



# PRESIDENCY UNIVERSITY

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

## School of Engineering

### Bachelor of Technology Degree

### Program Regulations and Curriculum 2020-2024

### B.Tech. Computer Science and Engineering (Cyber Security)

**2020-2024**

Regulations No: PU/AC-20.3/SOCSE01/CCS/2020-24  
Resolution No. 3 of the 20<sup>th</sup> Meeting of the Academic Council held on 15<sup>th</sup> February 2023, and  
Ratified by the Board of Management in its 21<sup>st</sup> Meeting held on 22<sup>nd</sup> February 2023

**February-2023**



# **Bachelor of Technology Degree Program Regulations and Curriculum 2020-2024**

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, 2019, of the University, the Academic Council hereby makes the following Regulations, namely;

## **Preliminary:**

### **Short Title and Commencement**

- (a) These Regulations shall be called the **Bachelor of Technology Degree Program Regulations and Curriculum 2020-2024**.
- (b) These Regulations are subject to, and, pursuant to the Academic Regulations, 2019.
- (c) These Regulations shall be applicable to the ongoing Bachelor of Technology Degree Programs of the 2020-2024 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 2020-2021.

## **Definitions:**

*In these Regulations, unless the context otherwise requires:*

- a) *“Academic Council” means the Academic Council of the University;*
- b) *“Academic Regulations” means the Academic Regulations, 2019, of the University;*
- c) *“Academic Term” means a Semester or Summer Term;*
- d) *“Act” means the Presidency University Act, 2013;*
- e) *“Board of Examinations (BOE)” means the Board of Examinations of the University;*
- f) *“Board of Management (BOM)” means the Board of Management of the University;*
- g) *“CGPA” means Cumulative Grade Point Average as defined in the Academic Regulations, 2019;*
- h) *“Clause” means the duly numbered Clause, with Sub-Clauses included, if any, of these Regulations;*
- i) *“Course” means, a specific subject usually identified by its Course Code and Course Name, with specified Credit Structure and Credits, Course Description/Content/Syllabus, a set of textbooks/references, taught by assigned Course Instructor(s) to a specific class (group of students) during a specific Academic Term;*
- j) *“Course Instructor” means the faculty member who is the Teacher/Course Instructor for the concerned Course;*
- k) *“DAC” means the Departmental Academic Committee;*
- l) *“Dean” means the Dean of the concerned School;*
- m) *“HOD” means the Head of the concerned Department;*



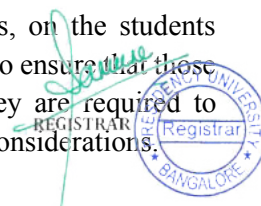
- n) *“Parent Department” means the Department that offers the Degree Program that a student undergoes;*
- o) *“Program” means the Bachelor of Technology (B. Tech.) Degree Program;*
- p) *“Program Regulations” means the Bachelor of Technology Degree Program Regulations and Curriculum 2020-2024;*
- q) *“Registrar” means the Registrar of the University;*
- r) *“SGPA” means the Semester Grade Point Average as defined in the Academic Regulations, 2019;*
- s) *“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;*
- t) *“Section” means the duly numbered Section, with Clauses included in that Section, of these Program Regulations;*
- u) *“Statutes” mean the Statutes of Presidency University;*
- v) *“Sub-Clause” means the duly numbered Sub-Clause of these Program Regulations;*
- w) *“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, and,*
- x) *“University” means Presidency University, Bengaluru;*

## 1. INTRODUCTION:

- 1.1. The **Academic Regulations, 2019**, are applicable to all existing Degree Programs of the University. The Academic Regulations, and any amendments made therein, shall also be applicable to new Degree and Diploma Programs that may be offered by the University in future.
- 1.2. The **Bachelor of Technology Degree Program Regulations and Curriculum 2020-2024** are subject to, and, pursuant to the Academic Regulations, 2019.
- 1.3. These Program Regulations shall be applicable to the following **Bachelor of Technology (B. Tech.) Degree Programs of 2020-2024:**
  - 1.3.1. Bachelor of Technology in Civil Engineering, abbreviated as B. Tech. (Civil Engineering);
  - 1.3.2. Bachelor of Technology in Computer Engineering, abbreviated as B. Tech. (Computer Engineering);
  - 1.3.3. Bachelor of Technology in Computer Science and Engineering, abbreviated as B. Tech. (Computer Science and Engineering);
  - 1.3.4. Bachelor of Technology in Information Science and Engineering, abbreviated as B. Tech. (Information Science and Engineering);
  - 1.3.5. Bachelor of Technology in Information Science and Technology, abbreviated as B. Tech. (Information Science and Technology);



- 1.3.6. Bachelor of Technology in Computer Science and Technology, abbreviated as B. Tech. (Computer Science and Technology);
  - 1.3.7. Bachelor of Technology in Electronics and Computer Engineering, abbreviated as B. Tech. (Electronics and Computer Engineering);
  - 1.3.8. Bachelor of Technology in Computer Science and Engineering (Cyber Security), abbreviated as B. Tech. (Computer Science and Engineering-Cyber Security);
  - 1.3.9. Bachelor of Technology in Computer Science and Engineering (Artificial Intelligence and Machine Learning), abbreviated as B. Tech. (Computer Science and Engineering-Artificial Intelligence and Machine Learning);
  - 1.3.10. Bachelor of Technology in Computer Science and Engineering (IoT), abbreviated as B. Tech. (Computer Science and Engineering-IoT);
  - 1.3.11. Bachelor of Technology in Computer Science and Engineering (Block Chain), abbreviated as B. Tech. (Computer Science and Engineering-Block Chain);
  - 1.3.12. Bachelor of Technology in Computer Science and Engineering (Cyber Security), abbreviated as B. Tech. (Computer Science and Engineering-Cyber Security);
  - 1.3.13. Bachelor of Technology in Computer Science and Technology (DevOps), abbreviated as B. Tech. (Computer Science and Technology-DevOps);
  - 1.3.14. Bachelor of Technology in Computer Science and Technology (Big Data), abbreviated as B. Tech. (Computer Science and Technology-Big Data);
  - 1.3.15. Bachelor of Technology in Electronics and Communication Engineering, abbreviated as B. Tech. (Electronics and Communication Engineering);
  - 1.3.16. Bachelor of Technology in Electrical and Electronics Engineering, abbreviated as B. Tech. (Electrical and Electronics Engineering);
  - 1.3.17. Bachelor of Technology in Mechanical Engineering, abbreviated as B. Tech. (Mechanical Engineering); and,
  - 1.3.18. Bachelor of Technology in Petroleum Engineering, abbreviated as B. Tech. (Petroleum Engineering).
- 1.4. These Program Regulations shall be applicable to other similar programs, which may be introduced in future.
  - 1.5. These Program 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.
  - 1.6. 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.



1.7. These Program Regulations are structured as follows:

- 1.7.1. **Part A:** Specific regulations relevant to the Bachelor of Technology (B. Tech.) Degree Programs in pursuant of the provisions in Section 6.0 of the Academic Regulations, 2019, of the University.
- 1.7.2. **Part B:** Program Curriculum for the specific ongoing Bachelor of Technology (B. Tech.) Degree Program of study as enumerated and named in Clause 1.3.

  
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## 2. PART A: PROGRAM REGULATIONS

### 2.1. Program Description and Duration

B. Tech. Degree Programs are offered in the following branches/disciplines by the respective Parent Departments as indicated in Table 2.1.

<b>Table 2.1</b>		
<b>B. Tech. Degree Programs and Respective Parent Departments</b>		
<i>S. No.</i>	<i>B. Tech. Program (Branch/Discipline)</i>	<i>Parent Department</i>
1	B. Tech. (Civil Engineering)	Department of Civil Engineering
2	B. Tech. (Computer Engineering)	Department of Computer Science and Engineering
3	B. Tech. (Computer Science and Engineering)	
4	B. Tech. (Information Science and Engineering)	
5	B. Tech. (Information Science and Technology)	
6	B. Tech. (Computer Science and Technology)	
7	B. Tech. (Electronics and Computer Engineering)	
8	B. Tech. (Computer Science and Engineering-Cyber Security)	
9	B. Tech. (Computer Science and Engineering-Artificial Intelligence and Machine Learning)	
10	B. Tech. (Computer Science and Engineering-IoT)	

  
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<b>Table 2.1</b>		
<b>B. Tech. Degree Programs and Respective Parent Departments</b>		
<i>S. No.</i>	<i>B. Tech. Program (Branch/Discipline)</i>	<i>Parent Department</i>
11	B. Tech. (Computer Science and Engineering-Block Chain)	
12	B. Tech. (Computer Science and Engineering-Data Science)	
13	B. Tech. (Computer Science and Technology-DevOps)	
14	B. Tech. (Computer Science and Technology-Big Data)	
15	B. Tech. (Electronics and Communication Engineering)	Department of Electronics and Communication Engineering
16	B. Tech. (Electrical and Electronics Engineering)	Department of Electrical and Electronics Engineering
17	B. Tech. (Mechanical Engineering)	Department of Mechanical Engineering
18	B. Tech. (Petroleum Engineering)	Department of Petroleum Engineering

  
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The 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.

## **2.2. Admission Criteria to the Four-Year Bachelor of Technology (B. Tech.) Degree Programs:**

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 Programs are listed in the following Sub-Clauses:

- 2.2.1. An applicant who has successfully completed the 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 course.
- 2.2.2. 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.
- 2.2.3. The applicant must have appeared for the Joint Entrance Examinations (JEE) Main/JEE (Advanced)/Karnataka CET/COMED-K, or any other State-level Engineering Entrance Examinations.
- 2.2.4. 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.
- 2.2.5. Admissions are offered to Foreign Nationals and Indians living abroad in accordance with the rules applicable for such admissions, issued from time to time by the Government of India.
- 2.2.6. Candidates must fulfil the medical standards required for admission as prescribed by the University.
- 2.2.7. 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.

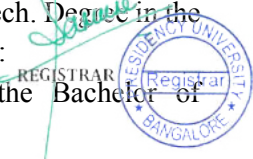
2.2.8. The decision of the BOM regarding the admissions is final and binding.

### 2.3. Lateral Entry

The University admits students directly to the second year (3<sup>rd</sup> 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:

- 2.3.1. Admission to the 2<sup>nd</sup> year (3<sup>rd</sup> 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 forty-five percent (45%) marks in the final year examination (fifth and sixth 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%).
- 2.3.2. 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.
- 2.3.3. 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.
- 2.3.4. The Course requirements prescribed for the 1<sup>st</sup> 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 3<sup>rd</sup> Semester (commencement of the 2<sup>nd</sup> Year) of the B. Tech. Program and culminating with the 8<sup>th</sup> Semester (end of the 4<sup>th</sup> Year) of the B. Tech. Program.
- 2.3.5. 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 3<sup>rd</sup> Semester of the Program, i. e., the Program Structure and Curriculum from the 3<sup>rd</sup> to 8<sup>th</sup> 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.
- 2.3.6. All the Courses (and the corresponding number of Credits) prescribed for the 1<sup>st</sup> 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 2020-2024, minus the number of Credits prescribed for the 1<sup>st</sup> Year (total number of Credits prescribed for the 1<sup>st</sup> and 2<sup>nd</sup> 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. (Computer Science and Engineering (Cyber Security)) is “N” Credits, and, if the total credits prescribed in the 1<sup>st</sup> Year (total credits of the 1<sup>st</sup> and 2<sup>nd</sup> Semesters) of the Program concerned is “M” Credits, then the *Minimum Credit Requirements* for the award of the B. Tech. Degree in Computer Science and Engineering (Cyber Security) for a student who joins the Program through the provision of the Lateral Entry shall be “N – M” Credits.

- 2.3.7. Further, no other waiver except the Courses prescribed for the 1<sup>st</sup> 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.

#### **2.4. Transfer of student(s) from another recognized University to the 2<sup>nd</sup> year (3<sup>rd</sup> Semester) of the B. Tech. Program of the University**

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

- 2.4.1. The student concerned fulfils the criteria specified in Sub-Clauses 2.3.1, 2.3.2 and 2.3.3.
- 2.4.2. The student shall submit the Application for Transfer along with a non-refundable 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 2<sup>nd</sup> Year (3<sup>rd</sup> Semester) of the B. Tech. Program commencing on August 1 on the year concerned.
- 2.4.3. The student shall submit copies of the respective Marks Cards/Grade Sheets/Certificates along with the Application for Transfer.
- 2.4.4. The transfer may be provided on the condition that the Courses and Credits completed by the concerned student in the 1<sup>st</sup> Year of the B. Tech./B. E./B. S., four-year Degree Program from the concerned University, are declared equivalent and acceptable by a Committee constituted by the Vice Chancellor for this purpose. Further, the Committee may also prescribe the Courses and Credits the concerned students shall have to mandatorily complete, if admitted to the 2<sup>nd</sup> Year of the B. Tech. Program of the University.
- 2.4.5. The Branch/Discipline allotted to the student concerned shall be the decision of the University and binding on the student.

#### **2.5. Change of Branch/Discipline**



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 the 1<sup>st</sup> 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.

- 2.5.1. Normally, only those students, who have passed all the Courses prescribed for the 1<sup>st</sup> Year of the B.Tech Program and obtained a CGPA of not less than 6.00 at the end of the 2<sup>nd</sup> Semester, shall be eligible for consideration for a change of Branch.
- 2.5.2. Change of Branch, if provided, shall be made effective from the commencement of the 3<sup>rd</sup> Semester of the B. Tech. Program. There shall be no provision for change of Branch thereafter under any circumstances whatsoever.
- 2.5.3. The student(s) 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.
- 2.5.4. 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.
- 2.5.5. The eligible student may be allowed a change in Branch, strictly in order of *inter se* merit, subject to the conditions given below:
  - 2.5.5.1. The actual number of students in the third 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; and,
  - 2.5.5.2. 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 Branch concerned.
- 2.5.6. The process of change of Branch shall be completed within the first five days of Registration for the 3<sup>rd</sup> Semester of the B. Tech. Program.

## 2.6. Professional Practice Courses

Professional Practice Courses (Professional Practice-I and Professional Practice-II) are practice based Courses with the objective to equip students with the skills of problem identification, root cause analysis and 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 Professional Practice Courses shall be prescribed and approved by the concerned Departmental Academic Committee (refer Annexure A of the Academic Regulations, 2019). The same shall be prescribed in the Course Handout.

## 2.7. Professional Practice-I

  
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Professional Practice–I is a 5-Credit Course. This first level practice-based course is conducted after the 4<sup>th</sup> Semester of the B. Tech. Program, during the summer break (usually June-July), in accordance with the following options and guidelines:

**2.7.1. Internship Program in an Industry/Company:**

A student may undergo an Internship Program for a period of 6–8 weeks in an Industry/Company, subject to the following conditions.

2.7.1.1. The Internship Program shall be conducted in accordance with the Internship Policy prescribed by the University from time to time.

2.7.1.2. 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 for award of the Internship to a student.

2.7.1.3. 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 providing the Internship, as stated in Sub-Clause 2.7.1.2 above.

2.7.1.4. A student may opt for an Internship in an Industry/Company 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 offering such Internship confirms to the University that the Internship program shall be conducted in accordance with the Program Regulations and Internship Policy of the University.

2.7.1.5. A student selected for an Internship in an Industry/Company shall adhere to all the rules and guidelines prescribed in the Internship Policy of the University.

**2.7.2. Project Work:**

A student may opt to do a Project Work in an Industry/Company/Research Laboratory or the University Department(s) subject to the following conditions:

2.7.2.1. The Project Work shall be approved by the concerned HOD and be carried out under the guidance of a faculty member.

2.7.2.2. The student may do the project work in an Industry/Company/Research Laboratory of her/his choice subject to the above mentioned condition (Sub-Clause 2.7.2.1). Provided further, that the Industry/Company/Research Laboratory 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.

**2.8. Professional Practice–II**



Professional Practice-II is an intensive practice based course with 15 Credits offered during the final (4<sup>th</sup>) year of the B. Tech. Program. Students may register for Professional Practice-II in the 8<sup>th</sup> Semester of the B. Tech. Program, in accordance with the following guidelines:

### **2.8.1. Internship Program in an Industry/Company:**

A student may undergo an Internship Program for a period of about 15 weeks in an Industry/Company, subject to the following conditions:

2.8.1.1. The Internship Program shall be conducted in accordance with the Internship Policy prescribed by the University from time to time.

2.8.1.2. The selection criteria (minimum CGPA, pass in all Courses as on date, any other qualifying criteria) as applicable/stipulated by the concerned Industry/Company for award of Internship to a student.

2.8.1.3. The number of Internships available for the concerned Academic Term: further, the available number of Internships will 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 providing the Internship, as stated in Sub-Clause 2.8.1.2 above.

2.8.1.4. A student may opt for Internship in an Industry/Company 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 offering such Internship confirms to the University that the Internship program shall be conducted in accordance with the Program Regulations and Internship Policy of the University.

2.8.1.5. A student selected/awarded an Internship Program in an Industry/Company shall adhere to all the rules and guidelines prescribed in the Internship Policy of the University.

### **2.8.2. Project Work with a Dissertation:**

A student may do an extensive Project Work (with a Dissertation) in an Industry/Company/Research Laboratory or the University Department(s), subject to the following conditions:

2.8.2.1. The Project Work shall be approved by the concerned HOD and be carried out under the guidance of a faculty member.

2.8.2.2. The student may do the Project Work in an Industry/Company/Research Laboratory of her/his choice subject to the above mentioned condition (Sub-Clause 2.8.2.1). Provided further, that the Industry/Company/Research Laboratory 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.

## 2.9. Social Immersion Courses

The objective of a Social Immersion Course (SIC) is to sensitize and inculcate commitment to social and environmental issues and make a contribution through service and experiential learning. The outcome is to produce graduates who are sensitized and committed to serving the social and environmental needs of society.

The SIC is a 1-Credit Course coordinated by the Parent Department or a group of Departments and the student is required to complete this course ideally during any of the Semesters of the 2<sup>nd</sup> or 3<sup>rd</sup> Year of the B. Tech. Program. The nature and details of the SIC shall be approved by the concerned Departmental Academic Committee (DAC). As per the Academic Regulations, the 'S' grade is awarded for "satisfactory completion" of the Course and the 'NC' grade is awarded for "non-completion" of the Course. The student who receives the 'NC' grade shall repeat the SIC (it may be another type of SIC as approved by the concerned DAC) until the concerned student secures the 'S' grade in the SIC. The 'S' and 'NC' grades do not carry grade points and, hence, are not included in the SGPA, CGPA computations.

## 2.10. Open Electives

Open Electives are Courses offered by any Department/School of the University. The primary objective of offering Open Electives is to provide interdisciplinary/transdisciplinary learning experiences. The outcome is a graduate with a fair exposure to disciplines beyond the chosen Branch in the B. Tech. Program.

Open Electives offered by any Department/School of the University are listed in the Course Structure under the Open Elective category and offered to students of any Department including the parent Department/School.

The Course details and method of evaluation shall be clearly prescribed in the concerned Course Handout.

## 2.11. Specific Regulations regarding Assessment and Evaluation

(Refer Sections 8.5 to 8.8 in the Academic Regulations, 2019)

The components of continuous assessments, weightage for each component and the method of evaluation shall be assigned considering the nature of the Courses in terms of the pedagogy and outcomes.


- 2.11.1. Normally, for the Courses that have only the Lecture and Tutorial or Lecture Credit Structure (L-T-0 or L-0-0), with no Practical component, the components of Continuous Assessment and the distribution of weightage among the components of Continuous Assessment and duration of the examination/assessment shall be as detailed in Table 2.11.1 below:

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<b>Table 2.11.1 Method of Assessment for Courses with Credit Structures L–T–0 and L–0–0</b>			
<b>S. No.</b>	<b>Components of Continuous Assessment</b>	<b>Weightage (% of Total Marks)</b>	<b>Duration of Assessment</b>
1	Mid-term Examination	30%	1.5 hours
2	Continuous Assessment : This component of Continuous Assessment shall consist of at least two (02) of the following: (1) Assignment(s), (2) Quiz, (3) Technical Seminar/Report, (4) Attendance/Class participation, (5) Assessment on the self-learning topic(s), or, (6) Any other type of assessment as prescribed in the concerned Course Handout.	20%	NA
3	End Term Final Examination	50%	3 hours
<b>Total</b>		<b>100%</b>	
<p><b>Note:</b></p> <p>(i) An additional Test 3 may be conducted as an optional test to allow for improvement with approval of the Dean, School of Engineering. If a Test 3 is provided, then the higher marks obtained in any two tests shall be considered for evaluation.</p> <p>(ii) Normally, the End Term Final Examination shall cover the entire course coverage as prescribed in the Course Handouts.</p>			

2.11.2. Normally, for Laboratory/Practice Based Courses with a Credit Structure of (0–0–P) or (L–0–P) the components of Continuous Assessment and the distribution of weightage among the components of Continuous Assessment and duration of the examination/assessment shall be as detailed in Table 2.11.2 that follows.

<b>Table 2.11.2 Method of Assessment for Practical Courses with Credit Structures 0–0–P and L–0–P</b>	
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S. No.	Components of Continuous Assessments	Weightage (% of Total Marks)	Duration of Assessment
1	Mid Term Examination: Laboratory Work/Practical exercises, conducted in every Laboratory/Practice session/activity, including Laboratory records, practice/project reports, attendance/class participation as applicable, and as prescribed by the Course Handout.	30%	NA
2	Continuous Assessment : Practical Test/Viva-Voce/Quiz/Practice Assignments/Presentations and other assessments as prescribed in the Course Handout.	20%	NA
3	End Term Practical Examination: Practical Experiment/Practice Test(s) with Viva-Voce, Jury or any other type of assessment as prescribed in the Course Handout.	50%	2 or 3 hours
<b>Total</b>		<b>100%</b>	

2.11.3. Normally, for Practice/Skill based Courses, without a defined credit structure (L–T–P) but with assigned Credits (as defined in Clause 5.2 of the Academic Regulations, 2019), 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 prescribed in the concerned Course Handout. There shall be no component of End Term Final Examinations for such Courses.

2.11.4. In case any exception is required for a particular Course, where the methods of assessment prescribed in the specific regulations mentioned above in Sub-Clauses 2.11.1, 2.11.2 and 2.11.3 are not suitable/relevant for assessing the performance in the concerned Course, the DAC shall recommend the appropriate method of assessment for approval by the BOS.

  
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## 2.12. Course Handout

The Course Handout (Refer Clause 6.2 of the Academic Regulations, 2019) is a comprehensive document describing the Objectives/Outcomes of the Course, the detailed syllabus (with the prescribed Textbook(s) and Reference Material), the Lesson/Session-wise Plan, and all the relevant and necessary details regarding the pedagogy, expectation from the students regarding preparation, participation and self-learning, components of continuous assessment and respective weightage (in percentage (%)) of the total marks of all components of assessment) given to the components, and the method of evaluation. The guidelines for preparation of the Course Handout, its approval and delivery are listed in the following Sub-Clauses:

- 2.12.1. The Course Handout will be prepared as per the Outcome Based Education Guidelines of the University.
- 2.12.2. Normally, the Course Handout is prepared by the Course Instructor(s) assigned to teach the Course. In cases of multiple sections of students registered for the same Course, an Instructor In-Charge, assigned by the DAC, shall prepare the Course Handout in consultation with the other Course Instructors assigned to the concerned Course.
- 2.12.3. The DAC shall examine each Course Handout and arrange for necessary deliberations as required. On acceptance of the completeness and quality of the Course Handout, the DAC shall approve the Course Handout.
- 2.12.4. A consolidated printed/soft copy of the Booklet of all Course Handouts corresponding to the concerned Semester of a particular Program of Study shall be provided to every student concerned on the first day/Registration day of the concerned Semester.
- 2.12.5. The Course Handout Booklet is a very important guide for the students registered in the concerned course. The students are expected to use the Course Handout Booklet to prepare regularly and benefit from each session (Lecture/Tutorial/Practical) of the Course(s) and perform well in the Continuous Assessments and End Term Final Examinations, as applicable. Every student shall read and adhere to all the guidelines prescribed in the Course Handout Booklet.

## 2.13. Rules and Guidelines for Transfer of Credits from Massive Open Online Courses

(Refer Section 18.0 of the Academic Regulations, 2019.)

The provisions and rules pertaining to the transfer of credits through Massive Open Online Courses are outlined in Section 18.0 of the Academic Regulations, 2019.

With reference to Clause 18.2 of the Academic Regulations, the rules and guidelines for transfer of credits specifically from Study Webs of Active-Learning for Young Aspiring Minds-National Program on Technology Enhanced Learning (SWAYAM-NPTEL) are as stated in the following Sub-Clauses:

- 2.13.1. A student may complete SWAYAM-NPTEL courses 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 and/or the mandatory credit requirements of Management Sciences Courses as prescribed in the concerned B. Tech. Program Regulations and Curriculum. However, it is the sole responsibility of the student to complete the mandatory credit requirements of the Discipline Elective Courses, the Open Elective Courses and the Management Sciences Courses as prescribed by the Program Regulations and Curriculum of the concerned B. Tech. Program.

- 2.13.2. Approved SWAYAM-NPTEL Courses shall be included as annexes to the Program Regulations and Curriculum for the concerned B. Tech. Program and shall be announced through University Notifications to the students from time to time. A student shall only request for transfer of credits from such approved/notified SWAYAM-NPTEL Courses as published by the concerned Departments.
- 2.13.3. SWAYAM-NPTEL Courses are considered for transfer of credits only if the concerned student has successfully completed the SWAYAM-NPTEL Course(s) and obtained the SWAYAM-NPTEL Certificate to this effect.
- 2.13.4. A student cannot transfer credits from SWAYAM-NPTEL Courses to earn the mandatory credits assigned for any other type of Courses (other than Discipline, Open Elective Courses and Management Sciences Courses) as prescribed in the concerned Program Regulations and Curriculum. However, a student may complete SWAYAM-NPTEL Courses and transfer equivalent credits in excess of the required mandatory Credits (and Courses). In the case of such transfers beyond the mandatory Credits the transferred Credits will be included in the calculations of SGPA and CGPA.
- 2.13.5. Before the commencement of each Semester or during Pre-Registration schedule as per the Academic Calendar, Parent Departments may release a list of SWAYAM-NPTEL courses approved as Discipline Elective courses for each B. Tech. Program offered by them. In addition, Departments may also release a list of Open Elective courses offered for all B. Tech. Programs.
- 2.13.6. Students may Pre-Register for the approved SWAYAM-NPTEL Courses in the respective Departments and register for the SWAYAM-NPTEL Courses as per the schedule announced by SWAYAM-NPTEL.
- 2.13.7. The credit equivalence of the SWAYAM-NPTEL Courses are based on course durations and/or as recommended by SWAYAM-NPTEL. The Credit Equivalence mapped to SWAYAM-NPTEL course durations for transfer of credits is summarized in Table 2.13.1 below.

  
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<b>Table 2.13.1 SWAYAM-NPTEL Course Durations and Credit Equivalence</b>		
<b>S. No.</b>	<b>Course Duration</b>	<b>Credit Equivalence for Transfer of Credits</b>
1	4 Weeks	1 Credit
2	8 Weeks	2 Credits
3	12 Weeks	3 Credits

2.13.8. A student who has successfully completed the approved SWAYAM-NPTEL Course(s) and wants to avail the provision of transfer of equivalent credits to fulfil (partially or fully) the mandatory credit requirements of the Discipline Electives and/or Open Electives and/or Management Sciences Courses as prescribed in the concerned Program Regulations and Curriculum, must submit the original SWAYAM-NPTEL Course Certificates to the Head of the Parent Department concerned, with a written request for the transfer of the equivalent credits. On verification of the SWAYAM-NPTEL Course Certificates and approval by the Head of the Department concerned, the SWAYAM-NPTEL Course(s) and equivalent Credits will be included in Course (with associated Credits) Registration of the concerned student in the Semester immediately following the completion of the SWAYAM-NPTEL Course(s).

2.13.9. The grading system for such SWAYAM-NPTEL Courses with transfer of credits is specified in Table 2.13.2 below.

<b>Table 2.13.2 Grading System for SWAYAM-NPTEL Courses</b>		
<b>S. No.</b>	<b>Final Score on the SWAYAM-NPTEL Certificate</b>	<b>Grade Awarded</b>
1	90% and above	O
2	From 80% to 89%	A+
3	From 70% to 79%	A
4	From 60% to 69%	B+
5	From 50% to 59%	B
6	From 40% to 49%	C

2.13.10. A student may submit a request for credit transfer from SWAYAM-NPTEL Courses before the last instruction day of the seventh (7<sup>th</sup>) Semester of the B.



Tech. program as specified in the Academic Calendar. Requests for credit transfers shall not be permissible in the eighth (8<sup>th</sup>) semester.

2.13.11. The maximum permissible number of credits that a student may request for transfer in a Semester is ten (10) credits.

2.13.12. The University shall not reimburse any fees/expense, a student may incur for the SWAYAM-NPTEL Courses.

  
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### 3 PART B: PROGRAM CURRICULUM

#### **BACHELOR OF TECHNOLOGY DEGREE PROGRAM IN COMPUTER SCIENCE AND ENGINEERING B.TECH (COMPUTER SCIENCE AND ENGINEERING (Cyber Security)) 2020-2024**

B.Tech in Computer Science and Engineering (Cyber Security) is a program that is offered by the Department of CSE, SOE. The faculty work with motivation and dedication to impart the best knowledge to the budding thoughts admitted in our department. A wide range of courses is offered to students to help them in the understanding of the various intricacies involved in computing. The courses are designed in a way to invoke students' ability to think originally and creatively. The faculty members of CS department are trained to produce computer engineers with the ability to design and develop systems involving the integration of software and hardware devices. The department is equipped with modern computer labs with well-trained lab assistants to empower students with a better understanding of the theory lecture sessions and to give them an exposure to practical problem solving.

The program will also prepare students for postgraduate studies and helps in cracking different national and international aptitude tests for getting admission to IITs, NITs as well as different top ranked Universities in countries like USA, Australia, Singapore and Europe. The students are encouraged to take online courses, from SWAYAM, NPTEL at national level and MOOCs from Harvard, MIT, Microsoft and other top universities and institutions across the World. The program also includes value added courses like SIC and NSS activities that help the students to build moral and ethical standards and also to inherit qualities such as integrity, transparency, respect, professionalism and teamwork.

The Program Educational Objectives, Program Outcomes, Program Specific Outcomes and Learning Objectives of the B.Tech. Program in Computer Science and Engineering (Cyber Security) at Presidency University are as follows.

#### **Program Educational Objectives (PEO)**

After the completion of B.Tech. Program in Computer Science and Engineering (Cyber Security) from Presidency University, the graduates shall:

**PEO-1:** Demonstrate as a Computer Engineering Professional

**PEO-2:** Engage in lifelong learning through research and professional development.

**PEO-3:** Serve as a leader in the profession through consultancy, extension activities and/ or entrepreneurship.

#### **Program Outcomes (PO)**

Graduates of the B. Tech. Program in Computer Science and Engineering (Cyber Security) will acquire:

**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.

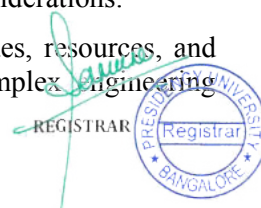
### **Program Specific Outcomes (PSO)**

At the end of the B. Tech. Program in Computer Science and Engineering (Cyber Security) the students shall:

**PSO-1: [Problem Analysis]:** Identify, formulate, research literature, and analyze complex engineering problems related to Cyber Security principles and practices, Programming and Computing technologies reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

**PSO-2: [Design/development of Solutions]:** Design solutions for complex engineering problems related to Cyber Security principles and practices, Programming and Computing technologies 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.

**PSO-3: [Modern Tool usage] :** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering



activities related to Cyber Security principles and practices, Programming and Computing technologies with an understanding of the limitations.

### Learning Outcome (LO)

**LO1:** To gain recognition as a Department of Excellence.

**LO2:** To provide opportunity to students to excel in curricular, extra-curricular and co-curricular activities.

**LO3:** To provide students an environment of innovation and train students to pursue research.

**LO4:** To equip students to face societal challenges.

## PROGRAM CURRICULUM


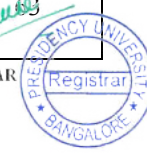
### 3.1.1 Mandatory Courses and Credits

The B. Tech (Computer Science and Engineering (Cyber Security)) Program structure (2020-2024) consists of a minimum of 61 Courses totaling 182 Credits.

Table 3.1.1 summarizes the type of Courses, number of Courses under each type and the associated Credits that are mandatorily required for the completion of the Degree.

**3.1.1.1** Students have an option of obtaining a specialization in any of the prescribed minors by earning 15 credits from the Course Basket listed under that particular minor within the Discipline Elective Courses.

<b>TABLE 3.1.1 Courses and Credits</b>			
<b>S. No.</b>	<b>TYPE OF COURSES</b>	<b>NO. OF COURSES</b>	<b>CREDITS</b>
1	Humanities (HS)	3	6
2	Management Sciences (MS)	2	6
3	Basic Sciences (BS)	8	24
4	Engineering Sciences (ES)	8	24
5	Core (Professional) Course (CC)	20	

  
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6	Discipline (Professional) Elective (DE)	10	30
7	Open Elective (OE)	3	9
8	Professional Practice (PP)	2	20
9	Personal and Professional Skills (PPS) (Compulsory to be audited.)	4	0
10	Social Immersion Course (SIC)	1	0
<b>TOTAL</b>		<b>Minimum of 61</b>	182
<b>The mandatory minimum Credits required for the award of the Degree is 182 Credits.</b>			

The Table 3.1.1 is indicative of various components such as Foundation Courses (Basic Sciences, Engineering Sciences, Humanities, Social Sciences and Management Sciences), Professional Core, Discipline and Open Elective Courses. The unique feature of this Program is Professional Practice - I of 6-8 weeks during the end of 4th Semester and before the commencement of 5th Semester for the student to have industry exposure. The Professional Practice - II will be during their 7th / 8th Semester for about 15 weeks. Social Immersion Course, which is mandatory, is introduced in the curriculum for the student to give value of social service such as community service, clean and green, NSS, Protection of environment and health hazards, etc.

Table 3.1.1 lists the mandatory Courses, type of Courses, number of type of Courses and the associated credits required for the completion of the B. Tech (Computer Science and Engineering (Cyber Security)) Program.

  
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3.1.2 B. Tech. (Computer Science and Engineering (Cyber Security)) Program Suggested Year Wise Structure

First Year		Summer Term	Second Year		Summer Term/PP-I	Third Year		Summer Term	Fourth Year	
Physics Cycle Sem. 1/2	Chemistry Cycle Sem. 1/2		Sem.3	Sem 4		Sem 5	Sem 6		Sem 7	Sem 8
BS-3	BS-4	Summer Term	MAT - BS- 1	Mat - BS 1	Summer Term/PP-I	DE -1 MS-1 PP-1  Core-6	DE -2 MS-1 Core-5 SIC-1	Summer Term	DE-6 OE-1	PP-1
ES-4	ES-3		OE 1 PPS1 Core 4	DE 1 Core - 5 PPS-1						
HS-2	HS-1									
PPS-1	PPS-1									

Mandatory Minimum Credits required for the award of the B.Tech (Computer Science and Engineering (Cyber Security)) Degree: 182

**Nomenclature:**

- BS - Basic Sciences
- ES - Engineering Sciences
- HS - Humanités
- MS - Management Sciences
- CC - Core Course
- DE - Discipline/Professional Electives
- OE - Open Electives
- PP-I/PP-II - Professional Practice
- PPS - Personal and Professional Skills
- SIC - Social Immersion Course

In the entire Program, the practical and skill based Course component contribute to an extent of approximately 30% out of the total credits of 182 for B. Tech (Computer Science and Engineering (Cyber Security)) Program of four years duration.



### 3.2 SUGGESTED PROGRAM STRUCTURE

I SEM - PHYSICS CYCLE (Aug-Dec)*									
S. NO	COURSE CODE	COURSE NAME	CREDIT STRUCTURE				CONTACT HOURS	TYPE OF SKILL	COURSE ADDRESSES TO
			L	T	P	CREDITS			
1	MAT105	Calculus and Linear Algebra	3	1	0	4	4	F <sup>1</sup>	-
2	PHY101	Engineering Physics	4	0	0	4	4	F	-
3	EEE101	Elements of Electrical Engineering	3	0	0	3	3	P <sup>2</sup>	-
4	CIV101	Elements of Civil Engineering	3	0	0	3	3	P	Env <sup>4</sup>
5	MEC152	Engineering Graphics	2	0	4	4	6	P	-
6	ENG103	Technical Written Communication	2	1	0	3	3	F/E <sup>3</sup>	-
7	KAN101	Kannada Kali	1	0	0	1	1	F	-
8	PHY151	Engineering Physics Lab	0	0	2	1	2	F	-
9	MEC151	Workshop Practice	0	0	2	1	2	P	-
10	PPS105	Building Self Confidence	0	0	2	0	2	E	-
		<b>TOTAL</b>	<b>18</b>	<b>2</b>	<b>8</b>	<b>24</b>	<b>30</b>		
<sup>1</sup> Foundation Course <sup>2</sup> Professional Skills					<sup>3</sup> Employability Skills <sup>4</sup> Environmental Issues				



  
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I SEM - CHEMISTRY CYCLE (Aug-Dec)#									
S. NO.	COURSE CODE	COURSE NAME	CREDIT STRUCTURE				CONTACT HOURS	TYPE OF SKILL	COURSE ADDRESSES TO
			L	T	P	CREDITS			
1	MAT105	Calculus and Linear Algebra	3	1	0	4	4	F	-
2	CHE101	Engineering Chemistry	4	0	0	4	4	F	-
3	ECE101	Elements of Electronics Engineering	3	0	0	3	3	P	-
4	MEC101	Elements of Mechanical Engineering	3	0	0	3	3	P	-
5	CIV102	Environmental Science and Disaster Management	3	0	0	3	3	F	Env
6	ENG104	Technical Spoken Communication	1	0	2	2	3	E	-
7	CSE151	Computer Programming	2	0	4	4	6	E	-
8	CHE151	Engineering Chemistry Lab	0	0	2	1	2	F	-
9	PPS105	Building Self Confidence	0	0	2	0	2	F	PE <sup>5</sup> /S <sup>6</sup>
		<b>TOTAL</b>	<b>19</b>	<b>1</b>	<b>8</b>	<b>24</b>	<b>30</b>		

<sup>5</sup> Professional Ethics

<sup>6</sup> Sustainability Issues

II SEM - CHEMISTRY CYCLE (Jan-May)#									
S. NO.	COURSE CODE	COURSE NAME	CREDIT STRUCTURE				CONTACT HOURS	TYPE OF SKILL	COURSE ADDRESSES TO
			L	T	P	CREDITS			
1	MAT106	Calculus, Differential Equations and Complex Variables	3	1	0	4	4	F	-
2	CHE101	Engineering Chemistry	4	0	0	4	4	F	-
3	ECE101	Elements of Electronics Engineering	3	0	0	3	3	P	-
4	MEC101	Elements of Mechanical Engineering	3	0	0	3	3	P	-

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5	CIV102	Environmental Science and Disaster Management	3	0	0	3	3	F	Env
6	ENG104	Technical Spoken Communication	1	0	2	2	3	E	-
7	CSE151	Computer Programming	2	0	4	4	6	E	-
8	CHE151	Engineering Chemistry Lab	0	0	2	1	2	F	-
9	PPS106	Effective Communication	0	0	2	0	2	E	-
		<b>TOTAL</b>	<b>19</b>	<b>1</b>	<b>8</b>	<b>24</b>	<b>30</b>		

II SEM - PHYSICS CYCLE (Jan-May) *									
S. NO.	COURSE CODE	COURSE NAME	CREDIT STRUCTURE				CONTACT HOURS	TYPE OF SKILL	COURSE ADDRESSES TO
			L	T	P	CREDITS			
1	MAT106	Calculus, Differential Equations and Complex Variables	3	1	0	4	4	F <sup>1</sup>	-
2	PHY101	Engineering Physics	4	0	0	4	4	F	-
3	EEE101	Elements of Electrical Engineering	3	0	0	3	3	P <sup>2</sup>	-
4	CIV101	Elements of Civil Engineering	3	0	0	3	3	P	Env
5	MEC152	Engineering Graphics	2	0	4	4	6	P	-
6	ENG103	Technical Written Communication	2	1	0	3	3	F/E <sup>3</sup>	-
7	KAN101	Kannada Kali	1	0	0	1	1	F	-
8	PHY151	Engineering Physics Lab	0	0	2	1	2	F	-
9	MEC151	Workshop Practice	0	0	2	1	2	P	-
10	PPS106	Effective Communication	0	0	2	0	2	E	-
		<b>TOTAL</b>	<b>18</b>	<b>2</b>	<b>8</b>	<b>24</b>	<b>30</b>		

Note: At the end of the 1<sup>st</sup> year (Common to all B. Tech. Programs) the total credits offered is 48.



The 1<sup>st</sup> year B.Tech Program structure is executed in two cycles.



\* The students undergoing the “Physics” cycle shall take the Courses as indicated.

# The students undergoing “Chemistry” cycle shall take the Courses as indicated

  
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III SEMESTER								
S.No.	COURSE CODE	COURSE NAME	CREDIT STRUCTURE				CONTACT HOURS	TYPE OF SKILL
			L	T	P	C		
1	MAT2001	Transform Techniques and Partial Differential equation	3	0	0	3	3	F
2	CSE2006	Data Structures	3	0	2	4	5	F/EM/EN
3	CSE2009	Computer Organization and Architecture	3	0	0	3	3	S/EM
4	CSE2017	Graph Theory and Combinatorics	3	0	0	3	3	F
5	XXXXXX	Open Elective – I	3	0	0	3	3	P/E
6	PPS107	Design Thinking and Team Building	0	0	2	0	2	E
7	CSE2008	Programming in Java	1	0	4	3	5	S/EM
8	CSEXXXX	Discipline Elective – I	3	0	0	3	3	P/E
		<b>TOTAL</b>	<b>19</b>	<b>0</b>	<b>8</b>	<b>22</b>	<b>27</b>	

IV SEMESTER								
S.No.	COURSE CODE	COURSE NAME	CREDIT STRUCTURE				CONTACT HOURS	TYPE OF SKILL
			L	T	P	C		
1	MAT2002	Numerical Methods, Probability and Sampling Techniques	3	0	0	3	3	F
2	CSE2007	Design and Analysis of Algorithms	2	0	2	3	4	S
3	ECE2002	Digital Electronics	3	0	2	4	5	S
4	CSE2010	Operating Systems	3	0	0	3	3	S
5	CSE2012	Database Management Systems	2	0	4	4	6	S
6	CSE2016	Discrete Mathematical Structures	3	0	0	3	3	S
7	XXXXXXXX	Open Elective – II	3	0	0	3	3	P/E
8	PPS108	Being Corporate Ready	0	0	2	0	2	E
		<b>TOTAL</b>	<b>19</b>	<b>0</b>	<b>10</b>	<b>23</b>	<b>29</b>	

  
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V SEMESTER								
S.No.	COURSE CODE	COURSE NAME	CREDIT STRUCTURE				CONTACT HOURS	TYPE OF SKILL
			L	T	P	C		
1	CSE2011	Data Communications and Networking	3	0	0	3	3	S
2	CSE2037	Cyber Forensics	2	0	2	3	4	S
3	CSE2014	Software Engineering	3	0	0	3	3	S
4	CSE2018	Theory of Computation	3	0	0	3	3	S
5	MGT112/MGT 113	Engineering Economics/Digital Entrepreneurship	3	0	0	3	3	S/EM
6	CSE3001	Artificial Intelligence and Machine Learning	2	0	2	3	4	S
7	CSE2039	Ethical Hacking	2	0	2	3	4	S
8	CSEXXXX	Discipline Elective – II	3	0	0	3	3	S/EM
9	PIP 101	Professional Practice - I **	-	-	-	5	-	P/E
TOTAL			20	0	6	29	27	

VI SEMESTER								
S.No.	COURSE CODE	COURSE NAME	CREDIT STRUCTURE				CONTACT HOURS	TYPE OF SKILL
			L	T	P	C		
1	CSE3097	Web Security	2	0	2	3	4	s
2	CSE2067	Web Technologies	2	0	2	3	4	S
3	CSE2013	Cloud Computing	3	0	0	3	3	S
4	CSE2040	Cyber Threats for IoT and Cloud	3	0	0	3	3	s
5	CSE3145	Intrusion Detection and Prevention System	3	0	0	3	3	

  
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6	MGT112/MGT113	Engineering Economics/Digital Entrepreneurship	3	0	0	3	3	S/EM
7	CSEXXXX	Discipline Elective-III	3	0	0	3	3	S/EM/EN
8	CSEXXXX	Discipline Elective-IV	3	0	0	3	3	S/EM
9	SIC501	Social Immersion Course	-	-	-	0	-	P
<b>TOTAL</b>			<b>22</b>	<b>0</b>	<b>4</b>	<b>24</b>	<b>26</b>	

<b>VII SEMESTER</b>								
Sl. No.	COURSE CODE	COURSE NAME	CREDIT STRUCTURE				CONTACT HOURS	TYPE OF SKILL
			L	T	P	C		
1	CSEXXXX	Discipline Elective – V	3	0	0	3	3	S/EM
2	CSEXXXX	Discipline Elective – VI	3	0	0	3	3	S/EM
3	CSEXXXX	Discipline Elective - VII	3	0	0	3	3	S/EM
4	XXXXXX	Open Elective – III	3	0	0	3	3	
5	PIP104	Professional Practice - II	-	-	-	10	-	
6	XXXXXX	Open Elective – IV	0	0	2	1	2	
7	XXXXXX	Open Elective – V	0	0	2	1	2	
8	XXXXXX	Open Elective – VI	0	0	6	3	6	
<b>TOTAL</b>			<b>12</b>	<b>0</b>	<b>10</b>	<b>27</b>	<b>22</b>	

<b>VIII SEMESTER</b>								
Sl. No.	COURSE CODE	COURSE NAME	CREDIT STRUCTURE				CONTACT HOURS	TYPE OF SKILL
			L	T	P	C		
1	CSEXXXX	Discipline Elective – VIII	3	0	0	3	3	S/EM
2	CSEXXXX	Discipline Elective – IX	3	0	0	3	3	S/EM

  
 REGISTRAR  

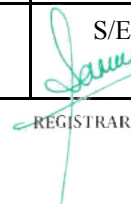




3	CSEXXX	Discipline Elective – X	3	0	0	3	3	S/EM
<b>TOTAL</b>			<b>9</b>	<b>0</b>	<b>0</b>	<b>9</b>	<b>9</b>	

Proposal for Continuation of PIP102 for Students who have gone abroad under various MOUs								
S.No	Course Code	Course Name	L	T	P	Credits	TYPE OF SKILL	
1.	PIP102	Professional Practice - II	-	-	-	15	EN	

TABLE — 3.2.1								
LIST OF MANAGEMENT SCIENCES COURSES								
S.NO	COURSE CODE	COURSE NAME	L	T	P	C	CONTACT HOURS	TYPE OF SKILL
1	MGT112	Engineering Economics	3	0	0	3	3	S
2	MGT113	Digital Entrepreneurship	3	0	0	3	3	S/EM/EN

Table 3.2.2								
DISCIPLINE ELECTIVE								
S.NO	COURSE CODE	COURSE NAME	L	T	P	C	CONTACT HOURS	TYPE OF SKILL
1	CSE2027	Fundamentals of Data Analysis	3	0	0	3	3	S/EM
2	CSE3082	Object Oriented Analysis and Design	3	0	0	3	3	S/EM
3	CSE2021	Data Mining	3	0	0	3	3	S/EM
4	CSE3073	Game Design and Development	3	0	0	3	3	S/EM
5	CSE3086	Information Theory and Coding	3	0	0	3	3	S/EM

  
 REGISTRAR  


6	CSE3146	Advanced Java Programming	1	0	4	3	5	S/EM
7	CSE2036	Programming in C++	1	0	4	3	5	S/EM
8	CSE3068	Advanced Database Management Systems	2	0	2	3	4	S
9	CSE3069	Introduction to Bioinformatics	3	0	0	3	3	F
10	CSE3070	Advanced Computer Networks	3	0	0	3	3	S/ EM
11	CSE3071	Computer Vision	2	0	2	3	3	F
12	CSE3072	Wireless Sensor Networks	3	0	0	3	3	S/EM
13	CSE3073	Game Design and Development	3	0	0	3	3	S
14	CSE3074	Microprocessors and Microcontrollers	3	0	0	3	3	S/EM
15	CSE3075	Mobile Application Development	1	0	4	3	5	S/EM/EN
16	CSE3077	Compiler Design	2	0	2	3	4	S/EM/EN
17	CSE3150	Front End Full Stack Development	2	0	2	3	4	EM
18	CSE3151	Java Full Stack Development	2	0	2	3	4	EM
19	CSE3152	.Net Full Stack Development	2	0	2	3	4	EM
20	CSE2033	Go Programming	3	0	0	3	3	S/EM
21	CSE2039	Ethical Hacking	2	0	2	3	4	S/EM
22	CSE2024	NO SQL Databases	2	0	2	3	4	S/EM
23	CSE3050	Software Project Management	3	0	0	3	3	S/EM
24	CSE3022	Cryptocurrency Technology	2	0	2	3	4	S/EM
25	CSE3075	Mobile Application Development	1	0	4	3	5	S/EM
26	CSE2037	Cyber Forensics	2	0	2	3	4	S/EM
27	CSE3046	Dev Ops Tools Internals	2	0	2	3	4	S/EM

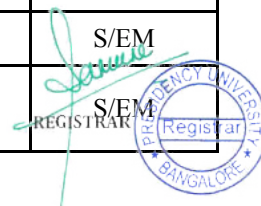

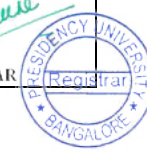


Table 3.2.3								
OPEN ELECTIVES OFFERED								
S.NO	COURSE CODE	COURSE NAME	L	T	P	C	CONTACT HOURS	TYPE OF SKILL
1	ECE1004	Microprocessor based Systems	3		0	3	3	
2	CIV 1001	Disaster Management & Mitigation (DM&M)	3		0	3	3	
3	CIV 2002	Occupational Health & Safety (OH&S)	3		0	3	3	
4	CIV 2001	Sustainability Concepts in Engineering (SCE)	3		0	3	3	
5	CIV 2004	Integrated Project Management ( <b>IPM</b> )	3		0	3	3	
6	CIV 383	Infrastructure Systems for Smart Cities (ISSC)	3		0	3	3	
7	PET 2025	Oil and Gas Quality Management (O&GQM)	3		0	3	3	
8	PET 2028	Petroleum Economics (PE)	3		0	3	3	
9	PET 2023	Petroleum Corrosion Technology (PCT)	3		0	3	3	
10	PET 2026	Health, Safety and Environment (HS&E)	3		0	3	3	
11	EEE 1003	Basic Circuit Analysis using NI LAB view (BCA-NI LAB)	3		0	3	3	
12	EEE 1004	Automation and Control in Industries using PLC Programming ( <b>A&amp;CI-PLC</b> )	3		0	3	3	
13	CHE1011	Chemical and Petrochemical catalysts (C&PC)	3		0	3	3	

  
 REGISTRAR  


14	CHE1009	3D printing with polymer (3DPP)	3		0	3	3	
15	CHE1015	Waste to fuel (WTF)	3		0	3	3	
16	CHE1008	Energy and Sustainability (E&S)	3		0	3	3	
17	MEC1001	Fundamentals of Automobile Engineering (FAUE)	3		0	3	3	
18	MEC1002	Introduction to Matlab and Simulink (IM&S)	3		0	3	3	
19	MEC1003	Engineering Drawing (ED)	3		0	3	3	
20	MEC2001	Renewable Energy Systems (RES)	3		0	3	3	
21	MEC2002	Operations Research & Management (OR&M)	3		0	3	3	
22	MEC2003	Supply Chain Management (SCM)	3		0	3	3	
24	MEC2004	Six Sigma for Professionals (SSP)	3		0	3	3	
25	MEC2005	Fundamentals of Aerospace Engineering (FAE)	3		0	3	3	
26	MEC2006	Safety Engineering (SE)	3		0	3	3	
27	MEC2007	Additive Manufacturing (AM)	3		0	3	3	
28	MEC3001	Electric Vehicles & Battery Technology (EV&BT)	3		0	3	3	
29	MEC3069	Engineering Optimization (EO)	3		0	3	3	
30	MEC3070	Electronics Waste Management (EWM)	3		0	3	3	
31	MEC3071	Hybrid Electric Vehicle Design (HEVD)	3		0	3	3	

  
 REGISTRAR  


32	MEC3072	Thermal Management of Electronic Appliances (TMEA)	3		0	3	3	
33	CIV 280	Environmental Impact Assessment (EIA)	3		0	3	3	
34	CIV 2044	Geospatial Applications for Engineers (GAE)	3		0	3	3	
35	CIV 382	Systems Design for Environment and Sustainability (SDES)	3		0	3	3	
36	CIV 383	Infrastructure Systems for Smart Cities (ISSC)	3		0	3	3	
37	CIV 1001	Disaster Management & Mitigation (DM&M)	3		0	3	3	
38	CIV 2004	Integrated Project Management (IPM)	3		0	3	3	
39	CIV 2002	Occupational Health & Safety (OH&S)	3		0	3	3	
40	PET 406	Polymer Technology (PT)	3		0	3	3	
41	PET 408	Oil and Gas Transportation and Marketing (O&GT&M)	3		0	3	3	
42	PET 409	Material Science and Engineering (MS&E)	3		0	3	3	
43	EEE 221	Energy Audit (EA)	3		0	3	3	
44	EEE 223	Smart Grid Technology (SGT)	3		0	3	3	
45	MEC 102	Automotive Vehicles (AV)	3		0	3	3	
46	MEC 103	Nanotechnology (NT)	3		0	3	3	
47	MEC 328	Engineering Optimization (EO)	3		0	3	3	
48	MEC 329	Operations Research for Engineers (ORE)	3		0	3	3	
49	MEC 104	Operations Management (OM)	3		0	3	3	

  
 REGISTRAR  


50	MEC 105	Work Study ( <b>WS</b> )	3		0	3	3	
51	MEC 106	Project Management (PM)	3		0	3	3	
52	MEC 107	Organizational Behaviour (OB)	3		0	3	3	
53	MEC 330	Renewable Energy Systems (RES)	3		0	3	3	
54	MEC 331	Design of Automatic Control Systems (DACs)	3		0	3	3	
55	ECE295	Artificial Neural Networks (ANN)	3		0	3	3	
56	ECE 297	IOT: Internet of Things (IOT)	3		0	3	3	
57	ECE 299	Computational Intelligence and Machine Learning (CI&ML)	3		0	3	3	
58	ENG1012	Gender and Society in India - (G&S)	3		0	3	3	
59	ENG1008	Indian Literature - (IL)	3		0	3	3	
60	ENG1013	Indian English Drama - (IED)	3		0	3	3	
61	CIV1001	Disaster mitigation and management - (DM&M)	3		0	3	3	
62	CIV1002	Environment Science and Disaster Management - (ESDM)	3		0	3	3	
63	CIV2001	Sustainability Concepts in Engineering - (SCE)	3		0	3	3	
64	CIV2002	Occupational Health and Safety - (OH&S)	3		0	3	3	
65	CIV2003	Sustainable Materials and Green Buildings - (SM&GB)	3		0	3	3	
66	CIV2005	Environmental Impact Assessment - (EIA)	3		0	3	3	

  
 REGISTRAR  


67	EEE1006	Smart Sensors for Engineering Applications - (SSEA)	3		0	3	3	
68	MEC 2005	Fundamentals of Aerospace Engineering - (FAE)	3		0	3	3	
69	MEC 1001	Fundamentals of Automobile Engineering - (FAUE)	3		0	3	3	
70	MEC 1003	Electronic Waste Management - (EWM)	3		0	3	3	
71	MEC 3070	Engineering Drawing - (ED)	3		0	3	3	
72	MEC 1005	Workshop Practice - (WSP)	3		0	3	3	
73	MEC2001	Renewable Energy Systems - (RES)	3		0	3	3	
74	CHE1013	Chemistry for engineers - (CFE)	3		0	3	3	
75	CHE1006	Introduction to Nano technology - (INT)	3		0	3	3	
76	CHE1004	Smart materials for IOT - (SMFI)	3		0	3	3	
77	CHE1014	Surface coatings technology and corrosion Science - (SCT&CS)	3		0	3	3	
78	CHE1010	Bioinformatics - (BI)	3		0	3	3	
79	CHE1008	Energy and sustainability - (E&S)	3		0	3	3	
80	COM2004	Introduction to Banking - (ItoB)	3		0	3	3	
81	COM2001	Introduction to Human Resource Management - (IHRM)	3		0	3	3	
82	PET1006	Overview of Energy Industry - (OEI)	3		0	3	3	
83	PET1005	Geology for Engineers - (GFE)	3		0	3	3	

  
 REGISTRAR  


84	ECE1004	Microprocessor Based Systems - (MBS)	3		0	3	3	
85	ECE1005	Fundamentals of Communication Systems - (FCS)	3		0	3	3	
86	MBA1004	Essentials of Leadership - (EL)	3		0	3	3	
87	DES2001	Design Thinking - (DT)	3		0	3	3	
88	DES1121	Introduction to UX Design - (IUXD)	3		0	3	3	
89	DES1122	Introduction to Jewellery Making - (IJM)	3		0	3	3	
90	DES1123	Introduction to packaging Design - (IPD)	3		0	3	3	
91	DES1124	Spatial Stories - (SS)	3		0	3	3	
92	DES1125	Wonder clay - (WC)	3		0	3	3	

### 3.3 COURSE DESCRIPTION AND SYLLABUS

<b>Course Name:</b>	<b>Calculus and Linear Algebra</b>					
<b>Course Code:</b>	<b>MAT 105</b>	<b>Credit Structure :</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
			<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>

**Course Description:** This course aims to introduce the idea of applying differential and integral calculus to notions of curvature and to improper integrals. Apart from some applications it gives a basic introduction on Beta and Gamma functions. Also introduces the fallouts of Rolle's Theorem that is fundamental to application of analysis to Engineering problems. Develops the tool of power series and Fourier series for learning advanced Engineering Mathematics. Familiarize the student with functions of several variables that is essential in most branches of engineering and develop the essential tool of matrices and linear algebra in a comprehensive manner.

Textbooks:

1. Erwin Kreyszig, "Advanced Engineering Mathematics", 9th Edition, John Wiley & Sons, 2006

Reference Books:





2. B. S. Grewal, ' *Higher Engineering Mathematics*', Khanna Publishers, 36th Edition 2010.
3. Cengage, Mathematics – I (Calculus & Linear Algebra), ITL Education Solutions Ltd., 2018.

  
REGISTRAR



<b>Course Name:</b>	<b>Engineering Physics</b>					
<b>Course Code:</b>	<b>PHY 101</b>	<b>Credit Structure :</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
			<b>4</b>	<b>0</b>	<b>0</b>	<b>4</b>

**Course Description:** The main objective of this course is to study the basic concepts of physics that helps developing the ability to identify, formulate and apply to engineering applications. This course covers the areas, namely, applied physics and modern physics. The course includes the concepts of free electron theory, electrical properties and applications of contemporary and useful materials such as semiconductors, superconductors and dielectric materials are discussed in detailed manner. It also emphasizes on modern concepts such as the concepts of lasers and its applications in the field of optical fiber communication system and other areas. Finally, the need of quantum mechanics, the quantum approach concepts like, matter waves, Heisenberg's uncertainty principle, Schrodinger's time independent equation and application of Schrodinger's wave equation are discussed.

**Textbooks:**

1. Wiley, *Engineering Physics*, 2014 Wiley India.

**Reference Books:**

1. G Aruldas, *Engineering Physics*, 2014 PHI Learning Pvt. Ltd, Delhi.
2. M.N Avadhanulu, P G Kshirsagar, *Engineering Physics*, 2010 S Chand & Co. Pvt. Ltd.
3. Md. N. Khan, S Panigrahi, *Principles of Engineering Physics 1 & 2*, 2014 Cambridge Univ. Press.
4. Serway Raymond and Jewett John, *Physics for Scientists and Engineers with Modern Physics*, 2003 Cengage.
5. Arthur and Beiser Concepts of Modern physics 2017 7<sup>th</sup> Edition McGraw Hill Education.



<b>Course Name:</b>	<b>Elements of Electrical Engineering</b>					
<b>Course Code:</b>	<b>EEE 101</b>	<b>Credit Structure :</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
			<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Description:** The course aims at nurturing the students with the significance of Electrical Engineering. The course provides exhaustive knowledge about the basic laws of electrical sciences, AC/DC circuit analysis, AC & DC machines. It also includes Measuring Instruments, Earthing, Electrical wiring and safety measures.

**Textbook:**

1. John Hiley, Keith Brown and Ian McKenzie Smith, "*Hughes Electrical and Electronic Technology*", Pearson.

**Reference Books:**

1. K Uma Rao and A Jayalakshmi, "*Basic Electrical Engineering*" 2016 Revised Edition, I K International Publishing House Pvt. Ltd.
2. D.P. Kothari, I. J. Nagrath, "*Basic Electronics*", McGraw Hill Education.
3. Smarajit Ghosh, "*Fundamentals of Electrical and Electronics Engineering*", PHI.

  
 REGISTRAR  


<b>Course Name:</b>	<b>Elements of Civil Engineering</b>					
<b>Course Code:</b>	<b>CIV 101</b>	<b>Credit Structure :</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
			<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Description:** The objective of this Course is to make students learn the basics of Civil Engineering concepts, role of civil engineers, infrastructure development, sustainability, and solve problems involving forces, loads and moments and know their applications in allied subjects. It is a pre-requisite for several Courses involving Forces and Moments.

The students should have a prior knowledge of basic mathematics and physics to pursue the Course. The Course consists of an introduction of civil engineering through an exposition of its disciplines, types of Infrastructure, different types of construction materials, composition of forces, concepts of resultants and equilibrium of forces.

After successful completion of the Course, the students would acquire knowledge on the basics of Civil Engineering, its scope of study, knowledge about green buildings, roads, airports, bridges and dams. They would be able to comprehend the action of Forces, Moments and other loads on systems of rigid bodies; Compute the reactive forces and the effects that develop as a result of the external loads.

**Textbooks:**

1. M.N. Shesha Prakash, Ganesh B. Mogaveer, “Elements of Civil Engineering and Engineering Mechanics”, PHI Learning.
2. Mimi Das Saikia, Bhargab Mohan Das and Madan Mohan Das, “Elements of Civil Engineering”, PHI Learning Pvt Ltd.

**Reference Books:**

1. Shrikrishna A Dhale and Kiran M Tajne, “Basics of Civil Engineering”, S Chand Publication.
2. S. S. Bhavikatti, “Basic Civil Engineering”, New Age International Publication
3. Satheesh Gopi, “Basic Civil Engineering”, Pearson Publication



<b>Course Name:</b>	<b>Engineering Graphics</b>					
<b>Course Code:</b>	<b>MEC 152</b>	<b>Credit Structure :</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
			<b>2</b>	<b>0</b>	<b>4</b>	<b>4</b>

**Course Description:** The course is designed with the objective of giving an overview of engineering drawing with the help of software tools. It is introductory in nature and acquaints the students with the techniques used to create engineering drawings with computerised drafting tools. Computerised drafting provides accurate and easily modifiable graphic entities, easy data storage, easy retrieval facility and it enhances creativity. It will expose students to the concept of engineering drawing and teach them to draw different views of planes and solids in different orientations.

The course will teach students to use AutoCAD to produce engineering drawings. They will learn to create drawing layouts, dimensioning, the theory of projection, orthographic projection of points, lines, planes and solids, isometric projection and be introduced to the development of surfaces.

**Textbook:**

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

**Reference Books:**

1. D. A. Jolhe, "Engineering Drawing: With an Introduction to AutoCAD," Tata McGraw Hill.
2. D. M. Kulkarni, A. P. Rastogi, A. K. Sarkar, "Engineering Graphics with AutoCAD," Prentice Hall.

**Course Material:**

"Engineering Graphics Lab Manual," Presidency University



<b>Course Name:</b>	<b>Technical Written Communication</b>					
<b>Course Code:</b>	<b>ENG 103</b>	<b>Credit Structure :</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
			<b>2</b>	<b>1</b>	<b>0</b>	<b>3</b>

**Course Description:** A course on Technical Written Communication facilitates writing skills; letters, emails, notice, agenda, minutes of the meeting, reports, etc. The course will train the students to write better English and face the corporate world with determination and self belief. The course includes theoretical session on communication, reading and writing skill with special emphasis on letters, emails and reports. Practical sessions in form of tutorials will help the students to practice vocabulary, reading, common errors, sentence transformations, etc.

**Reference Books:**

1. Greg Satell. *“Why Communication is Today’s Most Important Skill.”* FORBES. Feb 6, 2015.
2. Bacon, Francis. *“Of Studies.” Selected Writings of Francis Bacon.* Ed. Hugh G. Dick. New York. Random House, 1955. P. 22.
3. Bovee, Courtland L. Thill, John V, Chatterjee. Abha. *Business Communication Today.* 10th Edition. Pearson.
4. Raman, Meenakshi. Sharma, Sangeetha. *Technical Communication: Principles and Practice.* Oxford University Press, New Delhi. 2015.
5. Hart, Steve. Nari, Aravind R. and Bhambhani, Veena. *Embark: English for Undergraduates.* New Delhi; Cambridge University Press, 2016.
6. Online Resources: a.Globarena Online Language Learning Software



<b>Course Name:</b>	<b>Engineering Physics Lab</b>					
<b>Course Code:</b>	<b>PHY 151</b>	<b>Credit Structure :</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
			<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>

**Course Description:** This Course includes the laboratory sessions on determination of the wave length of Laser, rigidity modulus, Planck’s constant, dielectric constant, radius of curvature by Newton’s rings, calculation of Numerical Aperture, Resistivity by four probe method, Fermi energy of copper and acceleration due to gravity by simple pendulum. It also includes experiments on characteristics of Zener diode.

**Course Material:** “*Engineering Physics Lab manual*” Presidency University (2020-21).

  
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<b>Course Name:</b>	<b>Workshop Practice</b>					
<b>Course Code:</b>	<b>MEC 151</b>	<b>Credit Structure :</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
			<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>

**Course Description:** The primary objective of this course is to expose students to the basic skills in handling various tools in a workshop and cover some of the processes used for converting raw materials to finished products.

The course involves a hands on approach to fitting of metal components, concept of development of surfaces through sheet metal work, usage of engineering measurement devices, metal joining by arc welding, and an introduction to plumbing and electrical connections.

**Course Material:**

“Engineering Workshop Lab Manual,” Presidency University, 2017-18.

**Reference Books:**

1. B. S. Nagendra Parashar, R. K. Mittal, “Elements of Manufacturing Processes,” Prentice Hall of India.
2. S. K. Hajra Choudhury, “Elements of Workshop Technology - Volume I - Manufacturing Processes,” Media Promoters and Publishers Pvt. Ltd.





<b>Course Name:</b>	<b>Calculus, Differential Equations and Complex Variables</b>					
<b>Course Code:</b>	<b>MAT 106</b>	<b>Credit Structure :</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
			<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>

**Course Description :** This course aims to acquaint the student with mathematical tools needed in evaluating multiple integrals and their usage. Also to introduce effective mathematical tools for the solutions of differential equations that model physical processes and introduce the tools of differentiation and integration of functions of complex variable that are used in various techniques dealing engineering problems.

Textbooks:

1. Erwin Kreyszig, “*Advanced Engineering Mathematics*”, 9th Edition, John Wiley & Sons, 2006.

Reference Books:

1. B. S. Grewal, ‘*Higher Engineering Mathematics*’, Khanna Publishers, 44th Edition, 2007.
2. Cengage, Mathematics – II (Calculus, Ordinary Differential Equations & Complex Variables), ITL Education Solutions Ltd., 2018.



<b>Course Name:</b>	<b>Transform Techniques and Partial Differential Equations</b>					
<b>Course Code:</b>	<b>MAT 2001</b>	<b>Credit Structure :</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
			<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Description:** This course aims to introduce Fourier transform, z-transform and Laplace transform. The topics include the applications of Laplace transform in LCR circuits and solution of difference equations using z-transform. This course is commonly designed for all engineering branches and the contents learned in the previous semester are the prerequisite for this course. Solution of second and higher order, linear ordinary differential equations with constant and variable coefficients. Formation of Partial Differential Equations (PDE), solution of homogeneous and non-homogeneous PDEs and the application of PDEs. Laplace transforms of functions and properties; Laplace transform of periodic and unit step functions. Inverse Laplace Transforms, Application of Laplace transforms and solution of differential equations.

The course aims at introducing students to quantitative uncertainty analysis and risk assessment for engineering applications. Probability theory is of great use in understanding and modeling phenomena that exhibit random behavior and the emphasis is on real-world applications to engineering problems. The topics covered include basic concepts of probability and conditional probability, Baye's law and correlation analysis, Linear Regression and method of least square.

**Textbooks:**

1. Erwin Kreyszig, "Advanced Engineering Mathematics", 10th Edition, John Wiley & Sons (India), 2014.
2. Grewal B.S., "Higher Engineering Mathematics", 43rd Edition, Khanna Publishers, 2014.

**Reference Books:**

1. Peter V. O'Neil, Advanced Engineering Mathematics, 7<sup>th</sup> Edition, Cengage Learning, 2012.
2. Ronald E. Walpole, Raymond H. Myers & Sharon L. Myers, "Probability & Statistics for Engineers & Scientists", Ninth Edition.



<b>Course Name:</b>	<b>Numerical Methods, Probability and Sampling Techniques</b>					
<b>Course Code:</b>	<b>MAT 2002</b>	<b>Credit Structure :</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
			<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Description:** The objective of Engineering Mathematics – IV is to equip the students with adequate knowledge of basic mathematics that will enable them in formulating problems and solving them analytically as well as numerically in their Engineering programme. The course enables students to incorporate the knowledge of complex variables and their significance in engineering, Numerical methods and sampling theory to support their concurrent, subsequent engineering studies to explore complex systems, physicists, engineers and mathematicians require computational methods since mathematical models are rarely solvable analytically. This course provides an introduction to basic numerical methods such as fitting of various curves, interpolation, differentiation, integration. This course also provides an introduction to numerical solution of algebraic and transcendental equations, ordinary differential equations such as Taylor’s series method, modified Euler’s method and Runge-Kutta Methods. The course aims at introducing students to quantitative uncertainty analysis and risk assessment for engineering applications. Probability theory is of great use in understanding and modeling phenomena that exhibit random behavior and the emphasis is on real- world applications to engineering problems. sampling distributions of means and variances, chi- squared, t and F distributions, methods of estimation, estimating means, proportions and variances, maximum likelihood estimation, tests of hypothesis on means, proportions and variances, chi- squared test of goodness of fit.

#### **Textbooks**

1. Erwin Kreyszig, “Advanced Engineering Mathematics”, 10th Edition, John Wiley & Sons (India), 2014.
2. M.K. Jain, S.R.K. Iyengar and R.K. Jain, Numerical Methods for Scientific and Engineering Computations, 6th Edition, New age Publishing House, 2015.
3. Ronald .E. Walpole, Raymond. H. Myers, Sharon. L Myers, and Keying E.Ye, “Probability and Statistics for Engineers and Scientists”, Pearson Education, Delhi-9<sup>th</sup> edition, 2012.

#### **Reference Books**

1. B.S. Grewal, “Higher Engineering Mathematics”, 43<sup>rd</sup> edition, Khanna Publishers.
  2. B.S. Grewal, Numerical methods in engineering and science, 10th Edition, Khanna publishers, 2016.
- Kishor S Trivedi, “Probability and Statistics with reliability, Queuing and Computer Science Applications”, John Wiley & Sons, 2<sup>nd</sup> edition, 2008.



<b>Course Name:</b>	<b>Building Self Confidence</b>					
<b>Course Code:</b>	<b>PPS 105</b>	<b>Credit Structure :</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
			<b>0</b>	<b>0</b>	<b>2</b>	<b>0</b>

**Course Description:** Developing right attitude, effective communication skills and confidence to be successful in this highly competitive environment is of utmost importance. This course helps the students to develop their personality and drives them to create their personal brand. The students are exposed to various fun-filled activities to gain confidence in facing people, facing crowd and expressing their ideas.

**Textbooks:**

Building Self Confidence Training Manual

**Reference Books:**

2. Prakash Iyer, *“The Habit of Winning”*, 2<sup>nd</sup> Edition, Penguin Books Ltd., 2016.
3. Jack Canfield, *“The Success Principles”*, 8<sup>th</sup> Edition, HarperCollins Publishers India, 2015.
4. Shiv Khera, 3d Edition, *“You Can Win”*, Bloomsbury India, 2014.

  
 REGISTRAR  


<b>Course Name:</b>	<b>Engineering Chemistry</b>					
<b>Course Code:</b>	<b>CHE 101</b>	<b>Credit Structure :</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
			<b>4</b>	<b>0</b>	<b>0</b>	<b>4</b>

**Course Description:** The primary objective of the course is to introduce the students to the concepts and applications of chemistry in Engineering. It should cultivate in them an ability to identify chemistry in each piece of finely engineered products used in households and industry. It aims to strengthen the fundamental concepts of chemistry and then builds an interface with their industrial applications. It deals with applied and industrially useful topics, such as Water Technology, Engineering materials such as Polymers & Liquid crystals, Introduction to Computational Chemistry, Electrochemistry principles & its application to batteries, Corrosion and its control, Fuels and combustion.

**Textbooks:**

1. Wiley, "Engineering Chemistry", Wiley.

**Reference Books:**

1. Dr. K. Pushpalatha, "Engineering Chemistry", Revised Edition, Wiley.
2. F Jain and Jain, "Engineering Chemistry", 17th Edition, Dhanpat Rai Publishing Company. New Delhi, 2019.
3. Koch, W., & Holthausen, M. C. (2015). A chemist's guide to density functional theory. John Wiley & Sons.
4. Shikha Agarwal, "Engineering Chemistry-Fundamentals and Applications", Cambridge University Press, 2015.
5. Principles of Physical Chemistry B.R.Puri, L.R. Sharma & M.S. Pathania, S. Nagin Chand & Co., 41 Ed., 2004.
6. F.W. Billmeyer, Text Book of Polymer Science, John Wiley & Sons, 4th Edition, 1996.
7. M.G. Fontana, N. D. Greene, Corrosion Engineering, McGraw Hill Publications, New York, 3rd Edition, 1996.
8. Jurs, P.C., 1996. Computer software applications in chemistry. John Wiley & Sons.
9. Stephen Wilson (auth.) - Chemistry by Computer: An Overview of the Applications of Computers in Chemistry-Springer US (1986).



<b>Course Name:</b>	<b>Elements of Electronics Engineering</b>					
<b>Course Code:</b>	<b>ECE 101</b>	<b>Credit Structure :</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
			<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Description:** The course aims at nurturing the students with the fundamental principles of electronics engineering, prevailing in various engineering applications. The course begins with the fundamentals of electronic systems and some basic laws of electricity. The topics include: classification of materials, types of Semiconductor materials, p-n Junction, Diodes, Characteristics, Rectifiers, Junction Transistor, BJT Configurations, Characteristics, BJT Biasing basics, Transistor Applications. Subsequently the student is introduced to Digital Electronics – Codes and Number systems – viz. Decimal, Binary and hexadecimal systems, conversions. 1’s and 2’s complements, binary addition. Boolean logic, basic gates and Universal Gates, and laws for reduction of the logic expressions, implementation using basic gates. Basics of communication systems, introduction to microprocessors and its applications.

**Textbooks:**

1. John Hiley, Keith Brown and Ian McKenzie Smith, "*Hughes Electrical and Electronic Technology*", Pearson.

**Reference Books:**

1. Smarajit Ghosh, "*Fundamentals of Electrical and Electronics Engineering*", PHI.
2. D.P. Kothari, I. J. Nagrath, "*Basic Electronics*", McGraw Hill Education.
3. Rajendra Prasad, "*Fundamentals of Electronics Engineering*", Cengage Learning.

  
 REGISTRAR  


<b>Course Name:</b>	<b>Elements of Mechanical Engineering</b>					
<b>Course Code:</b>	<b>MEC 101</b>	<b>Credit Structure :</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
			<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Description:** This course is designed to acquaint students with the fundamentals of mechanical engineering by covering some basics of thermal engineering, design engineering and manufacturing processes.

The discussion on thermal engineering includes the study of different forms of energy, the laws of thermodynamics, properties of steam, heat engines, heat pumps, steam boilers and an introduction to fluid properties and machinery. The discussion on design engineering covers transmission of motion and power. The discussion on manufacturing processes includes metal cutting and machines tools.

**Textbooks:**

1. K. P. Roy, S. K. Hajra Choudhury, Nirjhar Roy, *“Elements of Mechanical Engineering,”* Media Promoters and Publishers Pvt. Ltd. Mumbai.

**Reference Books:**

1. Pravin Kumar, *“Basic Mechanical Engineering,”* Pearson.
2. V. K. Manglik, *“Elements of Mechanical Engineering,”* PHI.
3. Dr. D. S. Kumar, *“Elements of Mechanical Engineering,”* S. K. Kataria & Sons.

  
 REGISTRAR  


<b>Course Name:</b>	<b>Environmental Science and Disaster Management</b>					
<b>Course Code:</b>	<b>CIV 102</b>	<b>Credit Structure :</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
			<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Description:** The overall objective of the course is to provide clear understanding of natural resources, environment, its maintenance and the basic concepts of disaster management. The course consists of the concepts of renewable and non-renewable resources, conservation of these resources, ecosystems, role of human being in maintaining a clean and useful environment for the future generations, maintaining ecological balance and conservation of biodiversity. It includes causes of environmental deterioration and its control; human environmental disturbances, water and air pollution, mitigation measures, disaster and waste management etc. After successful completion of the course, the students would be able to understand the various types of natural resources and problems due to over exploitation. Also gain knowledge about the different components of the ecosystem, their interrelation, various hazards, natural disasters, their effects and management.

**Textbooks:**

1. Benny Joseph, “*Environmental Studies*”, McGraw-Hill.

**Reference Books:**

1. R. Rajagopalan, “*Environmental studies–From Crisis to Cure*”, Oxford University Press.
2. P. Anandan and R. Kumaravelan, “*Environmental Science and Engineering*”, Scitech.
3. ErachBharucha, “*Environmental Studies for Undergraduate courses*”, Universities Press.
4. R.B. Singh (Ed), “*Disaster Management*”, Rawat.
5. MahuaBasuand S. Xavier “*Fundamentals of Environmental Studies*” Cambridge University Press.





<b>Course Name:</b>	<b>Technical Spoken Communication</b>					
<b>Course Code:</b>	<b>ENG 104</b>	<b>Credit Structure :</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
			<b>1</b>	<b>0</b>	<b>2</b>	<b>2</b>

**Course Description:** A Course on Technical Spoken Communication in the field of technical education will train the students to speak better English and face the corporate world with determination and self-belief. The theoretical and practical sessions on pronunciation, listening, conversation, narration, speech presentation, will make the target audience to stand out in the forefront of their field of operation. At the end of the course, the students will have better skills, and the students will also be able to excel in middle-higher level management in the corporate world.

**Reference Books:**

1. Tomson, Robert. *“The Interview.”* Stories of Work, Life and the Balance in Between. The Write Place.
2. Daniel. J. C. “Unforgettable Salim Ali. ” *Inspiring People: Fifty People Who Made a Difference.* Readers Digest Selection.
3. Bovee, Courtland L. Thill, John V, Chatterjee. Abha. *Business Communication Today.* 10th Edition. Pearson
4. Carmine, Gallo. *“11 Presentation Lessons You Can Still Learn From Steve Jobs.”* FORBES, October 12, 2012.
5. Thrishna’s: *How to Do well in GDs and Interview.* New Delhi: Pearson 2013
6. Raman, Meenakshi. Sharma, Sangeetha. *Technical Communication: Principles and Practice.* Oxford University Press, New Delhi. 2015.
7. Hart, Steve. Nari, Aravind R. and Bhambhani, Veena. Embark: *English for Undergraduates.* New Delhi; Cambridge University Press, 2016.
8. J. K. Gangal, *A Practical course in Spoken English,* PHL Learning Private Limited, Delhi-2014.

  
 REGISTRAR  


<b>Course Name:</b>	<b>Kannada Kali</b>					
<b>Course Code:</b>	<b>KAN 101</b>	<b>Credit Structure :</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
			<b>1</b>	<b>0</b>	<b>0</b>	<b>1</b>

**Course Description:** This course aims to help the non Kannada speaking students to converse in Kannada for their day-to-day life activities. It supports to develop strong cognitive skills, use of local language, helps to mingle with the local society, ensures security, facilitates interaction with auto and cab drivers, shop owners, employees of local government, etc. It also helps Law students to understand local client's complaints and also to the students of Engineering for a better communication. Furthermore, this course is offered to all the students, irrespective of their domain.

**Text Books:**

1. G Kannada Kali – Linga Devaru Hale Mane, Publication – Prasaranga Kannada Vishvavidyalaya, Hampi.
2. Spoken Kannada – Publication – Kannada Sahitya parishath Bengaluru.
3. Kannada Kirana – Publication – Bangaore Institute of Languages, Bangalore.

  
 REGISTRAR  


<b>Course Name:</b>	<b>Computer Programming</b>					
<b>Course Code:</b>	<b>CSE 151</b>	<b>Credit Structure :</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
			<b>2</b>	<b>0</b>	<b>4</b>	<b>4</b>

**Course Description:** This course will provide an introduction to foundational concepts of computer programming to students of all branches of Engineering. This module includes a mix of traditional lectures and laboratory sessions. Each meeting starts with a lecture and finishes with a laboratory session. Topics covered in this course are problem formulation and development of simple programs, Pseudo code, Flow Chart, Algorithms, data types, operators, decision making and branching, looping statements, arrays, functions, pointers, structures, union and basic file operations. In the lab secession students are required to solve problems based on the above concepts to illustrate the features of the structured programming.

**Textbook:**

1. E. Balagurusamy, “*Programming in ANSI C*”, Tata McGraw Hill.

**Reference Books:**

1. Yale Patt, Sanjay Patel, “*Introduction to Computing Systems: From bits and gates to C and beyond*”, McGraw Hill.
2. Ehrouz A Forouzan, Richard F Gilberg, “*Computer science: A structured programming approach using C*”, Cengage Learning.



<b>Course Name:</b>	<b>Engineering Chemistry Lab</b>					
<b>Course Code:</b>	<b>CHE 151</b>	<b>Credit Structure :</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
			<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>

**Course Description:** The lab course intends to train the students to develop their experimental skills and apply fundamental chemical principles in problems related to chemistry in engineering. The experiments are designed to support the theory lectures and the hands-on experience will thus enhance students' in understanding the concepts.

The course includes the estimation of total hardness of water by EDTA complexometric method, determination of the total alkalinity of a given water sample, estimation of Iron (II) in Mohr's salt, estimation of calcium oxide in cement, determination of Chemical Oxygen Demand (COD) of Industrial Waste Water sample, determination of pKa value of weak acid using pH meter, Estimation of copper colorimetrically, determination of Iron (II) by potentiometry, determination of viscosity co-efficient of a liquid using Ostwald's Viscometer, estimation of strength of mixture of acids by conductometry method.

**Course Material:** "Engineering Chemistry Lab Manual", Presidency University.

<b>Course Name:</b>	<b>Engineering Economics</b>					
<b>Course Code:</b>	<b>MGT 112</b>	<b>Credit Structure :</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
			<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Description:** The objective of this Course is to enable engineering students to analyze cost / revenue data and make an economic analysis, which can help in the decision making process either to justify or reject alternative projects. This Course is designed to present the concepts and techniques of economic analysis needed in the decision making process. The emphasis is on the analytical analysis of money and its impact on decision making

The Course introduces the student to the discipline of economics and its application in the field of engineering. The Course examines the concept of time value of money and how engineers can apply it for making economic decisions. It also explains how interest rates and different compounding periods influence the value of various capital expenditures. The Course also deals with the effect of depreciation, taxes and inflation on capital expenditure decisions. .

**Text Book (s):**

Niall M Fraser, "Engineering Economics", Pearson.

**Reference Book (s):**

1. Jose Sepulveda, " Schaum's Outline of Engineering Economics", McGraw-Hill.
2. Tara Chand, "Engineering Economics" ,Vol-1, Nem Chand and Brothers.



<b>Course Name:</b>	<b>Digital Entrepreneurship</b>					
<b>Course Code:</b>	<b>MGT 113</b>	<b>Credit Structure :</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
			<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Description:** The objective of the Course on entrepreneurship will be on creating a learning system through which engineering students can acquaint themselves for starting new ventures and introducing new product and service ideas.

Entrepreneurship is the most powerful economic force known to humankind. The process of transforming creative ideas into commercially viable business continues to be a major force in today's world economy. Successful entrepreneurship requires more than merely luck and money. It is a cohesive process of creativity, risk taking, and planning. This Course gives an overall basic framework for understanding the process of entrepreneurship.

The Course includes topics such as Understanding the entrepreneurial mind set, Launching Entrepreneurial Ventures, The Search for Entrepreneurial Capital, Formulation of Entrepreneurial Plan.

**Text Book(s):**

D.F. Kuratko, T V Rao, " *Entrepreneurship- A South Asian Perspective*", Cengage Learning.

**Reference Book(s):**

1. Robert D. Hisrich, Michael P. Peters and Dean A. Shepherd, " *Entrepreneurship*", McGraw-Hill International.

2. Thomas W. Zimmerer, Norman M. Scarborough, " *Essentials of Entrepreneurship and Small Business Management*", Pearson International Edition.



<b>Course Name:</b>	<b>Calculus, Differential Equations and Complex Variables</b>					
<b>Course Code:</b>	<b>MAT 102</b>	<b>Credit Structure :</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
			<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>

**Course Description:** This course is also commonly designed for all engineering branches and the contents learned in the previous semester are the prerequisite for this course. Probability theory is of great use in understanding and modeling phenomena that exhibit random behavior and the emphasis is on real-world applications to engineering problems. The topics covered include basic concepts of probability and conditional probability, Baye's law and correlation analysis, Linear Regression and method of least square, Solution of second and higher order, linear ordinary differential equations with constant and variable coefficients. Formation of Partial Differential Equations (PDE), solution of homogeneous and non-homogeneous PDEs and the application of PDEs. Evaluation of double and triple integrals, change of order of integration, change of coordinates, beta and gamma functions, line integral, surface integral and volume integral of vector and scalar functions. Laplace transforms of functions and properties; Laplace transform of periodic and unit step functions. Inverse Laplace Transforms, Application of Laplace transforms and solution of differential equations.

**Textbooks:**

1. Erwin Kreyszig, *Advanced Engineering Mathematics*, 10<sup>th</sup> edition, John Wiley-India Publishers, 2014.
2. Ronald E. Walpole, Raymond H. Myers, Sharon. L. Myers and Keying E. Ye, *Probability and Statistics for Engineers and Scientists*, Pearson Education, Delhi. 9<sup>th</sup> Edition, 2012.

**Reference Books:**

- 1 Peter V. O'Neil, *Advanced Engineering Mathematics*, 7<sup>th</sup> Edition, Cengage Learning, 2012.
- 2 B. S. Grewal, *Higher Engineering Mathematics*, 43<sup>rd</sup> edition, Khanna Publishers, 2014.



<b>Course Name:</b>	<b>Effective Communication</b>					
<b>Course Code:</b>	<b>PPS 106</b>	<b>Credit Structure :</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
			<b>0</b>	<b>0</b>	<b>2</b>	<b>0</b>

**Course Description:** In order to succeed in the world that has become more global than being confined to smaller areas, we need to be very good in communication. This programme introduces students to different techniques of communication that makes them communicate clearly and effectively. During this programme, students are given a lot of exercises to inculcate better flow of thought and speech with emphasis on being effective in communication.

**Text Book:**

1. Presidency University “*Effective Communication*” Training Manual

<b>Course Name:</b>	<b>Design Thinking and Team Building</b>					
<b>Course Code:</b>	<b>PPS107</b>	<b>Credit Structure :</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
			<b>0</b>	<b>0</b>	<b>2</b>	<b>0</b>

**Course Description**

Developing right attitude, effective communication and problem solving skills along with confidence is very essential in this highly competitive environment. This course helps the students to develop the necessary attitudes and traits of problem solving coupled with thinking out of the box, brainstorming, root cause analysis etc. and adds to the students’ overall personality and drives them to solve problems and innovate. The students are exposed to various type of problem solving techniques followed by simulation exercises, group brainstorming and other activities like discussions, case-studies etc. The students get the right guidance from the faculty to develop and polish their skills which will make them successful in the corporate world.

**Books:**

**(i) Textbook(s)**

Design Thinking & Team Building Training Manual

**(ii) Reference Book(s)**

Emrah Yayici, “Design Thinkking Methodology Book”

Diane Deacon and Mike Vance, “*Think Out Of The Box*”

John Adair, “*Decision Making and Problem Solving Strategies*”

John Adair “*The Art Of Creative Thinking*”



<b>Course Name:</b>	<b>Being Corporate Ready</b>					
<b>Course Code:</b>	<b>PPS108</b>	<b>Credit Structure :</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
			<b>0</b>	<b>0</b>	<b>2</b>	<b>0</b>

### Course Description

Being Corporate Ready (BCR) is to help the students to get a glimpse of the acceptable corporate readiness and equip them with the fundamental necessities of being able to confidently deal with the highly competitive corporate environment. This course helps the students to develop the necessary skills like Presentation Skills, E-mail Etiquette, Group Discussion, Personal Interview and Resume Building etc. This course will definitely add value to the students in terms of their overall personality development and drive them to be acceptable in corporate world with essential skills required and create their own personal brand.

The students are exposed to the corporate culture through real-time presentations, real-life e-mail writing scenarios, group discussions and other allied activities like discussions, case-studies, role-plays etc.

The students will get the right guidance from L&D faculty members to help develop and polish their skills which will make them successful in corporate environment.

### Books:

(i) Textbook(s)

Being Corporate Ready Training Manual

(ii) Reference Book(s)

“Group Discussion and Interview Skills by Pataki, Priyadarshi, Cambridge University Press: 2016”

Prakash Iyer, “The Habit of Winning’, Second Ed, Penguin Books Ltd, 2016.

Jack Canfield, “The Success Principles”, 8th Edition, Harper Collins India, 2015





<b>Course Name:</b>	<b>Professional Practice - II</b>					
<b>Course Code:</b>	<b>PIP 102</b>	<b>Credit Structure :</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
			-	-	-	15

**Course Description:** Professional Practice- II is the necessary for the subsequent problem solving experience after PP-I. 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.

<b>Course Name:</b>	<b>Professional Practice - I</b>					
<b>Course Code:</b>	<b>PIP 101</b>	<b>Credit Structure :</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
			-	-	-	5

**Course Description:** The Professional Practice (PP) links the university with the professional world, by infusing the reality of the world of work into the educational process. The classroom is shifted for a period of two months in PP- I and another two months in PP-II to a professional location where the students, under the supervision of the faculty, are involved in applying the knowledge acquired in the classroom to finding solutions to real life problems. The PP programme has two components, namely PP-I of two months duration implemented during the summer following the 2nd year and PP- II two months duration implemented during either of the semesters of the final year.

PP-I is the first exposure to the world of work, necessary for the subsequent problem solving experience during PP-II. It is implemented at large industrial complexes, research and development centres, software development houses, pharmaceutical companies, etc. While the general aim of PP-I is to afford an opportunity for the student to learn how work is organized and carried out; by a process of observation and participation, the learning can be quite varied and exhaustive depending on the nature of the organization. It provides an opportunity for a detailed understanding of vast engineering operations and its various facets such as inventory, productivity, management, information systems, human resource development, etc.

  
 REGISTRAR  


<b>Course Code: CSE1001</b>	<b>Course Title: Introduction to Object Oriented Programming</b>			<b>L-P-C</b>	1	4	3
<b>Type of Course:</b>	<b>Program Core Theory and Laboratory Integrated</b>						
<b>Version No.</b>	1.0						
<b>Course Pre-requisites</b>	NIL						
<b>Anti-requisites</b>	NIL						
<b>Course Description</b>	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.						
<b>Course Out Comes</b>	On successful completion of the course the students shall be able to: <ol style="list-style-type: none"> <li>1. Write programs using basic concepts.</li> <li>2. Apply the concept of arrays, strings, polymorphism &amp; inheritance for building desktop</li> <li>3. Implement interface building secure applications</li> <li>4. Apply the concepts of error handling mechanism</li> <li>5. Apply the concepts of input output streams to develop simple applications.</li> </ol>						
<b>Course Content:</b>							
<b>Module 1</b>	Introduction to Principles of Programming	Assignment	Programming	<b>No. of Classes:10</b>			
Topics: Problem Solving using algorithms & Flowchart, Types of Programming Languages, Design Methodologies, Environment set up to run a program, Program Execution and Translation process. Command Line Arguments.							
<b>Module 2</b>	Data Types, Variables and Control Statements	Assignment	Programming	<b>No. of Classes:6</b>			

  
 REGISTRAR  


Topics:

Data types, Variables, Identifiers, Operators, Assignments and Expression, Basic Input/ Output, Functions, Control Statements: Branching and Looping.

<b>Module 3</b>	Object Oriented Concepts	Assignment	Programming	<b>No. of Classes:8</b>
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Topics: Object Oriented Principles

Introduction to object Oriented Principles: Object, class, Data abstraction, Encapsulation, Polymorphism, Inheritance.

Classes, Objects and Methods: Defining a class, access specifiers, instantiating objects, reference variable, accessing class members and methods, constructors, method overloading, constructor overloading, static members and static methods.

<b>Module 4</b>	Arrays, String, Inheritance and Interface	Assignment	Programming	<b>No. of Classes:12</b>
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Topics: Defining an Array, Initializing & Accessing Array, Multi –Dimensional Array. Passing arrays to method, returning arrays.

Creating Strings & Operation on String.

Defining a subclass, Types of Inheritance, Method overriding, Dynamic method invocation.

Interface - Definition, Implementing interface, abstract methods.

<b>Module 5</b>	Exception Handling and Input Output Streams	Assignment	Programming	<b>No. of Classes:12</b>
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Exceptions: Types of Exceptions, Handling the Exception with try, catch, finally.

Streams: Type of Streams, Input Stream, Output Stream, File - writing to the File and Reading from the File, Serialization.



**List of Laboratory Tasks:**

**Experiment No 1:** Problem Solving

**Level 1:** Problem solving using Algorithms and Flowcharts.

**Experiment No. 2:** Programming assignment using Variables and Expression

**Level 1:** Basic programs using data types and variables

**Level 2:** Programs using operators and flow control statements.

**Experiment No. 3:** Programming assignment using Object Oriented Concepts

**Level 1:** Programming scenarios which build class, methods to solve a problem.

**Level 1:** Programming scenarios which uses Constructors and Method overloading to solve a problem.

**Experiment No. 3:** Programming assignment using Arrays and Strings. (Application: Develop application on Matrices, build String based application like Telephone directory)

**Level 1:** Programming scenarios which build single dimensional and multidimensional array, apply the different methods to operate on strings.

**Level 2:** Programming assignment which will manipulate the data stored in matrices and identify the appropriate usage String methods.

**Experiment No. 4:** Programming assignment using Inheritance

**Level 1:** Programming assignment on building applications using Inheritance.

**Experiment No. 5:** Programming assignment using Interface

**Level 1:** Programming scenarios for building applications using Interface.

**Experiment No. 6:** Programming assignment using Exception Handling.

**Level 1:** Programming Scenarios to apply and use the exception handling mechanism.

**Experiment No. 7:** Programming assignment to build Input Output based Applications.

**Level 1:** Programming Scenarios to build IO based application for a given scenario using File Handling concepts.

**Targeted Application & Tools that can be used:**

- Platform independent Application Development
- Secure Application Development
- Database Management Systems
- Banking software
- Mobile Applications

**Tools:** Integrated Development Environment (IDE), Apache NetBeans, Eclipse.

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



After completion of each module a programming based Assignment/Assessment will be conducted.  
A scenario will be given to the student to be developed as a Java Application.

**Text Book**

- 1) Herbert Schildt, *“The Complete Reference Java 2”*, Tata McGraw Hill Education.

**References**

- 1) Cay S Horstmann and Cary Gornell, *“CORE JAVA volume I-Fundamentals”*, Pearson
- 2) James W. Cooper, *“Java TM Design Patterns – A Tutorial”*, Addison-Wesley Publishers.

**Topics relevant to development of “Employability”:** Real time application development using OOPs concept.

**Topics relevant to “ PROFESSIONAL ETHICS”:** Naming and coding convention for Project Development

<b>Catalogue prepared by</b>	Ms. Vinitha Dominic Mr. Md Ziaur Rahman Mr. Ravindranath R C Dr. Malepati Chandra Sekhar
<b>Recommended by the Board of Studies on</b>	BOS NO: 11 th. BOS held on 23/4/21
<b>Date of Approval by the Academic Council</b>	Academic Council Meeting No. 14, Dated 21/5/21

  
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<b>Course Code:</b> CSE1002	<b>Course Title:</b> Programming using Python		<b>L- P- C</b>	1	2	2
	<b>Type of Course:</b> School Core Theory & Integrated Laboratory					
<b>Version No.</b>	1.0					
<b>Course Pre-requisites</b>	Basic knowledge of Computers and Mathematics					
<b>Anti-requisites</b>	NIL					
<b>Course Description</b>	The purpose of this course is to enable the students to develop python scripts using its basic programming features and also to familiarize the Python IDLE and other softwares. This course develops analytical skills to enhance the programming abilities. The associated laboratory provides an opportunity to validate the concepts taught and enhances the ability to build real time applications.					
<b>Course Outcomes</b>	<b>On successful completion of this course the students shall be able to:</b> 1. Summarize the basic Concepts of python. 2. Demonstrate proficiency in using data structures. 3. Illustrate user-defined functions and exception handling. 4. Identify the various python libraries.					
<b>Course Content:</b>						
<b>Module 1</b>	Basics of Python programming	Assignment	Programming	<b>14 Classes</b>		
Topics: Data types, operators and Expressions, Input and Output Statements. Control Structures – Selective and Repetitive structures						
<b>Module 2</b>	Indexed and Associative Data Structures	Simple applications	Programming	<b>20 Classes</b>		
Topics: Strings, Lists, Sets, Tuples, Dictionaries						
<b>Module 3</b>	Functions, Exception handling and libraries	Case study	Programming	<b>10 Classes</b>		
Topics: User defined functions, exception handling, Introduction to python built-in libraries						
<b>List of Laboratory Tasks:</b>						
Sl. No.	Experiment Name					
1	PROGRAMS ON OPERATORS AND EXPRESSIONS Level - 1 : Basic programs on Operators and Expressions Level - 2 : Develop applications to solve mathematical equations					
2	PROGRAMS ON CONTROL STRUCTURES Level - 1 : Basic programs on Control structures Level - 2 : Create applications to solve the real time problems					
3	PROGRAMS ON SELECTIVE AND REPETITIVE STRUCTURES Level - 1 : Basic programs on Selective and Repetitive structures					

  
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	Level - 2 : Create applications to solve the real time problems
4	PROGRAMS ON STRINGS Level - 1 : Basic programs on Strings and its manipulation Level - 2 : Develop Real world applications that involves string matching
5	PROGRAMS ON LISTS, TUPLES and SETS Level - 1 : Basic programs on lists, Tuples and Sets Level - 2 : Create applications that involves sequential and Random access of data
6	PROGRAMS ON DICTIONARIES Level - 1 : Basic programs on dictionaries Level - 2 : Create applications that involves structuring of data.
7	PROGRAMS ON FUNCTIONS Level - 1 : Basic programs on Functions Level - 2 : Develop Real world applications using functions
8	PROGRAMS ON EXCEPTION HANDLING Level - 1 : Basic programs on exception handling Level - 2 : Develop applications that involves exception handling
9	BASIC PROGRAMS ON BUILT-IN LIBRARIES Level - 1 : Basic programs on python modules Level – 2: Develop applications using python libraries

**Targeted Application & Tools that can be used:**

**Targeted Application : Web application development, AI, Operating systems**

**Tools: Python IDLE, ANACONDA**

- **Application Areas:**
- Web Development
- Game Development
- Scientific and Numeric Applications
- Artificial Intelligence and Machine Learning
- Software Development
- Enterprise-level/Business Applications
- Education programs and training courses
- Language Development
- Operating Systems
- Web Scrapping Applications
- Image Processing and Graphic Design Applications

**Professionally Used Software: Python IDLE, Spyder, Jupyter Notebook, Google Colab**

**Project work/Assignment:**

**Project Assignment: Developing python scripts using built in methods and functions**

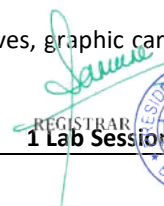


<b>Text Books:</b>	
<ul style="list-style-type: none"> <li>Charles Dierbach, “Introduction to Computer Science Using Python”, Wiley India Edition,2015.</li> </ul>	
<b>References:</b>	
<ol style="list-style-type: none"> <li>E. Balagurusamy, “Introduction to Computing and Problem Solving Using Python”, Tata McGraw-Hill, 2016</li> <li>Y. Daniel Liang, “Introduction to Programming Using Python”, Pearson, 2017</li> <li>Python Tutor - Visualize Python, Java, C, C++, JavaScript, TypeScript, and Ruby code execution</li> <li><a href="https://practice.geeksforgeeks.org/courses/Python-Foundation">https://practice.geeksforgeeks.org/courses/Python-Foundation</a></li> </ol>	
<b>Topics relevant to development of “FOUNDATIONS SKILLS”- Solve the real time problems by analyzing and visualizing the data.</b> <b>Topics relevant to “HUMAN VALUES &amp; PROFESSIONAL ETHICS”- Data collection and its arrangement</b>	
<b>Skill Level:</b> Foundation, Skill Development, Employability	
<b>Catalogue prepared by</b>	Prof. Isaac Joel Raj. S, Ms. GANGA V C, Ms. PALLAVI M, Ms.AKSHATHA Y, Mr.JOBIN THOMAS, Ms. POORNIMA GALIVEETI
<b>Recommended by the Board of Studies on</b>	BOS NO: 11 th. BOS held on 23/4/21
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<b>Course Code:</b> CSE1003	<b>Course Title:</b> Computer Hardware Workshop  <b>Type of Course:</b> 1] Program Core 2] Laboratory only	L- P- C	0	2	1
<b>Version No.</b>	1.0				
<b>Course Pre-requisites</b>	Elements of electrical and electronics engineering (EEE1001)- Basic logic operations, measuring voltages, measuring current, measuring of resistance, series and parallel connections, implementing simple circuits using resistors, capacitors, inductors.				
<b>Anti-requisites</b>	NIL				
<b>Course Description</b>	<b>Course description:</b> Computer hardware workshop course is designed to train students to <b>identify and handling the equipment's for assembling computer hardware (SK 6,8). This course will enhance the students attitude of enquiry for trouble shooting (SK 1,4).</b> Students shall be able to learn basics of electrical and electronic components related to hardware and networking system along with installation of operating system. At the end of course students will possess professional & employability skill.				
<b>Course Out Comes</b>	On successful completion of the course the students shall be able to: 1] Identify electrical and electronic components in computer system. 2] Demonstrate assembling of computer hardware. 3] Diagnose and resolve of hardware-related problems. 4] Installation of different operating system. 5] Share the resources and folders over network.				
<b>Course Content:</b>	<p><b>List of Laboratory Tasks:</b></p> <p><b>Experiment No 1</b> <span style="float: right;"><b>1 Lab Session</b></span> Implement basic circuit using breadboards and components to measure current and voltage. <b>Level No 01:</b> Implement the given circuit with 3 resistors connected in series with power source of voltage 5volts and calculate over all current flowing in this circuit. <b>Level No 02:</b> Implement the given circuit with 3 resistors connected in parallel with power source of voltage 5 volts and calculate over all current flow in this circuit.</p> <p><b>Experiment No 2:</b> <span style="float: right;"><b>1 Lab Session</b></span> Perform soldering &amp; de-soldering using discrete components for a specific circuit. <b>Level No 01:</b> Implement the given simple circuits. <b>Level No 02:</b> Implement the given complex circuits.</p> <p><b>Experiment No 3:</b> <span style="float: right;"><b>1 Lab Session</b></span> <b>Identify the computer hardware components</b> <b>Level No. 01:</b> Identify the specific hardware components in desktop system -motherboards components, connectors, slots, ports (USB, VGA, DVI, and HDMI), cables and connectors. <b>Level No. 02:</b> Identify the specific hardware components with specification (Manufacturer, specifications of hardware devices like RAM (Memory), ROM drives graphic cards, sound cards)</p> <p><b>Experiment No 4:</b> <span style="float: right;"><b>2 Lab Session</b></span> Assembling and disassembling the desktop system <b>Level No. 01:</b> Assembling CPU (Processor), RAM (Memory), ROM, Drives, graphic cards, sound cards and connecting with mother board. <b>Level No. 02:</b> Disassembling the desktop system.</p> <p><b>Experiment No 5:</b> <span style="float: right;"><b>1 Lab Session</b></span></p>				

  
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	<p>To demonstrate BIOS setup program  <b>Level No. 01:</b> Learn to use the BIOS SETUP program  <b>Level No. 02:</b> Configure the BIOS SETUP for given specification.  <b>Experiment No 6:</b> <span style="float: right;"><b>2 Lab Session</b></span>  Identify the computer hardware problems and trouble shoot.  <b>Level No 01:</b> Trouble shoot simple problems – (computer won't turn on, Turns on but still does not work, Screen freezes, CMOS error, Missing operating system, Hard drive not detected)  <b>Level No. 02:</b> Trouble shoot complex problems –(Booting infinite, resetting system clock, overheating of PC, dysfunctional of USB port )</p> <p><b>Experiment No 7:</b> To Install different operating system and drivers <span style="float: right;"><b>3 Lab Session</b></span>  <b>Level No 01:</b> Partitioning the hard disk and Installation of windows operating system.  <b>Level No 02:</b> Partitioning the hard disk and Installation of Linux Operating system.</p> <p><b>Experiment NO 8:</b> <span style="float: right;"><b>1 Lab Session</b></span>  To share folders and control the resources through network.  <b>Level No 01:</b> Sharing of folders, printers and scanners  <b>Level No 02:</b> Granting privileges to access resources.</p>
<p><b>Targeted Application &amp; Tools that can be used:</b></p> <p>Targeted employment sector is processor manufacturing and memory chip fabrication vendors like Intel, AMD etc. Targeted job profiles include hardware engineers and network administrator.</p> <p><b>Speccy-</b> is a <b>free system information tool. That gives information about design, portable support and a detailed list of hardware and software components.</b></p> <p><b>ASTRA32-</b> is a <b>free system information tool that shows detail on numerous devices and other parts of the system.</b></p>	
<p><b>Text Book-</b></p> <p>Govindarajulu. B., IBM PC and Clones Hardware trouble shooting and maintenance, McGraw Hill, New Delhi,</p> <p>Mueller.S, Upgrading and repairing PCS, 4th Edition, Prentice Hall.</p>	
<p><b>References</b> <a href="https://www.cpubid.com/software/cpu-z.html">https://www.cpubid.com/software/cpu-z.html</a>  <a href="https://www.chtips.com/">https://www.chtips.com/</a></p>	
<p><b>Entrepreneurship:</b> Students can become entrepreneur in the computer hardware field.  <b>Skill Development:</b> Practical hands on assembling, troubleshooting makes them computer hardware professionals.  <b>Human Values &amp; Professional ethics:</b> Set of standard procedures to assemble and trouble shoot the computer hardware components.</p>	
<p><b>Catalogue prepared by</b></p>	<p>Prof. Shanmugarathnam, Prof. Mohammed Mujeer ulla, Prof. Afroz Pasha, Prof. Preeti, Prof. Muthupandi</p>
<p><b>Recommended by the Board of Studies on</b></p>	<p>BOS NO: 11 th. BOS held on 23/4/21</p>
<p><b>Date of Approval by the Academic Council</b></p>	<p>Academic Council Meeting No. 14, Dated 21/5/21</p>

  
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<b>Course Code:</b> CSE2001	<b>Course Title: Data Structures and Algorithms</b>			<b>L- P- C</b>	2	2	3
<b>Type of Course:</b> School Core <b>Theory-Integrated Laboratory</b>							
<b>Version No.</b>	1.0						
<b>Course Pre-requisites</b>	Java or Python						
<b>Anti-requisites</b>	NIL						
<b>Course Description</b>	<p>The purpose of the course is to provide the fundamental concepts of data structures and algorithm, to emphasize the importance of choosing an appropriate data structure and algorithm for program development.</p> <p>The student should have basic programming skills, to solve engineering/computational problems.</p> <p>The associated laboratory provides an opportunity to implement the concepts and enhance critical thinking and analytical skills.</p> <p>With a good knowledge in the fundamental concepts of data structures and algorithm the student can gain practical experience in implementing them, enabling the student to be an effective designer, developer for new software applications.</p>						
<b>Course Outcomes</b>	<p>On successful completion of this course the students shall be able to:</p> <ol style="list-style-type: none"> <li>1. Understand the basic concepts of data structures and algorithms</li> <li>2. Apply an appropriate linear data structure for a given computation.</li> <li>3. Apply an appropriate non-linear data structure for a given computation</li> <li>4. Apply various searching &amp; sorting techniques for a given problem.</li> </ol>						
<b>Course Content:</b>							
<b>Module 1</b>	Fundamentals of Data Structure (Comprehension)	Assignment	Programming Task	<b>06 Classes</b>			
<b>Topics:</b> Data Management concepts, Data types – primitive and non-primitive, Types of Data Structures- Linear & Non Linear Data Structures. Recursion: Recursive Definition and Processes, Programming examples. Fundamentals of Algorithmic problem solving, Important Problem types.							
<b>Module 2</b>	Linear Data Structure Stack, Queues & Linked List (Application)	Case Study	Programming Task	<b>08 Classes</b>			
<b>Topics:</b> Stack- Concepts and representation, Stack operations, stack implementation using array. Applications of Stack. Queues- Representation of queue, Queue Operations, Queue implementation using array, Types of Queue, Applications of Queue. Linked List- Singly Linked List, Operation on linear list using singly linked storage structures, Doubly Linked List, Circular List, Applications of Linked list.							
<b>Module 3</b>	Non-linear Data Structures – Trees (Application)	Assignment	Programming Task	<b>03 Classes</b>			

  
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Topics:  
Introduction to Trees, Binary tree: Terminology and Properties, Binary tree traversals: Pre-Order traversal, In-Order traversal, Post-Order traversal.

<b>Module-4</b>	Non-linear Data Structures – Graphs (Comprehension)	Assignment	Programming Task	<b>02 Classes</b>
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Topics:  
Graph – Basic Concept of Graph Theory and its Properties, Representation Of Graphs.

<b>Module-5</b>	Searching & Sorting Performance Analysis and Management (Comprehension)	Assignment	Programming Task	<b>06 Classes</b>
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Topics:  
Sorting & Searching: Performance Analysis and Management - Time and space analysis of algorithms – Average, best and worst case analysis. Searching – Sequential Search and Binary Search, Sorting – Bubble Sort, Selection Sort.

**List of Laboratory Tasks:**

**Lab sheet 1:** [02 Classes ]

To implement the Programs on User define functions

Level 1: Implement a program to compute factorial using functions.

Level 2: Implement a program to pass array to a function and manipulate the data in array.

**Lab sheet 2:** [02 Classes ]

To implement the Programs on User define functions

Level 1: Implement a program to compute factorial using recursion.

Level 2: Implement a program to solve towers of Hanoi using recursion.

**Lab sheet 3:** [04 Classes ]

To implement the Programs on Stack.

Level 1: Implement the operations of the Stack.

Level 2: Implement the evaluation of postfix expression

**Lab sheet 4:** [04 Classes ]

To implement the programs on Queue.

Level 1: Implement all the operations of the Queue

Level 2: Issuing token for doctor appointment.

**Lab sheet 5:** [06 Classes ]

To implement the Programs on Linked List.


Level 1: Implement all the operations of the Singly Linked List



Level 2: Implement Stack and Queue with Linked List.	
<b>Lab sheet 6:</b> To implement the Programs on Trees and Traversals Level 1: Implement construction of the Binary tree. Level 2: Implement tree traversals.	<b>[04 Classes ]</b>
<b>Lab sheet 7:</b> To study and implement the Programs on Graphs. Level 1: Program to implement graph	<b>[2 Classes]</b>
<b>Lab sheet 8:</b> To analyze time complexity and implement the Programs on searching and sorting. Level 1: Program on searching and sorting. Level 2: To analyze the time complexity.	<b>[6 Classes ]</b>
<b>Targeted Application &amp; Tools that can be used:</b> <b>System software and Application software Programming</b> <b>Professionally Used Software : Eclipse / Jupyter notebook IDE</b>	
<b>Project work/Assignment:</b>	
<ol style="list-style-type: none"> <li><b>1. Problem Solving: Choose an appropriate data structure and implementation of programs.</b></li> <li><b>2. Programming: Implementation of given scenario using Java or python</b></li> </ol>	
<b>REFERENCE MATERIALS: Text Book(s):</b>	
<ol style="list-style-type: none"> <li>1. Goodrich, Tamassia, Goldwasser “Data Structures &amp; Algorithms in Java” Wiley, sixth edition, January 2014.</li> <li>2. Anany Levitin, “Introduction to the Design and Analysis of Algorithms”, Pearson Education.</li> </ol>	
<b>References</b>	
<ol style="list-style-type: none"> <li>1. Kurt Mehlhorn, and Peter Sanders “Algorithms and Data Structures The Basic Toolbox”, Springer-Verlag Berlin Heidelberg, 2008.</li> <li>2. Thomas H.Cormen, Charles E.Leiserson, Ronald L. Rivest and Clifford Stein, “Introduction to Algorithms”, PHI Learning Private Limited.</li> <li>3. R. Venkatesan, S. Lovelyn Rose, ”Data Structures” Wiley, Second edition, January 2019.</li> </ol>	
Topics relevant to development of “ <b>Foundation Skills</b> ”- Data types, Recursion and Fundamentals of Algorithmic problem solving “ <b>Skill Development</b> ” – Implementation Linear and nonlinear data structure, “ <b>Employability</b> ”-Linear & Nonlinear Data Structure	
<b>Catalogue prepared by</b>	Dr. Nagaraja S R Mr. Asif Mohamed H B Mr. Amogh Pramod Kulkarni Mrs. Yashaswini K A Dr. Mahalakshmi R
<b>Recommended by the Board of Studies on</b>	BOS NO: 11 th. BOS held on 23/4/21
<b>Date of Approval by the Academic Council</b>	Academic Council Meeting No. 14, Dated 21/5/21

  
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<b>Course Code:</b> CSE2006	<b>Course Title: Data Structures</b>		<b>L- P- C</b>	3	4	5
	<b>Type of Course: Program Core Theory &amp; Integrated Laboratory</b>					
<b>Version No.</b>	1.0					
<b>Course Pre-requisites</b>	Pre requisites: One week Orientation classes on Foundations, Revisiting C Language, Arrays, Loops, Functions.					
<b>Anti-requisites</b>	NIL					
<b>Course Description</b>	The purpose of this Course is to provide the students with solid foundations in data structures. It focuses on logical structures of data, their physical representation, design of algorithms and techniques for program development and debugging. Emphasis is placed on the appropriate use and choice of standard data structures. The course develops the critical thinking and analytical skills. The course also enhances the programming abilities through assignments. The associated laboratory provides an opportunity to validate the concepts Taught and enhances the ability to visualize and analyze the Data Structures Results.					
<b>Course Outcomes</b>	On successful completion of this course the students shall be able to: 1. Implement modularized solutions for given problem using structures and pointers. 2. Apply an appropriate linear data structure for a given computation. 3. Apply an appropriate non-linear data structure for a given computation 4. Identify the need for heap and hash functions for given computational scenario					
<b>Course Content:</b>						
<b>Module 1</b>	Introduction to Programming Fundamentals	Continuous Assessment	Programming Task	<b>12 classes</b>		
<b>Topics:</b> Structures and Unions: Introduction, Defining a Structure, Declaring Structure Variables, Accessing Structure Members, Structure Initialization, Size of Structures, Array of Structures, Arrays within Structures, Structures within Structures, Structures and Functions, Unions. Pointers: Introduction, Understanding Pointers, Accessing the Address of a Variable, Declaring Pointer Variables, Initialization of Pointer Variables, Accessing a Variable through the Pointer, Pointer Increments, Pointers and Arrays, Pointer as Function Arguments, Functions Returning Pointers, Pointers and Structures, Enumerations, ADT, Recursion: Recursive Definition and Processes, Recursion in C – factorial, Fibonacci numbers, Towers of Hanoi.						
<b>Module 2</b>	Application of Linear Data Structure	Continuous Assessment	Programming Task and choose an appropriate linear data structure task	<b>12.Hours</b>		
<b>Topics:</b> Dynamic Memory Allocation: Introduction, Dynamic Memory Allocation, Allocating a Block of Memory: Malloc, Allocating a Multiple Blocks of Memory: Calloc, Releasing the Used Space: Free, Altering a size of Block: Realloc, Linked Lists: Inserting and Removing Nodes from a List, Linked Implementation of Stacks, push and pop Operations, Stack application, Linked Implementation of Queues, C Implementation of Queues using array, Circular Queue, Priority Queue, Doubly Linked lists.						
<b>Module 3</b>	Application of Non Linear Data Structure	Continuous Assessment	Programming Task and choose an appropriate non-linear data structure task	<b>8.Hours</b>		
<b>Topics:</b> Introduction to Graphs and Trees, Operations on Binary Trees, Applications of Binary Trees, BST, Implementation and Tree Traversal.						
<b>Module 4</b>	Introduction to Heaps and	Continuous Assessment	Programming Task	<b>4 Hours</b>		

  
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	Hashing Techniques			
Topics: Introduction to Heaps , Hash Tables				
<b>List of Laboratory Tasks:</b>				
<b>Lab sheet 1:</b>				
Programs on arrays				
Programs on Functions				
Programs on Structures				
Programs on Pointers				
<b>List of skill set:</b>				
i. Analyze the problem and draw the flowchart				
ii. Selecting the suitable data type, category of function				
iii. Develop the program.				
iv. Identifying errors and rectifying them.				
<b>Lab sheet 2:</b>				
Programs on Linked List				
Programs on Stack and queues				
<b>List of skill set:</b>				
i. Analyze the problem and draw the flowchart				
ii. Selecting the appropriate linear data structure and performing operations				
iii. Develop the program.				
iv. Identifying errors and rectifying them.				
<b>Lab sheet 3:</b>				
Programs on Trees and Traversals				
<b>List of skill set:</b>				
i. Analyze the problem and draw the flowchart				
ii. Developing the solution using trees				
Identifying errors and rectifying them.				
<b>Lab sheet 4:</b>				
Programs on Heaps and Hashing				
<b>List of skill set:</b>				
i. Analyze the problem and draw the flowchart				
ii. Developing the solution to the problem using heap and storing and retrieval using hashing				
iii. Identifying errors and rectifying them.				
<b>Targeted Application &amp; Tools that can be used:</b>				
<b>System and Application Programming</b>				
<b>C compilers</b>				
<b>Project work/Assignment:</b>				
<b>Continuous Assessment 1- Module 1</b>				
<b>Continuous Assessment 2- Module 2</b>				
<b>Continuous Assessment 3- Module 3</b>				
<b>Continuous Assessment 4- Module 4</b>				
<b>REFERENCE MATERIALS: Text Book(s):</b>				

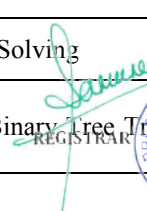
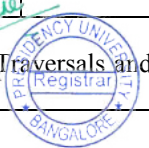
  
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Richard F Gilberg and Behrouz A Forouzan, “ <i>Data Structures: A Pseudocode Approach with C</i> ”, <i>Second Edition</i> , Cengage learning. ISBN-13: 978-0-534-39080-8, ISBN-10: 0-534-39080-3.	
<b>References</b>	
1. Robert L Kruse, Bruce P Leung and Clovis L Tondo, “ <i>Data Structures and Program Design in C</i> ”, Pearson.	
2. Seymour Lipschutz, “ <i>Data Structures with C (Schaum’s Outline Series)</i> ”, McGraw Hill Education.	
:	Mention the Weightages like, Test 1 25%, Test 2 : 25%, Assignment 25%, Term End Exam 25%
<b>Catalogue prepared by</b>	Dr. Nagaraja S R Asst.Professor,Dept of CSE
<b>Recommended by the Board of Studies on</b>	BOS NO: 11 th. BOS held on 23/4/21
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<b>Course Code:</b> CSE2007	<b>Course Title:</b> Design and Analysis of Algorithms			<b>L-P-C</b>	2	2	3
	<b>Type of Course:</b> 1] Program Core 2] Theory – Laboratory integrated						
<b>Version No.</b>	2.0						
Course Pre-requisites	<ul style="list-style-type: none"> <li>• <b>C programming</b></li> <li>• <b>Discrete mathematics.</b></li> <li>• <b>Data structure.</b></li> </ul>						
Anti-requisites	Nil						
Course Description	The main goal of this course is to study the fundamental techniques to design and analyze the efficient of algorithms and their running time. After a brief review of prerequisite material (search, sorting, asymptotic notation), solving various real time problems through various algorithmic techniques such as divide and conquer algorithms, dynamic programming, greedy algorithm etc.						
Course Out Comes	On successful completion of the course the students shall be able to: <ol style="list-style-type: none"> <li>1) Analyze the asymptotic performance of algorithms.</li> <li>2) Analyze the time and space complexity of an algorithm.</li> <li>3) Apply the different techniques of algorithm in solving real world problems.</li> <li>4) Summarize the performance of various real time problems using different algorithmic techniques.</li> </ol>						
<b>Course Content:</b>							
<b>Module 1</b>	Design of basic Tree and Graph problems	Assignment	Problem Solving	<b>08 Hours</b>			
Topics: Fundamentals of Algorithmic Problem Solving, Important Problem Types-Sorting, Searching, String Processing, Graph Problems, Combinatorial Problems, Fundamental Data Structures -Linear Data Structures, Graphs, Trees, Sets and Dictionaries. [ Blooms 'level selected: <b>Comprehension</b> ]							
<b>Module 2</b>	Analysis of Recursive and Non-recursive algorithms	Term paper/Assignment	Programming/ Problem Solving	<b>06Hours</b>			
Topics: Algorithm Design paradigms - motivation, concept of algorithmic efficiency, run time analysis of algorithms, Asymptotic Notations. Recurrences- substitution method. [ Blooms 'level selected: <b>Comprehension</b> ]							
<b>Module 3</b>	Divide-and-conquer	Term paper /Assignment	Programming/Problem Solving	<b>06 Hours</b>			
Topics: Structure of divide-and-conquer algorithms: examples; Binary search, quick sort, Merge sort, Binary Tree Traversals and Related Properties, Strassen's Multiplication. [ Blooms 'level selected: <b>Application</b> ]							

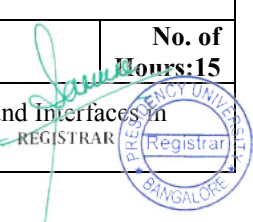
<b>Module 4</b>	Greedy Algorithms and Dynamic Programming	Term paper /Assignment	Problem Solving	<b>08Hours</b>
<p>Topics:  <b>Greedy Algorithms :</b>  Prim's Algorithm, Kruskal's Algorithm, Dijkstra's Algorithm.  <b>Dynamic Programming :</b>  The Knapsack Problem, Binomial coefficient, Warshall's and Floyd's Algorithms, Travelling sales person problem.  [ Blooms 'level selected: <b>Application</b>]</p>				
<b>Module 5</b>	Backtracking and Limitations of Algorithm	Term paper /Assignment	Problem Solving	<b>06Hours</b>
<p>Backtracking – n-Queens problem. Lower-Bound Arguments, Decision Trees, P , NP , and NP-Complete Problems,  [ Blooms 'level selected: <b>Comprehension</b>]</p>				
<p><b>List of Laboratory Tasks:</b></p> <p><b>Experiment No 1:</b> Apply non recursive algorithmic designing technique to solve Linear Search, finding max element problem and calculate the time efficiency (best, average &amp; worst). .[ <b>2 hours : Application Level</b>]  <b>Level 1: understanding and designing the algorithm.</b>  <b>Level 2: Implementing the algorithm and finding its efficiency.</b></p> <p><b>Experiment No. 2:</b> Apply Brute force algorithmic designing technique to sort elements using selection algorithm and calculate time (Best, average &amp; worst) efficiency. .[ <b>2 hours : Application Level</b>]  <b>Level 1: understanding and designing the algorithm.</b>  <b>Level 2: Implementing the algorithm and finding its efficiency.</b></p> <p><b>Experiment No. 3:</b> Apply divide and conquer algorithmic designing technique to sort elements using merge sort algorithm and calculate time (Best, average &amp; worst) efficiency.[ <b>2 hours : Application Level</b>]  <b>Level 1: Understanding merge sort using divide and conquer and designing the algorithm.</b>  <b>Level 2: Implementing the algorithm and finding its efficiency.</b></p> <p><b>Experiment No. 4:</b> Apply dynamic programming algorithmic designing technique to find binomial coefficient of a given number i.e <math>nCr</math> and calculate time (Best, average &amp; worst) efficiency [ <b>2 hours : Application Level</b>]  <b>Level 1: understanding dynamic problem, solve <math>nCr</math> problem and designing the algorithm.</b>  <b>Level 2: Implementing the algorithm and finding its efficiency.</b></p> <p><b>Experiment No. 5:</b> Apply dynamic programming algorithmic designing technique to find All pair Shortest Path for a given graph using Warshall's and Floyd's algorithm [ <b>2 hours : Application Level</b>]  <b>Level 1: understanding and designing the algorithm.</b>  <b>Level 2: Implementing the algorithm and finding its efficiency.</b></p>				

  
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<p><b>Experiment No.6:</b> Apply dynamic programming algorithmic designing technique for Solving 0/1 knapsack problem and find its efficiency [ 2 hours : Application Level]</p> <p><b>Level 1: understanding and designing the algorithm.</b></p> <p><b>Level 2: Implementing the algorithm and finding its efficiency.</b></p>	
<p><b>Experiment No. 7</b> Apply greedy algorithmic designing technique for Solving MST and single source shortest path problem by using – Dijkstra’s algorithm [ 2 hours : Application Level]</p> <p><b>Level 1: understanding and designing the algorithm.</b></p> <p><b>Level 2: Implementing the algorithm and finding its efficiency.</b></p>	
<p><b>Experiment No. 8:</b> Apply greedy algorithmic designing technique for constructing minimum spanning tree using prim’s algorithm and Kruskal’s algorithm [2 hours : Application Level]</p> <p><b>Level 1: understanding and designing the algorithm.</b></p> <p><b>Level 2: Implementing the algorithm and finding its efficiency.</b></p>	
<p><b>Experiment No. 9:</b> Apply backtracking algorithmic designing technique for solving queen’s problems for 4, 8 and 16 inputs. [2 hours : Application Level]</p> <p><b>Level 1: understanding and designing the algorithm.</b></p> <p><b>Level 2: Implementing the algorithm and finding its efficiency.</b></p>	
<p><b>Targeted Application &amp; Tools that can be used:</b></p> <p><b>Application Area is to Design and Analyzing the efficiency of Algorithms.</b></p> <p><b>Tools/Simulator used: GCC compiler.</b></p>	
<p><b>Project work/Assignment: Mention the Type of Project /Assignment proposed for this course</b></p>	
<p><b>3. Problem Solving: Design of Algorithms and implementation of programs.</b></p>	
<p><b>4. Programming: Implementation of given scenario using C.</b></p>	
<p><b>Text Book</b></p> <p><b>1.Thomas H.Cormen, Charles E.Leiserson, Ronald L. Rivest and Clifford Stein, “Introduction to Algorithms”, PHI Learning Private Limited.</b></p>	
<p><b>References</b></p> <p><b>1. Anany Levitin, “Introduction to the Design and Analysis of Algorithms”, Pearson Education.</b></p>	
<p>Topics relevant to development of “Foundation, skill Development, Employability”: Asymptotic Notations, Order of growth, P, NP Problems.</p> <p>Topics relevant to “ HUMAN VALUES &amp; PROFESSIONAL ETHICS”: Solving real time Problems &amp; Data collection for an assignment.</p>	
<b>Catalogue prepared by</b>	Dr.A.Jayachandran, Mr. Sunil Kumar R.M, Mr.Mrutunjaya, Mrs Preethi, Mrs Prakruthi, Mrs Smitha patil
<b>Recommended by the Board of Studies on</b>	BOS NO: 11 th. BOS held on 23/4/21
<b>Date of Approval by the Academic Council</b>	Academic Council Meeting No. 14, Dated 21/5/21

  
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<b>Course Code:</b> CSE2008	<b>Course Title: Programming in Java</b>			1-4-3			
	<b>Type of Course: Integrated</b>						
<b>Version No.</b>	1.0						
<b>Course Pre-requisites</b>	Basic knowledge of programming and data structure concept.						
<b>Anti-requisites</b>	NIL						
<b>Course Description</b>	This Course is designed for students who have prior programming experience. It introduces the concepts of object-oriented programming by focusing on the definition and use of classes along with the fundamentals of object-oriented design. Topics include: Control structures and data types, Object-oriented design- encapsulation and information-hiding, classes, objects, Constructor, Array, String, Inheritance, Polymorphism, Packages, Exception Handling, Thread, GUI						
<b>Course Out Comes</b>	On successful completion of the course the students shall be able to: 1) Use control structures and object oriented concepts. 2) Apply the concept of arrays, strings, polymorphism & inheritance to solve problems. 3) Use interface, packages for applications. 4) Demonstrate the concepts of error handling mechanism and multithreading. 5) Illustrate GUI applications and Collections to solve problems.						
<b>Course Content:</b>							
<b>Module 1</b>	INTRODUCTION	Assignment	Programming				<b>No. of Hours:15</b>
<p>Topics: Introduction to Object Oriented Programming, Java Evolution, and How Java differs from C++, Features of Java,</p> <p>Java Environment: Installing JDK (JVM, JRE), Java Source File Structure, Compilation and Execution of Java Programs.</p> <p>TOKENS: Data types, Variables, Operators, Control Statements, Command Line Arguments.</p> <p>CLASSES, OBJECTS, AND METHODS: Defining a class, access specifiers, instantiating objects, reference variable, accessing class members and methods, constructors, method overloading, static members, static methods, inner class, Wrapper class</p>							
<b>Module 2</b>	Arrays, Strings, inheritance and Polymorphism	Assignment	Programming				<b>No. of Hours:12</b>
<p>Topics: Defining an Array, Initializing &amp; Accessing Array, Multi –Dimensional Array.</p> <p>Operation on String, Mutable &amp; Immutable String, Creating Strings using StringBuffer or StringBuilder.</p> <p>Defining a subclass, types of Inheritance, method overriding, super keyword, dynamic method invocation, dynamic polymorphism, usage of final abstract and this keyword.</p>							
<b>Module 3</b>	Interfaces, Packages and Exception Handling	Assignment	Programming				<b>No. of Hours:15</b>
<p>Topics: Defining interfaces, extending an interface, Implementing interfaces. Organizing Classes and Interfaces in Packages, Package as Access Protection, Defining a Package, Library Packages, import packages.</p>							

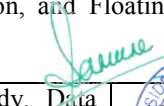



Exception handling: Introduction to Exceptions, Difference between Exceptions & Errors, Types of Exception. Handling Exceptions: Use of try, catch, finally, throw, throws. User Defined Exceptions, Checked and Un-Checked Exceptions.				
<b>Module 4</b>	MULTITHREADED PROGRAMMING:	Assignment	Programming	<b>No. of Hours:10</b>
Topics: Introduction to threads, life cycle of a thread, creating threads, extending the Thread Class, Implementing the “runnable” interface. Thread Priority, Thread synchronization, Inter communication of Threads				
<b>Module 5</b>	Collections and Graphic Programming	Assignment	Programming	<b>No. of Hours:13</b>
Introduction to Collections, Classification of Collection. List Interface, ArrayList Implementation, ArrayList without Generics, Generic ArrayList, Iteration and Boxing, Autoboxing and Unboxing, Set Interface, Map Interface. Introduction to the abstract window toolkit (AWT), Frames, Event-driven programming: Mouse and Key Event handling, Drawing geometric figures.				
<b>List of Laboratory Tasks:</b>				
<b>Experiment N0 1:</b>				
<b>Level 1:</b> Programming assignment with basic control structures.				
<b>Level 2:</b> Programming assignment with class, objects & methods.				
<b>Experiment No. 2:</b>				
<b>Level 1:</b> Programming assignment using Arrays and Strings.				
<b>Level 2:</b> Programming assignment using Inheritance and Polymorphism				
<b>Experiment No. 3:</b>				
<b>Level 1:</b> Programming assignment using Interface and Packages				
<b>Level 2:</b> Programming assignment using Exception Handling				
<b>Experiment No. 4:</b>				
<b>Level 1:</b> Programming assignment using MultiThreading				
<b>Experiment No. 5:</b>				
<b>Level 1:</b> Programming assignment using Collections				
<b>Level 2:</b> Programming assignment using Awt.				
<b>Targeted Application &amp; Tools that can be used:</b>				
<b>JDK (Java Development Tool kit),NETBEANS IDE</b>				
<b>Project work/Assignment: Mention the Type of Project /Assignment proposed for this course</b>				
<b>After completion of each module a programming based Assignment/Assesment will be conducted. A scenario will be given to the student to be developed as a Java Application.</b>				
<b>Text Book</b>				
1) Cay S Horstmann and Cary Gornell, “CORE JAVA volume I-Fundamentals”, Pearson.				
2) Cay S Horstmann and Cary Gornell, “CORE JAVA volume II-Advanced Features”, Pearson.				
<b>References</b>				
1)Herbert Schildt, “The Complete Reference Java 2”, Tata McGraw Hill Education.				
2)James W. Cooper, “Java TM Design Patterns – A Tutorial”, Addison-Wesley Publishers.				
<b>Catalogue prepared by</b>	Vinitha Dominic			

  
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<b>Recommended by the Board of Studies on</b>	BOS NO: 11 th. BOS held on 23/4/21
<b>Date of Approval by the Academic Council</b>	Academic Council Meeting No. 14, Dated 21/5/21

<b>Course Code:</b> CSE 2009	<b>Course Title: Computer Organization and Architecture</b>			<b>L- P- C</b>	3	0	3
	<b>Type of Course: Program Core &amp; Theory only</b>						
<b>Version No.</b>	1.0						
<b>Course Pre-requisites</b>	<b>Digital Design</b>						
<b>Anti-requisites</b>	<b>NIL</b>						
<b>Course Description</b>	This course covers basics of modern computer architecture and organization. The emphasis is on understanding the interaction between computer hardware and software at various levels. The students will learn the operational concepts of computer technology, performance evaluation, instruction set architecture, computer arithmetic, data path and control unit design of basic processing unit and enhancing performance with pipelining. The course concludes with a study of multiprocessors and multicores.						
<b>Course Outcomes</b>	On successful completion of the course the students shall be able to: 1] Explain the basic components of a computer, their interconnections, and machine instructions 2] Apply appropriate techniques to carry out selected arithmetic operations 3] Appreciate the organization of components such as processing unit and memory system 4] Explain the concept of pipelining, multicores and multiprocessors						
<b>Course Content:</b>							
<b>Module 1</b>	Basic Structure of computers	Assignment	Analysis, Case Study	<b>9 Hours</b>			
<b>Topics:</b> Computer Types, Functional Units, Basic Operational concepts, Bus Structures, Performance, Generation of Computers. Numbers, Arithmetic Operations and Characters.							
<b>Module 2</b>	Instruction Set Architecture and I/O Units	Assignment	Analysis, Case Study, Data Collection	<b>10 Hours</b>			
<b>Topics:</b> Instruction Set Architecture: Instructions and Instruction Sequencing, Instruction formats, Memory Instructions, Addressing Modes, Stacks and Subroutines. Input/output Design: Accessing I/O Devices, I/O communication, Interrupts, DMA.							
<b>Module 3</b>	Arithmetic Unit	Assignment	Analysis, Case Study, Data Collection	<b>7 Hours</b>			
<b>Topics:</b> Design of Fast Adders, Signed-Operand Multiplication, Fast Multiplication, Integer Division, and Floating point operations.							
<b>Module 4</b>	BPU and Memory Organization	Assignment	Analysis, Case Study, Data Collection	<b>10 Hours</b>			

  
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**Topics:**

Basic Processing Unit: Fundamental Concepts, Single Bus organization, Control sequence, Execution of a Complete Instruction, Multiple Bus Organization.

Memory System: Basic Concepts, Internal Organization of Memory chips, Read Only Memories, Memory Hierarchy, Cache Memories.

<b>Module 5</b>	Pipelining and Multiprocessing	Assignment	Analysis, Case Study, Data Collection	<b>6 Hours</b>
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**Topics:**

Pipelining: Overview of pipelining, 5 stage instruction pipeline, Hazards.

Multicores and Multiprocessors: Introduction to multicores and multiprocessors, Shared memory multiprocessors, Cluster and other message passing multiprocessors.

**Targeted Application & Tools that can be used:****Tools:**

- EasyCPU for the Intel 80X86 family of computer architecture
- RTLsim a data-path simulator for a MIPS like CPU
- RISC-V for ARM like RISC processors

Target Applications are System engineering and programming.

**Project work/Assignment:****Term Assignments:**

- **Comparative analysis of instruction set architecture (ISA) of CISC and RISC processors**

Carry out a thorough analysis of the internal organization and Instruction set Architecture of state-of the art CISC processors like VAX, PDP-11, Motorola 68k, Intel's x86 and the best in the market RISC architectures including DEC Alpha, ARC, AMD 29k, Atmel AVR, Intel i860, Blackfin, i960, Motorola 88000, MIPS, PA-RISC, Power, SPARC, SuperH, and ARM too.

- **A short survey of the recent trends in the Cache memory design**

Study and analyze few important present day cache memory design issues like the levels used, the mapping technique employed, read and write policies, coherency scenarios etc.

- **A case study on modern multi-core processors**

A deep look through into the architecture and working principles of modern multicore processors like MPC8641, Intel CE 2110 Media that consists of an Intel Xscale processor core and an Intel Micro Signal Architecture (MSA) DSP core etc., for example.

**Text Book**

1. "Computer Organization"- Carl Hamacher, Zvonko Vranesic, Safwat Zaky, Fifth Edition, McGraw-Hill Higher Education, 20016 reprint.
2. "Computer Organization and Design - The Hardware/Software Interface" - David A. Patterson & John L. Hennessy, Fifth Edition, Morgan Kaufmann, Elsevier Publications, 2017.

**References**

1. "Computer Organization & Architecture – Designing for Performance" - William Stallings, 9th Edition, Prentice Hall, Pearson Education Inc., 2015



<b>Catalogue prepared by</b>	Prof. Tapas Guha
<b>Recommended by the Board of Studies on</b>	BOS NO: 11 th. BOS held on 23/4/21
<b>Date of Approval by the Academic Council</b>	Academic Council Meeting No. 14, Dated 21/5/21

<b>Course Code: CSE2010</b>	<b>Course Title: Operating Systems</b>			<b>L- P- C</b>	3	0	3
	<b>Type of Course: Program Core and Theory Only</b>						
<b>Version No.</b>	1.0						
<b>Course Pre-requisites</b>	[1] Programming fundamentals: Pseudocode, Data Types and Operators, Selection Control Structures, Functions, Loops, Arrays, Structures. [2] C programming syntax and semantics [3] Data Structures: pointers, stacks, queues, linked lists						
<b>Anti-requisites</b>	NIL						
<b>Course Description</b>	<b>The purpose of this course is to enable the students to understand the need for Operating systems and to develop the basic concepts of process management, Synchronization and memory management. The course is both conceptual and analytical in nature towards Managing the Process and Memory and needs fair knowledge of programming fundamentals, C programming and data structures. The course develops the critical thinking and analytical skills on allocating and managing resources. The course also enhances the problem solving and systems programming abilities through assignments.</b>						
<b>Course Out Comes</b>	On successful completion of the course the students shall be able to: 1] Describe the fundamental concepts of Operating Systems. 2] Solve problems on various CPU Scheduling Algorithms. 3] Apply different techniques on to a various synchronization problems. 4] Discuss various memory management techniques.						
<b>Course Content:</b>							
<b>Module 1</b>	Introduction	Assignment	Programming/Data Collection	<b>9 Hours</b>			
Topics: Introduction to OS – Computer System Architecture , Operating System Structure, Operations,– Different management activities handled by the OS, Computing environments, Operating System Services, User and OS interface, System Calls and its types, System Programs[ loaders, linkers...], Overview of OS design and implementation.							
<b>Module 2</b>	Process Management	Coding Assignment/Case Study	Pseudocode/Programming	<b>9 Hours</b>			
Topics: Process Concept, Operations on Processes, Inter Process Communication, Introduction to threads - Multithreading Models, Process Scheduling– Basic concepts, Scheduling Criteria, Scheduling Algorithms: FCFS, SJF, SRTF, RR, Priority, Multilevel Queue, Multilevel Feedback Queue.							
<b>Module 3</b>	Process Synchronization and Deadlocks	Coding Assignment/Case Study	Pseudocode/Programming	<b>9 Hours</b>			

  
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Topics:

The Critical-Section Problem- Peterson's Solution, Synchronization hardware, Mutex locks, Semaphores, Monitors, Classical Problems of Synchronization. Introduction to Deadlocks, Deadlock Characterization, Methods for handling deadlock: Deadlock Prevention- Deadlock Avoidance- Deadlock detection & Recovery from Deadlock.

<b>Module 4</b>	Memory Management	Assignment/Case Study	Programming/Simulation/Data Collection	<b>9 Hours</b>
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Topics:

Introduction, Swapping, Contiguous and Non-Contiguous Memory Allocation, Segmentation, Paging - Structure of the Page Table – Demand Paging – Page Replacement, Allocation of Frames – Thrashing.

**Targeted Application:**

**Real time Applications such as traffic management system, banking system, health care and many more systems where there are entities that use and manage the resources.**

**Software Tools:**

1. 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.
2. 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**

- 1> **Develop programs to demonstrate the below concepts.**  
Process creation using fork() system call in Linux OS.  
IPC using POSIX shared memory API.  
Process synchronization using POSIX API.  
Monitors usage in JAVA/C#.  
Process creation using CreateProcess() system call in Windows OS.
- 2> **Develop your own CLI/Shell for Linux OS[like a mini BASH].**
- 3> **Download the Linux/ Fuchsia Kernel and compile and run.**
- 4> **Using POSIX Semaphores solve the below synchronization problem.**  
There are 3 processes [P1, P2, P3] having 3 statements S1, S2, S3. The requirement is that irrespective of the order of execution of the processes the statements should execute in the order S1, S2, and S3.
- 5> **Using POSIX Semaphores demonstrate the scenario where in deadlock happens because of incorrect use of the semaphores.**
- 6> **Write a C#/Java program to implement the algorithm you studied to solve the Dining Philosopher problem using Monitors.**
- 7> **Simulation of memory management techniques.**
- 8> **Simulating synchronization issues in banking system transactions and traffic management.**
- 9> **Installation of Windows 10, Linux.**

**Text Book**

1. Silberschatz A, Galvin P B and Gagne G, "Operating System Concepts", 9th edition Wiley, 2013.

**References**



1. Operating Systems   Internals and Design Principles   Ninth Edition   By Pearson Paperback – 1 March 2018. by William Stallings (Author)	
2. <a href="https://www.os-book.com/OS9/">https://www.os-book.com/OS9/</a>	
<b>Topics relevant to development of “Foundation Skill” and “Skill Development”:</b> Processes, Threads, CPU Scheduling, Synchronization, Memory Management.	
<b>Topics relevant to “Environment and Sustainability”:</b> Concepts of Multithreading, Deadlocks.	
<b>Catalogue prepared by</b>	Mr Sunilkumar Teggehalli, Mr Asif Mohamed H B, Mrs Sneha S Bagalkot, Mr Rupam Bhagawati.
<b>Recommended by the Board of Studies on</b>	BOS NO: 11 th. BOS held on 23/4/21
<b>Date of Approval by the Academic Council</b>	Academic Council Meeting No. 14, Dated 21/5/21

<b>Course Code:</b> CSE2012	<b>Course Title: Database Management Systems</b>			<b>L-P-C</b>	2	4	4
	<b>Type of Course: Program Core Theory–Laboratory integrated</b>						
<b>Version No.</b>	1.0						
<b>Course Pre-requisites</b>	Data Structures and Algorithms – Different ways of organizing the data and Selection methods.						
<b>Anti-requisites</b>	NIL						
<b>Course Description</b>	This course introduces the core principles and techniques required in the design and implementation of database systems. This introductory application-oriented course covers the relational database systems [RDBMS]. More emphasis is set on how to organize, maintain and retrieve the information efficiently. It helps the students to learn and practice data modeling and database designs. The associated laboratory is designed to implement database design using structured query languages in information technology applications. All the exercises will focus on the fundamentals for creating sophisticated, interactive, and secure database applications.						
<b>Course Out Comes</b>	On successful completion of the course the students shall be able to: 1] Describe the core concepts of relational database management systems. 2] Illustrate the design principles for Database design, ER Models and Normalization. 3]. Demonstrate query evaluation and query optimization techniques. 4] .Describe the concepts of Transaction management. 5] Develop a commercial relational database system.						
<b>Course Content:</b>							
<b>Module 1</b>	<b>Introduction to databases and Relational Algebra</b>	Assignment	Programming task	<b>8 Classes</b>			

  
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<p>Introduction to Database: Characteristics of database approach, Codd's Rules, Data Models, Schemas, and Instances, Data Modelling using Entities and Relationships, Relational database design using ER- Relational mapping, Query By Example(QBE).          Relational Algebra: Relational algebra operators, relational operations from set theory, binary relational operations: JOIN and DIVISION, examples of queries in relational algebra.</p>				
<b>Module 2</b>	<b>Schema Refinement</b>	Assignment	Problem Solving	<b>8 Classes</b>
<p>Normal Forms based on Primary Keys- (1NF,2NF, 3NF), Boyce-Codd Normal Form, Multi valued Dependency and Fourth Normal Form, Join Dependencies and Fifth Normal Form.</p>				
<b>Module 3</b>	<b>Query Processing And Optimization</b>	Assignment	Programming Task	<b>4 Classes</b>
<p>Query Processing and Optimization: Query interpretation, Equivalence of expressions, Algorithm for executing query operations.</p>				
<b>Module 4</b>	<b>Transaction Management.</b>	Assignment	Problem Solving	<b>6Classes</b>
<p>Transaction and System concepts, Desirable properties of Transactions, Concurrency control and recovery techniques-characterizing schedules based on recoverability and Serializability, Deadlock Prevention Schemes.</p>				
<p><b>List of Laboratory Tasks:</b>  <b>Experiment No 1:</b> To study and implement Data Definition Language commands of SQL.[4 Classes]  <b>Level 1:</b> Perform operations using Data Definition Language commands like Create, Alter and Drop on Student DB.  <b>Level 2:</b> Identify the given requirements; valid attributes and data types and Perform DDL operations on a given scenario. [Movie Databases]  <b>Experiment No. 2:</b> To implement Data Manipulation Language commands of SQL. [ 4 Classes]  <b>Level 1:</b> Perform operations using Data Manipulation Language commands like INSERT, UPDATE and DELETE on Student DB.  <b>Level 2:</b> identify valid DML operations to manipulate the data inside the tables to achieve expected requirement. [Movie Databases]  <b>Experiment No. 3.</b>To implement different types of SQL constraints. [ 4 Classes]  <b>Level 1:</b> Create tables on Banking database using PRIMARY KEY, NOT NULL, UNIQUE, FOREIGN KEY and Other Constraints.  <b>Level 2:</b> Identify different types of data and referential integrity constraints based on the requirement and create the tables as per the given scenario.[Music Databases]</p>				

  
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**Experiment No. 4: To study and implement SQL data retrieval using SELECT, FROM and WHERE clause. [ 4 Classes]**

**Level 1:** Illustrate the working of SELECT, FROM and WHERE clause on Banking Database.

**Level 2:** Implement SQL queries for Data Retrieval for a given Database using SQL clauses as per the given scenario.[Music Databases]

**Experiment No. 5: To Retrieve Data from Database using different types of operators. [ 4 Classes]**

**Level 1:** Demonstrate the working of relational, logical, pattern matching, BETWEEN, IS NULL, IN and NOT IN Special Operators on Banking Database.

**Level 2:** Implement SQL queries for Data Retrieval on a given Database using different types of operators.

**Experiment No. 6: To study and implement aggregating Data using Group by, HAVING and sort data using Order By Clauses. [ 4 Classes]**

**Level 1:** Implement the conjugate of GROUP BY, ORDER BY and aggregate functions on Banking Database.

**Level 2:** Implement SQL queries for Data Retrieval on a given Database using appropriate clauses and aggregate functions.[Library databases]

**Experiment No. 7: To study and implement different types of Set and Join Operations [ 4 Classes]**

**Level 1:** Demonstrate different types of Set Operations (UNION, UNION ALL, INTERSECT, MINUS) and Join Operations (INNER JOINS, OUTER JOINS, CROSS JOIN, NATURAL JOIN). Use Bank Database.

**Level 2:** Use Set and Join operations to retrieve the data from two or more relations as per the given scenario..[Library databases]

**Experiment No. 8: To Retrieve Data from a given Database using Nested queries, Correlated queries. [ 4 Classes]**

**Level 1:** Implement Data Retrieval using Nested and Correlated queries on a given Database.[Airline Database]

**Level 2:** Analyze the difference between nested query, correlated query choose the appropriate one as per the Mini Project domain

**Experiment No. 9: To study and implement Views, Procedures, Functions and Triggers in SQL [ 4 Classes]**

**Level 1:** Implement SQL Views, Procedures, Functions and Triggers in SQL on Employee database.

**Level 2:** Analyze the requirement and construct views, Procedures, Functions and Triggers- Mini Project Domain.

**Targeted Application & Tools that can be used:**

**Application Area: Relational database systems for Business, Scientific and Engineering Applications.**

**Tools/Simulator used: Mysql.**

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

- 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 given scenario using SQL.**
- 3. Mini project: Build a real time database application using suitable frontend tool. Indicative areas include; health care, education, industry, Library, Transport and supply chain, etc.**

**Text Book**

- 1. Elmasri R and Navathe S B, "Fundamentals of Database System", 7<sup>th</sup> Edition, 2016 Pearson Publication.**

**References**

- 1. Database systems, the complete book- 2nd edition- Hector Garcia Molina, Jeffery D Ullman, Jennifferwidom. Pearson publication.**

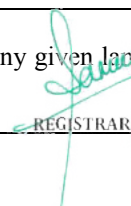



<b>2. Database System Concepts 7th Edition, 2019, AviSilberschatz · Henry F. Korth · S. Sudarshan. McGraw-Hill</b>	
<p><b>Topics relevant to development of “FOUNDATION SKILLS”:</b> S - Skill Development: Relational database design using ER- Relational mapping, Query By Example (QBE). Implementation of given scenario using SQL.</p> <p><b>Topics relevant to development of Employability:</b> Administer, test and implement computer databases, creating sophisticated, interactive and secure database applications</p> <p><b>Topics relevant to “ HUMAN VALUES &amp;PROFESSIONAL ETHICS:</b> Nil</p>	
<b>Catalogue prepared by</b>	<ol style="list-style-type: none"> <li>1. Dr.R.Mahalakshmi</li> <li>2. Mr. Mrutyunjaya M S.</li> <li>3. Dr. Manujakshi B C.</li> <li>4. Ms. Napa lakshmi.</li> <li>5. Mr. James Mathew.</li> <li>6. Ms. Shaleen Bhatnagar.</li> </ol>
<b>Recommended by the Board of Studies on</b>	BOS NO: 11 th. BOS held on 23/4/21
<b>Date of Approval by the Academic Council</b>	Academic Council Meeting No. 14, Dated 21/5/21

<b>Course Code:</b> CSE2018	<b>Course Title: Theory of Computations</b>	<b>L- P- C</b>	3	0	3
<b>Version No.</b>	1.0				
<b>Course Pre-requisites</b>	[1] Set Theory [2] Discrete mathematics [3] Data Structures				
<b>Anti-requisites</b>	NIL				
<b>Course Description</b>	This is an introductory Course for the study of formal languages and the correspondence between language classes and the automata that recognize them. Formal definitions of grammars and acceptors, Deterministic and Nondeterministic systems, Regular Expression, Grammar ambiguity, normal forms; finite state and push-down automata; Turing machines.				
<b>Course Out Comes</b>	<p>On successful completion of the course the students shall be able to:</p> <ol style="list-style-type: none"> <li>1] Describe various components of Automata.</li> <li>2] Construct Finite Automata for the given Language.</li> <li>3] Distinguish between Regular Grammar and Context Free Grammar</li> <li>4] Construct Push Down Automata.</li> <li>5] Construct Turing machine for a Language</li> </ol>				

  
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<b>Course Content:</b>				
<b>Module 1</b>	Introduction to Automata Theory	Assignment	Data Collection	<b>6 Hours</b>
<p>Topics: Introduction to Automata Theory, Applications of Automata Theory, Alphabets, Strings, Languages &amp; operations on languages, Representation of automata, Language recognizers, Example for language Recognizers.</p>				
<b>Module 2</b>	Finite Automata	Case Study	Simulation	<b>13 Hours</b>
<p>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 Acceptor, Languages and NFA's Why Non-determinism, Equivalence of Deterministic and Nondeterministic Finite Accepters, Reduction of the Number of States in Finite Automata.</p>				
<b>Module 3</b>	Regular Expressions & Context Free Grammar	Case study	Programming	<b>12 Hours</b>
<p>Topics: Formal Definition of a Regular Expression, Languages Associated with Regular Expressions, Closure Properties of Regular Languages, Pumping Lemma, Context Free Grammars-Examples of Context-Free Languages, Leftmost and Rightmost Derivations, Derivation Trees, Ambiguity in Grammars and Languages, Chomsky Normal Form, Greibach Normal Form</p>				
<b>Module 4</b>	Push Down Automata	Case Study	Simulation	<b>8 Hours</b>
<p>Topics: Definition of a Pushdown Automaton, Language Accepted by a Pushdown Automaton, Pushdown Automata for Context-Free Languages, and Context-Free Grammars for Pushdown Automata, Nondeterministic Pushdown Automata and Deterministic Pushdown Automata.</p>				
<b>Module 5</b>	Turing Machine	Case Study	Programming/Simulation	<b>7 Hours</b>
<p>Topics: Definition of a Turing Machine, Turing Machines as Language Accepters, Example Languages to construct Turing machine, Turing Machines as Transducers ,example Transducers</p>				
<p><b>Targeted Application &amp; Tools that can be used:</b></p> <p>[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.</p>				
<p><b>Project work/Assignment:</b></p>				
<p>1. Simulate deterministic finite automata / Push down automata / Turing machine for any given language using JFLAP software simulation tool. The input to the program will be,</p>				

  
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<ul style="list-style-type: none"> <li>i. The number of states</li> <li>ii. The set of alphabets</li> <li>iii. The transitions on each state</li> <li>iv. The initial and the final state</li> <li>v. Verification of accepting and rejecting strings for the designed automata.</li> </ul> <p>The output to the program will be,</p> <ul style="list-style-type: none"> <li>i. Acceptance/Rejection of the string</li> <li>ii. States traversed by the string for that input string.</li> </ul> <p>2. Design and develop a program to convert non-deterministic finite automata to deterministic finite automata and also simulate NFA to DFA Conversion using JFLAP</p>	
<p><b>Text Book</b></p> <ul style="list-style-type: none"> <li>1. Peter Linz, “An introduction to Formal Languages and Automata”, Jones and Bartlett Publications 5th Ed, 2011.</li> </ul>	
<p><b>References</b></p> <ul style="list-style-type: none"> <li>1. Aho, Ullman and Hopcroft, “Theory of Computation”, Pearson India 2nd Ed,2001.</li> <li>2. Michael Sipser, “Theory of Computation”, Cengage India 2nd Ed, 2012.</li> </ul>	
<p><b>Catalogue prepared by</b></p>	<p>Dr. Manujakshi B C, Ms. Thasni Dr. S.P. Anandaraj</p>
<p><b>Recommended by the Board of Studies on</b></p>	<p>BOS NO: 11 th. BOS held on 23/4/21</p>
<p><b>Date of Approval by the Academic Council</b></p>	<p>Academic Council Meeting No. 14, Dated 21/5/21</p>

  
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<b>Course Code:</b> CSE2027	<b>Course Title: Fundamentals of data analysis</b>					
	<b>Type of Course: Program Core &amp; theory only Discipline elective</b>		<b>L- P- C</b>	3	0	3
<b>Version No.</b>	1.0					
<b>Course Pre-requisites</b>	Basic statistics for simple operations.					
<b>Anti-requisites</b>	NIL					
<b>Course Description</b>	<p>This course is designed to provide the core concepts of data analysis . Initially train them with basic functionalities, 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 analysis in Excel, will help the students to apply their knowledge to a wide range of business applications</p> <p>The topics include, All about data, basic functions and techniques, analysis techniques to datasets, manipulate and prepare datasets, Visualize data through conditional formatting and charts - organize data interactively with tables and pivot tables- implement scenarios with what-if analysis-analyze data with statistical and probabilistic add-in tools - optimize formula results with solver/goal seek add-in. Build presentation ready dashboards ,create own formulas ,turn real world data into business insights , learn to use appropriate charts.</p>					
<b>Course Out Comes</b>	<p>On successful completion of the course the students shall be able to:</p> <ol style="list-style-type: none"> <li>1). <b>Apply basic excel functions pertaining to fundamental data analysis</b></li> <li>2). <b>Interpret data using appropriate statistical methods</b></li> <li>3). <b>Demonstrate the collection, processing and analysis of data for any given application.</b></li> <li>4). <b>Illustrate various charts using visualization methods.</b></li> <li>5). <b>Apply scenario based analysis techniques for rational decision making.</b></li> </ol>					
<b>Course Content:</b>						
<b>Module 1</b>	: Introduction to Data Analysis	Assignment	Data Collection , data analysis task	<b>8 classes</b>		
Topics: Introducing Data, overview of data analysis, Random number generation, rank and percentile. Building tables for data analysis, manipulate and prepare datasets.						
<b>Module 2</b>	Statistical functions	Assignment	Data Collection,Formulation	<b>9 classes</b>		
Topics: Create your own formulas, troubleshooting formulas, enhancing formulas with functions (R1), Basic functions and related lab works. Sampling Techniques: Fundamental Definitions, Important sampling distributions concept of standard error, Descriptive Statistics, Inferential Statistics (T test, Z test,)						
<b>Module 3</b>	Data Collection, Processing and Analysis	Assignment	Data Collection data analysis	<b>8 classes</b>		
Topics: Collection of Primary Data( Observation Method, Interview Method, Collection of Data through Questionnaires ,Collection of Data through Schedule) Difference between Questionnaires and Schedules, Some Other Methods of Data Collection, Collection of Secondary Data ,Difference between Survey and Experiment Processing Operations, correlation, Linear Regression Multiple Regression (t1)						





<b>Module 4</b>	Data Visualization and Charting	Assignment	Data Collection, data analysis	<b>9 classes</b>
Topics: Types of charts and their significance. Organize data interactively with tables -, visualizing data with charts, analyzing data with pivot tables, Build presentation ready dashboards, and turn real world data into business insights, Tracking trends and making forecasts, Interpretation and report writing.				
<b>Module 5</b>	Decision Making	Assignment	Data analysis with optimisation	<b>6 classes</b>
Topics: Introduction to decision making: Implement scenarios with what-if analysis, analyze data with statistical and probabilistic add-in tools, Case studies on Portfolio selection, Optimize formula results with solver/goal seek add-in.				
<b>Targeted Application &amp; Tools that can be used:</b> <b>Application Area is data analytics and business analytics, Statistical modelling.</b>				
<b>Project work/Assignment: Mention the Type of Project /Assignment proposed for this course</b>				
<b>1. Collection of data and applying inferential and descriptive statistics.</b> <b>2. Collecting the appropriate data for the objective , analyze and interpret and visualize the data.</b> <b>3. Collect the data and predict the values with linear regression.</b>				
<b>Text Book</b> 1. Data Analysis and business modelling using Microsoft Excel – Hansa Lysander-PHI,2017				
<b>References</b> 1. Excel Data Analysis-visual blue print –Paul McFedries –Wiley 4 <sup>th</sup> Edition September 2019 2. Analyzing Business Data with Excel - Gerald Knight - O'Reilly; 1 <sup>st</sup> Edition,13 January 2006 3. <a href="https://people.highline.edu/mgirvin/AllClasses/348/348/AllFilesBI348Analytics.htm">https://people.highline.edu/mgirvin/AllClasses/348/348/AllFilesBI348Analytics.htm</a>				
<b>Catalogue prepared by</b>	Mrs.MANASA C M			
<b>Recommended by the Board of Studies on</b>	BOS NO: 11 th. BOS held on 23/4/21			
<b>Date of Approval by the Academic Council</b>	Academic Council Meeting No. 14, Dated 21/5/21			

  
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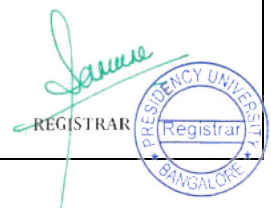

<b>Course Code:</b> CSE3092	<b>Course Title:</b> Programming in Python and its applications			1	4	3
	<b>Type of Course:</b> Program Core Theory & Integrated Laboratory		<b>L- P- C</b>			
<b>Version No.</b>	1.0					
<b>Course Pre-requisites</b>	Basic knowledge of C-programming language					
<b>Anti-requisites</b>	NIL					
<b>Course Description</b>	<p>The purpose of this course is to enable the students to develop python scripts using its powerful programming features and also to familiarize the Python IDLE and other soft wares. This course aids to advance critical thinking and analytical skills to enhance the programming abilities.</p> <p>The associated laboratory provides an opportunity to validate the concepts taught and enhances the ability to build real time applications.</p>					
<b>Course Outcomes</b>	<p><b>On successful completion of this course the students shall be able to:</b></p> <ol style="list-style-type: none"> <li>Summarize the basic Concepts of python</li> <li>Demonstrate proficiency in using various programming constructs and data structures such as string, lists, tuples, sets and dictionaries.</li> <li>Outline user-defined functions using concepts of file processing with exception handling.</li> <li>Identify the Libraries for Specific Applications.</li> </ol>					
<b>Course Content:</b>						
<b>Module 1</b>	Introduction to Python	Assignment	Programming	<b>10 Classes</b>		
Topics: Data types, operators and Expressions, Input and Output Statements. Control Structures – Selective and Repetitive structures						
<b>Module 2</b>	Indexed and Associative Data Structures	Simple applications	Programming	<b>20 Classes</b>		
Topics: Strings, Lists, Sets, Tuples, Dictionaries						
<b>Module 3</b>	Functions, Files and Exception handling	Case study	Programming	<b>10 Classes</b>		
Topics: User defined functions, recursive functions, File processing and exception handling						
<b>Module 4</b>	Working with Python libraries	Project work	Programming	<b>20 Classes</b>		
<p>Topics: Data Analysis using Numpy and xlrd; Visualization using Pandas and matplotlib; Data structure concepts - Searching and Sorting algorithms, Recursion, Stack, Queues and Trees.</p> <p>Mini Project( Level-1): Build a countdown timer using recursion</p> <p>Mini Project( Level-2): Job Scheduler using Binary Search Trees(BST)</p>						
<b>List of Laboratory Tasks:</b>						

  
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Sl. No.	Experiment Name
1	PROGRAMS ON OPERATORS AND EXPRESSIONS Level - 1 : Basic programs on Operators and Expressions Level - 2 : Develop applications to solve mathematical equations
2	PROGRAMS ON CONTROL STRUCTURES Level - 1 : Basic programs on Control structures Level - 2 : Create applications to solve the real time problems
3	PROGRAMS ON SELECTIVE AND REPETITIVE STRUCTURES Level - 1 : Basic programs on Selective and Repetitive structures Level - 2 : Create applications to solve the real time problems
4	PROGRAMS ON STRINGS Level - 1 : Basic programs on Strings and its manipulation Level - 2 : Develop Real world applications that involves string matching
5	PROGRAMS ON LISTS, TUPLES and SETS Level - 1 : Basic programs on lists, Tuples and Sets Level - 2 : Create applications that involves sequential and Random access of data
6	PROGRAMS ON DICTIONARIES Level - 1 : Basic programs on dictionaries Level - 2 : Create applications that involves structuring of data.
7	PROGRAMS ON FUNCTIONS Level - 1 : Basic programs on Functions Level - 2 : Develop Real world applications using functions
8	PROGRAMS ON FILES AND EXCEPTION HANDLING Level - 1 : Basic programs on File processing Level - 2 : Develop applications that involves exception handling
9	PROGRAMS ON DATA VISUALIZATION Level - 1 : Simple applications to visualize the data in the form of graphs Level - 2 : Create applications to see and understand trends, outliers, and patterns in data
10	PROGRAMS ON SEARCHING AND SORTING TECHNIQUES Level - 1 : Basic programs on searching and sorting techniques Level - 2 : Create applications using searching and sorting algorithms

**Targeted Application & Tools that can be used:**

- **Application Areas:**
- Web Development
- Game Development
- Scientific and Numeric Applications
- Artificial Intelligence and Machine Learning



- Software Development
- Enterprise-level/Business Applications
- Education programs and training courses
- Language Development
- Operating Systems
- Web Scrapping Applications
- Image Processing and Graphic Design Applications

**Professionally Used Software: Python IDLE, Spyder, Jupyter Notebook, Google Colab**

**Project work/Assignment:**

**Project Assignment: Developing Real world applications using python**

**Text Books:**

- Charles Dierbach, “Introduction to Computer Science Using Python”, Wiley India Edition, 2015.

**References:**

5. E. Balagurusamy, “Introduction to Computing and Problem Solving Using Python”, Tata McGraw-Hill, 2016
6. Y. Daniel Liang, “Introduction to Programming Using Python”, Pearson, 2017
7. Wes McKinney, “Python for Data Analysis: Data Wrangling with Pandas, NumPy and Ipython”, O’Reilly, 2nd Edition, 2012.
8. Python Tutor - Visualize Python, Java, C, C++, JavaScript, TypeScript, and Ruby code execution
9. <https://practice.geeksforgeeks.org/courses/Python-Foundation>

**Topics relevant to development of “FOUNDATIONS SKILLS”- Solve the real time problems by analyzing and visualizing the data.**

**Topics relevant to “HUMAN VALUES & PROFESSIONAL ETHICS”- Data collection and its arrangement**

<b>Catalogue prepared by</b>	Ms. GANGA V C, Ms. PALLAVI M, Ms. NAPALAKSHMI
<b>Recommended by the Board of Studies on</b>	BOS NO: 11 th. BOS held on 23/4/21
<b>Date of Approval by the Academic Council</b>	Academic Council Meeting No. 14, Dated 21/5/21

  
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<b>Course Code:</b> CSE2009	<b>Course Title: Computer Organization and Architecture</b>			<b>L- P- C</b>	3	0	3
<b>Version No.</b>	1.1						
<b>Course Pre-requisites</b>	CSE 2015 Digital Design						
<b>Anti-requisites</b>	<b>NIL</b>						
<b>Course Description</b>	This course introduces the core principles of computer architecture and organization from basic 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.						
<b>Course Outcomes</b>	On successful completion of the course the students shall be able to: 1] Describe the basic components of a computer, their interconnections, and instruction set architecture [ Comprehension] 2] Apply appropriate techniques to carry out selected arithmetic operations 3] Explain the organization of memory and processor sub-system						
<b>Course Content:</b>							
<b>Module 1</b>	Basic Structure of computers	Assignment	Data Analysis task	<b>6 Classes</b>			
<b>Topics:</b> Functional Units, Basic Operational concepts, Bus Structures, Performance, CISC and RISC, Generation of Computers.							
<b>Module 2</b>	Instruction Set Architecture and I/O Unit	Assignment	Analysis, Data Collection	<b>12 Classes</b>			
<b>Topics:</b> Instruction Set Architecture: Instructions types and Instruction Sequencing, Instruction formats, Addressing Modes, Stacks and Subroutines. Input/output Design: Accessing I/O Devices, I/O communication, Interrupts, DMA.							
<b>Module 3</b>	Arithmetic and Memory unit	Case Study	Data analysis task	<b>10 Classes</b>			
<b>Topics:</b> Design of Fast Adders, Signed-Operand Multiplication, Fast Multiplication, Integer Division, and Floating point operations.							

  
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Memory System: Basic Concepts, Internal Organization of Memory chips, Read Only Memories, Memory Hierarchy, Cache Memories, Virtual Memory.

<b>Module 4</b>	BPU and Pipelining	Assignment	Analysis, Data Collection	<b>11 Classes</b>
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**Topics:**  
 Basic Processing Unit: Fundamental Concepts, Single Bus organization, Control sequence, Execution of a Complete Instruction, Multiple Bus Organization.  
 Pipelining: Overview of pipelining, 5 stage instruction pipeline, Hazards and their Solutions.

**Targeted Application & Tools that can be used:**

Targeted employment sector is processor manufacturing and memory chip fabrication vendors like Intel, AMD, Motorola, NVidia, Samsung, Micron Technology, western Digital etc. Targeted job profiles include Memory circuit design and verification engineers, Physical system design engineer, System programmer, Fabrication engineer etc.

- Tools:**
- Virtual Lab, IIT KGP
  - Tejas – Java Based Architectural Simulator, IIT Delhi

**Project work/Assignment:**

- Mini Project:**
- Model a virtual computer system with the standard memory hierarchy having a layered cache with branch predictors and cache replacement/insertion policies

- Term Assignments:**
- **Comparative analysis of instruction set architecture (ISA) of CISC and RISC processors**  
 Carry out a thorough analysis of the internal organization and Instruction set Architecture of state-of-the-art CISC and RISC processors.
  - **A short survey of the recent trends in the Cache memory design**  
 Study and analyze few important present day cache memory design issues like the levels used, the mapping technique employed.


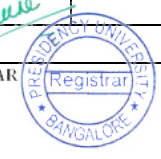
**Text Book**



3. Carl Hamacher, Zvonko Vranesic, Safwat Zaky, “Computer Organization”, Fifth Edition, McGraw-Hill Higher Education, 2016 reprint.	
<b>References</b>	
2. William Stallings, “Computer Organization & Architecture – Designing for Performance”, 11th Edition, Pearson Education Inc., 2019	
3. David A. Patterson & John L. Hennessy, “Computer Organization and Design MIPS Edition- The Hardware/Software Interface”, 6 <sup>th</sup> Edition, Morgan Kaufmann, Elsevier Publications, November 2020.	
Topics relevant to development of “FOUNDATION SKILLS”: Generation of Computers, CISC and RISC processors, Bus Arbitration.	
Topics relevant to “HUMAN VALUES & PROFESSIONAL ETHICS”: Collaboration and Data collection for Term assignments and Case Studies.	
<b>Catalogue prepared by</b>	Prof. Archana Sasi Dr. Tapas Guha Prof. Preethi
<b>Recommended by the Board of Studies on</b>	BOS NO: 11 th. BOS held on 23/4/21
<b>Date of Approval by the Academic Council</b>	Academic Council Meeting No. 14, Dated 21/5/21

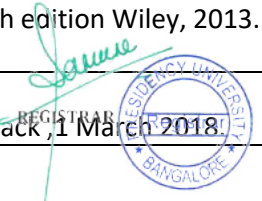
  
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<b>Course Code:</b> CSE2010	<b>Course Title: Operating Systems</b>			<b>L- P- C</b>	3	0	3
<b>Version No.</b>	1.1						
<b>Course Pre-requisites</b>	Computer Organization and Architecture [ CSE 2009 ]						
<b>Anti-requisites</b>	<b>NIL</b>						
<b>Course Description</b>	This course introduces the concepts of operating system design and implementation. It covers the classical operating systems internal algorithms such as process scheduling, synchronization, deadlocks and memory management. The course also enhances the problem solving and systems programming ability.						
<b>Course Out Comes</b>	On successful completion of the course the students shall be able to: 1] Describe the fundamental concepts of operating Systems. [ <b>Knowledge</b> ] 2] Solve various CPU scheduling problems.[ <b>Application</b> ] 3] Apply various tools to handle synchronization problems.[ <b>Application</b> ] 4] Illustrate various memory management techniques.[ <b>Application</b> ]						
<b>Course Content:</b>							
<b>Module 1</b>	Introduction to Operating System	Assignment	Programming				<b>9 Hours</b>
<b>Topics:</b> Introduction to OS , Operating-System Operations, Computing environments, Operating System Services, User and OS interface, System Calls and its types, Operating System Structure, Overview of OS design and implementation, UNIX/LINUX commands : System Programs[CLI/SHELL, loaders, linkers...]							
<b>Module 2</b>	Process Management	Assignment/Case Study	Programming/Simulation				<b>12 Hours</b>
<b>Topics:</b>							

  
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Process Concept, Operations on Processes, Inter Process Communication, Process Scheduling– Basic concepts, Scheduling Criteria, Scheduling Algorithms: FCFS, SJF, SRTF, RR, Priority, Multilevel Queue, CASE STUDY: Linux Scheduler				
<b>Module 3</b>	Process Synchronization and Deadlocks	Assignment	Programming	<b>12 Hours</b>
<p>Topics:</p> <p>The Critical-Section Problem- Peterson’s Solution, Synchronization hardware, Mutex locks, Semaphores, Monitors, Classical Problems of Synchronization. <b>Introduction to Deadlocks:</b> Deadlock Characterization, Methods for handling deadlock: Deadlock Prevention- Deadlock Avoidance- Deadlock detection &amp; Recovery from Deadlock.</p>				
<b>Module 4</b>	Memory Management	Assignment	Programming/Simulation	<b>8 Hours</b>
<p>Topics:</p> <p>Swapping, Contiguous and Non-Contiguous Memory Allocation, Segmentation, Paging - Structure of the Page Table – Demand Paging – Page Replacement, Allocation of Frames – Thrashing.</p>				
<p><b>Targeted Application:</b></p> <p><b>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.</b></p> <p><b>Software Tools:</b></p> <ol style="list-style-type: none"> <li>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.</li> <li>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.</li> </ol>				
<b>Project work/Assignment</b>				
<ol style="list-style-type: none"> <li>Demonstrate process concepts in LINUX OS.</li> <li>Simulation of CPU scheduling algorithms.</li> <li>Develop program to demonstrate use of Semaphores in threads.</li> <li>Develop program to demonstrate use of deadlock avoidance algorithms.</li> <li>Develop program to demonstrate use of page replacement algorithms.</li> <li>Simulation of memory allocation strategies [first fit, best fit and worst fit].</li> </ol>				
<b>Text Book</b>				
<ol style="list-style-type: none"> <li>Silberschatz A, Galvin P B and Gagne G, “Operating System Concepts”, 9th edition Wiley, 2013.</li> </ol>				
<b>References</b>				
<ol style="list-style-type: none"> <li>William Stallings, “Operating Systems”, Ninth Edition, By Pearson Paperback, 1 March 2018.</li> </ol>				



	<p>4. <a href="https://www.os-book.com/OS9/">https://www.os-book.com/OS9/</a></p> <p>5. <a href="https://codex.cs.yale.edu/avi/os-book/OS10/index.html">https://codex.cs.yale.edu/avi/os-book/OS10/index.html</a></p> <p>6. Remzi H. Arpaci-Dusseau Andrea C. Arpaci-dusseau , “Operating Systems: Three Easy Pieces, Amazon digital Services”, September 2018.</p> <p>7. <a href="https://pages.cs.wisc.edu/~remzi/OSTEP/">https://pages.cs.wisc.edu/~remzi/OSTEP/</a></p>
<b>Catalogue prepared by</b>	Mr Jyotiranjana Swain, Mr Sunilkumar Tegghalli, Dr Pamela Vinitha Eric, Dr. P Murali, and Mr. Rupam Bhagawati.
<b>Recommended by the Board of Studies on</b>	BOS NO: 11 th. BOS held on 23/4/21
<b>Date of Approval by the Academic Council</b>	Academic Council Meeting No. 14, Dated 21/5/21

<b>Course Code:</b> CSE 2017	<b>Course Title:</b> Computer Graphics	<b>L-P-C</b>	2	2	3
<b>Version No.</b>	1.0				
<b>Course Pre-requisites</b>	Basic knowledge of C programming				
<b>Anti-requisites</b>	NIL				
<b>Type of Skill</b>	Skill development				
<b>Course Caters to</b>	NA				
<b>Course Description</b>	<p>The purpose of this introductory course is to discuss the basics of graphics and visualization in computer science, enabling students to appreciate how the computer system displays graphics and visual effects on a display device. This course involves both theoretical and practical elements, and expects basic knowledge of high school geometry and Linear Algebra. The course uses assignments to develop programming and visualization skills of the students. The associated laboratory of this course uses OpenGL library to demonstrate how various aspects of graphics are effectuated. The key topics covered in this course include algorithms for drawing</p>				

	basic primitives, transformations, viewing and clipping for both 2D and 3D objects along with Bezier curves and Surfaces.			
<b>Course Out Comes</b>	<p>On successful completion of the course the students shall be able to:</p> <p>CO 1: Illustrate algorithms for drawing basic primitives like Point, Line and Polygon. [Application]</p> <p>CO 2: Illustrate algorithms for performing 2D Geometric Transformations, viewing and clipping. [Application]</p> <p>CO 3: Illustrate algorithms for performing 3D Geometric Transformations, clipping. [Application]</p> <p>CO 4: Demonstrate plane Bezier curves and Bezier surfaces. [Application]</p>			
<b>Course Content:</b>				
<b>Module 1</b>	<b>Overview: Basics of Computer Graphics and OpenGL:</b>	Assignment	practical Experiment	<b>7 Classes</b>
<p><b>Computer Graphics:</b> Basics of computer graphics, Application of Computer Graphics, Graphics software. , Line drawing algorithms (DDA, Bresenham's), circle generation algorithms (Bresenham's). Basics of 2D and 3D objects.</p> <p><b>OpenGL:</b> Introduction to OpenGL, coordinate reference frames in OpenGL, Color and Gray Scale, OpenGL Color function, OpenGL point attributes functions, OpenGL line attributes functions, OpenGL polygon drawing, OpenGL polygon fill area attributes functions. Polygon scan-line area filling algorithm.</p>				
<b>Module 2</b>	<b>2D Geometric Transformations, viewing and clipping:</b>	Assignment	practical Experiment	<b>8 Classes</b>
<p><b>2D Geometric Transformations:</b> Basics of translation, scaling and rotation. Matrix representations and homogeneous coordinates for translation, scaling and rotation. 2D Composite transformations, General pivot point rotation and scaling, OpenGL geometric transformations functions.</p> <p><b>Basics of 2D viewing and Clipping:</b> Basics of viewing and Clipping, 2D viewing pipeline, Viewing Transformation systems, Types of clipping: point, Line and polygon clipping, 2D line clipping algorithms: cohen-sutherland line clipping, Liang-Barsky line clipping algorithm, polygon fill area clipping: Sutherland-Hodgeman polygon clipping algorithm, OpenGL 2D viewing and clipping functions.</p>				
<b>Module 3</b>	<b>3D Geometric Transformations, clipping.</b>	Assignment	practical Experiment	<b>6 Classes</b>
<p><b>3D Geometric Transformations:</b> 3D translation, rotation, scaling, composite 3D transformations, OpenGL 3D geometric transformations functions.</p>				

  
  
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**Basics of 3D Viewing and Clipping:** 3D viewing concepts, 3D viewing coordinate parameters, Transformation from world to viewing coordinates, Projection transformation, orthogonal projections, perspective projections, Three dimensional line and polygon clipping.

<b>Module 4</b>	<b>Plane curves and surfaces</b>	Assignment	practical Experiment	<b>8 Classes</b>
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**Plane Curves:** Plane Curves representation, Nonparametric Curves, Parametric Curves, Parametric Representation of a Circle, Parametric Representation of an Ellipse, Parametric Representation of a Parabola, Parametric Representation of a Hyperbola, A Procedure for using Conic Sections, The General Conic Equation,

**Basics of Surfaces Curve:** Representation of Space Curves, Cubic Splines, Bezier Curves, Parametric Cubic Curves, Quadric Surfaces, Bezier Surfaces.

**List of Laboratory Tasks:**

**Lab Sheet 1:**

**Experiment No1:** Programs to implement basic primitives like Point, Line and polygon using C graphics. [One lab Session]

**Level 1:** Program to plot vertices of a square and complete the square.

**Level 2:** Program to draw equilateral triangle of side length entered by user.

**Experiment No2:** Programs to implement line drawing algorithms using OpenGL. [One lab Session]

**Level 1:** Program to draw a line using DDA line drawing algorithm.

**Level 2:** Program to draw a circle using Bresenham's line drawing algorithm.

**Experiment No3:** Programs to implement polygon drawing using OpenGL. [One lab Session]

**Level 1:** Program to draw a triangle having vertices entered by user.

**Level 2:** Program to create a square and fill the polygon using scan-line area filling algorithm.

**Lab Sheet 2:**

**Experiment No4:** Programs to implement 2D Geometric Translation and scaling using OpenGL. [One lab Session]

**Level 1:** Program to Create and translate a line to a given translation coordinates.

**Level 2:** Program to Create a rectangle and scale the rectangle by given scaling factor.

**Experiment No5:** Programs to implement 2D Geometric rotation using OpenGL. [One lab Session]

**Level 1:** Program to Create and rotate a line by an angle entered by user.



**Level 2:** Program to create a house like figure and rotate it about a given fixed point.

**Experiment No6:** Programs to implement 2D Geometric clipping using OpenGL.[One lab Session]

**Level 1:** Program to implement Liang-Barsky line clipping algorithm.

**Level 2:** Program to implement Sutherland-Hodgeman polygon clipping algorithm.

### Lab Sheet 3:

**Experiment No7:** Programs to implement 3D Geometric Translation and scaling using OpenGL.  
[One lab Session]

**Level 1:** Program to draw a color cube and translate the cube to a given translation coordinates.

**Level 2:** Program to draw a color cuboid and scale the cuboid by given scaling factor.

**Experiment No8:** Programs to implement 3D Geometric rotation using OpenGL.  
[One lab Session]

**Level 1:** Program to create a cylinder by extruding a circle and rotate it about a given fixed point.

**Level 2:** Program to draw a color cube and spin it using OpenGL transformation matrices.

### Lab Sheet 4:

**Experiment No9:** Programs to implement Bezier curve using OpenGL.  
[Two lab Sessions]

**Level 1:** Program to draw a parabolic (quadratic curve) Bezier curve.

**Level 2:** Program to create a flag by using Bezier curve concept.

**Experiment No10:** Programs to implement Bezier curved surface using OpenGL.  
[Two lab Sessions]

**Level 1:** Program to draw a spherical Bezier surface.

**Level 2:** Program to draw a wired Tea Pot and solid Tea Pot.

### Targeted Application & Tools that can be used:

**Application Area:** Game design and Animation

**Tools/Simulator/Software used:** Visual Studio 17.0

### Text Book:

- 1) Donald D. Hearn, M. Pauline Baker and Warren Carither,"Computer Graphics with OpenGL", 4th Edition, Pearson Education, 2021.
- 2) Edward Angel and Dave shreiner,"Interactive Computer Graphics, A top down approach with shader based OpenGL", 6<sup>th</sup> Edition, Pearson Education, 2018.



<b>Reference Books:</b>	
1) John F Hughes, Andries van Dam, Steven K. Feiner, James D. Foley, Morga, "Computer Graphics: Principles and Practice" Third Edition, Pearson Education India, 2013. 2) John Kessenich, Graham Sellers, Dave Shreiner, "OpenGL Programming guide", Ninth Edition, Addison-Wesley, 2016.	
<b>Catalogue prepared by</b>	7. Prof. Uday Kumar Singh 8. Prof. Divya Kulkarni 9. Prof. S. Thiruselvan 10. Prof. Murali P.
<b>Recommended by the Board of Studies on</b>	BOS NO: 11 th. BOS held on 23/4/21
<b>Date of Approval by the Academic Council</b>	Academic Council Meeting No. 14, Dated 21/5/21

  
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<b>Course Code:</b> CSE2011	<b>Course Title: Data Communications and Computer Networks</b>			<b>L-P-C</b>	2	2	3
	<b>Type of Course: Program Core Theory–Laboratory integrated</b>						
<b>Version No.</b>	1.0						
<b>Course Pre-requisites</b>	NIL						
<b>Anti-requisites</b>	NIL						
<b>Course Description</b>	<p>The objective of this course is to provide the knowledge in data communications and computer networks, its organization and its implementation, and gaining practical experience in installation, monitoring, and troubleshooting of LAN systems. .</p> <p>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 traffic.</p>						
<b>Course Out Comes</b>	<p>On successful completion of the course the students shall be able to:</p> <ol style="list-style-type: none"> <li>1. Explain the concepts of Computer Networks and Working Principles of Application Layer and Transport Layer (Comprehension)</li> <li>2. Apply the Knowledge of IP Addressing and Routing Mechanism in Computer Networks. (Application)</li> <li>3. Discuss the functionalities of Data Link Layer (Comprehension)</li> <li>4. Explain the Basic Concepts of Data communication. (Comprehension)</li> </ol>						
<b>Course Content:</b>							
<b>Module 1</b>	<b>Overview, Application and Transport Layers.</b>	Assignment	Problem Solving	<b>13 Classes</b>			
Introduction: Computer Networks, Topologies, OSI Reference Model, TCP/IP model. Principles of Network Applications, The Web and HTTP, DNS—The Internet’s Directory Service, Socket Programming: Creating Network Applications. Introduction and Transport-Layer Services, Connection-less Transport: UDP, Principles of Reliable Data Transfer, Connection-Oriented Transport: TCP, Principles of Congestion Control, TCP Congestion Control.							
<b>Module 2</b>	<b>Network Layer</b>	Assignment	Problem Solving	<b>12 Classes</b>			

  
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Overview of Network Layer, Forwarding and Routing, The Data and Control Planes. The Internet Protocol (IP): IPv4, Addressing, IPv6, IPv4 Datagram Format, IPv4 Addressing, Network Address Translation (NAT), IPv6. Introduction Routing Algorithms: The Link-State (LS) Routing Algorithm, The Distance-Vector (DV) Routing Algorithm, Intra-AS Routing in the Internet, OSPF Routing Among the ISPs: BGP, Introduction to BGP. ICMP: The Internet Control Message Protocol.

<b>Module 3</b>	<b>Data Link Layer</b>	<b>Assignment</b>	<b>Problem Solving</b>	<b>10 Classes</b>
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Introduction to the Link Layer, The Services Provided by the Link Layer, Error-Detection and -Correction Techniques, Parity Checks, Check summing Methods, Cyclic Redundancy Check (CRC), Multiple Access Links and Protocols. Switched Local Area Networks, Link-Layer Addressing and ARP, Ethernet, Link-Layer Switches, Virtual Local Area Networks (VLANs), DHCP, UDP, IP and Ethernet.

<b>Module 4</b>	<b>Physical Layer with Data Communication</b>	<b>Assignment</b>	<b>Problem Solving</b>	<b>07 Classes</b>
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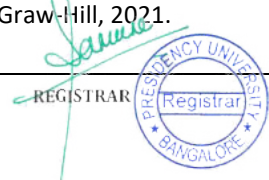
Data communications: Components, Data Representation, Data Flow, Analog and Digital Signals, Periodic Analog Signals: Sine Wave, Phase, Wavelength, Time and Frequency Domains, Composite Signals, Bandwidth, Digital Signals, Transmission Impairment, Data Rate Limits: Noiseless Channel, Nyquist Bit Rate, Noisy Channel: Shannon Capacity, Performance: Bandwidth, Throughput, Latency (Delay), Bandwidth-Delay Product, Parallel/Serial Transmission, Multiplexing: Frequency-Division Multiplexing, Wavelength-Division Multiplexing, Synchronous Time-Division Multiplexing.

**Targeted Applications & 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**



- 11. Problem Solving: Choose and appropriate devices and implement various network concepts.**
- 12. Programming: Simulation of any network using NS2.**

**Text Book**  
**T1.** James F. Kurose, Keith W. Ross, “Computer Networking A Top down Approach”, 8<sup>th</sup> Edition, Pearson, 2021.  
**T2.** Behrouz A. Forouzan, “Data Communications and Networking”, 6<sup>th</sup> Edition, Tata McGraw-Hill, 2021.





<b>References</b>	
<p>R1. William Stallings: “Data and Computer Communication”, 10th Edition, Pearson Education, 2017.  R2. Larry L. Peterson and Bruce S. Davie: Computer Networks – A Systems Approach, 4th Edition, Elsevier, 2012.</p> <p><b>Web Based Resources and E-books:</b>  <b>Digital Learning Resources (Library Resources)</b>  W1. <a href="https://puniversity.informaticsglobal.com/login">https://puniversity.informaticsglobal.com/login</a></p>	
<b>Catalogue prepared by</b>	13. Dr. Shamugarathinam 14. Dr. Ashish Kumar Srivastava 3. Ms. Prema Sindhuri 4. Ms. Bhavana A
<b>Recommended by the Board of Studies on</b>	BOS NO: 12th BOS, held on 04/08/2021
<b>Date of Approval by the Academic Council</b>	Academic Council Meeting No. 16, Dated 23/10/2021

<b>Course Code:</b> CSE 2014	<b>Course Title: Software Engineering</b> <b>Type of Course: School Core [Theory Only]</b>	<b>L- P- C</b>	<b>3</b>	<b>0</b>	<b>3</b>
<b>Version No.</b>	1.0				
<b>Course Pre-requisites</b>	NIL				
<b>Anti-requisites</b>	NIL				
<b>Course Description</b>	The objective of this course is to provide the fundamentals concepts of Software Engineering process and principles. The course covers software requirement engineering processes, system analysis, design, implementation and testing aspects of software system development. The course covers software quality, configuration management and maintenance.				
<b>Course Out Comes</b>	On successful completion of this course the students shall be able to: 1] Describe the Software Engineering principles, ethics and process models(Knowledge) 2] Identify the requirements, analysis and appropriate design models for a given application(Comprehension) 3] Understand the Agile Principles(Knowledge) 4] Apply an appropriate planning, scheduling, evaluation and maintenance principles involved in software(Application)				
<b>Module 1</b>	<b>Introduction to Software Engineering and Process Models</b>	Quiz	 REGISTRAR  <b>09 Hours</b>		

	<b>(Knowledge level)</b>			
<p><b>Introduction:</b> Need for Software Engineering, Professional Software Development, Software Engineering Ethics, Software Engineering Practice-Essence of Practice, General Principles Software Development Life Cycle</p> <p><b>Models:</b> Waterfall Model – Classical Waterfall Model, Iterative Waterfall Model, Evolutionary model-Spiral, Prototype.</p>				
<b>Module 2</b>	<b>Software Requirements, Analysis and Design (Comprehension level)</b>	Assignment	Development of SRS documents for a given scenario	<b>11 Hours</b>
<p><b>Requirements Engineering:</b> Eliciting requirements, Functional and non- Functional requirements, Software Requirements Specification (SRS), Requirement Analysis and validation. Requirements modelling- Introduction to Use Cases, Activity diagram and Swim lane diagram. CASE support in Software Life Cycle, Characteristics of CASE Tools, Architecture of a CASE Environment.</p> <p><b>Design:</b> Design concepts, Architectural design, Component based design, User interface design.</p>				
<b>Module 3</b>	<b>Agile Principles &amp; Devops (Knowledge level)</b>	Quiz		<b>09 Hours</b>
<p><b>Agile:</b> Scrum Roles and activities, Sprint Agile software development methods - Scaling, User Stories, Agile estimation techniques, Product backlogs, Stake holder roles, Dynamic System Development Method.</p> <p><b>Devops:</b> Introduction, definition, history, tools.</p>				
<b>Module 4</b>	<b>Software Testing and Maintenance (Application Level)</b>	Assignment	Apply the testing concepts using Programing	<b>12 Hours</b>
<p><b>Software Testing-</b>verification and validation, Test Strategies - White Box Testing, Black box Testing. Automation Tools for Testing.</p> <p><b>Software Quality Assurance-</b>Elements of software quality assurance, SQA Tasks, Goals and Metrics, Software configuration management- SCM process, SCM Tools (GitHub).</p> <p><b>Maintenance-</b> Characteristics of Software Maintenance, Software Reverse Engineering, Software Maintenance Process Models.</p>				
<b>Targeted Application &amp; Tools that can be used: Selenium, GitHub, CASE Tools</b>				
<b>Project work/Assignment: Mention the Type of Project /Assignment proposed for this course</b>				
<ol style="list-style-type: none"> <li>1] Identification of Software Process Models for a given scenario</li> <li>2] Development of SRS documents for a given scenario</li> <li>3] Apply the white box and black box testing concepts using Programing</li> <li>4] Installing Selenium/GitHub software and exploring the functionality</li> </ol>				
<p><b>Text Book</b></p> <ol style="list-style-type: none"> <li>1] Roger S. Pressman, “Software Engineering – A Practitioner’s Approach”, VII Edition, McGraw-Hill, 2017.</li> <li>2] Bob Hughes, Mike Cotterell, Rajib Mall, “Software Project Management”, VI Edition, McGraw-Hill, 2018.</li> </ol>				
<p><b>References</b></p> <ol style="list-style-type: none"> <li>1] Rajib Mall, “Fundamentals of Software Engineering”, VI Edition, PHI learning private limited, 2015.</li> <li>2] Ian Sommerville, “Software Engineering”, IX Edition, Pearson Education Asia, 2011.</li> <li>3] Agile Software Development Principles, Patterns and Practices.1<sup>st</sup> Edition, Wiley, 2002</li> </ol>				
<b>Catalogue prepared by</b>	Dr. S. Pravinth Raja, Associate Professor, CSE, SOE. Ms. Sweet Subhashree, Assistant Professor, CSE, SoE.			

  
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<b>Recommended by the Board of Studies on</b>	BOS NO: 12th BOS, held on 04/08/2021
<b>Date of Approval by the Academic Council</b>	Academic Council Meeting No. 16, Dated 23/10/2021

<b>Course Code:</b> CSE 2018	<b>Course Title: Theory of Computations</b>	<b>L- P- C</b>	3	0	3
<b>Version No.</b>	0.9				
<b>Course Pre-requisites</b>	NIL				
<b>Anti-requisites</b>	NIL				
<b>Types of Skills</b>	Foundation Skills, Analytical, Logical and Mathematical Thinking				
<b>Course Caters to</b>	Metatheory of Computing				
<b>Course Description</b>	<p>The purpose of Theory of Computation Course is to enable the students to appreciate the study of formal language and the correspondence between language classes and the automata that recognizes. Analytical ability is required for the students to analyze and develop. The course is both conceptual and analytical in nature and needs fair knowledge of Mathematical and computing. The course develops the critical thinking and analytical skills. The simulation using JFLAP makes the student to visualize the automata construction and string parsing. The project work helps the students to build any context free grammar and Turing Machine for the Language.</p>				
<b>Course Out Comes</b>	<p>On successful completion of the course the students shall be able to:</p> <p>[1] Understand basic concepts of Automata and its types. (Knowledge)</p> <p>[2] Construct Finite Automata with its Simulation. (Application)</p> <p>[3] Distinguish between Regular Grammar and Context Free Grammar. (Comprehensive)</p> <p>[4] Design Push Down Automata. (Application)</p> <p>[5] Implement Turing machine for a Language. (Application)</p>				

  
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<b>Course Content:</b>				
<b>Module 1</b>	Introduction to Automata Theory	Assignment	Data Collection	<b>6 Hours</b>
<p>Topics: Introduction to Automata Theory, Applications of Automata Theory, Basic Definitions, Representation of Automata, Language Recognizers, Example for Language Recognizers.</p> <p>(Knowledge)</p>				
<b>Module 2</b>	Finite Automata	Assignment	Simulation	<b>12 Hours</b>
<p>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 Acceptor, Languages and NFA's, Equivalence of Deterministic and Nondeterministic Finite Accepters, Reduction of the Number of States in Finite Automata. (Application)</p>				
<b>Module 3</b>	Regular Expressions & Context Free Grammar	Assignment	Programming	<b>8 Hours</b>
<p>Topics: Formal Definition of a Regular Expression, Pumping Lemma, Context Free Grammars-Examples of Context-Free Languages, Leftmost and Rightmost Derivations, Derivation Trees, Ambiguity in Grammars. (Comprehensive)</p>				
<b>Module 4</b>	Push Down Automata	Assignment	Simulation	<b>7 Hours</b>
<p>Topics: Definition of a Pushdown Automaton, Language Accepted by a Pushdown Automaton, Pushdown Automata for Context-Free Languages and Context-Free Grammars for Pushdown Automata, Deterministic Pushdown Automata. (Application)</p>				
<b>Module 5</b>	Turing Machine	Assignment	Programming/Simulation	<b>6 Hours</b>
<p>Topics:</p>				

  
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Definition of a Turing Machine, Turing Machines as Language Accepters, Example Languages to construct Turing Machine. (Application)

**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.

**Project work/Assignment:**

- 3. Simulate and verify the string acceptance and rejection using deterministic finite automata / Push down automata / Turing machine for any given regular language or a non-regular language in JFLAP software simulation tool.
- 4. Write a program to convert non-deterministic finite automata to deterministic finite automata.
- 5. Write a Java program to verify the given context free grammar is valid not.
- 6. Write a Java program to validate the given input (check it is valid or not) using Regular Expression.
  - i) IP Address
  - ii) Aadhaar number

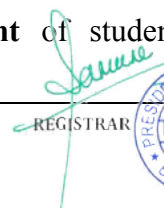

**Text Book**

- 2. Peter Linz, "An introduction to Formal Languages and Automata", Jones and Bartlett Publications 6<sup>th</sup> Edition, 2018.

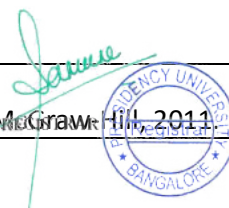


<b>References</b>	
<ol style="list-style-type: none"> <li>1. Aho, Ullman and Hopcroft, “Theory of Computation”, Pearson India 3<sup>rd</sup> Edition, 2008.</li> <li>2. Michael Sipser, “Theory of Computation”, Cengage India 3<sup>rd</sup> Edition, 2014.</li> </ol>	
Topics relevant to Development of Foundation Skills: Language Recognizers, Basic Concepts of Finite Automata.	
<b>Catalogue prepared by</b>	<ol style="list-style-type: none"> <li>1. Dr. Manujakshi B C</li> <li>2. Ms. Dipali K Dakhole</li> <li>3. Dr. Gowthul Alam M M</li> </ol>
<b>Recommended by the Board of Studies on</b>	BOS NO: 13 <sup>th</sup> BOS, held on 08/12/2021
<b>Date of Approval by the Academic Council</b>	Academic Council Meeting No. 17, Dated 11/12/2021
<b>Catalog Reviewed Details</b>	Catalogue reviewed in DAC meeting held on 28.01.2022 and subject to approval in BOS

<b>Course Code:</b> MAT2004	<b>Course Title:</b> Discrete Mathematical Structures <b>Type of Course:</b> Program Core	<b>L- P- C</b>	3	0	3
<b>Version No.</b>	1.0				
<b>Course Pre-requisites</b>	Nil				
<b>Anti-requisites</b>	Nil				
<b>Course Description</b>	The course provides insights into the fundamental aspects of mathematical logic and predicate calculus. The course delves deeply into the concepts of algebraic structures, lattices and Boolean algebras which are widely used in computer science and engineering. It also highlights the principles of counting techniques and their applications.				
<b>Course Objective</b>	The objective of the course is <b>Skill Development</b> of student by using <b>Participative Learning</b> techniques.				


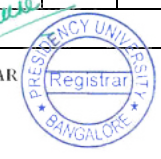
  
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<b>Course Outcomes</b>	On successful completion of the course the students shall be able to CO-1: Explain logical sentences through predicates, quantifiers and logical connectives. CO-2: Comprehend the basic principles of set theory and different types of relations. CO-3: Elucidate the concepts of lattices and Boolean algebra. CO-4: Deploy the counting techniques to tackle combinatorial problems.			
<b>Course Content:</b>				
<b>Module 1</b>	<b>Mathematical Logic and Predicate Calculus</b>			<b>12 Sessions</b>
Propositional Logic, propositional logic equivalences, normal forms, inference rules, introduction to proofs, conversion to clausal form, predicate calculus, the statement function, inference theory of the predicate calculus.				
<b>Module 2</b>	<b>Algebraic Structures</b>			<b>10 Sessions</b>
Sets and set operations, functions, relations and their properties & representations of relation by matrix, closure of different type of relations, equivalence relations, primitive recursive function.				
<b>Module 3</b>	<b>Lattices and Boolean Algebra</b>			<b>11 Sessions</b>
Partial ordering, Posset, Lattices & Algebraic structures, Sub lattice, Basic properties of algebraic systems by lattices, Distributive lattices, complement of an element in a lattice, Boolean lattice & Boolean algebra, cancellation laws and unique complement theorem.				
<b>Module 4</b>	<b>Principles of Counting Techniques</b>			<b>12 Sessions</b>
Chinese remainder theorem, Pigeonhole principle, generalized pigeonhole principle, mathematical induction, generalized permutations and combinations, recurrence relations.				
<b>Targeted Applications &amp; Tools that can be used:</b> Discrete mathematics provides the mathematical foundations for many computer science courses including data structures, algorithms, database theory, automata theory, formal languages, compiler theory, computer security, and operating systems.  Tools used: MS-Excel / Mathematica / Maple				
<b>Project work/Assignment: Mention the Type of Project /Assignment proposed for this course</b>				
<b>Assignment 1:</b> Logical equivalences and predicate calculus. <b>Assignment 2:</b> Equivalence relations and lattices. <b>Assignment 3:</b> Recurrence relations.				
<b>Text Book</b> 1. Kenneth H. Rosen, "Discrete Mathematics and its Applications", 7th Edition, McGraw-Hill, 2011.				



<p><b>Reference Books:</b></p> <ol style="list-style-type: none"> <li>1. Tremblay, J.P. and Manohar.R, "Discrete Mathematical Structures with Applications to Computer Science", 30th Reprint, Tata McGraw Hill, New Delhi, 2011.</li> <li>2. Grimaldi R.P., "Discrete and Combinatorial Mathematics: An Applied Introduction", 4th Edition, Pearson Education, New Delhi, 2007.</li> <li>3. Epp Susanna S, "Discrete Mathematics with Applications", 4<sup>th</sup> Edition, Cengage Learning, New Delhi, 2016.</li> <li>4. Kolman Bernard, Busby Robert C and Ross Sharon Cutler," Discrete mathematical structures", 6<sup>th</sup> Edition, Pearson, India, 2015.</li> <li>5. Liu, C L Mohapatra, D P.," Elements of Discrete Mathematics a Computer oriented approach", 4<sup>th</sup> Edition, McGraw Hill, New Delhi, 2015.</li> <li>6. Richard Johnsonbaugh, Discrete Mathematics, 8th Edition, Prentice Hall, 2017.</li> <li>7. Mott Joe L, Kandel Abraham, Baker Theodore P, "Discrete Mathematics for Computer Scientists and Mathematicians", 2<sup>nd</sup> Edition, Pearson, India, 2015.</li> </ol>	
<p><b>E-Resources ( <a href="https://presiuniv.knimbus.com">https://presiuniv.knimbus.com</a> )</b></p> <ol style="list-style-type: none"> <li>1. <a href="https://open.umn.edu/opentextbooks/textbooks/394">https://open.umn.edu/opentextbooks/textbooks/394</a></li> <li>2. <a href="https://open.umn.edu/opentextbooks/textbooks/237">https://open.umn.edu/opentextbooks/textbooks/237</a></li> <li>3. <a href="https://directory.doabooks.org/handle/20.500.12854/45249">https://directory.doabooks.org/handle/20.500.12854/45249</a></li> </ol>	
<p><b>Web Resources</b></p> <ol style="list-style-type: none"> <li>1. <a href="https://discrete.openmathbooks.org/pdfs/dmoi-tablet.pdf">https://discrete.openmathbooks.org/pdfs/dmoi-tablet.pdf</a></li> <li>2. <a href="https://www.pdfdrive.com/discrete-mathematics-d24475492.html">https://www.pdfdrive.com/discrete-mathematics-d24475492.html</a></li> <li>3. <a href="https://www.cis.upenn.edu/~jean/discmath-root-b.pdf">https://www.cis.upenn.edu/~jean/discmath-root-b.pdf</a></li> </ol>	
<p><b>Video Lectures</b></p> <ol style="list-style-type: none"> <li>1. <a href="https://www.youtube.com/watch?v=i3CpxxFedIA">https://www.youtube.com/watch?v=i3CpxxFedIA</a></li> <li>2. <a href="https://www.youtube.com/watch?v=FMh8qNV3PHk">https://www.youtube.com/watch?v=FMh8qNV3PHk</a></li> <li>3. <a href="https://archive.nptel.ac.in/courses/111/107/111107058/">https://archive.nptel.ac.in/courses/111/107/111107058/</a></li> </ol>	
<b>Catalogue prepared by</b>	Dr. M. Rajeshwari
<b>Recommended by the Board of Studies on</b>	8 <sup>th</sup> BOS on 23 <sup>rd</sup> July, 2022
<b>Date of Approval by the Academic Council</b>	18 <sup>th</sup> AC on 3 <sup>rd</sup> August 2022

<b>Course Code:</b> CSE2013	<b>Course Title:</b> Cloud Computing <b>Type of Course:</b> Theory	<b>L- P- C</b>	3	0	3
<b>Version No.</b>	<b>1.0</b>				

  
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<b>Course Pre-requisites</b>	<b>[1] Data Communication and Computer Networks (CSE2011)</b>			
<b>Anti-requisites</b>	<b>NIL</b>			
<b>Course Description</b>	<b>This course provides a hands-on comprehensive study of Cloud concepts and capabilities across the various Cloud service models including Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS). It dives into all of the details that a student needs to know in order to plan for developing applications on the cloud and what to look for when using applications or services hosted on a cloud.</b>			
<b>Course Objective</b>	<b>This course is designed to improve the learner's EMPLOYABILITY SKILLS using EXPERIENTIAL LEARNING techniques.</b>			
<b>Course Outcomes</b>	<b>Upon successful completion of the course the students shall be able to:</b> <b>6) Understand</b> the significance of Cloud computing technologies <b>7) Identify</b> appropriate Virtualization techniques to virtualize infrastructures <b>8) Discuss</b> Cloud mechanisms to optimize the QoS parameters <b>9) Develop</b> applications using Cloud services and VM instances			
<b>Course Content:</b>				
<b>Module 1</b>	<b>Introduction to Cloud services</b>	Assignment	Theory	<b>No. of Classes:10</b>
Topics: Evolution of cloud computing, Computing Platforms and Technologies, Cloud Computing Architecture, IaaS, PaaS, SaaS, Types of Clouds, Cloud Computing Environments.				
<b>Module 2</b>	<b>Virtualization Techniques</b>	Assignment	Theory	<b>No. of Classes:10</b>
Topics: Basics of Virtualization - Types of Virtualizations, Taxonomy of Virtualization Techniques, Implementation Levels of Virtualization.				
<b>Module 3</b>	<b>Cloud QoS and Management</b>	Assignment	Theory	<b>No. of Classes:10</b>
Topics: Cloud Infrastructure Mechanisms, SLAs, Specialized Cloud Mechanisms, Cloud Management Mechanisms, Cloud Security Mechanisms				
<b>Module 4</b>	<b>Application development in Cloud</b>	Assignment	Case Study	<b>No. of Classes:10</b>
Topics: Programming Models for Cloud Computing - Software Development in Cloud - Service creation environments to develop cloud-based applications. Development environments for service development (Demonstration using AWS Cloud); Docker and Containers.				
<b>Targeted Application &amp; Tools that can be used:</b>				
<b>Targeted Applications:</b> Developing applications on Cloud Platforms via Virtual machines				
<b>Cloud Tools:</b>				

  
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- CloudSim
- VMWare
- Amazon EC2
- Google Compute Engine
- Microsoft Azure

**Project work/Assignment:**

1. Automation of performance analysis of students through the Cloud
2. Chatbots development using Cloud resources
3. Blog creation using Cloud computing

**Analysis of Case Studies:** When deciding to adopt cloud computing architecture, decide if the cloud is right for your requirements (for the application identified).

**Suggested List of Hands-on Activities:**

Sl. No	Title
1	Install Virtualbox/VMware Workstation with different flavors of Linux or Windows OS on top of windows 11
2	Install a C compiler in the virtual machine created using a virtual box and execute Simple Programs.
3	Install Google App Engine (GAE). Create a "hello world" application and other simple web applications using python/java
4	Use GAE launcher to launch the web applications.
5	Simulate a cloud scenario using CloudSim and run a scheduling algorithm
6	Find a procedure to transfer the files from one virtual machine to another virtual machine.
7	Find a procedure to launch a virtual machine using Openstack
8	Demonstrate Migration, Cloning, and Snapshots within and across VMs

**Text Book(s)**

1. Rajkumar Buyya, Christian Vecchiola, and Thamarai Selvi, "Mastering Cloud Computing", McGraw Hill Education, 2013 edition.
2. John Rittinghouse and James Ransome, "Cloud Computing, Implementation, Management and Security", CRC Press, 2010 edition.

**References**




1. Thomas Erl, Zaigham Mahmood, and Ricardo Puttini, "Cloud Computing Concepts, Technology & Architecture", PHI publisher 2013 edition.
2. Anthony T Velte, Toby J Velte, Robert Elsenpeter, "Cloud Computing: A Practical Approach", Tata McGraw-Hill, 2010 edition.
3. David E.Y. Sarna, "Implementing and Developing Cloud Applications", CRC Press, 2018 edition.
4. Manvi, Sunilkumar, and Gopal K. Shyam. "Cloud Computing: Concepts and Technologies". CRC Press, 2021.

Web Resources and Research Articles links:

1. IEEE Transactions on Cloud Computing-  
<https://ieeexplore.ieee.org/xpl/RecentIssue.jsp?punumber=6245519>
2. International Journal of Cloud Computing-  
<https://www.inderscience.com/jhome.php?jcode=ijcc>
3. CloudSim Resources- <https://javadoc.io/doc/org.cloudsimplus/cloudsimplus/latest/org.cloudbus.cloudsim/resources/class-use/Resource.html>
4. Journal of Network and Computer Networking-  
<https://www.journals.elsevier.com/journal-of-network-and-computer-applications>

<b>Catalogue prepared by</b>	Dr. Gopal K. Shyam, Dr. Murali P., Mr. G Nagarajan
<b>Recommended by the Board of Studies on</b>	BOS NO: 19th BOS, held on 04/08/2022
<b>Date of Approval by the Academic Council</b>	Academic Council Meeting No. 18, Dated 03/8/2022.

<b>Course Code:</b> CSE2007	<b>Course Title:</b> Design and Analysis of Algorithms  <b>Type of Course:</b> Program Core & Theory only	<b>L- P- C</b>	3	0	3
<b>Version No.</b>	2.1				



<b>Course Pre-requisites</b>	CSE2001, Data Structure and Algorithms			
<b>Anti-requisites</b>	<b>NIL</b>			
<b>Course Description</b>	This intermediate course enables students to design and analyze efficient algorithms to solve problems. This course covers typical design methods such as divide-and-conquer, dynamic programming and greedy method to solve problems. The students shall develop strong analytical skills as part of this course.			
<b>Course Objectives</b>	This course is designed to improve the learners' EMPLOYABILITY SKILLS by using PROBLEM SOLVING Methodologies.			
<b>Course Outcomes</b>	<b>On successful completion of the course the students shall be able to:</b> <b>1] Identify the efficiency of a given algorithm. [Comprehension]</b> <b>2] Employ divide and conquer approach to solve a problem. [Application]</b> <b>3] Illustrate dynamic programming approach to solve a given problem. [Application]</b> <b>4] Solve a problem using the greedy method. [Application]</b> <b>5] Discuss the techniques to solve a real-world problem based on its complexity classes. [Comprehension]</b>			
<b>Course Content:</b>				
<b>Module 1</b>	Introduction to Algorithms	Assignment	Problem Solving	<b>06 Sessions</b>
<b>Topics:</b> Algorithm Design and efficiency, measuring of running time of algorithms. Insertion sort and merge sort, Asymptotic Growth and Notations. Recurrences--Masters method. <b>Assignment:</b> Comparatively evaluate bubble sort, insertion sort and mergesort.				
<b>Module 2</b>	Review of Searching and Sorting techniques	Assignment	Programming/ Problem Solving	<b>12 Sessions</b>
<b>Topics:</b> <b>Divide and Conquer:</b> Examples. Strassen's Matrix multiplication. <b>Sorting:</b> Quicksort, Heapsort, Lower bound of comparison-based sorting, non-comparison-based sorting: Radix sort. <b>Search:</b> Review of Linear Search and Binary Search, Hashing and hash tables. <b>Assignment:</b> Design and develop an algorithm using Divide and Conquer technique for a given scenario.				
<b>Module 3</b>	Greedy Algorithms	Assignment	Programming/ Problem Solving	<b>09 Sessions</b>
<b>Topics:</b> Introduction, Fractional Knapsack Problem, Minimal Spanning Tree: Prim's Algorithm and Kruskal's Algorithm, Single-source Shortest Path: Dijkstra's Algorithm. Huffman Codes.				

  
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<b>Assignment:</b> Design and Develop a solution to a given scenario using greedy method.				
<b>Module 4</b>	Dynamic Programming	Assignment	Programming/ Problem Solving	<b>09 Sessions</b>
<b>Topics:</b> Introduction with examples, Principles of Memoization, 0-1 Knapsack Problem, Bellman-Ford algorithm, Floyd-Warshall's Algorithms. Optimal Binary Search Trees, Chain Matrix Multiplication. <b>Assignment:</b> For a given scenario, attempt the three design paradigms learned so far and argue the best approach to solve the problem				
<b>Module 5</b>	Complexity Classes and Heuristics	Assignment	Programming/ Problem Solving	<b>09 Hours</b>
<b>Topics:</b> Complexity classes: P, NP, and NP-Complete Problems. Backtracking: n-Queens. Branch and bound: Travelling Salesman Problem. <b>Assignment:</b> Apply backtracking algorithmic designing technique for solving queen's problems for 4, 8 and 16 inputs.				
<b>Targeted Application &amp; Tools that can be used:</b>  <b>Application Area is to Design and Analyzing the efficiency of Algorithms. This fundamental course is used by all application developers.</b>  <b>Professionally Used Software: GCC compiler.</b>				
<b>Project work/Assignment:</b>				
<ol style="list-style-type: none"> <li><b>1. Problem Solving: Design of Algorithms and implementation of programs.</b></li> <li><b>2. Programming: Implementation of given scenario using Java.</b></li> </ol>				
<b>Text Book:</b> T1. Thomas H.Cormen, Charles E.Leiserson, Ronald L. Rivest and Clifford Stein, ' <i>Introduction to Algorithms</i> ', MIT Press, 2022. T2. J. Kleinberg and E. Tardos, ' <i>Algorithm Design</i> ', Addison-Wesley, 2005.				
<b>References</b> R1. Anany Levitin, ' <i>Introduction to the Design and Analysis of Algorithms</i> ', Pearson Education, 2003. R2. Tim Roughgarden, ' <i>Algorithms Illuminated</i> ' (books 1 through 3), Soundlikeyourself Publishing, 2017,18,19 respectively. R3. AV Aho, J Hopcroft, JD Ullman, ' <i>The Design and Analysis of Algorithms</i> ', Addison-Wesley, 1974.				
<b>Catalogue prepared by</b>	Dr Sandeep Albert Mathias, Dr Murali Parameswaran			
<b>Recommended by the Board of Studies on</b>	BOS NO: 12th BOS, held on 04/08/2021			
<b>Date of Approval by the Academic Council</b>	Academic Council Meeting No. 16, Dated 23/10/2021			
<b>Course Code:</b> CSE2067	<b>Course Title: Web Technology</b> <b>Type of Course: Program core</b>		L- P- C REGISTRAR	2 3



	<b>Theory &amp; Integrated Laboratory</b>						
<b>Version No.</b>	1.0						
<b>Course Pre-requisites</b>	NIL						
<b>Anti-requisites</b>	NIL						
<b>Course Description</b>	<p>The purpose of the course is to provide a comprehensive introduction to scripting languages that are used for creating web-based applications.</p> <p>The associated laboratory provides an opportunity to implement the concepts and enhance critical thinking and analytical skills.</p>						
<b>Course Objective</b>	This course is designed to improve the learners' <u>EMPLOYABILITY SKILLS</u> by using <u>EXPERIENTIAL LEARNING</u> techniques.						
<b>Course Outcomes</b>	<p><b>On successful completion of this course the students shall be able to:</b></p> <p><b>CO1:</b> Implement web-based application using client-side scripting languages. <b>(Application level)</b></p> <p><b>CO2:</b> Apply various constructs to enhance the appearance of a website. <b>(Application level)</b></p> <p><b>CO3:</b> Apply server-side scripting languages to develop a web page linked to a database. <b>(Application level)</b></p>						
<b>Course Content:</b>							
<b>Module 1</b>	<b>Introduction to XHTML</b>	Quizzes and Assignments	Quizzes on various features of XHTML, simple applications	<b>10 Classes</b>			
<p>Topics:</p> <p>Basics: Web, WWW, Web browsers, Web servers, Internet.</p> <p>XHTML: Origins and Evolution of HTML and XHTML: Basic Syntax, Standard XHTML Document Structure, Basic Text Markup, Images, Hypertext Links, Lists, Tables, Forms, Frames, Syntactic Differences between HTML and XHTML.</p>							
<b>Module 2</b>	<b>Advanced CSS</b>	Quizzes and assignments	Comprehension based Quizzes and assignments; Application of CSS in designing webpages	<b>12 Classes</b>			
<p><b>Advanced CSS:</b> Layout, Normal Flow, Positioning Elements, Floating Elements, Constructing Multicolumn.</p>							

  
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Layouts, Approaches to CSS Layout, Responsive Design, CSS Frameworks				
<b>XML:</b> Basics, demonstration of applications using XML				
<b>Module 3</b>	<b>PHP – Application Level</b>	Quizzes and assignments	Application of PHP in web designing	<b>14 Classes</b>
<p>Topics:</p> <p><b>PHP:</b> Introduction to server-side Development with PHP, Arrays, and Superglobals, Arrays, \$GET and \$ POST, Super global Arrays, \$_SERVER Array, \$_Files Array, Reading/Writing Files, PHP Classes and Objects, Object, Classes and Objects in PHP, Object Oriented Design, Working with Databases, SQL, Database APIs, Managing a MySQL Database. Accessing MySQL in PHP.</p>				
<p><b>List of Laboratory Tasks:</b></p> <p><b>Experiment No. 1: Demonstration of XHTML features</b></p> <p>Level 1: Demonstration of various XHTML Tags (Level 1)  Level 2: Design and develop static web pages for an online Book store (Level 2).</p> <p><b>Experiment No. 2: Application of CSS in web designing</b></p> <p>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.</p> <p><b>Experiment No. 3: Application of PHP in web designing.</b></p> <p>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.</p> <p><b>Experiment No. 4: Building a website.</b></p> <p>Build a website for organizing an International Conference. The conference website must be able to collect the author's details and upload a file.</p>				
<p><b>Targeted Application &amp; Tools that can be used:</b></p> <p>Xampp web server to be used to demonstrate PHP.</p>				
<p><b>Project work/Assignment:</b></p> <p>Assignments are given after completion of each module which the student need to submit within the stipulated deadline.</p>				
<p><b>Textbook(s):</b></p> <p>1] Robert. W. Sebesta, "<i>Programming the World Wide Web</i>", Pearson Education, 8th Edition, 2015.</p> <p>2] <i>CSS Notes for Professionals</i>, ebook available at <a href="https://books.goalkicker.com/CSSBook/">https://books.goalkicker.com/CSSBook/</a> (Retrieved on Jan. 20, 2022)</p>				



3] Deitel, Deitel, Goldberg, " <i>Internet &amp; World Wide Web How to Program</i> ", Fifth Edition, Pearson Education, 2021.	
<b>References</b>	
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. Topics related to development of "EMPLOYABILITY": CSS, PHP. Topics related to development of "HUMAN VALUES AND PROFESSIONAL ETHICS": Web designing for healthcare.	
<b>Catalogue prepared by</b>	Dr. Shankar K. Ghosh, Jobin Thomas.
<b>Recommended by the Board of Studies on</b>	BOS NO: 12th BOS, held on 04/08/2021
<b>Date of Approval by the Academic Council</b>	Academic Council Meeting No. 16, Dated 23/10/2021

  
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<b>Course Code:</b> CSE3082	<b>Course Title: Object Oriented Analysis and Design with UML</b>			<b>L- P- C</b>	3	0	3
	<b>Type of Course: Program Core and Theory</b>						
<b>Version No.</b>	1.0						
<b>Course Pre-requisites</b>	CSE 1001 Java Programming						
<b>Anti-requisites</b>	NIL						
<b>Course Description</b>	This course covers the analysis and design methodology in sufficient depth to convey a good understanding of object-oriented analysis and design using the unified process. Students will be able to design a use case model, identify the classes and their responsibilities, use interaction models to capture the interdependence among objects/classes and design an efficient solution. The application of the design axioms and the iterative nature of the process are emphasized. This course will enable students to apply object oriented concepts in all the stages of the software development life cycle.						
<b>Course objective</b>	This course is designed to improve the learners “ SKILL DEVELOPMENT “by using EXPERIENTIAL LEARNING techniques.						
<b>Course Outcomes</b>	On successful completion of the course the students shall be able to: 1)Describe the basics of object oriented system development [ <b>Knowledge</b> ] 2)Identify the various techniques for object-oriented analysis techniques [ <b>Comprehension</b> ] 3] Apply the design axioms to create appropriate UML diagrams. [ <b>Application</b> ] 4]Apply the design process to develop implementation models. [ <b>Application</b> ]						
<b>Course Content:</b>							
<b>Module 1</b>	Introduction to Object oriented system	Assignment	Identify problem domain objects for an application domain	<b>8 Classes</b>			
<b>Topics:</b> Object Basics-Object Oriented System Development Life Cycle- Use case driven approach-Rumbaugh Object Model-Booch Methodology-Jacobson Methodology-Unified Approach, Static and Dynamic Modeling-Unified Modeling Language							



  
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<b>Module 2</b>	Object oriented analysis	Assignment	Identification of candidate classes using various approaches	<b>10 Classes</b>
<p><b>Topics:</b></p> <p>Identifying use cases-Object Analysis-Classification: Theory-Approaches for Identifying Classes: Noun Phrase approach, Common Class pattern approach, Use case driven approach, Classes, Responsibilities and Collaborators- Identifying Object relationships: Associations, Super-sub class relationships, Aggregation. UML diagrams: Use case Diagram , Class diagram.</p>				
<b>Module 3</b>	Introduction to axiomatic design	Assignment	Apply axioms to create class diagram	<b>10 Classes</b>
<p><b>Topics:</b></p> <p>Object Oriented Design Axioms-Designing Classes -Class visibility -Redefining attributes -Designing methods and protocols -Packages and managing classes, UML Diagrams: Interaction diagram, Sequence diagram, Collaboration diagram, State-chart diagram, Activity diagram</p>				
<b>Module 4</b>	Object oriented Design process	Assignment	Apply the design process and develop a component and deployment diagram.	<b>10 Classes</b>
<p><b>Topics:</b></p> <p>Access Layer- Object Storage Persistence - Object oriented Database System-Designing view layer classes -Macro level process -Micro level process- Prototyping the user interface UML diagrams: component diagram, Deployment diagram, Quality Assurance Tests-Testing Strategies.</p>				
<p><b>Tools that can be used:</b></p> <p><b>Tools:</b></p> <ul style="list-style-type: none"> <li>• Microsoft visio, Rational software architect(RSA)</li> <li>• ArgoUML, Rational Rose, StarUML, Umbrello</li> </ul>				
<p><b>Project work/Assignment:</b></p>				
<p><b>Term Assignments:</b></p> <ul style="list-style-type: none"> <li>• <b>identify Use Cases and develop the Use Case model</b></li> <li>• <b>Identity the conceptual classes and develop a UML Class diagram</b></li> </ul>				


  
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<ul style="list-style-type: none"> <li>Using the identified scenarios find the interaction between objects and represent them using UML Interaction diagrams</li> <li>Identify the business activities and develop an UML Activity diagram</li> </ul>	
<b>Text Book</b> 1. Ali Behrami, "Object Oriented Systems Development using Unified Modeling Language" McGraw Hill International Edition, July 2017.	
<b>References</b> 1. Craig Larman, "Applying UML and Patterns", Pearson Education. 2. Grady Booch, "Object Oriented Analysis and Design with Applications", Addison-Wesley. 3. Simon Bennett, Steve McRobb, Ray Farmer, "Object Oriented Systems Analysis and Design using UML", McGrawHill Education	
Topics related to development of "FOUNDATION": Object Basics-Object Oriented System Development Life Cycle- Use case driven approach-Rumbaugh Object Model- Booch Methodology- Jacobson Methodology- Unified Approach, Static and Dynamic Modeling- Unified Modeling Language  Topics related to development of "SKILL DEVELOPMENT": UML diagrams: Use case Diagram, Class diagram, Interaction diagram, Sequence diagram, Collaboration diagram, State-chart diagram, Activity diagram, component diagram, Deployment diagram using the tool StarUML software	
<b>Catalogue prepared by</b>	Dr. Clara Kanmani A
<b>Recommended by the Board of Studies on</b>	BOS NO: 12th BOS, held on 04/08/2021
<b>Date of Approval by the Academic Council</b>	Academic Council Meeting No. 16, Dated 23/10/2021

<b>Course Code:</b> CSE 3078	<b>Course Title:</b> Cryptography and Network Security <b>Type of Course:</b> Program Core & Theory only	<b>L- P- C</b>	3	0	3
<b>Version No.</b>	1				
<b>Course Pre-requisites</b>	"Data Communications and Computer Networks".				
<b>Anti-requisites</b>	NIL				

  
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<b>Course Description</b>	<p>The Course covers the principles and practice of cryptography and network security, focusing in particular on the security aspects of the web and Internet.</p> <p><b>Topics:</b> The cryptographic tools such as shared key encryption, public key encryption, key exchange, and digital signature are explored. The use and utilization of the internet protocols and applications such as SSL/ TLS, IPSEC, Kerberos, PGP, and S/ MIME, SET are reviewed. System security issues such as viruses, intrusion and firewalls are also explored.</p>			
<b>Course Objective</b>	<p>The objective of the course is <b>SKILL DEVELOPMENT</b> of student by using <b>PARTICIPATIVE LEARNING techniques.</b></p>			
<b>Course Outcomes</b>	<p>On successful completion of this course the students shall be able to:</p> <p><b>CO1:</b> Identifies the basic concept of Cryptography (<b>Knowledge</b>)</p> <p><b>CO2:</b> Express the different types of Cryptographic Algorithms. (<b>Comprehension</b>)</p> <p><b>CO3:</b> Recognize the Public key Cryptographic Techniques for various applications. (<b>Comprehension</b>)</p> <p><b>CO4:</b> Apply the network security concepts during their implementation of network security application developments. (<b>Application</b>)</p>			
<b>Course Content:</b>				
<b>Module 1</b>	<b>Introduction to Cryptography</b>	Assignment	Identify the Concepts	08 Sessions
<p>Topics: 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 : Caesar, Mono alphabetic, Polyalphabetic, Play-fair and Hill Cipher, Introduction to Block Cipher and Stream Cipher, Festal Structure.</p>				
<b>Module 2</b>	<b>Private Key Cryptography and Number Theory</b>	Assignment	Analysis of requirement of complexity in cryptography	13 Sessions
<p>Topics: Symmetric Encryption Algorithms : Data Encryption Standard, Introduction to Galois Field, Advanced Encryption Standard, Modular Arithmetic, Prime numbers, Fermat's little theorem, brief about primality testing and factorization, Discrete Logarithmic Problem, Euclidean and Extended Euclidean Algorithm, Euler Totient Function, Chinese Remainder Theorem</p>				
<b>Module 3</b>	<b>Public Key Cryptography and its Applications</b>	Assignment	Recognize the importance of various security concepts to achieve sufficient solutions	10 Sessions
<p>Topics: Overview of Public Key Cryptography, RSA, Diffie - Helman Key exchange, Man in the middle attack, Cryptographic Hash functions, Secure Hash Algorithm, Message Authentication Codes – HMAC, Digital Signature, Discussion on real time practices of Cryptography.</p>				

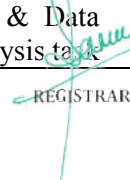

  
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<b>Module 4</b>	<b>Network Security</b>	Assignment	Implement the advanced network security algorithms in recent applications.	07 Sessions
<p>Topics: Network Security fundamentals, Network Security applications: Authentication: Kerberos, PKI, Network Security applications: e-mail security: PGP, MIME, Network Security applications: IP Security: IP Sec architecture, Network Security applications: Web Security.</p>				
<p><b>Targeted Application &amp; Tools that can be used:</b> Students get the knowledge about cryptography techniques followed, the algorithms used for encryption and decryptions &amp; the techniques for authentication and confidentiality of messages.</p>				
<p><b>Assignment:</b> <b>Assignment 1:</b> Solve the problems of basic encryption techniques. <b>Assignment 2:</b> Solve and analyze the problems on symmetric and asymmetric encryption.</p>				
<p><b>Textbooks:</b> 1. William Stallings, "Cryptography and Network Security - Principles and Practices", Prentice Hall, 8<sup>th</sup> Edition, 2019. 2. Wade Trappe and Lawrence C Washington, "Introduction to Cryptography with Coding Theory", Pearson, 2020.</p> <p><b>Reference Books:</b> 1. Behrouz A Forouzan, Debdeep Mukhopadhyay, "Cryptography and Network Security", McGraw Hill, third edition, 2010. 2. R. Rajaram, "Network Security and Cryptography" SciTech Publication. 3<sup>rd</sup> Edition, 2014. 3. Atul Kahate, "Cryptography and Network Security", Tata McGraw-Hill, 2<sup>nd</sup> Edition, 2019. 4. Bruce Schneier, "Applied Cryptography", John Wiley and Sons Inc. Second Edition, 2015.</p>				
<p><b>Web references:</b> 1. <a href="https://onlinecourses.nptel.ac.in/noc22_cs90/preview">https://onlinecourses.nptel.ac.in/noc22_cs90/preview</a> 2. e-pgpathshala UGC lecture series : E-Series and Self learning Materials. <a href="https://epgp.inflibnet.ac.in/Home/ViewSubject?catid=fBYckQKJvP3a/8Vd3L08tQ==">https://epgp.inflibnet.ac.in/Home/ViewSubject?catid=fBYckQKJvP3a/8Vd3L08tQ==</a> 3. <a href="http://182.72.188.195/cgi-bin/koha/opac-detail.pl?biblionumber=10133&amp;query_desc=kw%2Cwrdl%3A%20Cryptography%20and%20Network%20Security">http://182.72.188.195/cgi-bin/koha/opac-detail.pl?biblionumber=10133&amp;query_desc=kw%2Cwrdl%3A%20Cryptography%20and%20Network%20Security</a> 4. <a href="http://182.72.188.195/cgi-bin/koha/opac-detail.pl?biblionumber=5875&amp;query_desc=kw%2Cwrdl%3A%20Cryptography%20and%20Network%20Security">http://182.72.188.195/cgi-bin/koha/opac-detail.pl?biblionumber=5875&amp;query_desc=kw%2Cwrdl%3A%20Cryptography%20and%20Network%20Security</a>.</p>				
<p><b>Topics relevant to "Skill Development":</b> Symmetric and Asymmetric Encryption Algorithms and its problems.</p>				
<b>Catalogue prepared by</b>	Dr.A. Vijayakumar			
<b>Recommended by the Board of Studies on</b>	BOS NO: 12th BOS, held on 04/08/2021			

  
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<b>Date of Approval by the Academic Council</b>	Academic Council Meeting No. 16, Dated 23/10/2021
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<b>Course Code:</b> ECE2007	<b>Course Title:</b> Digital Design <b>Type of Course:</b> Program Core Theory & Integrated Laboratory	<b>L- P- C</b>	2	2	3
<b>Version No.</b>	1.0				
<b>Course Pre-requisites</b>	Basic concepts of number representation, Boolean Algebra, Arithmetic and Logic Computation.				
<b>Anti-requisites</b>	NIL				
<b>Course Description</b>	<p>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.</p>				
<b>Course Objective</b>	<p>The objective of the course is <b>SKILL DEVELOPMENT</b> of the student by using <b>PARTICIPATIVE LEARNING techniques.</b></p>				
<b>Course Outcomes</b>	<p>On successful completion of this course the students shall be able to:</p> <ol style="list-style-type: none"> <li><b>Discuss</b> the concepts of number systems, Boolean algebra and logic gates.</li> <li><b>Apply</b> minimization techniques to simplify Boolean expressions.</li> <li><b>Demonstrate</b> the Combinational circuits for a given logic</li> <li><b>Illustrate</b> the Sequential and programmable logic circuits</li> <li><b>Implement</b> various combinational logic circuits using gates.</li> <li><b>Verify</b> the performance of various sequential logic circuits using gates.</li> </ol>				
<b>Course Content:</b>					
<b>Module 1</b>	<b>Fundamentals of Number systems- Boolean algebra and digital logic</b>	Application Assignment	Data Analysis task	<b>6 Session</b>	
<p><b>Topics:</b> Review of Number systems, Number base conversions, complements of numbers, Binary Codes, Boolean theorems and Boolean algebra, Boolean functions- canonical and standard forms, Digital logic gates, Introduction, two, three, four variable K-Maps, utilizing Don't care conditions. Quine McClusky Method for simplification. Universal Gates (NAND &amp; NOR) Implementations.</p>					
<b>Module 2</b>	<b>Combinational Logic circuits:</b>	Application Assignment	Programming Task & Data Analysis task	<b>10 Session</b>	

  
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**Topics:**  
Introduction to Combinational circuits, Analysis, Design procedure, Binary Adder and Subtractor, Magnitude comparator, Multiplexers-Demultiplexers, Decoders, Encoders and Priority Encoders, HDL Models of combinational circuits.

<b>Module 3</b>	<b>Sequential and Programmable logic circuits:</b>	Application Assignment	Programming Task & Data Analysis task	<b>14 Session</b>
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**Topics:**  
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- ROMs, PLDs & PLAs. Implementation of Digital circuits.

**List of Laboratory Tasks:**  
**Experiment N0 1:** Verify the Logic Gates truth table  
**Level 1:** Verify basic logic gates on Digital Logic Trainer kit.  
**Level 2:** Construct basic logic gates using universal gates and verify using Digital Logic Trainer kit.

**Experiment No. 2:** Verify the Boolean Function and Rules  
**Level 1:** Verify basic Boolean laws on Digital Logic Trainer kit.  
**Level 2:** Construct a circuit to verify De Morgan's Theorem on Digital Logic Trainer kit.

**Experiment No. 3:** Construct and verify the HA/FA logic circuits  
**Level 1:** By using basic logic and XOR gates and Trainer Kit.  
**Level 2:** By using Universal logic gates and Trainer Kit

**Experiment No. 4:** Construct and verify the HS/FS logic circuits  
**Level 1:** By using basic logic and XOR gates and Trainer Kit  
**Level 2:** By using Universal logic gates and Trainer Kit

**Experiment No. 5:** Construct and verify the combinational logic circuit for given specifications.  
**Level 1:** Specifications given in the form of Truth table. Implement using basic gates.  
**Level 2:** Specification should be extracted from the given scenario. Implement using universal gates only.

**Experiment No. 6:** Study of SR and D Flip flops  
**Level 1:** Verify the operation of SR and D Flip-Flops on Digital Logic Trainer kit  
**Level 2:** Construct and verify a SR Flip Flop using D Flip Flops.

**Experiment No. 7:** Study of JK Flip-flop and Toggle Flip-Flop.  
**Level 1:** Verify the operation of JK Flip-flop and Toggle Flip-Flop on Digital Logic Trainer kit  
**Level 2:** Construct and verify a T Flip-Flop using JK Flip-Flop.

**Experiment No. 8:** Construct and verify the sequential logic circuit for given specifications  
**Level 1:** Specifications given in the form of Truth table.  
**Level 2:** Specification should be extracted from the given scenario.

**Experiment No. 9:** Write the HDL coding for basic combinational logic circuits  
**Level 1:** Gate level Modeling  
**Level 2:** Behavioral Modeling

**Experiment No. 10:** Write the HDL coding for basic sequential logic circuit



**Level 1:** Gate level Modeling

**Level 2:** Behavioral Modeling

**Targeted Application & Tools that can be used:**

Application Area includes all modern electronic devices (cellular phones, MP3 players, laptop computers, digital cameras, high definition televisions, Home Automation, Communication systems). The students will be able to join a profession which involves basics to high level of digital circuit design and analysis.

**Professionally Used Software:** HDL (VHDL/ Verilog HDL)/ C++

Besides these software tools Digital IC Trainer kit and Integrated Circuits (ICs) can be used to perform circuit testing and analysis.

**Project work/Assignment:**

**1. Case Studies:** At the end of the course students will be given a real-world scenario for any application like security system/digital clock/ 7segment disply. Students will be submitting a report which will include Truth table, Design, Circuit Diagrams, implementation and Results.

**2. Book/Article review:** At the end of each module a book reference or an article topic will be given to each student. They need to visit the library and write a report on their understanding about the assigned article in an appropriate format. Presidency University Library Link .

**3. 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.

**4. Assignment 1:** Raj is an engineering student. In his mini project, he has to design a circuit which has three inputs A, B, C and Two outputs. The circuit performing the summations of all input and produce sum and carry output. But Raj has only 3 into 8 line Decoder IC. Give the truth table and circuit diagram for his project with available Decoder:

**5. Assignment 2:** A student wants to design a digital logic switching function which is described by the following Boolean Function in SoP,  $F(A,B,C,D)=\sum(1,3,4,11,12,13,14,15)$ . But he has provided with only 8x1 MUX. Guide the student to design the switching function using MUX only

**Text Book(s):**

1. Mano, M. Morris and Ciletti Michael D., “*Digital Design*”, Pearson Education, 6<sup>th</sup> edition
2. Thomas 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), 4<sup>th</sup> Edition

R2. Roth, Charles H., Jr and Kinney Larry L., “*Fundamentals of logic Design*”, Cengage Learning, 7<sup>th</sup> Edition

**Online Resources (e-books, notes, ppts, video lectures etc.):** Book Free Download (studymaterialz.in)

1. **eBook1:** Mano, M. Morris and Ciletti Michael D., “*Digital Design*”, Pearson Education.
2. {[PDF] Digital Design By M. Morris Mano, Michael D Ciletti Book Free Download }
3. **eBook2:** Floyd “DIGITAL LOGIC DESIGN” fourth edition- ePub, eBook- [PDF] DIGITAL LOGIC DESIGN FOURTH EDITION FLOYD | abri.engenderhealth.org.
4. NPTEL Course- NPTEL :: Electrical Engineering - NOC:Digital Electronic Circuits
5. Digital Logic Design PPT Slide 1 (iare.ac.in)
6. 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

**E-content:**

1. 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.
2. An encoding technique for design and optimization of combinational logic circuit Dipayan Bhadra;Tanvir Ahmed Tarique;Sultan Uddin Ahmed;Md. Shahjahan;Kazuyuki Murase 2010 13th International Conference on Computer and Information Technology (ICCIT)
3. 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.

Topics related to development of “FOUNDATION SKILLS”: Adders, Multiplexers, Decoders / Encoders; Flip-Flops, Counters and Registers.



<b>Catalogue prepared by</b>	<b>Dr. G. Muthupandi</b>
<b>Recommended by the Board of Studies on</b>	BOS NO: 19th BOS, held on 04/08/2022
<b>Date of Approval by the Academic Council</b>	Academic Council Meeting No. 18, Dated 03/8/2022.



<b>Course Code:</b> CSE3097	<b>Course Title:</b> Web Security <b>Type of Course:</b> Integrated course	L- P- C	2	2	3
<b>Version No.</b>	1.0				
<b>Course Pre-requisites</b>	<b>Advanced Computer Networks (CSE3070)</b>				
<b>Anti-requisites</b>	NIL				
<b>Course Description</b>	This course is a comprehensive overview of web security that introduces to the field of web security by understanding web functionality and various security validations. The goal is to build an understanding of the most common web attacks and their countermeasures. The course also covers fundamental concepts of web security principles, web vulnerability and exploitation, various attacks on web applications, and a few basic topics on web encryption.				
<b>Course Objective</b>	The objective of the course is to develop ' <b>skill development</b> ' of the students by using <b>problem solving methodologies</b> .				
<b>Course Outcomes</b>	<b>On successful completion of this course the students shall be able to:</b> 1. <b>Illustrate</b> the fundamentals of Web applications and validation. [Knowledge] 2. <b>Recognize</b> the significance of password and authentication in web applications. [Comprehension] 3. <b>Explain</b> the importance of session management on the web [Comprehension]. 4. <b>Apply</b> web attack techniques to find vulnerabilities in web applications. [Application]				
<b>Course Content:</b>					
<b>Module 1</b>	<b>Introduction to Web Security</b>	Quiz	Knowledge	<b>10 Sessions - L[08]+P[02]</b>	
<b>Topics:</b> Web Functionality, Encoding Schemes, Mapping the Application - Enumerating the Content and Functionality, Analyzing the Application Bypassing, Client-Side Controls: Transmitting Data Via the Client, Capturing User Data, Handling Client-Side Data Securely - Input Validation, Blacklist Validation, Whitelist Validation. <b>Quiz:</b> Comprehension based Quiz on web fundamentals.					

  
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<b>Module 2</b>	<b>Web Application Authentication</b>	Assignments	Comprehension	<b>11 Sessions L[09] ]+P[02]]</b>
<p><b>Topics:</b> Authentication Fundamentals- Two Factor and Three Factor Authentication - Password Based, Built-in, HTTP, Single Sign-on Custom Authentication- Secured Password Based Authentication: Attacks against Password, Importance of Password Complexity, Design Flaws in Authentication Mechanisms - Implementation, Flaws in Authentication Mechanisms - Securing Authentication. <b>Assignment:</b> Comprehensive based assignment on Web authentication.</p>				
<b>Module 3</b>	<b>Session Management &amp; Web Security Principles</b>	Quiz	Comprehension	<b>11 Sessions L[09] ]+P[02]]</b>
<p><b>Topics:</b> Need for Session Management, Weaknesses in Session Token Generation, Weaknesses in Session Token Handling, Securing Session Management; Access Control: Access Control Overview, Common Vulnerabilities, Attacking Access Controls, Securing Access Control. Origin Policy, Exceptions, Cross Site Scripting, Cross Site Forgery Scripting; <b>Quiz:</b> Comprehension based Quizzes on web security techniques.</p>				
<b>Module 4</b>	<b>Web Application Vulnerability</b>	Assignment	Application	<b>10 Sessions L[08] ]+P[02]]</b>
<p><b>Topics:</b> Understanding Vulnerabilities in Traditional Client-Server Application and Web Applications, Cookie based Attacks, SQL Injection, Cross Domain Attack (XSS/ XSRF/ XSSI), HTTP Header Injection, SSL Vulnerabilities and Testing - Proper Encryption use in Web Application - Session Vulnerabilities and Testing - Cross-Site Request Forgery. <b>Assignment:</b> Assignment on web vulnerabilities and web exploitation.</p>				
<p><b>List of Laboratory Tasks:</b></p> <p>1. <b>Practical knowledge of known vulnerabilities in CGI, LAMP stacks, REST APIs cross-site scripting</b></p> <p><b>Practical knowledge of known vulnerabilities in CGI, LAMP stacks, REST APIs cross-site scripting:</b> Use the <b>Nessus tool</b> to scan the network for vulnerabilities.</p> <p>i. Basic Network scanning ii. Advanced scanning in general search</p>				

  
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- iii. Ntstat port scanning:
- iv. Vulnerability Mapping
- v. Policies:
- vi. Plugins:
- vii. General Scanning
- viii. Port Scanning

**Level 1: Identification of vulnerabilities**

**Level 2: Apply the concept**

**2. HTTP and setting up stacks, the various types of databases Access Controls, Vulnerabilities**

**HTTP and setting up stacks**

- i. Create a simple web application that can store information sent to it. For example, you could create a web application that will store to a text file anything provided in a URL parameter
- ii. Write or modify an existing application that legitimately needs access to a sensitive resource, but uses it at a time when it does not actually need it

**Various types of databases Access Controls**

- i. Role-Based Access Control (RBAC)
- iii. Mandatory Access Control (MAC)

**Vulnerability: Study and work with KF Sensor**

STEP1: Download KF Sensor tool Evaluation Setup File from KF Sensor Website.

STEP-2: Install with License Agreement and appropriate directory path.

STEP-3: Reboot the Computer now. The KF Sensor automatically starts during Windows boot.

STEP-4: Click Next to setup wizard.

STEP-5: Select all port classes to include and Click Next.

STEP-6: "Send the email and Send from email", enter the ID and Click Next.

STEP-7: Select the options such as Denial of Service[DOS], Port Activity, Proxy Emulsion, Network Port Analyzer, Click Next.

STEP-8: Select Install as System service and Click Next.

**Level 1: Identification of vulnerabilities**

**Level 2: Apply the concept**

**3. Study of web authoring tools (any 2-3 tools)**

- i. Study and work with Net Stumbler tool
- ii. Study and work with Snort
- iii. Study and work with Nmap



**Level 1: Install the tools required**

**Level 2: Apply the concept**

4. **Testing web applications**

**Study and work with Word press tool**

- i. Create an Online Community website and test the website
- ii. Showcase Your Work Online and test its worth
- iii. Create a Local Business Website and test the website.

**Level 1: Define the test cases**

**Level 2: Apply the concept to test the web application**

5. **SQL injection and prevention**

From the given data set ,

- i. Put limits on all result sets
- ii. Cleanse and Validate Freeform User Input
- iii. Remove Freeform User Input When Possible
- iv. Validate Data Prior to Processing
- v. Ensure Errors are Not User-Facing
- vi. Use Stored Procedures to Abstract Business Logic and Control parameters
- vii. Use LIKE Operators Carefully
- viii. Limit Use of xp\_cmdshell and Other Extended Stored Procedures
- ix. Perform Penetration Tests
- x. Code Review
- xi. Minimizing the Impact of SQL Injection
- xii. Principle of Least Privilege & Login Security
- xiii. Secure Linked Servers and Data Sources

**Level 1: Recognize and acquire the data**

**Level 2: Apply the concept**

6. **Cross site request forgery attack lab**

With the usage of Virtual Machines

- i. Configure the Virtual Machines:
- ii. Observing HTTP Request in Victim VM
- iii. CSRF Attack using GET Request
- iv. CSRF Attack using POST Request
- v. Implementing a countermeasure

**Level 1: Identify and acquire the data**

**Level 2: Apply the concept**

7. **Web tracking**

Tracking the Web based scenario by

- Environment Configuration



- clear history and cookies
- open a new private window in Firefox

Task 1: Understand the basic working of the web tracking

Task 2: Importance of cookie in Web tracking

Task 3: Tracked user interests and data

Task 4: How ads are displayed in a website

Task 5: Tracking in a Private browser window

Task 6: Real world tracking

Task 7: Countermeasures

**Level 1: Identify and acquire the data logs**

**Level 2: Apply the concept**

**Targeted Application & Tools that can be used:**

1. **Word press tool can be used for building websites with possible vulnerabilities.**
2. **Tools such as Nmap and Nessus can be used for web attack demonstration.**
3. **KF Sensor advanced 'honeypot' intrusion and insider threat detection system for Windows networks**
4. **Snort can be used for network intrusion detection system and intrusion prevention system**
5. **Net Stumbler tool for Windows that facilitates detection of Wireless LANs using the 802.11b, 802.11a and 802.11g WLAN standards.**

**Project work/Assignment:**

**Group assignment to identify and write different web exploits to demonstrate vulnerabilities in web applications.**

**Textbook(s):**

T1. B. Sullivan, V. Liu, and M. Howard, *"Web Application Security"*, A B Guide. New York: McGraw-Hill Education, 2011.

T2. *Web Application Security: Exploitation and Countermeasure for Modern Web Applications*, by Andrew Hoffman.



**References:**

R1. Hanqing and L. Zhao, "Web Security: A Whitehat Perspective". United Kingdom: Auerbach

Publishers, 2015.

R2. M. Shema and J. B. Alcover, "Hacking Web Apps: Detecting and Preventing Web Application". R3. "Security Problems". Washington", DC, United States: Syngress Publishing, 2014.

**E-book Links**

W1: <https://www.oreilly.com/library/view/web-application-security/9780071776165/>

W2: <https://www.oreilly.com/library/view/web-application-security/9781492053101/>

**Web links-**

W1. <https://www.coursehero.com/file/55761404/VIT-VELLORE-BCI3001-WEB-SECURITY-ETH-10-0-BCI3001-SYLLABUSpdf/>

W2. [https://presiuniv.knimbus.com/user#/viewDetail?searchResultType=ECATALOGUEBASED & unique\\_id=FREE TECHBOOKS\\_1\\_744](https://presiuniv.knimbus.com/user#/viewDetail?searchResultType=ECATALOGUEBASED&unique_id=FREE TECHBOOKS_1_744)

W3. <https://presiuniv.knimbus.com/user#/searchresult?searchId=web%20security&t=1658901356250>

W4. Web Security Model, MIT lectures, 2017  
[cw.mit.edu/courses/6-858-computer-systems-security-fall-2014/resources/lecture-8-web-security-model/](http://cw.mit.edu/courses/6-858-computer-systems-security-fall-2014/resources/lecture-8-web-security-model/)

**Topics related to development of "Skills":**

Web technology fundamentals, web security measures and web vulnerability/attacks.

**Topics related to development of "Participative Learning":**

Writing different web exploits to demonstrate vulnerabilities in web applications.

<b>Catalogue prepared by</b>	Dr.R.Kanthavel, Dr.S.P.Anandaraj, Mr.Shobhit Tembhre
<b>Recommended by the Board of Studies on</b>	(BOS NO: SOCSE1. BOS held on 22 / 12 / 2022 )
<b>Date of Approval by the Academic Council</b>	(Academic Council Meeting No.20.3 , Dated 15 /02 /23 )

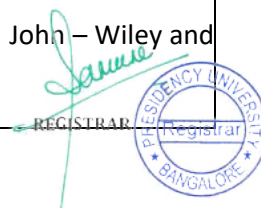
  
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<b>Course Code:</b> CSE 3099	<b>Course Title: Digital and Mobile Forensics</b> <b>Type of Course: Integrated</b>	L- P-C	2	2	3
<b>Version No.</b>	1				
<b>Course Pre-requisites</b>	CSE2011-Data Communications and Computer Networks				
<b>Anti-requisites</b>	NIL				
<b>Course Description</b>	The use of Mobile phones and digital devices across the globe has increased dramatically. These devices are more susceptible to information security attacks and thus they also possess huge evidence which shall be used during crime scene investigation. This makes the course on mobile and digital forensics an inevitable one for the security professionals. This course on mobile and digital forensics will provide a better understanding for the course participants on different forms of evidence in many digital devices, collection and interpretation of the same.				
<b>Course Objective</b>	The objective of the course is <b>Skill development</b> of student by using <b>Participative Learning</b> techniques.				
<b>Course Out Comes</b>	<b>On successful completion of the course the students shall be able to:</b> <ul style="list-style-type: none"> <li>Describe the basic concepts of Cybercrime and Digital Forensics. <b>[Knowledge]</b></li> <li>Employ various Digital Forensic tools to perform Forensic investigation. <b>[Application]</b></li> <li>Interpret security challenges and Forensic examination process of wireless devices. <b>[Comprehension]</b></li> <li>Produce digital evidence through the usage of mobile device Forensic tools. <b>[Application]</b></li> </ul>				
<b>Course Content:</b>					
<b>Module 1</b>	<b>Cybercrime and Digital Forensic Principles</b>	Assignment	<b>Knowledge</b>	<b>10 Sessions</b>	
<b>Topics:</b> Cybercrime: Definition, Nature and Scope of Cybercrime, Types of cyber crime, Categories of cyber crime, Investigating Cybercrime, Digital Evidence, Prevention of cyber crime, Overview of Digital Forensics, Phases of Digital Forensics, Digital devices in society, Evidential Potential of Digital Devices: closed and open systems, Digital investigation process models: Staircase Model, Evidence Flow Model, Increasing awareness of digital evidence, Case studies on Cyber Crimes.					
<b>Module 2</b>	<b>Digital Forensics examination process</b>	Case studies / Case let	<b>Application</b>	<b>11 Sessions</b>	
<b>Topics:</b> Language of Computer crime investigation, preparing a Digital Forensics Investigation, Challenging aspects of digital evidence, Presenting digital evidence, Device usage, Profiling and cyberprofiling, Contamination, Digital forensics examination principles: Previewing, Imaging, Continuity and hashing, Evidence locations, A seven-element security model, A developmental model of digital systems.					





<b>Module 3</b>	<b>Wireless technologies and Wireless threats</b>	Quiz	<b>Comprehension</b>	<b>10 Sessions</b>
<b>Topics:</b> Overview of Modern Wireless Technology, Wireless Crime Prevention Techniques, War-Driving, War-Chalking, War Flying, Voice SMS, GSM and Identification Data Interception in GSM, Cell Phone Hacking and Phreaking, Who's Tracking You and Your Cell Phone? How Does Cellular Fraud Occur? Cell Phone Forensics, Forensic Rules for Cellular Phones, Cell Phone Flowchart Processes Using Paraben's Cell Seizure.				
<b>Module 4</b>	<b>Mobile phone Forensics</b>	Quiz	<b>Application</b>	<b>8 Sessions</b>
<b>Topics:</b> Importance and Motivation behind Mobile Forensics, Mobile Phone Forensics: Crime and Mobile Phones, the Evidence, Forensic Procedures of mobile phones, The SIM Card, Files Present in SIM Card, Device Data, SMS Spam, What Data Is Available from Mobile Phones, Handling Instructions for Mobile Phones, Mobile Phone Forensics Tools and Methods, Social Media Forensics on Mobile Devices.				
<b>List of Laboratory Tasks:</b>				
<ol style="list-style-type: none"> <li>1. Cyber check suite and other forensic tools from CDAC</li> <li>2. Forensic Imaging of Virtual Machines</li> <li>3. Live Acquisition, Live Incident Response</li> <li>4. Live Memory Forensics (Volatility framework)</li> <li>5. Scalpel, Autopsy</li> <li>6. Installation of Android Studio, Working on Open-source android forensic tool kit (OSAF-TK)</li> <li>7. Extraction of mobile data using Oxygen forensic suit</li> <li>8. Physical Extraction of Data from mobile device using UFED Touch</li> <li>9. Analyzing data of android mobile using MOBILedit</li> <li>10. Analyzing android device using autopsy forensic tool.</li> </ol>				
<b>Targeted Application &amp; Tools that can be used</b>				
<b>Project work/Assignment:</b>				
<b>Project work/Assignment:</b>				
Each batch of students (self-selected batch mates) will identify projects based on the content and implement with the most suitable 2 or 3 antecedents.				
<b>Textbook:</b>				
<b>T1.</b> Gregory Kipper, "Wireless Crime and Forensic Investigation", Auerbach Publications, 1st Edition, September 19, 2019.				
<b>References</b>				
<b>R1 .</b> Losif I. Androulidakis, "Mobile phone security and forensics: A practical approach", Springer publications, 2nd Edition, 2016.				
<b>R2.</b> Andrew Hoog, "Android Forensics: Investigation, Analysis and Mobile Security for Google Android", Elsevier publications, 1st Edition, 15th June 2011.				
<b>R3 .</b> Angus M. Marshall, "Digital forensics: Digital evidence in criminal investigation", John – Wiley and Sons, November 2008, p 180.				



**E book link R1:** <https://www.udemy.com/course/mobile-computer-forensics/>

**E book link R2:** <https://www.coursera.org/learn/digital-forensics-concepts>

**E book link R3:** <https://www.classcentral.com/course/swayam-digital-forensics-45145>



**R3 Web resources:** <https://presiuniv.knimbus.com/user#/home>  
pu.informatics.global

**Topics relevant to development of "Skill Development":**

<b>Catalogue prepared by</b>	Shruthi U
<b>Recommended by the Board of Studies on</b>	(BOS NO: SOCSE1. BOS held on 22 / 12 / 2022 )
<b>Date of Approval by the Academic Council</b>	(Academic Council Meeting No.20.3 , Dated 15 /02 /23 )

  
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<b>Course Code:</b> CSE3145	<b>Course Title:</b> Cyber Security		<b>L- P- C</b>	3	0	3
	<b>Type of Course:</b> 1] Discipline Elective 2] Theory Only					
<b>Version No.</b>	1.1					
<b>Course Pre-requisites</b>	Fundamental knowledge in Information Security and Networks					
<b>Anti-requisites</b>	<b>NIL</b>					
<b>Course Description</b>	This is a foundation program geared towards generating and enhancing awareness about cyber security challenges and the concept of Cyber Security and Cyber Ethics among the stakeholders to help them become responsible Cyber Citizens and participate safely and securely in the rapidly evolving information-age society. The important topics include: Network Security model, attacks, malware, firewall, IT act and Cyber forensics					
<b>Course Objectives</b>	The objective of the course is <u>SKILL DEVELOPMENT</u> of student by using <u>PARTICIPATIVE LEARNING</u> techniques.					
<b>Course Out Comes</b>	On successful completion of the course the students shall be able to: 1) Describe the basic concept of Cyber Security [ <b>Knowledge</b> ] 2)Classify different types of attacks for a scenario [ <b>Comprehension</b> ] 3) Prepare a mitigation policy for security threat [ <b>Comprehension</b> ] 4) Demonstrate Cyber Security tools [ <b>Application</b> ]					
<b>Course Content:</b>						
<b>Module 1</b>	<b>Introduction to Cyber Security</b>	Quiz	<b>Knowledge</b>	<b>10 Sessions</b>		
<b>Topics</b> History of Internet, Cyber Crime, Information Security, Computer Ethics and Security Policies, Guidelines to choose web browsers, Securing web browser, Antivirus, Email security, Guidelines for setting up a Secure password , Cyber Security Threat Landscape, Emerging Cyber Security Threats, Cyber Security Techniques						
<b>Module 2</b>	<b>Security in Networks</b>	in Assignment	<b>Comprehension</b>	<b>10 Sessions</b>		
<b>Topics:</b> Security in Networks – Concepts, threats in Network, website vulnerabilities, man in the middle attack, denial of Service attack, distributed denial of service attack, Firewalls – introduction and design, types of firewalls, personal firewalls, Program Security – non malicious program errors, malicious program flaws, virus and other malicious code, prevention of virus infection.						

  
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<b>Assignment:</b> Program Security – non malicious program errors.				
<b>Module 3</b>	<b>Smartphone Security</b>	Assignment	<b>Comprehension</b>	<b>12 Sessions</b>
<b>Topics:</b> Introduction to mobile phones, Smartphone Security, Android Security, IOS Security, Cyber Security Exercise, Cyber Security Incident Handling, Cyber Security Assurance, Guidelines for social media security, Tips and best practices for safer Social Networking ,Basic Security for Windows, User Account Password Assignment: Social Media Security				
<b>Module 4</b>	Ethical Issues in Cyber Security	Assignment	Programming/Data analysis task	<b>9 Sessions</b>
Legal and ethical issues in Cyber Security – protecting program and data, copyright, patents and trade secrets, IT Act, EDP audit, Overview of CISA, Privacy in computing, Cyber Forensic Tools – types and categories, Cyber forensic suite. Forensic tools: types, categories, open source proprietary <b>Assignment:</b> Cyber Forensic Tools				
<b>Textbooks</b> T1. Charles P. Pfleeger and Shari Lawrence Pfleeger, “Security in Computing”, Pearson Education, 5 <sup>th</sup> Edition,2012 T2. Brooks, Charles J., Christopher Grow, Philip Craig, and Donald Short. Cybersecurity essentials. John Wiley & Sons, 2018 . T3. Dejey and Murugan, “Cyber Forensics”, Oxford University Press, 2018.				
<b>References</b> R1. Charles P. Pfleeger, Shari Lawrence Pfleeger, Jonathan Margulies, Security in Computing, 5th Ed, Pearson Education, 2015. R2. Behrouz A Forouzan and Debdeep Mukhopadhyay, Cryptography and Network Security, 3 <sup>rd</sup> Edition, Mc Graw Hill Publication, ISBN 13: 978-93-392-2094-5.2008.				
<b>Web links:</b> W1. <a href="https://www.youtube.com/watch?v=RYB4cG8G2xo">https://www.youtube.com/watch?v=RYB4cG8G2xo</a> W2. <a href="https://www.coursera.org/lecture/detecting-cyber-attacks/Cyber Security-UeDqj">https://www.coursera.org/lecture/detecting-cyber-attacks/Cyber Security-UeDqj</a>				
<b>Topics relevant to development of “SKILL DEVELOPMENT”:</b> Mobile Security				
<b>Catalogue prepared by</b>	Ms Impa B H			
<b>Recommended by the Board of Studies on</b>	(BOS NO: SOCSE1. BOS held on 22 / 12 / 2022 )			
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<b>Course Code:</b> CSE2038	<b>Course Title:</b> Privacy and Security in Online Social Media <b>Type of Course:</b> Program Core & Theory Only	L-P-C	3		0	3
<b>Version No.</b>		1.1				
<b>Course Pre-requisites</b>		Basic of Network security and cryptography.				
<b>Anti-requisites</b>		NIL				
<b>Course Description</b>		Objective of this course is to make students learn the basics of privacy and security in online social media and develop ability to understand the importance of privacy in anyone's life and their consequences if it is in peril. This course is both conceptual and analytical in nature that would help the student to predict the effects of any activity on Social Media. The students should have prior knowledge of some Social media platforms. After successful completion of the Course, the students would acquire knowledge to protect themselves from the online data theft on social media from attacker.				
<b>Course Objective</b>		This course is designed to develop <u>Technical skills</u> by using Real world test cases to make students industry(employability) ready.				
<b>Course Out Comes</b>		On successful completion of the course the students shall be able to: 1] Recognize the significance of the Privacy and how to protect it <b>[Knowledge]</b> 2] Summarize the privacy and security Encryption for Peer to Peer Social Networks. <b>[Comprehension]</b> 3] Understand the function of stealing Reality and K-Anonymity. <b>[Knowledge]</b> 4]Use the Link Reconstruction attack in privacy Social Networks. <b>[Application]</b>				
<b>Course Content:</b>						
<b>Module 1</b>	ANALYSIS OF PRIVACY IN SOCIAL NETWORKS	Assignment	Knowledge			<b>8 Sessions</b>
<b>Topics:</b> Three-Layered Framework-Characteristics Used to Analyze Social Web Privacy-Privacy Issues Related to Social Web Users-Privacy Issues Related to Service Providers-Security and Privacy for Digital Facets-Identifiable Facets-Private Facets. <b>Assignment:</b> Find real world problems and suggest solutions.						

  
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<b>Module 2</b>	ENCRYPTION FOR PEER-TO-PEER SOCIAL NETWORKS	Assignment	Comprehension	<b>8 Sessions</b>
<b>Topics:</b> Essential Criteria for the P2P Encryption Systems-Existing P2P OSN Architectures-Evaluations of Existing Encryption Schemes Based on Our Criteria-Broadcast Encryption-Predicate Encryption. <b>Assignment:</b> - Survey of Unethical Behavior and Influencing factors.				
<b>Module 3</b>	STEALING REALITY AND K-ANONYMITY	Quiz	Comprehension	<b>11 Sessions</b>
<b>Topics:</b> Stealing Reality- Social Attack Model- Social Learnability- k-Anonymity- k-Degree Anonymity- k-Neighborhood Anonymity- k- Automorphism- k-Isomorphism-L-diversity- Attack Model and Privacy Guarantee- Insights from an $\ell$ -Diversified Graph.				
<b>Module 4</b>	PRIVACY IN SOCIAL NETWORKS- LINKS RECONSTRUCTION ATTACK	Assignment/Case study	Application	<b>11 Sessions</b>
Privacy in Social Networks- Link Prediction- Feature Extraction- Communities Datasets- Electronic Currencies- Anonymity- The Bit coin System- The Transaction Network- The User Network- Anonymity Analysis- Integrating Off-Network Information. Use Case and the Threat Model- Use Case for Private Record Linkage- Use Case for Privacy-Preserving Record Linkage- <b>Assignment:</b> - The Bit coin Faucet- Voluntary Disclosures- TCP/IP Layer Information- Context Discovery- Flow and Temporal Analyses.				
<b>Text Book / References</b> T1. Yaniv Altshuler, Yuval Elovici, Armin B. Cremers Nadav Aharoni, Alex Pentland," Security and Privacy in Social Networks", Springer Publisher,2012,1 <sup>st</sup> Edition  <b>Online Resources:</b> - W1: <a href="https://presiuniv.knimbus.com/user#/searchresult?searchId=Privacy%20and%20Security%20in%20Online%20Social%20Media%20&amp;curPage=0&amp;layout=list&amp;sortFieldId=none&amp;topresult=false">https://presiuniv.knimbus.com/user#/searchresult?searchId=Privacy%20and%20Security%20in%20Online%20Social%20Media%20&amp;curPage=0&amp;layout=list&amp;sortFieldId=none&amp;topresult=false</a> W2: <a href="https://onlinecourses.nptel.ac.in/noc21_cs28/preview">https://onlinecourses.nptel.ac.in/noc21_cs28/preview</a>				
<b>Catalogue prepared by</b>	<b>Mr. Vikas Kumar</b>			
<b>Recommended by the Board of Studies on</b>	(BOS NO: SOCSE1st. BOS held on 22 / 12 / 2022 )			
<b>Date of Approval by the Academic Council</b>	(Academic Council Meeting No.20.3 , Dated 15 /02 /23 )			



<b>Course Code:</b> CSE2037	<b>Course Title: Cyber Forensics</b> <b>Type of Course: Program Core</b>			<b>L- P- C</b>	2	2	3
<b>Version No.</b>	1.0						
<b>Course Pre-requisites</b>	<b>Cryptography and Network Security</b>						
<b>Anti-requisites</b>	NIL						
<b>Course Description</b>	The purpose of this course is to introduce to the students Cyber Forensic concepts. The course is both conceptual and analytical and is understood with various open-source software's. The course develops critical thinking like correctly collect and analyze computer forensic evidence, analyze and validate Forensics Data, study the tools and tactics associated with Cyber Forensics. The course involves quizzes, assignments with various open-source software.						
<b>Course Objective</b>	This course is designed to improve the Learners EMPLOYABILITY SKILLS BY EXPERIENTIAL LEARNING techniques						
<b>Course Outcomes</b>	<b>On successful completion of this course the students shall be able to:</b> <b>(1) understand</b> various digital investigation terminologies and methods (knowledge) <b>(2) understand</b> various file formats (knowledge) <b>(3) Recognize</b> the importance of digital forensic duplication and various tools for analysis to achieve adequate perspectives of digital forensic investigation in various applications (Comprehension) <b>(4) Apply</b> techniques for forensic investigation (Application)						
<b>Course Content:</b>							
<b>Module 1</b>	<b>DIGITAL INVESTIGATION</b>	Quiz	MCQ/Based on Investigation process				<b>No. of Sessions: 09</b>
Digital Evidence and Computer Crime - History and Terminology of Computer Crime Investigation - Technology and Law - The Investigative Process -Investigative Reconstruction - Modus Operandi, Motive and Technology -Digital Evidence in the Courtroom.							
<b>Module 2</b>	<b>UNDERSTANDING INFORMATION</b>	Quiz	MCQ/Based on file format				<b>No. of Sessions: 09</b>
Methods of storing data: number systems, character codes, record structures, file formats and file signatures - Word processing and graphic file formats - Structure and Analysis of Optical Media Disk Formats - Recognition of file formats and internal buffers - Extraction of forensic artifacts- understanding the dimensions of other latest storage devices – SSD Devices.							
<b>Module 3</b>	<b>COMPUTER BASICS FOR DIGITAL INVESTIGATORS</b>	Assignment	Writing task				<b>No. of Sessions: 09</b>

  
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Computer Forensic Fundamentals - Applying Forensic Science to computers - Computer Forensic Services - Benefits of Professional Forensic Methodology -Steps taken by computer forensic specialists.

Information warfare: Arsenal – Surveillance Tools – Hackers and Theft of Components – Contemporary Computer Crime-Identity Theft and Identity Fraud – Organized Crime &Terrorism. Computer forensic cases: Developing Forensic Capabilities – Searching and Seizing Computer Related Evidence –Processing Evidence and Report Preparation – Future Issues.  
Assignment: Computer Crime

<b>Module 4</b>	<b>Computer Forensic Evidence and Data Recovery</b>	Assignment	Writing task	<b>No. of Sessions: 09</b>
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Data Recovery Defined, Data Backup and Recovery, The Role of Backup in Data Recovery, The Data-Recovery Solution, Hiding and Recovering Hidden Data.  
Data Collection and Data seizure: why collect evidence? - Collection Options, Obstacles, Types of Evidence, The Rules of Evidence, Volatile Evidence, General Procedure, Collection and Archiving, Methods of Collection, Artifacts, Collection Steps, Controlling Contamination: The Chain of Custody. Reconstructing the Attack.  
Assignment: Data Recovery





**List of Laboratory Tasks:**

1. Case Studies of Opensource Forensic Tools
2. FTK Forensic Tool kit for taking mirror image

**Disk Forensics-**

3. Identify digital evidences
4. Acquire the evidence
5. Authenticate the evidence
6. Preserve the evidence
7. Analyze the evidence
8. Report the findings

**Network Forensics:**

9. Intrusion detection
10. Logging
11. Correlating intrusion detection and logging

**Device Forensics**

12. Mobile phone
13. Digital Music
14. Printer Forensics
15. Scanner Forensics
16. Credit Card Forensics
17. Telecommunications Forensics
18. Forensic Analysis of a Virtual Machine
19. Forensic analysis of Cloud storage and data remnants
20. RAM Dumping Tool

**Targeted Application & Tools that can be used:**

1. **FTK Forensic Toolkit**
2. **Encase**
3. **Kali Linux- Vinetto, galatta**
4. **Autopsy – Disk Forensics**

**Project work/Assignment:**

Each batch of students (self-selected batch mates) will identify projects based on the content and implement with the most suitable 2 or 3 antecedents.

**Textbook(s):**

1. John R. Vacca, "Computer Forensics: Computer Crime Scene Investigation", Cengage Learning, 2nd Edition, 2019

**References**

1. Ravi Kumar & B Jain, 2006, "Cyber Forensics - Concepts and Approaches", icfai university press
2. Christof Paar, Jan Pelzl, "Understanding Cryptography: A Textbook for Students and Practitioners", Springer's, Second Edition, 2010,
3. Ali Jahangiri, "Live Hacking: The Ultimate Guide to Hacking Techniques & Countermeasures for Ethical Hackers & IT Security Experts", First edition, 2009
4. Computer Forensics: Investigating Network Intrusions and Cyber Crime", Ec-Council Press, 2010.



5. C. Altheide & H. Carvey, "Digital Forensics with OpenSource Tools, Syngress", 2011, ISBN: 781597495868, <a href="https://esu.desire2learn.com">https://esu.desire2learn.com</a>	
NPTEL: <a href="https://onlinecourses.swayam2.ac.in/cec21_ge10/preview">https://onlinecourses.swayam2.ac.in/cec21_ge10/preview</a> Udemy: <a href="https://www.udemy.com/topic/digital-forensics/">https://www.udemy.com/topic/digital-forensics/</a> E-book Link(PU):	
<b>Links</b> <a href="http://182.72.188.195/cgi-bin/koha/opac-detail.pl?biblionumber=14073&amp;query_desc=ti%2Cwrdl%3A%20CYBER%20FORENSIC">http://182.72.188.195/cgi-bin/koha/opac-detail.pl?biblionumber=14073&amp;query_desc=ti%2Cwrdl%3A%20CYBER%20FORENSIC</a>	
<b>Catalogue prepared by</b>	Dr. Sampath A K
<b>Recommended by the Board of Studies on</b>	BOS NO: 16 th. BOS held on 25/07/22
<b>Date of Approval by the Academic Council</b>	Academic Council Meeting No. 8, Dated 03/08/22

<b>Course Code:</b> CSE2039	<b>Course Title:</b> Ethical Hacking <b>Type of Course:</b> Discipline Elective in Cyber Security Basket	<b>L- P- C</b>	<b>2</b>	<b>2</b>	<b>3</b>
<b>Version No.</b>	1.0				
<b>Course Pre-requisites</b>	basic networking tools knowledge and Cryptography & Network Security				
<b>Anti-requisites</b>	NIL				
<b>Course Description</b>	This course introduces students to a wide range of topics related to ethical hacking. It also provides an in-depth understanding of how to effectively protect computer networks. These topics cover some of the tools and penetration testing methodologies used by ethical hackers and provide a thorough discussion of what and who an ethical hacker is and how important they are in protecting corporate and government data from cyber-attacks				
<b>Course Objective</b>	To study the fundamentals of ethical hacking To know how to work on linux systems. To learn, analyze and demonstrate hacking tools				
<b>Course Outcomes</b>	On successful completion of this course the students shall be able to: 1. Illustrate the importance of ethical hacking 2. Categorize the various techniques for performing reconnaissance. 3. Demonstrate various types of system scanners and their functions 4. Demonstrate the function of sniffers on a network				
<b>Course Content:</b>					

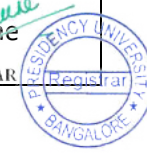
  
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<b>Module 1</b>	<b>Introduction to Hacking</b> (Knowledge, Application)	Assignment	Programming activity	<b>12 Hours</b>
<p>Topics: Introduction to Hacking-Important Terminologies - Asset - Vulnerability - Penetration Test - Vulnerability Assessments versus Penetration Test - Penetration Testing Methodologies - Categories of Penetration Test. <b>Assignment:</b> Different phase methodologies on penetration testing</p>				
<b>Module 2</b>	<b>Linux Basics</b>	Assignment	Programming activity	<b>10 Hours</b>
<p>Topics: Major Linux Operating Systems - File Structure inside of Linux - BackTrack - Changing the Default Screen Resolution - Some Unforgettable Basics. <b>Assignment:</b> Penetration testing distribution</p>				
<b>Module 3</b>	<b>Information Gathering Techniques</b>	Assignment	Programming activity	<b>11 Hours</b>
<p>Topics: Sources of Information Gathering - Copying Websites Locally - NeoTrace - Xcode Exploit Scanner - Interacting with DNS Servers - DNS Cache Snooping - DNS Lookup with Fierce - SNMP - SMTP. <b>Assignment:</b> Domain internet groper</p>				
<b>Module 4</b>	<b>Target Enumeration and Port Scanning Techniques</b>	Assignment	Programming activity	<b>13 Hours</b>
<p>Topics: Target Enumeration and Port Scanning Techniques - Host Discovery - Scanning for Open Ports and Services - Types of Port Scanning - Vulnerability Assessment. <b>Assignment:</b> Demonstrations for port scanning</p>				
<p><b>List of Laboratory Tasks:</b> <b>Experiments:</b></p> <ol style="list-style-type: none"> <li>1. Installing BackTrack</li> <li>2. Netcraft</li> <li>3. Keyloggers</li> <li>4. Acunetix</li> <li>5. Nslookup</li> <li>6. SNMP</li> <li>7. Port Scanning</li> <li>8. NetStumbler</li> <li>9. Performing an IDLE Scan with NMAP</li> <li>10. Network Sniffing</li> </ol>				
<p><b>Targeted Application &amp; Tools that can be used:</b> Application Software and open source tools</p>				
<p><b>Project work/Assignment: Mention the Type of Project /Assignment proposed for this course</b></p>				
<p>Any appropriate tool can be given to demonstrate i.e Sql injections.</p>				

  
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<b>Text Book</b>	
1. Rafay Baloch, 2014: "Ethical Hacking and Penetration Testing Guide" Apple Academic Press Inc.	
<b>References</b>	
2. Gary Hall, Rrin Watson, 2016: "Hacking: Computer Hacking, Security Testing, Penetration Testing, and Basic Security".	
3. James Corley, Kent Backman, Michael Simpson, 2010: "Hands-On Ethical Hacking and Network Defense", 2nd Edition, Cengage Learning.	
<b>Catalogue prepared by</b>	Dr. Sharmasth Vali Y
<b>Recommended by the Board of Studies on</b>	BOS NO: 16 th. BOS held on 25/07/22
<b>Date of Approval by the Academic Council</b>	Academic Council Meeting No. 8, Dated 03/08/22

<b>Course Code:</b> CSE2040	<b>Course Title:</b> Cyber threats for IOT and Cloud  <b>Type of Course:</b> 1] Program Core 2] Theory Only	<b>L- P- C</b>	3	0	3
<b>Version No.</b>	1.1				
<b>Course Pre-requisites</b>	Cyber Security, Information Security and Networks				
<b>Anti-requisites</b>	NIL				
<b>Course Description</b>	Objective of the course is to understand the most important cyber threats for IOT and Cloud. Cyber attackers discover new possibilities in the areas of Internet of Things and cloud services. It mainly focuses on multiple security challenges facing the IoT and cloud computing especially concerns surrounding privacy and cyber security threats of the users and the how can the cyber risks relating to them be mitigated.				
<b>Course Objectives</b>	The objective of the course is <u>SKILL DEVELOPMENT</u> of student by using <u>Problem Solving</u> methodologies.				
<b>Course Out Comes</b>	On successful completion of the course the students shall be able to: <ul style="list-style-type: none"> <li>• Understand the different types of cyber threats for IOT and cloud</li> <li>• Develop a deeper understanding and familiarity with various types of cyber-attacks, cybercrimes, vulnerabilities and remedies thereto.</li> <li>• Analyze different types of cyber threats using tools</li> <li>• Plan, implement, and monitor cyber security mechanisms to ensure the protection of information technology assets.</li> </ul>				

  
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<b>Course Content:</b>				
<b>Module 1</b>	<b>Introduction to IOT and Cloud computing</b>	Assignment	Programming Task	<b>12 Sessions</b>
<p><b>Topics</b>          What is IoT, Genesis of IoT, IoT and Digitization, IoT Impact, IoT Challenges, IOT Architecture and protocols, Various platforms for IoT, Real-Time examples of IoT, Overview of IoT components and IoT communication Technologies. Introduction to Cloud Computing, The Vision of Cloud Computing, Defining a Cloud, Cloud Computing Reference Model, Characteristics and Benefits, Challenges Ahead, Distributed Systems, Virtualization, Service-Oriented Computing, Utility-Oriented Computing, Building Cloud Computing Environments, Application Development, Infrastructure and System Development, Computing Platforms and Technologies.</p> <p><b>Assignment:</b></p>				
<b>Module 2</b>	<b>Cyber Threats</b>	Assignment	Programming Task	<b>8 Sessions</b>
<p><b>Topics:</b>          What are Cyber Security Threats? Common Sources of Cyber Threats, Types of Cyber security Threats- Malware attacks, Social Engineering attacks, Supply chain attacks, Man-in-the middle Attack, Threat Detection Tools, Cyber Defense for Individuals.</p> <p><b>Assignment:</b></p>				
<b>Module 3</b>	<b>Cyber Threats in Internet of Things</b>	Assignment	Programming/Data analysis task	<b>10 Sessions</b>
<p><b>Topics:</b>          IoT threats and vulnerabilities- IoT attack surface, Attack surface areas of the IoT, Types of IoT security threats-Botnets, Denial of service, Man-in-the-Middle, Identity and data theft, Social engineering, Advanced persistent threats, Ransomware, Remote recording, How does the IoT influence security?, Best practices to reduce risks and prevent threats. Security guidelines for IoT. Managing IoT Security Threats.</p> <p><b>Assignment:</b></p>				

  
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<b>Module 4</b>	<b>Cyber Threats in Cloud computing</b>	Assignment	Programming/Data analysis task	<b>9 Sessions</b>
<p><b>Topics:</b> Cybersecurity Threats to Cloud Computing-Identity First Security, Cloud misconfiguration, Denial of Service, Insider Threats, Reduced Infrastructure Visibility, Unauthorized use of Cloud workloads, Insecure API's, Compliance and regulation issues, Mitigating cyber risks in cloud computing</p> <p><b>Assignment:</b></p> <p><b>Text Books</b> T1. SunitBelapure and Nina Godbole,"Cyber Security: Understanding Cyber Crimes, Computer Forensics And Legal Perspectives" ,Wiley India Pvt Ltd,2013 T2. David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry,"IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things", 1 st Edition, Pearson Education (Cisco Press Indian Reprint). (ISBN: 978- 9386873743) T3. Rajkumar Buyya, Christian Vecchiola, and Thamarai Selvi Mastering Cloud. Computing McGraw Hill Education</p>				
<p><b>References</b></p> <p>R1. Brooks, Charles J., Christopher Grow, Philip Craig, and Donald Short. Cybersecurity essentials. John Wiley &amp; Sons,2018 R2. Ollie Whitehouse, "Security of Things: An Implementers' Guide to Cyber-Security for Internet of Things Devices and Beyond", NCC Group, 2014 R3. Securing The Cloud: Cloud Computing Security Techniques and Tactics by Vic (J.R.) Winkler (Syngress/Elsevier) - 978-1-59749-592-9</p> <p><b>Weblinks:</b> <a href="https://www.coursera.org/learn/cloud-security-basics">https://www.coursera.org/learn/cloud-security-basics</a> <a href="https://www.imperva.com/learn/application-security/cyber-security-threats/">https://www.imperva.com/learn/application-security/cyber-security-threats/</a></p>				
<b>Catalogue prepared by</b>	Ms Impa B H			
<b>Recommended by the Board of Studies on</b>	(BOS NO: SOCSE1st. BOS held on 22 / 12 / 2022 )			
<b>Date of Approval by the Academic Council</b>	(Academic Council Meeting No.20.3 , Dated 15 /02 /23 )			



<b>Course Code:</b> CSE3102	<b>Course Title:</b> Malware Analysis <b>Type of Course:</b> Discipline Elective in Cyber Security Basket		<b>L- P- C</b>	3	0	3
<b>Version No.</b>	1.0					
<b>Course Pre-requisites</b>	Should Have the knowledge of Cryptography and Network Security					
<b>Anti-requisites</b>	NIL					
<b>Course Description</b>	The purpose of the course is to explore malware analysis tools and techniques in depth. Understanding the capabilities of malware is critical to an organization's ability to derive threat intelligence, respond to information security incidents, and fortify defenses. This course builds a strong foundation for reverse-engineering malicious software using a variety of system and network monitoring utilities, a disassembler, a debugger, and other tools useful for turning malware inside-out.					
<b>Course Objective</b>	To study the fundamentals of malwares. To know about different malicious programs and their behavior To know how to work on linux systems. To learn, analyze and demonstrate network hacking tools					
<b>Course Outcomes</b>	On successful completion of this course the students shall be able to: 1. Understanding the nature of malware, its capabilities, and how it is combated through detection and classification. 2. Apply the methodologies and tools to perform static and dynamic analysis on unknown executables. 3. Analyze scientific and logical limitations on society's ability to combat malware.. 4. Apply techniques and concepts to unpack, extract, decrypt, or bypass new anti analysis techniques in future malware samples.					
<b>Course Content:</b>						
<b>Module 1</b>	<b>Introduction to MALWARE ANALYSIS</b>		Assignment	Programming activity		<b>12 Hours</b>
<p>Topics: Introduction to malware, OS security concepts, malware threats, evolution of malware, malware types viruses, worms, rootkits, Trojans, bots, spyware, adware, logic bombs, malware analysis, static malware analysis, dynamic malware analysis. <b>Assignment:</b> Brief study on types of spyware</p>						
<b>Module 2</b>	<b>Static Analysis</b>		Assignment	Programming activity		<b>11 Hours</b>
<p>Topics: X86 Architecture- Main Memory, Instructions, Opcodes and Endianness, Operands, Registers, Simple Instructions, The Stack, Conditionals, Branching, Rep Instructions, C Main Method and Offsets. Antivirus Scanning, Fingerprint for Malware, Portable Executable File Format, The PE File Headers and Sections, The Structure of a Virtual Machine, ReverseEngineering- x86 Architecture <b>Assignment:</b> Static analysis on malware (PeStudio &amp; ProcMon)</p>						




<b>Module 3</b>	<b>Dynamic Analysis</b>		Assignment	Programming activity	<b>11 Hours</b>
<p>Topics: Live malware analysis, dead malware analysis, analyzing traces of malware- system-calls, api-calls, registries, network activities. Anti-dynamic analysis techniques anti-vm, runtime-evasion techniques, , Malware Sandbox, Monitoring with Process Monitor, Packet Sniffing with Wireshark <b>Assignment:</b> Demonstration of wireshark</p>					
<b>Module 4</b>	<b>Malware Functionality and Detection Techniques</b>		Assignment	Programming activity	<b>12 Hours</b>
<p>Topics: Downloader, Backdoors, Credential Stealers, Persistence Mechanisms, Privilege Escalation, Covert malware launching- Launchers, Process Injection, Process Replacement, Hook Injection, Detours, APC injection. Signature-based techniques: malware signatures, packed malware signature, metamorphic and polymorphic malware signature Non-signature based techniques: similarity-based techniques, machine-learning methods, invariant inferences <b>Assignment:</b> Packet malware signature</p>					
<p><b>Targeted Application &amp; Tools that can be used:</b> eCMAP (Certified Malware Analysis Professional)</p>					
<p><b>Project work/Assignment: Mention the Type of Project /Assignment proposed for this course</b></p>					
<p>Any appropriate tool can be given to demonstrate.</p>					
<p><b>Text Book</b></p>					
<p>1. Michael Sikorski and Andrew Honig, 2012: “ Practical Malware Analysis”, No Starch Press.</p>					
<p><b>References</b></p>					
<p>1. Jamie Butler and Greg Hoglund, 2005: “Rootkits: Subverting the Windows Kernel”, Addison-Wesley. 2. Dang, Gazet and Bachaalany, 2014: “Practical Reverse Engineering”,Wiley. 3. Reverend Bill Blunden, 2012: “The Rootkit Arsenal: Escape and Evasion in the Dark Corners of the System” Second Edition,Jones&amp; Bartlett.</p>					
<b>Catalogue prepared by</b>	Dr. Sharmasth Vali Y				
<b>Recommended by the Board of Studies on</b>	BOS NO: 12th BOS held on 23/4/21				
<b>Date of Approval by the Academic Council</b>	Academic Council Meeting No. __, Dated ____				

  
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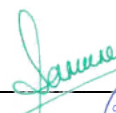
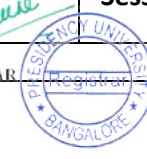

<b>Course Code:</b> CSE3150	<b>Course Title: Front-end Full Stack Development</b>			<b>L- P- C</b>	2	2	3
<b>Version No.</b>	1.0						
<b>Course Pre-requisites</b>	Nil						
<b>Anti-requisites</b>	NIL						
<b>Course Description</b>	This intermediate course enables students to perform front-end full stack development, with emphasis on employability skills. The course covers key technologies and architectures that enables the student to design and implement front-end. On successful completion of this course, the student shall be able to pursue a career in full-stack development. The students shall develop strong problem-solving skills as part of this course.						
<b>Course Objectives</b>	This course is designed to improve the learners' EMPLOYABILITY SKILLS by using PROBLEM SOLVING Methodologies.						
<b>Course Outcomes</b>	On successful completion of the course the students shall be able to: 1] Describe the fundamentals of DevOps and Front-end full stack development. [Comprehension] 2] Illustrate development of a responsive web. [Application] 3] Apply concepts of Angular.js to develop a web front-end. [Application] 4] Apply concepts of Angular.js to develop a web front-end. [Application]						
<b>Course Content:</b>							
<b>Module 1</b>	Fundamentals of DevOps and Web Development	Project	Programming	<b>04 Sessions</b>			
<b>Topics:</b> 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 <b>Assignment:</b> Develop a website for managing HR policies of a department.							
<b>Module 2</b>	Responsive web design	Project	Programming	<b>03 Sessions</b>			
<b>Topics:</b> BootStrap for Responsive Web Design; JavaScript – Core syntax, HTML DOM, objects, classes, Async; Ajax and jQuery Introduction <b>Assignment:</b> Design and develop a website that can actively keep track of entry-exit information of a housing society.							
<b>Module 3</b>	Fundamentals of Angular.js	Project	Programming	<b>03 Sessions</b>			
<b>Topics:</b>							

  
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<p>Setting up Development &amp; 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 &amp; Databinding in Depth; Angular Directives; Using Services &amp; Dependency Injection; Angular Routing; Observables; Handling Forms in Angular Apps; Output transformation using Pipes; Making Http Requests; Authentication &amp; Route Protection; Dynamic Components; Angular Modules &amp; Optimizing Angular Apps; Deploying an Angular App; Angular Animations; Adding Offline Capabilities with Service Workers; Unit Testing in Angular Apps (Jasmine, Karma).</p> <p><b>Assignment:</b> Develop a software tool to do inventory management in a warehouse.</p>				
<b>Module 4</b>	Fundamentals of React.js	Project	Programming	<b>15 Sessions</b>
<p><b>Topics:</b>  Overview of React.js.; Reactive Programming; React Components; Render Method; Virtual DOM and Bandwidth Salvation; Two Distinct Ways of Initializing a React Class; States &amp; Life Cycles; Component Mounting; Node.js &amp; NPM; JSX Walkthrough; React Testing.</p> <p><b>Assignment:</b> Develop a web-based application to book movies/events (like bookmyshow).</p> <p><b>Targeted Application &amp; Tools that can be used:</b></p> <p><b>Application Area is to Design and Analyzing the efficiency of Algorithms. This fundamental course is used by all application developers.</b></p> <p><b>Professionally Used Software: GCC compiler.</b></p>				
<p><b>Project work/Assignment:</b></p> <ol style="list-style-type: none"> <li><b>1. Problem Solving: Design of Algorithms and implementation of programs.</b></li> <li><b>2. Programming: Implementation of given scenario using Java.</b></li> </ol>				
<p><b>Text Book:</b></p> <p>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</p>				
<p><b>References:</b></p> <p>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 &amp; 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:  <a href="https://www.youtube.com/watch?v=JGNTYXkVCVY&amp;list=PLd3UqWTnYXOkTSBCBNyyhxo_jxIY_uTWA&amp;index=2">https://www.youtube.com/watch?v=JGNTYXkVCVY&amp;list=PLd3UqWTnYXOkTSBCBNyyhxo_jxIY_uTWA&amp;index=2</a></p>				
<b>Catalogue prepared by</b>	Dr. Jayakumar V, Dr. M Chandrashekhar, Dr. Murali Parameswaran			
<b>Recommended by the Board of Studies on</b>	(BOS NO: SOCSE1. BOS held on 22 / 12 / 2022 )			
<b>Date of Approval by the Academic Council</b>	(Academic Council Meeting No.20.3 , Dated 15 /02 /23 )			

  
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<b>Course Code:</b> CSE3151	<b>Course Title:</b> Java Full Stack Development			L- P- C	2	2	3
<b>Version No.</b>	1.0						
<b>Course Pre-requisites</b>	Nil						
<b>Anti-requisites</b>	CSE3152 .NET Full Stack Development						
<b>Course Description</b>	This advanced level course enables students to perform full stack development using Java, with emphasis on employability skills. The key technologies used for Full Stack development is based on either Java technology or .NET technology. In this course, the focus is on using Java, and the related technologies/tools like Java EE, Java Persistence, Hibernate, Maven, Spring Core, etc. On successful completion of this course, the student shall be able to pursue a career in full-stack development. The students shall develop strong problem-solving skills as part of this course.						
<b>Course Objectives</b>	This course is designed to improve the learners' EMPLOYABILITY SKILLS by using PROBLEM SOLVING Methodologies.						
<b>Course Outcomes</b>	<b>On successful completion of the course the students shall be able to:</b> <b>1] Practice the use of Java for full stack development [Application]</b> <b>2] Show web applications using Java EE. [Application]</b> <b>3] Solve simple applications using Java Persistence and Hibernate [Application]</b> <b>4] Apply concepts of Spring to develop a Full Stack application. [Application]</b> <b>5] Employ automation tools like Maven, Selenium for Full Stack development. [Application]</b>						
<b>Course Content:</b>							
<b>Module 1</b>	Introduction	Project	Programming				<b>03 Sessions</b>
<b>Topics:</b> Review of Java; Advanced concepts of Java; Java generics; Java IO; New Features of Java. Unit Testing tools.							
<b>Module 2</b>	Java EE Web Applications	Project	Programming				<b>05 Sessions</b>
<b>Topics:</b> Introduction to Eclipse & Tomcat; JSP Fundamentals; Reading HTML form Data with JSP; State Management with JSP; JSP Standard Tag Library - Core & Function Tags; Servlet API Fundamentals; ServletContext, Session, Cookies; Request Redirection Techniques; Building MVC App with Servlets & JSP; Complete App - Integrating JDBC with MVC App <b>Assignment:</b> Develop an application for managing HR policies of a department.							
<b>Module 3</b>	Java Persistence using JPA and Hibernate	Project	Programming				<b>06 Sessions</b>
<b>Topics:</b>							

  
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Fundamentals of Java Persistence with Hibernate; JPA for Object/Relational Mapping, Querying, Caching, Performance and Concurrency; First & Second Level Caching, Batch Fetching, Optimistic Locking & Versioning; Entity Relationships, Inheritance Mapping & Polymorphic Queries; Querying database using JPQL and Criteria API (JPA) <b>Assignment:</b> Design and develop a website that can actively keep track of entry-exit information of a housing society..				
<b>Module 4</b>	Spring Core	Project	Programming	<b>10 Sessions</b>
<b>Topics:</b> Spring Core, Spring MVC, Spring Boot REST API; Understanding Spring Framework; Using Spring MVC; Building a Database Web App with Spring and Hibernate o Spring AOP (Aspect Oriented Programming); Implementing Spring Security; Developing Spring REST API; Using Spring Boot for Rapid Development <b>Assignment:</b> Develop a software tool to do inventory management in a warehouse.				
<b>Module 5</b>	Automation tools	Project	Programming	<b>06 Sessions</b>
<b>Topics:</b> 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 <b>Assignment:</b> Illustrate the use of automation tools in the development of a small software project.				
<b>Targeted Application &amp; Tools that can be used:</b>  <b>Application Area is to Design and Analyzing the efficiency of Algorithms. This fundamental course is used by all application developers.</b>  <b>Professionally Used Software: Eclipse, NetBeans, Hibernate, Selenium, Maven, GIT.</b>				
<b>Project work/Assignment:</b>				
<ol style="list-style-type: none"> <li><b>1. Problem Solving: Design of Algorithms and implementation of programs.</b></li> <li><b>2. Programming: Implementation of given scenario using Java.</b></li> </ol>				
<b>Text Book:</b> T1. Fender, Young, "Front-end Fundamentals", Leanpub, 2015				
<b>References</b> 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				
<b>Catalogue prepared by</b>	Mr. Sunil Sahoo, Dr. M Chandrashekar, Dr. Murali Parameswaran			
<b>Recommended by the Board of Studies on</b>	(BOS NO: SOCSE1. BOS held on 22 / 12 / 2022 )			
<b>Date of Approval by the Academic Council</b>	(Academic Council Meeting No.20.3 , Dated 15 /02 /23 )			

  
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<b>Course Code:</b> CSE3152	<b>Course Title:</b> .NET Full Stack Development			<b>L- P- C</b>	2	2	3
<b>Version No.</b>	1.0						
<b>Course Pre-requisites</b>	Nil						
<b>Anti-requisites</b>	CSE3151 Java Full Stack Development						
<b>Course Description</b>	This advanced level course enables students to perform full stack development using .NET, with emphasis on employability skills. The key technologies used for Full Stack development is based on either Java technology or .NET technology. In this course, the focus is on using .NET and the related technologies/tools like C#, ASP.NET, Entity Framework Core, etc. On successful completion of this course, the student shall be able to pursue a career in full-stack development. The students shall develop strong problem-solving skills as part of this course.						
<b>Course Objectives</b>	This course is designed to improve the learners' EMPLOYABILITY SKILLS by using PROBLEM SOLVING Methodologies.						
<b>Course Outcomes</b>	<b>On successful completion of the course the students shall be able to:</b> <b>1] Practice the use of C# for developing a small application [Application]</b> <b>2] Show web applications using Entity Framework. [Application]</b> <b>3]Solve simple web applications that use SQL and ASP.NET [Application]</b> <b>4] Apply concepts of ASP.NET to develop a Full Stack application. [Application]</b>						
<b>Course Content:</b>							
<b>Module 1</b>	C# Programming for Full Stack Development	Project	Programming				<b>10 Sessions</b>
<b>Topics:</b> .NET Framework Fundamentals, Visual Studio IDE Fundamentals, C# Language Features, Working with arrays and collections, Working with variables, operators, and expressions, Decision and iteration statements, Managing program flow and events, Working with classes and methods, OOP concepts, Properties, Auto Implemented, Delegates, Anonymous Methods and Anonymous Types, Extension methods, Sealed Classes/Methods, Partial Classes/Methods, Asynchronous programming and threading, Data validation and working with data collections including LINQ, Handling errors and exceptions, Working with Files, Unit Testing – Nunit framework <b>Assignment:</b> Develop a small application for managing library using C#.							
<b>Module 2</b>	Entity Framework Core 2.0	Project	Programming				<b>06 Sessions</b>
<b>Topics:</b> Entity Framework Core 2.0 Code First Approach; Introduction To Entity Framework and EDM; Querying the EDM; Working With Stored Procedures; Advanced Entity Framework - DbContext [EF6]; Advanced Operations; Performance Optimization; Data Access with ADO.NET							

  
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<b>Assignment:</b> Develop an application for managing HR policies of a department.				
<b>Module 3</b>	ASP.NET	Project	Programming	<b>06 Sessions</b>
<b>Topics:</b> 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;				
<b>Assignment:</b> Develop a web application to mark entry/exit of guests in a building.				
<b>Module 4</b>	ASP.NET	Project	Programming	<b>08 Sessions</b>
<b>Topics:</b> 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				
<b>Assignment:</b> Develop a software tool to do inventory management in a warehouse.				
<b>Targeted Application &amp; Tools that can be used:</b>				
<b>Application Area is to Design and Analyzing the efficiency of Algorithms. This fundamental course is used by all application developers.</b>				
<b>Professionally Used Software: Visual Studio</b>				
<b>Project work/Assignment:</b>				
<ol style="list-style-type: none"> <li><b>1. Problem Solving: Design of Algorithms and implementation of programs.</b></li> <li><b>2. Programming: Implementation of given scenario using .NET.</b></li> </ol>				
<b>Text Book:</b>				
T1. Fender, Young, <i>“Front-end Fundamentals”</i> , Leanpub, 2015 T2. Valerio De Sanctis, <i>“ASP.NET Core 5 and Angular: Full-stack web development with .NET 5 and Angular 11”</i> , 4th Edition, Packt, 2021.				
<b>References</b>				
R1. Benjamin Perkins, Jon D. Reid, <i>“Beginning C# and .NET”</i> , Wiley, 2021 Reid, 2021. R2. Piotr Gankiewicz, <i>“Full Stack .NET Web Development”</i> , Packt Publishing, 2017. R3. Tamir Dresher, Amir Zuker, Shay Friedman, <i>“Hands-On Full-Stack Web Development with ASP.NET Core”</i> , Packt Publishing, 2018. R4. Dustin Metzgar, <i>“Exploring .NET core with microservices, ASP.NET core, and Entity Framework Core”</i> , Manning, 2017.				
<b>Catalogue prepared by</b>	Dr. Komalavalli C, Dr. Jayakumar V, Dr. Murali Parameswaran			
<b>Recommended by the Board of Studies on</b>	(BOS NO: SOCSE1. BOS held on 22 / 12 / 2022 )			
<b>Date of Approval by the Academic Council</b>	(Academic Council Meeting No.20.3 , Dated 15 /02 /23 )			

  
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