate an ability to identify chemistry in each of smart engineered materials and interpret solutions for the challenges connected to memory, display, energy, smart, green and sustainable technologies. It targets to strengthen the fundamental concepts behind chemistry of smart materials and then builds an interface with their industrial applications. This course is designed to cater to Environment and Sustainability					
	The objective of the course	is 'SKILL DEVE	OPMENT' of the	studer	t hy u	ising
jective	Participative learning techniques.					
	 Relate the knowledge of chemistry to computational approaches to identify materials functionalities and properties Recognize and interpret solutions for the challenges connected to memory, display, smart, green and sustainable technologies. Explain the quality parameters of engineering materials associated with environment and sensors. Interpret the knowledge of sustainable chemistry for E- waste management. Analyse the importance of various electrochemical sources in energy systems. 					
urse Content:		1	1			
odule 1	mputational Chemistry	Assignment	ata Collection an analysis	d 09	classe	S
pics: Fundamental number, Stabilizi interactions – van generation for Chemoinformatics f- learning topics:	Dics: Fundamental particles of atom – their mass, charge and location – atomic number and mass number, Stabilizing interactions: Bonded and non-bonded interactions. Chemistry of weak interactions – van der Waals force and hydrogen bonding, Density functional theory. 3D co-ordinate generation for small molecules, geometry optimization by Molview. Chemical Databases: Chemoinformatics, MSDS f. learning topics: Scope, cost and efficiency of computational modeling					
dula 2	terials for Memory and	Assignment	ata Collection an	d	09	
Jaule 2	Display Systems	Assignment	analysis	C	lasses	
 Topics: Memory Systems : Introduction, classification of electronic memory devices- Transistor, capacitor, charge -transfer and Resistor, types of materials - organic, polymeric and hybrid materials, and applications, manufacturing of semiconductor chips. Display Systems: photo and electroactive materials , materials for display -Principle, Properties and applications: Liquid crystals for LCD-Liquid crystals display, Basics of LED: OLED-organic light emitting diode and light emitting electrochemical cells. Self- learning topics: Green computing: Biocomposite based memory devices 						
	nomaterials based Smart		ata Collection an	Ч		

nomaterials based Smart Assignment ata Collection and analysis 09 Class	00 Classos					
	Sensors and I	Devices		Assignment	analysis	US Classes
nice: Nonomatorial	e Introduction	classifi	cation h	acad an dimans	ionality guantum o	onfinament Size

pics: Nanomaterials- Introduction, classification based on dimensionality, quantum confinement. Size dependent properties, Synthesis, Properties of CNT and Graphene and their application as **Materials**

for data analysis	and packaging -RFID and IO	NT.		
Sensors: Introdu	ction, types, Principle and a	pplications- electro	chemical sensor: n	anomaterials for
sensing application	ons - Glucose, VOC sensing.			
Self-learning top	ics: Fullerene, biomolecules	in sensing, Strain se	ensors	
odule 4	Sustainable Materials and Development	Quiz/Seminar	ita Collection and analysis	09 Classes
pics: E waste: Intr	oduction, E waste Hazards,	E- waste manageme	ent, Recovery of pr	ecious metal- Cu
by Hydrometallu	rgy.	_		
Green Chemist	'y : Fundamentals and 12	principles with	examples, Carbon	footprint and
sequestration				
Sustainable Che	mistry: -Introduction to Bior	materials- PLA , po	olymers in bio-com	patible and bio-
degradable ma	terials - Poly(3-hydroxybu	utyrate-co-3-hydrox	yvalerate) PHBV,	synthesis and
applications in di	ug delivery.			
Self-learning top	ics: circular economy- case	studies.		
	ray Science	Quiz/Sominar	ata Collection and	Classos
	gy Science	Quiz/Seminai	analysis	Classes
pics: Battery tech	nology:Fundamentals of ele	ctrochemistry, Intro	oduction to electro	chemical storage
devices: battery	Lithium-ion battery- LiMnO ₂	, LiCoO ₂ , metal air b	patteries- LiO ₂) and	supercapacitors-
Introduction, Prin	nciple, Types - EDLC, pseudo	and asymmetric ca	pacitor.	
Photovoltaics: S	olar cells - Construction a	nd working princip	ole; types- Inorgar	ic, Organic and
quantum dot ser	sitized (QDSSC's).			
Self -learning top	pics: Battery technology for e	e-mobility, Green hy	/drogen	
geted Application	۱ & Tools that can be used:			
plication areas a	re Data storage and analy	sis, logistics, Biom	edicine, Energy, E	nvironment and
sustainability		-		
ols: Molview, che	mdraw, excel etc			
oject work/Assign	ment:			
sessment Type				
Midterm exa	im			
Assignment	(review of digital/ e-resource	e from PU link given	in references section	on - mandatory
to submit sc	reenshot accessing the digita	al resource.)		
Quiz/Studen	t Seminar			
• End Term Ex	am			
 Self-learning 				
t Book				
21. Wiley. "Engin	eering Chemistry". Wiley.			
22. G.A. Ozin an	d A.C. Arsenault. Nanocher	mistry: A chemical	approach to nano	materials. Roval
_ · ·	emistry, 2009			
Society of Ch				
Society of Ch Ference Books				
Society of Ch ference Books 1. Functional and	l smart materials, Chander Prak	kash, Sunpreet Singh,	J. Paulo Davim, 2020	, CRC Press,
Society of Ch Ference Books 1. Functional and 2. ISBN: 978-036	l smart materials, Chander Prak -727-510-5.	kash, Sunpreet Singh,	J. Paulo Davim, 2020	, CRC Press,
Society of Ch ference Books 1. Functional and 2. ISBN: 978-036 3. E-waste recycl	l smart materials, Chander Prak -727-510-5. ing and management: present :	kash, Sunpreet Singh, scenarios and enviror	J. Paulo Davim, 2020 nmental issues, Khan,	, CRC Press, Anish, and
Society of Ch Ference Books 1. Functional and 2. ISBN: 978-036 3. E-waste recycl 4. Abdullah M. A	l smart materials, Chander Pral -727-510-5. ing and management: present siri. 2019, Springer, Vol. 33. ISB	kash, Sunpreet Singh, scenarios and enviror N: 978-3-030-14186-	J. Paulo Davim, 2020 nmental issues, Khan, 8.	, CRC Press, Anish, and
Society of Ch ference Books 1. Functional and 2. ISBN: 978-036 3. E-waste recycl 4. Abdullah M. A 5. Essentials of co	I smart materials, Chander Prak -727-510-5. ing and management: present : siri. 2019, Springer, Vol. 33. ISB omputational chemistry: theori	kash, Sunpreet Singh, scenarios and enviror N: 978-3-030-14186-4 es and models, Christ	J. Paulo Davim, 2020 nmental issues, Khan, 8. copher J Cramer, 2013	, CRC Press, Anish, and 3, John Wiley &
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Society of Ch ference Books 1. Functional and 2. ISBN: 978-036 3. E-waste recycl 4. Abdullah M. A 5. Essentials of co 6. Sons. ISBN: 97 7. Energy storage 8. L. Sharma, Ani 9. Fundamentals 10. Ltd 8th. ISBN	I smart materials, Chander Pral -727-510-5. ing and management: present siri. 2019, Springer, Vol. 33. ISB omputational chemistry: theori 8-0-470-09182-1. and conversion devices: Super I Arya. 2021, CRC press, 1st edi of analytical chemistry: An intr : 978-0-495-55828-6	kash, Sunpreet Singh, scenarios and enviror N: 978-3-030-14186-4 es and models, Christ rcapacitors, batteries tion, ISBN: 978-1-003 roduction, Douglas A.	J. Paulo Davim, 2020 nmental issues, Khan, 8. copher J Cramer, 2013 and hydroelectric ce -14176-1. Skooget etal., 2004 T	, CRC Press, Anish, and 3, John Wiley & Ils, Anurag Gaur, Thomson Asia pte
Society of Ch ference Books 1. Functional and 2. ISBN: 978-036 3. E-waste recycl 4. Abdullah M. A 5. Essentials of co 6. Sons. ISBN: 97 7. Energy storage 8. L. Sharma, Ani 9. Fundamentals 10. Ltd., 8th, ISBN 11. Functional and	smart materials, Chander Prak -727-510-5. ing and management: present siri. 2019, Springer, Vol. 33. ISB omputational chemistry: theori 8-0-470-09182-1. and conversion devices: Super Arya. 2021, CRC press, 1st edir of analytical chemistry: An intr : 978-0-495-55828-6 smart materials, Chander Prak	kash, Sunpreet Singh, scenarios and enviror N: 978-3-030-14186- es and models, Christ rcapacitors, batteries tion, ISBN: 978-1-003 oduction, Douglas A. kash, Sunpreet Singh,	J. Paulo Davim, 2020 Imental issues, Khan, 8. copher J Cramer, 2013 and hydroelectric ce -14176-1. Skooget etal., 2004 T J. Paulo Davim, 2020	, CRC Press, Anish, and 3, John Wiley & Ils, Anurag Gaur, Thomson Asia pte , CRC Press,

13. Electrical and electronic devices, circuits and materials: Technological challenges and solutions. Tripathi,

- 14. L., Alvi, P. A., & Subramaniam, U, 2021, John Wiley & Sons, ISBN: 978-0367564261.
- 15. F. Jensen, Introduction to Computational Chemistry, 3rd edition, Wiley, 2017.

E resources

- 1. <u>https://presiuniv.knimbus.com/user#/searchresult?searchId=computational%20chemistry& t=1</u> 738054970142
- 2. <u>https://presiuniv.knimbus.com/user#/viewDetail?searchResultType=ECATALOGUE_BASED&uniq</u> <u>ue_id=EBSCO95_30102024_48504</u>
- 3. <u>https://presiuniv.knimbus.com/user#/viewDetail?searchResultType=ECATALOGUE_BASED&uniq_ue_id=EBSCO95_30102024_147967</u>
- 4. <u>https://presiuniv.knimbus.com/user#/viewDetail?searchResultType=ECATALOGUE_BASED&uniq_ue_id=EBSC095_30102024_130301</u>
- 5. <u>https://presiuniv.knimbus.com/user#/viewDetail?searchResultType=ECATALOGUE_BASED&uniq_ue_id=EBSCO95_30102024_87297</u>
- 6. <u>https://presiuniv.knimbus.com/user#/viewDetail?searchResultType=ECATALOGUE_BASED&uniq_ue_id=EBSCO95_30102024_67006</u>
- 7. <u>https://presiuniv.knimbus.com/user#/viewDetail?searchResultType=ECATALOGUE_BASED&uniq</u> ue_id=EBSC095_30102024_137261
- 8. <u>https://presiuniv.knimbus.com/user#/viewDetail?searchResultType=ECATALOGUE_BASED&uniq</u> <u>ue_id=EBSCO95_30102024_86712</u>

ll Sets

topics in theory component are relevant to Environment and Sustainability.

Course	Course Title: Program Solvi	ng Using C	, ,					
Code:	Type of Course:			L- T-P-C	2	0	0	2
CSE2200	Theory - PCC							
Version No.	1.0							
Course Pre-	NIL							
requisites								
Anti-requisites	NIL							
Course Description	The course is designed to pro will be able to develop logic applications in C. ACAlso by can easily switch over to any other language in futur	The course is designed to provide complete knowledge of C language. Students will be able to develop logics which will help them to create programs and applications in C. ACAlso by learning the basic programming constructs they can easily switch over to any other language in future.						
Course Object	The objective of the course is Problem SolvingUsing C and Methodologies.	he objective of the course is to familiarize the learners with the concepts of roblem Solving Using C and attain Employability through Problem Solving Aethodologies						
Course Outcomes	 On successful completion of this course the students shall be able to: 1. Write algorithms and to draw flowcharts for solving problems 2. Demonstrate knowledge and develop simple applications in C programming constructs 3. Develop and implement applications using arrays and strings 4. Decompose a problem into functions and develop modular reusable code 5. Solve applications in C using structures and Union 6. Design applications using Sequential and Random Access File Processing 							
Course Content:								
Module 1	Introduction to C Language	Quiz	Problem Solving	6 Sess	ions	5		
Topics:								
Introduction to Prog	ramming – Algorithms – Pseuc	lo Code - Fl	ow Chart – C	Compilation	1 – I	Exec	cuti	on –
Preprocessor Directi	ives (#define, #include, #undef) - Overview	v of C - Cons	stants, Vari	able	es ai	nd I	Data
types – Operators ar	nd Expressions – Managing Inp	out and Outp	put Operatior	ns – Decisi	on I	Mak	ing	and
Branching - Decisio	n Making and Looping.	1	1	I				
Module 2	Introduction to Arrays and Strings	Quiz	Problem Solving	6 Sess	ions	5		
Topics:								I
Arrays: Introduction	n – One Dimensional Array – Ir	nitialization	of One Dime	nsional Ar	rays	-E	xan	nple
Programs – Sorting	(Bubble Sort, Selection Sort)	- Searching	g (Linear Sea	arch) - Tw	o D	ime	ensi	onal
Arrays – Initializatio	on of Two Dimensional Arrays	. Example P	Programs – M	latrix opera	tior	ns. S	stri	ngs:
Introduction – Decla	aring and Initializing String							
Variables – Reading	Strings from Terminal – Writi	ng String to	Screen – Str	ing Handli	ng F	Func	tior	ns.
Module 3	Functions and Pointers	Quiz	Problem Solving	6 Sess	ions	5		
Topics:					_	_	_	
Functions: Introduc	ction – Need for User-defined f	unctions – E	Elements of U	Jser-Define	d F	unc	tion	is:
declaration, definition	on and function call-Categories	s of Function	ns – Recursic	on. Pointer	s:			
Introduction – Decla	aring Pointer Variables – Initial	ization of V	ariables – Po	inter Operation	ator	s – 1	Poir	nter
Arithmetic – Arrays	and Pointers – Parameter							
Passing: Pass by Va	lue, Pass by Reference.							

Module 4	Structures and Union	Quiz	Problem Solving	6 Sessions
Topics:				
Structures: Introduc	ction – Defining a Struc	ture – Declari	ng Structure Variable	- Accessing Structure
Members – Array of	Structures – Arrays wi	thin Structure	es – Union: Introducti	on – Defining and
Declaring Union – I	Difference Between			-
Union and Structure				
Module 5	File handling	Case Study	Problem Solving	6 Sessions
Topics:	·			
Files: Defining and	Opening a File – Closin	g a File – Inp	ut / Output Operation	s on File – Random
Access Files		0 1	1 1	
Text Book(s):				
1. E. Balaguru	iswamy, "Programmin	ig in ANSI C	", 8th Edition, 2019,	McGraw Hill
Education, ISBN: 9	078-93-5316- 513-0.	-		
Reference Book(s):				
6. Yashwant Kanet	kar, Let us C, 17th Edit	tion, BPB Put	olications, 2020.	
7. ReemaThareja, "	Programming in C", O	xford Univers	sity Press, Second Edi	tion, 2016.
8. Kernighan, B.W	and Ritchie, D.M, "The	C Programm	ing language", Secon	d Edition, Pearson
Education, 2015		-		
9. Schildt Herbert,	"C: The Complete Refe	erence", Tata	McGraw Hill Educati	on, 4th Edition, 2014.
10. Stephen G. Koch	nan, "Programming in C	, Addison-V	Vesley Professional, 4	th Edition, 2014.
Web Links and Vid	leo Lectures:		· · ·	·
1. https://nptel	l.ac.in/courses/106/105	/106105171/		
2. https://archi	ive.nptel.ac.in/courses	/106/104/106	104128/	
	r			

		1					
Course	Course Title: Program Solving Using C Lab				ļ		
Code:	Type of Course:	L- T-P-C	0	0	4	2	
CSE2201	Lab - PCC						
Version No.	1.0						
Course Pre-	NIL						
requisites							
Anti-requisites	NIL						
Course	The course is designed to provide complete kn	owledge of	f C	lar	igua	age.	
Description	tudents will be able to develop logics which will help them to create rograms and applications in C. ACAlso by learning the basic rogramming constructs they can easily switch over o any other language in future.						
Course Object	The objective of the course is to familiarize the lea of Problem SolvingUsing C and attain Employabi Solving Methodologies.	The objective of the course is to familiarize the learners with the concepts f Problem Solving Using C and attain Employability through Problem olving Methodologies.					
Course Outcomes	 On successful completion of this course the stude 7. Write algorithms and to draw flowcharts for 8. Demonstrate knowledge and develop sime programming constructs 9. Develop and implement applications using 10. Decompose a problem into functions and or reusable code 11. Solve applications in C using structures and 12. Design applications using Sequential and I Processing. 	dents shall or solving p pple applica g arrays and develop mo d Union Random Ac	be prob ation I str dul	abl olem ns i ings ar	e to 1s n C s		
Course Content:							
I ist of Practicals:							
Lab Sheet 1: 10 S	Sessions						
Program 1: Sum of Program 2: Find th Program 3: Check 1 Program 4: Print M Program 5: Count I Program 6: Demon Program 7: Simple Lab Sheet 2: 10 Se Program 1: Check Program 2: Find th Program 3: Check	Two Numbers e Greatest of Three Numbers Even or Odd using Conditional Operator Iultiplication Table using Loop Digits in a Number using While Loop Istration of Preprocessor Directives Calculator using Switch Case essions Whether a Number is Positive, Negative or Zero e Sum of First N Natural Numbers Whether a Number is Prime or Not						
Program 3: Check Program 4: Find Fa Program 5: Reverse Program 6: Simple	whether a Number is Prime or Not actorial of a Number e a Number Number Guessing Game						

Lab Sheet 3: 10 Sessions

Program 1: Linear Search in a One-Dimensional Array
Program 2: Bubble Sort on an Integer Array
Program 3: Matrix Addition (2D Arrays)
Program 4: Count Vowels in a String
Program 6: Selection Sort on an Array

Lab Sheet 4: 10 Sessions

Program 1: Sum of Two Numbers Using User-Defined Function

Program 2: Factorial Using Recursion

Program 3: Swap Two Numbers Using Call by Value (No Swap)

Program 4: Swap Two Numbers Using Call by Reference (With Swap)

Program 5: Pointer Basics - Access and Modify Variable via Pointer

Program 6: Accessing Array Elements Using Pointers

Lab Sheet 5: 10 Sessions

Program 1: Basic Structure Usage

Program 2: Input and Display Array of Structures

Program 3: Array Inside Structure (Student Marks)

Program 4: Structure with Nested Structures (Date of Birth)

Program 5: Union Example and Member Access

Lab Sheet 6: 10 Sessions

Program 1: Write to a File (Text Mode)

Program 2: Read from a File (Text Mode)

Program 3: Append Data to a File

Program 4: Count Characters, Words and Lines in a File

Program 5: Write and Read Structure to/from a Binary File

Program 6: Random Access in File (Update a Record)

Text Book(s):

1. E. Balaguruswamy, "Programming in ANSI C", 8th Edition, 2019, McGraw Hill Education, ISBN: 978-93-5316- 513-0.

Reference

Book(s):

- 11. Yashwant Kanetkar, Let us C, 17th Edition, BPB Publications, 2020.
- 12. ReemaThareja, "Programming in C", Oxford University Press, Second Edition, 2016.
- 13. Kernighan, B.W and Ritchie, D.M, "The C Programming language", Second Edition, Pearson Education, 2015
- 14. Schildt Herbert, "C: The Complete Reference", Tata McGraw Hill Education, 4th Edition, 2014.
- 15. Stephen G. Kochan, "Programming in C", Addison-Wesley Professional, 4th Edition, 2014.

Web Links and Video Lectures:

- 3. <u>https://nptel.ac.in/courses/106/105/106105171/</u>
- 4. https://archive.nptel.ac.in/courses/106/104/106104128/

G2501	vanced English		T- P- C		2			
rsion No.								
urse Pre- requisites	G1900 - English fo	or Technical Communication	n					
ti-requisites	L							
urse Description	This course is des in Listening, Spea communication p impromptu speak logical fallacies, students to the po elevate their com students will be v academic and pro	igned to equip students to e king, Reading, and Writing principles, the art of spee ang), strategic approaches to and persuasive writing. Fu- tential of AI tools and the munication skills in the d well-prepared to communic fessional environments	enhance their commu . The curriculum cov ch writing and deli- o critical reading, the rthermore, the cours techniques of promp igital age. Upon cou- cate effectively and c	inication ab vers interpe ivery (inclet identificat se will intr pt engineer urse compl critically in	vilities rsonal luding ion of roduce ing to letion, n both			
urse Out Come	 On successful completion of the course the students shall be able to: 5. Recognize the elements of interpersonal and cross-cultural communication to address communication challenges effectively. 6. Demonstrate the ability to deliver structured and impromptu speeches using effective speaking techniques. 7. Interpret textual and visual materials using critical reading strategies to evaluate arguments, logic, and persuasion. 8. Produce persuasive and analytical essays using effective argumentation techniques and structured writing strategies. 							
Course Content:	teeninques and	i structured writing strategi	cs.					
odule 1	undations of Effective Communication	se Studies/ Role play	oss-Cultural Competency	12 C	lasses			
pics: Fundamenta Verbal, Non Cultural dim Active Liste Common Er Activities: Instagram/Y Charades wi Reversal Co	pics: • Fundamentals of Interpersonal Communication • Verbal, Non-verbal, and Paraverbal communication. • Cultural dimensions theory (Hofstede's Cultural Dimensions). • Active Listening Techniques • Common Errors in Communication Activities: • Instagram/YouTube Vocabulary Activity • Charades with a Twist/Tone and Emotion Experiment/Mixed Messages Challenge/Role Reversal Conversations/Observation Exercise							
odule 2	astering Speech Delivery	М	blic Speak Confidence	king 12 C	lasses			
 ics: Introduction to Prompt Engineering Speech Preparation and Organization Techniques for Effective Impromptu Speaking Practice Speech Delivery Activities: Speech Writing Impromptu Speech 								
odule 3	itical Reading and Logical	prksheet	itical Thinking a Analysis	and 12 C	lasses			

		Analysis					
Topic	es:						
•	Critical Re	eading Strategies: C	ontextualizing, Figurative	Language, Evaluating I	Logic of an		
	Argument,	Recognizing Emotio	onal Manipulation, Analysi	ng Visuals			
•	• Recognizing Logical Fallacies: Slippery Slope, False Dilemma, Post Hoc, Hasty Generalization,						
	Ad Homine	em, Straw Man, Ban	dwagon, No True Scotsma	an, Red Herring, Appeal to	o Authority,		
	Sunk Cost,	Appeal to ignorance	;				
Activi	ties:						
•	Critical Rea	ading Worksheet/Ide	ntifying Bias in News Arti	cles			
odule 4		riting Effective Arguments	signment	ear and Coherent Writing	lasses		
pics:							
•	Understand	ling Critical Writing					
•	Building A	rguments (Pathos, E	thos, Logos)				
•	Techniques	for Persuasion					
Ac	tivities:						
•	Causes or H	Effects/Appeal Mash	-Up/Debates on Controvers	sial Topics			
•	Opinion W	riting					
rgeted	Application	& Tools that can b	e used: Quizziz Chatont (Gemini Youtube Instagra	m Quillbot		
Gram	narly. Padlet	t a i oois that can b	e useu. Quizziz, chargpi, c	Jennin, Toutube, Instagra	in, Quinoot,		
ference							
ici chec	6 Adler I	R B Rodman G &	z DuPré A (2019) Under	standing human communi	cation (14th		
	ed) Ox	ford University Pres	s		carron (1 mi		
	7. Moore.	B N. & Parker, R.	(2020). Critical thinking (1	3th ed.) McGraw-Hill Ed	lucation		
	8 Hamilto	on C (2020) Comm	unicating for success (2nd	ed) Routledge	ideation.		
	9 Ting-To	oomey S & Doriee	T (2018) Intercultural co	ompetence [.] A model for t	eaching and		
	assessir	ng cross-cultural co	munication <i>Journal of</i>	Intercultural Communica	47(2)		
	213-22	9 https://doi.org/10	1016/i jicc 2018 03 004	interetation communica	<i>non, 17(2)</i> ,		
	10 https://w	www.ted.com/	1010/j.jiee.2010.05.001				
	10. <u>mtps.//v</u>	<u>, ,, ,, ,, ,, ,, ,, ,, ,, ,, ,, ,, ,, ,</u>					
Topics	Relevant to	"employability": Te	amwork and Collaboration	, Critical Thinking and Press	oblem-		
Solvin	g						
Topics	Relevant to	"Human Values and	Professional Ethics": Critic	cal reasoning, Inclusivity a	and Fairness		

	urse Title Basics of	Electrical and Electronics				
urse Code:	Engineering	Electrical and Electronics	L-T-P-C	3		
E1200	be of Course: Theory	- FSC				
rsion No	se of course. Theory			I		
unco Duo noquisitos	NIL					
ti no preisitos						
n-requisites	L This is a fundamental	Course which is designed to know	with a was of hosis	a of algorithms al		
urse Description	and electronics engineering principles occurs in various fields of Engineering. The course emphasises on the characteristics and applications of electrical and electronic devices. The course also emphasizes on the working, analysis and design of electrical circuits using both active & passive components. Additionally, this course creates a foundation for the future courses such as Electrical machines, power system, power electronics Linear Integrated Circuits, Analog Communication and Digital Communication etc.					
urse Objective	The objective of the c of Electrical and Ele	course is to familiarize the learn ctronics Engineering and attai	n Skill Develop	epts of Basics ment through		
	Participative Learni	ng techniques.	4			
	 Apply basic laws of Electrical Engineering to compute voltage, currents and other parameters in the circuits. Discuss various fundamental parameters appearing in the characteristics of semiconductor devices and their applications. Summarize the operations of different biasing configurations of BJTs and amplifiers. Discuss the performance characteristics and applications of various electrical 					
urse Content:						
dule 1	Introduction to Electrical Circuits	ignment/ Quiz	merical solving Task	0 Sessions		
DC Circuits: Concept of C parallel connections of res Numerical examples. AC Circuits: Fundamentals reactive power and Power fa Introduction to three phase Numerical examples.	Circuit and Network, T sistive networks, Star- s of single phase circuits actor, Numerical examp e system and relation	ypes of elements, Network Rec to-Delta Transformations, Me - Series RL, RC and R-L-C Ci les. between line and phase value	luction Technique ish Analysis, No rcuits, Concept of s in Star & Delt	28- Series and dal Analysis, active power, a connection,		
dule 2	niconductor and _j Diode applications	ignment/ Quiz	mory Recall based Quizzes	Sessions		
Mass Action Law, Charge behaviour, Modelling the characteristics and its applic	densities in a semico Diode Forward Charac ations like voltage regu	nductor, Types of SC, Junction teristic, and Diode application lator.	on diodes -Ideal as like rectifiers,	and practical Zener diode,		
dule 3	nsistors and its Applications	ignment/ Quiz	mory Recall- based Quizzes	0 Sessions		
nsistor characteristics, Curre gains. Operating point, Bias principal of Operation and MOSFET (Construction, p Depletion modes.	nt components, BJT C sing, Fixed Bias, and lo Volt –Ampere charac rincipal of Operation	configurations (CB, CC, CE co ad line analysis. Single Stage teristics). Pinch- off voltage, and symbol), MOSFET chara	onfigurations) and amplifier. JFET (Comparison of E cteristics in Enha	their current (Construction, JT and FET. ancement and		
dule 4	Fundamentals of trical Machines	ignment/ Quiz	merical solving Task	Sessions		
Electrical Machines: Singl	e phase transformers: p	rinciple of operation and EMF	equation, Numeri	cal examples.		

DC Motor: principle of operation, Back EMF, torque equation, Numerical examples. AC Motor: Principle operation of Induction Motors and its Applications.

f-Learning Topics:

oping and clamping circuits, Stabilization Techniques, Voltage divider bias and its stability factor, Multistage amplifier, Darlington pair.

Special Machines: Introduction to special electrical machines and its applications.

geted Application & Tools that can be used:

Targeted Applications: Application Area includes all electrical and electronic circuits (power supply unit, regulator unit, embedded devices, hardware electronics etc.). The students will be able to join a profession which involves basics to high level of electronic circuit design.

Professionally Used Software: Multisim/ P Spice

ides these software tools hardware equipment such as Multimeters, Function Generators, Power Supplies, Oscilloscopes etc., can be used to perform component/circuit testing and analysis.

ject Work/ Assignment:

1. Article review: At the end, of course an article topic will be given to an individual or a group of students. They need to refer the library resources and write a report on their understanding about the assigned article in appropriate format.

2. Presentation: There will be a group presentation, where the students will be given a topic. They will have to explain/demonstrate the working and discuss the applications for the same.

3. Case Study: - At the end of the course students will be given a 'real-world' application based circuits like Power Amplifier, Signal/Function Generator etc. as a case study. Students will be submitting a report which will include Circuit Diagrams, Design, Working Mechanism and Results etc. in appropriate format

t Book(s):

- 7. Kothari D. P. & Nagrath I. J., "Basic Electrical and Electronics Engineering", Tata McGraw-Hill
- 8. Education
- 9. Theraja B.L. and Theraja A.K., "A Textbook of Electrical Technology: Basic Electrical Engineering" in S.I. System of Units, 23rd ed., New Delhi: S. Chand, 2002.
- 10. A.P.Malvino, Electronic Principles,7thEdition, Tata McGraw Hill,2007
- 11. J. Millman, C. C. Halkias and C. D. Parikh, "Millman's Integrated Electronics", McGraw Hill Education, 2nd Edition.
- 12. Basics of Electrical & Electronics Laboratory Manual.

erence Book (s):

- 7. John Hiley, Keith Brown and Ian McKenzie Smith, "HUGHES Electrical and Electronic Technology", 10th Edition (Indian Edition published by Dorling Kindersley), Pearson, 2011
- 8. Samarajit Ghosh, "Fundamentals of Electrical and Electronics Engineering", 2nd Edition, Prentice Hall India, 2007.
- 9. K Uma Rao, A Jaya Lakshmi, "Basic Electrical engineering" IK International publishing house Pvt. Ltd
- 10. R. L. Boylestad and L. Nashelsky, "Electronic Devices and Circuit Theory", Pearson Education India 7th Edition.
- 11. A K. Maini, V. Agrawal, "Electronic Devices & Circuits", Wiley, 2nd Edition
- 12. A.S Sedra, K. C. Smith, "Microelectronic Circuits", Oxford University Press, 6th Edition
- **Online Resources (e-books, notes, ppts, video lectures etc.):**
- 7. https://presidencyuniversity.linways.com
- 8. https://www.digimat.in/nptel/courses/video/108105112/L01 "Fundamentals of Electrical Engineering-Basic Concepts, Examples"
- 9. Seminar Topic: https://nptel.ac.in/courses/108/105/108105153/ "Electrical Measurements"
- 10. Video lectures on "Electronic Devices" by Prof. Dr. A. N. Chandorkar, IIT Bombay http://www.satishkashyap.com/2013/03/video-lectures-on-electron-devices-by.html

- 11. Video lectures on "Analog Electronics" by Prof. S.C. Dutta Roy, IIT Delhi https://nptel.ac.in/courses/108/102/108102095/
- 12. Video lectures on "Diodes", by Prof. Chitralekha Mahanta, IIT Guwahati,

https://nptel.ac.in/courses/117/103/117103063/

E-content:

- 5. "Introduction to Electrical Machines https://nptel.ac.in/courses/108/102/108102146/"
- M. -Y. Kao, H. Kam and C. Hu, "Deep-Learning-Assisted Physics-Driven MOSFET Current Voltage Modeling," in IEEE Electron Device Letters, vol. 43, no. 6, pp. 974-977, June 2022, doi: 10.1109/LED.2022.3168243 https://ieeexplore-ieee-org-resiuniv.knimbus.com/document/9758727
- 6. F. Bonet, O. Aviñó-Salvadó, M. Vellvehi, X. Jordà, P. Godignon and X. Perpiñà, "Carrier
- Concentration Analysis in 1.2 kV SiC Schottky Diodes Under Current Crowding," in IEEE Electron Device Letters, vol. 43, no. 6, pp. 938-941, June 2022, doi: 10.1109/LED.2022.3171112. https://ieeexplore-ieeeorg-presiuniv.knimbus.com/document/9764749
- M. Chanda, S. Jain, S. De and C. K. Sarkar, "Implementation of Subthreshold Adiabatic Logic for Ultralow-Power Application," in IEEE Transactions on Very Large Scale Integration (VLSI) Systems, vol. .23, no. 12, pp. 2782-2790, Dec. 2015.

https://ieeexplore.ieee.org/document/7018053

- 8. R. Raut and O. Ghasemi, "A power efficient wide band trans-impedance amplifier in submicron
- CMOS integrated circuit technology," 2008 Joint 6th International IEEE Northeast Workshop on Circuits and Systems and TAISA Conference, 2008, pp. 113-116, doi: 0.1109/NEWCAS.2008.4606334. https://ieeexplore.ieee.org/document/4606334

Topics relevant to "SKILL DEVELOPMENT": Performing suitable experiments to compute the electric circuit parameters, performance operation of machines, and operation of semiconductor devices for **Skill Development** through **Participative Learning techniques.** This is attained through assessment component mentioned in course plan.

urse Code EEE1250	urse Title: Basics of Electrical and Electronics Engineering Laboratory pe of Course: Laboratory - ESC	- T- P- C	C	0	2	1		
rsion No.								
urse Pre- requisites								
ti-requisites								
urse Description	This fundamental laboratory provides an optaught in the basics of electrical and electro ability to visualize real system performance, tools.	This fundamental laboratory provides an opportunity to validate the concepts aught in the basics of electrical and electronics engineering and enhances the bility to visualize real system performance, using both hardware and simulation pols.						
urse Objective	of Electrical and Electronics Engineering and attain Skill Development through Experiential Learning techniques.							
sic skill sets required for the laboratory:								
	The students shall be able to develop:							
	14) An attitude of enquiry.							
	15) Confidence and ability to tackle new pr	oblems.						
	16) Ability to interpret events and results.	1 64						
	17) Ability to work as a leader and as a me	mber of tea	m.					
	18) Assess errors and eliminate them.							
	19) Observe and measure physical phenom	lenon.						
	20) Write Reports.		1					
	21) Select suitable equipment, instrument a	and materia	IS.					
	22) Locate faults in systems.	•						
	23) Manipulative skills for setting and handli	ng equipmer	it.					
	24) The ability to follow standard test proc	edures.						
	25) An awareness of the need to observe sa	iety precau	tions	•				
	26) To judge magnitudes without actual meas	urement.			4			
	5. Apply basic laws of Electrical Engineerin	ig to compu	te vol	tage, o	to: current	ts, and		
	other parameters in the circuits.	other parameters in the circuits.						
	6. Demonstrate the working of electrical r	nachines to	obse	rve	perfor	mance		
urse Out Comes	characteristics.			1.	• •			
	7. Demonstrate the working of electro	onic circuits	s to	obta	in the	e V-I		
	Characteristics of various semiconductor	devices.		1 1	1 . •	1 1		
	8. Sketch the characteristics and waveform	s relevant to	stan	aara e	lectric	ai and		
	electronic circuits							
urse Content:								
	Experiment No 1: Verification of KVL and Level 1: Study and Verify KVL and KCL for Level 2: For the same circuit considered in le perform the simulation using NI LabVIEW/Multisim/MATLAB. Experiment No 2: Analyse AC series circuit Level 1: Conduct an experiment to perform a and power of Series RL and RC circuits	KCL for a gi the given el vel 1, s – RL, RC a nd verify the	ven I ectric and R e imp	DC circ cal Cir LC . edance	cuit. cuit. e, curre	ent		
	of RLC series circuits. Experiment No 3: Calculation of power and	no verify the	r of tł	euance	en AC	unent		

Circuit.
Level 1: Conduct an experiment to measure the power and power factor for
given resistive load.
Level 2: Conduct an experiment to measure the power and power factor for
given inductive load.
Experiment No 4: Perform the experiments on given 1 ransformer.
Level 1: Verify the ENF equation of a transformer and compute the voltage
Level 2: Study the effect of load on the secondary side of the transformer and
verify the EMF equation under load conditions.
Experiment No 5: Load test on DC shunt motor
Level 1: Conduct load test on DC shunt motor and find its efficiency at different
loads
Level 2: Conduct load test on DC shunt motor and plot the performance characteristics.
periment 6: Study of PN-Junction Diode Characteristics in Forward and Reverse Bias Conditions.
vel 1: Carry out an experiment to plot VI Characteristics and hence find the cut-in voltage on forward characteristics for the Silicon P-N Junction diode.
vel 2: Carry out an experiment to plot VI Characteristics of Zener diode and hence find the zener voltage on reverse characteristics for the Silicon P-N Junction zener diode.
periment No. 7: To observe the output waveform of half wave and full wave rectifier circuit and compute ripple factor and efficiency
vel 1: Identify the components required for a rectifier circuit, rig up the circuit, and sketch the output waveforms without filter.
vel 2: Rig up the rectifier circuit with RC filter, observe the output waveforms, determine the efficiency and ripple factor.
periment 8: To construct clipping and clamping circuits for different reference voltages and to verify the responses.
vel 1: Identify the components required for building a Clipper / Clamper circuit. Rig up the circuit according to the circuit diagram given and sketch the output waveform.
vel 2: Given a sinusoidal input of 10 V p-p, implement a positive / negative clipper with output clipped at 2 V.
periment 9: To calculate various parameters of emitter follower circuit using BJT
vel 1: Identify the components required to implement an emitter follower circuit.
Rig up the circuit and observe the variations in output waveform with respect to the variations in input waveform.
vel 2: Determine the values of Z_{in} input impedance and Z_{out} output impedance for Emitter Follower.
periment 10: To Implement RC Coupled amplifier using a BJT and sketch the frequency response.
vel 1 : Identify the components required to implement an RC coupled amplifier circuit. Rig up the circuit and sketch the frequency response.
Level 2 : From the frequency response curve determine the value of the mid band gain and the bandwidth.
geted Application & Tools that can be used: Targeted Applications: Application Area includes all electrical and electronic circuits (power supply

Targeted Applications: Application Area includes all electrical and electronic circuits (power supply unit, regulator unit, embedded devices, hardware electronics etc.). The students will be able to join a profession which involves basics to high level of electronic circuit design. Professionally Used Software: Multisim/ P Spice sides these software tools hardware equipment such as Multimeters, Function Generators, Power Supplies, Oscilloscopes etc., can be used to perform component/circuit testing and analysis.

urse Material

12. Basics of Electrical and Electronics Engineering Laboratory Manual, Presidency University, Bengaluru.

xt Book:

13. Kothari D. P. & Nagrath I. J., "Basic Electrical and Electronics Engineering", Tata McGraw-Hill

Reference Books:

- John Hiley, Keith Brown and Ian McKenzie Smith, "HUGHES Electrical and Electronic Technology", 10th Edition (Indian Edition published by Dorling Kindersley), Pearson,2011
- 15. Samarajit Ghosh, "Fundamentals of Electrical and Electronics Engineering", 2nd Edition, Prentice Hall India, 2007.
- 16. K Uma Rao, A Jaya Lakshmi, "Basic Electrical engineering" IK International publishing house Pvt. Ltd
- 17. R. L. Boylestad and L. Nashelsky, "Electronic Devices and Circuit Theory", Pearson Education India 7th Edition.
- 18. A K. Maini, V. Agrawal, "Electronic Devices & Circuits", Wiley, 2nd Edition
- 19. A.S Sedra, K. C. Smith, "Microelectronic Circuits", Oxford University Press, 6th Edition

Online Learning Resources:

- 20. <u>https://presidencyuniversity.linways.com</u>
- 21. https://www.digimat.in/nptel/courses/video/108105112/L01 "Fundamentals of Electrical Engineering-Basic Concepts, Examples"
- 22. Video lectures on "Diodes", by Prof. Chitralekha Mahanta, IIT Guwahati, <u>https://nptel.ac.in/courses/117/103/117103063/</u>

Topics relevant to "SKILL DEVELOPMENT": All the experiments which are listed are for **Skill Development** through **Experiential Learning Techniques**. This is attained through the assessment component mentioned in course handout.

	Indian Constitution	L P. C					
Course Code:	Type of Course: MOOC course						
LAW7601		ntact hours					
urse Pre- requisites	Pre- NIL tes						
ti-requisites							
urse Description	This course is designed to improve the learners' SKILL DEVELOPMENT by using PATICIPATIVE LEARNING techniques. This course aims to familiarize students with fundamentals of Indian Constitution concepts and their relevance to 75+ Years of Republic of India (https://constitution75.com/) as well as #AzaadiKaAmrutMahotsav / Azadi Ka Amrit Mahotsav (https://amritmahotsav.nic.in). It is designed to equip students with the knowledge about the Constitution of India. This course aims to introduce the constitutional law of India to students from all walks of life and help them understand the constitution of India, familiar to all students, and not only to law students, this course aims and objectifies legal understanding in the simplest of forms. This course is designed to cater to Constitutional Studies.						
urse jective	The objective of the course is 'SKILL DEVELOPMENT' of the student by using 'PARTICIPATIVE LEARNING' techniques						
urse Outcomes	 On successful completion of this course the students shall be able to: 1. Describe the basic understanding of the Indian Constitution and the concepts and issues relevant to day-to-day life of the nation and to equip the Citizen with the zeal of capacity building. Recognizing and identify the values of the Constitution of India. 2. Enabling the Citizen-centric Awareness of Rights and Responsibilities of the State 3. Explain the role of the State actors in building India. 4. Understanding the Gandhian vision over the power of the LSG (Local Self-Governance) 						
urse Content:							
dule 1	derstanding the Making of the Constitution: The Constituent Assem	oly & The Con	stitu	tion o	of Ind	dia	
 pics: Historical Context of Constituent Assembly - Compositions & Functions of Constituent Assembly What is a Constitution? – Why have a Constitution? – Constitutional Change - Features of Indian Constitution – Preamble of Indian Constitution 							
dule 2	zen's Fundamental Rights and State's Responsibilities (Directive Pri	nciples)					
bics: Introduction to Fundamental Rights - Right to Equality – Facets of Right to Equality - Right to Freedom - Constitutional Position of Some Democratic Rights - Right Against Exploitation - Right to Freedom of Religion - Right to Constitutional Remedies Directive Principles of the State Policy dule 3 gans Of the Government							
pics:							
Executive: The P of the President Legislature: Unio Lok Sabha & Raj Judiciary: The St Supreme Court -	President of India - Powers and Functions of President of India - Emergen on Council of Ministers - Prime Minister - The Rajya Sabha - The Lok S ya Sabha - Office of the Speaker – Important Parliamentary Committe cructure and Organization of the Judiciary & the High Court - The Supr - Judicial Activism in India - Basic Structure Doctrine & PIL	gency Powers abha - Relatio es eme Court - R	and n be ⁻ ole o	the P tweei f The	วsitio า the	on ?	
dule 4	leralism & Decentralization						
pics: What is Federali Financial Relatio The 5th & 6th Sc (Idea of Panchay	sm? - Centre-State Legislative Relations - Centre-State Administrative ns chedules - Municipality- (History of Indian Municipality, Organization & rat, Organization and Powers of Panchayats in India)	Relations - Ce & Functions) –	ntre Pan	-State chaya	• t 1		
geted Application & Tools that can be used:

plication areas to familiarize students with fundamentals of Indian Constitutional concepts.

bls: Online Tools – NPTEL and Swayam.

ject work/Assignment:

sessment Type

• Online end term exam will be conducted as notified by the Presidency University.

line Link*:

1) Prof. Amitabha Ray, SWAYAM Course: "Constitutional Government & Democracy in India" <u>https://onlinecourses.swayam2.ac.in/cec19_hs13/preview</u>

* Other source links are available in below Resources link.

t Book

- 1. Durga Das Basu --- Introduction to the Constitution of India, 23rd Edition (Gurgaon; LexisNexis, 2018).
- 2. MP Jain's Constitutional Law of India, Lexis Nexis
- 3. V.N Shukla's Indian Constitutional Law, M.P Singh 13th Edition
- 4. MV Pylee's Constitution of India
- 5. J.C.Johari -- The Constitution of India: A Politico-Legal Study (Greater Noida: Sterling Publishers Pvt. Ltd. 2013).
- 6. Himangshu Roy and M.P.Singh Indian Political System, 4th Edition (Bengaluru; Pearson Education, 2018)
- 7. Vidya Bhushan & Vishnoo Bhagwan--- Indian Administration (S. Chand, 2011)
- 8. S.R.Maheswari --- Indian Administration (Orient Blackswan, 2001)
- 9. Dr. A.Avasthi & A.P. Avasthi --- Indian Administration (L.N. Agarwal Educational Publishing, 2017).
- 10. B. L. Fadia --- Indian Government and Politics (Sahitya a. Bhawan, 13th Revised Edition, 2017).
- 11. P.M.Bakshi The Constitution of India (Prayagraj, UP; a. Universal Law Publishing, January, 2018)

erence Books

- 1. HM Seervai, Constitutional Law of India, 4th Ed. Vol I, II, & III
- 2. Uday Raj Rai, Constitutional Law-I
- 3. Democracy and Constitutionalism in India, Oxford University Press 2009

Resources:

- 1. <u>https://onlinecourses.nptel.ac.in/noc20_lw03/course?&force_user=true</u>
- 2. <u>https://onlinecourses.swayam2.ac.in/cec19_hs13/course?&force_user=true</u>
- 3. <u>https://nptel.ac.in/courses/129106003</u>
- 4. https://nptel.ac.in/courses/129106411
- 5. <u>https://nptel.ac.in/courses/129105608</u>
- 6. https://nptel.ac.in/courses/129106002

Topics relevant to Skill Development:

- 1. An attitude of inquiry.
- 2. Write reports

topics related to Constitutional Studies and its application :

topics in theory component are relevant to Indian Constitution.

Course Code: PPS1026	Course Title: Industry Readiness Program – II (Audited Course)	5	L- T - P- C	0	0	2	0		
	Type of Course: Practical Only Co	ourse							
Version No.	1.0								
Course Pre- requisites									
Anti-requisites	NIL								
Course Description	This course is designed to ena team building and use empathy in preparing themselves effect methodologies.	This course is designed to enable students learn styles of communication, team building and use empathy in leadership. The course will benefit learners in preparing themselves effectively through various activities and learning methodologies.							
Course Objective	The objective of the course is to "Industry Readiness for Young through PARTICIPATIVE LEARN	The objective of the course is to familiarize the learners with the concepts of "Industry Readiness for Young Professionals" and attain SKILL DEVELOPMENT through PARTICIPATIVE LEARNING techniques.							
Course Out Comes	On successful completion of this course the students shall be able to: CO 1 Apply different communication skills for success in workplace CO 2 Practice team building skills for career success CO3 Demonstrate ethical leadership skills in workplace								
Course Content									
Module 1	Effective Communication	Classr	oom activitie	S		10 H	ours		
Topics: Practice et Activity: Use so	ffective communication skills (Verba	al, Noi f-intro	n-verbal, Writ	ten ar os	nd Visua	al)			
Module 2	Team Building	Group	o Activity			10) Hours		
Topics: Skills of ar	n effective team player								
Activity: Student ;	group activity to build class network	king							
Module 3	Leadership	Case	study			10 H	ours		
Topics: Types of Activity: Individua	leadership, using empathy in leade	ership rporat	e leaders.						
-	. ,	-							

Faculty : L&D

Targeted Application & Tools that can be used:

10. TED Talks

11. You Tube Links

12. Activities

Assignment proposed for this course

Assignment 1: One minute reel

Assignment 2: Team building assignment

Continuous Individual Assessment

Module 1: L-S-R-W class assessment

Module 2: Team Presentation

Module 3: Individual Assessment

The topics related to skill development:

Students acquire knowledge on effective communication skills, team building skills and how to prepare themselves to be leaders in workplace using empathy and implement various skill sets during the course of their time in the university.

urse Code: ECE1511	urse Title: Design Workshop urse Type : ESC					T-P- C	1	0	2	2
rsion No.										
urse Pre- requisites	NIL									
ti-requisites	-	,								
urse Description	This cour Raspberry Througho programm explore h sensor da beginners applicatio	This course is designed to provide an in-depth understanding of Arduino, microcontrollers Raspberry pi and their application in various real time projects involving sensors. Throughout the course, students will learn the fundamentals of Arduino and Raspberry Pi programming and gain hands-on experience with a wide range of sensors. Students will explore how to connect and interface sensors with Arduino and Raspberry Pi boards, read sensor data, and use it to control various output devices This course is suitable for beginners who are interested in exploring the world of electronics and developing practical applications using Arduino, Raspberry Pi and sensors.								
urse Objective	The obj	ective of the CIPATIVE LE	co CAR	ourse is Employa NING techniques.	ability	Skills of s	stude	nt b	y u	sing
urse Outcomes	 mes On successful completion of the course the students shall be able to Explain the main features of the Arduino & the Raspberry Pi prototype board. Demonstrate the hardware interfacing of the peripherals to Arduino and Raspberry Pi system. Understand the types of sensors and its functions Demonstrate the functioning of live projects carried out using Arduino and Raspberry Pi system. 									
urse Content:					1					
dule 1	Basic cor Microcoi	ncepts of ntrollers		Hands-on	Interfac Analysi	cing Task and is	1	3	Sess	ions
pics: Introduction to features, Conce Introduction to Arduino Comm	Arduino, ept of digi Embedded unications,	ESP and Node tal and analog C and Arduino p Arduino IDE, V	MC port latfo	CU Pin configuration ts, Familiarizing with orm, Arduino Dataty ous Cloud Platforms.	n and are ith Ardu pes and	chitecture, D ino Interfaci variables, Ar	evice ing B duino	and oard, i/o F	platt , AP Funct	form I's , ions,
odule 2	nsory Devi	ces	nds	-on	erfacing T	Fask and Ana	alysis	ess	ions	
luino Sensors: H Connecting Swi roduction to 3D F Simulators: Wo	luino Sensors: Humidity Sensor, Temperature Sensor, Water Detector / Sensor, PIR Sensor, Ultrasonic Sensor, Connecting Switches and actuators, sensor interface with Arduino. oduction to 3D Printer: 3D Printer technology and its working Principles, Applications. Introduction to online Simulators: Working with AutoCAD/Fusion 360 Simulator.									
dule 3		roduction Micro python	to	nds-on	erfacing Analys	Task and sis	Sessio	ns		
pics: roduction to Mi development en	icroPython, vironment,	Comparison w Basics of Micro	ith Pytl	other programming hon syntax and struc	language ture.	es, Setting u	p the	Mic	roPy	thon
dule 4		orking w Raspberry-pi	rith	nds-on	erfacing Analys	Task and sis	ession	IS		
roduction to rasp and switch cont complicated ser	berry pi boarol. Master nsors and ac	ards, pin-diagrar ing Modules, Se ctuators. Various	n, d tup l Lit	ifferent types of rasp Raspberry - PuTTY praries and its function	pberry pi SSH,VN ons.	boards and i C Viewer to	its app interf	olicat ace v	ion, 1 vith 1	LED nore
p: Name of the E	xperiments	:								
16. Introd	uction Lab	1:								

Level 1: Overview on Arduino based Micro-controller, and sensors.

Level 2: Interfacing of Arduino and ESP boards with sensors and other components.

17. Lab 2: Smart Plant Monitoring

Level 1- Push button-controlled LED.

Level 2- Automatic Irrigation and monitoring System using Arduino

18. Lab 3: Robotics with Arduino.

Level 1- Servo Motor control using Arduino

Level 2: DC Motor Control Using Arduino for Robotics.

19. Lab 4: Environmental pollution using ESP.

Level 1 - IoT based air Pollution Monitoring System.

Level 2- IoT Based water pollution system

20. Introduction Lab for raspberry pi:

Level 1: Overview on Different Raspberry Pi Boards, and sensors.

Level 2: Configuring the Raspberry Pi and Interfacing with sensors and other components.

21. Lab 7: Raspberry Pi based Object Detection using TensorFlow and OpenCV.

22. Lab 8: Speech Recognition on Raspberry Pi for Voice Controlled Home Automation.

23. Lab 9: Design the website using HTML and CSS, and host the website on Raspberry Pi.

24. Introduction Lab for 3D printing:

Overview of 3D printing. Design of 3D structure using the CAD. Understand the steps of fabrication of simple rectangular box using 3D printer.

25. Lab 10: Design and print of Hollow Cylindrical structure using 3D CAD and 3D printer.

26. Lab 11 Demonstration of Jetson nano board and its capability. (OPTIONAL)

27. Lab 12: Revision

28. Lab 13: Revision

29. Lab 14: Mini Project

30. Lab 15: Mini Project Evaluation.

Topics: Types of Arduino boards, Thonny Python, Python IDLE, sensors, 3D Printer

rgeted Application & Tools that can be used:

plication Area:

ne Automation, Environmental Monitoring, Agriculture and Farming, Industrial Automation, Internet of Things (IoT), Robotics, Wearable Devices, Security Systems, Education and Learning. These are just a few examples of the many application areas where Arduino, Raspberry Pi and sensors can be applied. The flexibility and affordability of Arduino, and Raspberry Pi combined with the wide range of sensors available, allow for endless possibilities in creating innovative projects.

fessionally Used Software: Students can use open SOURCE Software's Arduino IDE and Tincker CAD, Thonny Python, Python IDLE etc.

ject work/Assignment:

1. Projects: At the end of the course students will be completing the project work on solving many real time issues.

2. Book/Article review: At the end of each module a book reference or an article topic will be given to an individual or a group of students. They need to refer the library resources and write a report on their understanding about the assigned article in appropriate format. <u>Presidency University Library Link</u>.

Presentation: There will be a presentation from interdisciplinary students group, where the students will be given a project on they have to demonstrate the working and discuss the applications for the same

xtbook(s):

3. Monk Simon "Programming Arduino: Getting Started with Sketches", Mc Graw Hill Publications Second Edition

4. Monk Simon "Raspberry Pi Cookbook: Software and Hardware Problems and Solutions", Publisher(s): O'Reilly Media, Inc. ISBN: 9781098130923 fourth Edition.

ferences

ference Book(s)

- 1. Neerparaj Rai "Arduino Projects for Engineers" BPB publishers, first edition, 2016.
- 2. Ryan Turner "Arduino Programming" Nelly B.L. International Consulting Ltd. first edition, 2019.

3. Charles Bell Micro Python for the Internet of Things: A Beginner's Guide to Programming with Python on Microcontrollers" by" Edition 1, 2017, ISBN 978-1-4842-3123-4

4. Stewart Watkiss "Learn Electronics with Raspberry Pi " Apress Berkeley, CA . second edition,2020. ISBN 978-1-4842-6348-8

5. Jo Prusa, "Basic of 3D printing", Prusa Research, 3rd edition.

6. <u>Volker Ziemann</u>, "A Hands-On Course in Sensors Using the Arduino and Raspberry Pi (Series in Sensors)", CRC Press, 1st Edition. 2018.

line Resources (e-books, notes, ppts, video lectures etc.):

- 6. Arduino trending Projects < <u>https://www. https://projecthub.arduino.cc/</u>>
- 7. Introduction to Arduino < <u>https://onlinecourses.swayam2.ac.in/aic20_sp04/preview></u>
- 8. Case studies on Wearable technology< <u>https://www.hticiitm.org/wearables></u>
- 9. Raspberry-pi Projects < <u>https://magpi.raspberrypi.com/articles/category/tutorials/</u>>
- 10. Introduction to internet of things< <u>https://nptel.ac.in/courses/106105166></u>

content:

- 8. Cattle Health Monitoring System Using Arduino and IOT (April 2021 | IJIRT | Volume 7 Issue 11 | ISSN: 2349-6002)
- 9. M H Hemanth Kumar, Ravi Pratap Singh, Nishu Sharma, Pragya Singh" IOT BASED SMART SECURITY SYSTEM USING ARDUINO" 2021 JETIR August 2021, Volume 8, Issue 8<u>.</u>
 - R. Maheswar, P. Jayarajan, S. Vimalraj, G. Sivagnanam, V. Sivasankaran and I. S. Amiri, "Energy Efficient Real Time Environmental Monitoring System Using Buffer Management Protocol," 2018, pp. 1-5, doi: 10.1109/ICCCNT.2018.8494144. https://ieeexplore.ieee.org/document/8494144.
 - Yaser S Shaheen, Hussam., "Arduino Mega Based Smart Traffic Control System," December 2021 Asian Journal of Advanced Research and Reports 15(12): 43-52, 2021(15(12): 43-52, 2021):15(12): 43-52, 2021.
- 12. Basil, Eliza Sawant, S.D. "IoT based traffic light control system using Raspberry Pi " DOI 10.1109/ICECDS.2017.8389604
- 13. Supriya S, 2Dr. Aravinda " Green leaf disease detection and identification using Raspberry Pi https://www.irjet.net/archives/V9/i8/IRJET-V9I847.
- 14. Dr. E.N. Ganesh., "Health Monitoring System using Raspberry Pi and IOT" DOI : http://dx.doi.org/10.13005/ojcst12.01.03

pics relevant to development of "SKILL": System design for achieving Sustainable Development Goals.

Course Code: MAT2303	Course T Calculus	itle: Linear Algebra & Vecto	r	L-T- P- C	3	1	0	4		
	Type of	Course:BSC								
Version No.		1.0								
Course Pre- requisites		Basic Concepts of Limits, Dif	fer	entiation, Integ	ration, I	Matrice	s (PU L	evel)		
Anti-requisites		NIL								
Course Description		This course explores the fur their operations within t differentiation and integra problems related to linea interpretations in higher dir physics, engineering, and o algebra, matrix operations gradients, divergence, cur fundamental theorems of v Theorem, and the Divergence	is course explores the fundamental concepts of vectors, matrices, and eir operations within the context of calculus, including vector ferentiation and integration, while applying these tools to solve oblems related to linear systems, transformations, and geometric erpretations in higher dimensions, often with applications in fields like sysics, engineering, and computer graphics; key topics include vector gebra, matrix operations, determinants, eigenvalues, eigenvectors, adients, divergence, curl, line integrals, surface integrals, and the ndamental theorems of vector calculus like Green's Theorem, Stokes' peorem, and the Divergence Theorem.							
Course Objective		The course is intended to procedures in Matrices, Lin useful to all engineering dis the ability to understand space, apply matrix operati utilize concepts like gradie phenomena, all while devel tools in various scientific an and computer graphics.	The course is intended to develop computational proficiency involving procedures in Matrices, Linear Algebra and Vector Calculus which are useful to all engineering disciplines. This course is to equip students with he ability to understand and manipulate vectors in multidimensional space, apply matrix operations to solve systems of linear equations, and utilize concepts like gradients, divergence, and curl to analyze physical phenomena, all while developing a strong foundation for applying these cools in various scientific and engineering fields like physics, mechanics,							
Course Out Comes		 and computer graphics. On successful completion of the course the students shall be able to: CO1 - Use matrix methods and certain techniques to solve the system of linear equations and to find eigen values, eigen vectors of a matrix to chect whether it is diagonalizable. CO2 - Understand the abstract notions of vector space and dimensionalit of it. CO3 - find the matrix representation of a linear transformation given base of the relevant vector spaces. CO4 - Learn different notions of vector and scalar fields with the properties. Understanding the major theorems (Green's, Stokes', Gauss) 								
Course Content:										
Module 1	Systems	of Linear Equations				7.	Cla	asses)		
Systems of Linear operations, invertibl Applications of Syste	Equation le matrice ems of Lin	s, Matrices and Elemental es, Determinants and their ear Equations.	ry oro	Row Operation perties, Crame	ns, Echo r's Rule,	elon fo , LU-de	orms, I compo	Matrix sition,		
Module 2	Vector S	расе	A	ssignment			(9Cla	asses)		
Linear Combinations Vector Spaces, Defin Basis, Orthogonal ba	and Linea iition of a ises and o	ar Independence, Vectors in r Vector Space, Subspaces, Ba rthogonal projections.	R∩, sis	, Linear Combin and Dimension	ations, L , Coordi	inear Ir. nates ai	ndepen nd Cha	dence nge of		

Module 3	Linear Transformations	(15 lectures)

Linear Transformations, Algebra of transformations, The Null Space and Range, Isomorphisms, Matrix Representation of Linear Transformations, Similarity Eigenvalues and Eigenvectors, Eigen values and Eigen vectors, Diagonalization.

Inner Product Spaces, The Dot Product on R[®] and Inner Product Spaces, Orthonormal Bases, Orthogonal Complements, Application: Least Squares Approximation, Diagonalization of Symmetric Matrices, Application: Quadratic Forms.

Singular Value Decomposition: Singular values, computing singular value decomposition, and Introduction to principal component analysis.

Module 4 Vector Calculus	Assignment	(15 lectures)
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Vector & Scalar Functions and Fields, Derivatives, Curve, Arc length, Curvature & Torsion, Gradient of Scalar Field, Directional Derivative, Divergence of a Vector Field, Curl of a Vector Field, Physical interpretation, solenoidal and irrotational vector fields. Problems.

Line Integrals, Path Independence of Line Integrals, Green`s Theorem in the plane, Surface Integrals, Divergence Theorem of Gauss, Stokes`s Theorem.

Targeted Application & Tools that can be used:

- Solve systems of linear equations using various methods including Gaussian and Gauss Jordan elimination and inverse matrices.
- Perform matrix algebra, invertibility, and the transpose and understand vector algebra in Rⁿ.
- Determine relationship between coefficient matrix invertibility and solutions to a system of linear equations and the inverse matrices.
- Find eigenvalues and eigenvectors and use them in applications.
- Find the dimension of spaces such as those associated with matrices and linear transformations.
- Understand real vector spaces and subspaces and apply their properties.
- Compute inner products in a real vector space and compute angle and orthogonality in inner product spaces.
- Create orthogonal and orthonormal bases: Gram-Schmidt process and use bases and orthonormal bases to solve application problems.
- Prove basic results in linear algebra using appropriate proof-writing techniques such as linear independence of vectors; properties of subspaces; linearity, injectivity and subjectivity of functions; and properties of eigenvectors and eigenvalues.

Assignment:

Preparation of power-point slides, which include videos, animations, pictures, graphics for better erstanding the applications of Linear Algebra and Vector Calculus to engineering applications – The faculty allocate chapters/ parts of chapters to groups of students so that the entire syllabus of Linear Algebra and tor Calculus is covered.

Text Book

- 2. Gilbert Strang, Linear Algebra and its applications, Wellesley-Cambridge Press, U.S.; 6th edition.
- B. S. Grewal (2017), Higher Engineering Mathematics by, 44th Edition, Khanna Publishers.

References:

2. Introduction to Linear Algebra with Application, Jim Defranza, Daniel Gagliardi, Tata McGraw-Hill

- 3. Elementary Linear Algebra, Applications version, Anton and Rorres, Wiley India Edition.
- 4. Advanced Engineering Mathematics, Erwin Kreysig, Wiley Publication.
- 5. Elementary Linear Algebra, Ron Larson, Cengage Learning.
- 6. Linear Algebra and its Applications, David C. Lay, Pearson Education.

E-resources/ Web links:

2. <u>https://presiuniv.knimbus.com/user#/viewDetail?searchResultType=ECATALOGUE_BASED&uni</u> <u>que_id=EBSCO95_30102024_9607</u>

3. <u>https://presiuniv.knimbus.com/user#/viewDetail?searchResultType=ECATALOGUE_BASED&uni</u> <u>que_id=EBSCO95_30102024_143156</u>

4. <u>https://presiuniv.knimbus.com/user#/viewDetail?searchResultType=ECATALOGUE_BASED&uni</u> que_id=CUSTOM_PACKAGE_EBSCO_29052023_270975

5. <u>https://presiuniv.knimbus.com/user#/viewDetail?searchResultType=ECATALOGUE_BASED&uni</u> que_id=EBSCO95_30102024_94555

6. <u>https://presiuniv.knimbus.com/user#/viewDetail?searchResultType=ECATALOGUE_BASED&uni</u> <u>que_id=EBSCO95_30102024_243864</u>

7. <u>https://presiuniv.knimbus.com/user#/viewDetail?searchResultType=ECATALOGUE_BASED&uni</u> <u>que_id=EBSCO95_30102024_224531</u>

- 8. NPTEL Video Lectures Matrices and Linear Algebra:
- 9. https://nptel.ac.in/courses/111106051/
- 10. NPTEL Video Lectures Differential Equations:
- 11. https://nptel.ac.in/courses/111106100/
- 12. NPTEL Vector Calculus:
- 13. https://nptel.ac.in/courses/111/105/111105122/

14. https://www.math.hkust.edu.hk/~maqian/ma006_0607F.html

15. <u>https://www.scu.edu.au/study-at-scu/units/math1005/2022/</u>

Topics relevant to SKILL DEVELOPMENT: The course focuses on the concepts of Vector calculus and Linear Algebra with reference to specific engineering problems. The course is of both conceptual and analytical type in nature through Problem Solving. This is attained through the assessment component mentioned in the course handout.

Course Code: CSE2251	Course Title: Data Computer Networks	Com	munications and		L-T-P-C	3	0	0	3	
¥7 NI	Type of Course: Th	eory	/ PCC							
Version No.	1.0									
Course Pre-										
A pti-roquisitos	NII									
Anti-requisites										
Course	The objective of the	is co	ourse is to provid	le know	ledge in data	. com	muni	cation	s and	
Description	computer networks, 1	ts org	ganization and its i	mpleme	f f f f f f f f f f	in pra	.ct1ca	l expe	rience	
	In the installation, mo	onito	ring, and troublesi	100ting (of LAN system	1S.	a not	worke	ucina	
	Cisco packet tracer	atory NS2	All the lab exercis	piement es will f	ocus on the fu	ndam	s net ental	works	eating	
	multiple networks, to	no2.	gies and analyzing	the net	work traffics.	Iduili	ontai	5 01 01	cuting	
		r	8							
Course	The objective of the	e cou	rse is to familiar	ize the	learners with	the c	once	pts of	Data	
Objective	Communications and	l Cor	nputer Networks a	nd attair	n Employabilit	y thro	ough	-		
	Problem Solving Me	thode	ologies.							
Course	On successful comple	etion	of the course, the	students	s shall be able	to:				
Outcomes	1] Ilustrate the Basic	Con	cepts Of Data Con	nmunica	tion and Comp	outer				
	Networks.	. 1		· 1 T						
	2] Analyze the functi	lonar	of ID Addressing a	ink Laye	er. ing Machaniar	nain				
	5] Apply the Knowle Computer Networks	uge	of IP Addressing a	ιπα κουι		115 111				
	41 Demonstrate the w	vorki	ng principles of th	e Transr	ort layer and					
	Application Layer.	. 01111			,					
Course										
Content:										
	Introduction and									
Module 1	Physical Layer-		Assignment		Problem Solv	ving		7 Ses	sions	
	CO1		· · ·							
Introduction to Co	mputer Networks and	Data	communications,	Networ	k Components	_				
Topologies, Transi	mission Media – Reference	ence	Models -OSI Mod	lel – TC.	P/IP Suite.	ion				
Multipleving and	Spread Spectrum	mais	– Digital allu Alla	log Sign		SIOI	-			
winnpiexing and s	spieau specirum.									
M 11 0	Reference Models an	nd	A : (D 11 0 1	•		– 0	•	
Module 2	Data Link Layer – C	O2	Assignment		Problem Solv	ing		7 Ses	sions	
Data Link Layer -	Error Detection and C	orrec	ction – Parity, LRO	C, CRC,	Hamming Coo	le,				
Flow Control and	Error Control, Stop an	d Wa	ait, ARQ, Sliding '	Window	, Multiple Acc	ess				
Protocols, CSMA/	CD,CSMA/CA, IEEE	802.	3, IEEE 802.11 Et	thernet.				-		
Module 3	Network Layer –CO3	3	Assignment		Problem Solv	ving		1 Sess	0 sions	
Network Layer Ser	rvices - Network Laye	er Se	rvices, Switching	Techniq	ues, IP Addres	sing				
methods- IPv4 IPV	/6 – Subnetting. Routi	ng, -	Distance Vector I	Routing -	– RIP-BGP-Li	nk				
State Routing –OS	PF-Multi cast Routing	g-MC	DSPF- DVMRP – J	Broad Ca	ast Routing. E	VPN-				
VALAN, VPLS, E	Trongnort and			Duchlen		<u> </u>				
iviouule 4	Application Laver A	ssiar	ment	Problem Solving	1		10	Saccia	nc	
	-CO3	oorgi	unicht	Souving			10	962210	113	

Transport Layers - Connection management – Flow control – Retransmission, UDP, TCP, congestion control, – Congestion avoidance (DECbit, RED)

The Application Layer: Domain Name System (DNS), Domain Name Space, SSH, FTP, Electronic Mail (SMTP, POP3, IMAP, MIME) – HTTP – – SNMP, Web Services, Virtual Networking.

Targeted Application & Tools that can be used: Cisco Packet Tracer, Wireshark, and NS2.

Case Study/Assignment: Choose and analyze a network from any organization/Assignment proposed for this course in CO1-CO4

Problem Solving: Choose and appropriate devices and implement various network concepts.

Programming: Simulation of any network using NS2.

Text Book(s):

1. 1. Behrouz A. Forouzan, "Data Communications and Networking 5E", 5 th Edition,

Tata McGraw-Hill, 2017.

2. Andrew S Tanenbaum, Nick Feamster & amp; David J Wetherall, "Computer Networks" Sixth Edition, Pearson Publication, 2022

Reference(s):

1.References

1. "Computer Networking: A Top-Down Approach", Eighth Edition, James F. Kurose, Keith W. Ross, Pearson publication, 2021.

2. William Stallings, Data and Computer Communication, 8th Edition, Pearson Education, 2007.

3. Larry L. Peterson and Bruce S. Davie: Computer Networks – A Systems Approach, 4th Edition, Elsevier, 2007.

E- Resources:

1. https://archive.nptel.ac.in/courses/106/105/106105183/

2. <u>http://www.nptelvideos.com/course.php?id=393</u>

3.https://www.youtube.com/watch?v=3DZLItfbqtQ

4.<u>https://www.youtube.com/watch?v=_fIdQ4yfsfM</u>

5. https://www.digimat.in/keyword/106.html

6. https://puniversity.informaticsglobal.com/login

	itgaipur, Rajankun	ite, Yelananka, Bengaluru	- 360064						
Course Code:	Course Title: Data Com	munications and							
CSE2252	Computer Networks		L-T-P-C	0	0	2	1		
	Type of Course: Lab / P	CC							
Version No.	1.0								
Course Pre-									
requisites									
Anti-requisites	NIL								
Course	This lab-based course provides hands-on experience in the principles and practices of data								
Description	ommunications and computer networking. It is designed to complement theoretical								
Description	concepts covered in the	oncents covered in the associated lecture course. Through a series of structured							
	experiments and practical	al exercises, students wi	ll gain profic	iencv	in	config	uring.		
	analyzing, and troublesho	oting computer networks.	8 F	j					
	Key topics include networ	rk topology design, IP add	lressing and su	bnetti	ing, l	Etherne	et and		
	LAN technologies, routin	ng and switching, TCP/II	P protocol sui	te, an	d ba	sic ne	twork		
	security measures. Stude	ents will work with indu	stry-standard	tools	and	equip	ment,		
	including routers, switche	s, protocol analyzers, and	network simul	ation	softv	ware su	ich as		
	Cisco Packet Tracer or W	ireshark.							
Course	The objective of this lab c	ourse is to provide student	s with practica	l, han	ds-oi	n expei	rience		
Objective	in the configuration, operation	ation, and troubleshooting	of data comm	unica	tion	system	is and		
	computer networks. Throu	ugh guided experiments ar	nd real-world s	cenar	ios, s	student	s will		
	reinforce theoretical know	wledge, develop essential	technical skil	ls, ar	nd ga	in a d	eeper		
	understanding of netwo	orking concepts, protoco	ols, and device	ces u	ised	in m	odern		
~	communication systems.								
Course	On successful completion	of the course, the student	s shall be able	to:	•. 1		1 1		
Outcomes	1. Design and config	gure basic network topolog	gies using rout	ers, s	witch	nes, an	d end		
	devices to meet sp	ecified requirements.							
	2 Analyza and travi	hlashaat natwork aannaat	tivity and north	ormo	noo		using		
	2. Analyze and from	abarly and naturally simula	tivity and peri	oma	lice	issues	using		
	tools such as wire	snark and network simula	lors.						
	3 Demonstrate unde	erstanding of key networ	king protocols	(e o	тс	P/IP	ARP		
	ICMP DHCP) thr	ough practical implements	ation and obser	vatio	., 10 n	л, п ,	, iici ,		
	icivit, Driet) uit	ough practical implementa		vano	11.				
	4. Apply IP addressin	ng and subnetting techniqu	ues to efficientl	y allo	ocate	and m	anage		
	network resources	in various networking sce	enarios.				U		
Course									
Content:									
	Physical Layer,					2	1		
Module 1,2,3,4	Network Layer,	Lab Assignment	Problem Solv	ving		Sess	ions		
	Transport Laye					0035	510115		
List of Laboratory	Tasks:								
Lab sheet -1, M-1	, 3 [2 Hours]								
Experiment No 1:			_						
Level 1: Study of	basic network commands an	nd network configuration	commands.						
Lab sheet -2, M-1	[2 Hours]								
Experiment NO 1:	nd avalana Naturada daviaa	a madala and ashlas. Inte	a du ati an ta Ci						
nacket tracer	ind explore metwork device	s, models and cables. Intro		500					
Fyneriment No. 2									
$\frac{1}{1} \frac{1}{2} \frac{1}$	arious network topologies	using a cisco nacket tracer							
10001 2 - 010000	arrous network topologies (using a cisco packet il deel	•						
Lab sheet -3. M-2	.3 [2 Hours]								

Experiment No. 1: Level 2 - Basic Configuration of switch/router using Cisco packet tracer. Experiment No. 2: Level 2 -Configure the privilege level password and user authentication in the switch/router. Lab sheet – 4, M-3 [2 Hours] Experiment No. 1: Level 2 - Configure the DHCP server and wireless router and check the connectivity Lab sheet – 5, M-3 [2 Hours] Experiment No. 1: Level 2 - Configure the static routing in the Cisco packet tracer. Experiment No. 2: Level 2 - Configure the dynamic routing protocol in the Cisco packet tracer. Lab sheet -6, M-4 [2 Hours] Experiment No. 1: Configuration of DNS Server with Recursive & amp; Integrative approach in Cisco packet tracer. Lab sheet -7, M-4 [2 Hours] Experiment No. 1: Configure the telnet protocol in the router using the Cisco packet tracer. Lab sheet -8, M-4[2 Hours] Experiment No. 1: Level1- Introduction to NS2 and basic TCL program. Lab sheet -9, M-4 [2 Hours] Experiment No. 1: Level 1: Simulate three node Point to point network using UDP in NS2. Experiment No. 2: Simulate transmission of Ping message using NS2. Lab sheet - 10, M-4[2 Hours] Experiment No. 1: Simulate Ethernet LAN using N-node in NS2. **Experiment No. 2:** Simulate Ethernet LAN using N-node using multiple traffic in NS2 Lab sheet -11, M-3,4 [2 Hours] Experiment No. 1: Level 1- Introduction to Wire Shark. **Experiment No. 2:** Level 2- Demonstration of packet analysis using wire shark. Lab sheet -12, M-1,2,3 [2 Hours] Experiment No. 1: Level 2- Demonstration of switch and router configuration using real devices Targeted Application & Tools that can be used: Cisco Packet Tracer, Wireshark, and NS2. Case Study/Assignment: Choose and analyze a network from any organization/Assignment proposed for this course in CO1-CO4 Problem Solving: Choose and appropriate devices and implement various network concepts. Programming: Simulation of any network using NS2. **Text Book(s):** 1. Behrouz A. Forouzan, "Data Communications and Networking 5E", 5 th Edition, Tata McGraw-Hill, 2017. 2. Andrew S Tanenbaum, Nick Feamster & amp; David J Wetherall, "Computer Networks" Sixth Edition, Pearson Publication, 2022

Reference(s):

- 1. "Computer Networking: A Top-Down Approach", Eighth Edition, James F. Kurose, Keith W. Ross, Pearson publication, 2021.
- 2. William Stallings, Data and Computer Communication, 8th Edition, Pearson Education, 2007.
- 3. Larry L. Peterson and Bruce S. Davie: Computer Networks A Systems Approach, 4th Edition, Elsevier, 2007.

E- Resources:

- 1. https://archive.nptel.ac.in/courses/106/105/106105183/
- 2. <u>http://www.nptelvideos.com/course.php?id=393</u>
- 3.https://www.youtube.com/watch?v=3DZLItfbqtQ
- 4.https://www.youtube.com/watch?v=_fIdQ4yfsfM
- 5. https://www.digimat.in/keyword/106.html
- 6. https://puniversity.informaticsglobal.com/login

						1				
Course Code:	urse Title: Data Structures		P.C	2	0					
CSE1508	e of Course: Theory			5	0					
Version No.										
Course Pre-										
requisites										
Anti-requisites	uisites									
urse Description	This course introduces the fundamental concepts of data structures and to emphasize the importance of choosing an appropriate data structure and technique for program development .This course has theory and lab component which emphasizes on understanding the implementation and applications of data structures using Java programming language .With a good knowledge in the fundamental concepts of data structures and practical experience in implementing them, the student can be an effective designer, developer for new software applications.									
ourse Objective	The objective of the co	ourse is <mark>SKILL</mark>	L DEVELOPMENT	of stud	lent by	y us	sing			
	EXPERIENTIAL LEARNI	NG techniques	students shall be abl	o to.						
	CO1 :Describe the conce	ept of basic data	a structure, stacks, o	ueues, a	nd arr	avs a	and			
	their operations. [Unders	stand]		[acues, c		ajs c				
ourse Out Comes	CO2: Utilize linked lists for real-time scenarios. [Apply]									
	CO3: Apply an appropriate non-linear data structure for a given scenario. [Apply]									
	CO4: Demonstrate different searching and sorting techniques. [Apply]									
urse Content:										
	Froduction to Data Structure and Linear ignment gram activity Data Structure - Stacks and Oueues 9 Hou									
Module 1	Data Structure – Stacks and Queues	lignment ig	gram activity			9 Ho	urs			
Module 1 Introduction -	Data Structure - Stacks and Queues - Introduction to Data Struct	ures, Types and	concept of Arrays.			9 Ho	urs			
Module 1 Introduction – Stack -Concep	Structure and Linear Data Structure - Stacks and Queues - - Introduction to Data Struct - - ots and representation, S	ures, Types and tack operations	concept of Arrays.	tion usi	ing arr	ay a	and			
Module 1 Introduction – Stack -Concep Applications of 3	Structure and Linear Data Structure - Stacks and Queues Output Output Introduction to Data Struct Output Output ots and representation, Stack.	ures, Types and tack operations	concept of Arrays.	tion usi	ing arr	чно сауа	and			
Module 1 Introduction – Stack -Concep Applications of 3 Queues -Repres	Data Structure - Data Structure - Stacks and Queues - - Introduction to Data Struct - - pts and representation, S Stack. - - - - sentation of queue, Queue - - -	ures, Types and tack operations Operations, Qu	concept of Arrays. , stack implementa	tion usi using a	ing arr	ay a	and of			
Module 1 Introduction – Stack -Concep Applications of 3 Queues -Repres Queue and Appl	Data Structure – <u>Stacks and Queues</u> Introduction to Data Struct ots and representation, S Stack. sentation of queue, Queue ications of Queue.	ures, Types and tack operations Operations, Qu	concept of Arrays. , stack implementa	tion usi using a	ing arr	cay a	and of			
Module 1 Introduction – Stack -Concep Applications of 3 Queues -Repres Queue and Appl Module 2	Structure-DataStructureStacks and QueuesIntroduction to Data Structots and representation, SStack.sentation of queue, Queueications of Queue.nearDataStructure -Linked List	ures, Types and tack operations Operations, Qu	concept of Arrays . , stack implementa eue implementation Program activity	tion usi using a	ing arr rray, T	2 Ho	urs and s of urs			
Module 1 Introduction – Stack -Concep Applications of 3 Queues -Repres Queue and Appl Module 2 Topics: Linked	Data Structure - Stacks and Queues - Introduction to Data Structor - ots and representation, S - Stack. - sentation of queue, Queue - ications of Queue. - hear Data Structure - Linked List - Singly Linked Linked	ures, Types and tack operations Operations, Qu ignment	concept of Arrays . , stack implementa eue implementation Program activity on linear list using	tion usi using a singly	ing arr rray, T	ray a sy a	urs and s of urs age			
Module 1 Introduction – Stack -Concep Applications of 3 Queues -Repres Queue and Appl Module 2 Topics: Linked structures, Circu	Data Structure - Stacks and Queues - Introduction to Data Struct - ots and representation, S Stack. - sentation of queue, Queue - ications of Queue. - hear Data Structure - Linked List - - lar List, Applications of Linked List -	ures, Types and tack operations Operations, Qu ignment ist, Operation of inked list.	concept of Arrays . , stack implementa eue implementation Program activity on linear list using	tion usi using a singly	ing arr rray, T 12 inked	^c ay a Sypes 2 Ho stora	urs and s of urs age			
Module 1 Introduction – Stack -Concep Applications of 2 Queues -Repres Queue and Appl Module 2 Topics: Linked structures, Circu Recursion - Rec	Data Structure - Stacks and Queues - Introduction to Data Structor - ots and representation, S - Stack. - sentation of queue, Queue - ications of Queue. - hear Data Structure - Linked List - Singly Linked List lar List, Applications of Lic - - cursive Definition and Processing - -	ignment ig ures, Types and tack operations Operations, Qu ignment ist, Operation of inked list.	concept of Arrays . , stack implementation eue implementation Program activity on linear list using	tion usi using a singly	ing arr rray, T	^c ay a ypes 2 Ho stora	urs and s of urs age			
Module 1 Introduction – Stack -Concep Applications of 2 Queues -Repres Queue and Appl Module 2 Topics: Linked structures, Circu Recursion - Rec Module 3	Data Structure - Stacks and Queues - Introduction to Data Structor - ots and representation, S - Stack. - sentation of queue, Queue - ications of Queue. - near Data Structure - Linked List - Singly Linked List lar List, Applications of Lic - - n-linear Data Structures - n-linear Data -	ignment ig ures, Types and tack operations Operations, Qu ignment ist, Operation of inked list. cesses.	concept of Arrays . , stack implementation eue implementation Program activity on linear list using Program activity	tion usi using a singly	ing arr rray, T 12 inked	2 Ho 2 Ho 2 Ho	urs and s of urs age urs			
Module 1 Introduction – Stack -Concep Applications of 3 Queues -Repres Queue and Appl Module 2 Topics: Linked structures, Circu Recursion - Rec Module 3 pics: Trees - Intr	Structure - Stacks and Queues - Introduction to Data Structor - ots and representation, Sistack. - Stacks. - sentation of queue, Queue - ications of Queue. - hear Data Structure - - Linked List - I List - Singly Linked List - lar List, Applications of List - n-linear Data Structures - Trees - roduction to Trees, Binary -	ignment ig ures, Types and tack operations Operations, Qu ignment ist, Operation of inked list. cesses. ignment tree :Terminolo	concept of Arrays . , stack implementation eue implementation Program activity on linear list using Program activity ogy and Properties,	tion usi using a singly 1	ing arr rray, T 12 inked 12 Doubly	2 Ho 2 Ho 2 Ho 2 Ho Linl	urs and s of urs age urs ked			
Module 1 Introduction – Stack -Concep Applications of 3 Queues -Repres Queue and Appl Module 2 Topics: Linked structures, Circu Recursion - Rec Module 3 pics: Trees - Intr List, Binary tree	Data Structure - Stacks and Queues - Introduction to Data Structor - ots and representation, S - Stack. - sentation of queue, Queue - ications of Queue. - hear Data Structure - Linked List - - I List - Singly Linked List - - lar List, Applications of Lic - - oursive Definition and Procession - - n-linear Data - structures - Trees - - roduction to Trees, Binary - - e traversals - - -	ignment ig ures, Types and tack operations Operations, Qu ignment ist, Operation of inked list. cesses. ignment tree :Terminolo versal, In-Order	concept of Arrays . , stack implementation eue implementation Program activity on linear list using Program activity ogy and Properties, T r traversal, Post - O	tion using a using a singly I Use of I	ing arr rray, T 12 inked 12 Doubly versalE	² Ho ² Ho ² Ho ² Linl ³ Jinar	urs and s of urs age urs ked y ,			

dule 4	n-linear Data Structures - Graphs and Hashing	ignment	gram activity	lours				
Topics: Graphs: Basic Concept of Graph Theory and its Properties, Representation of Graphs . ADT, Elementary graph operations, Minimum Cost spanning trees, Shortest path and Transitive closure. Hashing : Introduction, Static Hashing, Dynamic Hashing								
Module 5	Searching & Sorting	Assignment	Program activity	6 Hours				
Topic: Sorting &	Searching - Sequer	ntial and Binary Searc	ch, Sorting – Selection	n and Insertion sort,				
Quick sort, Merge	Sort, Bubble sort.							
of Laboratory Tasks:								
sheet -1 Level 1: Prompt the Level 2: Programmir	user, read input and ng Exercises on funda	print messages.Progra Imental Data structure	ms using class, method - Arrays based on Scen	s and objects ario.				
sheet -2 Level 1: Programmi Level 2: Programmi	ing Exercises on St ing Exercises on St	ack and its operations tack and its operation	s s with condition					
• sheet -3 Level 1: Programm Level 2: -	ing on Stack applic	cation infix to postfix	Conversion					
o sheet -4								
vel 1: Programming o	on Stack application	n – Evaluation of post	tfix					
Level 1: Programm	ning Exercises on (Queues and its operation	ions with conditions					
sheet -6 Level 1: Program	ming Exercises on I	Linked list and its ope	erations.	ocitions				
sheet -7	ling Exercises on L	inked list and its oper	rations with various p	OSITIONS				
Level 1: Programm Level 2: Programm	ming Exercises on (ning Exercises on C	Circular Linked list ar Circular Linked list an	nd its operations. d its operations with	various positions				
 sheet -8 Level 1: Programmed Programmed	ming Exercises on t ming the tower of H	factorial of a number Ianoi using recursion						
Level 1: -								
Level 2: Program	ming the tower of l	Hanoi using recursion						
Level 1: Program	uming Exercise on I	Doubly linked list and	its operations					
sheet -11 Level 1: Program	n to Construct Bina	ry Search Tree and G	raph					

Level 2: Program to traverse the Binary Search Tree in three ways)in-order, pre-order and post-order(and implement BFS and DFS

sheet -12

Level 1: Program to Implement the Linear Search & Binary Search

Level 2: Program to Estimate the Time complexity of Linear Search

sheet -13

Level 1: Program to Implement and Estimate the Time complexity of Selection Sort

Level 2: Program to Implement and Estimate the Time complexity of Insertion Sort

sheet -14 (Beyond syllabus activity)

el 1: Program to Construct AVL Tree

rel 2:

sheet -15 (Beyond syllabus activity)

el 1: Program to Construct RED BLACK Tree

geted Application & Tools that can be used

e of PowerPoint software for lecture slides and use of Modern IDE like VS Code and Eclipse for lab programs to execute.

Project work/Assignment:

ignment: Students should complete the lab programs by end of each practical session and module wise assignments before the deadline.

Text Book

T1 Ellis Horowitz and Sartaj Sahni, Fundamentals of Data Structures in C, 2nd Edition, Universities Press, reprint 2018.

Pless, lepinit 2018.

T2 Seymour Lipschutz, Data Structures Schaum's Outlines, Revised 1st Ed, McGraw Hill, 2014.

erences

R1 Data structures and program design in C by Robert Kruse, Tondo C L, Bruce Leung, Pearson education publishers, 2017.

R2 Programming and Data Structure by Jackulin C Salini etal., Ane books publishers, 2019.

Web resources:

- 1. For theory :<u>https://onlinecourses.nptel.ac.in/noc20_cs85/preview</u>
- 2. https://puniversity.informaticsglobal.com/login

Topics relevant to development of "Skill Development":

ked list and stacks

pics relevant to development of "Environment and sustainability: Queues

Catalogue	Muthuraj
prepared by	
Recommended	09 th BOS held on 04/05/19
by the Board of	
Studies on	
Date of	Academic Council Meeting No. 11, Dated 11/06/19
Approval by the	
Academic	
Council	

Course Code:	urse Title: Data Structures	Lab		P.C	0	0	1	
CSE1509	e of Course:Lab				0	0	t	
Version No.								
Course Pre-								
requisites								
Anti-requisites								
urse Description	This course introduces the fundamental concepts of data structures and to emphasize the importance of choosing an appropriate data structure and technique for program development .This course has theory and lab component which emphasizes on understanding the implementation and applications of data structures using Java programming language .With a good knowledge in the fundamental concepts of data structures and practical experience in implementing them, the student can be an effective designer, developer for new software applications.							
ourse Objective	The objective of the c	ourse is <mark>SKIL</mark>	L DEV	ELOPMENT	of stuc	lent by	y us	ing
	EXPERIENTIAL LEARNI	NG techniques						
ourse Out Comes	On successful completion of CO1 :Describe the conce their operations. [Unders CO2: Utilize linked lists CO3: Apply an appropri- CO4: Demonstrate diffe	On successful completion of the course the students shall be able to: CO1 :Describe the concept of basic data structure, stacks, queues, and arrays and their operations. [Understand] CO2: Utilize linked lists for real-time scenarios. [Apply] CO3: Apply an appropriate non-linear data structure for a given scenario. [Apply] CO4: Demonstrate different searching and sorting techniques. [Apply]						
urse Content:								
Module 1	roduction to Data Structure and Linear Data Structure – Stacks and Queues	ignment	gram act	ivity		9	9 Ho	urs
Introduction –	Introduction to Data Struct	tures, Types and	d concep	ot of Arrays.				
Stack -Concep	pts and representation, S	tack operation	s, stack	implementat	tion usi	ng arr	ay a	and
Applications of	Stack.							
Queues -Repres	sentation of queue, Queue	Operations, Q	ueue imj	plementation	using a	rray, T	ypes	s of
Queue and Appl	ications of Queue.							
Module 2	near Data Structure - Linked List	ignment	Pro	ogram activity		1	2 Ho	urs
Topics: Linked	l List - Singly Linked L	ist, Operation	on linea	ar list using	singly l	inked	stora	age
structures, Circu	lar List, Applications of L	inked list.						
Recursion - Rec	cursive Definition and Proc	cesses.						
Module 3	n-linear Data Structures - Trees	ignment	Pro	ogram activity		1	2 Ho	urs
pics: Trees - Intr	roduction to Trees, Binary	tree :Termino	logy and	l Properties, U	Jse of D	Doubly	Linł	ked
List, Binary tree	e traversals :Pre-Order tra	versal, In-Orde	er traver	sal, Post - O	rder trav	versalE	linar	у,
L								

.Red Black Tree, Ex	pression Tree , He	aps -Serach Tree, AVL	. Trees	
dule 4	n-linear Dat Structures - Graphs an Hashing	a ignment d	gram activity	lours
Topics: Graphs: Ba Elementary graph o Hashing: Introduct	asic Concept of Gr operations, Minimution, Static Hashing	aph Theory and its Pro im Cost spanning tree g, Dynamic Hashing	operties, Representations, Shortest path and T	on of Graphs . ADT, ransitive closure.
Module 5	Searching & Sorting	Assignment	Program activity	6 Hours
Topic:Sorting &Quick sort, Merge	Searching - Seque Sort, Bubble sort.	ntial and Binary Sear	ch, Sorting – Selection	n and Insertion sort,
<pre>: of Laboratory Tasks: > sheet -1 Level 1: Prompt the Level 2: Programming > sheet -2 Level 1: Programming > sheet -3 Level 1: Programming > sheet -3 Level 2: - > sheet -4 vel 1: Programming > sheet -5 Level 1: Programming > sheet -5 Level 1: Programming > sheet -6 Level 1: Programming > sheet -7 Level 2: Programming > sheet -7 Level 1: Programming > sheet -7 Level 1: Programming > sheet -7 Level 1: Programming > sheet -8</pre>	user, read input and ng Exercises on fund ing Exercises on S ning Exercises on S ning on Stack appli on Stack application ning Exercises on a ming Exercises on a ming Exercises on a ming Exercises on a ming Exercises on a	d print messages.Progra amental Data structure tack and its operation tack and its operation cation infix to postfix on – Evaluation of pos Queues and its operat Linked list and its ope Linked list and its ope Circular Linked list an Circular Linked list an	ms using class, method - Arrays based on Scen s as with condition Conversion tfix ions with conditions erations. rations with various p and its operations. ad its operations with y	s and objects ario. positions various positions
Level 1: Programs Level 2: Programs sheet -9 Level 1: - Level 2: Program sheet -10	ming Exercises on ming the tower of I uming the tower of	tactorial of a number Hanoi using recursion Hanoi using recursion	1	

Programming Exercise on Doubly linked list and its operations Level 1: Level 2: sheet -11 Program to Construct Binary Search Tree and Graph Level 1: Program to traverse the Binary Search Tree in three ways)in-order, pre-order and post-Level 2: order(and implement BFS and DFS sheet -12 Level 1: Program to Implement the Linear Search & Binary Search Program to Estimate the Time complexity of Linear Search Level 2: sheet -13 Level 1: Program to Implement and Estimate the Time complexity of Selection Sort Program to Implement and Estimate the Time complexity of Insertion Sort Level 2: sheet -14 (Beyond syllabus activity) el 1: Program to Construct AVL Tree rel 2: sheet -15 (Beyond syllabus activity) vel 1: Program to Construct RED BLACK Tree geted Application & Tools that can be used of PowerPoint software for lecture slides and use of Modern IDE like VS Code and Eclipse for lab programs to execute. **Project work/Assignment:** signment: Students should complete the lab programs by end of each practical session and module wise assignments before the deadline. **Text Book T1** Ellis Horowitz and Sartaj Sahni, Fundamentals of Data Structures in C, 2nd Edition, Universities Press, reprint 2018. **T2** Seymour Lipschutz, Data Structures Schaum's Outlines, Revised 1st Ed, McGraw Hill, 2014. erences Data structures and program design in C by Robert Kruse, Tondo C L, Bruce Leung, Pearson R1 education publishers, 2017. **R2** Programming and Data Structure by Jackulin C Salini etal., Ane books publishers, 2019. Web resources: 3. For theory :https://onlinecourses.nptel.ac.in/noc20_cs85/preview 4. https://puniversity.informaticsglobal.com/login **Topics relevant to development of "Skill Development":** ked list and stacks pics relevant to development of "Environment and sustainability: Queues Catalogue Muthuraj prepared by Recommended 09th BOS held on 04/05/19

	by the Boar	r d of								
	Studies of	on								
	Date of	F	Academic C	Counci	I Meeting No.	11, Dat	ed 11/06/1	Э		
4	Approval by	y the								
	Academ	ic								
	Counci									
I		Course	Title: CSE2	2255 -	Object Orient	ted		3	0	D 8
Course	Code:	Progra	mming Usin	ig Java	a		L-T- P- C	0	Ŭ	
CSE225	5	Type o	f Course: Th	heory	- PCC					
Version	n No.	2.0					•			
Course	Pre-	Nil								
requisit	tes									
Anti-re	quisites	Nil								
Course Descrip	otion	This unders progra applica solving progra	course had standing the ations by g. The stuce ations to be	he in he in aradig apply lents build	eory and la nplementatic m. It helps ving these co interpret and applications.	ab con on and s the st oncepts l unders	application application udent to 1 and also tand the n	which end on of couild read for effe eed for co	mphas object- al time ctive object	izes on oriented e secure problem oriented
Course	Objective	The ob Problei EXPER I	ojective of t m-Solving IENTIAL LE	the co using ARNIN	ourse is to fai JAVA and IG techniques	miliarize attain	the learne SKILL D	rs with t EVELOPN	he cor MENT	ncepts of through
		000.				0	L	-	1	
Course Comes	Out	co2: A proble co3: A co4: I applica co5: A	Apply the c ms. [Appl Apply the c mplement ations. [Ap Apply the c v]	oncer icatio oncer inheri ply] oncer	ot of classes, on] ot of arrays a itance and po ots of interfac	objects nd strin lymorp ce and e	and metho gs. [Appy] hism build error handli	ing secu	lve re nanism	ι.
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Course Comes Course Module Topics: structur Identifi Output Mo Topics: class, a referen Static	Out Content: e 1 Introduction iers, Variable functions, odule 2 : Classes, Cadding data ince variable Polymorpl	CO2: A proble CO3: A CO4: I applica CO5: A [Apply Basic C Progra on to P oad E oles, Co Contro Classes metho Constr Objects a member c, acces hism:	Apply the c ms. [Appl Apply the c mplement ations. [Ap Apply the c g] Concepts of mming and rinciples of clipse IDE onstants in ol Statement s, objects, ds and uctors and Meth bers and m ssing class Method c	oncep icatio oncep inheri pply] oncep Java f Prog E to java, nts: B ods: 1 ods: 1	ot of classes, on] ot of arrays a itance and po- ots of interface Assignment gramming: Pr run Java pr Operators, A ranching and Assignment Introduction Is to the class bers and met oading, cons	objects nd strin olymorp ce and e p cograms assignm l Loopin to object s, acces hods. tructors	and metho gs. [Appy] hism build error handli roblem olving of Problem , Sample ents and E ng. Problem Solving ct Orienteo s specifier:	ing secu ing mech Solving program xpressio	re nanism 9 , Java n, Dat n, Bas 10 les, de tiating	sessions program a types, ic Input/ Sessions efining a objects, ng, this
Course Course Module Topics: structur Identifi Output Mo Topics: class, a referen Static keywor	Out Content: e 1 Introductions, iers, Variant functions, odule 2 : Classes, Cadding data nce variable Polymorph rd, static ke	CO2: A proble CO3: A CO4: I applica CO5: A [Apply Basic C Progra On to P oad E oles, Co Contro Classes metho Constr Objects a membe, access hism: eyword	Apply the c ms. [Appl Apply the c mplement : ations. [Ap Apply the c y] Concepts of mming and rinciples of clipse IDE onstants in ol Statement s, objects, ds and uctors s and Meth pers and m ssing class Method co I, Nested cl	oncep icatio oncep inheri pply] oncep Java f Prog E to java, nts: B ods: 1 ethod meml overlo lasses	ot of classes, on] ot of arrays a itance and po- ots of interface Assignment gramming: Pr run Java pr Operators, A ranching and Assignment Introduction Is to the class bers and met ading, cons a, Accessing	objects nd strin olymorp ce and e p ce and e p s rocess o ograms Assignm l Loopin to object s, acces hods. tructors member	and metho gs. [Appy] hism build error handli roblem olving of Problem , Sample ents and E ng. Problem Solving ct Orientec s specifier ct orientec s specifier	ing secu ing mech Solving program xpressio	re nanism 9 , Java n, Dat n, Bas 10 lles, de tiating	sessions program a types, ic Input/ Sessions efining a objects, ng, this
Course Comes Course Module Topics: structur Identifi Output Mo Topics: class, a referen Static keywor Mo	Out Content: e 1 Introduction iers, Downla iers, Variable functions, odule 2 : Classes, Ca adding data nee variable Polymorpland, static ker odule 3	CO2: A proble CO3: A CO4: I applica CO5: A [Apply Basic C Progra on to P oad E oles, Co Contro Classes metho Constr Objects a memb c, acces hism: eyword Arrays, String	Apply the c ms. [Appl Apply the c mplement : ations. [Ap Apply the c y] Concepts of mming and rinciples of clipse IDE onstants in ol Statements, objects, ds and uctors and Meth bers and m ssing class Method co l, Nested cl , String and buffer	oncep icatio oncep inheri pply] oncep Java f Prog E to java, nts: B ods: 1 ethod meml overlo lasses	ot of classes, on] ot of arrays a itance and po- ots of interface Assignment gramming: Pr run Java pr Operators, A ranching and Assignment Introduction Is to the class bers and met oading, cons Assignment	objects nd strin olymorp ce and e p cograms assignm l Loopin to object s, acces hods. tructors member	and metho gs. [Appy] hism build error handli roblem olving of Problem , Sample ents and E ng. Problem Solving ct Oriented s specifiers , construct rs in nested Problem Solving	ing secu ing secu ing mech Solving, program xpressio	lve re nanism 9 , Java n, Dat n, Bas 10 lles, de tiating rloadi	a. Sessions program a types, ic Input/ Sessions efining a objects, ng, this Sessions
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Module 4 Inheritance and	Assignment	Problem	10 Sessions
Polymorphism	halaas Temas of Iul	Solving	armond Demonsio
Polymorphism: Mothod overriding	Example Sources of Information Englished	with data momb	eyword. Dynamic
functions and with class. Abstract 1	z. Filial Keywolu.	ambers with men	aber functions and
with class. Exception handling	eyworu. with data in	embers, with men	iber functions and
with class, Exception handling.		Drahlam	9 Cassians
Module 5 Operation in Java	Assignment	Solving	8 Sessions
Input/output Operation in Java(java.io	Package), Streams and	the new I/O Capab	ilities,
Understanding Streams, working with	File Object, File I/O Bas	ics, Reading and Wr	iting to Files, Buffer
and Buffer Management, Read/Write (Operations with File Ch	annel, Serializing Ob	ojects, Observer
and Observable Interfaces.			
Text Book			
T1 Herbert Schildt, "The Complete Edition 2019	Reference Java 2", T	Tata McGraw Hill	Education, 11th
References			
R1 Cay S Horstmann and Cary Go	mell "CORF IAVA y	volume L-Fundame	entals" Tenth
Edition, Pearson 2015.			intars, rentri
R2: James W. Cooper, "Java TM De Publishers.4 th Edition, 2000.	esign Patterns – A Tu	torial", Addison-V	Vesley
D2 E Dologumusomy "Drogrammir	a with Iava" Tata M	Crow Hill Educe	tion 6 th Edition
2019.	ig with Java , Tata M		uon, o Euruon,
E book link R1: <u>http://rmi.yaht.net/b</u> <u>1.pdf</u>	oookz/core.java/97801	<u>34177373-Vol-</u>	
E book link R2: <u>Java(tm) Design Patter</u>	ns: A Tutorial([PDF] [70	<u>qmsenjl97t0] (vdoc.</u>	<u>pub)</u>
Web resources			
os://youtube.com/playlist?list=PLuOW	9lll9agS67Uits0UnJyrY	iXhDS6q	
ps://puniversity.informaticsglobal.co	om:2229/login.aspx		
Topics relevant to development of "SI	kill Development":		
2. Static Polymorphism			
4. Method overloading, construct	tors		
5. constructor overloading			
6. this keyword			
7. static keyword and Inner class	es		
8. Inheritance and Polymorphism	l.		
for Skill Development through Experie	ntial Learning techniqu	ues. This is attained	through assessment
component mentioned in course hand	out.		





Presidency University Act, 2013 of the Karnataka Act No. 41 of 2013 | Established under Section 2(f) of UGC Act, 1956 Approved by AICTE, New Delhi



Itgalpur, Rajankunte, Yelahanka, Bengaluru – 560064

Course Code	Course Title: CSE2256 - Ob	oject Oriented					Τ		
Course Code:	Programming Using Java La	0	0	4	2				
CJEAAAA	Type of Course: Lab - PCC								
Version No.	2.0								
Course Pre-	SEXXXX – Problem Solving Using C								
requisites									
Anti-requisites	Nil								
Course Description Course Objective	This course introduces the core concepts of object-oriented programming. This course has theory and lab component which emphasizes on inderstanding the implementation and application of object-oriented programming paradigm. It helps the student to build real time secure applications by applying these concepts and also for effective problem solving. The students interpret and understand the need for object oriented programming to build applications. The objective of the course is to familiarize the learners with the concepts of								
	Problem-Solving using . EXPERIENTIAL LEARNING	JAVA and attain techniques	SKILL DE	VELOP	MENT	thr	ough		
Course Out Comes	Course Out ComesOn successful completion of the course the students shall be able to: CO1: Demonstrate basic programming concepts. [Apply] CO2: Apply the concept of classes, objects and methods to solve problems. [Application] CO3: Apply the concept of arrays and strings. [Appy] CO4: Implement inheritance and polymorphism building secure applications. [Apply] CO5: Apply the concepts of interface and error handling mechanism.								
Course Content:									
Module 1	Basic Concepts of Programming and Java	Assignment	Problem Solving		12	2 Ses	sions		
Download Eclips	e IDE to run Java progr	ams, Sample prog	grams on D	ata typ	pes, Io	denti	fiers,		
Variables, Consta	ants in java, Operators, A	Assignments and	Expression	, Basic	: Inpu	it/ O	utput		
functions, Contro	l Statements: Branching a	and Looping.							
Module 2	Classes, objects, methods and Constructors	Assignment	Problem Solving		14	1 Ses	sions		
Problem solving	using Classes, Objects an	d Methods: defini	ng a class,	adding	g data	mem	ibers		
and methods to th	ne class, access specifiers,	, instantiating obje	cts, referen	ce vari	able,	acces	ssing		
class members an	d methods.								
Use Static Polyn	norphism: Method overlo	pading, constructo	rs, construe	ctor ov	verloa	ding,	, this		
keyword, static ke	eyword, Nested classes, A	Accessing member	s in nested	classes	5.				
Module 3	Arrays, String and String buffer	Assignment	Problem Solving		10) Ses	sions		
Using Arrays and	Strings : Defining an	Array, Initializing	$g \& \overline{Acces}$	sing A	Array,	Mu	lti –		
Dimensional Arr	ay, Array of objects. St	ring: Creation &	Operation.	String	g buil	der c	lass,		
methods in String	g Buffer <mark>.</mark>	1							
Module 4	Inheritance and Polymorphism	Assignment	Problem Solving		12	2 Ses	sions		

Inheritance: Defining a subclass, Types of Inheritance, super keyword. Dynamic
Polymorphism: Method overriding. Final keyword: with data members, with member
functions and with class. Abstract keyword: with data members, with member functions and
with class. Exception handling.
Input & Output Operation Problem 12 Sessions
Module 5 in Java Assignment Solving
nput/output Operation in Java(java.io Package), Streams and the new I/O Capabilities,
Understanding Streams, working with File Object, File I/O Basics, Reading and Writing to Files, Buffer
and Buffer Management, Read/Write Operations with File Channel, Serializing Objects, Observer
and Observable Interfaces.
P1: Programming Exercises on Basic Concepts.
LEVEL 1: Discuss about datatypes and variables.
LEVEL 2: Demonstrate a simple java program
P2: Programming Exercises on Basic Concepts.
LEVEL 1: Discuss about datatypes and variables.
LEVEL 2: Demonstrate a simple java program
P3: Programming Exercises on operators, expressions based on a given scenario.
LEVEL 1: Explain operators, expressions.
LEVEL 2: Demonstrate operators
P4: Programming Exercises Command Line Arguments based on a given scenario.
LEVEL 1: Explain command line arguments
LEVEL 2: Demonstrate command line arguments
P5: Programming Exercises on basic Input/ Output functions and Control Statements: Branching
LEVEL 1: Explain Input/ Output functions
LEVEL 2:Demonstrate Control Statements: Branching
P6: Programming Exercises on Control Statements: Looping
LEVEL 1: Explain variour loops.
LEVEL 2:Demonstrate Control Statements: Looping
P7: Programming Exercises on Creating Objects, classes on a given scenario.
LEVEL 1: Illustrate class, object and methods.
LEVEL 2: Execute Java program using class and objects
P8: Programming Exercises on Adding methods and Constructors to the class based on a given
scendrio.
LEVEL 1. Industrate methods and constructors
Level 2: Execute Java program using methods based on a given scenario
P9. Programming exercises on methods based on a given scenario.
LEVEL 1. Inustrate method overloading for the given scenario
P10: Programming Exercises on methods based on a given scenario
EVEL 1: Illustrate constructors overloading
LEVEL 2: Apply constructor overloading for the given scenario
P11: Programming Exercises on methods for static members bassed on a given scenario
FVFL 1: Renefits of usage static members
EVEL 1: Benefits of usage static members EVEL 2: Usage of Static Members for the given scenario
P12: Programming Exercises on static methods based on a given scenario.
EVEL 1: Benefits of usage static methods
LEVEL 2: Usage of Static Methods for the given scenario.
P13: Programming Exercises on nested Classes based on a given scenario.
LEVEL 1: Benefits of usage nested classes
LEVEL 2: Apply the concept of usage of nested classes for the given scenario
P14: Programming Exercises on Arrays and its built-in functions based on a given scenario.
LEVEL 1: Illustrate one dimensional arrays and its functions.
LEVEL 2: Demonstrate programs with single-dimensional arrays and operations.

P15: Programming Exercises on Arrays and its built-in functions based on a given scenario.

LEVEL 1: Illustrate multi dimensional arrays and its functions.

LEVEL 2: Demonstrate programs with multi-dimensional arrays and operations.

P16: Programming Exercises on String Class and its built-in functions based on a given scenario.

LEVEL 1: Explain about String class and String methods.

LEVEL 2: Execute simple java applications for String and StringBuffer operations

P17: Programming Exercises on String Buffer Class and its built-in functions based on a given scenario.

LEVEL 1: Explain about StringBuffer class and String methods.

LEVEL 2: Execute simple java applications for String and StringBuffer operations

P18: Programming Exercises on String Builders and its built-in functions based on a given scenario. LEVEL 1: Explain about String Builders.

LEVEL 1: Explain about String Builders. LEVEL 2: Execute java applications for String Builders

P19: Programming Exercises on single, multi level Inheritance and super keyword based on given scenario.

LEVEL 1: Explain single and multi level inheritance.

LEVEL 2: Demonstrate simple applications for the different types of inheritance

P20: Programming Exercises hierarchical Inheritance and super keyword based on given scenario.

LEVEL 1: Explain hierarchical inheritance.

LEVEL 2: Demonstrate simple applications for hierarchical inheritance

P21: Programming Exercises on Overriding.

LEVEL 1: Differentiate method overloading and method overriding.

LEVEL 2: Demonstrate simple program with dynamic method dispatch.

P22: Programming Exercises on Final based on given scenario.

LEVEL 1: Implement programs using concept of final.

LEVEL 2: Use final keyword for the given problem

P23: Programming Exercises on Abstract keyword based on given scenario.

LEVEL 1: Implement programs using concept of Abstract.

LEVEL 2: Use abstract keyword for the given problem

P24: Programming Exercises on Interface based on a given scenario.

LEVEL 1: Differentiate abstract class about interface

LEVEL 2: Implement interfaces in the given problem

P25: Programming Exercises on Exception Handling based on a given scenario.

LEVEL 1: Explain exception handling

LEVEL 2: Solve the given problem using exception handling mechanism.

P26: Programming Exercises on Character Stream Classes based on a given scenario.

LEVEL 1: Explain Character Stream Classes

LEVEL 2: Solve the given problem using Character Stream Class.

P27: Programming Exercises on Read/Write Operations with File Channel based on a given scenario.

LEVEL 1: Explain Read/Write Operations with File Channel

LEVEL 2: Solve the given problem using Read/Write Operations with File Channel.

P28: Programming Exercises on Read/Write Operations with File Channel based on a given scenario. LEVEL 1: Explain Read/Write Operations with File Channel

LEVEL 2: Solve the given problem using Read/Write Operations with File Channel.

P29: Programming Exercises on Read/Write Operations with File Channel based on a given scenario.

LEVEL 1: Explain Read/Write Operations with File Channel

LEVEL 2: Solve the given problem using Read/Write Operations with File Channel.

P30: Programming Exercises on Read/Write Operations with File Channel based on a given scenario.

LEVEL 1: Explain Read/Write Operations with File Channel

LEVEL 2: Solve the given problem using Read/Write Operations with File Channel.

Targeted Application & Tools that can be used : JDK /Eclipse IDE/Visual Studio Code / net Beans IDE.

Text Book

T1 Herbert Schildt, "The Complete Reference Java 2", Tata McGraw Hill Education, 11th Edition, 2019.

References

R1. Cay S Horstmann and Cary Gornell, "CORE JAVA volume I-Fundamentals", Tenth Edition, Pearson 2015.

R2: James W. Cooper, "Java TM Design Patterns – A Tutorial", Addison-Wesley Publishers.4th Edition, 2000.

R3. E. Balagurusamy, "Programming with Java", Tata McGraw Hill Education, 6th Edition, 2019.

E book link R1: <u>http://rmi.yaht.net/bookz/core.java/9780134177373-Vol-1.pdf</u>

E book link R2: Java(tm) Design Patterns: A Tutorial([PDF] [7qmsenjl97t0] (vdoc.pub)

Web **resources**

os://youtube.com/playlist?list=PLu0W_9III9agS67Uits0UnJyrYiXhDS6q os://puniversity.informaticsglobal.com:2229/login.aspx

Topics relevant to development of "Skill Development":

- 2. Static Polymorphism
- 5. Method overloading, constructors
- 6. constructor overloading
- 7. this keyword
- 8. static keyword and Inner classes
- 9. Inheritance and Polymorphism.

for **Skill Development** through **Experiential Learning** techniques. This is attained through assessment component mentioned in course handout.

urse Code: E2501	urse Title: Comput Architecture pe of Course: PCC	ter Organization a	and	T-P- C	3	0	0	3	
rsion No.							<u> </u>		
urse Pre- requisites									
ti-requisites									
urso	This course introduces	the core principles of	com	puter architect	ure and	organiza	ation fro	mbasic	
Description	to intermediate level. between computer har assembly-level instruct concepts of computer t	to intermediate level. This theory based course emphasizes on understanding the interaction between computer hardware and software. It equips the students with the intuition behind assembly-level instruction set architectures. It helps the students to interpret the operational concepts of computer technology as well as performance enhancement.							
urse Objective	The objective of the ob	course is to familiari architecture and att	ze th tain	ne learners wit Skill Develop	h the co ment t	oncepts hrough	of Cor Partic	nputer ipative	
urse Outcomes	On successful completi 1] Describe the basic of 2] Explain Instructi 3] Apply appropria 4] Explain the orga	On successful completion of the course the students shall be able to: 1] Describe the basic components of a computer and their interconnections. [Remember] 2] Explain Instruction Set Architecture and Memory Unit[Understand] 3] Apply appropriate techniques to carry out selected arithmetic operations [Apply] 4] Explain the organization of memory and processor sub system [Understand]							
urse Content:									
Module 1	ic Structure of Computer	Assignment	Da	ta Analysis tas	k	12	Session	ıs	
Memory Instruction dule 2 Topics: Instruction Set A	Instruction Set hitecture and Memory Unit	ignment al	ysis, ubrou	Data Collectio	n	12	Session	ns	
mory System: Me Organization of M	emory Location and Add Iemory chips, Cache men	dresses, Memory Open nory mapping Technic	eratio ques.	ons, Semicondu	ictor RA	M Me	mories, I	Internal	
dule 3	Arithmetic l Input/outputDesign	e Study a	analy	ysis task		10	Session	ns	
Topics: Arithmetic: Carr operations. ut/output Design: A Interface Circuits	y lookahead Adder, Signe Accessing I/O Devices, I/	ed-Operand Multiplica	ation, nterru	, Integer Division pt Hardware, I	on, and Direct M	Floating lemory	; point Access,	Buses,	
Module 4	BPU and Pipelining	Assignment A	nalys	sis, Data Colle	ction	11	Session	IS	
Topics: Basic Processing Complete Instruct elining: Parallel Pr rgeted Applicatio Targeted employr AMD, Motorola, J Memory circuit do Fabrication engine	g Unit: Fundamental Cor ion, Multiple Bus Organi rocessing, Pipelining, Arit on & Tools that can b nent sector is processor m NVidia, Samsung, Micror esign and verification eng eer etc.	ncepts, Single Bus o zation. thmetic Pipeline, Instr e used: nanufacturing and men n Technology, wester gineers, Physical syste	rgani uctio mory n Dig m de	zation, Contro n Pipeline, Haz chip fabricatio gital etc. Target sign engineer,	l sequer zards. n vendo ed job p System j	nce, Exe rs like I rofiles i program	ecution ntel, nclude nmer,	of a	
Tools: Virtual Lab, IIT K Tejas – Java Base	GP d Architectural Simulator	r, IIT Delhi							

oject work/Assignment:

ch batch of students (self-selected batch mates – up to 4 in a batch) will be allocated case studies/assignments

xtbook(s):

- **1.** Carl Hamacher, Zvonko Vranesic, Safwat Zaky, "Computer Organization", Sixth Edition, McGraw-Hill Higher Education, 2023 reprint.
- 2. William Stallings, "Computer Organization & Architecture Designing for Performance", 11th Edition, Pearson Education Inc., 2019.

erences

- David A. Patterson & John L. Hennessy, "Computer Organization and Design MIPS Edition- The Hardware/Software Interface", 6th Edition, Morgan Kaufmann, Elsevier Publications, November 2020.
- 2. Web References:
- 3. NPTEL Course on "Computer architecture and organization" IIT Kharagpur By Prof. Indranil Sengupta, Prof. Kamalika Datta. https://nptel.ac.in/courses/106105163
- 4. NPTEL Course on "Computer Organization", IIT Madras By Prof. S. Raman.
- 5. <u>https://nptel.ac.in/courses/106106092</u>
- 6. https://puniversity.informaticsglobal.com:2229/login.aspx

Topics relevant to "SKILL DEVELOPMENT": Generation of Computers, CISC and RISC processors, Bus Arbitration, Collaboration and Data collection for Term assignments and Case Studies for Skill Development through Participative Learning techniques. This is attained through assessment component mentioned in course handout.

urse Code: N1002	urse Title: Essentials pe of Course: HSMC	of Finance	-т-р-с	þ)	3
rsion No.)					
urse Pre- requisites	This course is designed prior financial knowled	l to be accessible to all stu ge.	udents, rega	rdles	s of	their
ti-requisites						
urse Description	This course is designed understanding of k enable them to compresent the intricacies of final gain insights into the aims to develop stude evaluate investment decisions, and naviga	gned to equip students ey financial concepts rehend the core function ncial management with fundamental aspects ents' abilities to interpre- t opportunities, unders ate the basics of tax imp	s with a f and princ ns of financ thin organi of taxation t financial stand capit plications.	iples ce, d zatio 1. Th stat	dati s. It lelve ons, le co eme truc	onal : will e into . and ourse ents, cture
urse Objective	Upon successful compl • Understand the back financial implication • Understand the influence financial do • Analyse and interposed health and performation • Identify income under Tax Act, 1961 and	etion of this course, stud asic forms of business ons. fundamental principle ecision-making in various pret financial statemen ance of an organization. nder various heads of determine the tax liab	ents will be organization es and co s contexts. hts to assess income as pility.	able on a nce s the per	to: nd t pts fina Inc	their that ancial
urse Outcomes	List the course outco On successful compleable to: 9. Understand the markets and or 10. Apply and inter decision makin 11. Identify varior Income Tax Act	omes letion of this course the ganizations. pret financial informat g. us heads of income t. 1961.	e students ince and fin tion for bus and deduc	shal Ianc Sines ctior	l be ial ss n u	nder
urse Content:						
dule 1	Introduction to Finance	signment/ Quiz	merical solving Task) S	ess	ions
Definition and Se Financial Institu Markets vs. Cap Organization an Maximization; U Statement- Simp	cope of Finance, Areas itions, International I bital Markets, Primary d Financial Goals: S Inderstanding Financi ble Numerical.	of Finance: Corporate Finance; Types of Fina v vs. Secondary Mark hareholder Wealth M al Statements: Balan	Finance, I ancial Marl ets; Forms aximization ce Sheet a	nves (ets: of E n vs and	stme : Mo Busi 5. P Inc	ents, oney ness rofit ome
dule 2	hancial Management	signment/ Quiz	merical solving	S	essi	ons

Capital Budgeting Decisions: Payback Period, Net Present Value (NPV), Profitability Index (PI), Internal Rate of Return (IRR); Leverage- Basic Numerical; Capital Structure Decisions: Optimal Capital Structure, Trade-off Theory of Capital Structure; Cost of Capital: Equity, Debt, WACC; Dividend Policy: Factors influencing Dividend Policy.

dule 3	xation	signment/ Quiz	merical solving Task	' Sessions				
Principles of a Good Tax System: Equity, Certainty, Convenience, Economy; Direct vs. Indirect Taxes; Residential Status of an Individual- Basic Problems; Heads of Income; Salary, House Property- Basic Numerical; Deductions under Chapter VI-A; Computation of Taxable Income and Tax Liability; E-Filing procedure.								
rgeted Application xtbooks, PPT, Sp Income Tax Depa piect Work / Assign	& Tools that can be us readsheet Software (rtment.	ed: e.g., Microsoft Excel), Official V	Vebsite of				
bject work/ Assign								
They will have to ex	nere will be a group prese xplain/demonstrate the w	orking and discuss the a	ents will be gi applications fo	ven a topic. r the same.				
2. Case Study: - business models of have to come up wi	At the end of the course successful companies or ith detailed analysis and a	e students will be given tax evasion by reputed assessment.	a `real-world companies on	l' cases like which they				
13.Dr. Vinod K. S Students' Guide	Singhania & Dr. Monica to Income Tax including M. (2025). Financial Mana	Singhania. (Latest A GST. Taxmann Publicat agement. Vikas Publishi	ssessment Ye ions. ng House.	ar Edition).				
ference Book (s):								
12 Photo J M	Mahalund 1 (Commant Fo	lition) Financial Institut	tions and Mau	linter				
13. Bhole, L.M., &	Manakud, J. (Current Ed	lition). Financial Institut	tions and Mari	kets:				
Structure, Grow	<i>ith and Innovations</i> . McGr	aw Hill Education India.						
14. Mehrotra, H.C <i>Practice</i> . Sahity	 & Goyal, S.P. (Latest a Bhawan Publications. 	: Assessment Year Edit	ion). <i>Income</i>	Tax Law &				
15.Gordon, E., & I	Natarajan, K. (Current E	dition). <i>Financial Market</i>	s and Service	s. Himalaya				
Publishing Hous		uidee lestures etc.).						
	(e-books, notes, ppts,	video lectures etc.):						
13. <u>https://presider</u>	icyuniversity.inways.com							
14. <u>https://onlineco</u>	ourses.nptel.ac.in/noc24	ecu1/preview						
15. <u>nttps://www.ind</u>	cometax.gov.in/iec/foport							
lopics relevant	to "SKILL DEVELOPMI	NI": This course is	designed 1	to provide				
practical financia	il skills through partic	cipative learning tech	iniques. Stu	dents will				
engage in perform	ning suitable calculatio	ons to determine final	ncial parame	eters (e.g.,				
time value of mo	oney, investment retur	formance and make in	nd analysing					
Statements to ass	sess organizational per		inormed dec	1510115.				
Catalogue	Dr. Amit Saha							
Prepared by								
hy the Reard of	C Nev VV th . DeC held en C							
Studies on	5 NO: XX [®] BOS neid on L							
Date of								
Approval by the								
Academic	th Academic Council Meeti	ing held on DD/MM/YYY	Y					
Council	1							







Course Code:	Course Title: Discrete Mathematics	I -T- P- C	R	1	0	Δ				
MAT2404	Type of Course: Theory - ESC	L-1-1-C	5	-	U	-				
Version No.	1.0									
Course Pre-requisites	MAT2302									
Anti-requisites	NIL	NIL								
Course Description	The course explores the study of fundamentally discrete (not contin theory, logic, graph theory, combi applications primarily in comput software development, and cryp propositional logic, proof techniq principles, and basic graph algor analyzing discrete problems and str	The course explores the study of mathematical structures that are fundamentally discrete (not continuous), focusing on concepts like set theory, logic, graph theory, combinatorics, and number theory, with applications primarily in computer science fields like algorithms, software development, and cryptography; it covers topics such as propositional logic, proof techniques, relations, functions, counting principles, and basic graph algorithms, providing a foundation for analyzing discrete problems and structures within computer science.								
Course Objective	The main objective of the cours particular set of mathematical facts students how to think logically important themes: mathematical discrete structures, algorithmic thin A successful discrete mathematics balance all five themes.	e is that stu s and how to and mathen reasoning, c king, and app course shou	idents apply natical combin licatior ild care	shou them ly th atoria ns and efully	Id lea . It tea rough al ana I mod blend	arn a aches i five alysis, eling. d and				
Course Outcomes	On successful completion of the con CO1 - Explain logical sentences thro logical connectives. CO2 - Deploy the counting techniqu problems CO3 - Comprehend the basic princip types of relations. CO4 - Apply different types of se programming skills	On successful completion of the course the students shall be able to: CO1 - Explain logical sentences through predicates, quantifiers and logical connectives. CO2 - Deploy the counting techniques to tackle combinatorial problems CO3 - Comprehend the basic principles of set theory and different types of relations. CO4 - Apply different types of structures of trees for developing programming skills								
Course Content:										
Module 1	Fundamentals of Logic			(1	lO Cla	sses)				

Basic Connectives and Truth Tables, Propositional Logic, Applications of Propositional Logic, Propositional Equivalences, Predicates and Quantifiers, Nested Quantifiers, Rules of Inference, Introduction to Proofs, Proof Methods and Strategy.

Module 2	Principle of Counting	Assignment	(15 Classes)
The Well Ordering	Principle – Mathematical Induction		

The Basics of Counting, Permutations and Combinations, Binomial Coefficients and Identities, Generalized Permutations and Combinations, Generating Permutations and Combinations

Advanced Principle Counting: The Principle of Inclusion and Exclusion, Generalizations of the Principle, Derangements – Nothing is in its Right Place, Rook Polynomials.

Module 3Relations and Functions(10 Classes)Cartesian Products and Relations, Functions, One-to-One, Onto Functions. The Pigeon-hole Principle,
Function Composition and Inverse Functions.
Relations, Properties of Relations, Computer Recognition – Zero-One Matrices and Directed Graphs,



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Partial Orders, Lattice,	Hasse Diagrams, Equivalence Relations	and Partitions.	
Module 4	Recurrence Relations and Generating Functions		(10 Classes)
Homogeneous and inho	pmogeneous recurrences and their solu	tions - solving recurren	ices using generating
functions - Repertoire i	method - Perturbation method - Convo	olutions - simple manip	ulations and tricks.
Module 5	Graph Theory & Algorithms on Networks	Assignment	(15 Classes)
Definitions and basic ro Properties - Paths and and edge cuts - Vertex Tree - Definitions, Prop tree: BFS, DFS. Algorithms on Network algorithm and Prim's al	esults - Representation of a graph by a connectedness - Sub graphs - Graph Iso and edge connectivity, Euler and Hami perties, and Examples, Routed Trees, E ss - Shortest path algorithm- Dijikstra's gorithm.	matrix and adjacency omorphism - Operation Iton Paths, Shortest-Pa Binary search tree, Dec algorithm, Minimal sp	list - Trees - Cycles ns on graphs - Verte oths. cision tree, spannin panning tree- Kruska
Targeted Application & Discrete mathematics including data structur theory, computer secu Assignment:	Tools that can be used: provides the mathematical foundati res, algorithms, database theory, auto rity, and operating systems.	ons for many compu omata theory, formal	ter science course languages, compile
Assignment 1	Logic Equivalences and Predicate calc	ulus	

Assignment 2: Equivalence Relations and Lattices

Assignment 3: Recurrence Relations

Text Book

- 2. Kenneth H. Rosen, "Discrete Mathematics and its Applications", McGraw-Hill, s 8th Edition, 2019.
- 3. Harary Graph Theory, Addison-Wesley Publishing Company.

References:

- 2. Arthur Gill, "Applied Algebra for Computer Science", Prentice Hall.
- 3. K.D. Joshi, "Discrete Mathematics", Wiley Eastern Ltd.

4. Ralph. P. Grimaldi., "Discrete and Combinatorial Mathematics: An Applied Introduction", 4th Edition, Pearson Education Asia.

E-resources/ Web links:

https://presiuniv.knimbus.com/user#/viewDetail?searchResultType=ECATALOGUE_BASED&uni id=EBSCO95 30102024 54588

https://presiuniv.knimbus.com/user#/viewDetail?searchResultType=ECATALOGUE BASED&uni id=EBSCO95 30102024 375







https://www.math.hkust.edu.hk/~maqian/ma006_0607F.html

https://www.scu.edu.au/study-at-scu/units/math1005/2022/

Topics relevant to SKILL DEVELOPMENT: The course focuses on the concepts of calculus and differential equation with reference to specific engineering problems. The course is of both conceptual and analytical type in nature through Problem solving. This is attained through the assessment component mentioned in course handout.



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Course Code:	Course Title: Web	Technologies						
CSE1504	Type of Course: P	of Course: Program core			2	0		2
	Theory	-		L-1- P-	2	0	0	2
				C				
Version No.	1.0						•	I.
Course Pre-								
requisites								
Anti-requisites	NIL	NIL						
Course	This cou	This course highlights the comprehensive introduction to seriating lenguages						at aro
Description	ription					lages the	atare	
	useu io	r creating web-based	applications.					
	The ass	ociated laboratory pro	ovides an opportu	nity to im	plemen	t the co	ncepts a	nd
	enhanc	e critical thinking and	analytical skills.	-	-		-	
Course	The objec	tive of the course is t	to familiarize the	learners	with the	concep	ots of <mark>W</mark>	<mark>eb</mark>
Objective	Technolog	<mark>gy</mark> and attain <mark>Skill Dev</mark>	<mark>/elopment</mark> throug	gh <mark>Experie</mark>	ential Le	arning	techniqu	ies.
Course	On succes	sful completion of th	is course the stud	ents shal	l be able	e to:		
Outcomes		·						
	CO1: Impl	ement web-based app	olication using clie	nt-side so	ripting	anguage	es.	
	(Apply)							
	CO2: Appl	v various constructs t	o enhance the anr	nearance	ofawol	ncita (A	nnlv)	
		y various constructs to						
	CO3: Appl	y server-side scripting	languages to dev	elop a we	eb page	linked to	o a datak	base.
	(Apply)							
Course Content:								
			Quizzos on	various fo	aturoc			
Modulo 1	Introduction to	Quizzes and	of XHTML	simple	atures			20
would I	XHTML	Assignments	applications	simple			Ses	sions
Basics: W	eb, WWW, Web bro	wsers, Web servers, I	nternet.	·				
							_	
XHTML: C	rigins and Evolution	of HTML and XHTML:	Basic Syntax, Star	ndard XH1	ML Doc	uments	Structure	e, Basic
Text Mark	up, Images, Hyperte	ext Links, Lists, Tables,	Forms, Frames, S	yntactic D	Differen	es betw	veen HTI	VIL and
XHTML, C	emonstration of ap	plications using XHTN	1L for Responsive	web page	es.			

HKK.	PRESID	ENCY L	JNIVERSITY	PRESIDENCY GROUP	
GAIN MORE KNOWLEDGE REACH GREATER HEIGHTS	Presidency University Act, 2013 of the Karnataka Act No. 41 of 2013 Established under Section 2(f) of UGC Act, 1956 Approved by AICTE, New Delhi				
Module 2	Advanced CSS	Quizzes and assignments	Comprehension based Quizzes and assignments; Application of CSS in designing webpages		20 Sessions
Adva	anced CSS: Layout, Norm	al Flow, Positioning E	lements, Floating Elements, Construc	ting Mu	lticolumn

Layouts, Approaches to CSS Layout, Responsive Design, CSS Frameworks

KML: Basics, De	emonstration of applic	cations using XML with	1 XSL1.	
Module 3	PHP – Application Level	Quizzes and assignments	Application of PHP in web designing	20 Sessions
PHP: Introduct	tion to server-side De	evelopment with PHP	, Arrays, Superglobal Arrays, \$GET	and \$ POST,
\$_SERVER Arra	y, \$_Files Array, Rea	ding/Writing Files, Pl	HP Classes and Objects, Object Ori	ented Design,
Working with	Databases, SQL, Data	abase APIs, Managing	g a MySQL Database. Accessing N	lySQL in PHP,
Applications.				
List of Laborato	ory Tasks:			
Experiment No	. 1: Demonstration o	f XHTML features		
Level 1: Demon	stration of various XH	ITML Tags (Level 1)		
Level 2: Design	and develop static we	eb pages for an online	Book store (Level 2).	
Experiment No	. 2: Application of CS	S in web designing		
Level 1: Design	a document using XH	ITML and CSS to creat	e a catalog of items for online electr	onic shopping.
Level 2: Create sheet.	and save XML docum	nent for students' info	rmation and display the same using	cascaded style
Experiment No	. 3: Application of PH	P in web designing.		
Level 1: Write a age, permanen information fro	a PHP program to rea t address, and pin co m the database and o	d the personal inform de entered by the use display it on the front	ation of a person such as first name r into a table created in MySQL. Re end.	e, last name, ad the same
Level 2: Using P edition, and pu	HP develop a web pa blisher and store info	ge that accepts book i rmation submitted th	nformation such as ISBN number, ti rough the web page in MySQL datab	tle, authors, base.
Experiment No	. 4: Building a websit	e.		
Build a website the author's de	for organizing an Inte tails and upload a file	ernational Conference	. The conference website must be al	ole to collect
Targeted Applic web server to b	cation & Tools that co be used to demonstra	an be used: Xampp Ite PHP.		
Project work/A	ssignment:			
Assignments ar stipulated dead	e given after comple lline.	tion of each module v	which the student need to submit w	vithin the


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Textbook(s):

2] Robert. W. Sebesta, "*Programming the World Wide Web*", Pearson Education, 9th Edition, 2016. 2]Paul Deitel, Harvey Deitel, Abbey Deital, "Internet & World Wide Web How to Program", Fifth Edition,

Pearson Education, 2021.

3]CSS Notes for Professionals, ebook available at https://books.goalkicker.com/CSSBook/ (Retrieved on Jan. 20, 2022)

4]Deitel, Deitel, Goldberg,"Internet & World Wide Web How to Program", Fifth Edition, Pearson

Education, 2021.

Reference Book(s):

- **R1.** Randy Connolly, Ricardo Hoar, "Fundamentals of Web Development", Pearson Education India, 1st. Edition.2016.
- **R2.** Jeffrey C. Jackson, "Web Technologies: A Computer Science Perspective", Pearson Education, 1st Edition, 2016.

Additional web-based resources

- W1. W3schools.com
- W2. Developer.mozilla.org/en-US/docs/Learn
- W3. docs.microsoft.com

W4. informit.com/articles/ The Relationship Between Web 2.0 and Social Networking https://presiuniv.knimbus.com/user#/home

Topics related to development of "FOUNDATION":

- 7. Web, WWW, Web browsers, Web servers, Internet.
- 8. CSS, PHP.
- 9. Designing the website for healthcare.

The objective of the course is to familiarize the learners with the concepts of Web Technology and attain Skill Development through Experiential Learning techniques.



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Itgalpur, Rajankunte, Yelahanka, Bengaluru – 560064

Course Code: CSE1505	Course Lab Type of lab cou	Title: Web Technologies Course: Program core rse	L-T- P- C	0	0	2	1
Version No.		1.0					
Course Pre- requisites							
Anti-requisites		NIL					





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Description	This cou used fo	This course highlights the comprehensive introduction to scripting languages that are used for creating web-based applications.					
	The associated laboratory provides an opportunity to implement the concepts an enhance critical thinking and analytical skills.						
Course	The objec	tive of the course is f	to familiarize the learners with the conc	epts of <mark>Web</mark>			
Objective Technology and attain Skill Development through Experiential Learning techniques.							
Course	On succes	sful completion of th	is course the students shall be able to:				
Jutcomes	CO1: Impl (Apply)	CO1: Implement web-based application using client-side scripting languages. (Apply)					
	CO2: Appl	y various constructs t	o enhance the appearance of a website.	(Apply)			
	CO3: Appl (Apply)	y server-side scripting	g languages to develop a web page linked	to a database.			
Course Content:							
Module 1	Introduction to XHTML Features	Quizzes and Assignments	Quizzes on various features of XHTML, simple applications	8 Sessions			
		tructure Pacie Toxt N					
Standard	XHTIML Document S	filluciule, basic lext r	Markup such as headings, paragraphs, lis	ts, tables, forms,			
Standard and sema	ntic tags.		Markup such as headings, paragraphs, lis	ts, tables, forms,			

Module 3	PHP – Application Level	Quizzes and assignments	Application of PHP in web designing	12 Sessions			
PHP: Introduc	ction to server-side D	evelopment with PHP	, Arrays, Superglobal Arrays, \$GET a	and \$ POST,			
\$_SERVER Arr	ay, \$_Files Array, Rea	ading/Writing Files, P	HP Classes and Objects, Object Ori	ented Design,			
Working with Databases, SQL, Database APIs, Managing a MySQL Database. Accessing MySQL in PHP,							
Applications.							







List of Laboratory Tasks:

Experiment No. 1: Demonstration of XHTML features

Level 1: Demonstration of various XHTML Tags (Level 1)

Level 2: Design and develop static web pages for an online Book store (Level 2).

Experiment No. 2: Application of CSS in web designing

Level 1: Design a document using XHTML and CSS to create a catalog of items for online electronic shopping.

Level 2: Create and save XML document for students' information and display the same using cascaded style sheet.

Experiment No. 3: Application of PHP in web designing.

Level 1: Write a PHP program to read the personal information of a person such as first name, last name, age, permanent address, and pin code entered by the user into a table created in MySQL. Read the same information from the database and display it on the front end.

Level 2: Using PHP develop a web page that accepts book information such as ISBN number, title, authors, edition, and publisher and store information submitted through the web page in MySQL database.

Experiment No. 4: Building a website.

Build a website for organizing an International Conference. The conference website must be able to collect the author's details and upload a file.

Targeted Application & Tools that can be used: Xampp web server to be used to demonstrate PHP.

Project work/Assignment:

Assignments are given after completion of each module which the student need to submit within the stipulated deadline.

Textbook(s):

2] Robert. W. Sebesta, "*Programming the World Wide Web*", Pearson Education, 9th Edition, 2016. 2]Paul Deitel, Harvey Deitel, Abbey Deital, "Internet & World Wide Web How to Program", Fifth Edition,

Pearson Education, 2021.

3]CSS Notes for Professionals, ebook available at https://books.goalkicker.com/CSSBook/ (Retrieved on Jan. 20, 2022)

4]Deitel, Deitel, Goldberg,"Internet & World Wide Web How to Program", Fifth Edition, Pearson

Education, 2021.

Reference Book(s):

- **R1.** Randy Connolly, Ricardo Hoar, "Fundamentals of Web Development", Pearson Education India, 1st. Edition.2016.
- **R2.** Jeffrey C. Jackson, "Web Technologies: A Computer Science Perspective", Pearson Education, 1st Edition, 2016.

Additional web-based resources

W1. W3schools.comW2. Developer.mozilla.org/en-US/docs/LearnW3. docs.microsoft.com



W4. informit.com/articles/ The Relationship Between Web 2.0 and Social Networking https://presiuniv.knimbus.com/user#/home

Topics related to development of "FOUNDATION":

- 10. Web, WWW, Web browsers, Web servers, Internet.
- 11. CSS, PHP.
- 12. Designing the website for healthcare.

The objective of the course is to familiarize the learners with the concepts of Web Technology and attain Skill Development through Experiential Learning techniques.



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Itgalpur, Rajankunte, Yelahanka, Bengaluru - 560064

Course Code: CSE2260	Course Title: Database Man	L-T-P-C	2	0	0	2			
	Type of Course: Theory only - PCC				5	0	0	5	
Version No.	1.0								
Course Pre- requisites	Foundational understanding of data types, data structures, basic programming knowledge, familiarity with operating systems and file management. Basic knowledge of set theory, logic, and discrete mathematics to understand relational algebra and query formulation.								
Anti-requisites	NIL								
Course Description Course Objective	This course introduces the foundational principles of database management systems, including data models, schemas, and architectures. This course provides a solid foundation on the relational model of data and the use of relational algebra. It develops skills in SQL for data definition, manipulation, and control, enabling students to construct and execute complex queries. The course also introduces the concept of object oriented and object relational databases and modern database technologies like NoSQL . The also course allows the students to gain insights into data storage structures and indexing strategies for optimizing query performance.								
	Management Systems and a	ttain Employabilit y	through Prol	olem Solvin	gМ	etho	odolo	gies.	
Course Out	On successful completion of	the course the stu	dents shall be	able to:					
Comes	 13. Describe the fundamental elements of relational database management systems. [Understand] 14. Examine databases using SQL query processing and Optimization. [Apply] 15. Design simple database systems applying the normalization constraints and demonstrate the database transaction processing, recovery, and security. [Apply] 16. Interpret the generat of educated database and its applying the normalization. 								
Course Content:					- 1- 1	1			
	Introduction to Database								

Module 1

Topics:

Introduction to Database: Schema, Instance, 3-shema architecture, physical and logical data independence, Data isolation problem in traditional file system, advantages of database over traditional file systems. Entity Relationship (ER) Model, ER Model to Relational Model, Examples on ER model.

Assignment

Problem Solving

10 Sessions

Modelling and Relational

Algebra(Understand)

Relational Algebra with selection, projection, rename, set operations, Cartesian product, joins (inner and outer joins), and division operator. Examples on Relational Algebra Operations.



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Module 2	Fundamentals of SQL and Query Optimization (Apply)	Assignment	Programming	11 Sessions
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Topics:

SQL Database Querying, DDL, DML, Constraints, Operators, Set Operators, Aggregate Functions, Joins, Views, Procedures, Functions and Triggers.

Database programming issues and techniques: Embedded SQL, Dynamic SQL; SQL / PSM and NoSQL. **Query Optimization:** Purpose, transformation of relational expressions, estimating cost and statistics of expression, choosing evaluation plans, linear and bushy plans, dynamic programming algorithms.

Relational Database Design & Transaction Management (Apply)	Assignment	Problem Solving	12 Sessions
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Topics:

Relational database design: Problems in schema design, redundancy and anomalies, Normal Forms based on Primary Keys-(1NF,2NF, 3NF), Boyce-Codd Normal Form, Multi valued Dependency (Fourth Normal Form), Join Dependencies (Fifth Normal Form), lossy and lossless decompositions, Database De-normalization.

Transaction Management: The ACID Properties; Transactions and Schedules; Concurrent Execution of Transactions; Lock- Based Concurrency Control; Performance of locking; Transaction support in SQL; Introduction to crash recovery; 2PL, Serializability and Recoverability; Lock Management; The write-ahead log protocol; Check pointing; Recovering from a System Crash; Media Recovery; Other approaches and interaction with concurrency control.

Module 4	Advanced DBMS Topics (Apply)	Assignment	Case Study	12 Sessions
- ·				

Topics:

Advanced topics: Object oriented database management systems, Deductive database

management systems, Spatial database management systems, Temporal database management systems, Constraint database management systems.

New database applications and architectures such as Data warehousing, Multimedia, Mobility, NoSQL, Native XML databases (NXD), Document-oriented databases, Statistical databases.

Targeted Application & Tools that can be used:

Application Area: Relational database systems for Business, Scientific and Engineering Applications. Tools/Simulator used: MySQL DB for student practice.

Also demonstration of ORACLE DB on object-relational database creation and JDBC connection.

- 7. Problem Solving: Constructing ER-Diagrams for a given real time requirements, Normalizing the databases, querying the databases using relational algebra.
- 8. Programming: Implementation of any given scenario using MySQL.

Text Books:

- T1. Elmasri R and Navathe S B, "Fundamentals of Database System", Pearson Publication, 7th Edition, 2018.
- T2. RamaKrishna & Gehrke, "Database Management Systems" 3rd Edition, 2018, McGraw-Hill Education.
- T3. W. Lemahieu, S. vanden Broucke and B. Baesens, "Principles of Database Management: Practical Guide to Storing, Managing and Analyzing Big and Small Data", Cambridge University Press, 2018.



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References

R1 Avi Silberschatz, Henry F. Korth, S. Sudarshan, "Database System Concepts", McGraw-Hill ,7th Edition, 2019. R2 M. Kleppmann, "Designing Data-Intensive Applications: The Big Ideas Behind Reliable, Scalable, and Maintainable Systems", O'Reilly, 2017.

Topics relevant to development of "FOUNDATION SKILLS": S - Skill Development: Relational database design using ER- Relational mapping, Implementation of given database scenario using MYSQLDB.

Topics relevant to development of Employability: Develop, test and implement computer databases, creatingsophisticated, interactive and secure database applications

Topics relevant to "HUMAN VALUES & PROFESSIONAL ETHICS": Nil



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Course Code: CSE2261	Course Title: Database Management Systems Laboratory									
	Type of Course: 1) Laboratory - PCC	L-T-P-C	0	0	2	1				
Version No.	1.0									
Course Pre- requisites	Foundational understanding of data types, basic programming knowledge, operating systems and file management.									
Anti-requisites	NIL									
Course Description Course Objective	The Database Management Systems (DBMS) Laboratory is designed to provide students with hands-on experience in database design, implementation, and management using SQL and database management tools such as MySQL. The lab complements theoretical concepts learned in database courses by allowing students to practice database creation, querying, and optimization techniques. The DBMS Lab enables students to develop industry-relevant skills in database management, preparing them for careers in software development, data engineering, and database administration . The objective of the course is to familiarize the learners with the concepts of Database Management Systems and attain Employability through Broblem Solving Methodologies									
Course Out Comes	On successful completion of the course the students shall be 17.Demonstrate the database concepts, practice, and SQL qu 18.Design and implement database schemas while applyin optimize structure. [Apply]] 19.Develop and implement stored procedures, triggers, a efficiency. [Apply] 20.To Design and build database applications for real world	able to: ueries. [Appl ng normaliza and views fo problems. [A	y] itior or a	n te iuto y]	chnic mati	ques to on and				

List of Laboratory Tasks:

Create Employee, Student, Banking and Library databases and populate them with required data. Do the following experiments of different lab sheets on those databases.

Labsheet-1 [3 Practical Sessions]

Experiment No 1: [1 Session]

To study and implement the different language of Structured Query Language. 1.

Level 1: Perform operations using Data Definition Language and Data Manipulation Language commands including different variants of SELECT on Student DB.

Level 2: Identify the given requirements; valid attributes and data types and Perform DDL and DML operations on a given scenario. [Banking Databases]

Experiment No. 2: [2 Sessions]

2. To study and implement the concept of integrity constraints in SQL.

Level 1: Create tables on Banking database using PRIMARY KEY, NOT NULL, UNIQUE, FOREIGN KEY and demonstrate the working of relational, logical, pattern matching, BETWEEN, IS NULL, IN and NOT IN Special



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Operators on Student Database.

Level 2: Enforce different types of data and referential integrity constraints. Then try queries with special operators based on the student database. [Banking Database].

Labsheet-2 [3 Practical Sessions]

Experiment No. 3: [1 Session]

3. Implement complex queries in SQL.

Level 1: Implement the conjugate of GROUP BY, ORDER BY and aggregate functions on Banking Database. Level 2: Implement MySQL DB queries on library database using appropriate clauses and aggregate functions. Also order the data either in ascending and descending order using corresponding clause. [Library databases].

Experiment No. 4: [2 Session]

4. To study and implement different types of Set and Join Operations [2 Slots]

Level 1: Demonstrate different types of Set Operations (UNION, UNION ALL, INTERSECT, MINUS) and Join Operations (INNER JOINS, OUTER JOINS, CROSS JOIN, NATURAL JOIN) on two or more tables of Airline Database. Level 2: Use Set and Join operations to retrieve the data from two or more relations(tables) as per the given

scenario. [Airline Database]

Labsheet-3 [2 Practical Sessions]

Experiment No. 5: [2 sessions]

5. To study and implement Views, and Procedures in MySQL DB.

Level 1: Implement MySQL Views, and Procedures in ORACLE DB on Employee database.

Level 2: Analyze the requirement and construct views, and Procedures on Mini Project Domain. [Banking Database]

Labsheet-4 [2 Practical Sessions]

Experiment No. 6: [2 Sessions]

6. To study and implement Functions, and Triggers in MySQL DB.

Level 1: Implement Oracle Functions and Triggers in Oracle on Employee database.

Level 2: Analyze the requirement and construct Functions and Triggers. [Supply chain Database]

Labsheet-5 [2 Practical Sessions]

Experiment No. 7: [2 Sessions]

7. To study and implement Functions, and Triggers in MySQL DB.

Level 1: Implement Oracle Functions and Triggers in Oracle on Employee database.

Level 2: Determine the requirement and construct Functions and Triggers. [Supply chain Database]

Labsheet-6 [4 Practical Sessions]

Experiment No. 8: [2 Sessions]

8. To implement the concept of forms and reports.

Level 1: Implement the concept of forms and reports.

Level 2: Examine the schema relationship.

Experiment No. 9: [2 Sessions]

9. Create the database using the given schema. (Flight Management)

Level 1: Implement a relational database based on the provided schema for the Flight Management system, including the creation of tables, relationships, and constraints.

Level 2: Demonstrate schema relationships by defining primary and foreign keys to ensure data integrity within the Flight Management database.



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Labsheet-7 [4 Practical Sessions]

Experiment No. 10: [2 Sessions]

10. Create the database using the given schema. (Company database)

Level 1: Implement the database schema by defining tables, relationships, and constraints according to the given Company Database schema.

Level 2: Demonstrate the schema's relationships and data integrity by creating and linking tables as per the specified requirements.

Experiment No. 11: [2 Sessions]

11. Create the database using the given schema. (Student Library)

Level 1: Implement forms and reports based on the provided Student Library database schema, ensuring effective data entry and reporting mechanisms.

Level 2: Demonstrate the schema relationships within the Student Library database, demonstrating how these relationships influence the creation and functionality of forms and reports.

Labsheet-8 [1 Sessions]

12. Design a mini project based on the databases such as Inventory Management System, University Management System, Hospital Management System, etc.

Level 1: Implement the real time database.

Level 2: Analyze the working of database in real time.

Targeted Application & Tools that can be used:

Application Area: Relational database systems for Business, Scientific and Engineering Applications. Tools/Simulator used: MySQL DB for student practice.

Also demonstration of ORACLE DB on object-relational database creation and JDBC connection.

Percentage of changes in this version: 50% of changes from earlier version. New topics are highlighted in italic.

- 9. Problem Solving: Constructing ER-Diagrams for a given real time requirements, Normalizing the databases, querying the databases using relational algebra.
- 10. Programming: Implementation of any given scenario using MySQL.

Text Books:

- T1. Elmasri R and Navathe S B, "Fundamentals of Database System", Pearson Publication, 7th Edition, 2018.
- T2. RamaKrishna & Gehrke, "Database Management Systems" 3rd Edition, 2018, McGraw-Hill Education.
- T3. W. Lemahieu, S. vanden Broucke and B. Baesens, "Principles of Database Management: Practical Guide to Storing, Managing and Analyzing Big and Small Data", Cambridge University Press, 2018.

References

R1 Avi Silberschatz, Henry F. Korth, S. Sudarshan, "Database System Concepts", McGraw-Hill ,7th Edition, 2019. R2 M. Kleppmann, "Designing Data-Intensive Applications: The Big Ideas Behind Reliable, Scalable, and Maintainable Systems", O'Reilly, 2017.

Topics relevant to development of "FOUNDATION SKILLS": S - Skill Development: Relational database design using ER- Relational mapping, Implementation of given database scenario using MYSQLDB.

Topics relevant to development of Employability: Develop, test and implement computer databases,

creatingsophisticated, interactive and secure database applications

Topics relevant to "HUMAN VALUES & PROFESSIONAL ETHICS": Nil

Course Code:	Course Title: [Data Analytics			2	0	0	2
CSE2500	Type of Cours	se: Theory - PCC		L-1-P- C				
Version No.	1.0							-
Course Pre-requisites	MAT2402							
Anti-requisites	NIL							
Course Description	Fundamentals transforming, and supports pre-processing an intuitive w the knowledg	s of Data Analytics and modeling data wi in decision-making. Th g, and transformation ay to analysis the data e on data analysis to a	is designed f th the goal of disco e course begins b . It delivers the ba a. This course will wide range of ap	or inspe overing u y coverin asic statis help the plications	ectin sefu g Da tics stuc s.	g, I in Ita an Ien	clea form extra d tau its to	nsing, ation, iction, ight in apply
Course Objective	The objective of the course is to familiarize the learners with the concepts of Fundamentals of Data Analytics and attain SKILL DEVELOPMENT through PROBLEM SOLVING Methodologies							
Course Out Comes	On successful CO1:Describe CO2: Explain c CO3: Demons application an CO4: Apply the	 Dn successful completion of this course, the students shall be able to: CO1:Describe different types of data and variables. CO2: Explain data using appropriate statistical methods. CO3: Demonstrate the collection, processing and analysis of data for any given application and illustrate various charts using visualization methods. CO4: Apply the Data Analysis techniques by R Programming 						
Course Content:								
Module 1	Introduction to Data Analysis- CO1	Assignment	Data Collection, Programming	data analy	/sis,		06 c	lasses

Topics: Introducing Data, overview of data analysis: Data in the Real World, Data vs. Information, The Many "Vs" of Data, Structured Data and Unstructured Data, Types of Data, Data Analysis Defined, Types of Variables, Central Tendency of Data, Scales of Data, Sources of Data. Data preparation.

R Studio: Base R-R Studio IDE-Introduction to R Projects and R Markdown. Basic R: R as a calculator-Scripts and Comments-R Variables. Data I/O: Working Directories-Importing Data Exporting Data-More ways to save-Data I/O in Base R.

Module 2	Data Analysis and Visualization- CO2	Case studies	Programming	10 classes
Topics: Data Sum	marization: One Qu	antitative and Categori	cal Variable. Data Classes: One I	Dimensional

Data Classes-Data Frames and Matrices-Lists. Data Cleaning: Dealing with Missing Data-Strings and Recoding Variables. Manipulating Data in R: Reshaping Data-Merging Datasets. Data Visualizations: Plotting with ggplot2- Plotting with Base R

Module 3	Statistical Analysis -CO3	Case studies	R programming	7 classes			
Topics: Proportion tests-Chi squared test-Fisher exact test-Correlation-T test-Wilcoxon Rank sum tests-							
Wilcoxon signed rank to	est- one-way A	NOVA test- Kruskal Wal	lis test				

Modul	e 4	Predictive Analysis-CO4	Case studies	Programming	7 classes	
Topics resamp regress serial c	s: Linear least-s oling. Regressio sion – estimatinį sorrelation – aut	quares – imple n using Stats g parameters – ocorrelation. Ir	mentation – the models – multip accuracy. Time s itroduction to su	goodness of fit – testing a line ole regression – nonlinear re series analysis – moving averag rvival analysis	ear model – weighted lationships – logistic ges – missing values –	
Target Applica	ed Application 8 ation Area are D	& Tools that ca Decision making	<mark>n be used:</mark> g in business, hea	alth care, financial sector, Me	dical diagnosis etc.	
Text Bo	ooks					
1.	Glenn J. Myatt Data Analysis a	and Wayne P. and Data Minin	Johnson, "Makin g Paperback", Im	g Sense of Data I: A Practical G port, 22 July 2014.	iuide to Exploratory	
2.	 Introduction to statistics and Data analytics, Christian H, Michael S, Springer, 2016 					
3.	 Introduction to R- Robert Parker, John Mushcelli and Andrew Jaffe, Johns Hopkins University, 2020 (E-resource) 					
4.	 Introduction to Time Series and Forecasting (Springer Texts in Statistics), Peter Brockwell, Richard A. Davis, Springer, 2016. 					
Refere	nces					
1.	Making Sense Glenn J. Mvatt	of Data I: A Prac and Wavne P.	ctical Guide to Ex Johnson, Import,	ploratory Data Analysis and Da 22 July 2014.	ita Mining Paperback,	
2.	The R Software Remy Drouilhe	e-Fundamentals t, Benoit Lique	s of Programming t, Springer 2013.	, g and Statistical Analysis -Pierre	e Lafaye de Micheaux,	
Online	resources: http://www.m	odernstatistics	withr.com/soluti	ons.html#solutionsch3		
	https://johnmu https://users.p	uschelli.com/in hhp.ufl.edu/rlp	tro_to_r/ 0176/Courses/PH	IC6089/R_notes/		
Topics	relevant to dev	elopment of "F	OUNDATION SK	ILLS":		
1.	Statistical Cond	cepts for data,	visualization tech	iniques.		
2.	Data collectior	n for project ba	sed assignments.			
3.	Inferential Stat	tistics (T test, Z	test)			
4.	Probability Cal	culation				
for Skil	ll Development	through Proble	em Solving meth	odologies. This is attained thr	ough assessment	

component mentioned in course handout.

Course Code:	Course Title: F	undamentals of Data	Analytics		0 ()	2	1	
CSE2501	Type of Course	e: Lab - PCC		L-T-P- C					
Version No.	1.0							1	
Course Pre-requisites	MAT2402								
Anti-requisites	NIL								
Course Description	Fundamentals transforming, and supports i pre-processing an intuitive w the knowledge	Fundamentals of Data Analytics is designed for inspecting, cleansing, transforming, and modeling data with the goal of discovering useful information, and supports in decision-making. The course begins by covering Data extraction, pre-processing, and transformation. It delivers the basic statistics and taught in an intuitive way to analysis the data. This course will help the students to apply the knowledge on data analysis to a wide range of applications.							
Course Objective	The objective of the course is to familiarize the learners with the concepts of Fundamentals of Data Analytics and attain SKILL DEVELOPMENT through PROBLEM SOLVING Methodologies.								
course out comes	 CO1:Describe different types of data and variables. CO2: Explain data using appropriate statistical methods. CO3: Demonstrate the collection, processing and analysis of data for any given application and illustrate various charts using visualization methods. CO4: Apply the Data Analysis techniques by R Programming 								
Course Content:									
Module 1	Introduction to Data Analysis- CO1	Assignment	Programming				09 c	lasses	
List of Laboratory Task Experiment No. 1: Intr Level 1: Getting Starte Installing R and Basic R syntax Level 2: Working with Understanding Creating and m	oduction to R a ed with R and RS d RStudio. and commands RStudio the RStudio int nanaging R scrip ic Data Handlin	nd RStudio Studio erface. ots. a in R							
Level 1: Data Types an • Vectors, matr • Lists and factor Lists Import and	d Structures in l ices, and data ors. nd Export	R frames.							
 Reading data Exporting dat	from CSV, Exc a to different	el, and text files. ^F ormats.							

• Exporting data to different formats.

Level 3: Exploring Datasets

• Using functions like head(), summary(), and str().

Experiment No. 3: Basic Data structure in R

Level 1: a. Demonstrate a program to join columns and rows in a data frame using cbind() and rbind() in R.

b. Implement different data structures in R (Vectors, Lists, Data Frames)

Level 2: R AS CALCULATOR APPLICATION a. Using with and without R objects on console

- a. Using mathematical functions on console
- b. Write an R script, to create R objects for the calculator application

Module 2	Data Analysis and Visualization- CO2	Assignment	Programming	13 classes				
Experiment No. 1: Data Cleaning and Preprocessing								

Level 1: Handling Missing Data in R

- Identifying missing values.
- Imputing missing values using mean, median, or other methods.
- Level 2: Data Transformation in R
 - Standardizing and normalizing data.
 - Log-transformations and scaling.

Experiment No. 2: Exploratory Data Analysis (EDA) with R

Level 1: Descriptive Statistics

- Calculating mean, median, and standard deviation.
- Visualizing data using histograms, box plots, and scatter plots.

Experiment No. 3: Data Visualization with ggplot2

Level 1: Demonstrate various graphs that can be made and altered using the ggplot2 package. Level 2: Create 500 random temperature readings for six cities over a season and then plot the generated data using ggplot2 packages in R

Module 3	Statistical Analysis -CO3	Assignment	programming	10 classes

Experiment No. 1: Perform Tests of Hypotheses hypothesis test (parametric)

Level 1: How to perform tests of hypotheses about the mean when the variance is known. How to compute the p-value. Explore the connection between the critical region, the test statistic, and the p-value. Level 2: A teacher claims that people who work for only five hours per week will score significantly lower than people who work for ten hours per week on a quantitative abilities test. He brings twenty people and randomly assigned them to one or two groups. In one group he has participants who work for ten hours and in another group, he has participants who work for five hours. He conducts the test for all participants. Scores on the test range from one to ten with higher scores representing better performance. Test if there is any significant difference between those who work for five hours per week versus those who work for ten hours per week based on the test performance.

Experiment No 2: Hypothesis – Non-Parametric Test

Level 1: A car manufacturing company like to find the sales of three types of cars produced by them in three regions and is given. Test if there is an association between the regions and types of cars purchased.

Experiment No 3: Correlation and Covariance

Level 1: Using the iris data set in R

- a. Find the correlation matrix.
- b. Plot the correlation plot on dataset and visualize giving an overview of relationships among data on iris data.
- c. Analysis of covariance: variance (ANOVA), if data have categorical variables on iris data.

Level 2: Ramesh is doing a statistics paper in his post-graduation course. He met his friend Amal who is a textile engineer. Ramesh, who is doing his internship at ABC Researchers, is interested in a question. He poses this question to Amal and tries to find if he can answer. The question is as follows: The data regarding sales of soft- drinks and sales of cotton clothes in a place during the last 12 months are given. Find if there is any association between sales of soft drinks and sales of cott drinks and sales of cotton clothes in a place of cotton clothes. Also explain the reason if there is any relationship.

Analysis-CO4	Module 4	Predictive Analysis-CO4	Assignment	Programming	10 classe
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Experiment No 1: Regression Model

Level 1: Import data from web storage (http://www.ats.ucla.edu/stat/data/binary.csv). Name the dataset and now do Logistic Regression to find out the relation between variables that are affecting the admission of a student in an institute based on his or her GRE score, GPA obtained, and rank of the student. Also check the model is fit or not. Require (foreign), require (MASS).

Level 2: Demonstrate multiple regressions, if data have a continuous Independent variable. Apply on the above dataset

Experiment No. 2: Time Series Analysis in R Level 1: Demonstrate Timeseries analysis using Time Series Data Library at http://robjhyndman.com/TSDL/.

Targeted Application & Tools that can be used:

Application Area are Decision making in business, health care, financial sector, Medical diagnosis etc.

Text Books

- 5. Glenn J. Myatt and Wayne P. Johnson, "Making Sense of Data I: A Practical Guide to Exploratory Data Analysis and Data Mining Paperback", Import, 22 July 2014.
- 6. Introduction to statistics and Data analytics, Christian H, Michael S, Springer, 2016
- 7. Introduction to R- Robert Parker, John Mushcelli and Andrew Jaffe, Johns Hopkins University, 2020 (E-resource)
- Introduction to Time Series and Forecasting (Springer Texts in Statistics), Peter Brockwell, Richard A. Davis, Springer, 2016.

References

- Making Sense of Data I: A Practical Guide to Exploratory Data Analysis and Data Mining Paperback, Glenn J. Myatt and Wayne P. Johnson, Import, 22 July 2014.
- The R Software-Fundamentals of Programming and Statistical Analysis -Pierre Lafaye de Micheaux, Remy Drouilhet, Benoit Liquet, Springer 2013.

Online resources:

http://www.modernstatisticswithr.com/solutions.html#solutionsch3 https://johnmuschelli.com/intro_to_r/ https://users.phhp.ufl.edu/rlp176/Courses/PHC6089/R_notes/

Topics relevant to development of "FOUNDATION SKILLS":

- 2. Statistical Concepts for data, visualization techniques.
- 3. Data collection for project based assignments.
- 4. Inferential Statistics (T test, Z test)
- 5. Probability Calculation

for Skill Development through Problem Solving methodologies. This is attained through assessment component mentioned in course handout.

Catalogue prepared	
by	
Recommended by the	
Board of Studies on	
Date of Approval by	
the Academic Council	

urse Code: urse Title: Analysis of Algerithms									
arse Code:	e of Course: Theory PCC	oriunms		Г-Р-С	3	1	0	4	
rsion No.								<u> </u>	
urse Pre-									
requisites									
ti-requisites									
urse Description	This course introduces te	chniques for the design	and analysis	s of efficie	nt alg	orithn	ns and		
	methods of applications.	This course discusses th	e classic ap	proaches f	for alg	orithn	n desig	gn	
	such as Divide and Conq	uer, Dynamic Programn	ning, Greed	y method.	This c	course	also		
	describes other basic stra	tegies searching solution	n space. The	core con	cepts o	of anal	yzing		
	algorithms and classifyin	g them into various com	plexity clas	ses is cov	ered in	n the e	nd.		
urse Objective	The objective of the councertain Algorithms and attain Sk	urse is to familiarize the till Development throug	e learners w h <mark>Problem</mark> (vith the co <mark>Solving</mark> M	oncep ethod	ts of <mark>/</mark> ologie	<mark>Analys</mark> s.	<mark>is of</mark>	
urse Out Comes	Inse Out ComesOn successful completion of the course the students shall be able to:1. Compute efficiency of a given algorithm.[Apply]								
2. Apply divide and conquer technique for searching and sorting Problems.[Apply]									
	3. Apply the Dynamic P	rogramming technique	for a given p	problem. [Apply	·]			
	4. Apply greedy technique for solving a Problem.[Apply]								
	5. Demonstrate Back tracking technique and limitations of Algorithms.[Apply]								
urse Content:	urse Content:								
dule 1	roduction	ignment	ulation/Da	ta Analysi	S	10 9	Sessio	ns	
Introduction, Asymptotic Notations and its properties, Best case, worst case and average case- Sequential search, Sorting; Mathematical analysis for Recursive and Non-recursive algorithms: Substitution method and Master's Theorem.									
dule 2	vide-and-conquer	ignment	ulation/Da	ta Analysi	S	08 9	Sessio	ns	
oduction. Insertio	on Sort; Merge sort, Quick	sort, Binary search.							
dule 3	namic programming	m paper/Assignment	nulation/Da	ta Analysi	S	10 5	Sessio	ns	
roduction with ex Warshall's Algo	kamples, Principles of Mer writhms. Chain Matrix Mult	moization, 0-1 Knapsac	k Problem,	Bellman-l	Ford a	lgorit	hm, Fl	oyd-	
dule 4	eedy technique	m paper/Assignment	ulation/Da	ta Analysi	S	09 9	Sessio	ns	
Introduction, Fra Algorithm, Sing	actional Knapsack Problem le-source Shortest Path: Di	ı, Minimal Spanning Tre jkstra's Algorithm	e: Prim's A	lgorithm a	nd Kr	uskal'	S		
dule 5	mplexity Classes	m paper/Assignment	ulation/Da	ta Analysi	S	08 9	Sessio	ns	
Complexity Cla	sses- P,NP- NP Hard and N	P Complete - Boolean Sa	atisfiability F	Problem (S	SAT).				
inch and Bound: R	chapsack problem; Backtra	cking, - N-Queens probl	em.						
t Book 1. Anany I 2018.	evitin, "Introduction to the	e Design and Analysis of	Algorithms'	', 3rd editi	on, Pe	arson	Educa	ition,	
2. Thomas	H.Cormen, Charles E.Leis	erson, Ronald L. Rivest	and Cliffor	d Stein, "I	Introd	uction	to		
Algorith	ems", 4th edition, MIT Pres	s, 2022.							
erences									
1. J. Klein	berg and E. Tardos, "Algor	ithm Design", Addison-	Wesley, 200)5.					
2. Tim Rot	ughgarden, "Algorithms Ill	<i>uminated</i> " (books 1 thro	ough 3), "Op	perating S	ystem	s Desi	gn and	1	

Implementation", Soundlikeyourself Publishing, 2017-2019.

- 3. AV Aho, J Hopcroft, JD Ullman, "The Design and Analysis of Algorithms", Addison-Wesley, 1974.
- 4. Donald E. Knuth, "The Art of Computer Programming", Volumes 1and 3 Pearson.

b-Resources

- 1. <u>NPTEL: https://onlinecourses.nptel.ac.in/noc19_cs47/preview</u>
- 2. Coursera: Analysis of Algorithms by Princeton University
- 3. <u>Algorithms Specialization in Coursera by Stanford University(Group of 4 courses)</u>.
- 4. Algorithms Coding Contest Links maintained by Prof Gerth Stølting Brodal of Aarhus University

pics relevant to "SKILL DEVELOPMENT": knapsack, prim's, kruskal's algorithm, quick sort, binary search for Skill
 Development through Problem Solving methodologies. This is attained through assessment component
 mentioned in course handout.

Catalogue	Dr Murali Parameswaran
prepared by	
Recommended	
by the Board	S NO: XX th BOS, held on N/NN/202N
of Studies on	
Date of	
Approval by	
the Academic	ademic Council Meeting No. XX ^{III,} Dated N/NN/202N
Council	

Course	Course Title: Analysis of Algorithms Lab								
Code:	Type of Course: Lab - PCC	L- T-P- C	0	0	2	1			
CSE2263									
Version	1								
No.									
Course Pre-	Nil								
requisites									
Anti-	NIL								
requisites		C CC : :		1	•.1	1			
Course Description	This course introduces techniques for the design and analysis of methods of applications. This course discusses the classic approa- such as Divide and Conquer, Dynamic Programming, Greedy describes other basic strategies searching solution space. The c algorithms and classifying them into various complexity classes	aches for a method. ' ore conce	t a alg Th pts ed i	lgo ori is s o n t	thm cours f ana	ns and design se also lyzing nd.			
Course	The objective of the course is to familiarize the learners with	the conc	ep	ts	of <mark>A</mark>	nalysis			
Objective	of Algorithms and attain Skill Development through Experiential Learning								
	Niethodologies.	able to:							
	1. Compute efficiency of a given algorithm. [Applying]	able to.							
	2. Apply divide and conquer technique for searching and sorting Problems [Applying]								
Course Out Comes	3. Apply the Dynamic Programming technique for a given problem. [Applying]								
	4. Apply greedy technique for solving a Problem.[Applying]								
	5 Demonstrate Back tracking technique and limitations of Alg	Back tracking technique and limitations of Algorithms [Applying]							
Course	5. Demonstrate Dack tracking teeninque and minitations of Arg	51101115.[7	<u>чр</u>	pry	mgj				
Content									
Module 1	Introduction				Se	3 ssions			
Measuring r algorithms s	unning time of an algorithm, Compare running time of algorithm such as bubble sort, selection sort	ms, Imple	me	ent	sort	ing			
Module 2	Divide-and-conquer				Se	3 ssions			
Compare se Sort, Merge	arching algorithms: Linear Search, Binary Search; Compare Sort Sort, QuickSort.	ing algori	thr	ns:	Inse	rtion			
Module 3	Dynamic programming				Se	3 ssions			
Introductior	and memorization: Factorial; Coin Change Problem ; Floyd-Wa	rshall's A	lgo	rit	hm.				
Module 4	Greedy technique				Se	3 ssions			
Fractional K algorithm	napsack Problem; Minimal Spanning Tree Algorithms-Prim's Alg	;orithm, K	rus	ska	ıl's				
Module 5	Complexity Classes				Se	3 ssions			
Branch and	Bound: Knapsack problem; Backtracking, - N-Queens problem.								
	List of Laboratory Tasks:								

1. N	Aeasuring running time of an algorithm
	Objective: To experimentally determine the running time of basic algorithms
	for input size n=10, 100, 1000, etc. by taking difference of starting time and
	ending time.
2. 0	Compare running time of algorithms
	Objective: To execute two algorithms to solve the same problem, and to
	comparatively evaluate the better algorithm for large values of N.
3. I	mplement sorting algorithms such as bubble sort, selection sort
	Objective: To implement comparison based sorting strategies.
4. C	Compare searching algorithms
	Objective: To implement two searching strategies and compare their
	performance.
5. C	Compare Sorting algorithms
	Objective: To implement searching strategies that follow top down design
	approach(Insertion sort, merge sort).
6. 0	Quick Sort
	Objective: To demonstrate Quick sort and its variants, and their impact on
	running time.
7. C	Dynamic Programming
	Objective: To demonstrate Dynamic Programming approach with the help of
	Factorial algorithm.
8. C	Coin Change Problem
	Objective: To implement an efficient algorithm for the Coin Change problem.
9. F	loyd-Warshall's Algorithm
	Objective: To demonstrate how dynamic programming is used with the help
	of Floyd-Warshall's algorithm.
10.	Fractional Knapsack Problem
	Objective: To demonstrate how greedy method can be used to solve the
	Fractional Knapsack Problem.
11.	Minimal Spanning Tree Algorithm
	Objective: To implement greedy strategy to solve the Minimal Spanning Tree
	problem using Prim's Algorithm.
12.	Kruskal's Minimal Spanning Tree Algorithm
	Objective: To implement greedy strategies to solve the Minimal Spanning Tree
12	problem using Kruskal's Algorithm.
13.	Chiestive To implement Knonsock problem using brench and bound
	to shrique
1.4	technique.
14.	N-Queen's Problem Objectives To domonstrate backtracking method with the balm of N Queen's
	problem
15	problem. Casa Study
15.	Case Sluuy Objective: To demonstrate how various techniques can be used to solve the
	same problem with the bein of Knansack problem
Tar	geted Application & Tools that can be used
	1. PyTorch/Jupyter Notebook – For Python programming
Тех	t Book
11	Anany Levitin, Introduction to the Design and Analysis of Algorithms", 3rd edition,

Pearson Education, 2018.
T2 Thomas H.Cormen, Charles E.Leiserson, Ronald L. Rivest and Clifford Stein,
 "Introduction to Algorithms", 4th edition, MIT Press, 2022.
References R1. J. Kleinberg and E. Tardos, " <i>Algorithm Design</i> ", Addison-Wesley, 2005. R2. Tim Roughgarden, " <i>Algorithms Illuminated</i> " (books 1 through 3), "Operating Systems Design and Implementation", Soundlikeyourself Publishing, 2017-2019.
K5. AV Ano, J Hopcront, JD Ullman, <i>The Design and Analysis of Algorithms</i> ,
R4. Donald E. Knuth, " <i>The Art of Computer Programming</i> ", Volumes 1 and 3 Pearson.
Web Based Resources and E-books: W1. <u>NPTEL</u> : <u>https://onlinecourses.nptel.ac.in/noc19_cs47/preview</u>
W2. Coursera: Analysis of Algorithms by Princeton University
W3. <u>Algorithms Specialization in Coursera by Stanford University(Group of 4 courses).</u>
W4. <u>Algorithms Coding Contest Links maintained by Prof Gerth Stølting Brodal of</u>
 Aarhus University
Topics relevant to "EMPLOYABILITY SKILLS": The lab experiments and assessments enable the student to acquire Skill Development through Experiential Learning techniques



P



Presidency University Act, 2013 of the Karnataka Act No. 41 of 2013 | Established under Section 2(f) of UGC Act, 1956 Approved by AICTE, New Delhi

Itgalpur, Rajankunte, Yelahanka, Bengaluru – 560064

urse Code:	Course Title: Essentials	s of Artificial Intelligence m Core Course -Theory	2	P-C	3			3
urse Pre-requisites	NIL							
ci-requisites								
urse Description	This course introduces the student to the basics of artificial intelligence. In this course, the student first learns the various search methods for problem-solving, followed by knowledge-based logic representations. After that, the student will learn about uncertainty in AI, as well as approaches to solve such challenges such as Naïve Bayes Classifier and Hidden Markov Models. Topics: Uninformed search, Heuristic search, Local search, Adversarial search, Constraint satisfaction, logic, First Order Resolution, Probability, Naïve Bayes Classifier, and Hidden Markov Model (HMM).							
urse Objectives	The objective of the course is EMPLOYBILITY of student by using EXPERIENTIAL LEARNING techniques.							
urse OutComes	On successful completion of this course the students shall be able to: 5. Explain different methods of searching, proving, and analysis in AI [Understand] 6. Implement various graphical and adversarial search algorithms. [Apply] 7. Prove, by resolution, different situations using First Order Logic [Apply] 8. Solve sequence labeling problems using HMM [Apply]							
Course Content:								
dule 1	dule 1 Irch Methods for blem-Solving Tests TEL Assignments Sessions: 13							
Introduction – Hist Formulation of Sea First Search, Dept Single-Source Shor Uninformed Searc Search, A* Search	Introduction – History of AI, Agents and Environment, Types of AI and Learning. State Space Search; General Formulation of Search Problems; Data Structures used in Searching. Uninformed Search Algorithms – Breadth First Search, Depth First Search, Uniform Cost Search, Generalized Uniform Cost Search (a.k.a Dijkstra's Single-Source Shortest Path), Iterative Deepening Depth-First Search, Time and Space Complexity Analysis of Uninformed Search Algorithms. Heuristic Search Algorithms – Heuristics and Admissibility, Greedy Best-First Search, A* Search and weighted A* Search.							
dule 2	vanced Search Methods	blem-Solving Tests	TEL Assig	nments		s	r Sessio	No. of ons: 12
Local Search – Local Search, Hill Climbing, Genetic Algorithms, Gradient Descent. Adversarial Search – Minimax Search, Alpha-Beta Pruning, Ideal Ordering. Constraint Satisfaction – Constraint Satisfaction Problems Definitions and Examples – Map Colouring, N Queens, Cryptarithmetic, Generalized CSP; Back- tracking Heuristics: Arc Consistency and Path Consistency								
dule 3	wledge-Based Logic Representation	comated Theorem Proving using FOL Resolution	TEL Assig	nments		Sessi	l ons:	No. of 10
Propositional Logic Conjunctive and D Logical connective Principle. Proposit	c – Syntax and Semant Disjunctive Normal Form es. Inference Rules. Con <u>ional and</u> First Order Res	tics of Propositional Lc s. First Order Logic – Sy njunctive and Disjunctiv <u>solution.</u> Applications fo	ogic. Logi intax and ie Norma or solving	ical conne Semantic al Forms. <u>s sto</u> ry pro	ctives. s of Pro Resolut <u>ble</u> ms u	Infere positi ion – Ising F	ence ional Reso Reso	Rules. I Logic. olution lution
dule 4	certainty in Al	presenting problems as HMM	TEL Assig	nments		s	l Sessio	No. of ons: 06

Probability – Probability Definitions. Conditional Probability. Bayes Theorem. Naïve Bayes Classifier. Using Naïve Bayes Classifier for Supervised Learning. **Hidden Markov Models** – Definition of HMM. Sequence Labeling and Markov Assumption. Sub-Problems in HMM and their solutions – Forward Probability and Viterbi Algorithm. Applications of Sequence Labeling in Natural Language Processing (Eg. Part-of-Speech Tagging). **Introduction to Deep Learning** – Artificial Neurons, Activation Functions, Multilayer Perceptron.

Targeted Application & Tools that can be used:

- 5. Implementation of a shortest-path finder using different search algorithms.
- 6. Implementation of a sequence labeler using Viterbi Algorithm.

ject work/Assignment: Mention the Type of Project /Assignment proposed for this course

2. Group project on one of the topics mentioned above (Eg. Adversarial search).

tbook(s):

- 4. Stuart Russel and Peter Norvig. *Artificial Intelligence: A Modern Approach*. 4th Edition. Pearson Education. 2022.
- 5. Lavika Goel. *Artificial Intelligence: Concepts and Applications*. 1st Edition. Wiley. 2021.
- 6. Elaine Rich, Kevin Knight and Shivashankar B Nair. *Artificial Intelligence*. 4th Edition. MedTech Science Press. 2024.

erences:

- 4. Deepak Khemani. A First Course in Artificial Intelligence. 1st Edition. 6th Reprint, 2018.
- Munesh Chandra Trivedi. A Classical Approach to Artificial Intelligence. 2nd Edition. Khanna Publishers. 2018.
- 6. George Luger. *Artificial Intelligence: Structures and Strategies for Complex Problem Solving*. 6th Edition. Pearson Education. 2021.

blinks

- 6. NPTEL Courses: Mausam (IIT Delhi), "An Introduction to Artificial Intelligence" Link: https://nptel.ac.in/courses/106102220.
- Shyamanta M. Hazarika (IIT Guwahati), "Fundamentals of Artificial Intelligence". Link: <u>https://nptel.ac.in/courses/112103280</u>. Useful for the full course.
- 8. Deepak Khemani (IIT Madras), "Artificial Intelligence: Search Methods for Problem-Solving". Link: <u>https://nptel.ac.in/courses/106106226</u>. Useful for Module 1 and 2
- 9. Deepak Khemani (IIT Madras), "Artificial Intelligence: Knowledge Representation and Reasoning". Link: <u>https://nptel.ac.in/courses/106106140</u>. Useful for Module 3.
- 10. Deepak Khemani (IIT Madras), "Al: Constraint Satisfaction". Link: https://nptel.ac.in/courses/106106158. Useful for Module 2.

Catalogue prepared by	Dr. Sandeep Albert Mathias
Recommended by the Board of Studies on	BOS NO: SOCSE 2 nd BOS held on 17/03/25
Date of Approval by the Academic Council	Academic Council Meeting No 21, Dated 17/03/25







Presidency University Act, 2013 of the Karnataka Act No. 41 of 2013 | Established under Section 2(f) of UGC Act, 1956 Approved by AICTE, New Delhi

Itgalpur, Rajankunte, Yelahanka, Bengaluru – 560064

urse Code:	Course Title: Essentials of AI Lab	-Р-С	0			1	
	e of Course: Program Core Course - Lab						
SIOTI NO.	NII						
i-requisites	-						
arse Description	This course introduces the student to the basics of artificial intelligence. In this course, the student first learns the various search methods for problem-solving, followed by knowledge-based logic representations. After that, the student will learn about uncertainty in AI, as well as approaches to solve such challenges such as Naïve Bayes Classifier and Hidden Markov Models. Topics: Uninformed search, Heuristic search, Local search, Adversarial search, Constraint satisfaction, logic, First Order Resolution, Probability, Naïve Bayes Classifier, and Hidden Markov Model (HMM).						
urse Objectives	The objective of the course is EMPLOYBILITY of studen techniques.	it by using E	EXPERIE	NTIAL	LEA	RNING	
Jrse OutComes	 On successful completion of this course the students shall be able to: 5. Explain different methods of searching, proving, and analysis in AI [Understand] 6. Implement various graphical and adversarial search algorithms. [Apply] 7. Prove, by resolution, different situations using First Order Logic [Apply] 8. Solve sequence labeling problems using HMM [Apply] 						
Course Content: No. of Sessions: 15 (30 hours)							
Course Content:	No	. of Session	s: 15 (3	0 hour	s)		
Course Content: Experiment No. 1: Level 1: Read text Level 2: Parse text Experiment No. 2: Level 1: Implemen Level 2: Implemen	No File Handling files using Python files using Python Implementation of Graph Representations t graph representations by taking input from the conso t graph representations by taking input from files.	. of Session	ıs: 15 (3	0 hour	s)		
Course Content: Experiment No. 1: Level 1: Read text Level 2: Parse text Experiment No. 2: Level 1: Implemen Level 2: Implemen Experiment No. 3 & Level 1: Implemen Level 2: Implemen graphs	File Handling files using Python files using Python Implementation of Graph Representations t graph representations by taking input from the consol t graph representations by taking input from files. & 4: Implementation of Uninformed Search Algorithms t uninformed search algorithms – BFS and DFS – on unit t uninformed search algorithms – Uniform Cost Search	e of Session de weighted g	raphs. ra's SSS	0 hour	s)	eighted	
Course Content: Experiment No. 1: Level 1: Read text Level 2: Parse text Experiment No. 2: Level 1: Implemen Level 2: Implemen Level 2: Implemen graphs Experiment No. 5: Level 1: Calculate to Level 2: Implemen	No File Handling files using Python files using Python Implementation of Graph Representations t graph representations by taking input from the consol t graph representations by taking input from files. & 4: Implementation of Uninformed Search Algorithms t uninformed search algorithms – BFS and DFS – on unit t uninformed search algorithms – Uniform Cost Search Implementation of Heuristic Search Algorithms the upper-bounds of admissible heuristics using Dijkstratic t Greedy Best-First Search and A* Search Algorithms.	of Session de weighted g and Dijkst	raphs. ra's SSS	0 hour	s)	eighted	
Course Content: Experiment No. 1: Level 1: Read text Level 2: Parse text Experiment No. 2: Level 1: Implemen Level 2: Implemen Level 2: Implemen graphs Experiment No. 5: Level 1: Calculate to Level 2: Implemen Experiment No. 6 & Level 1: Implemen Level 2: Perform A	File Handling files using Python files using Python Implementation of Graph Representations t graph representations by taking input from the consol t graph representations by taking input from files. & 4: Implementation of Uninformed Search Algorithms t uninformed search algorithms – BFS and DFS – on unit t uninformed search algorithms – Uniform Cost Search Implementation of Heuristic Search Algorithms the upper-bounds of admissible heuristics using Dijkstratic Greedy Best-First Search and A* Search Algorithms. & 7: Implementation of Adversarial Search t a Game Tree Ipha-Beta Pruning and Ideal Ordering	of Session de weighted g a and Dijkst	raphs. ra's SSS	0 hour	r s)	eighted	

Level 2: Implemen	t a CSP solver for map colouring
Experiment No. 10	: Using Python Packages for CSP
Level 1: Implemen	t a CSP solver for Sudoku
Level 2: Implemen	t a CSP solver for Addoku
Experiment No. 11	: Implement a Family Tree Parser
Level 1: Perform lo	ogic programming using logpy.
Level 2: Implemen	t a family tree parser
Experiment No. 12	& 13: Implement a Decision Maker
Level 1: Implemen	t a Minesweeper solver
Level 2: Implemen	t a Battleship solver
Experiment No. 14	& 15: Hidden Markov Model
Level 1: Implemen	t a generic HMM
Level 2: Build a Po	S Tagger using a HMM with the Brown Corpus and the Universal Dependencies Tagset.
largeted Application	on & Tools that can be used:
7. Google Colab	
8. Python IDEs I	ike PyCharm
Project work/Assig	nment: Mention the Type of Project /Assignment proposed for this course
The course is a lab	p-based course with all the assessments centrally evaluated. Every experiment consists of
two sessions. The	first session involves exploring a solution to the problem. The second session involves
solving a particula	r problem.
tbook(s):	
3. Stuart Russe	and Peter Norvig. Artificial Intelligence: A Modern Approach. 4 th Edition. Pearson
Education 20	172
A Dratack lock	and Alberto Artacanchez, Artificial Intelligence with Puthen 2 nd Edition Deckt, 2020
4. Prateek joshi	and Alberto Artasanchez. Artificial intenigence with Python. 2 Edition. Packt. 2020.
erences:	the second se
3. Deepak Kł	iemani. <i>A First Course in Artificial Intelligence</i> . 1 st Edition. 6 st Reprint, 2018.
4. Munesh (Chandra Trivedi. A Classical Approach to Artificial Intelligence. 2 nd Edition. Khanna
Publishers	. 2018.
Catalogue	
prepared by	Dr. Sandeep Albert Mathias
Recommended	
by the Board of	BOS NO: SOCSE 2^{nd} BOS held on $17/03/25$
Studies on	
Date of Approval	
by the Academic	Academic Council Meeting No 21 Dated 17/03/25
sy the Academic	readenice courch freeding to 21, Duca 17, 00/20

Council



Itgalpur, Rajankunte, Yelahanka, Bengaluru – 560064

Course Code: CSE2266	Course Title: Theory of Comput Type of Course: Theory Only	ation	L- T-P- C	3	0	0	3			
Version No.	2.0	2.0								
Course Pre- requisites										
Anti-requisites	NIL									
Course Description	The course deals with introduction of formal languages and the correspondence between language classes and the automata that recognize them. Topics include: Formal definitions of grammars and acceptors, Deterministic and Nondeterministic systems, Grammar ambiguity, finite state and push-down automata; normal forms; Turing machines and its relations with algorithms.									
Course Objective	The objective of the course is to familiarize the learners with the concepts of Theory of Computation as mentioned above and attain Skill Development through Problem Solving Methodologies.									
Course Outcomes	On successful completion of the course the students shall be able to: 1. Describe various components of Automata. (Knowledge) 2. Illustrate Finite Automata for the given Language. (Application) 3. Distinguish between Regular grammar and Context free grammar. (Comprehension) 4. Construct Push down Automata. (Application) 5. Construct Turing machine for a Language. (Application)									
Course Content:										
Module 1	Introduction to automata theory	Assignment	Problems or and Languag operations	n Strii ge	ngs	6 cl	asses			
Topics: Introduction to Automata Theory, Applications of Automata Theory, Alphabets, Strings, Languages & operations on languages, Representation of automata, Language recognizers, Finite State Machines (FSM): Deterministic FSM, Regular languages, Designing FSM, Nondeterministic FSMs										
Module 2	Finite Automata	Assignment	Assignment Problems on NFA's	n DFA	A,	13 Sessi	ons			

Topics: Basic concepts of Finite automata, DFA- definitions of DFA, Deterministic Accepters Transition Graphs and Languages and DFA's, Regular Languages, NFA- Definition of a Nondeterministic Accepter, Languages and NFA's Why Non- determinism? Equivalence of Deterministic and Nondeterministic Finite Accepters, Reduction of the Number of States in Finite Automata. **Regular Expressions & Context** Assignment Problems on RE, 12 CFG, PT, PL and Sessions Free Grammar Module 3 Ambiguity **Topics:** Formal Definition of a Regular Expression, Languages Associated with Regular Expressions, Languages, Regular Languages (RL) and Non-regular Languages: Closure properties of RLs, to show some languages are not RLs, Closure Properties of Regular Context Free Grammars-Examples of Context-Free Languages, Leftmost and Rightmost Derivations, Derivation Trees, Relation Between Sentential Forms and Derivation Trees, Ambiguity in Grammars and Languages: Ambiguous Grammars, Removing Ambiguity, Chomsky Normal Form, Gribiche Normal Form. Module 4 08 Sessions Push down Problems on Assignment Automata pushdown Automaton Topics: Definition of a Pushdown Automaton, Language Accepted by a Pushdown Automaton, Acceptance by Final State, Acceptance by Empty Stack, From Empty Stack to Final State, From Final State to Empty Stack Equivalence of PDA's and CFG's: From Grammars to Pushdown Automata. Module 5 Turing Machine Assignment Problems on Turning 07 Sessions Machine **Topics:** Definition of a Turing Machine, Turing Machines as Language Accepters, Example Languages to construct Turing machine, Turing Machines as Transducers, Halting Programming Techniques for Turing Machines **Targeted Application & Tools that can be used: Targeted Application:**

- 1. Text Processing
- 2. Compilers
- 3. Text Editors
- 4. Robotics Applications
- 5. Artificial Intelligence

Tools:

1. JFLAP (Java Formal Language and Automata Package) Software simulation tool. It's interactive educational

software written in Java to experiment topics in automata theory.

2. Turing machine Online simulators.

Text Book(s):

1. Peter Linz, "An introduction to Formal Languages and Automata", Jones and Bartlett Publications 6th Ed, 2018.

Reference(s):

1. Aho, Ullman and Hopcroft, "Theory of Computation", Pearson India 3rd Edition 2008.

2. Michael Sipser, "Theory of Computation", Cengage India 3rd Ed, 2014.

E-Resources

 $NPTEL\ course - https://online courses.nptel.ac.in/noc21_cs83/preview$



Itgalpur, Rajankunte, Yelahanka, Bengaluru – 560064

				1	1	1	1
Course Code:	Course Title: Cryptography and	Network					
	Security		L- T-P- C	3	0	0	3
CSE502				-		-	
	Type of Course: Theory - PCC						
Version No.	2.0				1	1	
Course Pre- requisites							
Anti-requisites	NIL						
Course Description	The Course deals with the principles and practice of cryptography and network security, focusing in particular on the security aspects of the web and Internet						
Course Objective	The objective of the course is to familiarize the learners with the concepts of Cryptography and Network Security above and attain Skill Development through Problem Solving methodologies.						
Course Outcomes	On successful completion of this course the students shall be able to: 1. Describe the basic concept of Cryptography						
	 Classify different types of Cryptographic Algorithms Solve Mathematical problems required for Cryptography Illustrate Network Security concepts 						
Course Content:							
Module 1	Introduction to Cryptography	Assignmen t	Recognize the techniques	2		7 Se	ssions
Introduction to Cryptography, Model of Network Security, OSI Security architecture, Security Attacks: active attacks, passive attacks, services: Authentication, Access Control, Data Confidentiality, Data Integrity, Nonrepudiation, Substitution Ciphers : Play-fair and Hill Cipher, Vigenere cipher, Introduction to Block Cipher and Stream Cipher, Feistel Structure, ECB modes of block cipher.							
Module 2	Symmetric Encryption Algorithm	Assignmen t	Analysis of so	olutic	ons	9 Ses	sions

Overview of Publ	ic Key Cryptography,	RSA, Diffie-	Helman H	Key	exchange, Man in	the mi	ddle attack,
Cryptographic Ha	sh functions, Secure H	lash Algorith	m, Messa	age A	Authentication Co	des – H	IMAC,
Digital Signature,	Ei-gamal Encryption,	Elliptic curv	e cryptog	graph	iy overview.		
Module 3	Public Key Cryptogr	aphy	Assignm s	ent	Analysis of solution	ons	9 Sessions
Overview of Publ	ic Key Cryptography,	RSA, Diffie-	Helman I	Key	exchange, Man in	the mi	ddle attack,
Cryptographic Ha Digital Signature,	sh functions, Secure H Ei-gamal Encryption,	lash Algorith Elliptic curv	m, Messa e cryptog	age A graph	Authentication Coordinate of the second seco	des – H	IMAC,
Module 4	Network Security	Assignment		Ana	lysis of solutions	05 Sess	sions
Topics:				I			
Network Security Network Security Security: IPSec ar	fundamentals, Networ applications: e-mail se chitecture, Network Se	k Security ap ecurity: PGP, ecurity appli	pplication MIME, 1 cations: D	ns: A Netw DNS	uthentication: Ker vork Security appl Security.	rberos, lication	PKI, s: IP
Targeted Applica	ition & Tools that car	n be used:					
Students get the k encryption and de	nowledge about crypto cryptions & the techni	ography tech ques for auth	niques fol nentication	llow n and	ed, the algorithms d confidentiality c	used for the second sec	or ages.
Text Book(s):							
T1 William Stallin Pearson publicatio	ngs, "Cryptography an on, ISBN: 978-93-325-	d Network S -8522-5, 201	ecurity -] 7	Princ	ciples and Practice	es", 7th	Edition,
Reference(s): R1 Bruice Schneier, "Applied Cryptography – Protocols, Algorithms and Source code in C", Second Edition, Wiley Publication, ISBN: 978-81-265-1368-0, 2017 R2 Cryptography and Network Security, Express Learning, ITL Education Solution Limited. R3 e-pg pathshala UGC lecture series Web references: https://puniversity.informaticsglobal.com:2229/login.aspx?direct=true&db=nlebk&AN=2233842&site =ehost-live https://nptel.ac.in/courses/106105031.							
Topics relevant to 1. Play-fair and H 2. Euclidean and H 3. Secure Hash Al 4. Diffie-Helman 5. Totient Function 6. Fermat's little t	"Skill Development": ill Cipher Extended Euclidean Al gorithm Key exchange n. heorem	Topics relev	vant to "S	kill I	Development":		

urse Code: CSE2267	Course Title: Machine Type of Course: Progra	Learning Techniques am Core -Theory		-Р-С	3			3
rsion No.						•		
urse Pre- requisites	NIL							
ti-requisites								
urse Description	Machine Learning algorithms are the key to developing intelligent systems such as Apple's Siri, Google's self-driving cars, and more. This course introduces the core concepts and essential algorithms of various machine learning techniques, including Regression learning, Bayesian learning, Ensemble learning, Perceptron learning (foundations of Neural Networks), Unsupervised learning, Competitive learning, learning from Gaussian Mixture Models, and learning to detect outliers. The course lectures cover both the theoretical foundations and practical algorithms for these learning methods. Lab sessions complement the lectures, enabling students to develop intelligent systems for real life problems using Puthon libraries.							
urse Objectives	The primary objective leveraging EXPERIENT applying machine learn	of this course is to en IAL LEARNING technic ning to real-world chall	hance tl ques. St enges.	he EMPLOY udents will	(ABILI I gain	TY of pract	stude ical s	ents by kills in
urse OutComes	 On successful completion of this course the students shall be able to: 9. Apply advanced supervised machine learning methods for predictive modeling. [APPLY] 10. Produce machine learning models with better predictive performance using meta- learning (ensemble) algorithms. [APPLY] 11. Create predictive models using Perceptron learning algorithms, understanding their foundational role in neural networks. [APPLY] 12. Employ advanced unsupervised learning algorithms for clustering, competitive learning, and outlier detection. [APPLY] 13. Implement machine learning-based intelligent models using Python libraries and 							
Course Content:								
dule 1	pervised Learning	ignment	dule Te	sts			Sessi	No. of ons: 12
Overview of Machine Learning (ML): ML workflow, types of ML (supervised, unsupervised, reinforcement), types of features, Feature Engineering (Data Imputation Methods). Regression: Introduction, Simple Linear Regression, Loss Functions (MSE, MAE, RMSE), Polynomial Regression, Logistic Regression, Softmax Regression with Cross-Entropy as cost function. Bayesian Learning: Bayes Theorem, estimating conditional probabilities for categorical and continuous features, Naïve Bayes for supervised learning, Bayesian Belief Networks. Support Vector Machines (SVM): Soft margin and kernel tricks (Polynomial, RBF, Sigmoid). Evaluation Methodologies: Testing Dataset, Train-Validation-Testing split, N-Fold Cross Validation (K-Fold, Stratified K-Fold)								
dule 2	emble Learning	ignment	dule Te	sts		9	Sessi	No. of ons: 11
Introduction to Ensemble Learning: Motivation, bias-variance trade-off. Bagging: Using subsets of instances (Bagging, Pasting), using subsets of features (Random Patches, Random Subspaces method). Ensemble Methods: Voting Classifier (Hard and Soft Voting), Random Forest (Algorithm, Feature Importance). Boosting: AdaBoost (Adaptive Boosting), Gradient Boosting Machines (GBM), Extremely Bandomized Trees, Stacking (Meta-Learning)								
dule 3	ceptron Learning & Neural Networks Foundation	signment	dule Te	ests			Sessi	No. of ons: 11

From Biological to Artificial Neurons: Basic structure of a neuron. Perceptrons: Single-layer Perceptrons, Linear Threshold Units, logical computations with Perceptrons (AND, OR, NOT). Activation Functions: Common activation functions (Sigmoid, Tanh, ReLU, Leaky ReLU, ELU, Softmax) and their properties. Loss Functions: Common loss functions for classification (Binary Cross-Entropy, Categorical Cross-Entropy) and regression (MSE, MAE). Multi-layer Perceptrons (MLP): Architecture, advantages over single Perceptrons.

Backpropagation Algorithm: Understanding the concept of backpropagation, Gradient Descent and its variants (Stochastic Gradient Descent, Mini-batch Gradient Descent, Adam, RMSprop).

dulo 4	supervised Learning & ignment		No. of				
uule 4	Advanced Topics	ppics		Sessions: 11			
Clustering: Simp	le K-Means Clustering	g (Algorithm, Simple	and Mini-Batch), u	updating centroids			
incrementally. K-N	/leans Enhancements: F	inding the optimal num	nber of clusters (Elbow	Method, Silhouette			
Coefficient), drawbacks of K-Means, K-Means++. Hierarchical Clustering: Divisive hierarchical clustering							
(Bisecting K-Mean	s), clustering using Mini	mum Spanning Tree (M	ST). Competitive Learn	ing: Clustering using			
Kohonen's Self-Or	ganizing Maps (SOM). D	ensity-Based Clustering	: DBSCAN (Density-Base	ed Spatial Clustering			
of Applications wi	th Noise). Probabilistic (Clustering: Clustering u	sing Gaussian Mixture I	Models (GMM) with			
Expectation-Maximization (EM) algorithm. Outlier Detection Methods: Isolation Forest, Local Outlier Factor							
(LOF). Association Rule Mining: Introduction, Apriori Algorithm (concepts only). Collaborative Filtering:							
Introduction (Use	r-based, Item-based).						

Targeted Application & Tools that can be used:

9. Google Colab

10. Python IDEs like PyCharm

ching Methodology

- 1. Lectures: Interactive lectures covering theoretical foundations and algorithmic details.
- 2. **Lab Sessions:** Hands-on sessions focusing on implementing algorithms using Python libraries (e.g., scikit-learn, NumPy, Pandas, Matplotlib, Seaborn, Keras/TensorFlow for Perceptron).
- 3. **Problem-Based Learning:** Real-world case studies and problems will be discussed and solved in labs.
- 4. **Experiential Learning:** Emphasis on practical application through assignments, mini-projects, and a final course project.
- 5. **Discussions:** Encouraging critical thinking and peer learning through in-class discussions.

ject work/Assignment:

3. Students can be assigned a mini project to develop a machine learning application for real-life problems in various domains such as health care, business intelligence, environmental modeling, etc.

tbook(s):

T1. Aurélien Géron. *Hands-on Machine Learning with Scikit-Learn, Keras, and TensorFlow*, Oreilly, 3rd Edition, 2022.

erences:

R1. Raschka, S., Liu, Y., & Mirjalili, V. (2022). Machine Learning with PyTorch and Scikit-Learn: Develop machine learning and deep learning models with Python. Packt Publishing Ltd.

R2. Alpaydin, E. (2021). Machine Learning, revised and updated edition. MIT Press.

R3. Deisenroth, M. P., Faisal, A. A., & Ong, C. S. (2020). Mathematics for machine learning. Cambridge University Press.

R4. Andreas C Muller, and Sarah Guido. *Introduction to Machine Learning with Python: A Guide for Data Scientists*, O'Reilly, 1st Edition, 2016.

blinks

W1. W1. NPTEL Courses: <u>https://nptel.ac.in/courses/106106139</u> (IIT M),

https://nptel.ac.in/courses/106105152 (IIT Kgp)

- W2. Scikit-learn documentation: <u>https://scikit-learn.org/stable/</u>
- W3. TensorFlow documentation: <u>https://www.tensorflow.org/</u>

W4. Keras documentation: <u>https://keras.io/</u>

- W5. Pandas documentation: <u>https://pandas.pydata.org/</u>
- W6. NumPy documentation: https://numpy.org/
- W7. Kaggle: For datasets and competitions.

urse Code:	Course Title: Machine Learning Techniques Lab	P.C	0			1				
CSE2268	pe of Course: Program Core -Laboratory		0							
sion No.										
urse Pre-requisites	CSE1500 – Computational Thinking with Python									
	CSE3157 – Artificial Intelligence and Machine Learnin	g								
i-requisites										
urse Description	Machine Learning algorithms are the key to develop intelligent systems such as Apple's Siri, Google's self-driving cars etc. This course introduces the concepts of the core machine learning techniques such as Regression learning, Bayesian learning, Ensemble learning, Perceptron learning, Unsupervised learning, Competitive learning, learning from Gaussian mixture models and learning to detect outliers. Course lectures covers both the theoretical foundations as well as the essential algorithms for the various learning methods. Lab sessions complement the lectures and enable the students in developing intelligent systems for real life problems.									
urse Objectives	The objective of the course is EMPLOYBILITY of studen techniques.	it by using E	EXPERIE	NTIA	L LEA	ARNING				
urse OutComes	 On successful completion of this course the students shall be able to: Apply advanced supervised machine learning methods for predictive modeling. [Apply] Produce machine learning models with better predictive performance using meta learning algorithms [Apply] Create predictive models using Perceptron learning algorithms [Apply] Employ advanced unsupervised learning algorithms for clustering, competitive learning and outlier detection [Apply] Implement machine learning based intelligent models using Python libraries. 									
Course Content:	Νο	. of Session	s: 15 (3	0 hoi	urs)					
 Experiment No. 1: File Handling Using Python Level 1: Read a CSV file using Python Level 2: Read a text file using Python Experiment No. 2: Methods for handling missing values Level 1: Given a data set from UCI repository, implement the different ways of handling missing values in it using Scikit-learn library of Python Level 2: Implement one of these methods using a custom defined function in Python. Experiment No. 3: Data Visualization Level 1: Perform Exploratory Data Analysis for a given data set by creating Scatter Plot, Pair Plot, Count Plot using Matplotlib and Seaborn Level 2: Create Heat Maps, WordCloud 										
Experiment No. 4: Level 1: Given a dathe models param Level 2: Implement Linear Regression Experiment No. 5: Level 1: Write cust	Regression learning ata set from UCI repository, implement the simple linear leters and the performance metrics. Plot the learning cu at the polynomial regression algorithm. Compare the Logistic Regression tom code for generating the logistic/sigmoid plot for a g	regression urves. learning cu given input	algorit	hm a f Poly	nd e: /nom	stimate nial and				

Level 2: Given a data set from UCI repository, implement the Logistic regression algorithm. Estimate the class probabilities for a given test data set. Plot and analyze the decision boundaries.

Experiment No. 6: Bayesian Learning

Level 1: Given a data set from UCI repository, implement a classification model using the Bayesian algorithm. **Level 2:** Implement a Naïve Bayes classifier using 5-fold cross-validation

Experiment No. 7: Support Vector Machine (SVM)

Level 1: Given data sets from UCI repository, implement a linear SVM and a non-linear SVM based classification model.

Level 2: Construct kernels with 5-fold cross-validation for SVM.

Experiment No. 8 & 9: Ensemble Learning

Level 1: Implement Ensemble Learning algorithms such as Bagging, Pasting and Out-of Bag Evaluation **Level 2:** Random Patches and Random Subspace Method, Adaboost and Gradient Boosting, Stacking.

Experiment No. 10: Perceptron Learning

Level 1: Implement the Perceptron Classifier Level 2: An Image Classifier Using the Sequential API of Keras

Experiment No. 11 & 12: Unsupervised Learning

Level 1: K-means – simple and mini-batch. Finding the optimal number of clusters using Elbow method and Silhoutte Coefficient . Compare the inertia of both as k increases. Tuning the hyperparameter 'k' using GridSearchCV.

Level 2: Using clustering for Image segmentation and Preprocessing. Kmeans++

Experiment No. 13: Density Based Clustering

Level 1: Implement DBSCAN – clustering using the local density estimation. Perform hard and soft clustering for new instances.

Level 2: Outlier Detection using Isolation Forest and Local Outlier Factor

Experiment No. 14: Association Rule Mining

Level 1: Implement the Apriori Algorithm for Association Rule Mining Level 2: Implement the Dynamic Itemset Counting Algorithm for Association Rule Mining.

Experiment No. 15: Collaborative Filtering

Level 1: Implement Collaborative Filtering using Item-Based Filtering

Level 2: Implement Collaborative Filtering using User-Based Filtering

Targeted Application & Tools that can be used:

11. Google Colab

12. Python IDEs like PyCharm

ject work/Assignment: Mention the Type of Project /Assignment proposed for this course

Students can be assigned a mini project to develop a machine learning application for real-life problems in various domains such as health care, business intelligence, environmental modeling, etc.

tbook(s): Aurélien Géron. *Hands-on Machine Learning with Scikit-Learn, Keras, and TensorFlow,* Oreilly, 3rd Edition, 2022.

CSE2269 Type of Course: Program Core and Theory U-T. P. C Version No. 1.0 Course Pre- Nil Nil requisites NIL Course Dre- Description Nil Anti-requisites NIL Course Dre- Description Nil Course Object The objective of the course is to familiarize the learners with the concepts of Description Course Object The objective of the course is to familiarize the learners with the concepts of Description Systems programming ability and case studies. Course Object The objective of the course is to familiarize the learners with the concepts of Description Systems and attain Employability through Problem Solving Methodologies. Course Out Course Out Comes On successful completion of the course the students shall be able to: 1) Describe the fundamental concepts of Deriving Systems and case studies. [Knowledge] 2) Demonstrate deadlock detection and recovery methods [Application] 3) Apply various tools to handle synchronization problems.[Application] 4) Demonstrate deadlock detection and recovery methods [Application] 5) Illustrate various memory management techniques.[Application] 6) Application to obs. Operating-System Operations. Description of the course is observices., System Calls and its types. Linkers and Loaders. Overview of Ods design ment/Case Module 1 Proccess A	Course Code:	Course Title: Or	perating Systems			3	0 ()	3
Type of Course: Program Core and Theory L-T- P- C Only Lo Version No. 1.0 Course Pre- requisites NIL Anti-requisites NIL Course Description This course introduces the concepts of mecating system operations, operating system internal algorithms such as process scheduling, synchronization, deadlocks detection and recovery and memory management. The course also enhances the problem solving, systems programming ability and case studies. Course Object The objective of the course is to familiarize the learners with the concepts of Description Course Out On successful completion of the course the students shall be able to: 11 Description bethe fundamental concepts of preating systems and case studies. [Knowledge] 21 Demonstrate various CPU scheduling algorithms. [Application] 3] Apply various tools to handle synchronization problems.[Application] 4] Demonstrate deadlock detection and recovery methods [Application] 5] Illustrate various memory management techniques.[Application] 5] Illustrate various memory management system Services, system Calls and its types. Discription Topics: Introduction to System Study Stem Program and its types, Linkers and Loaders, Overview of OS design and implementation, Open-source perform system Module 1 Process Management Study Process Scheduling – Basic concepts, Scheduling Models, Thread Libraries, Threading Issues, Process Scheduling – Basic concepts, Scheduling Models, Th	CSE2269		ystems			5	U C	,	5
Only Only Version No. 1.0 Course Pre- requisites Nil Anti-requisites NLL Course This course introduces the concepts of meating system operating system sinternal algorithms such as process scheduling, synchronization, deadlocks detection and recovery and memory management. The course also enhances the problem solving, systems programming ability and case studies. Course Object The objective of the course is to familiarize the learners with the concepts of meaning systems and attain Employability through Problem Solving Methodologies. Course Out On successful completion of the course the students shall be able to: 11 Describe the fundamental concepts of preatine systems and case studies. [Knowledge] 2 Demonstrate various CPU scheduling algorithms. [Application] 3 Apply various tools to handle synchronization problems.[Application] 3 [] Demonstrate deadlock detection and recovery methods [Application] 4 Demonstrate deadlock detection and recovery methods [Application] 4 [] Demonstrate deadlock detection and recovery methods [Application] 5 [] Illustrate various memory management techniques.[Application] 5 [] Illustrate various memory management techniques.[Application] 9 Hours 6 design and implementation. Open-source [printing system Services., System Calls and its types. Oncept. Operating.System Operations, [prenting system Summation, Communication in client- server systems (sockets, RPC, Pipes), Introduction to	C5L2207	Type of Course:	Program Core and T	heory	L-T- P- C				
Version No. 1.0 Course Pre- requisites Nil Anti-requisites NIL Course This course introduces the concepts of menting system operations, pperating system structure and its design and implementation. It covers the classical menting systems internal algorithms such as process scheduling, synchronization, deadlocks detection and recovery and memory management. The course also enhances the problem solving, systems programming ability and case studies. Course Object The objective of the course is to familiarize the learners with the concepts of Descrime Systems and attain Employability through Problem Solving Methodologies. Course Out On successful completion of the course the students shall be able to: [1] Describe the fundamental concepts of perting systems and case studies. [Knowledge] 2] Demonstrate various CPU scheduling algorithms. [Application] 3] Apply various tools to handle synchronization problems.[Application] 5] Illustrate various memory management techniques.[Application] 6] Demonstrate various memory management techniques.[Application]		Only	1 rogram core and 1	neory					
Version No. 1.0 Course Pre- requisites Nil Anti-requisites NIL Course This course introduces the concepts of mentine system operations, prenting system structure and its design and implementation. It covers the classical mentine systems internal algorithms such as process scheduling, synchronization, deadlocks detection and recovery and memory management. The course also enhances the problem solving, systems and attain Employability through Problem Solving Methodologies. Course Object The objective of the course is to familiarize the learners with the concepts of Dentating Systems and attain Employability through Problem Solving Methodologies. Course Out On successful completion of the course the students shall be able to: [1] Describe the fundamental concepts of pertunne Systems and case studies. [Knowledge] 2] Demonstrate various CPU scheduling algorithms. [Application] 3] Apply various tools to handle synchronization problems.[Application] 4] Demonstrate deadlock detection and recovery methods [Application] 5] Illustrate various memory management techniques.[Application] 6] Onerning System Assignment Proces: Introduction to DS , Operating System Operations Open-source [Potiting System Services, system Calls and its types, Decenting System Structure, System Program and its types, Linkers and Loaders, Overview of OS design and implementation, Open-source [Potiting System Process Assignment/Case Programming Simulation 11 Hours		0 3							
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Trequisites Interpretation Anti-requisites NIL Course This course introduces the concepts of perating system operations, perating system structure and its design and implementation. It covers the classical prenating system structure and its design and implementation. It covers the classical prenating system structure and algorithms such as process scheduling, synchronization, deadlocks detection and recovery and memory management. The course also enhances the problem solving, systems programming ability and case studies. Course Object The objective of the course is to familiarize the learners with the concepts of merating systems and case studies. Course Out On successful completion of the course the students shall be able to: 1) Describe the fundamental concepts of perating systems and case studies. [Knowledge] 2) Demonstrate various CPU scheduling algorithms. [Application] 3) Apply various tools to handle synchronization problems.[Application] 4) Demonstrate deadlock detection and recovery methods [Application] 4) Demonstrate deadlock detection and recovery methods [Application] 5) Illustrate various remory management techniques.[Application] 2) System Module 1 Introduction to Discutting system Program and its types, Linkers and Loaders, Overview of OS design and implementation, Open-source perating system Module 2 Process Assignment/Case Programming/Simulation 11 Hours Tropics: Process Synchronization Assignment Programming 11 Hours and Deadlocks <li< td=""><td>Course Pre-</td><td>Nil</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></li<>	Course Pre-	Nil							
Anti-requisites NIL Course This course introduces the concepts of menting system operations, perating system structure and its design and implementation. It covers the classical greating systems suctures and its design and implementation. It covers the classical greating system structure and its design and implementation. It covers the classical greating system solving, systems programming ability and case studies. Course Object The objective of the course is to familiarize the learners with the concepts of menting systems and attain Employability through Problem Solving Methodologies. Course Out On successful completion of the course the students shall be able to: 11 Describe the fundamental concepts of perating Systems and case studies. [Knowledge] 21 Demonstrate various CPU scheduling algorithms. [Application] 3] Apply various tools to handle synchronization problems [Application] 31 Apply various tools to handle synchronization problems.[Application] 4] Demonstrate deadlock detection and recovery methods [Application] 41 Demonstrate deadlock detection and recovery methods [Application] 5] Illustrate various memory management techniques.[Application] 50 Sesign and implementation. Open-source [perating system Services., System Calls and its types. Operating system Structure, System Program and its types, Linkers and Loaders, Overview of Os design and implementation. Open-source [perating system Module 1 Process Masignment Study Programming/Simulation 11 Hours Topics: Process Masignment Study	requisites	1 111							
This course Description This course introduces the concepts of operating y stem operations, operating y stems structure and its design and implementation. It covers the classical operating y stems internal algorithms such as process scheduling, synchronization, deadlocks detection and recovery and memory management. The course also enhances the problem solving, systems programming ability and case studies. Course Object The objective of the course is to familiarize the learners with the concepts of operating y stems and attain Employability through Problem Solving . Methodologies. Course Out On successful completion of the course the students shall be able to: Comes 1) Describe the fundamental concepts of operating y stems and case studies. [Knowledge] 2) Demonstrate various CPU scheduling algorithms. [Application] 3 Apply various tools to handle synchronization problems.[Application] 3) Apply various tools to handle synchronization problems.[Application] 9 Hours S) Illustrate various memory management techniques.[Application] 9 Hours Module 1 Introduction to os . Operating System Operating System Services, . System Calls and its types, Operating System Structure, System Program and its types, Linkers and Loaders, Overview of OS design and implementation, Open-source [perating Tystem Module 2 Process Scheduling - Basic concepts, Scheduling Models, Thread ILibraries, Threading Issues, Process Scheduling - Basic concepts, Scheduling Models, Thread ILibraries, Threading Issues, Process Scheduling - Basic concepts, Scheduling Models	Anti-requisites	NIL							
Course Inits course inductes the concepts of pertunner stem operations, pretunner structure and its design and implementation. It covers the classical pertunny systems internal algorithms such as process scheduling, synchronization, deadlocks detection and recovery and memory management. The course also enhances the problem solving, systems programming ability and case studies. Course Object The objective of the course is to familiarize the learners with the concepts of Decauting Systems and attain Employability through Problem Solving Methodologies. Course Out On successful completion of the course the students shall be able to: 11 Describe the fundamental concepts of Decauting Systems and case studies. [Knowledge] 21 Demonstrate various CPU scheduling algorithms. [Application] 31 Apply various tools to handle synchronization problems.[Application] 41 Demonstrate deadlock detection and recovery methods [Application] 51 Illustrate various memory management techniques.[Application] 42 Demonstrate deadlock detection and recovery methods [Application] 51 Illustrate various memory management techniques.[Application] 51 Illustrate various memory management techniques.[Application] 52 Illustrate various memory management techniques.[Application] 53 Illustrate various memory management techniques.[Application] 54 Operating System Structure, System Program and its types, Linkers and Loaders, Overview of OS design and implementation, Open-source pertinting system 7 opcies	Course	This course introd	luces the concents of	poroting	wetom oporat	ione	0.000	roting	evetom
Description Since of a process of the classical process of the problem solving, systems programming ability and case studies. Course Object The objective of the course is to familiarize the learners with the concepts of Dependent Systems and attain Employability through Problem Solving Methodologies. Course Out On successful completion of the course the students shall be able to: 1] Describe the fundamental concepts of operating Systems and case studies. [Knowledge] 2] Demonstrate various CPU scheduling algorithms. [Application] 3] Apply various tools to handle synchronization problems.[Application] 4] Demonstrate deadlock detection and recovery methods [Application] 5] Illustrate various memory management techniques.[Application] 5] Illustrate various memory management techniques.[Application] 9 Hours 7 opics: Introduction to OS, Operating-System Operating System Services, , System Calls and its types, Operating System Structure, System Program and its types, Linkers and Loaders, Overview of OS design and implementation. Open-source proteing system 11 Hours Module 2 Process Concept, Operations on Processes, Inter Process Conmunication, Communication in client-server systems (sockets, RPC, Pipes), Introduction to threads - Multithreading Models, Thread Topics: Process Scluding Base process S	Course	structure and its d	asign and implementat	ion It co	ystelli operat	ions	, ope	oting	vetome
Internal agonumns such a process scheduling, synchronization, denotes detection and recovery and memory management. The course also enhances the problem solving, systems programming ability and case studies. Course Object The objective of the course is to familiarize the learners with the concepts of Overating Systems and attain Employability through Problem Solving Methodologies. Course Out On successful completion of the course the students shall be able to: 1] Describe the fundamental concepts of operating Systems and case studies. [Knowledge] Course Out On successful completion of the course the students shall be able to: 1] Describe the fundamental concepts of operating Systems and case studies. [Knowledge] 2] Demonstrate various CPU scheduling algorithms. [Application] 3] Apply various tools to handle synchronization problems.[Application] 5] Illustrate various memory management techniques.[Application] Course Content: Introduction to Deparating System Programming 9 Hours Topics: Introduction, Open-source [perating System Programming System 11 Hours Module 2 Process Management Assignment/Case Study Programming Simulation 11 Hours Topics: Process Concept, Operations on Processes, Inter Process Communication, Communication in client- server system (sockets, RPC, Pipes), Introduction to threads - Multithreading Models, Thread Libraries, Threading Issues, Process Scheduling– Basic concepts, Scheduling Models, Thread Libraries, Threading Issues, Process Scheduling– Bas	Description	internal algorithm	e sign and implementat	duling ex	vers the class	n de	adle	aing s ocks de	ysiems
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Module 3Process Synchronization and DeadlocksAssignmentProgramming11 HoursTopics: The Critical-Section Problem- Peterson's Solution, Synchronization hardware, Semaphores, Classic Problems of Synchronization with Semaphore Solution- Producer-Consumer Problem, Reader-Writer problems, Dining Philosopher's Problem, . Introduction to Deadlocks, Necessary conditions for deadlock, Resource allocation Graph, Methods for handling deadlock: Deadlock Prevention and Implementation, Deadlock Avoidance and Implementation, Deadlock detection & Recovery from Deadlock.Module 4Memory ManagementAssignmentProgramming/Simulation10 Hours		1	1	T					
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Implementation, Deadlock Avoidance and Implementation, Deadlock detection & Recovery from Deadlock.Module 4Memory ManagementAssignmentProgramming/Simulation10 Hours	deadlock, Resour	rce allocation Gra	aph, Methods for har	ndling de	adlock: Dead	dloc	k Pr	eventi	on and
Deadlock.Module 4Memory ManagementAssignmentProgramming/Simulation10 Hours	Implementation.	Deadlock Avoida	nce and Implementation	ion, Dead	dlock detecti	on a	& Re	ecover	y from
Module 4Memory ManagementAssignmentProgramming/Simulation10 Hours	Deadlock.		r · · · · · ·	,					,
Module 4 Assignment Programming/Simulation 10 Hours		Memory		D	· /~· ·			40-	
	viodule 4	Management	Assignment	Program	ming/Simula	tion		101	tours

Topics:

Introduction to Memory Management, Basic hardware-Base and Limit Registers, Memory Management Unit(MMU), Dynamic loading and linking, Swapping, Contiguous and Non-Contiguous Memory Allocation, Segmentation, Paging - Structure of the Page Table – Virtual Memory and Demand Paging – Page Faults and Page Replacement Algorithms, Copy-on-write, Allocation of Frames, Thrashing Introduction to File system management: File System Interface (access methods, directory structures), File system implementation. **Targeted Application:** Application area is traffic management system, banking system, health care and many more systems where in there are resources and entities that use and manage the resources. Software Tools: Oracle Virtual Box/VMWare Virtualization software [Virtual Machine Managers]. Used to install and work on multiple guest Operating Systems on top of a host OS. Intel Processor identification utility: This software is used to explain about multi-core processors. It helps to identify the specifications of your Intel processor, like no of cores, Chipset information, technologies supported by the processor etc. **Project work/Assignment** Demonstrate process concepts in LINUX OS. Simulation of CPU scheduling algorithms. Develop program to demonstrate use of Semaphores in threads. Develop program to demonstrate use of deadlock avoidance algorithms. Develop program to demonstrate use of page replacement algorithms. Simulation of memory allocation strategies [first fit, best fit and worst fit]. Text Book Silberschatz A, Galvin P B and Gagne G, "Silberschatz's Operating System Concepts", Paperback, Global Edition Wiley, 2019 References Silberschatz A, Galvin P B and Gagne G, "Operating System Concepts", 10th edition Wiley, 2018. William Stallings, "Operating Systems", Ninth Edition, By Pearson Paperback, 1 March 2018. Sundaram RMD, Shriram K V, Abhishek S N, B Chella Prabha, "Cracking the Operating System skills", Dreamtech, paperback, 2020 Remzi H. Arpaci-Dusseau Andrea C. Arpaci-dusseau, "Operating Systems: Three Easy Pieces, Amazon digital Services", September 2018. E-resources/Weblinks https://www.os-book.com/OS9/ https://pages.cs.wisc.edu/~remzi/OSTEP/ https://codex.cs.yale.edu/avi/os-book/OS10/index.html
Course Code:	Course Title: Operating Systems Lab 0 0 2 1				
CSE2270	Type of Course: Lab Only				
Version No.	1.0				
Course Pre-	Nil				
requisites					
Anti-requisites	NIL				
Course Description	This laboratory course provides hands-on experience with the core concepts of operating systems through practical assignments, simulations, and case studies. It covers foundational aspects such as system calls, process and thread management, inter-process communication, synchronization, deadlocks, memory management, and file systems. Students will implement and simulate real-time OS components and scheduling algorithms, fostering deeper understanding of OS architecture and design. The lab also introduces modern OS tools, programming interfaces, and the				
Course Object	The objective of the course is to familiarize the learners with the concepts of Operating Systems and attain Employability through Problem Solving Methodologies				
Course Out Comes	On successful completion of the course the students shall be able to: 1] Demonstrate system-level programming using system calls and OS structures. [Apply] 2] Simulate process scheduling and multithreading techniques. [Apply] 3] Apply various tools to handle synchronization problems using semaphores and shared memory. [Apply] 4] Demonstrate memory management and file system concepts using simulation or scripting. [Apply]				
Course Content:					
Targeted Application: Application area is traffic management system, banking system, health care and many more systems where in there are resources and entities that use and manage the resources.					
Oracle Virtua and work on	al Box/VMWare Virtualization software [Virtual Machine Managers]. Used to instal multiple guest Operating Systems on top of a host OS.				
Intel Process processors. I information,	or identification utility: This software is used to explain about multi-core t helps to identify the specifications of your Intel processor, like no of cores, Chipset technologies supported by the processor etc.				

of Laboratory Tasks:

sheet -1

- L1: Write a program to demonstrate the use of fork() and exec() system calls in process creation.
- L2: A system has limited memory and high-priority real-time processes. Design a scheduling algorithm that ensures responsiveness while preventing starvation.

sheet -2

- L1: Implement First-Come-First-Serve (FCFS) process scheduling using C or Python.
- L2: You are designing a server that handles thousands of client connections. Compare multithreading and multiprocessing for this task and implement a basic server model.

sheet -3

- L1: Implement Round Robin Scheduling with a fixed time quantum.
- L2: In a banking system, concurrent access to accounts leads to data corruption. Design a synchronization solution to avoid race conditions.

sheet -4

L1: Write a program to create threads using Pthreads or Python's threading module. L2: You're tasked with building a file access tracker in an OS. Implement a system to log file access patterns and identify frequent accesses.

sheet -5

- L1: Demonstrate inter-process communication (IPC) using pipes.
- L2: A simulation tool needs to emulate process suspension and resumption. Design and implement such a mechanism using signals or condition variables.

sheet -6

L1: Simulate the Producer-Consumer problem using semaphores.

L2: You're developing a system where sensor devices (producers) generate temperature readings, and data processors (consumers) store and process these readings. To prevent race conditions and ensure buffer safety, implement a synchronization mechanism using semaphores.

sheet -7

- L1: Implement Dining Philosophers Problem using threads and synchronization.
- L2: In a multi-threaded cafeteria simulation, five philosophers sit around a circular table, each alternating between thinking and eating. To eat, a philosopher must hold two forks (represented by shared resources). Your task is to avoid deadlock and ensure no philosopher starves using thread synchronization techniques.

sheet -8

- L1: Write a program to simulate First Fit, Best Fit, and Worst Fit memory allocation strategies.
- L2: A system with limited memory blocks needs to allocate memory to processes arriving with various size requests. Your task is to implement three classic memory allocation strategies— First Fit, Best Fit, and Worst Fit—to allocate memory to each process efficiently. Simulate and compare how memory gets allocated in each strateg

sheet -9
 L1: Demonstrate paging using a simple page table simulation. L2: A program has a logical address space divided into pages. The system's memory is divided int equal-sized frames. When a program executes, its pages are loaded into available frames i main memory. Simulate the address translation process using a page table and demonstrat how a logical address is converted to a physical address.
sheet -10
L1: Write a program to simulate page replacement algorithms like FIFO and LRU.
L2: In a virtual memory system, a process accesses pages in a specific order. The memory can onl hold a limited number of pages (frames). When a page is needed and the memory is full, page replacement algorithm is used to decide which page to evict. Simulate and compar FIFO and LRU algorithms for a given page reference string.
sheet -11
 L1: Simulate file directory structure (single level/two level). L2: A university campus computer lab has limited memory space available for each student logi session. When students open files or run programs, memory pages are loaded into availabl memory frames. Due to the limited number of frames, some pages must be replaced whe new ones are needed. The lab system uses page replacement algorithms to decide whic pages to evict when memory is full
sheet -12
L1: Write a shell script to demonstrate file handling commands in Linux. L2: Design a command-line mini shell that can run background and foreground processes an handle basic built-in commands like cd, pwd, exit.
Project work/Assignment
Demonstrate process concepts in LINUX OS. Simulation of CPU scheduling algorithms. Develop program to demonstrate use of Semaphores in threads. Develop program to demonstrate use of deadlock avoidance algorithms. Develop program to demonstrate use of page replacement algorithms. Simulation of memory allocation strategies [first fit, best fit and worst fit].
Text Book Silberschatz A, Galvin P B and Gagne G , "Silberschatz's <mark>Operating S</mark> ystem Concepts", Paperbacl Global Edition Wiley, 2019
References
 Silberschatz A, Galvin P B and Gagne G, "Operating System Concepts", 10th edition Wiley 2018. William Stallings, "Operating Systems", Ninth Edition, By Pearson Paperback, 1 March 2018. Sundaram RMD, Shriram K V, Abhishek S N, B Chella Prabha, "Cracking the Operating System skills", Dreamtech, paperback, 2020 Remzi H. Arpaci-Dusseau Andrea C. Arpaci-dusseau, "Operating Systems: Three Easy Pieces Amazon digital Services", September 2018. F-recourses/Wablinks
https://www.os-book.com/OS9/
https://pages.cs.wisc.edu/~remzi/OSTEP/ https://codex.cs.yale.edu/avi/os-book/OS10/index.html

Course Code:	Course Title: Scalable Application					
	Development using Java	LTPC	0	Δ	1	2
CSE2505		L- 1-1 - C	U	U	-	2
	Type of Course: Lab					
Version No.	2.0				1	
Course	Basic Java Programming Knowledge, Java fra	mework, und	ersta	ndin	g of	
Prerequisites	databases and fundamentals of web developmed concurrency.	ent, basics of	mult	ithre	ading	and
Anti-requisites	NIL					
Course Description	This course provides a hands-on, practical approach to building scalable, high- performance applications using Java and related technologies. This course is designed to complement theoretical concepts by offering real-world lab exercises focused on the development of microservices architectures, cloud-native applications, and distributed systems. In this lab-intensive course, students will work on building and deploying scalable applications using Spring Boot, Spring Cloud, Docker, Kubernetes, and Apache Kafka. Students will gain experience in implementing RESTful APIs, asynchronous messaging, data caching, and load balancing to ensure that applications can handle increased traffic and scale efficiently. The course will also cover essential techniques for optimizing performance, including JVM tuning, database optimization, and memory management.				high- urse is ercises native alable pache APIs, e that ill also uning,	
Course Objective	The primary objectives of the course are t building scalable applications using Java and Boot, Spring Cloud, and Apache Kafka, Impl that enable applications to handle increasing le systems and cloud-native practices, Gain p performance by leveraging tools for JVM to memory management to improve applicatio Work with containerization technologies sud deploy Java applications in cloud environm integration/continuous deployment (CI/CD) p load balancing, and caching mechanisms to tolerance, and low-latency operations in produ event-driven architectures to build scalable an Apache Kafka for real-time data processing ar	o Develop h d modern fran lement microso oads efficientl ractical exper- uning, databa n responsiver ch as Docker nents with an ipelines, Mass to ensure hig ction-grade ap d resilient sys- nd messaging.	ands newo servio y thr rienc se op ness r and utom ter so gh a oplic stems	-on orks ces a rough e in ptim and d Ku ated ervic vaila ation s usin	expert like s archite h distr optir ization scala uberne conti e disc ubility, as and ng too	ise in Spring ctures ibuted nizing n, and bility., tes to inuous overy, fault Apply ls like
Course Outcomes	On successful completion of the course the students shall be able to: 1. Implement Performance Optimization Techniques 2. Design and Build Scalable Microservices					

	3. Integrate Event-Driven Architectures and Caching.					
	4. Deploy and Scale Applications in Cloud Environments.					
Course Content:						
Module 1	Foundations of Scalable Java Applications	Assignmen t	Implementation	10 Sessions		
Lab Assignment 1: Setting Up Development Environment						

Objective: Set up the Java development environment and configure a Spring Boot project for scalability testing.

Tasks:

- Install Java 17, Maven, and IDE (IntelliJ or Eclipse).
- Set up a basic **Spring Boot project** using **Spring Initializr** with **RESTful endpoints**.
- Verify application functionality by running a **local server** and testing API responses via **Postman** or **curl**.
- Add a basic **Spring Boot Actuator** to monitor application health and performance. **Deliverables:**
- Working **Spring Boot application** with basic endpoints.
- Screenshots of successful tests (Postman or curl).

Lab Assignment 2: Performance Optimization with JVM

Objective: Profile and optimize a Java application for better performance. **Tasks:**

- Implement a **simple Java application** that performs a memory-intensive task (e.g., sorting a large dataset).
- Use VisualVM to monitor JVM memory usage, CPU usage, and garbage collection.
- Optimize the application by adjusting **JVM flags** (e.g., **heap size**, **garbage collection strategy**).
- Measure the impact of optimizations on execution time and memory usage. Deliverables:
- Profiled and optimized Java application with performance comparison charts.
- Detailed report on **JVM tuning** and optimization strategies.

Lab Assignment 3: Implementing Multi-threading

Objective: Understand Java's concurrency model and implement multi-threading for parallel tasks.

Tasks:

- Implement a **multi-threaded Java application** that simulates multiple tasks (e.g., processing large files, image processing).
- Use the **Executor framework** to manage thread pools.
- Measure the execution time and compare the performance of single-threaded vs multithreaded approaches.
 Deliverables:
- Source code for **multi-threaded application** with explanations of thread management.
- Execution time comparison chart.

Module 2	Scalable Architectures and	Assignmen	Implementation	10
	Microservices	t		Sessions

Lab Assignment 4: Building a Simple Microservice with Spring Boot

Objective: Develop a **basic microservice** with Spring Boot. **Tasks:**

- Create a **Spring Boot microservice** that provides a RESTful API (e.g., a book or customer service).
- Implement basic CRUD operations (Create, Read, Update, Delete).
- Use Spring Data JPA to interact with an SQL database (e.g., MySQL).
- Write unit tests using **JUnit** for API endpoints. **Deliverables:**
- Working **Spring Boot microservice** with API documentation.
- Source code with unit tests.

Lab Assignment 5: Implementing Service Discovery & Load Balancing

Objective: Enable service discovery and load balancing using Spring Cloud Eureka. Tasks:

- Set up a Spring Cloud Eureka server for service discovery.
- Create two Spring Boot microservices that register with the Eureka server.
- Implement **load balancing** with **Spring Cloud Ribbon** by making API calls to different instances of the microservices.
- Test and verify load balancing behavior using **Postman** or **curl**. **Deliverables:**
- Spring Cloud Eureka server and two microservices.
- Load balancing validation and test results.

Lab Assignment 6: Building an Event-Driven System with Kafka

Objective: Implement an **event-driven architecture** using **Apache Kafka** for inter-service communication.

Tasks:

- Set up Apache Kafka locally or in Docker.
- Create two Spring Boot applications: one as a **Kafka producer** and the other as a **consumer**.
- Implement asynchronous message communication where the producer sends messages (e.g., order events) and the consumer processes them.
- Add error handling and retry logic using **Spring Kafka**. **Deliverables:**
- Kafka producer and consumer applications with **message processing logic**.
- Screenshots or logs showing messages being passed from producer to consumer.

Module 3	Scalable Data Management	Mini -	Implementation	10
	and Caching	Project		Sessions

Lab Assignment 7: Integrating SQL and NoSQL Databases

Objective: Learn to integrate **relational (SQL)** and **non-relational (NoSQL)** databases with Spring Boot applications.

Tasks:

- Integrate a **MySQL** database into a **Spring Boot microservice** and implement CRUD operations.
- Set up a MongoDB instance (locally or via Docker) and create a second microservice using Spring Data MongoDB.
- Compare the performance and scalability aspects of both databases. **Deliverables:**
- Source code for Spring Boot microservices using MySQL and MongoDB.
- Database performance comparison with benchmarks.

Lab Assignment 8: Implementing Redis Caching

Objective: Improve application performance using **Redis** as an in-memory cache. **Tasks:**

- 1. Integrate Redis with your Spring Boot application.
- 2. Cache frequently accessed data (e.g., product information, user profiles) in Redis.
- 3. Implement cache expiration and cache invalidation strategies.
- 4. Measure the performance improvement by comparing **cache hits vs. misses**. **Deliverables:**
- 5. Redis-integrated Spring Boot application with caching logic.

6. Performance comparison between cached and non-cached operations.

Lab Assignment 9: Data Streaming with Kafka

Objective: Implement a **data streaming pipeline** with Kafka for real-time data processing. **Tasks:**

- Build a data pipeline where Kafka producers stream events (e.g., logs, transactions) to Kafka brokers.
- Use **Kafka consumers** to process these events in real-time (e.g., updating a database or triggering a workflow).
- Implement Kafka Streams to process data within the Kafka ecosystem. Deliverables:
- Kafka producer-consumer setup with real-time data flow.

Module 4	Cloud Deployment	Quiz	Implementation	10 Sessions
	and DevOps for			
	Scalability			

Lab Assignment 10: Dockerizing a Spring Boot Application

Objective: Containerize a Spring Boot application using **Docker** for scalability. **Tasks:**

- Write a **Dockerfile** for your Spring Boot application.
- Build a **Docker image** and run the application in a Docker container.
- Test the application running in the container and compare performance to local deployment.
 - **Deliverables:**
- Dockerized **Spring Boot application** with a functional test.
- Docker image and run command documentation.

Lab Assignment 11: Deploying with Kubernetes

Objective: Deploy a Spring Boot microservice to a **Kubernetes cluster** for horizontal scaling. **Tasks:**

- Deploy the **Dockerized Spring Boot application** to a **Kubernetes cluster** (local Minikube or cloud-based).
- Set up Kubernetes Pods, Services, and Deployments to scale the microservice.
- Implement **auto-scaling** based on CPU or memory usage. **Deliverables:**
- Kubernetes **deployment YAML files** for Spring Boot application.
- Running Kubernetes cluster with auto-scaling behavior.

Lab Assignment 12: Setting Up CI/CD for Scalable Applications

Objective: Automate the deployment process using **CI/CD pipelines**. **Tasks:**

- Set up a **Jenkins** or **GitHub Actions** CI/CD pipeline to automate the build, test, and deployment process.
- Implement continuous deployment (CD) for deploying a Dockerized microservice to a Kubernetes cluster.
- Test the pipeline by pushing changes to a GitHub repository and triggering the deployment process automatically. **Deliverables:**
- **CI/CD pipeline configuration** (Jenkins or GitHub Actions).
- Deployment automation logs and screenshots.

Targeted Application & Tools that can be used:

Applications:

The course will focus on building and scaling the following types of applications:

- E-Commerce Platforms Handling high traffic, product catalogs, and real-time inventory.
- Banking & FinTech Applications Secure and high-availability transactions.
- Streaming & Event-Driven Applications Using Kafka for real-time data processing.
- Social Media & Messaging Platforms Scalable messaging and real-time updates.
- SaaS & Cloud-Native Applications Multi-tenant, API-based scalable solutions.

Tools:

Programming & Frameworks

- Java 17+ Core programming language for scalable applications.
- Spring Boot Microservices development, REST APIs, and dependency injection.
- Spring Cloud Service discovery, load balancing, and resilience patterns.
- Quarkus Lightweight, high-performance microservices alternative.

Database & Caching

- SQL Databases: MySQL, PostgreSQL Scalable relational data management.
- NoSQL Databases: MongoDB, Cassandra High-availability distributed databases.
- **Redis** / **Memcached** In-memory caching for faster response times.

Messaging & Event-Driven Architecture

- Apache Kafka Real-time event streaming and asynchronous communication.
- **RabbitMQ** Message brokering for decoupling services.
- **gRPC** High-performance inter-service communication.

Cloud & Deployment

- **Docker** Containerization for application portability.
- Kubernetes Scaling, orchestration, and auto-recovery.
- AWS / GCP / Azure Cloud deployment and auto-scaling.

CI/CD & DevOps

- GitHub Actions / Jenkins Automated build and deployment pipelines.
- Terraform Infrastructure as Code for cloud provisioning.
- **Helm** Kubernetes package management for scalable applications.

Text Book(s):

T1: "Spring in Action" by Craig Walls

T2: "Java Performance: The Definitive Guide" by Scott Oaks

T3: "Designing Data-Intensive Applications" by Martin Kleppmann

T4. "Spring Microservices in Action" by John Carnell

Reference(s):

- 1. "Designing Data-Intensive Applications" Martin Kleppmann
- 2. "Java Performance: The Definitive Guide" Scott Oaks
- 3. "Spring Microservices in Action" John Carnell
- 4. "Kubernetes Up & Running" Kelsey Hightower, Brendan Burns, Joe Beda

Catalogue prepared by	
Recommended by the Board of Studies on	
Date of Approval by the Academic Council	

Course Code:	Course Title: Scalable Application	on					
Course Coue.	Development using Java	511					
CSEVVVV	Development using Java		L- T-P- C	3	0	0	3
CSEAAAA	Type of Course: Lab						
X 7 • X 7	2.0						
Version No.	2.0						
Course	Basic Java Programming Knowled	dge, Java fram	ework, unders	tandi	ng o	f datab	ases
Prerequisites	and fundamentals of web develop	ment, basics of	f multithreadir	ng an	d coi	ncurrei	ncy.
Anti-requisites	NIL						
Course	This course provides a comprehen	sive guide to d	esigning, deve	elopir	ng, ai	nd dep	loving
Description	scalable lava applications cove	ring high-ner	formance arc	hitect	hires	distr	ibuted
- ···· · · · ·	systems microservices cloud den	lovment and l	DevOns integr	ation		, 4150	louted
	systems, meroservices, cioue dep	noyment, and I	Devops meg	anon	•		
Course	The objective of the course is to U	Understand Sca	alability Princ	iples,	, dev	elopin	g high
Objective	performance Java applications, de	esign and impl	lement scalabl	e arc	hited	cture, c	leploy
	and manage scalable data.						
Course	On successful completion of the c	ourse the stude	ents shall be al	ole to):		
Outcomes	-						
	CO 1: Design and Develop Scalable Java Applications						
	CO 2: Design and Implement Sca	lable Architect	ures and Micr	o ser	vices	5	
	CO 3: Implement Scalable Data I	Management T	echniques				
	CO 4: Deploy and Monitor Applications in Cloud Environments						
Course							
Content:							
	Foundations of Scalable Java					1	0
Module 1	Applications	Assignment	Implementat	10n		Ses	sions
Topics:							
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Introduction to S	scalability - Defining scalability: v	ertical vs. hori	zontal scaling,	Mor	nolith	nc vs.	
Microservices Architecture, Performance bottlenecks and solutions.							
Java Performan	e Ontimization - IVM internals a	nd tuning Garl	hage Collectio	n (G	() st	rategie	20
Profiling and monitoring Java applications							
Concurrency and Multithreading - Java concurrency model and thread management, Executor							
framework, ForkJoinPool, Thread safety, locks, and synchronization.							
		A •	τ 1			10	
Module 2	Scalable Architectures and	Assignment	Implementat	10n			
	WI1Croservices		1			Sessi	ons

Topics:

Microservices and Distributed Systems - Principles of microservices, Service-to-service, communication (REST, gRPC, Kafka), API Gateway, Service Discovery, and Load Balancing

Design Patterns for Scalability - Singleton, Factory, and Builder patterns, CQRS (Command Query Responsibility Segregation), Circuit Breaker and Retry patterns (Resilience4j)

Event-Driven Architecture & Asynchronous Processing - Event Sourcing with Kafka, WebSockets and Reactive Programming, Handling failures in distributed systems.

Module 3	Scalable Data Management and	Mini -	Implementation	10
	Caching	Project		Sessions

Topics:

Database Scalability - SQL vs. NoSQL databases (MySQL, PostgreSQL, MongoDB, Cassandra), Sharding, Replication, and Partitioning strategies, Optimizing queries (Indexing, Query Caching)

Caching Strategies - In-memory caching with **Redis, Memcached**, Distributed caching techniques, Cache Invalidation and Eviction Policies

Data Streaming & Batch Processing - Apache Kafka for event-driven data pipelines, Apache Spark for large-scale data processing.

Module 4	Cloud Deployment	Quiz	Implementation	10 Sessions
	and DevOps for Scalability			

Topics:

Cloud-Native Development - Containerization with **Docker**, Kubernetes for scaling and orchestration, Cloud deployment strategies (AWS, GCP, Azure),

CI/CD & DevOps for Scalable Applications - Building CI/CD pipelines (Jenkins, GitHub Actions), Canary & Blue-Green Deployments, Infrastructure as Code (Terraform, Kubernetes Helm)

Security & Reliability - Securing APIs with OAuth2, JWT, API Gateway, Load Balancing & Rate Limiting, Monitoring with Prometheus, ELK Stack

Targeted Application & Tools that can be used:

Applications:

The course will focus on building and scaling the following types of applications:

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- Banking & FinTech Applications Secure and high-availability transactions.
- Streaming & Event-Driven Applications Using Kafka for real-time data processing.
- Social Media & Messaging Platforms Scalable messaging and real-time updates.

• SaaS & Cloud-Native Applications – Multi-tenant, API-based scalable solutions.

5.

Tools:

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- Spring Boot Microservices development, REST APIs, and dependency injection.
- **Spring Cloud** Service discovery, load balancing, and resilience patterns.
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- NoSQL Databases: MongoDB, Cassandra High-availability distributed databases.
- Redis / Memcached In-memory caching for faster response times.

Messaging & Event-Driven Architecture

- Apache Kafka Real-time event streaming and asynchronous communication.
- **RabbitMQ** Message brokering for decoupling services.
- **gRPC** High-performance inter-service communication.

Cloud & Deployment

- 5. Docker Containerization for application portability.
- 6. Kubernetes Scaling, orchestration, and auto-recovery.
- 7. AWS / GCP / Azure Cloud deployment and auto-scaling.

CI/CD & DevOps

- GitHub Actions / Jenkins Automated build and deployment pipelines.
- Terraform Infrastructure as Code for cloud provisioning.
- Helm Kubernetes package management for scalable applications.

Text Book(s):

T1: "Designing Data-Intensive Applications" – By Martin Kleppmann

T2: "Java Concurrency in Practice" – By Brian Goetz

T3: "Spring Microservices in Action" – By John Carnell

T4. "Cloud Native Java" – By Josh Long & Kenny Bastani

Reference(s):

- "Designing Data-Intensive Applications" Martin Kleppmann
- "Java Performance: The Definitive Guide" Scott Oaks
- "Spring Microservices in Action" John Carnell
- "Kubernetes Up & Running" Kelsey Hightower, Brendan Burns, Joe Beda

Catalogue	
nuonound by	
prepared by	
Recommended	
her the Decard	
by the Board	
of Studies on	
Date of	
Approval by	
the Academic	
Council	

Course Code: CSE7000	Course Title: Internship Type of Course:	L-T-P-C	-	-	-	2	
Version No.	1.0		1				
Course Pre- requisites	Knowledge and Skills related to all the course	es studied in	previ	ious s	emeste	ers.	
Anti-requisites	NIL						
Course Description	Students observe science and technology in action, develop an awareness of the method of scientific experimentation, and often get an opportunity to see, study and operate sophisticated and costly equipment. They also learn about the implementation of the principles of management they have learnt in class, when they observe multidisciplinary teams of experts from engineering, science, economics, operations research, and management deal with techno-economic problems at the micro and macro levels. Finally, it enables them to develop and refine their language, communication and inter-personal skills, both by its very nature, and by the various evaluation components, such as seminar, group discussion, project report preparation, etc. The broad-based core education, strong in mathematics and science and rich in analytical tools, provides the foundation necessary for the student to understand properly the nature of real-life problems.						
Course Objectives	The objective of the course is to familiarize the lear Practice and attain Employability Skills through	mers with the Experienti	conce al Lea	epts of arnin	f Profe g techr	ssional 1iques.	
Course Outcomes	 On successful completion of this course the stude 6. Identify the engineering problems relate needs. (Understand) 7. Apply appropriate techniques or mod problem. (Apply) 8. Design the experiments as per the stand 9. Interpret the events and results for mea 	ents shall be a ed to local, re- lern tools fo lards and spe- ningful conclu	ble to gional or sol cificat usions	: , nati ving ions. 5. (Eva	onal or the int (Analyz iluate)	global tended ze)	
Catalogue prepared by	Mr. Md Ziaur Rahman						
Recommended by the Board of Studies on Date of Approval							
bythe Academic Council							

Course Code: CSE2271	Course Title: Software De Type of Course: School Co	sign and Deve re [Theory On	lopment ly]	L-T- P- C	3.	-0-0-3
Version No.	1.0			-		
Course Pre-requisites	NIL					
Anti-requisites	NIL					
Course Description	The objective of this cours	e is to provide	the fundame	entals con	cepts of S	oftware
	Engineering process and p	rinciples.				
	I ne course covers softwar	e requirement	engineering	processes	, system a	anaiysis, oont
	The course covers softwar	e quality, confi	iguration mar	nagement	and main	itenance.
Course Objectives	The objective of the course	e is to familiari	ze the learne	rs with th	e concept	s of
	Software Engineering and	d attain Skill De	evelopment tl	hrough Pa	rticipative	e Learning
	techniques.					
Course Out Comes	On successful completion	of this course t	the students s	shall be at	ole to:	
	models(Knowledge)	tware Engin	eering prin	icipies,	ethics a	and process
	2] Identify the requireme	ents, analysis	and appropr	iate desig	gn model	s for a given
	application(Comprehensio	n)			-	-
	3] Understand the Agile Pr	inciples(Know	ledge)			
	4] Apply an appropriate p involved in coftware (Appli	lanning, sched	luling, evalua	tion and	maintena	nce principles
		cation				
	Introduction to Software					
Modulo 1	Engineering and Process	Quiz				
	Models	Quiz				10110013
Introduction, Nood for Cof	(Knowledge level)	ional Cafturar		nt Coftu	ara Engin	ooring Ethios
Software Engineering Practi	ice-Essence of Practice Ger	neral Principle	e Developme s Software De	velonme	are Engin ht Life Cvc	eering Ethics, Ie
Models: Waterfall Model	– Classical Waterfall Mod	del, Iterative	Waterfall Mo	odel, Evol	lutionary	model-Spiral,
Prototype.		-		-	•	
	Software Requirements,		Developmen	t of SRS		
Module 2	Analysis and Design	Assignment	documents fo	or a given		12 Hours
Requirements Engineering	r Eliciting requirements	Functional ar	nd non- Fun	ctional re	auireme	nts Software
Requirements Specification	(SRS), Requirement Analy	sis and validat	ion. Requirer	nents mo	delling- In	itroduction to
Use Cases, Activity diagram	and Swim lane diagram.	CASE support i	n Software Li	ife Cycle,	Character	ristics of CASE
Tools, Architecture of a CAS	E Environment.					
Design: Design concepts, Ai	rchitectural design, Compo	nent based des	sign, User inte	erface des	sign.	
Modulo 2	Agile Principles &	Quiz				10 Hours
	(Knowledge level)	Quiz				10110013
Agile: Scrum Roles and a	ctivities, Sprint Agile soft	ware developr	nent method	ds - Scali	ng, User	Stories, Agile
estimation techniques, Proc Devops: Introduction, defin	duct backlogs, Stake holder ition, history, tools.	roles, Dynami	c System Dev	velopment	: Method.	
	Software Testing and		۸ مماريد م	ting	onto	
Module 4	Maintenance	Assignment	Apply the tes	ning conc ming	epts	13 Hours
	(Application Level)		using i rogial	•••••ъ		

Software Testing-verification and validation, Test Strategies - White Box Testing, Black box Testing. Automation Tools for Testing.

Software Quality Assurance-Elements of software quality assurance, SQA Tasks, Goals and Metrics, Software configuration management- SCM process, SCM Tools (GitHub).

Maintenance- Characteristics of Software Maintenance, Software Reverse Engineering, Software Maintenance Process Models.

Targeted Application & Tools that can be used: Selenium, GitHub, CASE Tools

Text Book

1. Roger S. Pressman, "Software Engineering – A Practitioner's Approach", VII Edition, McGraw-Hill, 2017.

2. Bob Hughes, Mike Cotterell, Rajib Mall, "Software Project Management", VI Edition, McGraw-Hill, 2018.

References

- 4. Rajib Mall, "Fundamentals of Software Engineering", VI Edition, PHI learning private limited, 2015.
- 5. Ian Sommerville, "Software Engineering", IX Edition, Pearson Education Asia, 2011.
- 6. Agile Software Development Principles, Patterns and Practices.1st Edition, Wiley, 2002

Topics Relevant to "Skill Development: Balck box Testing, White box Testing, Automated Testing for Skill development through Participative Learning Techniques. This is attained through assessment mentioned in the course handout



Itgalpur, Rajankunte, Yelahanka, Bengaluru - 560064

Course Code:	Course Title: Cloud computing		2	0	0			
CSE2272	Type of Course: Theory	L- I-P- C	3	U	0	3		
Version No.	2.0	2.0						
Course Pre- requisites								
Anti-requisites	NIL							
Course Description	This Course is designed to introduce the concepts of Cloud Computing as a new computing paradigm. Cloud Computing has emerged in recent years as a new paradigm for hosting and delivering services over the Internet. The students can explore various Cloud Computing terminology, principles and applications. Understanding different views of the Cloud Computing such as theoretical, technical and commercial aspects. Topics include: Evolution of cloud computing and its services available today, Introduction, Architecture of cloud computing, Infrastructure, platform, software, Types of cloud, Business models, cloud services, Collaborating using cloud services, Virtualization for cloud, Security, Standards and Applications.							
Course Objective	The objective of the course is to familiarize the learners with the concepts of Could computing and Virtualization and attain Employability through Participative Learning techniques.							
Course Outcomes	On successful completion of the course t	he students	shall	be	able t	:0:		
	 On successful completion of the course the students shall be able Describe fundamentals of cloud computing, virtualization and computing services. Discuss high-throughput and data-intensive computing. Explain security and standards in cloud computing. 							
Course		suration of V	ntua			Ξ.		
Content:								





Itgalpur, Rajankunte, Yelahanka, Bengaluru – 560064

Module 1	Introduction to Cloud and Virtualization	Assignment	Virtualization	10 Sessions
— ·				

Topics:

Introduction to Cloud and Virtualization Cloud Computing at a Glance, Historical Developments, Building Cloud Computing Environments, Computing Platforms and Technologies, Virtualization, Characteristics of Virtualized Environments Taxonomy of Virtualization Techniques, Virtualization and Cloud Computing, Technology Examples, Cloud Computing Architecture, IaaS, PaaS,

SaaS, Types of Clouds, Economics of Cloud

Module 2	High Throughput and Data Intensive Computing	Assignment	Virtualization	10 Sessions
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Topics:

High Throughput and Data Intensive Computing: Task computing, MPI applications, Task based programming, Introduction to DIC, Technologies for DIC, Aneka Map Reduce Programming.

Module 3	Cloud Security and Standards	Assignment	Virtualization	9 Sessions
				SUSSIONS
- ·				

Topics:

Cloud Security and Standards: Cloud Security Challenges, Software-as-a-Service Security, Application standards, Client standards, Infrastructure and Service standards.

Module 4	Cloud Platforms	Assignment	Virtualization	9 Sessions

Cloud Platforms, Advances in cloud: introduction to Amazon Web Services: Introduction to Google App Engine, Introduction to Microsoft Azure. Media Clouds -Security Clouds - Computing Clouds - Mobile Clouds – Federated Clouds – Hybrid Cloud

Targeted Application & Tools that can be used:

Text Book(s):



Itgalpur, Rajankunte, Yelahanka, Bengaluru – 560064

1. John Rittinghouse and James Ransome, "Cloud Computing, Implementation, Management and

Security", CRC Press.

2. Rajkumar Buyya, Christian Vecchiola, and Thamarai Selvi, "Mastering Cloud Computing", McGraw

Hill Education.

Reference(s):

1. David E.Y. Sarna, "Implementing and Developing Cloud Applications", CRC Press.

2. Anthony T Velte, Toby J Velte, Robert Elsenpeter, "Cloud Computing: A Practical Approach", Tata McGraw-Hill. Web resources: https://presiuniv.knimbus.com/user#/home

Course Code:	Course Title: Cloud co	omputing					
CSE2273	Type of Course : Lab		L- T-P- C	0	0	2	1
Version No.	1.0					I	
Course Pre- requisites							
Anti-requisites	NIL						
Course Description	This course is designed to give hands-on experience with cloud platforms, services, and deployment models. Students will learn to set up, configure, and manage cloud environments using platforms like AWS, Microsoft Azure, and Google Cloud. The course covers virtualization, containerization, serverless computing, cloud storage, security, and scalability. Through practical assignments, students will develop skills in deploying cloud applications, managing cloud resources, automating cloud workflows, and implementing cost-effective cloud solutions.						
Course Objective	The objective of the course is to Understand Cloud Infrastructure, deploy and manage virtual machines, implement cloud storage, develop and deploy cloud applications, optimize cost and performance.						
Course Outcomes	On successful completion CO1 · Deploy and Man CO2. Develop and Dep CO3. Optimize Perform CO4. Implement Secur	 On successful completion of the course the students shall be able to: CO1 · Deploy and Manage Cloud Resources. CO2. Develop and Deploy Cloud-based Applications CO3. Optimize Performance and Cost in the Cloud CO4. Implement Security and Automation in Cloud Environments 					
Course Content:							
Module 1	Introduction to Cloud and Virtualization	Assignment	Virtualization			1 Sess	0 sions
 Lab Assignment 1: Setting Up Virtual Machines on Cloud Create a Virtual Machine (VM) on AWS/Azure/GCP Configure OS, storage, and network settings 							

• Connect to the VM using SSH/RDP Install web server (Apache/Nginx) and deploy a static webpage

Lab Assignment 2: Containerization Using Docker

- Install **Docker** on a local or cloud VM
- Create and run a **Docker container**
- Build a **custom Docker image** with a simple Python/Node.js application
- Push the image to **Docker Hub** and deploy it on a new VM

Module 2	High Throughput and Data Intensive	Assignment	Virtualization	10
	Computing			563510115

Lab Assignment 1: Setting Up a Distributed Computing Environment

- Launch a Hadoop or Spark cluster on AWS EMR / Azure HDInsight / Google Dataproc
- Configure HDFS (Hadoop Distributed File System) for big data storage
- Run a **basic MapReduce job** on sample data

Lab Assignment 2: Data Preprocessing with Cloud Storage

- Store large datasets in Amazon S3 / Azure Blob Storage / Google Cloud Storage
- Use Apache Spark or Hadoop to read, clean, and process data
- Convert datasets into **Parquet or Avro formats** for efficient storage

Lab Assignment 3: Batch Processing with Apache Spark

- Load large datasets (e.g., logs, tweets, transaction data) into Spark DataFrame
- Perform ETL (Extract, Transform, Load) operations on the data
- Use **SparkSQL** for querying large datasets

Lab Assignment 4: Real-Time Data Processing with Spark Streaming

- Set up Kafka / AWS Kinesis / Google Pub/Sub for real-time data ingestion
- Process streaming data using **Spark Streaming**
- Perform windowed aggregations and visualize real-time trends

Lab Assignment 5: Cloud-Based Machine Learning with Big Data

- Use Google BigQuery ML / AWS SageMaker / Azure Machine Learning for model training
- Train a linear regression or classification model on a large dataset
- Deploy the trained model as an API for real-time predictions

Lab Assignment 6: Running Parallel Machine Learning Workloads

- Implement distributed ML training using Spark MLlib or TensorFlow on Cloud TPUs
- Train models on a large dataset and optimize performance using distributed execution

Lab Assignment 7: Auto-Scaling and Load Balancing for Data Processing

- Deploy a serverless Spark job using AWS Glue / Azure Synapse
- Implement **auto-scaling for high-throughput jobs**
- Measure performance improvements using cloud monitoring tools

Lab Assignment 8: Cost Optimization for High-Throughput Data Processing

- Analyze cloud cost reports for data-intensive workloads
- Optimize cloud storage and compute resources for cost-efficiency
- Compare on-demand vs. reserved vs. spot instances for cost savings

Module 3Cloud Security and Standards	Assignment	Virtualization	9 Sessions
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Lab Assignment 9: Configuring Identity and Access Management (IAM)

- Set up IAM roles and policies in AWS / Azure / Google Cloud
- Create and assign users with **least privilege access**
- Implement Multi-Factor Authentication (MFA) for added security
- Audit IAM policies using AWS IAM Access Analyzer / Azure Security Center

Lab Assignment 10: Setting Up Single Sign-On (SSO) and Role-Based Access Control (RBAC)

- Configure AWS Cognito / Azure Active Directory / Google IAM for authentication
- Implement Role-Based Access Control (RBAC) for users and groups
- Integrate OAuth 2.0 / OpenID Connect (OIDC) / SAML for secure authentication

Lab Assignment 11: Encrypting Data at Rest and in Transit

- Encrypt cloud storage (S3, Blob, Cloud Storage) using KMS (Key Management Service)
- Set up TLS/SSL certificates for secure web traffic encryption
- Enable database encryption (AWS RDS, Azure SQL, GCP Cloud SQL)

Lab Assignment 12: Implementing Compliance & Governance in Cloud

- Enable GDPR, HIPAA, ISO 27001 compliance tools in cloud platforms
- Use AWS Config / Azure Policy / GCP Security Command Center to enforce compliance
- Conduct security audits and generate compliance reports

Lab Assignment 13: Implementing Cloud Monitoring & Threat Detection

- Configure AWS CloudTrail / Azure Monitor / GCP Operations Suite for activity logging
- Set up intrusion detection systems (IDS) & anomaly detection
- Analyze security logs using Amazon GuardDuty / Azure Sentinel / Chronicle Security

Lab Assignment 14: Automating Security Incident Response

- Deploy a Serverless Lambda / Azure Logic App to automatically respond to security incidents
- Implement automated alerts for suspicious activity
- Test a **denial-of-service (DDoS) simulation** and implement mitigation strategies

Module 4	Cloud Platforms	Assignment	Virtualization	9 Sessions			
Lab Assignment 15: Getting Started with Cloud Platforms							
• Create a f	free-tier account	on AWS, Azure, or Go	ogle Cloud				
• Navigate t	the Cloud Consol	e, CLI, and SDKs					

• Explore and configure dashboard, billing, and IAM settings

Lab Assignment 16: Launching a Virtual Machine (VM) on Cloud

• Deploy a VM instance using AWS EC2, Azure Virtual Machines, or Google Compute Engine

Configure **OS**, storage, networking, and security groups Connect to the instance using SSH (Linux) or RDP (Windows)

Lab Assignment 17: Cloud Storage and File Management

• Create Object Storage (AWS S3 / Azure Blob Storage / Google Cloud Storage) Upload, download, and set access permissions for files Implement Lifecycle Policies and Versioning

Lab Assignment 18: Cloud Database Management

• Deploy a Relational Database (AWS RDS / Azure SQL Database / Cloud SQL) Connect and query the database using MySQL/PostgreSQL clients Set up database backups and automatic scaling

Lab Assignment 19: Configuring Virtual Networks in Cloud

• Set up a Virtual Private Cloud (VPC) / Azure Virtual Network / GCP VPC Configure subnets, firewalls, and security groups Test network communication between two VMs

Lab Assignment 20: Deploying a Web Application on Cloud

Deploy a Python/Node.js/Java web app using:

- AWS Elastic Beanstalk
- Azure App Service
- Google App Engine Connect the app to Cloud Database (RDS, CosmosDB, Firestore) Monitor application performance and logs

Targeted Application & Tools that can be used:

Text Book(s):

1. John Rittinghouse and James Ransome, "Cloud Computing, Implementation, Management and

Security", CRC Press.

2. Rajkumar Buyya, Christian Vecchiola, and Thamarai Selvi, "Mastering Cloud Computing", McGraw

Hill Education.

Reference(s):

1. David E.Y. Sarna, "Implementing and Developing Cloud Applications", CRC Press.

2. Anthony T Velte, Toby J Velte, Robert Elsenpeter, "Cloud Computing: A Practical Approach", Tata McGraw-Hill. Web resources: https://presiuniv.knimbus.com/user#/home

Course Code:	Course Title: Mobile App	plication Development					
CSE2505	Type of Course: Theory		L- T-P- C	2	0	0	2
Version No.	2.0						
Course Pre- requisites	CSE2255						
Anti- requisites	NIL						
Course Description	The course deals with the basics of android platform and application life cycle. The goal of the course is to develop mobile applications with Android containing at least one of the following phone material components: GPS, accelerometer or phone camera, use simple GUI applications and work with database to store data locally or in a server. Topics include user interface design; user interface building; input methods; data handling; network techniques and URL loading; GPS and motion sensing. Android application framework and deployment. Power management, Screen resolution, Touch interface, Store data on the device.						
Course Objective	The objective of the cours Applications and Develop through Experiential Learn	The objective of the course is to familiarize the learners with the concepts of Mobile Applications and Development as mentioned above and attain Employability Skills through Experiential Learning Techniques.					
Course Outcomes	 On successful completion of the course the students shall be able to: 1. Discuss the fundamentals of mobile application development and its architecture. (Comprehension) 2. Illustrate mobile applications with appropriate android view. (Application) 3. Demonstrate the use of services, broadcast receiver, Notifications and content provider.(Application) 4. Apply data persistence techniques, to perform CRUD operations. (Application) 5. Use advanced concents for mobile application development (Application) 						
Course Content:							
Module 1	Introduction and Architecture of Android	Assignment	Simulation/E Analysis	Data		1 Sess	0 sions
Topics:							
Android: Histor Life cycle.	ry and features, Architecture	e, Development Tools, A	Android Debug	g Bri	dge	(ADB)), and
Module 2	User Interfaces, Intent and Fragments	Term paper/Assignment	Simulation/E Analysis	Data		15 Sessi	ons
Topics:						-	
Views, Layout,	Menu, Intent and Fragments	S.					

M I I 2	ale 3 Components of Android Term paper/Assignment		Term		Simulation/Data		15	
Module 3			Analysis		Sessions			
Topics:								
Activities, Serv	ices, Broadcast receiv	ers. C	ontent providers.	User N	avigation			
Module 4	Notifications and	Term	,	Simula	tion/Data	15 Ses	sions	
	Data Persistence	paper/	Assignment	Analys	Analysis			
Topics:								
Notification St	pared Preferences SO	I ite d	atabase Android	Roomy	vith a View Fire	hase		
Notification, Si	Advance App	Term	naper/Assignmer	nt Simul	ation/Data	15 Se	ssions	
	Development		paperin issigning	Analy	sis			
Topics:								
	·····		Derfe	. T	tion Discon Ma		7	
Views, Canvas.	nimation, App widge	ts, Ser	isors, Performance	ce, Loca	tion, Places, Ma	pping, (Justom	
Targeted Appl	ication & Tools that	can b	e used:					
Applications:								
	· 1 A 1· /·							
Native And	roid Applications							
Native iOS Applications								
Cross Platfo	Cross Platform mobile Apps							
Mobile web Applications								
Text Book(s):								
T1. Pradeep kothari "Android Application Development - Black Book", dreamtechpress								
T2. Barry Burd (Author), "Android Application Development" ALL – IN – ONE FOR Dummies								
T3. Jeff Mcherter (Author), Scott Gowell (Author), "Professional mobile Application								
Development" paperback, Wrox - Wiley India Private Limited								
T4. Wei-Meng Lee (Author) "Beginning Android Application Development" Wrox – Wilev								
India Private Limited								
	inntou							

Reference(s):

1. Bill Phillips, Chris Stewart, and Kristin Marsicano (Author) "Android Programming" 3rd edition,

2017. The Big Nerd Ranch Guide, Big Nerd Ranch LLC, 5. The Big Nerd Ranch Guide, by"

2. Erik Hellman, "Android Programming – Pushing the Limits", 1st Edition, Wiley India Pvt Ltd,
 2014.

3. Dawn Griffiths and David Griffiths, "Head First Android Development", 1st Edition, O'Reilly SPD Publishers, 2015.

4. J F DiMarzio, "Beginning Android Programming with Android Studio", 4th Edition, Wiley India Pvt

Ltd, 2016. ISBN-13: 978-8126565580

5. Anubhav Pradhan, Anil V Deshpande, "Composing Mobile Apps" using Android, Wiley 2014,

ISBN: 978-81-265-4660-2

6. Reto Meier "Professional Android Application Development"

E-Resources: https://puniversity.informaticsglobal.com/login Or http://182.72.188.193/

Course Code:	Course Title: Mobile A	pplication					
	Development Lab		L T-P-C	0	0	Δ	2
CSE2506			L- 1-1 - C	U	U	т	2
	Type of Course: Lab						
Version No.	2.0		I				
Course Pre-	CSE2256						
requisites							
Anti-requisites	NIL						
Course	The course provides ha	nds-on experience in des	signing, develo	oping	, and	d depl	oying
Description	mobile applications for	Android and iOS platfor	ms. Students v	vill v	ork	with r	native
	development framework	s such as Android Studio	(Java/Kotlin)	and X	Cod	e (Swi	ft), as
	well as explore cross-pla	atform tools like Flutter o	r React Native				
Course	The objective of the	course is to develop N	lative and Cr	oss-P	latfo	orm M	lobile
Objective	Applications, design Int	eractive and Responsive	User Interface	es, in	tegra	ite Bac	ckend
	Services and APIs, imp	element State Manageme	ent and Perfor	manc	e Oj	ptimiza	ation,
	ensure Mobile App Secu	irity and Data Protection					
Course	On successful completion of the course the students shall be able to:						
Outcomes	1 Develop Functional M	Iobile Applications					
	1. Develop Functional Moone Applications						
	2. Design and Implement Interactive UIs						
	3. Integrate Cloud Services and APIs						
	4. Integrate Backend Systems and Data Management						
	5. Deploy, Publish, and Maintain advanced Mobile Application						
Course							
Content:							
	Introduction and						
Module 1	Architecture of	Assignment	Simulation/D)ata		1	0
	Android	8	Analysis			Sess	sions
using toast message.							
1.b. Create an android app to calculate the current age of yourself, select your DOB using date picker.							
2. Design an app to input your personal information. Use an autocomplete text view to select your							
place of birth.							
	Lloon Interference Interit	Тонно	Cimeralation /	lat-		15	
Module 2	oser interfaces, intent	nonor/Assignment	Analyzia	vata		13 Soca:	ong
	and Fragments	paper/Assignment	Anarysis			50551	0115

3. a. Design an app to select elective course using spinner view and on click of the display button,

toast your ID and selected elective course.

3. b. Design a restaurant menu app to print the total amount of orders.

Module 3	Components of T		Ferm		Simulation/Data		15	
Module 5	Android	Į	paper/Assignme	nt	Analysis		Sessions	
4. Develop an android app that uses intent to maintain the following scenario.								
Check the eligibil	ity criteria for votir	ng. Input	the Aadhar no.	, Name	& age in the first	activit	y. If the	
age is above 18, d vote" in the secon	d Activity.	etail in t	he second activi	ity. Else	, display, "You ai	re not e	ligible to	
5. Demonstrate th	e use of fragment v	vith list o	of buttons repre	senting	various colors, a	nd on c	lick of	
these buttons, the the vitals of a pers	appropriate color is son (temperature, B	s filled in BP). If the	n the next fragm e vitals are abno	nent. Cre ormal, g	eate an Android a ive proper notific	applicat cation to	tion to input o the user.	
6. Create an andro	oid app to for movie	e ticket b	oooking. Save th	ne user r	ame of the custo	omer us	ing shared	
preferences. After the ticket details.	completion of boo	king, ret	rieve the userna	me from	n the shared pref	erences	and print	
Module 4	Notifications and	Term		Simulation/Data		15 Sessions		
	Data Persistence	paper/A	ssignment	Analysi	s			
7. Create an android application to manage the details of students' database using SQLite.Use necessary UI components, which perform the operations such as insertion, modification, removal and								
view.Presidency University needs an APP for Admission eligibility checking for students, for that you need to take the following information from the Student: registration ID, physics, chemistry and mathematics marks (PCM), fees is allotted as below criteria.								
PCM (Total marks %) Fee concession								
90 above 80 %								
70 to 89 60 %								
Below 69 % no concession								
On click on the button "Registration" details should be stored in the database using SQLite. Create button DISPLAY ALL (full students list) on click on the button it should display the students list per the fee								
concession.								
8. A company need to design an app that plays soft music automatically in the background. Create an app to achieve this functionality.								

9. Create an android application such that your view object in the Activity can be Animated with fadein effect. Create an appropriate XML file named fade-in and write the application to perform the property animation.

Module 5	Advance App	Term paper/Assignment	Simulation/Data	15 Sessions
	Development		Analysis	

10. Demonstrate how to send SMS and email.

11. Create an android application to transfer a file using WiFi. Create an android application "Where am I" with an Activity that uses the GPS Location provider to find the device's last known location.

Targeted Application & Tools that can be used:

Applications:

- 1. Native Android Applications (Java/Kotlin)
 - Android Mobile Apps built for Android smartphones and tablets using Java or Kotlin programming languages.
 - Target audience: Android users.
- Native iOS Applications (Swift)
 - o iOS Mobile Apps designed for iPhone and iPad using Swift.
 - Target audience: iOS users (Apple ecosystem).
- Cross-Platform Mobile Apps (Flutter, React Native)
 - Cross-platform apps designed to run on both Android and iOS from a single codebase using frameworks like Flutter or React Native.
 - Target audience: Users on both Android and iOS platforms.
- Mobile Web Applications (Progressive Web Apps PWA)
 - Mobile-optimized web applications using HTML5, CSS3, and JavaScript that run in a browser with native-like functionality (offline support, push notifications).
 - Target audience: Users accessing apps via mobile browsers.

Development Tools and Frameworks

- 1. Integrated Development Environments (IDEs)
 - Android Studio (for Android): The official IDE for Android development, supporting Java, Kotlin, and Android SDK.
 - Xcode (for iOS): The official IDE for iOS development with Swift and Objective-C, providing a comprehensive suite of development tools for iPhone/iPad applications.

- Visual Studio Code (VS Code): Lightweight IDE for working with Flutter, React Native, and web development projects.
- Cross-Platform Development Frameworks
 - Flutter: Open-source UI framework by Google for building natively compiled applications for mobile, web, and desktop from a single codebase.
 - React Native: Open-source framework developed by Facebook for building crossplatform apps with JavaScript and React.
- Backend & Cloud Tools
 - Firebase: Google's backend-as-a-service (BaaS) platform offering authentication, realtime databases, cloud storage, and push notifications for mobile apps.
 - AWS Amplify: Cloud platform for backend services (API, storage, authentication) and mobile deployment.
 - SQLite / Realm: Local storage solutions for mobile apps to manage data storage and retrieval on-device.
- Mobile App Testing and Debugging Tools
 - Android Emulator (for Android): A virtual device to run and test Android apps without needing physical devices.
 - Xcode Simulator (for iOS): A tool to simulate different iOS devices and test apps during development.
 - Appium: Open-source tool for automated testing across native, hybrid, and mobile web applications.
- Version Control and Collaboration
 - Git: Version control system for managing code changes and collaborating with teams.
 - GitHub / GitLab / Bitbucket: Online platforms for hosting Git repositories, collaboration, and version control management.
- Mobile App Deployment Tools
 - Google Play Console: For managing Android app publishing, distribution, and monitoring.
 - Apple App Store Connect: For managing iOS app submissions, reviews, and releases on the Apple App Store.
- UI/UX Design Tools
 - Figma / Adobe XD: Tools for UI/UX design and wireframing to create the visual elements of mobile applications before development.
 - Sketch: Vector-based design tool for iOS UI design and prototyping

Text Book(s):

T1. Pradeep kothari "Android Application Development - Black Book", dreamtechpress

T2. Barry Burd (Author), "Android Application Development" ALL - IN - ONE FOR Dummies

T3. Jeff Mcherter (Author), Scott Gowell (Author), "Professional mobile Application

Development" paperback, Wrox - Wiley India Private Limited

T4. Wei-Meng Lee (Author) "Beginning Android Application Development" Wrox - Wiley

India Private Limited

Reference(s):

1. Bill Phillips, Chris Stewart, and Kristin Marsicano (Author) "Android Programming" 3rd edition,

2017. The Big Nerd Ranch Guide, Big Nerd Ranch LLC, 5. The Big Nerd Ranch Guide, by"

2. Erik Hellman, "Android Programming – Pushing the Limits", 1st Edition, Wiley India Pvt Ltd,

2014.

3. Dawn Griffiths and David Griffiths, "Head First Android Development", 1st Edition, O'Reilly SPD Publishers, 2015.

4. J F DiMarzio, "Beginning Android Programming with Android Studio", 4th Edition, Wiley India Pvt

Ltd, 2016. ISBN-13: 978-8126565580

5. Anubhav Pradhan, Anil V Deshpande, "Composing Mobile Apps" using Android, Wiley 2014,

ISBN: 978-81-265-4660-2

6. Reto Meier "Professional Android Application Development"

E-Resources: https://puniversity.informaticsglobal.com/login Or http://182.72.188.193/

urse Code: 2274	urse Title: Competitive Programming and Problem Solving	-P-C	þ	þ				
	e of Course: Program Core							
rsion No.				•				
urse Pre-requisites								
ti-requisites								
arse Description	The Competitive Programming and Problem Solving course equips students with efficient problem-solving skills for coding competitions and real-world challenges. Starting with brute-force solutions, students learn to optimize time and space complexity using advanced techniques like dynamic programming, greedy algorithms, and backtracking. Hands-on practice on platforms like CodeChef and Codeforces helps tackle problems involving number theory, data structures, and algorithmic paradigms. By understanding CP constraints and fostering a strategic mindset, students gain the confidence to excel in competitions, technical interviews, and practical applications.							
urse Out Comes	On successful completion of the course the stude	ents shall b	e abl	e to:				
	CO1 : Understanding the issues of online platforms and Competitive Programming (CP) and developing brute force coding for commonly asked CP problems.CO2 : Analyzing the space and time complexity of brute force solutions and designing efficient solutions.							
	CO3 : Evaluating the applicability of suitable algorithmic approaches to solve relevant CP problems.							
	CO4: Creating efficient solutions of CP problems using the learnt approaches.							
urse Objective	The objective of the course is to familiarize the learners Programming and Problem Solving and att Experiential Learning techniques.	with the co ain Skill	ncept Dev	ts of elopn	Comp lent	<mark>betitive</mark> through		

dule 1: Introduction to Competitive Programming

erview of Efficient Coding for Problem Solving and CP: Introduction to competitive programming (CP); revisit of complexity analysis; introduction to online platforms such as codechef, codeforces etc and online submission; constraints during CP, online testing process and common errors such as TLE; use of STL

dule 2: Number Theory for Problem-Solving

of Number Theory for problem-solving: reducing time/space complexity of brute force coding solution of Sieve Method, Inverse Module, Euclidian Method of factorization; efficient coding for Permutation Combination; XORing based and pattern-based solutions.
dule 3: Optimizing Time & Space Using Sequential Storage

ing for Optimizing time and Space using Sequential Storage: two pointer approach; problem-solving using arrays and strings such as rotation on sorted arrays, duplicate removal, string matching algorithms; Kadane's algo, stacks, priority-queues and hashing based efficient coding; median based problems and alternate solutions.

dule 4: Non-Linear Data Structures

blying Non-Linear Data Structures for real-life problems: design of efficient solutions for problems such as finding loops in a linked list, memory efficient DLL, block reversal in LL; problem solving using trees and binary trees, Catalan numbers, applications of graphs, spanning tree and path algos for CP problems with reduced time/space complexity.

dule 5: Problem Solving using Advanced Topics

Problem Solving using Advanced Topics: concept of disjoint sets and their efficient representation, algorithmic approaches such as Greedy, Backtracking, Dynamic Programming and applying them for CP problems using bottom-up dynamic programming.

of Laboratory Tasks:

- 31. You are given the finishing times of 'N' runners in a marathon. Write a program to find the runner who finished in the third position. **Focus:** Basic data structures (arrays), sorting algorithms (e.g., insertion sort, selection sort), and basic input/output.
- 32. In the same marathon, you are given the finishing times of 'N' runners and their bib numbers. Write a program to efficiently find the top 10 runners and their corresponding bib numbers. **Focus:** Efficient sorting algorithms (e.g., merge sort, quick sort), data structures like priority queues, and optimizing for large datasets.
- 33. A library maintains a list of books with their unique IDs. Write a program to check if a given book ID is present in the library. Focus: Searching algorithms (linear search), basic data structures (arrays or lists).
- 34. The library wants to implement a system to quickly find books by their titles. Suggest an efficient data structure (e.g., a hash table or a trie) and explain how to implement it to achieve fast book lookups. Focus: Understanding the trade-offs between different data structures, choosing the most appropriate data structure for a specific problem, and implementing efficient search operations.
- 35. An online store sells products with different prices. Write a program to calculate the total cost of a given list of products. **Focus:** Basic arithmetic operations, working with arrays or lists to store product prices.
- 36. The online store offers discounts based on the total purchase amount. Design an algorithm to efficiently calculate the final cost of an order, considering different discount rules (e.g., percentage discounts, fixed amount discounts, tiered discounts). Focus: Algorithmic design, conditional statements, handling complex scenarios with multiple rules, and potentially using dynamic programming techniques for optimization.
- 37. You are given two integers, 'a' and 'm'. Calculate 'a' raised to the power 'm' modulo a large prime number 'p'. **Focus:** Basic modular arithmetic operations (modular exponentiation), understanding the modulo operator.
- 38. In a secure communication system, you need to efficiently compute the modular exponentiation for very large values of 'm'. Implement and analyze the efficiency of the binary exponentiation algorithm for this task. **Focus:** Efficient algorithms for modular exponentiation (binary

exponentiation), time complexity analysis, and understanding the importance of efficient algorithms in cryptography.

- 39. You have a deck of 'N' cards. Calculate the total number of possible hands of size 'K' that can be drawn from the deck. **Focus:** Basic combinatorics (combinations), factorial calculations.
- 40. In a card game, you need to calculate the probability of drawing certain combinations of cards (e.g., a pair, a three-of-a-kind) from a shuffled deck. Design an efficient algorithm to calculate these probabilities. **Focus:** Advanced combinatorics (permutations and combinations with repetitions), probability calculations, and optimizing calculations to avoid overflows.
- 41. You are given a network of devices represented as a graph. Determine if there is a path between two given devices in the network. **Focus:** Graph traversal algorithms (depth-first search or breadth-first search).
- 42. In a secure network, you need to detect and isolate compromised devices. Design an algorithm that efficiently identifies devices that exhibit anomalous behavior (e.g., unusual traffic patterns) using XOR-based techniques for data comparison and pattern matching. **Focus:** Applying XOR operations for data comparison and pattern recognition, understanding the properties of XOR (e.g., commutative, associative), and designing algorithms for network anomaly detection.
- 43. You are given an array representing the speeds of cars on a highway. Find the minimum time required for all cars to pass a certain point. **Focus:** Basic array traversal, finding the minimum element in an array.
- 44. In a more realistic scenario, cars have different lengths. Implement a two-pointer approach to simulate the movement of cars and determine the minimum time for all cars to pass a given point.
 Focus: Two-pointer technique, simulating real-world scenarios with arrays, optimizing time complexity.
- 45. Given a string, find the number of occurrences of a specific substring within the string. **Focus:** Basic string manipulation, string matching (brute-force approach).
- 46. Implement the KMP (Knuth-Morris-Pratt) string matching algorithm to efficiently find all occurrences of a given pattern within a large text document. **Focus:** Advanced string matching algorithms, understanding the concept of the "next" array in KMP, optimizing for large input sizes.
- 47. An online auction platform receives bids for different items. Implement a data structure (e.g., a priority queue) to efficiently track the highest bid for each item. **Focus:** Priority queues, insertion and extraction operations on priority queues, basic implementation of a priority queue using an array or a suitable library.
- 48. The auction platform needs to handle a large number of bids concurrently. Design and implement a system that efficiently processes bids, updates the highest bid for each item, and handles potential race conditions. **Focus:** Concurrent data structures and algorithms, thread safety, handling race conditions, optimizing for high-throughput scenarios.
- 49. A social network can be represented as a graph where users are nodes, and connections between users are edges. Write an algorithm to find if two given users are connected in the network. **Focus:** Graph traversal algorithms (depth-first search or breadth-first search), basic graph representation (adjacency list or adjacency matrix).
- 50. In a large social network, efficiently finding the shortest path between two users is crucial. Implement Dijkstra's algorithm to find the shortest paths between users in the network, considering edge weights (e.g., representing the strength of connections). **Focus:** Shortest path algorithms (Dijkstra's algorithm), graph algorithms with weighted edges, optimizing for large graphs.

- 51. A file system can be modeled as a tree structure. Implement a function to traverse the file system and print the names of all files and directories. **Focus:** Tree traversal algorithms (depth-first search or breadth-first search), basic tree representation (using nodes and pointers).
- 52. Design and implement a file system that supports efficient operations like creating directories, deleting files, and finding files based on their names or paths. Consider using a combination of tree structures and hash tables for efficient indexing and searching. **Focus:** Designing and implementing file system structures, using multiple data structures together, optimizing for common file system operations.
- 53. An online shopping cart can be represented as a tree, where each node represents an item or a category of items. Write an algorithm to calculate the total price of all items in the shopping cart. Focus: Tree traversal, calculating sums within a tree structure.
- 54. Implement a system that allows customers to apply discounts and coupons to their shopping carts. Consider using a combination of trees and other data structures (e.g., hash tables) to efficiently apply discounts and calculate the final price. **Focus:** Applying discounts and promotions to tree-like structures, efficient implementation of discount rules, optimizing for complex pricing scenarios.
- 55. In a social network, users can form groups. Given a list of friendships, determine if all users in a specific group are connected (directly or indirectly) through friendships. **Focus:** Disjoint set union (DSU) data structure, basic connectivity checks.
- 56. Design an efficient algorithm to find the minimum number of new friendships needed to connect all users in the social network into a single, connected component. **Focus:** Applying DSU for finding connected components, greedy algorithms, optimization for minimizing connections.
- 57. A treasure hunt involves a series of clues leading to the final treasure. Given a list of possible paths and their associated costs, find the cheapest path to reach the treasure. **Focus:** Greedy algorithms (e.g., Dijkstra's algorithm for shortest paths), basic graph representation.
- 58. In a more complex treasure hunt, there are time constraints associated with each path. Design an algorithm to find the fastest path to the treasure while considering both path costs and time constraints.
- **Focus:** Combining greedy approaches with other techniques (e.g., priority queues), handling multiple constraints, optimizing for time-critical scenarios.
 - 59. In a simplified chess game with only rooks, determine the minimum number of moves required for a rook to reach a specific target square on an empty board. **Focus:** Breadth-first search (BFS) on a graph (the chessboard), basic graph traversal.
 - 60. In a more realistic chess game with multiple pieces and obstacles, implement a minimax algorithm with alpha-beta pruning to determine the best move for a player. **Focus:** Game tree search, minimax algorithm, optimization techniques like alpha-beta pruning, handling complex game states.

geted Application & Tools that can be used:

- 10. C or C++ Compiler (g++): The standard compiler for CP. Familiarize students with compilation flags (e.g., -O2 for optimization).
- 11. IDE (Integrated Development Environment): Code:: Blocks, Visual Studio, CLion, or similar IDEs. These provide debugging capabilities, code completion, and other helpful features.
- 12. Online Judges (CodeChef, Codeforces, LeetCode, HackerRank): Essential for practicing and submitting solutions.
- 13. Debugger (gdb): Crucial for understanding code execution and finding bugs. Origin, excel and Mat lab soft wares for programming and data analysis.

- 14. Number Theory Libraries: Some libraries provide pre-built functions for number theory operations (though often it's better to implement them yourself for learning).
- 15. Wolfram Alpha: A useful tool for verifying number theory calculations and exploring concepts.
- 16. String Libraries: Familiarize students with the string manipulation functions available in C++.
- 17. **Graph Visualization Tools:** Tools like Graphviz can be helpful for visualizing graphs and understanding graph algorithms.
- 18. **DP Debugging Techniques:** Practice debugging DP solutions, as they can be complex. Visualizing the DP table can be helpful.

t Books:

- **3** Guide to Competitive Programming: Learning and Improving Algorithms Through Contests" (3rd Edition), *Antti Laaksonen, springer, 2024*
- 4 "Data Structures and Algorithms in Java: A Project-Based Approach" Dan S. Myers, Cambridge University Press

Reference Books:

- 3. Data Structures and Algorithmic Thinking with Python/C++/Java", Narasimha Karumanchi, 5th Edition, Career Monk, 2017.
- 4. Introduction to Algorithms, <u>Thomas H. Cormen</u> (Author), <u>Charles E. Leiserson</u> (Author), <u>Ronald L.</u> <u>Rivest</u>, fourth edition April 2022

Web Resources

- 3. https://nptel.ac.in/courses/106106231
- 4.

ject work/Assignment: Mention the Type of Project /Assignment proposed for this course

<mark>Assessment Type</mark>

- Midterm exam
- Assignment (review of digital/ e-resource from PU link given in references section mandatory to submit screen shot accessing digital resource.)
- Quiz
- End Term Exam
- Self-Learning

Course Code: PPS 3019	Course Title: Corporate Comr	nunication						
	Type of Course: Practical Only	Course	L- T - P- C	0	0	2	1	
Version No.	1.0							
Course Pre- requisites	 Students are expected a Students should have d learn. 	 Students are expected to understand Basic English. Students should have desire and enthusiasm to involve, participate and learn. 						
Anti-requisites	NIL	NIL						
Course Description	This course is designed to enable students to understand concepts of corporate communication, improve confidence, and develop professional skills. This course will give the students a competitive advantage and increase their chances of success in the professional world by building their strong resumes and better online presence. This will benefit learners in effectively presenting their concepts and ideas in a corporate environment through various activities and learning methodologies.							
Course Objective								
	The objective of the course is to familiarize the learners with the concepts of "Corporate Communication" and attain SKILL DEVELOPMENT through PARTICIPATIVE LEARNING techniques.							
Course Out Comes	On successful completion of this course, the students shall be able to: CO1: Demonstrate effective communication while presenting oneself and others CO2: Design resume based on industrial standards CO3: Employ techniques to face interview and Group discussion							
Course Content:								
Module 1	Introduction to Corporate Communication	Classrooma	activity		6	Hours		
Topics: Setting Expec communication, Comm messages, non-verbal c	Fopics: Setting Expectations, Ice Breaker, Cs of communication, Significance of corporate communication, Communication process, barriers in communication and solutions, Structuring messages, non-verbal communication, written communication, Self introduction.							
Module 2	Presentation Skills Group Presentation 8 Hours							

Topics: Presentation Skills, Opening Body & Closing Body, Audibility, Speech Clarity, Fluency, Voice Modulation, Non-verbal Communication and Body Language.

Module 3		Resume Writing	Individual Assessment	8 Hours
Topics: Imp Understand Requiremer	oortance o ing Job De its, Format	f a Resume, Types of Res scriptions, Optimizing for ting Tips for ATS Compliar	L umes (Chronological, Functiona Applicant Tracking Systems (ATS) nce, The Digital Edge: Online Prof	I, and Combination),), Understanding ATS files (Aligning
Resumes wi	th LinkedIr	n Profiles)		
Module 4		Personal Intervie	W Individual Assessment	8 Hours
Understand Strengths an Response, <i>H</i> (Dressing fo Etiquette: T	ing Person nd Weakne Answering or Success: hank You E	nal Interviews, Self-Awar esses), Handling Common Situational and Behaviora Professional Appearance Emails and Calls)	eness and Preparation (SWOT A Questions (Tell Me About Yourse Il Questions (STAR Method) Pra- e, Mock Interviews: Practice wit	Analysis: Knowing Your elf: Structuring a Strong ctical Skills for Success h Feedback, Follow-Up
Targeted Ap 1. TEL 2. You 3. Act	plication & Talks Tube Link vities	& Tools that can be used: s		
Pro	ject work/	Assignment: Mention the	Type of Project /Assignment prop	posed for this course
	1) Resum	ie		
	 Self-In Persor 	troduction nal Interview		
Targeted A	plication	& Tools that can be used:		
1. TEL 2. You) Talks Tube Links	5		
Assignment 1. Sel 2. Res	<mark>s propose</mark> -Introduct ume	d for this course ion		

YouTube Links: <u>https://youtu.be/z jxoczNWc</u> (Steve Jobs Introducing the iPhone 4 in June 2010)

- 1. "Talk Like TED The 9 Public-Speaking Secrets of the World's Top Minds" By Carmine Gallo St. Martin's Press Copyright © 2014 Carmine Gallo All rights reserved. ISBN: 978-1-250-04112-8
- "The Presentation Secrets of Steve Jobs: How to Be Insanely Great in Front of Any Audience" MP3 CD – Import, 22 April 2014
- 3. "The Definitive Book of Body Language: The Hidden Meaning Behind People's Gestures and Expressions" Hardcover Illustrated, 25 July 2006
- 4. "Crucial Conversations: Tools for Talking When Stakes Are High" Paperback Import, 1 July 2002

Web links:

1. <u>https://www.wordstream.com/blog/ws/2014/11/19/how-to-improve-presentation-skills</u>

https://www.cbs.de/en/blog/15-effective-presentation-tips-to-improve-presentation-skills/

2. <u>https://hbr.org/2022/05/the-art-of-asking-great-questions</u>

Topics relevant to development of "SKILL": Art of Presentation, Team building, Art of questioning and Personal Branding for Skill Development through Participative Learning Techniques. This is attained through assessment component mentioned in course handout.

Catalogue prepared by	Faculty of L&D
Recommended by the Board of Studies on	
Date of Approval by the Academic Council	

Course Code: CSE 7100	Course Title: Mini Project Type of Course:	L-T-P-C	0	0	0	4			
Version No.	1.0			1					
Course Pre- requisites	Knowledge and Skills related to all the courses studied in previous semesters.								
Anti-requisites	NIL	NIL							
Course Description	Students observe science and technology in action, develop an awareness of the method of scientific experimentation, and often get an opportunity to see, study and operate sophisticated and costly equipment. They also learn about the implementation of the principles of management they have learnt in class, when they observe multidisciplinary teams of experts from engineering, science, economics, operations research, and management deal with techno-economic problems at the micro and macro levels. Finally, it enables them to develop and refine their language, communication and inter-personal skills, both by its very nature, and by the various evaluation components, such as seminar, group discussion, project report preparation, etc. The broad-based core education, strong in mathematics and science and rich in analytical tools, provides the foundation necessary for the student to understand properly the nature of real-life problems. The students have options to pursue this course as either Project Work and Dissertation at the university, or Project Work in an Industry/Company/ Research Laboratory, or Internship Program in an Industry/Company.								
Course Objectives	The objective of the course is to familiarize the lease Practice and attain Employability Skills through	rners with the Experienti	conc al Lea	epts c arnin	of Profe g techr	ssional 1iques.			
Course Outcomes	 On successful completion of this course the students shall be able to: 6. Identify the engineering problems related to local, regional, national or global needs. (Understand) 7. Apply appropriate techniques or modern tools for solving the intended problem. (Apply) 8. Design the experiments as per the standards and specifications. (Analyze) 9. Interpret the events and results for meaningful conclusions. (Evaluate) 10. Appraise project findings and communicate effectively through scholarly publications. (Create) 								
Catalogue prepared by	Dr. Sampath A K								
Recommended by the Board of Studies on									
Date of Approval bythe Academic Council									

Course Code: CSE 7300	Course Title: Capstone Project Type of Course:	L- T-P- C	0	0	0	10			
Version No.	1.0		1	1					
Course Pre- requisites	Knowledge and Skills related to all the courses studied in previous semesters.								
Anti-requisites	NIL								
Course Description	Students observe science and technology in action, develop an awareness of the method of scientific experimentation, and often get an opportunity to see, study and operate sophisticated and costly equipment. They also learn about the implementation of the principles of management they have learnt in class, when they observe multidisciplinary teams of experts from engineering, science, economics, operations research, and management deal with techno-economic problems at the micro and macro levels. Finally, it enables them to develop and refine their language, communication and inter-personal skills, both by its very nature, and by the various evaluation components, such as seminar, group discussion, project report preparation, etc. The broad-based core education, strong in mathematics and science and rich in analytical tools, provides the foundation necessary for the student to understand properly the nature of real-life problems. The students have options to pursue this course as either Project Work and Dissertation at the university, or Project Work in an Industry/Company/Research Laboratory, or Internship Program in an Industry/Company.								
Course Objectives	The objective of the course is to familiarize the lear Practice and attain Employability Skills through	ners with the Experientia	conc al Lea	epts o arnin	f Profe g techr	ssional 1iques.			
Course Outcomes	On successful completion of this course the students shall be able to: 8. Identify problems based on societal /research needs. (Understand) 9. Apply Knowledge and skill to solve societal problems in a group. (Apply) 10. Develop interpersonal skills to work as member of a group or leader. (Apply) 11. Analyze the inferences from available results through theoretical / Experimental / Simulations. (Analyze) 12. Analyze the impact of solutions in societal and environmental context for sustainable development. (Analyze) 13. Improve in written and oral communication. (Create)								
Catalogue prepared	learning. (Understand)								
by	Dr. Sampath A K								
Recommended by the Board of Studies on									
Date of Approval bythe Academic Council									

Course Code: CSD3408	ourse Title: Data Mining and Warehousing ype of Course:1] Program Core L-T-P-C 3 0							
Version No.	1.0		•					
Course Pre- requisites	CSE1510							
Anti-requisites	NIL	NIL						
Course Description	This course covers the fundamental conce mining and data warehousing. Students wil warehouses and how to extract meaning datasets using data mining methods. Topic rules, classification, clustering, OLAP oper Real-world applications and hands-on pro an essential part of the learning experience	This course covers the fundamental concepts, techniques, and tools used in data mining and data warehousing. Students will learn how to design and implement data warehouses and how to extract meaningful patterns and knowledge from large datasets using data mining methods. Topics include data preprocessing, association rules, classification, clustering, OLAP operations, and warehouse schema design. Real-world applications and hands-on projects using industry-standard tools form an essential part of the learning experience.						
Course Objective	To teach principles, concepts and application To introduce the task of data mining as an process To inculcate Conceptual, Logical, a OLAP applications and OLAP deploymen Solving Methodologies.	To teach principles, concepts and applications of data warehousing and data mining To introduce the task of data mining as an important phase of knowledge recovery process To inculcate Conceptual, Logical, and Physical design of Data Warehouses OLAP applications and OLAP deployment. for Employability through Problem						
Course Out Comes	 On successful completion of this course the 1. Design a data mart or data wareh (Understand) 5. Extract knowledge using data mir 6. Adapt to new data mining tools. (7. Explore recent trends in data min temporal mining. (Apply) 	 On successful completion of this course the students shall be able to: 1. Design a data mart or data warehouse for any organization (Understand) 5. Extract knowledge using data mining techniques. (Apply) 6. Adapt to new data mining tools. (Apply) 7. Explore recent trends in data mining such as web mining, spatial- temporal mining. (Apply) 						
Course Content:								
Module 1	Introduction to Data Mining	ssignment			10	Hours		
Data Mining - Defi - Data Selection, C - Data Quality - D Statistics Visualiza	nition - DM Techniques - Current Trends in Data N Cleaning, Integration, Transformation, Reduction Data Preprocessing - Measures of Similarity and ation.	Mining - Dif and Enrich I Dissimilar	ferent i iment. ity. Exp	forms o Data: 1 ploratio	of Know Types of on: Sum	rledge f Data nmary		

Module 2	Data Warehouse	Assignment	10 Hours			
Introduction to Data Ware House, Differences between operational data base systems and data Ware						
House, Data Ware	House characteristics, Data Ware House Archi	tecture and its components,	Extraction-			
Transformation-Lo	oading, Logical (Multi- Dimensional), Data Mo	deling, Schema Design, star	and snow-			
Flake Schema, Fac	t Constellation, Fact Table, Fully Addictive, Sei	mi-Addictive, Non-Addictive	Measures.			
Association rule Mining ANDModule 3CLASSIFICATIONAssignment13 H						

Introduction: - Clustering Paradigms - Partitioning Algorithms - K Means & K Medoid Algorithms - CLARA - CLARANS - Hierarchical Clustering - DBSCAN - BIRCH - Categorical Clustering Cluster Density-Based Clustering, Graph-Based Clustering, Scalable Clustering Algorithms.

	WEB MINING	Assignment	
Module 4			12 Hours

Introduction: Web Content Mining - Web Structure Mining - Web Usage Mining - Text Mining - Text Clustering, Temporal Mining - Spatial Mining. Visual Data Mining: Knowledge Mining - Various Tools and Techniques for Implementation using Weka, Rapidminer and MATLAB.

Text Book

- 1. Introduction to Data Mining, Pang-Ning Tan, Vipin Kumar, Michael Steinbanch, Pearson Education.
- 2. Data Mining-Concepts and Techniques- Jiawei Han, Micheline Kamber, Morgan Kaufmann Publishers, Elsevier, 2 Edition, 2006.

References

- 1. Data Mining Techniques, Arun K Pujari, 3rd Edition, Universities Press.
- 2. Data Ware Housing Fundamentals, Pualraj Ponnaiah, Wiley Student Edition.
- 3. The Data Ware House Life Cycle Toolkit- Ralph Kimball, Wiley Student Edition.
- 4. Data Mining, Vikaram Pudi, P Radha Krishna, Oxford University

Catalogue	Dr. Manjunath KV
prepared by	
Recommended by	
the Board of	
Studies on	
Date of Approval	
by the Academic	
Council	

Course	Code:	urse Title: Edge AI and IoT Analytics		2		0	2		
CSD2	2006	pe of Course: Theory	- C	3	0	0	3		
Versio	n No.								
Course req	e Pre- uisites	Basics of Machine Learning, IoT fundamentals, and Pyth	hon progr	rammin	g				
nti-rec	nti-requisites L								
Cou Desc	This course provides a comprehensive overview of the convergence between Edge Computing, Artificial Intelligence (AI), and the Internet of Things (IoT). Learners will explore how intelligent analytics can be performed on-device at the edge of the network, reducing latency and enabling real-time decision-making in resource-constrained environments. The course covers core concepts of edge architecture, IoT protocols, AI model optimization, and deployment on edge hardware such as Raspberry Pi, Jetson Nano, and Google Coral Real-world use cases from domains such as healthcare, smart cities, and Industry 4.0 are discussed along with emerging trends in DataOps, ModelOps, and Edge-to-Cloud integration. By the end of the course, students will be able to design, build, and deploy secure and efficient edge-AI-powered IoT systems.								
ourse O	bjective	e objective of the course is to familiarize the learners with th Analytics and attain Employability through Participative I	he concept <mark>Learning</mark> (ts of E techniqu	E dge A ies.	AI and	d IoT		
Course	 Course Out Comes Course Out Comes Design and develop secure, scalable, and intelligent Edge-IoT solutions for real-world applications On successful completion of the course the students shall be able to: Understand and analyze the architecture of IoT systems and Edge AI platforms. Select and apply appropriate hardware, tools, and optimization techniques for deploying AI models on edge devices. Perform real-time analytics on IoT data streams using lightweight ML models and appropriate platforms. 						d world		
urse Co	ontent:								
dule 1	: Fundan	nentals of Edge AI and IoT Systems		Sessi	ions				
	Introduction Edge Devi Overview	on to IoT and Edge Computing- Edge vs Cloud vs Fog C ices-Key Communication Protocols: MQTT, CoAP, BLE, of Edge AI: Concepts and Industry Trends-Introduction to	Computing , LoRaWA o TinyML	g-Archi AN. 2 and E	tectur mbedo	es of I led Al	оТ &		
odule 2	Edge H	ardware, Platforms, and AI Model Deployment		Sess	sions				
Edge AI Hardware Platforms: Raspberry Pi, NVIDIA Jetson, Google Coral, Arduino Nano 33 BLE- Model Optimization Techniques for Edge: Quantization, Pruning, Knowledge Distillation-AI Frameworks for Edge: TensorFlow Lite, ONNX, PyTorch Mobile, Edge Impulse-Deployment Workflows: From Training to On-Device Inference-Power, Memory, and Latency Constraints in Edge Devices									
dule 3 IoT Data Analytics and Real-Time Processing Sessions									
	IoT Data Acquisition, Streaming, and Preprocessing -Time-Series Analysis for IoT Sensors - Lightweight ML Models for Edge: Decision Trees, k-NN, Naïve Bayes, SVMs -Anomaly Detection and Predictive Maintenance -Tools and Platforms: Azure IoT Hub, AWS Greengrass, Google IoT Core-Data Visualization for Edge Analytics (Grafana, ThingsBoard)								
Modu	le 4 App	lications, Security, and Project Implementation		10	Sessio	ns			
	Smart Home, Smart Agriculture, Industrial IoT (IIoT), Smart Cities-Case Studies: Edge AI in Surveillance, Energy Monitoring, Healthcare-Security in Edge AI and IoT (Device Authentication, Secure Boot, Data Privacy)-Edge-to-Cloud Integration								

Text I	Book Xiaofei Wang, Yi Pan, "Edge AI: Machine Learning for Embedded Applications" Publisher:		
	Springer- 1st Edition (2022)		
3.	Yunchuan Sun et al "Learning Edge AI: Algorithms and Applications". Publisher: Springer		
	Edition: 1st Edition (2022)		
4. Arshdeep Bahga, Vijay Madisetti "Internet of Things: A Hands-On Approach" Pu			
	Universities Press Edition: 2nd Edition (2023)		
5.	William Lawless et al. "Artificial Intelligence for the Internet of Everything" Publisher:		
	Academic Press (Elsevier) Edition: 1st Edition (2022)		
ference 9.	S Colin Dow "Hands-On Edge Analytics with Azure IoT: Stream Data Processing from Devices		
	to Cloud" Publisher: Packt Publishing Edition: 1st Edition (2022)		
W	ah rasources.		
1	NDTEL Introduction to Internet of Things		
1.	NPTEL – Introduction to Internet of Things		
	https://nptel.ac.in/courses/106/105/106105166/		
2.	Google Developers – Edge Al Overview		
	https://developers.google.com/edge-tpu		
3.	Google Cloud IoT Core (Edge to Cloud Integration)		
	https://cloud.google.com/iot-core		
Topic offs an Emplo assess	s relevant to "EMPLOYABILITY SKILLS": Edge computing vs. cloud computing: trade- ad applications- Use of analytics platforms (Grafana, AWS IoT, Azure IoT) for developing by ability Skills through Participative Learning techniques. This is attained through ment component mentioned in course handout.		
Catalogu	e Dr.S.Saravana Kumar		
prepared b			
d hv the			
Board of			
Studies of	1		
Date of			
Approval	by .		
the Acaden			
Council			

Course Code: CSD3418	Course Title: Feature Engineering and Model Optimization Type of Course: Discipline Elective/ Theory Only Course		L- T-P- C	3	0	0	3
Version No.		2.0					
Course Pre-							
requisites							
Anti-		NIL					

requisite	es								
Course Descript Course	tion		This course prov into valuable inp engineering. It e dimensionality r model optimizat automated macl The objective of	his course provides a deep dive into the techniques of transforming raw data to valuable inputs for machine learning models through effective feature ngineering. It explores strategies for feature selection, transformation, mensionality reduction, and hyperparameter tuning. Emphasis is placed on odel optimization techniques including regularization, ensemble methods, and utomated machine learning pipelines.					
Objectiv	/e		Data Mining and attain Employability through Problem Solving Methodologies						
Course (Comes Course	Out		Upon successful 11. Apply v transfor 12. Evaluat tuning a 13. Integrat into cor	completion of t arious feature rm data effecti e and optimize and selection t te feature engi nplete machin	his course engineer vely. machine echnique neering a e learnin	e, students will be ring techniques to e learning model es. and model optim g pipelines.	able to: o preprocess and s using advanced nization strategies		
Content									
Module	1	Introduction t Engineering	o Feature	Assignment	Da	ata Collection	10 Sessions		
	Topic Unde variat	s: rstanding data bles, Feature sc	types and quality aling and normal	γ, Missing value lization techniqι	handling, Jes	outlier detection,	encoding categorical		
Module	2	Feature Select Extraction	tion and	Quiz Problem Solving		10 Sessions			
	Topic Filter impoi	s: , wrapper, and tance and inte	embedded meth rpretability in mo	nods, Principal C odels	omponer	nt Analysis (PCA), L	.DA, t-SNE, Feature		
Module	3	Model Optimi Techniques	zation	Assignment	Pr	oblem Solving	10Sessions		
	Topic Hype strate	s: rparameter tu gies, Regulariz	ning (Grid Search ation techniques	, Random Searc (L1, L2, ElasticN	h, Bayesia let)	an Optimization), (Cross-validation		
Module	4	Advanced Tec AutoML	hniques and	Assignment	Pr	oblem Solving	12 Sessions		
	Featu Introd	re generation duction to Auto	using domain kno ML frameworks	wledge and inte (e.g., AutoSklea	eractions, rn, H2O.a	Ensemble learnin i, TPOT)	g and stacking,		
	6	 Feature Eng Kuhn, Kjell J "Hands-On F Publishing, N 	ineering and Sele ohnson, Publishe Feature Engineeri Year: 2020	ction: A Practica r: CRC Press, Ta ing with Python	al Approa ylor & Fra ", Author:	ch for Predictive N ncis Group, Year: Soledad Galli, Pul	Aodels", Author: Max 2019 olisher: Packt		
	Refer	ences: Automated Ma	chine Learning: I	Vethods, Svste	ms, Challe	enges", Editors: Fr	ank Hutter, Lars		

Kottho	Kotthoff, Joaquin Vanschoren, Publisher: Springer, Year: 2021											
R2 "M	R2 "Machine Learning Engineering", Author: Andriy Burkov, Publisher: True Positive Inc., Year: 2020											
Additi	Additional web-based resources:											
W1. <u>h</u> and Te W2.ht fd304! &db=r Topics Emplo assess	attps://onlineco echniques, Jiaw tps://puniversi 9a98f0393e963 hlebk <u>https://n</u> relevant to "E yability Skills ti ment compone	Durses.swayam2.ac.in/cec20_cs12/preview Text book of Data Mining: Concepts rei Han, Micheline Kamber and Jian Pei, Morgan Kaufmann Publishers, 2012. ity.informaticsglobal.com:2284/ehost/detail/detail?vid=7&sid=e2d7362a- 8521dbd%40redis&bdata=JnNpdGU9ZWhvc3QtbGl2ZQ%3d%3d#AN=377411 ptel.ac.in/courses/105105157 MPLOYABILITY SKILLS": Data Mining Techniques, FP Growth for developing hrough Participative Learning techniques. This is attained through the ent mentioned in the course handout.										
Catalogue prepared by		Shaik Salma Begum										
Recommended by the Board of Studies on												
Date of Approval by the Academic Council												

Course Code:	Course Title: Data Structures and Analysis of Algorithm		3-1-0-4
CSE2278	Type of Course: Program core	L- T-P- C	
	Theory Only		
Version No.			
Course Pre-	NIL		
requisites			
Anti-	NIL		
requisites			
Course	This course introduces the concepts of abstract data types	s, data structu	ures, and
Description	algorithm design techniques. Students will learn to repres	ent data usin	g arrays, linked
	lists, stacks, queues, trees, heaps, graphs, and hash tables	, and analyze	their time and
	space complexities. Emphasis is placed on the development	nt of efficient	algorithms and
	their correctness using Big-O, Big-Theta, and Big-Omega n	otations. Stu	dents will also
	explore algorithmic paradigms such as divide-and-conque	r, greedy met	hods, and
	dynamic programming.		
Course	To understand and implement fundamental data struct	ures such as a	arrays, linked
Objective	lists, stacks, queues, trees, heaps, hashing, and graphs.		
	To analyze the time and space complexity of algorithms	using asymp	totic notations
	and solve recurrence relations for algorithm performance	evaluation.	
	To design and apply efficient algorithmic techniques inc	luding divide	-and-conquer,
	greedy methods, and dynamic programming for solving re	al-world com	putational
	problems.		
Course	Upon successful completion of this course, students will b	e able to:	
Outcomes	• CO1 : Apply suitable data structures for problem so	olving in softv	ware systems.

Course Code:	Course Code: Course Title: Data Handling and Visualization									
CSD1710	Type of Course: 1] Integrated		L- I-P- C	2	0	0				
Version No.	1.0									
Course Pre-requisites	NIL									
Anti-requisites	NIL									
Course Description	The purpose of the course is to install a strong foundation of scientific process orientation that is the cornerstone of effective data handling, and creative design thinking appended with strong programming skills to create meaningful visualizations of data. The student should have prior knowledge of python programming and basic knowledge of data concepts. The associated laboratory provides an opportunity to strengthen student's skillset in the arena of Data Preprocessing and Visualization. With a good knowledge in the fundamental concepts of the various libraries for handling and visualizing data the student can gain a stronghold in Data Science enabling the student to be an effective analyst for prospective employers. Keywords: Visualization, Preprocessing, Data Cleaning, Data extraction.									
Course Outcomes	 On successful completion of this course the students shall be able to: 1] Understand the various types of data, apply and classify the principles of data visualization- L1 & L2 2] Illustrate the visualization techniques to a problem and its associated dataset-L3 3] Implement interactive visualization for better insight using various visualization tools-L3 4] Demonstrate the visualization concepts practically using Python-L3 									
Course Content:										
Module 1	Introduction to Data Visualization (Comprehension)	Assign	ment	Pr	ogra	mming activity				
Topics: Data collection, Data Preparation Basic Models- Overview of data visualization - Data Abstraction - Task Abstraction - Analysis: Four Levels for Validation, Interacting with Databases, Data Cleaning and Preparation, Handling Missing Data, Data Transformation.										
Python Libraries: NumPy,	pandas, matplotlib, GGplot, Introduction to	o panda	s Data Str	uctu	res					
Module 2 Data Visualization Techniques Assignment Programming activity					nming activity					
Topics: Scalar and point techniqu Trees, Graphs, and Netwo Channels- Manipulate View	es – vector visualization techniques – ma rks, Multidimensional data, Visual Variable w- Heat Map.	trix visu es- Netw	ialization, vorks and	Visu Tree	aliza s - N	tion Techniques for lap Color and Other				

Module	3	Visual Analysis of data from domain (Application)	various	Assignment	Programming a	is i activity n s					
Topics: Time-oriented and case studi	data visualiz es, Finance-	ation – Spatial data visualization marketing-insurance-healthcare	, Text data etc.	a visualization -	– Multivariate data	visualization					
Module	4	Visualization of Streaming Data (Application) Assignment			Programming a	is i ctivity c n s					
Topics: Guidelines for Streaming, pr techniques, str 3] Problem S 4] Programm	Topics: Guidelines for designing successful visualizations, Data visualization dos and don'ts, Best practices of Data Streaming, processing streaming data for visualization, presenting streaming data, streaming visualization techniques, streaming analysis. 3] Problem Solving: Choose an appropriate set of visualization elements and design for a dashboard.										
5] McKinney, O'Reilly M 6] Munzner, 7] Dr. Ossam	Text Books 5] McKinney, W.(2017). Python for Data Analysis: Data Wrangling with Pandas, NumPy and IPython. 2nd edition. O'Reilly Media. 6] Munzner, T., "Visualization Analysis and Design", CRC Press, (2015). 7] Dr. Ossama Embarak, "Data Analysis and Visualization Using Python", Apress,(2018) • CO2: Analyze the time and space complexity of algorithms using asymptotic notations. • CO3: Design efficient algorithms using divide-and-conquer, greedy, and dynamic programming paradigms. • CO4: Implement and evaluate algorithms for tree, heap, hashing, and graph-based evaluates										
Course Content:											
Module 1	Introduction Algorithm A	n to Data Structures and nalysis	6 Hour	s Lecture +	2 Hours Tutorial						
 Abstract Data Types (ADT), Time and Space Complexity Asymptotic Notations: Big O, Big Θ, Big Ω Empirical and Mathematical Analysis of Algorithms Recurrence Relations and Solving Techniques 											
Module 2	Adule 2 Linear Data Structures 10 Hours Lecture + 4 Hours Tutorial										
 Arrays, Stacks a Deque, 	 Arrays, Strings, Linked Lists (Singly, Doubly, Circular) Stacks and Queues: Implementation and Applications Deque, Priority Queue, Applications in Expression Evaluation, Backtracking 										
Module 3	Trees and Heaps 10 Hours Lecture + 3 Hours Tutorial										

	Dinony Troop Troversals (Do	oursive and Nen requiring	<u>_</u>					
•	Binary frees, fraversals (Re		e)					
•	Min Lloop, May Lloop and Lloop Operations							
•	Min-Heap, Max-Heap and H	leap Operations						
•	Heap Sort and Priority Quel	ue implementation						
Module	4 Hashing and Search	ing Techniques	(6 Hour	s Lecture + 2 Hours Tutorial)				
•	Hash Tables, Hash Function	s, Collision Resolution						
•	Linear and Binary Search, In	terpolation Search						
•	Complexity Analysis of Sear	ching Algorithms						
Module	5 6	Graphs and Traversals		7 Hours Lecture + 2 Hours Tutorial				
•	Graph Representations: Adi	iacency Matrix/List						
•	BES. DES. Topological Sort	,,,						
•	Shortest Path Algorithms: D)iikstra's Bellman-Ford						
_	Shortest rutin igoritimis. D	ijkotra 5, Bennari i ora						
Module	6 A	Algorithmic Strategies		6 Hours Lecture + 2 Hours Tutorial				
•	Divide and Conquer: Merge	Sort, Quick Sort						
•	Greedy Method: Kruskal's a	nd Prim's Algorithms						
•	Dynamic Programming: Mar	trix Chain Multiplication,	0/1 Kna	psack				
Text Bo	oks : Sartaj Sahni, Ellis Horo v	witz , Fundamentals of Da	ta Struc	tures and Algorithms, Universities				
Press, 2	nd Edition, 2021. ISBN: 9788	8173716615						
Referen	ice Books							
1.	Thomas H. Cormen et al., //	ntroduction to Algorithms	, MIT Pr	ess, 3rd Edition, 2009. ISBN:				
	9780262033848							
2.	Mark Allen Weiss, Data Stru ISBN: 9780132847377	uctures and Algorithm An	alysis in	<i>C++</i> , Pearson, 4th Edition, 2014.				
3.	Narasimha Karumanchi, Da 2nd Edition, 2021. ISBN: 978	ata Structures and Algorit. 88193245279	hms Ma	de Easy, CareerMonk Publications,				

Course Code:	de: Course Title: Data Structures and Analysis of Algorithm 3-1-0-4								
CSE2279	Lab								
	Туре	of Course: Lab	L- 1-F- C						
Version No.									
Course Pre-	NIL								
requisites									
Anti- requisites	NIL								
Course	This c	ourse introduces the concents of abstract data types	data structu	res and					
Description	algorithm design techniques. Students will learn to represent data using arrays, linked lists, stacks, queues, trees, heaps, graphs, and hash tables, and analyze their time and space complexities. Emphasis is placed on the development of efficient algorithms and their correctness using Big-O, Big-Theta, and Big-Omega notations. Students will also explore algorithmic paradigms such as divide-and-conquer, greedy methods, and dynamic programming.								
Course	🤉 То і	understand and implement fundamental data structu	ires such as a	rrays, linked					
Objective	 lists, stacks, queues, trees, heaps, hashing, and graphs. To analyze the time and space complexity of algorithms using asymptotic notations and solve recurrence relations for algorithm performance evaluation. To design and apply efficient algorithmic techniques including divide-and-conquer, greedy methods, and dynamic programming for solving real-world computational problems. 								
Course Outcomes	 Upon successful completion of this course, students will be able to: CO1: Implement fundamental linear and non-linear data structures such as arrays, linked lists, stacks, queues, trees, heaps, and graphs using a programming language. (<i>Skill Level: Apply</i>) CO2: Analyze and compare the performance of algorithms using empirical methods such as time and space measurements. (<i>Skill Level: Analyze</i>) CO3: Apply algorithmic techniques such as divide-and-conquer, greedy methods, and dynamic programming to solve computational problems. (<i>Skill Level: Apply</i>) CO4: Develop modular and well-structured programs to solve real-world problems using appropriate data structures and algorithms. (<i>Skill Level: Create</i>) 								
Course	List o	of Laboratory Experiments:							
Content:	Exp. No.	Title	Learning Ou	tcome					
	1	Analysis of Algorithms – Measure execution time and space usage of simple recursive vs. iterative algorithms Array and String Operations – Implement insertion,	Understand analysis and measureme Gain proficie	empirical performance nt ency in linear					
	2	deletion, search, and reverse operations	data manipu	lations					
	3	Linked Lists (Singly, Doubly, Circular) – Create and manipulate linked lists with dynamic memory allocation	Understand dynamic dat	pointer-based a structures					

	4	Stacks and Queues using Arrays and Linked Lists – Implement push/pop/enqueue/dequeue operations	Apply stack/queue in real- life problem-solving					
	5	Applications of Stack – Infix to postfix conversion, expression evaluation	Apply stacks in arithmetic expression evaluation					
	6	Applications of Queue – Simulation of round-robin scheduling using circular queue	Simulate process scheduling scenarios					
	7	Binary Tree Traversals – Preorder, Inorder, Postorder (Recursive & Iterative)	Learn various tree traversal strategies					
	8	Binary Search Tree (BST) – Construct BST, insert, delete, and search operations	Analyze BST behavior with different datasets					
	9	AVL Trees / Balanced BST – Implement insertions and rotations	Understand tree balancing for efficient searching					
	10	Heap and Heap Sort – Implement min-heap, max- heap and perform heap sort	Learn priority queue operations and sorting					
	11	Hashing Techniques – Implement hash tables with collision resolution (linear probing, chaining)	Understand the trade-offs in hashing and lookup efficiency					
	12	Graph Representations and Traversals – Adjacency list/matrix, BFS and DFS	Solve problems involving connectivity and traversal					
	13	Shortest Path Algorithms – Implement Dijkstra's and/or Bellman-Ford algorithm	Solve optimization problems using graph algorithms					
	14	Divide and Conquer Techniques – Implement Merge Sort and Quick Sort	Compare recursive sorting strategies with performance analysis					
	15	Dynamic Programming and Greedy Techniques – 0/1 Knapsack, Matrix Chain Multiplication, Kruskal's or Prim's	Learn and apply problem- solving paradigms					
Text Books : Sar	taj Sal	nni, Ellis Horowitz, Fundamentals of Data Structures	and Algorithms, Universities					
Press, 2nd Editi	on, 20	21. ISBN: 9788173716615						
Reference Bool	<s< td=""><td></td><td></td></s<>							
1. Thomas	s H. Co	ormen et al., Introduction to Algorithms, MIT Press, 3	rd Edition, 2009. ISBN:					
9/8026	20338	48 Inice Data Structures and Algorithm Anglusis in Cult	Doarson 1th Edition 2011					
	78013	2847377	reaison, 4m cuilion, 2014.					
 Narasimha Karumanchi, Data Structures and Algorithms Made Easy, CareerMonk Publications, 2nd Edition, 2021. ISBN: 9788193245279 								

urse Code: /7601	urse Title: Universal Human Values and Ethic pe of Course: MAC course	-T-P-	С	-	-	-)			
urse Pre- requisites	NIL								
ti-requisites	-								
Course Code:	Course Title: Object Oriented Programming L-	T- P- C	3	0	0	3			

urse Description	The purpose of the course is to develop a holistic perspective in students' life. The course adopts a self-reflective methodology of teaching and is designed to equip the student to explore their role in all aspects of living as a part of the society. It presents a universa approach to value education by developing the right understanding of reality through the process of self-exploration. This self-exploration develops more confidence and commitment in students enablin them to critically evaluate their pre-conditioning and present beliefs. As an outcome of the holistic approach, the students will be able to practice the ethical conduct in the social and professional life. The prime focus throughout the course is toward affecting qualitative transformation in the life of the student rather than just a transfer of information. This course is designed to cater to Human Values and Professional Ethics.										
urse jective	The ol LEARN	bjective of th ING' techniqu	ne course is `S ues	SKILL D	EVELOPM	IENT' of	the	stud	ent	by ι	sing `SEL
urse Outcomes	 On successful completion of this course the students shall be able to: CO.1 Recognize the importance of Value Education through the process of self exploration CO.2 Explain the human being as the co-existence of the self and the body in harmony CO.3 Describe the role of foundational values in building harmonious relationships. CO.4 Summarize the importance of a holistic perspective in developing ethical professional behavior. 										
urse Content:											
dule 1	roducti	on to Value E	ducation	0	nline Ass	sessmen	t N	1CQ	Quiz		Sessions
ht Understandir Understanding Happiness and Method to Fulfi	ng, Rela Value Prospei <u>I the Ba</u>	itionship and Education, S rity – the Bas sic Human As	Physical Facili Self-exploration sic Human Aspi spirations.	ty (Holis n as th rations,	stic Deve e Proces Happine	elopment ss for N ss and F	t and Value Prospe	the Edu erity	Role catio – Cu	of on, irrer	Education Continuou It Scenario
dule 2	rmony i	in the Human	i Being	0	nline Ass	sessmen	t N	1CQ	Quiz		Sessions
pics: Understanding Needs of the S Self, Harmony	Human elf and of the S	being as the the Body, Th Self with the B	e Co-existence le Body as an I Body, Program	of the S Instrume me to er	Self and t ent of the sure self	the Body e Self, U f-regulat	y, Dis nders tion a	tingu tand nd H	iishir ing l ealth	ng b Harn า	etween th nony in th
dule 3	rmony i	in the Family	and Society	0	nline Ass	sessmen	t N	1CQ	Quiz		Sessions
bics: Harmony in the Relationship, 'F Relationship, U	e Family Respect' ndersta	 – the Basic – as the Rig nding Harmo 	Unit of Human ht Evaluation, ny in the Socie	Interact Other Fe	tion, 'Tru eelings, J on for the	st' – the ustice in Univers	e Four Hum sal Hu	idatio an-to iman	onal o-Hu i Ord	Valu Imar er.	ie in າ
dule 4	olicatior A Look	ns of the Holis at Professior	stic Understand nal Ethics	ling – li	ne Asses	sment	Q Q	uiz			Sessions
bics: tural Acceptanco Education, Hur Holistic Techno	e of Hu manistic logies,	man Values, Constitutior Strategies for	Definitiveness and Universa r Transition tov	of (Eth al Huma vards Va	ical) Hur n Order, lue-base	nan Cor Compe d Life ai	nduct, etence nd Pro	A B in ofess	asis Profe ion	for essic	Humanist anal Ethics
rgeted Application plication areas Responsibility	on & Too are Pe s – NPT	ols that can b ersonal life, EL and Sway	e used: Education and	d Caree	r, Work	place ,	Soci	ety a	and	Εnv	vironmenta
ject work/Assia	nment:	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0									
sessment Type • Online e	exams (MCQs) will be	e conducted by	the Dep	artment	of Civil	Engin	eerir	ng th	roug	jh Linways
CSE2255	Using J	ava									

line Link*:

- 5) UHV II -
- https://www.youtube.com/watch?v=NhFBzn5qKIM&list=PLWDeKF97v9SO8vvjC1KyqteziTbTjN1 So&pp=0gcJCWMEOCosWNin
- 6) Lecture by Dr. Kumar Sambhav, NPTEL course: Universal Human Values, https://onlinecourses.swayam2.ac.in/aic22_ge23/preview
- 7) Lecture by Dr. Padmavati, Dr Narendran Thiruthy, NPTEL Course: Biodiversity Protection, Farmers and Breeders Rights, https://nptel.ac.in/courses/129105008, 2024.

ther source links are available in below Resources link.

kt Book

- 23. A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1
- 24. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2019.
- 25. Premvir Kapoor, Professional Ethics and Human Values, Khanna Book Publishing, New Delhi, 2022

erence Books

- 11. E.F. Schumacher, 1973, Small is Beautiful: a study of economics as if people mattered, Blond 8 Briggs, Britain.
- 12. Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986.
- 13. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth Club of Rome's report, Universe Books.
- 14. A Nagraj, 1998, Jeevan Vidya Ek Parichay, Divya Path Sansthan, Amarkantak.
- 15. P L Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Publishers.
- 16. A N Tripathy, 2003, Human Values, New Age International Publishers.
- 17. E G Seebauer& Robert L. Berry, 2000, Fundamentals of Ethics for Scientists & Engineers, Oxfor University Press
- M Govindrajran, S Natrajan& V.S. Senthil Kumar, Engineering Ethics (including Human Values), Eastern Economy Edition, Prentice Hall of India Ltd.
- 19. B P Banerjee, 2005, Foundations of Ethics and Management, Excel Books.
- 20. William P. Cunningham and Mary Ann Cunningham (2020), Principles of Environmental Science Inquiry & Applications, 9th Edition, McGraw-Hill Education, USA.

Resources:

- 31. <u>https://onlinecourses.swayam2.ac.in/imb25_mg195/preview</u>
- 32. <u>https://onlinecourses.nptel.ac.in/noc25_mg141/preview</u>
- 33. <u>https://onlinecourses.swayam2.ac.in/ini25_hs52/preview</u>
- 34. <u>https://onlinecourses.nptel.ac.in/noc25_hs219/preview</u>
- 35. <u>https://onlinecourses.swayam2.ac.in/cec25_mg14/preview</u>
- 36. <u>https://onlinecourses.swayam2.ac.in/imb25_mg195/preview</u>

37. <u>https://onlinecourses.swayam2.ac.in/imb25_mg196/preview</u>

Topics relevant to Skill Development:

- 5. An attitude of enquiry.
- 6. Write reports

e topics related to Human values and Professional ethics:

topics in are relevant to Human values and Professional ethics.

Catalog	Mrs. Divya Nair
prepared by	
Recommended by the Board of Studies on	th BoS dated 06 June 2025
Date of Approval by the Academic Council	ademic Council no. 26 dated June 2025
	Type of Course: Theory - PCC

Version No.	2.0								
Course Pre-	Nil								
requisites									
Anti-requisites	Nil								
Course Description	This course introduces the core concepts of object-oriented programming. This course has theory and lab component which emphasizes on inderstanding the implementation and application of object-oriented programming paradigm. It helps the student to build real time secure applications by applying these concepts and also for effective problem solving. The students interpret and understand the need for object oriented programming to build applications								
Course Objective	The objective of the co Problem-Solving using	The objective of the course is to familiarize the learners with the concepts of Problem-Solving using JAVA and attain SKILL DEVELOPMENT through							
Course Out Comes	 On successful completion of the course the students shall be able to: CO1: Describe the basic programming concepts. [Understand] CO2: Apply the concept of classes, objects and methods to solve problems. [Application] CO3: Apply the concept of arrays and strings. [Appy] CO4: Implement inheritance and polymorphism building secure applications. [Apply] CO5: Apply the concepts of interface and error handling mechanism. 								
Course Content:									
Module 1	Basic Concepts of Programming and Java	Assignment	Problem Solving	9 Sessions					
Topics: Introduction	on to Principles of Prog	ramming: Process	of Problem So	lving, Java program					
structure, Downl	oad Eclipse IDE to 1	run Java programs	s, Sample pro	ogram, Data types,					
Identifiers, Variał	oles, Constants in java,	Operators, Assignn	nents and Expr	ession, Basic Input/					
Output functions,	Control Statements: Br	ranching and Loopi	ng.						
Module 2	Classes, objects, methods and Constructors	Assignment	Problem Solving	10 Sessions					
Topics: Classes, (Objects and Methods: I	ntroduction to obje	ect Oriented Pr	rinciples, defining a					
class, adding data	members and method	s to the class, acces	ss specifiers, in	nstantiating objects,					
reference variable	e, accessing class memb	pers and methods.							
Static Polymorpl	hism: Method overloa	ading, constructor	s, constructor	overloading, this					
keyword, static ke	eyword, Nested classes,	, Accessing membe	rs in nested cl	asses.					
Module 3	Arrays, String and String buffer	Assignment	Problem Solving	8 Sessions					
Topics: Arrays: De	efining an Array, Initial	izing & Accessing	Array, Multi –	Dimensional Array,					
Array of objects. S	String: Creation & Oper	ration. String builde	er class, metho	ds in String Buffer.					
Module 4	Inheritance and Polymorphism	Assignment	Problem Solving	10 Sessions					
Topics: Inheritan	ce: Defining a subclas	ss, Types of Inher	itance, super	keyword. Dynamic					
Polymorphism: M functions and wit	Method overriding. Find the class. Abstract keywe	nal keyword: wi ord: with data mem	th data meml bers, with me	bers, with member ember functions and					
Module F	uon nandiing <mark>.</mark>	Accignment	Broblem	0 Cassiana					
ivioaule 5	input & Output	Assignment	Problem	8 Sessions					

Operation in Java	Solving	

Input/output Operation in Java(java.io Package), Streams and the new I/O Capabilities, Understanding Streams, working with File Object, File I/O Basics, Reading and Writing to Files, Buffer and Buffer Management, Read/Write Operations with File Channel, Serializing Objects, Observer and Observable Interfaces.

Text Book

T1 Herbert Schildt, "The Complete Reference Java 2", Tata McGraw Hill Education, 11th Edition, 2019.

References

R1. Cay S Horstmann and Cary Gornell, "CORE JAVA volume I-Fundamentals", Tenth Edition, Pearson 2015.

R2: James W. Cooper, "Java TM Design Patterns – A Tutorial", Addison-Wesley Publishers.4th Edition, 2000.

R3. E. Balagurusamy, "Programming with Java", Tata McGraw Hill Education, 6th Edition, 2019.

E book link R1: <u>http://rmi.yaht.net/bookz/core.java/9780134177373-Vol-1.pdf</u>

E book link R2: Java(tm) Design Patterns: A Tutorial([PDF] [7qmsenjl97t0] (vdoc.pub)

Web **resources**

bs://youtube.com/playlist?list=PLuOW_9III9agS67Uits0UnJyrYiXhDS6q bs://puniversity.informaticsglobal.com:2229/login.aspx

Topics relevant to development of "Skill Development":

- 3. Static Polymorphism
- 6. Method overloading, constructors
- 7. constructor overloading
- 8. this keyword
- 9. static keyword and Inner classes
- 10. Inheritance and Polymorphism.

for **Skill Development** through **Experiential Learning** techniques. This is attained through assessment component mentioned in course handout.

						1	· · · · ·				
Course Code:	Course Title: Object Oriented	Programming Using Jav	va	_	_						
CSE2256			L-1- P- C	0	0	2	1				
Marcian Na	Type of Course: Lab - PCC										
Version No.	2.0	J									
Course Pre-	N11	1									
requisites	N11										
Anti-requisites		<u> </u>			• •	F1 ·					
Course Description	has theory and lab component which emphasizes on understanding the implementation and application of object-oriented programming paradigm. It helps the student to build real time secure applications by applying these concepts and also for effective problem solving. The students interpret and understand the need for object oriented programming to build applications.										
Course Objective	The objective of the course i Solving using JAVA and attai techniques	ne objective of the course is to familiarize the learners with the concepts of Problem- olving using JAVA and attain SKILL DEVELOPMENT through EXPERIENTIAL LEARNING									
Course Out Comes	 On successful completion of the course the students shall be able to: CO1: Demonstrate basic programming concepts. [Apply] CO2: Apply the concept of classes, objects and methods to solve problems. [Application] CO3: Apply the concept of arrays and strings. [Appy] CO4: Implement inheritance and polymorphism building secure applications. [Apply] CO5: Apply the concepts of interface and error handling mechanism. [Apply] 										
Course Content:											
Module 1	Basic Concepts of Programming and Java	Assignment S	roblem olving			12 Se	ssions				
Download Eclipse Constants in java, Statements: Branch	IDE to run Java programs, Operators, Assignments an ing and Looping.	Sample programs or nd Expression, Basic	n Data type c Input/ Ou	s, Identi itput fu	ifiers, nctior	Varia 1s, Co	ables, ontrol				
Module 2	Classes, objects, methods and Constructors	Assignment	Problem Solving		-	14 Se	sions				
Problem solving us to the class, acces methods. Use Static Polymo static keyword, New	ing Classes, Objects and Met s specifiers, instantiating ob orphism: Method overloadin sted classes, Accessing mem	hods: defining a class bjects, reference vari g, constructors, cons bers in nested classes	s, adding dat able, access structor ove	ta memb sing clas erloading	bers ar ss me g, this	nd me mbers s key	thods 3 and word,				
Module 3	Arrays, String and String buffer	Assignment	Problem Solving			10 Se	ssions				
Using Arrays and Str Array of objects. St	rings : Defining an Array, Initring: Creation & Operation.	tializing & Accessing String builder class,	g Array, Mu methods in	ılti –Dir String E	nensio Suffer <mark>.</mark>	onal A	Array,				

Module 4	Inheritance and Polymorphism	Assignment	Problem Solving	12 Sessions
Inheritance: Defini overriding. Final ke	ng a subclass, Types of Inher eyword: with data members,	itance, super keywor with member functio	d. Dynamic Poly	morphism: Method . Abstract keyword:
with data members	, with member functions and	with class, Exception	n handling <mark>.</mark>	
Module 5	Input & Output Operation in Java	Assignment	Problem Solving	12 Sessions
Input/output Operat working with File Ob Read/Write Operatio	ion in Java(java.io Package), St ject, File I/O Basics, Reading an ons with File Channel, Serializin	reams and the new I/C Id Writing to Files, Buff g Objects, Observer an) Capabilities, Und fer and Buffer Mar Id Observable Inte	erstanding Streams, nagement, rfaces.
P1: Programming Ex LEVEL 1: Discuss abo LEVEL 2: Demonstrat P2: Programming Ex LEVEL 1: Discuss abo LEVEL 2: Demonstrat P3: Programming Ex LEVEL 1: Explain ope LEVEL 2: Demonstrat P4: Programming Ex LEVEL 1: Explain com LEVEL 2: Demonstrat P5: Programming Ex LEVEL 1: Explain lnpu LEVEL 2: Demonstrat P5: Programming Ex LEVEL 1: Explain lnpu LEVEL 2: Demonstrat P6: Programming Ex LEVEL 1: Explain vari LEVEL 2: Demonstrat P6: Programming Ex LEVEL 1: Explain vari LEVEL 2: Demonstrat P7: Programming Ex LEVEL 1: Illustrate cla LEVEL 2: Execute jav P8: Programming Ex LEVEL 1: Illustrate m LEVEL 2: Execute jav P9: Programming Ex LEVEL 1: Illustrate m LEVEL 2: Apply meth P10: Programming E LEVEL 2: Apply cons P11: Programming E LEVEL 2: Usage of St P12: Programming E	ercises on Basic Concepts. ut datatypes and variables. te a simple java program ercises on Basic Concepts. ut datatypes and variables. te a simple java program ercises on operators, expressio rators, expressions. te operators ercises Command Line Arguments ercises Command Line arguments te command line arguments te command line arguments te command line arguments ercises on basic Input/ Output for ut/ Output functions e Control Statements: Branchir ercises on Control Statements: our loops. e Control Statements: Looping ercises on Creating Objects, cla ass, object and methods. a program using class and objects tercises on Adding methods and constructors a program using methods and constructors a program using for the given sce xercises on methods based on a ethod overloading od overloading for the given sce xercises on methods for static re usage static members atic Members for the given sce xercises on static methods based	ns based on a given sce nts based on a given sc functions and Control S ng Looping sses on a given scenari cts d Constructors to the c constructors given scenario. enario. a given scenario. enario members bassed on a g nario ed on a given scenario.	enario. cenario. Statements: Branc o. lass based on a giv	hing ven scenario.

LEVEL 1: Benefits of usage static methods

LEVEL 2: Usage of Static Methods for the given scenario.

P13: Programming Exercises on nested Classes based on a given scenario.

LEVEL 1: Benefits of usage nested classes

LEVEL 2: Apply the concept of usage of nested classes for the given scenario

P14: Programming Exercises on Arrays and its built-in functions based on a given scenario.

LEVEL 1: Illustrate one dimensional arrays and its functions.

LEVEL 2: Demonstrate programs with single-dimensional arrays and operations.

P15: Programming Exercises on Arrays and its built-in functions based on a given scenario.

LEVEL 1: Illustrate multi dimensional arrays and its functions.

LEVEL 2: Demonstrate programs with multi-dimensional arrays and operations.

P16: Programming Exercises on String Class and its built-in functions based on a given scenario.

LEVEL 1: Explain about String class and String methods.

LEVEL 2: Execute simple java applications for String and StringBuffer operations

P17: Programming Exercises on String Buffer Class and its built-in functions based on a given scenario.

LEVEL 1: Explain about StringBuffer class and String methods.

LEVEL 2: Execute simple java applications for String and StringBuffer operations

P18: Programming Exercises on String Builders and its built-in functions based on a given scenario.

LEVEL 1: Explain about String Builders.

LEVEL 2: Execute java applications for String Builders

P19: Programming Exercises on single, multi level Inheritance and super keyword based on given scenario.

LEVEL 1: Explain single and multi level inheritance.

LEVEL 2: Demonstrate simple applications for the different types of inheritance

P20: Programming Exercises hierarchical Inheritance and super keyword based on given scenario.

LEVEL 1: Explain hierarchical inheritance.

LEVEL 2: Demonstrate simple applications for hierarchical inheritance

P21: Programming Exercises on Overriding.

LEVEL 1: Differentiate method overloading and method overriding.

LEVEL 2: Demonstrate simple program with dynamic method dispatch.

P22: Programming Exercises on Final based on given scenario.

LEVEL 1: Implement programs using concept of final.

LEVEL 2: Use final keyword for the given problem

P23: Programming Exercises on Abstract keyword based on given scenario.

LEVEL 1: Implement programs using concept of Abstract.

LEVEL 2: Use abstract keyword for the given problem

P24: Programming Exercises on Interface based on a given scenario.

LEVEL 1: Differentiate abstract class about interface

LEVEL 2: Implement interfaces in the given problem

P25: Programming Exercises on Exception Handling based on a given scenario.

LEVEL 1: Explain exception handling

LEVEL 2: Solve the given problem using exception handling mechanism.

P26: Programming Exercises on Character Stream Classes based on a given scenario.

LEVEL 1: Explain Character Stream Classes

LEVEL 2: Solve the given problem using Character Stream Class.

P27: Programming Exercises on Read/Write Operations with File Channel based on a given scenario.

LEVEL 1: Explain Read/Write Operations with File Channel

LEVEL 2: Solve the given problem using Read/Write Operations with File Channel.

P28: Programming Exercises on Read/Write Operations with File Channel based on a given scenario.

LEVEL 1: Explain Read/Write Operations with File Channel

LEVEL 2: Solve the given problem using Read/Write Operations with File Channel.

P29: Programming Exercises on Read/Write Operations with File Channel based on a given scenario.

LEVEL 1: Explain Read/Write Operations with File Channel

LEVEL 2: Solve the given problem using Read/Write Operations with File Channel.

P30: Programming Exercises on Read/Write Operations with File Channel based on a given scenario.

LEVEL 1: Explain Read/Write Operations with File Channel

LEVEL 2: Solve the given problem using Read/Write Operations with File Channel.

 Targeted Application & Tools that can be used : JDK /Eclipse IDE/Visual Studio Code / net Beans IDE.

Text Book

T1 Herbert Schildt, "The Complete Reference Java 2", Tata McGraw Hill Education, 11th Edition,2019. **References**

R1. Cay S Horstmann and Cary Gornell, "CORE JAVA volume I-Fundamentals", Tenth Edition, Pearson 2015.

R2: James W. Cooper, "Java TM Design Patterns – A Tutorial", Addison-Wesley Publishers.4th Edition, 2000.

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E book link R1: <u>http://rmi.yaht.net/bookz/core.java/9780134177373-Vol-</u> 1.pdf

E book link R2: Java(tm) Design Patterns: A Tutorial([PDF] [7qmsenjl97t0] (vdoc.pub)

Web **resources**

https://youtube.com/playlist?list=PLu0W_9llI9agS67Uits0UnJyrYiXhDS6q

https://puniversity.informaticsglobal.com:2229/login.aspx

Topics relevant to development of "Skill Development":

- 3. Static Polymorphism
- 7. Method overloading, constructors
- 8. constructor overloading
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- 10. static keyword and Inner classes
- 11. Inheritance and Polymorphism.

for **Skill Development** through **Experiential Learning** techniques. This is attained through assessment component mentioned in course handout.

Course Code:	Course Title: Cyber Security and Data Pr	ivacy								
CSD3411	Type of Course: Theory	,	I - P- T-C	3	0	0	3			
			2	•	•	•	•			
Version No.	1.0									
Course Pre-	NIL									
requisites										
Anti-requisites	NIL									
Course Description	This course provides a foundational yet comprehensive understanding of modern cyber security practices and data privacy principles. Students will explore real-world cyber threats, security frameworks, cryptographic techniques, and regulatory frameworks for privacy. Emphasis is placed on practical approaches to securing networks, ethical hacking, and forensic analysis to prepare learners for dynamic challenges in digital security									
Course Outcomes	On successful completion of this course t	he stude	ents shall be abl	e to:						
	Assess cyber threats across vario	us doma	ins and evaluat	e po	tenti	al securi	ity			
	risks. (Bloom's Level: Evaluate)									
	Apply cryptographic methods to a	secure d	ata and commu	inica	tions	. (Bloon	ı's			
	Level: Apply)									
	Implement security tools for prot	tecting n	etworks and sys	stem	s. (B	loom's L	evel:			
	Apply)									
	Understand data privacy laws, inc	cluding f	rameworks like	GDP	PR. <i>(B</i>	Bloom's L	level:			
	Understand)									
	Perform basic penetration testing	g and dig	gital forensics in	vest	igatio	ons to de	etect			
	and analyze security breaches.									
	(Bloom's Level: Analyze)									
Course Content:										
Module 1	Foundations of Cyber Security	Assignm	ient							
Topics: Introduction to Cybe and management – S defense.	r Security – Cyber threat landscape: malwa Security policies and standards (e.g., ISO 270	re, ransc 001) – Se	omware, phishir ecurity protocol	ng – I s and	Risk a d laye	assessm ers of	ent			
Module 2	Cryptography and Network Security	Assignm	ient			13 Classes	5			
Topics: Symmetric and asym – Secure communica	metric encryption – Hash functions and dig tion protocols (TLS, SSH) – Network securit	ital signa y fundan	atures – Public I nentals: firewal	Key I ls, ID	nfras S/IPS	structure S, VPNs.	e (PKI)			
Module 3 Data Privacy and Legal Frameworks Assignment 10 Classes										

Topics:

Principles of data privacy and data governance – GDPR, HIPAA, and Indian IT Act – Data classification and anonymization techniques – Privacy-by-design in systems – Consent, rights, and responsibilities of data subjects.

Module-4	Ethical Hacking and Digital Forensics	Assignment	12 Classes
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Topics:

Introduction to ethical hacking & penetration testing – Footprinting, scanning, and enumeration techniques – Common tools: Nmap, Metasploit, Wireshark – Incident response and log analysis – Basics of digital forensics and evidence handling.

Project work/Assignment:

Assignment 1 on (Module 1 and Module 2) Assignment 2 on (Module 3 and Module 4)

REFERENCE MATERIALS:

TEXTBOOKS

- 1. Engebretson, P. The Basics of Hacking and Penetration Testing. Syngress, 2nd Edition, 2013. ISBN: 978-0124116443.
- 2. Singer, P. W., & Friedman, A. Cybersecurity and Cyberwar: What Everyone Needs to Know. Oxford University Press, 1st Edition, 2014. ISBN: 978-0199918119.
- 3. Kolah, A. The GDPR Handbook: A Guide to Implementing the EU General Data Protection Regulation. Kogan Page, 1st Edition, 2018. ISBN: 978-0749474942.

REFERENCES

- 1. William Stallings. Cryptography and Network Security: Principles and Practice. Pearson, 8th Edition, 2024. ISBN: 978-1292742366.
- 2. William Stallings and Lawrie Brown. Computer Security: Principles and Practice. Pearson, 5th Edition, 2023. ISBN: 978-0138091712.
- 3. William Stallings. Network Security Essentials: Applications and Standards. Pearson, 6th Edition, 2017. ISBN: 978-0134527338.

JOURNALS/MAGAZINES

- 1. IEEE Security & Privacy Magazine
- 2. IEEE Transactions on Information Forensics and Security
- 3. IEEE Transactions on Dependable and Secure Computing
- 4. IEEE Internet Computing
- 5. IEEE Communications Magazine

SWAYAM/NPTEL/MOOCs:

1. NPTEL on SWAYAM – Cyber Security and Privacy

	Weblink: <u>httr</u>	os://onlinecourses.nptel.ac.in/noc24_cs121/preview_					
Catalogu by	le prepared	Dr.K.Marimuthu					
Recomm the Boar Studies	nended by ⁻ d of on						
Date of a the Acad Council	Approval by lemic						
Course Code: CSD3406	Course Title: Type of Cour Course	: Business Oriented Data Analytics rse: Discipline Elective/ Theory Only L- T-P- C 3 0 3					
Version No.							
Course Pre- requisites							
Anti- requisites		NIL					
Course Description	application of analytics techniques in business environments. Students will learn to harness data to solve business problems, improve decision-making, and support organizational objectives. The course covers all four stages of analytics – descriptive, diagnostic, predictive, and prescriptive – along with tools and techniques widely used in the industry. Case studies, real datasets, and project-based learning are integrated to develop industry-ready analytical thinking						
Course Objective	To enable st on deriving i the gap betv data into act	udents to apply data analytics techniques in business scenarios, with an emphasis nsights that support strategic and operational decision-making. This course bridges ween data science and business understanding, empowering students to translate tionable business strategies.					
Course Out Comes	Upon succes At the end CO1: Under and decisio CO2: Apply real-world I CO3: Develo CO4: Analyz	of the course, students will be able to: rstand the foundations of data analytics in the context of business processes n-making. descriptive, diagnostic, predictive, and prescriptive analytics techniques to business problems. op interactive data visualizations and dashboards using contemporary tools. ze business case studies to identify suitable data analytics methods and					
	tools. CO5: Interpret analytical results to provide data-driven business insights and recommendations.						

Course								
Content:								
Module 1	Introduction t	o Business Analytics	Assignment	Data Collection	06 Sessions			
Introduction t data analytics HR, and opera	o Business Anal in business stra tions	lytics, Types of analy ategy, Analytics proc	tics: Descriptive, Di ess and life cycle, C	agnostic, Predictive, Pre Case examples from mar	scriptive, Role of keting, finance,			
Module 2	Data Preparat	ion and Exploration	Quiz	Problem Solving	08 Sessions			
Data collection	n methods and	business data source	s, Data cleaning, t	ransformation, and feat	ure engineering,			
Exploratory Da visualization u	ata Analysis (ED sing tools like E	OA), Outlier detectio Excel, Power BI, Table	n and handling miss au, or Python libra	sing values , Introductio ries	n to data			
Module 3	Descriptive an Analytics	d Diagnostic	Assignment	Problem Solving	07Sessions			
Summary stat correlation an	istics and busin alysis, Cross-ta	ess KPIs, Trend, patte bulation and drill-do	ern, and anomaly do wn analysis, Busine	etection, Hypothesis test ess dashboard design and	ting and d reporting			
Module 4	Predictive Ana	lytics for Business	Assignment	Problem Solving	10 Sessions			
Introduction t	o predictive mo	delling, Regression r	nodels, decision tre	ees, and classification te	chniques, Model			
evaluation me	trics (accuracy,	precision, recall, F1-	score, AUC), Forec	asting techniques for bu	siness data (time			
series models)), Case studies:	Customer churn, sale	s forecasting, credi	it scoring				
Module 5:				09 session				
Introduction to analysis	o optimization	techniques,Linear pro	ogramming and goa	al seeking,Simulation and	d scenario			
,Decision anal	ysis under unce	ertainty, Applications i	n supply chain, logi	istics, and resource plan	ning			
References: R1: Evans, J. R. (2016). <i>Business Analytics</i> , 2nd Edition, Pearson. R2: Sharda, R., Delen, D., & Turban, E. (2020). <i>Analytics, Data Science, and Artificial Intelligence: Systems</i> for Decision Support, 11th Edition, Pearson.								
KS:Provost, F.	, & Fawcett, 1.	(2013). Data Science	jor Business, O'Re	iliy.				

Course Code:urse Title:CSE3415xtGen Predictive Analysispe of Course:eory Integrated Lab Course		L-T-P-C	2	b	2	3		
Version No.	Version No.							
Course P requisites	re-		stics & Probability, Machine Learning Fundamentals, Programming in Python					

A req	nti- uisites		L					
C Des	CourseThis course introduces advanced predictive modeling techniques using machine learnin deep learning, and AI-driven analytics. Students will learn to design, train, and depl predictive models for real-world applications, including business forecasting, healthca diagnostics, and automated decision-making systems. Hands-on lab sessions w reinforce theoretical concepts through industry-relevant case studies.							
C Obj	Course ObjectivesThe objective of the course is to familiarize the learners with the concepts of Streamin Data Analytics as mentioned above and attainSkill Development Skill DevelopmentLearning 							
Course Outcomes			On successful completion of the course the students shall be able to: CO1: Recognize the foundational principles and significance of predictive analytics in various sectors CO2: <i>Demonstrate</i> proficiency in preparing and exploring datasets to identify meaningful patterns and insights. CO3: <i>Apply</i> appropriate predictive modeling techniques to analyze data and generate accurate forecasts CO4 : <i>Implement</i> the various predictive models and assess ethical considerations in their					
C Cor	ourse							
odule	e 1	oduc Ger	ction to Next- neration Analytics	signment/ Problem Solving	owledge [L1]		16 Sessions (L- 8 & P-8)	
	• Fund from class	dam Trad ificat	entals of Advance itional to Advance ion, time-series). D	ed Analytics :Defin d Analytical Technique ata cleaning, outlier de	itions and Core Conce es, Types of predictive etection, and feature sc	pts in mod aling	Analytics Evolution els (regression,	
odule	e 2	issica Lea Pree	al Machine arning for diction	ogramming Assignment	ply [L3]		16 Sessions (L- 8 & P-8)	
	issical Maching Lir including Lir Forests for (SVM) for h accuracy and	ine l near d interp igh-d robu	Learning for Pro & Logistic Regress pretable and enser imensional data se stness, hyperparam	ediction supervised sion for continuous ar nble-based classificat paration. Ensemble M leter tuning, performan	learning techniques ad binary outcomes, D ion/regression, and S Methods (Boosting, B ace evaluation (e.g., RM	for lecisi uppo aggi i ASE,	predictive analytics, on Trees & Random ort Vector Machines ng to enhance model precision-recall)	
odulo	e 3	E A	Deep Learning & Advanced Models	gramming Assignment	ply [L3]		14 Sessions (L- 7 & P-7)	
	Deep Learni RNNs), Tim Overview of	ing m ne-sen f prec	nodels: Introduction ries forecasting (L dictive modeling t	on to deep learning t STMs), Transforme techniques and their	echnique, Neural net r-based models (e.g., applications.	work , BEl	as (MLPs, CNNs, RT for text),	

odule4	rescriptive and Optimiz	Analytics zation	ogramming Assignment	eaming analysis	Data	14 Sessions (L- 7 & P-7)					
Basics of Prescriptive Analytics: Concepts and Methods in Prescriptive Analytics, Using Optimization and Simulation to Inform Decision Making. Ethics in Analytics: Ethical Considerations in Data Collection and Analysis, Developing Guidelines for Ethical Use of Analytics.											
 t of Laboratory Tasks: Design and implement data preprocessing techniques: Perform data cleaning, handle missing values, detect outliers, and apply feature scaling on a raw dataset. Design and implement exploratory data analysis (EDA): Use visualization tools to uncover patterns, correlations, and insights within a dataset. Design and implement regression models: Develop and evaluate linear regression models to predict continuous outcomes. Design and implement classification models: Apply logistic regression to classify binary outcomes in a dataset. Design and implement decision tree algorithms: Build and interpret decision trees for classification tasks. Design and implement support vector machines (SVM): Train SVM models for classification tasks and visualize decision boundaries. Design and implement artificial neural networks (ANN): Construct and train a multilayer perceptron for a predictive task. Design and implement recurrent neural networks (RNN): Implement an RNN, such as LSTM, for time-series forecasting. Design and implement optimization models: Formulate and solve linear programming problems relevant to business scenarios. 											
rgeted Applic. IDEs Finat Pred pject work/Ast dents will be a	ation & Tool :: Jupyter No nce for risk a ictive Analyt signment: sked to Desig	ls that can otebook, G assessment tics n and Impla	be used: boogle Colab, VS Coo t, and healthcare for ement a Comprehensiv	le (with Pyth patient outco ve Analytical S	on extension ome foreca Solution for	ons) sting r a Hypothetical Business					
kt Book											

 Drake, Alysor Center Fortho Yan, Zhen, Ko de Almeida M analysis." Nuc 	n, and Amanda Watson. "Legal Research in the NextGen Era." <i>U of Houston Law coming, Buffalo Law Review Forthcoming</i> (2024). evin Kim, Haeuk Kim, Brendan Ha, Anaïs Gambiez, Jason Bennett, Marcus Fabiano lendes et al. "Next-generation IEDB tools: a platform for epitope prediction and <i>cleic acids research</i> 52, no. W1 (2024): W526-W532.								
Terences ta Margret, A., Chrisanne Freeman, Mrs Merlyn Diana AS, and Preyenga Ramesh. <i>Next-gen Biology: Ai's</i> <i>Transformative Impact On Life Sciences: Ai Innovations In Biotechnology, Healthcare, And Agriculture</i> . OrangeBooks Publication, 2025.									
blinks:									
p://www.liaad.up.pt/are ps://presiuniv.knimbu	ea/jgama/DataStreamsCRC.pdf us.com/user#/home								
pics relevant to "SKII	LL DEVELOPMENT":								
xtGen Predictive analys using various tolls ar attained through asses	tGen Predictive analysis of real time datasets like health monitoring analysis, finance for risk management using various tolls and libraries for Skill Development through Experiential Learning techniques. This is attained through assessment component mentioned in course handout.								
Catalogue prepared by	Dr. Manjula H M								
Recommended by the Board of Studies on									
Date of Approval by the Academic Council									

Course Code:	Course Title: Graph Analytics	L-P-C	3	0	0	3		
CSD3412	ype of Course: Professional Core							
Version No.								
Anti- requisites	L							
Course Description	This course introduces the fundamentals of graph theory and analytics, covering key algorithms and metrics. Students will learn to model and analyze real-world networks using tools like Neo4j and NetworkX. Topics include centrality, community detection, and graph querying. Applications in social networks, recommendation systems, and cybersecurity are explored							
Course Objectives	The objective of the course is to fami concepts of Graph Analytics and a Experiential Learning techniques.	liarize the le attain Skill I	earn Dev	ers elop	with the oment th	rough		

C Gianse s&od@ut	Onsucestal ca	walwinnaf this saure	students	shall be	ab2le to2	3
CCSD3405	T.Understand scaph theory fordamentals and key					
Version No.	algorithms.[Understand]					
Course Pre-	Propability and Statistics MAT2001					
requisites	VISUALIZATION. [Application]					
nti-requisites	Nikyplore graph databases and machine learning					
	Toplicationse [Application] the extraction of meaningful information from					
	unstructured textual data. It covers key concepts in natural language processing.					
Course Course	text representation, information retrieval, and text-based predictive modeling.					
Content:	Students gain hands-on experience using tools like NLTK, Scikit-learn, and					
	space of the second sec					
ourse Objective	GTaphtroducedt	udents to techniques f	or extracting,	analyzir	ng <mark>+ angl</mark> jin	terpreting
Module 1	patterns in large-	scale text data.				
	Algorithms					
Basics of Graph 2Theory invertness Edgeprarticel skill in phylomaphy Representations						
Adjacency Matrix, Adjacency Pals, Of aph Phiversals BFS, DFS, Shortest Path Algorithms:						
Dijkstra's, Bellman-Ford, Minimum Spanning Trees: Prim's, Kruskal's						
Real-world App	Applications: Social, Biological, and Web Graphs					
On successful completion of the course the students shall be able to: apply the trues, significant of the course the students shall be able to:						
Module 2	CO2: Apply algorithms for topic modeling, classification, and clustering of text.					
Course Out						
Graph Propertie	s: Degree, Density	, Diameter, Clusterin	g Coefficient,	Centrali	ty	l research
Measures: Degre	e, Closeness, Betweenness, Eigenvector, PageRank, Community					
Detection: Modu	ularity, Eouvain Method, Label Propagation, Applications: Influence					
Analysis, Fraud Detection, Recommendation Systems						
urse content.			Γ			
	aph Databases	rm		5.5	ession (I -	8
Module 3	Fuddam Qualy o	f Text Mining and N paper/Assignment	ple mentation	· ·	+P-8)]	7 Sessions
Text . nrenroces	Languages	n stemming Jemm	atization Text	renre	entation	· Bag-of-
Graph Data Mod Words TF-IDI	Property Graf word, embedd	ings N-gram model	rto Graph Data S POS taggi	abases.	Neu4j,	removal
Orientibe; Querying Oraphs with Cyprice (Hands-on examples); Introduction to BPARQL (Howar, Overview of NLR libraries; NLTK, spaCy, Hugging Face.						
(101 semantic web), Data woulding and importing astapit Data						
Module 2	anh AnalytTex	t.Classification and	Clustering	2	Session (17	Sessions
	Tools., 5 &	aponer/Assignment	prementation		+P-6)	
Supervised models? Naïve Bayes, SVW, Logistic Regression, Unsupervised models? K-means,						
Hierarchical clustering, "DDA, Sentiment analysis and spam detection, Evaluation: Precision,						
kecali, F1, KOC	Applications	FIX				
Linda Brediction,	Node Classfintin	evGAnalEsibaddi 133	pid Modeling	DeepWa	ılk 8	Sessions
Bessicon-Hasted and WIO-Gased Sentine Actionalysis, WADER, Test Blothemet transformer-						
Nased sextiment it outs, the protocology of the protocology of the protocol sexual standards in the protocol of the protocol o						
castonergefeetbackcurity						
rgvfoduApplication & ToolA dvanced TextsAdvalytics and Applications 8 S	essions					
--	----------					
Deep Icaphing nting NHyBelgoRinniss, also FM sics TAanaston melup model of the (BER Thoog PT)	, Text					
summacization, semantic search, and similarity matching, Information retriev	al and					
question answering systems. Applications in healthcare, finance, legal, and e-commer	се					
Hands-on with NetworkX (Python), Neo4j, Graph visualization with Gephi List of Experiments (30 Hours)						
Module 1: Fundamentals of Text Mining and NLP						
1. Text Preprocessing I	ipeline					
Dject working the method beneficiation, stop word removal, stemming, and lemmatization	using					
NLTK and spacy. b Darian-antiputementation of a real world problem with Staph						
2. Research paper review and presentation on a grad to the distribution of a grad to the sector of t	ntation					
importance	woru					
3 Word Embeddings and Sir	hilarity					
xtbook(s); or and Sincered Sin	ds and					
 xisualize them. Craph-Powered Analytics and Machine Learning with TigerGraph" 4 POS 	eration					
Authors: Victor Part-or Speech tagging and extract n-grams (fi-grams, tri-grams) fr 2. "Graph Data Apalytics: A Practical Guide to Process", Visualize, and Analyze	om text					
5. Complex a raph Data, Author Sumit Raj, Publisher: BPB Publications, Year: 2023	braries					
Preprocess the same text using NLTK, spaCy, and Hugging Face Transfe	rmers;					
ferences compare speed and output.	, í					
4. "The Practitioner's Guide to Graph Data", Authors: Denise Gosnell, Matthias						
 6. "Graph Data Science for Dummles (2nd Edition), Author: Alicia Frame, Implement a snam vs. ham classifier using the Naïve Bayes algorithm. 	Bayes					
7. Text Classification using SVM and Logistic Reg	ression					
6. "Managing and Mining Graph Boto", Editors: Charu Regressional Haixun Wangt of	r spam					
Publisker: Springer, Year: 2010	-					
7.8. Fr Chust Haring: Graph Theory, CRC Press, 20 Textoriginally published in 1969). Doc	uments					
Apply K-means and Hierarchical Clustering to a corpus (e.g., news articles); v	sualize					
eblinks: clusters using PCA or t-SNE.						
8.9.httpopioresiuniv.knimbus.coExtractionme using	LDA					
9. Ulextrachtlpm/mant/topics/rom/a setsefsdocumdents using Latent Dirichlet Alloca	tion.					
10ximudelcouponCode=LETSLEARNNOWPHDEFTGEL online course	Metrics					
pics relevantuatesk riges fiber en pen contrusion prateix, tips esising devendon fen ven forgan	d ROC					
Experientian Learning techniques.						
nis is attained through assessment component mentioned in course handout.						
Catalogue 3: Sentiment Analysis and Assistant Professor (Senior Scale)						
Prepared by	nalysis					
Recommended strong	exts or					
by the Board						

of Sta	idies on									
Date	of	Academic	Council Me	eting No.						
Appr	oval by									
the A	cademic									
Coun	cil									
12	2. Transfo	rmer-Based		S	entiment				Classif	ication
	Use Hug	ging Face T	ransforme	rs (e.g., BER	AT) to class	sify sen	time	nt in a t	weet or	review
	dataset.									
1.	3. Topic		Mod	eling		wit	h			NMF
	Apply N	on-negative	Matrix Fa	ctorization	for topic d	iscove	ry an	d comp	are with	n LDA.
⊘ M	odule 4: A	dvanced Te	ext Analytic	cs and Appl	ications					
14	4. Text		Summariza	ation	u:	sing			Transfe	ormers
	Use BEI	RT or GPT t	o summari	ize long arti	cles or rep	orts.				
15	5. Semanti	с	Search	and	l	Simi	larity	r	Ma	tching
	Build a	semantic sea	arch engine	e using sente	ence trans	formei	s or]	BERT	embedd	ings to
	find sim	ilar texts or	answers fr	om a corpu	s.					
Text	Book									
1.Titl	e: Speech	and Langua	ge Processi	ng.Authors	Daniel Ju	rafskv	and Ja	ames H		
Marti	n. Publish e	er: Pearson,	dition: 3rd	Edition (Dr	aft, update	d conte	nt on	line).Y	ear: 202	3
(lates	t version o	online)			, 1			- / /		
,		,								
2.Titl	e : T <i>ext M</i>	ining with R	: A Tidy Ap	proach,Aut	hors: Julia	Silge,	Davi	d		
Robir	nson, Publi	sher: O'Reil	ly Media, É	dition: 2nd I	Edition, Ye	ar: 202	22			
ferenc	es									
R1 <i>i</i>	Natural La	nguage Pro	cessing with	h Transform	ers, Autho	rs: Lev	vis Tu	ınstall,	Leandro	von
Werr	a, Thomas	Wolf, Publis	her: O'Reil	lly Media, Y	ear: 2022.			,		
	Course Ti	tle: Probabilis	tic Modeling	for Machine		3	0	0	3	
Course Code:	Learning		-							
CSD3416	Type of C	ourse: Discipli	ne Elective/	Theory Only	L- I-P- C					
	Course									
Version No.		2.0								
Course Pre-										
requisites										
Anti-requisites		NIL								
		This course pr	rovides an in	-depth under	standing of	probab	ilistic	models	and their	
Course		, application in	machine lea	irning. It explo	ores technic	ques su	ch as E	Bayesiar	n inferenc	e,
Course		graphical mod	dels, and late	ent variable m	odels for h	andling	uncer	tainty ir	n data. Th	e
Description		focus is on bo	th the theor	etical founda	tions and pi	ractical	imple	mentati	ons using	
		modern librar	ies.				-			

Course	Objective		The objective of the course is to familiarize the learners with the concepts of Data Mining and attain Employability through Problem Solving Methodologies						
Course Comes	Out		 Upon successful completion of this course, students will be able to: 14. Understand the fundamental principles of probabilistic modeling and reasoning. 15. Design and implement probabilistic models for supervised and unsupervised learning. 16. Apply inference techniques and evaluate probabilistic models in real-world scenarios. 						
Course	Content:								
Module	e 1	Foundati and Stati	ons of Probability stics for ML	Assignment		Data Collection	10 Sessions		
	Topics: Basics of J Introducti	orobability on to Bay	y theory, Random esian inference	variables and di	stributi	ons, Statistical decision t	heory,		
Module	e 2	Bayesian Inference	Methods and Techniques	Quiz		Problem Solving	10 Sessions		
	Topics: Prior, like families, N	lihood, an ⁄ICMC and	d posterior, Bayes d Variational Infere	ian parameter e ence	stimati	on, Conjugate priors and	l exponential		
Module	23	Probabili Models	stic Graphical	Assignment		Problem Solving	10Sessions		
	Topics: Directed (paramete	Bayesian r learning	networks) and Und , Exact and approx	directed (Marko imate inference	v Rando algorit	om Fields) models, Struct hms	cure learning and		
Module	e 4	Advanceo Applicatio	d Topics and ons	Assignment		Problem Solving	13 Sessions		
	Latent vai Variationa and proje	riable moo al Autoeno ct work	dels (e.g., Gaussian coders), Temporal	Mixture Model models (e.g., Hi	s, LDA) dden M	, Deep probabilistic mode larkov Models), Real-wor	els (e.g., Id case studies		
	Text Book 3. Mur 4. Bishc	ohy, Kevin op, Christo	n P. Probabilistic M opher M. Pattern F	achine Learning Recognition and	: An Int Machir	troduction, MIT Press, 20 ne Learning, Springer, 20	22. 06.		

	Reference	s:						
	R1 Koller, Press, 200	Daphne, a 9.	and Nir Friedman. Probabilistic Graphical Models: Principles and Techniques, MIT					
	R2 Ghahramani, Zoubin. An Introduction to Probabilistic Machine Learning, Cambridge University Press (Forthcoming / Preprints), Latest Edition.							
	Additiona	l web-bas	ed resources:					
	W1. <u>https</u> and Techn W2.https:, fd3049a98 &db=nlebl	iques, Jiav iques, Jiav //punivers f0393e96 k https://r	courses.swayam2.ac.in/cec20_cs12/preview Text book of Data Mining: Concepts wei Han, Micheline Kamber and Jian Pei, Morgan Kaufmann Publishers, 2012. sity.informaticsglobal.com:2284/ehost/detail/detail?vid=7&sid=e2d7362a- i3521dbd%40redis&bdata=JnNpdGU9ZWhvc3QtbGl2ZQ%3d%3d#AN=377411 hptel.ac.in/courses/105105157					
	Topics rele Employabi componer	evant to "I ility Skills t nt mentior	MPLOYABILITY SKILLS": Data Mining Techniques, FP Growth for developing through Participative Learning techniques. This is attained through the assessment ned in the course handout.					
Catalog prepare	ue ed by		Shaik Salma Begum					
Recomr by the E Studies	nended Board of on							
Date of by the A Council	Approval Academic							

Course Code: PPS 1025	Course Title: Industry Readiness Program – I (Audited Course)	L- T - P- C	0	0	2	0
	Type of Course: Practical Only Course					
Version No.	1.0	·				
Course Pre- requisites	Students are expected to understand Basic English. Students should have desire and enthusiasm to involve, participate and learn.					
Anti-requisites	NIL					

Course Description This course is designed to enable students to set SMART goals, form professional of personal ethics for success and learn various email writing techniques. The course will benefit learners in presenting themselves effectively through various activities and learning methodologies.							
Course Objective The objective of the course is to familiarize the learners with the concepts of "Employability for Young Professionals" and attain SKILL DEVELOPMENT through the participative LEARNING techniques.							
Course Out Cor	nes	On successful completion of this course the students shall be able to: CO 1 Define their career goals CO 2 Practice ethical habits for better career success CO3 Demonstrate effective email writing techniques					
Course Content	t						
Module 1	Goa	l Setting & Grooming	Classroom activities	10 Hours			
Activity: Real w Module 2	orld scer Hab	narios it Formation	Role plays	10 Hours			
Topics: Professi	ional and	Personal ethics for success a	and activity-based practice				
Activity: Studer	nts to pre	esent 2 min video on building	professional ethics				
Module 3	Ema	il Etiquettes	Individual and group presentation	10 Hours			
Topics: Types o	f promp	ts to generate effective or des	sired results for email etiquettes	<u>I</u>			
Activity: Individ	ual stud	ent presenting various search	n prompts				
Faculty: L&D							
Targeted Applic TED Talks You Tube Links Activities	cation &	Tools that can be used:					

Assignment proposed for this course

Assignment 1: SMART Goal

Assignment 2: AI tools for prompt search

Continuous Individual Assessment

Module 1: Presentation

Module 2: Activity based assessment

Module 3: Class assessment

The topics related to skill development:

Students acquire knowledge on SMART goals, implement grooming standards, practice ethical behavior in class and campus, acquire hands-on experience to use AI tools to get search prompts for desired email etiquettes.

Catalogue prepared by	Faculty of L&D
Recommended by the Board of Studies on	BOS held on
Date of Approval by the Academic Council	Academic Council Meeting held on

Course Code:	Course Title: Introduction to Aptitude		0	h	0				
AP14002	(Audited)	L- P- C	U	Z	U				
Version No.	1.0								
Course Pre- requisites	Students should know the basic Mathematics & aptitude along with understanding of English								
Anti-requisites	Nil								
Course Description	The objective of this course is to prepare the trainees to tackle the questions on various topics and various difficulty levels based on Quantitative Ability, and Logical Reasoning asked during the placement drives. There will be sufficient focus on building the fundamentals of all the topics, as well as on solving the higher order thinking questions. The focus of this course is to teach the students to not only get to the correct answers, but to get there faster than ever before, which will improve their employability factor.								
Course Objective	se Objective The objective of the course is to familiarize the learners with the concepts of Aptitu and attain Skill Development through Problem Solving techniques.								

Course Code:	Course Title: Logical	and Critical Thinking								
APT4006			L- T-P- C	0	0	2	0			
	I ype of Course: Audited									
Version No.										
course Pre- requisites	Students should have the basic concepts of Logical reasoning and Critical thinking, along with its applications in real life problems.									
Anti-requisites	Nil									
Course	This is a skill-based t	training program for the engi	neering stud	lents (Un	dergradua	ate). Thi	S			
Description	course is designed t	o enable the students to enh	ance their sl	kills in Log	gical reaso	oning an	ıd			
	The objective of the	course is to familiarize the le	earners with	concepts	in in Log	ical				
Objective	reasoning and Critic development.	al thinking through problem	solving tech	niques su	itable for	their ca	reer			
	On successful comp	letion of the course the stud	ents shall be	able to:						
Course	CO1] Understand al	I the concepts.								
Outcomes	CO2] Apply the cond	cepts in problem solving (Blo	om's taxono	my Level	3)					
	CO3] Analyze and st	ructure the reasoning techni	ques and sp	atial visua	alization s	kills				
Course Content:										
Module 1	Logical Thinking	Assignment				10 H	5 ours			
	Topics:									
	Syllogisms, Cubes ar Embedded figures 8	nd Dices, Mirror and Water in Completion of figures, Data	nages, Pape Interpretati	r cutting a on, Data	and Foldir sufficienc	ng, Y				
Module 2	Critical Thinking	Assignment				14 H	4 ours			
	Topics:					·				
	Analogy, Symbol an	d Notations, Statement and	assumption,	Cause of	action, St	tatemer	nt and			
		n & Tools that can be used.								
	Application area: Pla	acement activities and Comp	etitive exam	inations.						
	Tools: LMS									
	Continuous Evaluati	on								
Evaluation										
	Iopic wise eval	uation								
	Internal Assess Toxt Book	ments								
	1 A new annroa	ch to reasoning verbal non-v	verhal & ana	lytical by	BS Siiwali					
	2. R S Aggarwal			y cical by	23 517 Wall					
	3. Kiran publicat	ions								

	References			
	1. www.india	bix.com		
	2. www.testb	ook.com		
	3. www.yout	ube.com/c/TheApti	itudeGuy/videos	
	Topics relevant t	o Skill Developmen	t Logical reasoning and Critical thinkin	g for Skill
	Development th	rough Problem solv	ring Techniques. This is attained throug	gh assessment
	component men	tioned in course ha	andout.	
Catalogue prepared by	L&D Department	t Faculty Member		
Recommended				
by the Board				
of Studies on				
Date of				
Approval by				
the Academic				
Council				
Course Outcome	es On successful	completion of the o	course the students shall be able to:	
	CO1] Recall all	the basic mathema	atical concepts they learnt in high scho	ol. CO2] Identify
	the principle c	oncept needed in a	question.	
	CO3] Solve the	e quantitative and lo	ogical ability questions with the appro	priate concept.
	CO4] Analyze t	he data given in co	mplex problems.	
	CO5] Rearrang	e the information t	to simplify the question	
Course Content:				
Module 1	Quantitative Ability	Assignment	Bloom's Level : Application	12 Hours
Topics:		·		
Introduction to A	Aptitude, working	of Tables, Squares,	Cubes	
Module 2	Logical Reasoning	Assignment	Bloom's Level : Application	18 Hours
Topics:		·		
Linear & Circular	Arrangement Puz	zle, Coding & Deco	ding, Blood Relations, Directions, Orde	ering and
Ranking, Clocks	and Calendars, Nu	mber Series, Wron	g number series, Visual Reasoning	
Targeted Applica	ation & Tools that	can be used:		
Application area	: Placement activi	ties and Competitiv	e examinations. Tools: LMS	
Text Book				
Quantitative Apt	itude by R S Aggai	rwal		
Verbal & Non-Ve	erbal Reasoning by	R S Aggarwal		

References www.indiabix.com www.youtube.com/c/TheAptitudeGuy/videos

Topics relevant to Skill development: Quantitative and reasoning aptitude for Skill Development through Problem solving Techniques. This is attained through assessment component mentioned in course handout.

Catalogue prepared by	L&D Department faculty members
Recommended by the Board of Studies on	
Date of Approval by the Academic Council	

Course Code: APT4004	Course Title: Aptitude Training- Intermediate							
	Type of Course: Practical Only Course	L- T - P- C	0	0	2	0		
Version No.	1.0							
Course Pre- requisites	Students should have the basic concepts of Quantitative aptitude along with its applications in real life problems.							
Anti-requisites	NIL							
Course Description	In This is a skill-based training program for the students. This course is designed to enable the students to enhance their skills in Quantitative Aptitude.							
Course Objective	The objective of the course is to familiarize th and attain Skill Development through Probler	ne learners wit m Solving tech	h the c niques	concepts	s of Ap	titude		

Course Out Comes						
course out comes	On successful completion of this course the students shall be able to: CO1: Recall all the basic mathematical concepts.					
CO2: Identify the principle concept needed in a question.						
CO3: Solve the quantitative and logical ability questions with the appropriate cor						
	CO4: Analyze the data given in complex problems.					
Course Content:						
Module 1	Quantitative Ability 1	Assignment	16 Hours			
Topics:						
Number System, Po and Loss	ercentage, Ratio and Proportio	on, Average, Mixture and Alle	gation, Time and Work, Profit			

Module 2	Quantitative Ability 2	Assignment	14 Hours
Topics:	d Distance, Beats and Streams	imple Interact Compound Int	erest Brobability Dormutation
and Combinati	on	simple interest, compound int	erest, Frobability, Fermutation
Targeted Appli	cation & Tools that can be used:		
Application are	ea: Placement activities and Com	petitive examinations. Tools: I	∟MS
Continuous Ev	aluation:		
CA1 – Online T	est CA2 – Online Test CA3 – Onli	ne Test Assignment	
Text Book:			
Fast Track Obj	ective by Rajesh Verma		
R S Aggarwal			
Rakesh Yadav			
References:			
www.indiabix.	com		
www.testbook	com		
www.youtube	.com/c/TheAptitudeGuy/videos		

Topics relevant to S <mark>Techniques</mark> . This is	Skill Development: Quantitative aptitude for <mark>Skill Development</mark> through <mark>Problem solving</mark> attained through components mentioned in course handout.
Catalogue	Faculty of L&D
prepared by	
Recommended by	BOS held on
the Board of	
Studies on	
Date of	Academic Council Meeting held on
Approval by the	
Academic	
Council	

Course Code: PPS 1026	Course Title: Industry Rea – II (Audited Course)	adiness Program		0	0	2	0
	Type of Course: Practical	Only Course	L- I - F- C	U	U	2	
Version No.	1.0			I		I	
Course Pre- requisit	es Students are expected to Students should have des	understand Basi sire and enthusia	c English. sm to involv	e, part	icipate	and lea	arn.
Anti-requisites NIL							
Course Description	This course is designed to enable students learn styles of communication, team building and use empathy in leadership. The course will benefit learners in preparing themselves effectively through various activities and learning methodologies.						team
Course Objective The objective of the course is to familiarize the learners with the concepts of "Industry Readiness for Young Professionals" and attain SKILL DEVELOPMENT through PARTICIPATIVE LEARNING techniques.					1 i.		
Course Out Comes	On successful completion CO 1 Apply different com CO 2 Practice team buildi CO3 Demonstrate ethical	munication skills ng skills for cared leadership skills	for success of for success or success in workplac	in wor e	e able to	0:	
Course Content							
Module 1	Effective Communication	Classroom a	activities		10	Hours	
Topics: Practice effe	ctive communication skills (Ve	erbal, Non-verba	l, Written ar	nd Visu	al)		
Activity: Use social r	nedia prompts to prepare self	f-introduction vic	leos				
Module 2	Group Activ	vity		1	0 Hour	S	
Topics: Skills of an e	ffective team player						
Activity: Student gro	oup activity to build class netw	vorking					

Module 3	Leadership	Case study	10 Hours				
Copics: Types of leadership, using empathy in leadership Activity: Individual presentation by students on corporate leaders.							
Faculty : L&D							
Targeted Applica TED Talks You Tube Links Activities	Fargeted Application & Tools that can be used: FED Talks You Tube Links Activities						
Assignment prop	osed for this course						
Assignment 1: Or Assignment 2: Te	Assignment 1: One minute reel Assignment 2: Team building assignment						
Continuous Indiv	Continuous Individual Assessment						
Module 1: L-S-R-W class assessment							
Module 2: Team	Presentation						
Nodule 3: Individual Assessment							

The topics related to skill development:

Students acquire knowledge on effective communication skills, team building skills and how to prepare themselves to be leaders in workplace using empathy and implement various skill sets during the course of their time in the university.

Catalogue prepared by	Faculty of L&D
Recommended by the Board of Studies on	BOS held on
Date of Approval by the Academic Council	Academic Council Meeting held on

Course Code: Cours			e Title: Aptitu	de For Employa	bility					
APT4005		Туре о	Гуре of Course: Practical Only L- T-P- С 0 0 2				2	1		
Version No.			1.0			1				
Course Pre-			Students sho	ould have the ba	sic conc	epts of Qu	uantita	tive ap	titude,	,
requisites			Verbal ability	y along with its	application	ons in rea	l life pr	oblem	s.	
Anti-requisi	ites		Nil							
Course Des	cription		This course i quantitative	s designed to en aptitude and ve	nable the erbal abil	e students ity skills.	to enh	nance t	heir sk	ills in
Course Obje	ective		The objective of the course is to familiarize the learners with concepts in Quantitative Aptitude and Verbal ability through problem solving techniques suitable for their career development.							
Course Out	comes		On successful completion of the course the students shall be able to: CO1] Recall all the basic mathematical concepts CO2] Identify the principle concept needed in a question CO3] Solve the quantitative and logical ability questions with the appropriate concept.							
Course Con	tent:									
Module 1		Quanti	itative Ability	Lab-10hrs	Pla 10	atform As Ihrs	sessme	ent-	20 H	ours
	Topics: Number S Time and Compour	System, Work, nd Inter	, Percentage, Profit and Lo est, Probabili	Ratio and Prop ss, Time Speed ity, Permutation	ortion, A and Dista n and Cor	verage, N ance, Sim mbinatior	lixture ple Inte	and Al erest a	legatic nd	on,
Module 2		Verbal	Ability	Lab-5hrs	Pla	atform As	sessme	ent-5hr	s 10 H	ours
	Topics: - Analogies	Parts of s,	f Speech, Sub	ject Verb Agree	ment, Sp	ootting Er	ror, Clo	ze Tes	t, Verb	al

	Reading Comprehension, Idioms & Phrases, Para Jumbles
	Targeted Application & Tools that can be used: Application area: Placement activities and Competitive examinations. Tools: LMS
Evaluation	Continuous Evaluation Topic wise evaluation

	Text Book							
	Fast track objective by Rajesh Verma							
	R S Aggarwa	al						
	S.P Bakshi							
	References							
	www.indiab	pix.com						
	www.testbo	pok.com						
	www.youtu	be.com/c/TheAptitudeGuy/videos						
	Topics relev	ant to Skill development: Quantitative and reasoning aptitude for Skill Development						
	through Pro	blem solving Techniques. This is attained through assessment						
	component	mentioned in course handout.						
Catalogue pr	epared by	Faculty of L&D						
Recommend	ed by the							
Boar	d							
of								
Studies on								
Date of Appr	oval by the							
Acad	lemic							
Council								

Course Code: PPS 3018	Course T	L- T- P- C	0	0	2	1	
	/	,					
Version No.		1.0					
Course Pre- requisites		Students are expected to understand Basic English. Students should have desire and enthusiasm to involve, participate and learn.				and	
Anti-requisites		NIL					

Course	se This course is designed to enable students to understand soft skills					
Description	concepts to be corpo	concepts to be corporate ready. The modules are set to improve self-				
	confidence, communi	cate effectively and Prepare	for the Interview to assist			
	in employability. It helps the students to get a glimpse of the acceptable					
	corporate readiness a	and equip them with the fu	indamental necessities of			
	being able to confid	lently deal with the highl	y competitive corporate			
	environment and help	os in crafting different types	of resumes. The pedagogy			
	used will be group di	iscussions, flipped classrooi	ms, continuous feedback,			
	role-play and mentori	ing.				
Course Objective The objective of the course is to familiarize the learners with the concept						
	of "Preparing fo	or Interview" and attain SKIL	L DEVELOPMENT			
	th <mark>rough PARTICIPATIN</mark>	/E LEARNING techniques.				
	On sussessful complex	tion of this course the stud	ants shall be able to:			
Comes	CO1: Develop profess	CO1: Develop professional Resumes CO2: Illustrate Resumes effectively				
comes	CO3: Apply skills and I	knowledge learnt for active	and effective Group			
	Discussions and Inter		and effective droup			
Course Content:						
		1				
Module 1	Resume Building	Classroom activity	10 Hours			
Topics: F	lesume structure, use of templa	ates, Do's and Don'ts, ATS n	nethods, Cover Letter			
and Vide	o Resume					
Activity:	Real world scenarios					

Module	2	Group Discussion	Mock G D	9 Hours
	Topics: -(POV of a	Group discussion as a placeme	ent process, GD techniques like Ke	yword. SPELT &
	parties. [Activity:-	Do & Don't of GD, Case-lets ar Real world scenarios	nd topics for GD, practice session a	and evaluation
Module	3	Personal Interview	Grooming checks + Evaluation + Mock Interview+ Role Play	9 Hours
	and desi Activity:	red answers, Different types o - Role Play & Real-world scena	of interviews, Do's and Don'ts. ario	
Module	4	Recap/Revision /Feedback Session	Practice sessions	2 Hours
	Targeted TED Talk: You Tube Role Play Project w course Continuc	Application & Tools that can s e Links r activities vork/Assignment: Mention the pus Individual Assessment	be used: e Type of Project /Assignment pro	posed for this

The Topi	The Topics related to Skill Development:				
Art Of Pr Learning course ha	esentatic Tech- nic andout.	on and Group Discussion for Skill Development through Participative ques. This is attained through assessment Component mentioned in			
Catalogue prepared by		Faculty of L&D			
Recommended by the Board of Studies on		BOS held on			
Date of Approval by the Academic Council		Academic Council Meeting held on			

Course Code:	Environmental Studies					
CHE7601	Type of Course: MOOC course					
		Contact				
Course Pre- requisites	NIL	nours	<u> </u>	<u> </u>		
Anti- requisites	NIL					
Course Description	This course is designed to improve the learners' SKILL DEVELOPMENT by using PATICIPATIVE LEARNING techniques. This course aims to familiarize students with fundamental environmental concepts and their relevance to business operations, preparing them to address forthcoming sustainability challenges. It is designed to equip students with the knowledge and skills needed to make decisions that account for environmental consequences, fostering environmentally sensitive and responsible future managers.					
Course	The objective of the course is 'SKILL DEVELOPMENT	of the st	ude	nt by	/ usi	ing
Objective	'PARTICIPATIVE LEARNING' techniques					U
Course Outcomes	 On successful completion of this course the students shall be able to: 9. Describe the issues related to natural resources, ecosystems and biodiversity 10. Identify environmental hazards affecting air, water and soil quality 11. Recognize the importance of healthy environment and finding the sustainable methods to protect the environment 12. Convert skills to address immediate environmental concerns through changes in environmental processes, policies, and decisions 					
Course Content:						
Module 1	derstanding Environment, Natural Resources, and Sustainability					

Topics	
Course Code:	ian Constitution
Lassification of	natural resources. Issues related to Population growth and their overutilization, and
strategies for th	eir conservation. Water, air, soil, mineral, energy and food source. Effect of human
activities on nat	hours hours
Concept of susta Course Pre-	inability- Sustainable Development Goals (SDGs)- targets and indicators, challenges
and strategies for requisites	r SDGs; Sustainable practices in managing resources, including deforestation, water
Conservation, D	esalination – types, energy security, and food security issues, Life Cycle thinking and
Circular Econom	ty.
Course	This course is designed to improve the learners' SKILL DEVELOPMENT by using
Course Modulation	systems. Biodiversity and Sustainable
Description	Practices
Topics:	Republic of India (https://constitution75.com/) as well as
Ecosystems and	sosystem fragera services Warious natural ecosystems, Major ecosystem types in India
and their basic	characteristics, forests, wetlands, tgriesslands, eagriculture, ceastal, and marines
Ecosystem servi	CREATER AND AND THE STRICT AND A CONTRACT OF CALL TO C
The importance	of biodiversity, Types of biodiversity, Biodiversity, and Chievete Ghanger that threats
it faces, hotspo	tsurand star methodas wired idaa its ranser ation strategies, far its and real with
conservation, n	Grade diverse billeting of making the Constitution of India, familiar to all students and
	vinonmented law stRoleutionthis cou Waste ns and objectifies legal understanding in
Module 3	Mensagement formend Sustainable
	Prive low sense to cater to Constitutional Studies.
Tonics	The objective of the course is 'SKILL DEVELOPMENT' of the student by using
Tunes of nollut	io PARTICIPATIVBLEARNING (constitution lessoise air water soil thermal radioactive
and marine no	Hution and their impacts on society. Urbanization and Urban environmental
Course Droblems: effec	On successful completion of this course the students shall be able to:
Outcomes Callses of pollur	5. Describe the basic understanding of the Indian Constitution and the
and acid rain w	concepts and issues relevant to day-to-day life of the nation and to equip
technologies. So	the Citizen with the zeal of capacity building. Recognizing and identify the
	values of the Constitution of India.
Sustainable Ma	6. Enabling the Citizen-centric Awareness of Rights and Responsibilities of terials and Technologies: Biodegradable and compostable materials. Recycled and
reclaimed mate	the State rials (E-waste management). Sustainable manufacturing processes.
	7. Explain the role of the State actors in building India.
Module 4	Applications
.	איאאי (Government)
Course	
Content:	y environmental legislation and the judiciary's role in environmental protection,
meluaing the W	ater (Prevention and Control of Pollution) Act of 1974, the Environment (Protection)
ACT OT 1986, an	menstancingevenneon aviakuogitroopt Primeition) Act of 1981. Hazardous waste Rule
	A woasteruarouning 1978 A successful were not Dulas Solid Waste Rule 2000, Battery
Kules 2001, E- V	v Aussember & Une Construction Of The Bernant Rules 2016, Construction Demolition
Topics:	
Dialation D	
HISTBRIESI CARE	ist of course internet assem RK-3 could be stilled a function of the coust of the assembly assembly assembly as
Change (UNFCC	L); KYOTO PROTOCOI; Paris Agreement.
Whaterisiateena	
Constitutionite	Reamble of Indian Constitution cientific and Cultural Organization (UNESCO),
Intergovernmer	ntal Panel on Climate Change (IPCC).
Madela 2	zen's Fundamental Rights and State's
The set of Applic	akespensibilities (Difective Principles)
Application area	as are Energy, Environment and sustainability

hored notion of the second	gdannental Rightswayaght to Equality - Fac	cets of Right t	o Equality - Rig	sht to
Freedom of Konstitutional Position of Some Democratic Rights - Right Against Exploitation - Right to				on - Right to
Freedom of Religio Assessment Type	in - Right to Constitutional Remedies			
• Or Directive Principles	lline exams (MCOs) will be conducted by s of the State Policy	the departme	ent of Chemist	ry
Module 3 ar	1s Of the Government	0 1 1 1 2 2 2		
Topics:			• · · · • • · · ·	
Executive: The Pre	sident of India - Powers and Functions o	f President of	India - Emerge	ency
Powers and the Po	sition of the President			
Legislature: Union	Council of Ministers - Prime Minister - T	he Rajya Sabł	na - The Lok Sa	bha -
Relation between	the Lok Sabha & Rajya Sabha - Office of t	he Speaker –	Important Parl	iamentary
Committees				
Judiciary: The Stru	cture and Organization of the Judiciary &	the High Cou	irt - The Supre	me Court -
Role of The Supren	Sedeneliene & Decentrelization	c Structure Do	octrine & PIL	
iviodule 4	Federalism & Decentralization			
lopics:				
What is Endoralism	2 - Contro-Stato Logislativo Polations - C	antro-Stato A	dministrativo P	elations -
Centre-State Finan	rial Relations	entre-State A		
The 5th & 6th Sche	edules - Municipality- (History of Indian N	Aunicipality, C)rganization &	Functions)
– Panchavat 1 (Ide	a of Panchavat. Organization and Power	s of Panchava	ts in India)	i unicciono,
<i>,</i> , , , , , , , , , , , , , , , , , ,	, , , ,	,	,	
Targeted Applicati	on & Tools that can be used:			
Application areas t	o familiarize students with fundamentals	s of Indian Co	nstitutional co	ncepts.
Tools: Online Tool	s – NPTEL and Swayam.			
Project work/Assig	gnment:			
Assessment Type				
• Or	line end term exam will be conducted as	notified by tl	he Presidency	University.
Online Link (2022), Col	nservation through Sustainable Use: Less	ons from Indi	a. Routledge.	
22. ₩illiam P.	Cunningham and Wary Ann Course: "Cons	titutional Gov	ernment & Den Inciples of Env	nocracy in Vironmental
India" Science: In	quiry & Applications, 9 th Edition, McGrav	v-Hill Educatio	on, USA.	
23 ^{https://onlin}	<u> 1969 HEAREONYO, MARCOE JAKE (2022) SEANAF</u>	őhine ntal Ma	nagement: Co	ncepts and
Practical S	kills. Cambridge University Press.		_	
Text Booktos://doi	3.E. (2022). Environmental Chemistry (1)	lth ed.). CRC I	ress.	
25 theodorbu	I.org/10.1201/9781003090238	titutionofilm	dia.~236d Editio	Magament
23. τηευαυιε; (Gursano,a)	Lexis hexis, 2018).			magement,
Resources: MI	P Jain's Constitutional Law of India, Lexis	Nexis		
38. Attps://Yp	<u>ትምምምምምምምምምምምምምምምምምምምምም</u>	Singh 13th E	dition	
39. Attps://arc	hRd9pfea925titetianse5/1200/108/12010	8004/		
40. <u>Attps://hp</u>	tenaerin/courses/1211419018 India: A Pol	itico-Legal Stι	udy (Greater N	oida:
41. <u>Atepling Bru</u>	Hielouissestnettel.2017/noc23_lw06/prev	<u>view</u>	4.1 m 1 /-	
42. <u>Attps://ohi</u>	manashukesewanya M2P.a Sing/Ini29diato 2/4	tecae Sy stem,	4th Edition (Be	ingaluru;
43. <u>Keeps9//are</u>	Nive Motel Stephon R Victoria Discussion 120/108/12010	<u>8002/</u>	tion (C Chand	2011)
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45. Attps://Ap	tel ac in/courses/12/107165	IICIIL DIALKSW	aii, 2001)	
40. <u>nttps://np</u>	121.ac.111/courses/12410/165			

47. <u>Attps://</u>	ወታተፈት.ቋል.ቋቋታ bo&rse <u>8/140 ዓመር መፅ 200</u> Indian Administration (L.N. Agarwal Educational
48. <u>Attpliss/v</u>	agch204.7)ptel.ac.in/content/storage2/courses/120108004/module1/lecture1.pdf
49. <u>h0tps://</u>	<u>&nlinēediarseslowiava@ro2vecrim/anotu2055d@ro119i/cpr(53.eievityaa. Bhawan, 13th Revised</u>
50. <u></u> 560 (1915)	2001179 courses.swayam2.ac.in/ini25_hs01/preview_
51. <u>http://k</u>	<mark>֎. არე მათხანის რესილებით ან საკვე სამეთან საკვე სამელის კა კა სასა სასა სასა სასა სასა სასა ს</mark>
52. <u>Janpary</u>	n 2018) c.in/courses/105105169
Topics relevant	to Skill Development:
erence Bootksude	of enquiry.
8. 12/ritherrsee	${ m R}$ ai, Constitutional Law of India, 4 th Ed. Vol I, II, & III
	g Raviconstantional Sustainability:
topics 4n thermonyco	acy pome 60 as tituellieven listo Em kickia, nDevilo ach U Sivetainta Bilitiss 2009
Resources:	
preparedtbys://	onlinecourses.nptel.ac.in/noc20_lw03/course?&force_user=true
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d by ³ the ^{https://}	nptel.ac.in/courses/129106003
Board of https://	nptel.ac.in/courses/129106411
Studies on //	nptel.ac.in/courses/129105608
6. <u>https://</u> Date of	nptel.ac.in/courses/129106002
Topics, selevan	t to Skill Development:
An attitude	of inquiry.
4. Write repo	ts
e topics related to	Constitutional Studies and its application :
topics in theory c	omponent are relevant to Indian Constitution.
Catalog	Faculty members of the Department of Law.
prepared by	
Recommende	
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Studies on	
Date of	
Approval by	
the Academic	
Council	

Rajanukunte, Yelahanka, Bengaluru 560 119