



PRESIDENCY UNIVERSITY

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Approved by AICTE, New Delhi | Approved By BCI



PRESIDENCY SCHOOL OF ENGINEERING DEPARTMENT OF CIVIL ENGINEERING

Program Regulations and Curriculum 2026-2028

MASTER OF TECHNOLOGY (M.Tech.) in BUILDING AND CONSTRUCTION TECHNOLOGY based on Choice Based Credit System (CBCS) and Outcome Based Education (OBE)

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PART A – PROGRAM REGULATIONS

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

1.1 Vision of the University

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

1.2 Mission of the University

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

1.3 Vision of Presidency School of Engineering

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

1.4 Mission of Presidency School of Engineering

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

1.5 Vision of Department of Civil Engineering

To emerge as a global leader in civil engineering through excellence in quality education, cutting edge research and innovative practices for sustainable societal development.

1.6 Mission of Department of Civil Engineering

- Impart quality civil engineering education through an experiential, interdisciplinary approach, strengthened by excellent infrastructure, academic rigour, and global academic collaborations.
- Enable academia-industry synergy through research, consultancy, and training.
- Nurture socially responsible civil engineers with strong ethics, leadership skills, and a commitment to lifelong learning and sustainable practices.

2 Preamble to the Program Regulations and Curriculum

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

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

In exercise of the powers conferred by and in discharge of duties assigned under the relevant provision(s) of the Act, Statutes and Academic Regulations, 2025 of the University, the Academic Council hereby makes the following Regulations.

3 Short Title and Applicability

- a. These Regulations shall be called the Master of Technology Degree Program Regulations and Curriculum 2026-2028.
- b. These Regulations are subject to, and pursuant to the Academic Regulations.
- c. These Regulations shall be applicable to the ongoing Master of Technology Degree Programs of the 2026-2028 batch, and to all other Master of Technology Degree Programs which may be introduced in future.
- d. These Regulations shall supersede all the earlier Master of Technology Degree Program Regulations and Curriculum, along with all the amendments thereto.
- e. These Regulations shall come into force from the Academic Year 2026-2027.

4 Definitions

In these Regulations, unless the context otherwise requires:

- a. "Academic Calendar" means the schedule of academic and miscellaneous events as approved by the Vice Chancellor;
- b. "Academic Council" means the Academic Council of the University;
- c. "Academic Regulations" means the Academic Regulations, of the University;
- d. "Academic Term" means a Semester or Summer Term;
- e. "Act" means the Presidency University Act, 2013;
- f. "AICTE" means All India Council for Technical Education;
- g. "Basket" means a group of courses bundled together based on the nature/type of the course;
- h. "BOE" means the Board of Examinations of the University;
- i. "BOG" means the Board of Governors of the University;
- j. "BOM" means the Board of Management of the University;
- k. "BOS" means the Board of Studies of a particular Department/Program of Study of the University;
- l. "CGPA" means Cumulative Grade Point Average as defined in the Academic Regulations;
- m. "Clause" means the duly numbered Clause, with Sub-Clauses included, if any, of these Regulations;
- n. "COE" means the Controller of Examinations of the University;
- o. "Course In Charge" means the teacher/faculty member responsible for developing

and organising the delivery of the Course;

- p. "Course Instructor" means the teacher/faculty member responsible for teaching and evaluation of a Course;*
- q. "Course" means a specific subject usually identified by its Course-code and Course-title, with specified credits and syllabus/course-description, a set of references, taught by some teacher(s)/course-instructor(s) to a specific class (group of students) during a specific Academic Term;*
- r. "Curriculum Structure" means the Curriculum governing a specific Degree Program offered by the University, and, includes the set of Baskets of Courses along with minimum credit requirements to be earned under each basket for a degree/degree with specialization/minor/honours in addition to the relevant details of the Courses and Course catalogues (which describes the Course content and other important information about the Course). Any specific requirements for a particular program may be brought into the Curriculum structure of the specific program and relevant approvals should be taken from the BOS and Academic Council at that time.*
- s. "DAC" means the Departmental Academic Committee of a concerned Department/Program of Study of the University;*
- t. "Dean" means the Dean / Director of the concerned School;*
- u. "Degree Program" includes all Degree Programs;*
- v. "Department" means the Department offering the degree Program(s) / Course(s) / School offering the concerned Degree Programs / other Administrative Offices;*
- w. "Discipline" means specialization or branch of M.Tech. Degree Program;*
- x. "HOD" means the Head of the concerned Department;*
- y. "L-T-P-C" means Lecture-Tutorial-Practical-Credit – refers to the teaching – learning periods and the credit associated;*
- z. "MOOC" means Massive Open Online Courses;*
- aa. "MOU" means the Memorandum of Understanding;*
- bb. "NPTEL" means National Program on Technology Enhanced Learning;*
- cc. "Parent Department" means the department that offers the Degree Program that a student undergoes;*
- dd. "Program Head" means the administrative head of a particular Degree Program/s;*
- ee. "Program Regulations" means the Master of Technology Degree Program Regulations and Curriculum, 2026-2028;*
- ff. "Program" means the Master of Technology (M.Tech.) Degree Program;*
- gg. "PSOE" means the Presidency School of Engineering;*
- hh. "Registrar" means the Registrar of the University;*
- ii. "School" means a constituent institution of the University established for monitoring, supervising and guiding, teaching, training and research activities in broadly related fields of studies;*
- jj. "Section" means the duly numbered Section, with Clauses included in that Section, of these Regulations;*
- kk. "SGPA" means the Semester Grade Point Average as defined in the Academic Regulations, 2021;*
- ll. "Statutes" means the Statutes of Presidency University;*
- mm. "Sub-Clause" means the duly numbered Sub-Clause of these Program Regulations;*

- nn. "Summer Term" means an additional Academic Term conducted during the summer break (typically in June-July) for a duration of about eight (08) calendar weeks, with a minimum of thirty (30) University teaching days;*
- oo. "SWAYAM" means Study Webs of Active Learning for Young Aspiring Minds.*
- pp. "UGC" means University Grant Commission;*
- qq. "University" means Presidency University, Bengaluru; and*
- rr. "Vice Chancellor" means the Vice Chancellor of the University.*

5 Program Description

The Master of Technology Degree Program Regulations and Curriculum 2026-2026 are subject to, and, pursuant to the Academic Regulations. These Program Regulations shall be applicable to the following ongoing Master of Technology (M.Tech.) Degree Programs of 2026-2028 offered by the Presidency School of Engineering (PSOE):

1. Master of Technology in Building and Construction Technology, abbreviated as M.Tech. (BCT)
 2. Master of Technology in Embedded System and VLSI, abbreviated as M.Tech. (VLSI)
- 5.1** These Program Regulations shall be applicable to other similar programs, which may be introduced in future.
- 5.2** These Regulations may evolve and get amended or modified or changed through appropriate approvals from the Academic Council, from time to time, and shall be binding on all concerned.
- 5.3** The effect of periodic amendments or changes in the Program Regulations, on the students admitted in earlier years, shall be dealt with appropriately and carefully, so as to ensure that those students are not subjected to any unfair situation whatsoever, although they are required to conform to these revised Program Regulations, without any undue favour or considerations

6 Minimum and Maximum Duration

- 6.1** Master of Technology Degree Program is a Two-Year, Full-Time Semester based program. The minimum duration of the M.Tech. Program is four (02) years and each year comprises of two academic Semesters (Odd and Even Semesters) and hence the duration of the M.Tech. program is four (04) Semesters.
- 6.2** A student who for whatever reason is not able to complete the Program within the normal period or the minimum duration (number of years) prescribed for the Program, may be allowed a period of two years beyond the normal period to complete the mandatory minimum credits requirement as prescribed by the concerned Program Regulations and Curriculum. In general, the permissible maximum duration (number of years) for completion of Program is 'N' + 2 years, where 'N' stands for the normal or minimum duration (number of years) for completion of the concerned Program as prescribed by the concerned Program Regulations and Curriculum.
- 6.3** The time taken by the student to improve Grades/CGPA, and in case of temporary withdrawal/re-joining (Refer to Clause 16.1 of the Academic Regulations), shall be counted in the permissible maximum duration for completion of a Program.
- 6.4** In exceptional circumstances, such as temporary withdrawal for medical exigencies where there is a prolonged hospitalization and/or treatment, as certified through

hospital/medical records, women students requiring extended maternity break (certified by registered medical practitioner), and, outstanding sportspersons representing the University/State/India requiring extended time to participate in National/International sports events, a further extension of one (01) year may be granted on the approval of the Academic Council.

- 6.5** The enrolment of the student who fails to complete the mandatory requirements for the award of the concerned Degree (refer Section 19.2 of Academic Regulations) in the prescribed maximum duration (Sub-Clauses 18.1 and 18.2 of Academic Regulations), shall stand terminated and no Degree shall be awarded.

7 Programme Educational Objectives (PEO)

After two years of successful completion of the program, the graduates shall be:

- PEO1.** Graduates will establish successful careers in building construction technology, by applying advanced technical skills, modern tools, and innovative practices to deliver sustainable and high-quality infrastructure solutions.
- PEO2.** Graduates will cultivate a professional attitude emphasizing lifelong learning, research, ethical responsibility, environmental stewardship, and social commitment, contributing meaningfully to the built environment and society at large.

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

8.1 Programme Outcomes (PO)

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

- PO1.** Design building construction systems and processes using advanced engineering principles, contemporary tools, and multidisciplinary knowledge to solve real-world challenges.
- PO2.** Utilize innovative construction technologies, materials, and methods that promote resource efficiency and environmental sustainability, considering health, safety, social, and economic constraints.
- PO3.** Investigate complex building construction engineering problems, conduct original research, synthesize findings, and foster a culture of inquiry, and continuous professional advancement.
- PO4.** Communicate effectively, lead and collaborate in diverse teams, and drive projects through proactive engagement with stakeholders and industry partners, while disseminating knowledge through scientific publications and professional contributions
- PO5.** Exhibit professional integrity, global awareness, uphold ethics and contribute to the sustainable development of society and the built environment.

8.2 Program Specific Outcomes (PSOs):

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

PSO1: Apply modern concepts and techniques in construction technologies, materials, and project delivery systems, enabling effective decision-making in real-world scenarios.

PSO2: Execute construction projects effectively by applying advanced engineering tools and technologies such as BIM and construction management systems for efficient planning, resource management, and implementation through hands-on and experiential learning.

PSO3: Exhibit leadership, innovation, and professional integrity in addressing construction challenges, with a commitment to sustainable practices, ethical conduct, and continuous improvement in a rapidly evolving industry.

9 Admission Criteria (as per the concerned Statutory Body)

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

- 9.1** An applicant who has successfully completed B. Tech course from a recognized university of India or outside or from Senior Secondary Board or equivalent, constituted or recognized by the Union or by the State Government of that Country for the purpose of issue of qualifying certificate on successful completion of the course, may apply for and be admitted into the Program.
- 9.2** Provided further, the applicant must have taken Civil / Construction Management/ Construction Technology subject, and, the applicant must have obtained a minimum of 45% of the total marks (40% in case of candidates belonging to the Reserved Category as classified by the Government of Karnataka) in these subjects taken together.
- 9.3** The applicant must have appeared for Karnataka PG CET, or any other State-level Engineering Entrance Examinations.
- 9.4** Reservation for the SC / ST and other backward classes shall be made in accordance with the directives issued by the Government of Karnataka from time to time.
- 9.5** Admissions are offered to Foreign Nationals and Indians living abroad in accordance with the rules applicable for such admission, issued from time to time, by the Government of India.
- 9.6** Candidates must fulfil the medical standards required for admission as prescribed by the University.
- 9.7** If, at any time after admission, it is found that a candidate had not in fact fulfilled all the requirements stipulated in the offer of admission, in any form whatsoever, including possible misinformation and any other falsification, the Registrar shall report the matter to the Board of Management (BOM), recommending revoking the admission of the candidate.

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

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

10.1 The academic performance evaluation of a student in a Course shall be according to the University Letter Grading System based on the class performance distribution in the Course.

10.2 Academic performance evaluation of every registered student in every Course registered by the student is carried out through various components of Assessments spread across the Semester. The nature of components of Continuous Assessments and the weightage given to each component of Continuous Assessments (refer Clause 8.8 of academic regulations) shall be clearly defined in the Course Plan for every Course, and approved by the DAC.

10.3 Format of the End-Term examination shall be specified in the Course Plan.

10.4 Grading is the process of rewarding the students for their overall performance in each Course. The University follows the system of Relative Grading with statistical approach to classify the students based on the relative performance of the students registered in the concerned Course except in the following cases:

- Non-Teaching Credit Courses (NTCC)

Absolute grading method may be adopted, where necessary with prior approval of concerned DAC.

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

10.5 Assessment Components and Weightage

Table 1: Assessment Components and Weightage for different category of Courses		
Nature of Course and Structure	Evaluation Component	Weightage
Lecture-based Course L component in the L-T-P Structure is predominant (more than 1) (Examples: 3-0-0; 3-0-2; 2-1-0; 2-0-2, 2-0-4 etc.)	Continuous Assessments	50%
	End Term Examination	50%
Lab/Practice-based Course P component in the L-T-P Structure is predominant (Examples: 0-0-4; 1-0-4; 1-0-2; etc.)	Continuous Assessments	50%
	End Term Examination	50%

Skill based Courses like Industry Internship, Capstone project, Research Dissertation, Integrative Studio, Interdisciplinary Project, Summer / Short Internship, Social Engagement / Field Projects, Portfolio, and such similar Non-Teaching Credit Courses, where the pedagogy does not lend itself to a typical L-T-P structure	Guidelines for the assessment components for the various types of Courses, with recommended weightages, shall be specified in the concerned Program Regulations and Curriculum / Course Plans, as applicable.
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The exact weightages of Evaluation Components shall be clearly specified in the concerned PRC and respective Course Plan.

Normally, for Practice/Skill based Courses, without a defined credit structure (L–P–C) [NTCC], but with assigned Credits (as defined in Clause 5.2 of the Academic Regulations), the method of evaluation shall be based only on Continuous Assessments. The various components of Continuous Assessments, the distribution of weightage among such components, and the method of evaluation/assessment, shall be as decided and indicated in the Course Plan/PRC. The same shall be approved by the respective DAC.

10.6 Minimum Performance Criteria:

10.6.1 Theory only Course and Lab/Practice Embedded Theory Course

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

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

10.6.2 Lab/Practice only Course and Project Based Courses

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

- 10.6.3** A student who fails to meet the minimum performance criteria listed above in a Course shall be declared as "Fail" and given "F" Grade in the concerned Course. For theory Courses, the student shall have to re-appear in the "Make-Up Examinations" as scheduled by the University in any subsequent semester, or, re-appear in the End Term Examinations of the same Course when it is scheduled at the end of the following Semester or Summer Term, if offered. The marks obtained in the Continuous Assessments (other than the End Term Examination) shall be carried forward and be included in computing the final grade, if the student secures the minimum requirements (as per sub-Clauses 8.9.1 and 8.9.2 of academic regulations) in the "Make-Up Examinations" of the concerned Course. Further, the student has an option to re-register for the Course and clear the same in the summer term/

subsequent semester if he/she wishes to do so, provided the Course is offered.

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

The University allows students to acquire credits from other Indian or foreign institutions and/or Massive Open Online Course (MOOC) platforms, subject to prior approval. These credits may be transferred and counted toward fulfilling the minimum credit requirements for the award of a degree. The process of transfer of credits is governed by the following rules and guidelines:

- 11.1** The transfer of credits shall be examined and recommended by the Equivalence Committee (Refer ANNEXURE B of academic regulations) and approved by the Dean - Academics.
- 11.2** Students may earn credits from other Indian or foreign Universities/Institutions with which the University has an MOU, and that MOU shall have specific provisions, rules and guidelines for transfer of credits. These transferred credits shall be counted towards the minimum credit requirements for the award of the degree.
- 11.3** Students may earn credits by registering for Online Courses offered by *Study Web of Active Learning by Young and Aspiring Minds* (SWAYAM) and *National Program on Technology Enhanced Learning* (NPTEL), or other such recognized Bodies/ Universities/Institutions as approved by the concerned BOS and Academic Council from time to time. The concerned School/Parent Department shall publish/include the approved list of Courses and the rules and guidelines governing such transfer of credits of the concerned Program from time to time. The Rules and Guidelines for the transfer of credits specifically from the Online Courses conducted by SWAYAM/ NPTEL/ other approved MOOCs are as stated in the following Sub-Clauses:
 - 11.3.1** A student may complete SWAYAM/NPTEL/other approved MOOCs as mentioned in Clause 11.3 (as per academic regulations) and transfer equivalent credits to partially or fully complete the mandatory credit requirements of Discipline Elective Courses and/or the mandatory credit requirements of Open Elective Courses as prescribed in the concerned Curriculum Structure. However, it is the sole responsibility of the student to complete the mandatory credit requirements of the Discipline Elective Courses and the Open Elective Courses as prescribed by the Curriculum Structure of the concerned Program.
 - 11.3.2** SWAYAM/NPTEL/ other approved MOOCs as mentioned in Clause 11.3 (as per academic regulations) shall be approved by the concerned Board of Studies and placed (as Annexures) in the concerned PRC.
 - 11.3.3** Parent Departments may release a list of SWAYAM/NPTEL/other approved MOOCs for Pre-Registration as per schedule in the Academic Calendar or through University Notification to this effect.
 - 11.3.4** Students may Pre-Register for the SWAYAM/NPTEL/other approved MOOCs in the respective Departments and register for the same Courses as per the schedule announced by respective Online Course Offering body/institute/ university.

- 11.3.5** A student shall request for transfer of credits only from such approved Courses as mentioned in Sub-Clause 11.3.2 above.
- 11.3.6** SWAYAM/NPTEL/other approved MOOCs Courses are considered for transfer of credits only if the concerned student has successfully completed the SWAYAM/NPTEL/other approved MOOCs and obtained a certificate of successful/satisfactory completion.
- 11.3.7** A student who has successfully completed the approved SWAYAM/NPTEL/ other approved MOOCs and wants to avail the provision of transfer of equivalent credits, must submit the original Certificate of Completion, or such similar authorized documents to the HOD concerned, with a written request for the transfer of the equivalent credits. On verification of the Certificates/Documents and approval by the HOD concerned, the Course(s) and equivalent Credits shall forwarded to the COE for processing of results of the concerned Academic Term.
- 11.3.8** The credit equivalence of the SWAYAM/NPTEL/other approved MOOCs are based on Course durations and/or as recommended by the Course offering body/institute/university. The Credit Equivalence mapped to SWAYAM/ NPTEL approved Courses based on Course durations for transfer of credits is summarised in Table shown below. The Grade will be calculated from the marks received by the Absolute Grading Table 8.11 in the academic regulations.

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

- 11.3.9** The maximum permissible number of credits that a student may request for credit transfer from MOOCs shall not exceed 20% of the mandatory minimum credit requirements specified by the concerned Program Regulations and Curriculum for the award of the concerned Degree.
- 11.3.10** The University shall not reimburse any fees/expense; a student may incur for the SWAYAM/NPTEL/other approved MOOCs.
- 11.4** The maximum number of credits that can be transferred by a student shall be limited to forty percent (40%) of the mandatory minimum credit requirements specified by the concerned Program Regulations and Curriculum for the award of the concerned Degree. However, the grades obtained in the Courses transferred from other Institutions/MOOCs, as mentioned in this Section (11.0), shall not be included in the calculation of the CGPA.

PART B: PROGRAM STRUCTURE

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

The M.Tech. (Building and Construction Technology) Program Structure (2026-2028) totalling 68 credits. Table 3 summarizes the type of baskets, number of courses under each basket and the associated credits that are mandatorily required for the completion of the Degree.

Table 3: M.Tech. (Building and Construction Technology) 2026-2026: Summary of Mandatory Courses and Minimum Credit Contribution from various Baskets		
Sl. No.	Baskets	Credit Contribution
1	School Core Courses (SC)	32
2	Program Core Courses (PC)	15
3	Discipline Elective Courses (DE)	15
4	Open Elective Courses (OEC)	06
	Total Credits	68

In the entire Program, the practical and skill based course component contribute to an extent of approximately 51% out of the total credits of 68 for M.Tech. (Building and Construction Technology) program of two years duration.

13 Minimum Total Credit Requirements of Award of Degree

As per the AICTE guidelines, a minimum of 68 credits is required for the award of a M.Tech. degree.

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

14.1 The award of the Degree shall be recommended by the Board of Examinations and approved by the Academic Council and Board of Management of the University.

14.2 A student shall be declared to be eligible for the award of the concerned Degree if she/he:

- Fulfilled the Minimum Credit Requirements and the Minimum Credits requirements under various baskets;
- Secure a minimum CGPA of 5.00 in the concerned Program at the end of the Semester/Academic Term in which she/he completes all the requirements for the award of the Degree as specified in Sub-Clause 19.2.1 of Academic Regulations;
- No dues to the University, Departments, Hostels, Library, and any other such Centers/ Departments of the University; and
- No disciplinary action is pending against her/him.

PART C: CURRICULUM STRUCTURE

15 Curriculum Structure – Basket Wise Course List

List of Courses Tabled – aligned to the Program Structure

Table 3.1: List of School Core Courses (SC)						
Sl. No.	Course Code	Course Name	L	T	P	C
1	MAT4006	Advanced Mathematical Methods for Engineers	3	0	0	3
2	ENG5001	English for Employability	2	1	0	3
3	BCT8100	Mini Project	-	-	4	2
4	BCT8500	Dissertation/ Internship - I	-	-	-	10
5	BCT8400	Dissertation/ Internship - II	-	-	-	14
Total No. of Credits						32

Table 3.2: List of Program Core Courses (PC)						
Sl. No.	Course Code	Course Name	L	T	P	C
1	BCT4001	Advanced Construction Materials and Technology	2	0	2	3
2	BCT4002	Quality, Risk and Safety in Construction	3	0	0	3
3	BCT4003	Construction Planning, Schedule and Control	2	0	2	3
4	BCT4004	Building Services and Building Information Modelling	2	0	2	3
5	BCT4501	Construction Economics and Contract Specifications	3	0	0	3
Total No. of Credits						15

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

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

Departmental Academic Committee (refer Annexure A of the Academic Regulations). The same shall be prescribed in the Course Handout.

16.1 Internship

A student may undergo an Internship for a period of 12-14 weeks in an industry / company or academic / research institution during 3rd and 4th Semesters, subject to the following conditions:

- 16.1.1** The Internship shall be conducted in accordance with the Internship Policy prescribed by the University from time to time.
- 16.1.2** The selection criteria (minimum CGPA, pass in all Courses as on date, and any other qualifying criteria) as applicable / stipulated by the concerned Industry / Company or academic / research institution for award of the Internship to a student;
- 16.1.3** The number of Internships available for the concerned Academic Term. Further, the available number of internships shall be awarded to the students by the University on the basis of merit using the CGPA secured by the student. Provided further, the student fulfils the criteria, as applicable, specified by the Industry / Company or academic / research institution providing the Internship, as stated in Sub-Clause 16.1.2 above.
- 16.1.4** A student may opt for Internship in an Industry / Company or academic/ research institution of her / his choice, subject to the condition that the concerned student takes the responsibility to arrange the Internship on her/ his own. Provided further, that the Industry / Company or academic / research institution offering such Internship confirms to the University that the Internship shall be conducted in accordance with the Program Regulations and Internship Policy of the University.
- 16.1.5** A student selected for an Internship in an industry / company or academic / research institution shall adhere to all the rules and guidelines prescribed in the Internship Policy of the University.

16.2 Project Work

A student may opt to do a Project Work for a period of 12-14 weeks in an Industry / Company or academic / research institution or the University Department(s) as an equivalence of Internship during the 3rd and 4th Semester as applicable, subject to the following conditions:

- 16.2.1** The Project Work shall be approved by the concerned HOD and be carried out under the guidance of a faculty member.
- 16.2.2** The student may do the project work in an Industry / Company or academic/ research institution of her / his choice subject to the above mentioned condition (Sub-Clause 16.2.1). Provided further, that the Industry / Company or academic / research institution offering such project work confirms to the University that the project work will be conducted in accordance with the Program Regulations and requirements of the University.

16.3 Capstone Project

A student may undergo a Capstone Project for a period of 12-14 weeks in an industry/ company or academic / research institution in the 3rd and 4th Semester as applicable, subject to the following conditions:

- 16.3.1** The Capstone Project shall be conducted in accordance with the Capstone Project Policy prescribed by the University from time to time.
- 16.3.2** The selection criteria (minimum CGPA, pass in all Courses as on date, and any other qualifying criteria) as applicable / stipulated by the concerned Industry / Company or academic / research institution for award of the Capstone Project to a student;
- 16.3.3** The number of Capstone Project available for the concerned Academic Term. Further, the available number of Capstone Project shall be awarded to the students by the University on the basis of merit using the CGPA secured by the student. Provided further, the student fulfils the criteria, as applicable, specified by the Industry / Company or academic / research institution providing the Capstone Project, as stated in Sub-Clause 16.3.2 above.
- 16.3.4** A student may opt for Capstone Project in an Industry / Company or academic / research institution of her / his choice, subject to the condition that the concerned student takes the responsibility to arrange the Capstone Project on her / his own. Provided further, that the Industry / Company or academic / research institution offering such Capstone Project confirms to the University that the Capstone Project shall be conducted in accordance with the Program Regulations and Capstone project Policy of the University.
- 16.3.5** A student selected for a Capstone Project in an industry / company or academic / research institution shall adhere to all the rules and guidelines prescribed in the Capstone Project Policy of the University.

16.4 Research Project / Dissertation

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

- 16.4.1** The Research Project / Dissertation shall be approved by the concerned HOD and be carried out under the guidance of a faculty member.
- 16.4.2** The student may do the Research Project / Dissertation in an Industry / Company or academic / research institution of her / his choice subject to the above mentioned condition (Sub-Clause 16.4.1). Provided further, that the Industry / Company or academic / research institution offering such Research Project / Dissertation confirms to the University that the Research Project / Dissertation work will be conducted in accordance with the Program Regulations and requirements of the University.

17 List of Discipline Elective Courses:

Table 3.3: Discipline Elective Courses (DE)						
Sl. No.	Course Code	Course Name	L	T	P	C

1	BCT4005	Construction Demolition and Waste Management	3	0	0	3
2	BCT4006	Mechanization in Construction	3	0	0	3
3	BCT4007	Pre – Engineered Construction	3	0	0	3
4	BCT4008	Formwork and Scaffolding Design	3	0	0	3
5	BCT4009	Advanced Design of RC Structures	3	0	0	3
6	BCT4010	Human Resource Management	3	0	0	3
7	BCT4011	Elements of Prestressed Concrete Structures	3	0	0	3
8	BCT4012	Advanced Design of Steel Structures	3	0	0	3
9	BCT4013	Applications of Remote Sensing and GIS in Construction	1	0	4	3
10	BCT4502	Sustainable Construction Materials and Characterisation	3	0	0	3
11	BCT5001	Retrofitting and Repair Techniques	3	0	0	3
12	BCT5002	Building Automation and 3D Printing	3	0	0	3
13	BCT5003	Seismic analysis and Design of Buildings	3	0	0	3
14	BCT5004	Design concepts of substructures	3	0	0	3
Total No. of Credits						15

18 List of Open Electives to be offered by the School / Department

Table 3.4: Open Elective Courses (OE): Minimum Credits to be earned from this Basket is 06						
Civil Engineering Basket						
Sl. No.	Course Code	Course Name	L	T	P	C
1.	BCT4014	Sustainable Smart Cities	3	0	0	3
2.	BCT4015	Systems Design for Sustainability	3	0	0	3
3.	BCT4016	Self Sustainable Buildings	3	0	0	3
4.	BCT4017	Energy and Buildings	3	0	0	3
Law Basket						
1.	LAW2014	Cyber Law				
2.	LAW5005	Law Relating to Infrastructure Projects				
Electronics and Communication Engineering Basket						
1.	ECE5001	Wearable Computing	3	0	0	3
2.	ECE5002	MEMS and Nanotechnology	3	0	0	3
3.	ECE5003	Advanced Computer Networks	3	0	0	3
4.	ECE5004	Pervasive Computing	3	0	0	3
Mechanical Engineering Basket						
1.	MEC5001	Optimization Techniques	3	0	0	3
2.	MEC5002	Industry 4.0	3	0	0	3
3.	MEC5003	Six Sigma for Engineers	3	0	0	3
4.	MEC5004	Design for Internet of Things	3	0	0	3
Management Basket						

Table 3.4: Open Elective Courses (OE): Minimum Credits to be earned from this Basket is 06						
Civil Engineering Basket						
1	MBA3042	Innovation and Business Incubation	3	0	0	3
2	MBA3037	Personal Wealth Management	3	0	0	3
3	MBA3038	Team Dynamics	3	0	0	3
4	MBA3039	Market Research	3	0	0	3
5	MBA2023	Design Thinking for Business Innovation	3	0	0	3
6	MBA3046	Game Theory in Business	3	0	0	3
7	MBA3047	Data Story Telling	3	0	0	3
8	MBA3048	Environmental Sustainability and Value Creation	3	0	0	3
9	MBA3049	Industry 4.0	3	0	0	3
Media Studies Basket						
1	BAJ5001	Media and Entertainment Business	3	0	0	3
2	BAJ5002	TV Journalism and News Management	2	0	2	3
Research Basket						
1.	RES5001	Research Methodology	3	0	0	3
1.	URE7001	University Research Experience	-	-	-	3
2.	URE7002	University Research Experience	-	-	-	0

19 List of MOOC (NPTEL) Courses

19.1 NPTEL - Discipline Elective Courses for M. Tech. (Building and Construction Technology)

Sl. No.	Course ID	Course Name	Duration
1	noc25-ar30	Architectural Approaches to Decarbonization of Buildings	12 Weeks
2	noc25-ce72	Geosynthetics and Reinforced Soil Structures	12 Weeks
3	noc25-ce79	Sustainable Transportation Systems	12 Weeks
4	noc25-ce80	Environmental Modeling and Simulation	12 Weeks
5	noc25-ce83	Underground Space Technology	12 Weeks
6	noc25-ce88	Environmental Geomechanics	12 Weeks

19.2 NPTEL - Open Elective Courses for M. Tech. (Building and Construction Technology)

Sl. No.	Course ID	Course Name	Duration
1	noc25-ae30	Drone Systems and Control	12 Weeks
2	noc25-ge43	Carbon Accounting and Sustainable Designs in Product Lifecycle Management	12 Weeks
3	noc25-ce133	An Introduction to Climate Dynamics, Variability and Monitoring	12 Weeks
4	noc25-cs147	Introduction to Internet of Things	12 Weeks
5	noc25-ec10	Foundations of Accounting & Finance	12 Weeks
6	noc25-hs120	Patent Law for Engineers and Scientists	12 Weeks

Sl. No.	Course ID	Course Name	Duration
7	noc25-ma99	Foundations of R Software	12 Weeks
8	noc25-me178	Sustainable Energy Technology	12 Weeks
9	noc25-ge77	Machine Learning for Core Engineering Disciplines	12 Weeks

Note: The NPTEL courses listed above are subjected to change based on the offering of NPTEL. The updated list of NPTEL courses shall be notified before the commencement of the semester after the same is approved by BoS and the same shall also be updated in the table above.

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

Semester 1										
Sl. No.	Course Code	Course Name	Credit Structure					Basket	Type of Skill	Course Addresses to
			L	T	P	C	Contact Hours			
1	MAT4012	Computational Engineering Mathematics	3	0	0	3	3	SC	S	
2	ENG5001	English for Employability	2	1	0	3	3	SC	S	HP
3	BCT4001	Advanced Construction Materials and Technology	2	0	2	3	4	PC	S	ES
4	BCT4002	Quality, Risk and Safety in Construction	3	0	0	3	3	PC	S	HP
5	BCT4003	Construction Planning, Schedule and Control	2	0	2	3	4	PC	S	HP
6	BCTXXXX	Discipline Elective - I	3	0	0	3	3	DE	EM	
7	BCTXXXX	Discipline Elective - II	3	0	0	3	3	DE	EM	
8	SEM5001	Seminar - I	-	-	-	-	1	SC		
Total			18	0	6	21	24			

Semester 2										
Sl. No.	Course Code	Course Name	Credit Structure					Basket	Type of Skill	Course Addresses to
			L	T	P	C	Contact Hours			
1	BCT4501	Construction Economics and Contract Specifications	3	0	0	3	3	PC	S	HP
2	BCT4004	Building Services and Building Information Modelling	2	0	2	3	4	PC	S	HP/ ES
3	BCTXXXX	Discipline Elective - III	3	0	0	3	3	DE	EM	
4	BCTXXXX	Discipline Elective - IV	3	0	0	3	3	DE	EM	
5	BCTXXXX	Discipline Elective - V	3	0	0	3	3	DE	EM	
6	XXXxxxx	Open Elective - I	3	0	0	3	3	OE	S	
7	XXXxxxx	Open Elective - II	3	0	0	3	3	OE	S	
8	SEM5002	Seminar-II	0	0	0	1	1	SC		
Total			20	0	6	23	26			

Semester 3										
Sl. No.	Course Code	Course Name	Credit Structure					Basket	Type of Skill	Course Addresses to
			L	T	P	C	Contact Hours			
1	BCT8400	Dissertation / Internship -I	-	-	-	10	0	SC	EM	HP/ ES
Total			-	-	-	10	0			

Semester 4										
Sl. No.	Course Code	Course Name	Credit Structure					Basket	Type of Skill	Course Addresses to
			L	T	P	C	Contact Hours			
1	BCT8500	Dissertation / Internship -II	-	-	-	14	0	SC	EM	HP/ ES
Total			-	-	-	14	0			

22 Course Catalogue

Course Code: MAT4012	Course Title: Computational Engineering Mathematics Type of Course:1] School Core	L-T- P- C	3	0	0	3
Version No.	1.0					
Course Pre-requisites	NIL					
Anti-requisites	NIL					
Course Description	This course is intended to provide an in-depth theoretical background and mathematical skills that are imperative for the effective understanding of engineering problems. The topics introduced will serve as basic tools for specialized studies in many engineering fields. The course focuses on various mathematical techniques with a strong focus on modelling, simulation and solving problems relevant to the industry. The course covers topics such as linear algebra, numerical methods and optimization techniques.					
Course Objective	The objective of the course is to familiarize the learners with the concepts of “Computational Engineering Mathematics” and attain Skill Development through Problem Solving Techniques.					
Course Outcomes	On successful completion of the course the students shall be able to: CO1: Apply concepts of linear algebra and matrix decompositions to develop solutions for engineering and computational applications. (L3) CO2: Apply numerical solution techniques for analyzing nonlinear and boundary value problems in engineering systems. (L3) CO3: Apply computational methods for solving elliptic, parabolic, and hyperbolic PDEs. (L3) CO4: Apply operations research techniques to formulate and solve optimization and decision-making problems. (L3) CO5: Solve LPPs using graphical methods and the Simplex algorithm. (L3) CO6: Apply specialized algorithms to solve transportation, assignment, and travelling salesman problems. (L3)					
Course Content:						
Module 1	Linear Algebra	(13L Sessions)				
Vector Space, Properties, Subspaces, Linear Combinations, Spanning Set of a Vector Space, Linear Dependence and Independence, Basis and Dimension, Change of Basis; Normed Linear Spaces, Inner Products Spaces, Orthogonality, Orthogonal and Orthonormal Bases, Gram-Schmidt Orthogonalization Process. Linear Transformations, Algebra of transformations, Isomorphisms, Matrix Representation of Linear Transformations, The Range						

and Null Space, Rank-Nullity Theorem. Least Squares Approximation, Singular Value Decomposition, Data Compression Using Singular Value Decomposition.		
Module 2	Numerical Methods	(16L Sessions)
Introduction, Newton-Raphson method for system of nonlinear equations, Runge-Kutta Method for system of first order ODEs and for second order ODEs, finite difference method for boundary value problems, shooting method, finite difference method for PDEs, Crank-Nicolson method for parabolic PDEs, explicit finite difference method for hyperbolic PDEs, Gauss-Seidel iteration method for elliptical PDEs.		
Module 3	OR and LPP	(16L Sessions)
Definition and basics of OR, characteristics of OR, OR and decision making, scope and limitations of OR, linear programming problem, formulation of LPP, graphical solution of LPP, Simplex method, transportation problem, assignment problem, travelling salesman problem.		
Targeted Application & Tools that can be used: • Data analysis, dimensionality reduction, and feature extraction in machine learning. Modeling and processing of engineering and scientific data. • Numerical solution of nonlinear equations, ODEs, PDEs, and boundary value problems. Simulation and analysis of engineering and physical systems. • Optimization of resource allocation, transportation, assignment, and scheduling problems. Decision-making and operational planning in industrial and service systems. Software: MATLAB, Python, Mathematica, Maple, SciLab, GNU Octave, Excel Solver, LINGO/LINDO, GAMS.		
Assignment:		
Assignments will involve theoretical problem-solving and computational implementation using suitable programming tools. The assignments may be undertaken individually or in groups, as decided by the instructor.		
Text Book 1. Erwin Kreyszig, "Advanced Engineering Mathematics", 10th Edition, Wiley, 2017. 2. M K Jain, S R K Iyengar, R K Jain, "Numerical methods for Scientific and Engineering Computations", 7th Edition, New Age International, 2010. 3. Hamdy A Taha, "Operations Research: An Introduction", Pearson Education, 10th Edition, 2017.		
Reference Books: 1. C Ray Wylie and Louis C Barrett, "Advanced Engineering Mathematics", 6th Edition, McGraw-Hill, 2012. 2. Glyn James and Phil Dyke, "Modern Engineering Mathematics", 6th Edition, Pearson, 2019. 3. B S Grewal, "Higher Engineering Mathematics", Khanna Publishers, 44th Edition, 2017. 4. I N Herstein, "Topics in Algebra", 3rd Edition, Wiley, 1996.		

5. Steven C Chapra and Raymond P Canale, "Numerical Methods for Engineers", 7th Edition, McGraw-Hill, 2015.
6. Kanti Swarup, P K Gupta and Man Mohan, "Operations Research", Sultan Chand & Sons, New Delhi, 2015.
7. F S Hillier and G J Lieberman, "Introduction to Operations Research", 9th Edition, McGraw Hill-Higher Education, 2010.

E-Resources (<https://presiuniv.knimbus.com>)

1. https://presiuniv.knimbus.com/portal/v2/default/viewDetail?searchResultType=ECATALOGUE_BASED&uniqueId=TEXTBOOK_LIBRARY01_06082022_117
2. https://presiuniv.knimbus.com/portal/v2/default/viewDetail?searchResultType=ECATALOGUE_BASED&uniqueId=TEXTBOOK_LIBRARY01_06082022_385
3. http://presiuniv.knimbus.com/portal/v2/default/viewDetail?searchResultType=ECATALOGUE_BASED&uniqueId=EBSCO95_10122025_221436
4. https://presiuniv.knimbus.com/portal/v2/default/viewDetail?searchResultType=ECATALOGUE_BASED&uniqueId=JSTOR_GLOBAL_ALLBOOKTITLES_2022_10_17_18102022_118962

Web Resources

1. <https://archive.nptel.ac.in/courses/111/105/111105035/>
2. <https://archive.nptel.ac.in/courses/111/107/111107105/>
3. <https://archive.nptel.ac.in/courses/112/101/112101298/>
4. <https://in.coursera.org/learn/essential-linear-algebra-for-data-science>
5. <https://in.coursera.org/learn/numerical-methods-engineers>
6. <https://in.coursera.org/learn/operations-research-modeling>

Topics relevant to SKILL DEVELOPMENT: This course focuses on formulating and solving problems concerning real-world engineering applications numerically as well as statistically. This course provides an introduction to Linear Algebra, Numerical Methods and basic Operational research methods to deal with Linear Programming Problems, Finding Optimum Basic feasible solution, Transportation and Assignment problems, Finding Total duration of Completing Project, Inventory models and Theory of games for Skill Development through Problem Solving methodologies. This is attained through the assessment component mentioned in course handout.

Catalogue prepared by	Dr. SR Sudheendra
Recommended by the Board of Studies on	
Date of Approval by the Academic Council	

Course Code: ENG5001	Course Title: English for Employability Type of Course: Theory	L-T-P-C	2	1	0	3
Version No.	1.0					
Course Pre-requisites	Graduate Level English Language Proficiency					
Anti-requisites	NIL					
Course Description	This course is designed to develop advanced communication skills required for employability in contemporary professional environments. It focuses on Listening, Speaking, Reading, and Writing (LSRW) through real-world contexts such as podcasts, professional talks, research literature, workplace communication, and digital platforms. The course integrates AI-assisted learning tools to enhance comprehension, writing, and presentation skills. It also introduces students to personal branding and digital communication practices, enabling them to position themselves effectively in professional and public spaces.					
Course Objective	The course aims to develop advanced employability-oriented communication abilities across listening, speaking, reading, and writing. It enables students to interpret professional talks and podcasts, communicate confidently in interviews and presentations, read technical and academic texts with AI-assisted tools, and produce structured professional and research-based writing. The course also encourages students to build a professional digital identity through responsible, effective, and purposeful communication.					
Course Outcomes	• Explain key ideas, arguments and perspectives from professional talks and podcasts through structured listening and note-taking. • Apply effective speaking strategies in interviews, presentations and professional interactions to communicate technical and non-technical ideas. • Apply critical reading strategies and AI-assisted tools to analyse technical, academic, and digital texts by identifying arguments, patterns, and insights. • Apply principles of clarity, coherence, argumentation, and effectiveness to assess written content in professional and research writing contexts. • Analyse structured written and digital communication, including research-based writing and personal branding content, using appropriate tools and strategies.					

Course Content:	English for Employability			
Module 1	Listening and Interpreting Ideas in the Digital Age	Assignment	Podcast/Talk Comprehension and Group Discussion	09 Sessions
• Listening as an interpretive skill • Understanding long-form discussions • Structured note-taking • Identifying arguments, perspectives, and biases • Comprehension of curated talks and podcasts from TED Talks, Big Think, Harvard Business Review, The Lex Fridman Podcast, and WTF is with Nikhil Kamath • Group discussions demonstrating comprehension				
Module 2	Speaking for Professional Impact	Assignment	Mock Interview and Investor Pitch	09 Sessions
• Interpersonal communication • Emotional intelligence • Presentation skills • Persuasion techniques • Interview communication • Communicating technical ideas to non-experts • Analysing founder talks and investor pitches • Role plays, mock interviews, and presentations				
Module 3	Reading, Research, and AI-Assisted Comprehension	Assignment	AI-Assisted Reading Notes	09 Sessions
• Reading strategies: skimming, scanning, and inference • Close reading • Identifying arguments and insights • Reading research papers and technical literature • AI-assisted reading and note-taking • Introduction to SEO logic and content discoverability				
Module 4	Writing with Clarity, Purpose, and AI Support	Assignment	Research Writing and Professional Writing Portfolio	09 Sessions

• Principles of effective writing • Styles of writing • Professional writing: emails and reports • Research writing: abstract writing, paragraph structure, argument development, and citation basics • AI prompting and editing • Refining and humanising AI-generated text • Resume and profile writing				
Module 5	Personal Branding and Digital Communication	Assignment/ Quiz	Digital Profile and Content Strategy	09 Sessions
• Building a professional identity • Social media communication and etiquette • SEO for blogs and digital content • Storytelling • Content creation strategies • Developing content for platforms such as YouTube and LinkedIn				
Targeted Application & Tools that can be used: Microsoft Word, Google Docs, ChatGPT, Grammarly, QuillBot, ProWritingAid, LanguageTool, Hemingway App, Google NotebookLM, Perplexity, Google Scholar, LinkedIn, YouTube Studio, podcast platforms				
Project Work/ Assignment:				
1. Podcast/Talk Comprehension Notes and Group Discussion 2. Mock Interview and Investor Pitch 3. AI-Assisted Reading Notes 4. Professional Writing Portfolio 5. Research Writing Task 6. Resume/Profile Writing 7. Digital Personal Branding Content				
Assessment Structure: Continuous Assessment (CA): 25% Mid-Semester Examination: 25% End-Semester Examination: 50%				
Continuous Assessment Breakdown: Speaking: presentations, GD, interview simulation: 15% Writing: emails, research writing, resume, AI-assisted tasks: 10% Listening and Reading tasks: 10% Participation and engagement: 5%				

Text Book(s): 1. Munter, Mary. Guide to Managerial Communication: Effective Business Writing and Speaking. 8th ed., Pearson India Education Services, 2011. 2. Mohan, Krishna, and Meera Banerji. Developing Communication Skills. 2nd ed., Trinity Press, 2017. 3. Bailey, Stephen. Academic Writing: A Handbook for International Students. Routledge, 2018. 4. Basu, B. N. Technical Writing. PHI Learning Pvt. Ltd., 2016.	
Reference Book (s): 1. Dimbleby, Richard, and Graeme Burton. More than Words: An Introduction to Communication. 4th ed., Routledge, 2007. 2. Seely, John. The Oxford Guide to Effective Writing and Speaking. Oxford University Press, 2013. 3. Strunk, William, and E. B. White. The Elements of Style. Pearson, 2000. 4. Sharma, R. C., and Krishna Mohan. Business Correspondence and Report Writing. Tata McGraw-Hill, 2016. 5. Harvard Business Review. HBR Guide to Better Business Writing. Harvard Business Review Press, 2013. Web Sources: 1. https://www.ted.com 2. https://bigthink.com 3. https://hbr.org 4. https://owl.purdue.edu 5. https://www.bbc.co.uk/learningenglish 6. https://www.phrasebank.manchester.ac.uk 7. https://www.linkedin.com/learning	
Topics relevant to "SKILL DEVELOPMENT": Employability communication, listening comprehension, interpersonal communication, presentation skills, research writing, AI-assisted reading and writing, professional writing, personal branding, digital communication.	
Catalogue prepared by	Dr. Yashavantha T. S.
Recommended by the Board of Studies on	
Date of Approval by the Academic Council	

Course Code: SEM5001	Course Title: Seminar - I Type of Course: School Core	L-T-P-C	-	-	-	1
Version No.	1.0					
Course Pre-requisites	NIL					
Anti-requisites	NIL					
Course Description	This course provides expertise in practice, and assess effective scientific seminar techniques. The seminar report writing process is also covered in the course, which calls for students to be able to connect theories, research questions, and experiment design. The seminars will assist students in acquiring the abilities needed to effectively compete for positions in various research domains. The presentation abilities they learn in the process will be crucial throughout their entire professional careers. These abilities will enable students to respond to constructive criticism and work to explain scientific concepts to peers, other scientists, and the general public.					
Course Outcome	On successful completion of this course the students shall be able to: (1) Identify the core technical problem through a literature survey using journals, conference papers, and technical reports. (2) Discriminate research gaps through the conclusions of literature survey. (3) Prepare a comprehensive technical report as per university template. (4) Deliver oral presentations using visual aids to communicate technical concepts. (5) Perform confident communication while responding to technical queries.					
Course Content:	Research articles / publications corresponding to a particular domain of interest will be presented					
Targeted Application & Tools that can be used: 1. Emerging areas in engineering and science based research domains. 2. TED Talks 3. You Tube Links						
Text Book	NA					
References	NA					
Catalogue prepared by	Dr. Blesson S					
Recommend ed by the Board of Studies on	BoS No. 12 held on 07 August 2021					
Date of Approval by the Academic Council	Academic Council Meeting No. 16 held on 23 October 2021					

Course Code: SEM5002	Course Title: Seminar - II Type of Course: School Core	L-T-P-C	-	-	-	1
Version No.	1.0					
Course Pre-requisites	NIL					
Anti-requisites	NIL					
Course Description	This course provides expertise in practice, and assess effective scientific seminar techniques. The seminar report writing process is also covered in the course, which calls for students to be able to connect theories, research questions, and experiment design. The seminars will assist students in acquiring the abilities needed to effectively compete for positions in various research domains. The presentation abilities they learn in the process will be crucial throughout their entire professional careers. These abilities will enable students to respond to constructive criticism and work to explain scientific concepts to peers, other scientists, and the general public.					
Course Outcome	On successful completion of this course the students shall be able to: (6) Identify the core technical problem through a literature survey using journals, conference papers, and technical reports. (7) Discriminate research gaps through the conclusions of literature survey. (8) Prepare a comprehensive technical report as per university template. (9) Deliver oral presentations using visual aids to communicate technical concepts. (10)Perform confident communication while responding to technical queries.					
Course Content:	Research articles / publications corresponding to a particular domain of interest will be presented					
Targeted Application & Tools that can be used: 4. Emerging areas in engineering and science based research domains. 5. TED Talks 6. You Tube Links						
Text Book	NA					
References	NA					
Catalogue prepared by	Dr. Blesson S					
Recommend ed by the Board of Studies on	BoS No. 12 held on 07 August 2021					
Date of Approval by the Academic Council	Academic Council Meeting No. 16 held on 23 October 2021					

Course Code: BCT8500	Course Title: Dissertation/ Internship - I Type of Course: School Core	L-T-P-C	-	-	-	1 0
Version No.	1.0					
Course Pre-requisites	NIL					
Anti- requisites	NIL					
Course Description	The PIP6001 involving internship 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 four to five months to a professional location where the students, under the supervision of the faculty, are involved in applying the knowledge acquired in the classroom for finding solutions to real life problems. The Dissertation however enables a student to implement the ideas that he/she would have into reality either through simulation or experimental prototypes. PIP6001 enables students 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, science and rich in analytical tools, provides the foundation necessary for the student to understand properly the nature of real-life problems. This course also enables the students to take research oriented tasks in order to provide solutions for real-life problems.					
Course Outcome	On successful completion of this course the students shall be able to: (1) Identify the engineering problems related to local, regional, national or global needs. (2) Apply appropriate techniques or modern tools for solving the intended problem. (3) Design the experiments as per the standards and specifications. (4) Interpret the events and results for meaningful conclusions. (5) Appraise project findings and communicate effectively through scholarly publications.					
Course Content:	Not Applicable					
Targeted Application & Tools that can be used: 1. Industry specific tools and work functions						
Text Book	NA					
References	NA					
Catalogue prepared by	Dr. Nakul R					
Recommend ed by the Board of Studies on	BoS No. 12 held on 07 August 2021					
Date of Approval by the Academic Council	Academic Council Meeting No. 16 held on 23 October 2021					

Course Code: BCT8500	Course Title: Dissertation/ Internship - II Type of Course: School Core	L-T-P-C	-	-	-	14
Version No.	1.0					
Course Pre-requisites	NIL					
Anti-requisites	NIL					
Course Description	The PIP6002 involving internship 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 four to five months to a professional location where the students, under the supervision of the faculty, are involved in applying the knowledge acquired in the classroom for finding solutions to real life problems. The Dissertation however enables a student to implement the ideas that he/she would have into reality either through simulation or experimental prototypes. PIP6002 enables students 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, science and rich in analytical tools, provides the foundation necessary for the student to understand properly the nature of real-life problems. This course also enables the students to take research oriented tasks in order to provide solutions for real-life problems.					
Course Outcome	On successful completion of this course the students shall be able to: (1) Identify the engineering problems related to local, regional, national or global needs. (2) Apply appropriate techniques or modern tools for solving the intended problem. (3) Design the experiments as per the standards and specifications. (4) Interpret the events and results for meaningful conclusions. (5) Appraise project findings and communicate effectively through scholarly publications.					
Course Content:	Not Applicable					
Targeted Application & Tools that can be used: 2. Industry specific tools and work functions						
Text Book	NA					
References	NA					
Catalogue prepared by	Dr. Nakul R					
Recommended by the Board of Studies on	BoS No. 12 held on 07 August 2021					
Date of Approval by the Academic Council	Academic Council Meeting No. 16 held on 23 October 2021					

Course Code: BCT 4001	Course Title: Advanced Construction Materials and Technology Type of Course: Program Core Theory &Integrated Laboratory			L-T-P-C	2	0	2	3
Version No.	1.2							
Course Pre-requisites	Basics of civil engineering- for having basic knowledge of Building materials and concrete technology basic exposure for civil components and IS code books.							
Anti-requisites	NIL							
Course Description	This course gives knowledge regarding, how to select the construction material for structures and execute the same for a given environment. Also, to know the different types of material with characterization and field tests. It includes Concrete making materials-cement, aggregates including recycled, Admixtures (both mineral and chemical), Supplementary cementitious materials (GGBS, Micro-silica, Fly ash), Microstructure of concrete, Fresh concrete and its rheology, Mechanical, deformational behavior of hardened concrete. Creep and Shrinkage of Concrete. Durability of Plain and Reinforced Concrete. Proportioning of Mixes- Normal Concrete, High Strength/Performance Concrete, Light Weight Concrete, High Density Concrete, Fiber Reinforced Concrete, Ferro-cement, Reactive Powder Concrete, Roller Compacted Concrete, Self-Compacting Concrete, Geo-polymer and green cement. Concrete and Decorative Concrete, Types of Reinforcements. Corrosion of Reinforcing Steel- Electro-chemical process, measures of protection. Polymers, fibers, adhesives and sealants- types and their uses. Structural glazing. By this student can have an in-depth knowledge of construction materials and can select for the suitable application. The associated laboratory provides an opportunity to validate the concepts Taught and enhances the ability to visualize the real system performance.							
Course Objective	The objective of the course is to familiarize the learners with the concepts of Computer Aided Analysis and Detailing and attain Employability Skills through Participative Learning techniques.							
Course Outcomes	On successful completion of this course the students shall be able to: 1] Explain the properties, composition, and applications of basic building materials. 2] Describe the behavior and characteristics of concrete in fresh and hardened state. 3] Apply IS code-based mix design methods to prepare and assess various concrete mixes for different engineering requirements. 4] Demonstrate the performance and sustainability aspects of advanced concretes and alternative construction materials such as geo-polymers, reactive powder concrete, and ferrocement. 5] Examine the influence of various parameters on properties of fresh and hardened concrete based on laboratory experimental investigation.							
Course Content:								
Module 1	Introduction to Basic Building Materials		Assignment	MS word and Excel		10 Sessions		
Topics: Cement – Introduction, Chemical composition, Hydration process, types of cement, Aggregates- classification, effect of geometry & texture, strength, mechanical properties -recycled Aggregates. Admixtures - types, necessity and benefits, Mineral admixture & Chemical admixtures.								

Module 2	Concrete	Case Study	Analysis of test results and can be dealt with Lab	10 Sessions
Topics: Workability, Segregation and bleeding, Compressive and tensile strength and, Factors influencing strength, Microstructure of concrete, Creep –factors affecting creep. Shrinkage of concrete – types & Factors. Definition and significance of durability. Internal and external factors influencing durability. Mix design IS code.				
Module 3	Advanced concretes, steel & Structural Glass	Assignment	Data Collection and Interpretation of special concrete types	10 Sessions
Topics: High Strength/Performance Concrete, Light Weight Concrete, High Density Concrete, Ferro-cement, Reactive Powder Concrete, Roller Compacted Concrete, Geo-polymer and green cement. Decorative Concrete, Types of Reinforcement materials, measures of protection of steel in concrete, adhesives and sealants- types and their uses. Structural glazing.				
List of Laboratory Tasks: Experiment No 1: Overview of Lab Experiment No 2: Effect of water to cement ratio on workability and strength of concrete. Level 1: Prepare concrete mixes of varied water to cement ratio and compare the workability and strength parameters of concrete. Level 2: Prepare concrete mixes of varied water to cement ratio and compare the workability, strength and durability parameters of concrete. Experiment No. 3: Effect of aggregate to cement ratio on workability and strength of concrete. Level 1: Prepare concrete mixes of varied aggregate to cement ratio and compare the workability and strength parameters of concrete. Level 2: Prepare concrete mixes of varied aggregate to cement ratio and compare the workability, strength and durability parameters of concrete. Experiment No. 4: Effect of chemical and mineral admixtures on fresh and hardened properties of concrete. Level 1: Prepare concrete mixes of varied chemical, mineral admixtures content and compare the workability and strength parameters of concrete. Level 2: Prepare concrete mixes of varied chemical, mineral admixtures content and compare the workability, strength and durability parameters of concrete. Experiment No. 5: Correlation between strength of cube, cylinder and Split Tensile strength of concrete. Level 1: Determine the compressive strength of cube, cylinder and split tensile strength of cylinder on specimens made of single concrete mix. Level 2: Determine the compressive strength of cube, cylinder and split tensile strength of cylinder on specimens made of single concrete mix with varied admixture content. Experiment No. 6: Design mix for self-compacting concrete and Measure Workability of self-compacting Concrete by flow test. Level 1: Prepare Design mix for self-compacting concrete of M40 grade and Measure Workability of self-compacting Concrete by flow tests. Level 2: Prepare Design mix for self-compacting concrete of M70 grade and Measure Workability of self-compacting Concrete by flow tests. Experiment No. 7: Perform Non Destructive testing on concrete				

Level 1: Perform Rebound hammer test and Ultrasonic pulse velocity test on Concrete cubes. Level 2: Perform Rebound hammer test and Ultrasonic pulse velocity test on Concrete beams and columns of an existing structure in field.	
Targeted Application & Tools that can be used: Students get the beforehand knowledge about Basic building material and its various application for present day need. MS excel can used to do analyze the concrete test results and perform various mix designs.	
Textbooks: T1 A.R. Santhakumar, "Concrete Technology", Oxford Publishers. T2 M.S Shetty, "Concrete Technology Theory and Practice", S.Chand & Company Pvt. Ltd.	
References: R1 P.C Varghese, "A textbook Building Materials", Prentice-Hall of India Pvt. Ltd. R2 S. K. Duggal, "Building Materials", New age International Publishers. R3 IS 456 2000 for Plain and reinforced concrete, R4 IS 10262 2019 Recommended guidelines for concrete mix design PU Web Resources https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=2196240&site=ehost-live&ebv=EB&ppid=pp_x https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=1558372&site=ehost-live Web references: https://nptel.ac.in/courses/105106053 Standards/Hand Book: IS 456 2000 for Plain and reinforced concrete IS 10262 2019 Recommended guidelines for concrete mix design.	
Topics relevant to "Skill Development": Introduction to basic construction materials, Design mix of concrete, Tests on concrete and analysis of concrete properties, Usage of mineral admixtures in concrete, structural glass for natural lighting for Skill Development through Experiential Learning techniques. This is attained through assessment component mentioned in course handout.	
Catalogue prepared by	Mr. Dayalan J
Recommended by the Board of Studies on	BoS No. 12 held on 07 August 2021
Date of Approval by the Academic Council	Academic Council Meeting No. 16 held on 23 October 2021

Course Code: BCT 4002	Course Title: Quality, Risk and Safety in Construction Type of Course: Program Core and Theory only	L-T-P-C	3	0	0	3
Version No.	1.2					
Course Pre-requisites	Basic terminologies of quality, risk and safety General parameters of quality					
Anti-requisites	NIL					
Course Description	The purpose of this course is to enable the students to appreciate the significance of Quality, Risk and Safety in Construction and to develop the basic abilities of risk management. The course is more conceptual in nature and needs fair knowledge of causes for construction accidents, risk identification. This course mainly focuses on management aspects of construction project such as organization, quality management and safety management. The course develops the construction site safety skills by attaining quality.					
Course Objective	<i>The objective of the course is to familiarize the learners with the concepts of Quality, Risk and Safety in Construction and attain Skill Development through Participative Learning techniques.</i>					
Course Outcomes	On successful completion of the course the students shall be able to: 1) Explain the role of a project manager, principles of organization and organization types 2) Prepare a quality management plan for a construction project, incorporating quality assurance and control measures 3) Examine construction accidents and safety practices to improve project safety 4) Determine the safety considerations, safety standards and legislation as applicable to construction projects 5) Predict the risks involved in construction projects					
Course Content:						
Module 1	Project Organization Management	Assignment	Data Collection	10 Sessions		
Topics: Construction Projects: Concept, Project Categories, Characteristic of projects, project life cycle phase, Project Management- Project Management Function, Role of Project Manager, Organizing for Construction - Principles of organization, type of organization structure.						
Module 2	Construction Quality Management	Case Study	Data Collection	12 Sessions		
Topics: Construction Quality, Inspection and Testing, Quality control, Quality Assurance, Total Quality Management, Critical factors of TQM, TQM in Projects, Benchmarking, concepts of quality policy, standards, manual, Quality philosophy. Quality Certification for companies and laboratories, ISO Certification.						
Module 3	Safety Management	Case Study	Data Collection	8 Sessions		
Topics: Safety in Construction: Causes, classification, cost of an accident, safety programme for construction, protective equipment, accident report. Types of injuries, Personal & Structural safety. Recording injuries, Construction Accident Statistics, Factors Affecting Effectiveness of Safety Programme and Safety Performance on Construction Sites, Safety Auditing and Its Use in Proactive Prevention of Accidents.						
Module 4	Construction Safety	Assignment	Data Collection	5 Sessions		

Topics: Safety consideration during construction, demolition, storage and handling of building materials and during use of equipment. Safety legislation and Standards, Human Pain and Suffering Costs of Construction Accidents				
Module 5	Construction Risk Management	Term paper	Data Collection	5 Sessions
Topics: Certainty, Risk and Uncertainty Reasons for the risks, Types of Risks, Risk Management, Identification and Nature of Construction Risks, Minimizing risks and mitigating losses, Risk mitigation				
Targeted Application & Tools that can be used: Construction Sites, Risk managing consultancy, EHS dept.				
Text Books: T1. Kumar Neeraj Jha, "Construction Project Management, Theory and Practices", Second Edition, Pearson Education India, 2015 T2. P.S. Gahlot, B. M. Dhir, "Construction Planning and Management Paperback", 2018.				
References: R1. David Gold Smith, "Safety Management in construction and Industry", Mc Graw Hill R2. K N Vaid, "Construction Safety Management", NICMAR R3. N. Logothetis, "Management for Total Quality", Prentice Hall R4. "Project Management Body of Knowledge" (PMBOK® GUIDE, Guide, A.), Project Management Institute, 2001. R5. Nigel J. Smith, Tony Merna and Paul Jobling, "Managing Risk in Construction Projects", 3rd Edition, Wiley Blackwell				
Weblinks: 1. L.A. van Gunsteren, "Quality in Design and Execution of Engineering Practice", IntechOpen https://presiuniv.knimbus.com/openFullText.html?DP=https://directory.doabooks.org/handle/20.500.12854/57415 2. NPTEL Course – Principles of Construction Management, Prof. Sudhir Misra https://nptel.ac.in/courses/105104161 3. NPTEL course – Safety in Construction, Dr. J. Uma Maheswari https://nptel.ac.in/courses/105102206 4. NPTEL Course – Safety and Risk Analytics, Prof. Jhareswar Maiti https://nptel.ac.in/courses/110105160 5. NPTEL Course on Engineering Mechanics by Prof. Manoj K Harbola, IIT Kanpur https://nptel.ac.in/courses/122104015 https://web.p.ebscohost.com/ehost/ebookviewer/ebook/ZTAwMHh3d19fMjQ2NDA2OF9fQU41?sid=3281a842-6740-4e2b-a3d5-36b396d796c3@redis&vid=4&format=EB&rid=4 https://web.p.ebscohost.com/ehost/ebookviewer/ebook/ZTAwMHh3d19fMzIyMDcyX19BTg2?sid=3281a842-6740-4e2b-a3d5-36b396d796c3@redis&vid=5&format=EB&rid=1				
Topics relevant to development of "Skill": Organizing for Construction, Principles of organization, Project Management- Project Management Function, Role of Project Manager for Skill Development through Participative Learning techniques. This is attained through assessment component mentioned in course handout.				
Catalogue prepared by	Mr. Gopalakrishnan N			
Recommended by the	BoS No. 12 held on 07 August 2021			

Board of Studies on	
Date of Approval by the Academic Council	Academic Council Meeting No. 16 held on 23 October 2021

Course Code: BCT 4003	Course Title: Construction Planning, Schedule and Control Type of Course: Program Core, Theory & Integrated Laboratory			L-T-P-C	2	0	2	3
Version No.	1.1							
Course Pre-requisites	[1] Construction Technology, [2] Engineering Mathematics Basic understanding of the construction process and techniques in various civil engineering projects. Basics of engineering mathematics pertaining to Probability functions and distributions.							
Anti-requisites	NIL							
Course Description	This course deals with the Project planning & scheduling in civil engineering and to develop the basic abilities required for project planning, scheduling along with monitoring and control techniques for construction project. The course is both conceptual and analytical in nature and needs fair knowledge of Mathematics and skills of logical reasoning. The course develops the critical thinking and basic skills required for a project manager. The course also enhances the analytical skills through assignments and usage of software. The associated laboratory provides an opportunity to validate the concepts Taught, enhances the ability to visualize the project schedules and analyze various techniques to optimize them.							
Course Objective	This objective of the course is to familiarize the learners with concepts of Construction Planning Schedule and Control and attain Skill Development through Experiential learning techniques.							
Course Outcomes	On successful completion of the course the students shall be able to: 1] Describe the basic concepts of construction project management and Project organization. 2] Prepare a project network diagram for various construction projects 3] Prepare the project Resource schedule by allocating resources and optimizing resource allocation. 4] Apply different monitoring and control techniques to monitor the progress of construction projects. 5] Prepare a schedule of projects in MS Project/ Primavera software and perform various operations to optimize the schedule.							
Course Content:								
Module 1	Basic concepts of a Project		Assignment		Data Collection		6 Sessions	
Topics: Introduction to construction project, phases of a construction project, Project management in construction, Stakeholders of a construction project, Forms of business organizations, Traits of a project manager. Different methods of time estimates.								

Module 2	Basics of Project Planning	Assignment	Programming simulation type	10 Sessions
Topics: Introduction to construction planning, type of project plans, work breakdown structure (WBS). Planning terminologies: activity, event, network, precedence, duration of an activity, forward and backward pass, float or slack time, activity path and critical path of activities. Preparation of network diagram – Activity on Arrow and Activity on Node.				
Module 3	Planning techniques	Assignment	Data Simulation and Analysis	8 Sessions
Topics: Basic conventional tools for planning, Planning techniques: critical path method (CPM), program evaluation and review technique (PERT), Advantages of network techniques, Introduction to Graphical evaluation and review technique (GERT).				
Module 4	Resource Management	Assignment	Data Simulation and Analysis	8 Sessions
Topics: Introduction to Resource scheduling, Resource allocation, Resource levelling and smoothing, Network crashing, Cost-Time trade-off.				
Module 5	Project Monitoring and Control	Assignment	Data Simulation and Analysis	8 Sessions
Topics: Introduction to precedence diagramming method, Updating project schedule: Using Bar chart, Using PERT/CPM, Using Precedence network. Project control: Progress control by Monthly progress reports and progress reviews, Cost control by using S-curve and Unit costing. Control of schedule, cost and technical performance by Earned value method.				
List of Laboratory Tasks: Experiment No 1: Overview of the Lab Experiment No 2: Creating Calendar for Project Task. Experiment No 3: Creating project tasks in MS Project or Primavera. Level 1: Define project tasks and its duration associated with construction of a Two storied residential Building with Conventional RCC construction. Level 2: Define project tasks and its duration associated with construction of a Two storied residential Building with Conventional RCC construction including services such as electrical, plumbing and sanitary works. Experiment No. 4: Defining Milestones and Dependencies among the project tasks in MS Project or Primavera. Level 1: Define Milestones and assign logical relationships between project tasks for a Two storied residential Building with Conventional RCC construction. Level 2: Define Milestones and assign logical relationships between project tasks for a Two storied residential Building with Conventional RCC construction including services such as electrical, plumbing and sanitary works. Experiment No. 5: Creating and assigning resources in MS Project or Primavera Level 1: Creating required resources for the project and assigning them to project tasks involved in construction of a Two storied residential Building with Conventional RCC construction. Level 2: Creating required resources for the project and assigning them to project tasks involved in construction of a Two storied residential Building with Conventional RCC construction including services such as electrical, plumbing and sanitary works. Experiment No. 6: Creating Project Baseline and Generating reports in MS Project or Primavera. Level 1: Create project baseline and generate resource reports, cost reports and progress reports for a Two storied residential Building with Conventional RCC construction.				

Level 2: Create project baseline and generate resource reports, cost reports and progress reports for a Two storied residential Building with Conventional RCC construction including services such as electrical, plumbing and sanitary works. Experiment No. 7: Preparation of Project plan and schedule on MS Project or Primavera. Level 1: Prepare a comprehensive project plan for one of the infrastructure project mentioned in the theory lecture using all the skills acquired in previous lab sessions. Level 2: Prepare a comprehensive project plan for one of the infrastructure project mentioned in the theory lecture using all the skills acquired in previous lab sessions and perform resource optimization on the prepared plan.	
Targeted Application & Tools that can be used: Application area is Construction Project management consultancies, Construction companies, Entrepreneurship. Professionally used software: MS Project, Oracle Primavera.	
Text Book: T1 Kumar Neeraj Jha, "Construction Project Management – Theory and Practice", Pearson. T2 Jimmie W. Hinze "Construction Planning and Scheduling" Tata McGraw Hill	
References: R1 Sengupta B. and Guha H, "Construction Management and Planning", Tata McGraw Hill, New Delhi. R2 Jebesen J, "Cost and Optimisation Engineering", McGraw Hill, New York. R3 Moder J.J. and Phillips C.R., "Project Management with CPM and PERT" https://puniversity.informaticsglobal.com:2229/login.aspx?direct=true&db=iih&AN=127161593&site=ehost-live https://web.s.ebscohost.com/ehost/ebookviewer/ebook/ZTAwMHh3d19fMTg1NzUwM19fQU41?sid=3c1a81df-4265-4bb8-97a9-c4d919cf0793%40redis&vid=2&format=EB&rid=1 https://web.s.ebscohost.com/ehost/ebookviewer/ebook/ZTAwMHh3d19fMTA4MDg0NI9fQU41?sid=3c1a81df-4265-4bb8-97a9-c4d919cf0793%40redis&vid=2&format=EK&rid=1 https://web.s.ebscohost.com/ehost/ebookviewer/ebook/ZTAwMHh3d19fMTUyMzcwMV9fQU41?sid=3c1a81df-4265-4bb8-97a9-c4d919cf0793%40redis&vid=2&format=EB&rid=1 Website: Scheduling techniques in Projects: https://swayam.gov.in/nd1_noc19_ce24/preview Project Planning and Control: https://swayam.gov.in/nd1_noc19_ce30/preview Project Management: https://swayam.gov.in/nd1_noc19_mg30/preview	
Topics relevant to "Skill development": Project planning and techniques, Project monitoring and control techniques. Application of planning, scheduling techniques using software. Stakeholders of a construction project, Forms of business organizations, Traits of a project manager for Skill Development through Experiential Learning techniques. This is attained through assessment component mentioned in course handout.	
Catalogue prepared by	Dr. Blesson S
Recommended by the Board of Studies on	BoS No. 12 held on 07 August 2021
Date of Approval by the Academic Council	Academic Council Meeting No. 16 held on 23 October 2021

Course Code: BCT4004	Course Title: Building Services and Building Information Modelling Type of Course: Program Core Theory & Integrated Laboratory			L-T-P-C	2	0	2	3
Version No.	1.1							
Course Pre-requisites	Basics of civil engineering- for having basic knowledge of Building materials, component parts of types of building. Ability to use computer.							
Anti-requisites	NIL							
Course Description	This course introduces the essential building services required for the safe, functional, and sustainable operation of buildings. It covers ventilation, lighting, electrical and water supply systems, lifts, fire safety provisions, and associated standards—especially the National Building Code (NBC). Students will develop the ability to select, plan, and integrate these services into various building types considering safety, efficiency, and sustainability.							
Course Objective	The objective of the course is to familiarize the learners with the concepts of Applications of Remote Sensing and GIS in Construction and attain Employability Skills through Experiential Learning techniques.							
Course Outcomes	On successful completion of this course the students shall be able to: 1. The objective of the course is to familiarize the learners with the concepts of Applications of Remote Sensing and GIS in Construction 2. Plan building services for residential and commercial buildings 3. Prepare basic electrical service layouts for typical buildings 4. Identify vertical transportation and fire safety provisions for given building 5. Evaluate building service selections for safety, sustainability, and usability 6. Create a comprehensive 3D model of a building using REVIT platform							
Course Content:								
Module 1	Introduction to Building services	Assignment	Data Collection	08 Sessions				
Topics: Basics of building services, Types of buildings, Classification and types of building services. Apply various types of services as per needs of building. Lighting - Natural and artificial lighting, Principles and factors, Lighting provisions as per NBC Ventilation - Natural and Mechanical. Principles and factors to be considered in the design of Ventilation.								
Module 2	Electrical and Water services	Assignment	Data Collection	12 Sessions				
Topics: Cold and Hot water distribution system, Electrical services in the building per NBC, Prepare electrical services requirement and Layout of a given building (Eg. Residence, small workshop, showroom, school building)								
Module 3	Vertical transportation and Fire safety	Assignment	Data Collection	10 Sessions				
Topics: Types of Elevators / Lifts, Design Considerations, Location, Sizes as per NBC 2016, Types of Escalators, Types of Conveyors, Fire Safety – Materials and Systems / Services, Fire escape, Lightning protection								
List of Laboratory Tasks: 1. Overview of the Lab 2. Creating a commercial building 3. Creating a residential building								

Targeted Application & Tools that can be used: Application area is Construction works of residential and commercial projects, Construction companies. Professionally used software: Revit software tool for BIM.	
Textbooks: T1. T.W. MEVER, "<i>Building Services Design</i>". T2. Faye C. McQuiston and Jerald D, "<i>Heating Ventilating and Air Conditioning Analysis and Design</i>", Parker. T3. H.L. MALHOTRA, "<i>Design of fire resisting structures</i>". T4. D.DRYSDALE, "<i>An introduction to fire dynamics</i>". T5. G.C. BARNEY, "<i>Elevator technology</i>". T6. D.CAMPBELL, ALLEN & H. ROPER, "<i>Concrete Structures: Materials, Maintenance and Repair</i>".	
References: R1. "<i>Hand Book of Functional Requirements of Buildings, (SP-41 & SP- 32)</i>", Bureau of Indian Standards, BIS 1987 and 1989. R2. Markus, T.A. & Morris, E.N., (1980) "<i>Building Climate and Energy</i>", Pitman publishing limited. R3. Croome, J.D. Roberts, B.M, "<i>Air Conditioning and Ventilation of Buildings VOL-1</i>", Pergamon press. R4. F.S. MERRIT & J. AMBROSE, "<i>Building Engineering & System Design</i>". R5. SP-35 (1987): <i>Handbook of Water supply & drainage</i>-BIS R6. R. Udaykumar "A text book on Building Services " Eswar Press, ISBN-13,9788178740638, Chennai R7. Eastman, "<i>BIM Handbook: A Guide to Building Information Modeling for Owners, Managers, Designers, Engineers and Contractors</i>". R8. Allen and Edward, "<i>Fundamentals of Building Construction</i>", Wiley. R9. S. M. Patil "Building Services", Seema Publication, ISBN-13, Mumbai Revised edition. R10. Dr. B. C. Punmia "Building Construction", Laxmi Publications (P) Ltd. https://web.p.ebscohost.com/ehost/ebookviewer/ebook/ZTAwMHh3d19fMTZzMTEyN19fQU41?sid=6f5bc344-a2dd-41d3-a665-989372bd4e1f@redis&vid=9&format=EB&rid=3 https://web.p.ebscohost.com/ehost/ebookviewer/ebook/ZTAwMHh3d19fMjMyNjYyOV9fQU41?sid=6f5bc344-a2dd-41d3-a665-989372bd4e1f@redis&vid=3&format=EB&rid=1	
Weblinks: 1. https://nptel.ac.in/courses/105/107/105107156/ 2. https://nptel.ac.in/courses/124/107/124107006/	
Topics relevant to development of "SKILL DEVELOPMENT": BIM Modeling of Buildings using REVIT, Vertical transportation and Fire safety, Electrical services in the building, building services for Skill Development through Experiential Learning techniques. This is attained through assessment component mentioned in course handout.	
Catalogue prepared by	Dr. Nakul Ramanna
Recommended by the Board of Studies on	BoS No. 14 held on 30 July 2022

Date of Approval by the Academic Council	Academic Council Meeting No. 18 held on 03 August 2022
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Course Code: BCT 4501	Course Title: Construction Economics and Contract Specifications Type of Course: Program Core and Theory only		L-T-P-C	3	0	0	3
Version No.	1.1						
Course Pre-requisites	Knowledge of Construction Equipment, basic knowledge of economics						
Anti-requisites	NIL						
Course Description	The purpose of this course is to include knowledge of Construction economics is a branch of general economics. It consists of the application of the techniques and expertise of economics to the study of the construction firm, the construction process and the construction industry. The course is both conceptual and analytical in nature and needs fair knowledge of mathematics. The course develops the critical thinking for decision making and analytical skills to choose construction resources for the construction project. By participating in the course students will be able to understand the economics of construction projects, idea of decision making to make the project monitoring more efficient by understanding profit or loss.						
Course Objective	The objective of the course is to familiarize the learners with the concepts of Construction Economics and Finance and attain Employability Skills through Problem Solving methodologies.						
Course Out Comes	On successful completion of the course the students shall be able to: 1) Explain the fundamental concepts of engineering economics for comparing economic alternatives. 2) Apply equipment economics principles to describe ownership, operating costs. 3) Apply benefit-cost analysis and replacement analysis to support equipment selection decisions 4) Describe the concepts of estimates for construction projects. 5) Illustrate the contractual issues and their implications in construction projects						
Course Content:							
Module 1	Construction Economics	Assignment	Data Collection	13 Sessions			
Topics: Engineering economics: Basic principles – Time value of money, Quantifying alternatives for decision making, Cash flow diagrams, Equivalence- Single payment in the future, Present payment compared to uniform series payments, Future payment compared to uniform series payments, Comparison of alternatives: Present, future and annual worth method of comparing alternatives, Rate of return							
Module 2	Equipment economics	Case Study	Data Collection	16 Sessions			
Topics: Equipment costs, Ownership and operating costs, Buy/Rent/Lease options, Replacement analysis. Depreciation, Inflation and Taxes. Benefit-cost analysis.							
Module 3	Estimate & Contract Changes	Case Study	Data Collection	16 Sessions			
Topics: Types of Estimates, Approximate estimates – Unit estimate, Factor estimate, parametric estimate and Life cycle cost. Breach of the Contract, Contract Changes and Construction Contract Claims and							

Dispute Resolution.	
Targeted Application & Tools that can be used: Applicable in project management, resource management, project planning	
Text Book 1. Blank, L. T. and Tarquin, A. J., "Engineering Economy", Fourth Edition, WCB/McGraw-Hill, 1998. 2. Collier, Kieth, "Managing Construction Contracts".	
References 1. K N Jha, "Construction Project Management", Second edition, Pearson. 2. S. Ranaga Rao, "Contract Management and Dispute Resolutions", Engineering staff College of India, January 2008. https://web.p.ebscohost.com/ehost/ebookviewer/ebook/ZTAwMHh3d19fMjE5NjI0NF9fQU41?sid=6f5bc344-a2dd-41d3-a665-989372bd4e1f@redis&vid=16&format=EB&rid=10 https://web.p.ebscohost.com/ehost/ebookviewer/ebook/ZTAwMHh3d19fMTM1MzI5NI9fQU41?sid=6f5bc344-a2dd-41d3-a665-989372bd4e1f@redis&vid=23&format=EB&rid=2	
Web links: https://onlinecourses.nptel.ac.in/noc21_ce16/preview https://onlinecourses.nptel.ac.in/noc22_mg55/preview https://nptel.ac.in/courses/110/105/110105094/	
Topics relevant to "Skill Development": Quantifying alternatives for decision making, Incremental rate of return, Break-even comparisons. Comparing alternatives for Skill Development through Problem Solving methodologies. This is attained through assessment component mentioned in course handout.	
Catalogue prepared by	Dr. Blesson S
Recommended by the Board of Studies on	BoS No. 12 held on 07 August 2021
Date of Approval by the Academic Council	Academic Council Meeting No. 16 held on 23 October 2021

Course Code: BCT 4005	Course Title: Construction Demolition and Waste Management Type of Course: Department Elective and Theory only	L-T-P-C	3	0	0	3
Version No.	1.1					
Course Pre-requisites	CIV2001- Sustainability concepts in engineering					
Anti-requisites	NIL					
Course Description	This course provides insights about the latest technological advancements in construction demolition and subsequent waste management concepts. It deals with issues such as the regulatory framework, government policy, waste management, processing, recovery, and the supply network, recycling opportunities, sustainable ways forward and the sustainable economy.					
Course Objective	The objective of the course is to familiarize the learners with the concepts of Water Infrastructure Systems and attain Skill Development through Problem Solving methodologies.					
Course Outcomes	On successful completion of the course the students shall be able to: 1) Recognize the current trends and challenges associated with C&D waste across Indian cities. 2) Illustrate the environmental and economic importance of recycling and reusing C&D waste. 3) Choose the sustainable models and best practices for effective C&D waste management 4) Examine transportation, processing, utilization, resource and energy recovery of C&D waste. 5) Infer the technological interventions to improve efficiency and sustainability in C&D waste management					
Course Content:						
Module 1	Introduction to C and D waste	Assignment	Data Collection/ Programming	14 Sessions		
Topics: Construction and demolition waste: Concepts, Challenges, Evolution of construction waste; Categories of construction wastes. C&D waste management Rules in India, C&D Waste Management Rules, 2016. Estimation of C&D waste across Indian cities. Participatory Planning Process and Policies, Programmes and Legislation Methods, role of stakeholders, Related Acts, Policies and Programs at various levels.						
Module 2	C and D waste management	Assignment	Programming	15 Sessions		
Topics: Indian Construction Industry: Overview, Past, Present and future. Hierarchy in waste management, Importance of recycling C & D Wastes, Sustainable Model on C & D waste management, Generation, Collection, Transportation and Disposal of C&D waste. Estimation of the						

generation of C&D waste by various methods. Existing collection methods, Technological interventions.

Module 3	C & D Waste processing and utilisation technology	Minor project	Data Collection/ Analysis	16 Sessions
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Topics:
Processing and Utilisation of C&D waste, Transport, Energy/ Utilities, protection of the environment and safety. Existing practices requiring changes with changing practices, technology. Secondary Construction Materials from C&D waste. Utilisation of processed C&D waste. Elements of Tendering, Environmental Management of C & D Wastes

Targeted Application & Tools that can be used:

Application areas: Decision Support for Inventorisation of C&D, Processing and Utilisation of C&D waste in urban area

Professionally used software/Platform: MATLAB/GIS/Python/IoT

Text Books

Advances in Construction and Demolition Waste Recycling Management, Processing and Environmental Assessment A volume in Woodhead Publishing Series in Civil and Structural Engineering

Sustainable Waste Management and Recycling: Construction Demolition Waste.

Mukesh C. Limbachiya and John J. Roberts, Default Book Series. September 2004

References

"Guidelines on Environmental Management of Construction & Demolition (C & D) Wastes",
CENTRAL POLLUTION CONTROL BOARD (Ministry of Environment, Forests & Climate Change), 2017.

Additional web-based resources

1.<https://nptel.ac.in/courses/105/105/105105160/>

2.https://presiuniv.knimbus.com/user#/viewDetail?searchResultType=ECATALOGUE_BA SED&unique_id=DOAB_1_06082022_16429

Topics relevant to development of "Employability Skills": Inventorisation of C&D waste in urban area, Processing and Utilization of C&D waste for developing **Employability Skills** through **Participative Learning techniques. This is attained through assessment component mentioned in course handout**

Catalogue prepared by	Dr. Venkatesha Raju K
Recommended by the Board of Studies on	BoS No. 11 held on 05 September 2020
Date of Approval by the Academic Council	Academic Council Meeting No. 13 held on 06 November 2020

Course Code: BCT4006	Course Title: Mechanization in Construction Type of Course: Discipline Elective and Theory only		L-T-P-C	3	0	0	3
Version No.	1.2						
Course Pre-requisites	NIL						
Anti-requisites	NIL						
Course Description	This course deals with different construction methods and its applications in various fields of civil engineering. The purpose of the course is to identify the latest construction techniques and its importance in creating smarter and more durable structures in less duration of time. This course is conceptual in nature and presents new opportunities of growth in the construction field. The course provides highlights about advanced construction techniques such as Box pushing and Trenchless technology used in tunnelling and pipe laying respectively that can be beneficial at subsurface level projects. The course also talks about the safety and environmental issues in mechanization.						
Course Objective	The objective of the course is to familiarize the learners with the concepts of Mechanization in Construction and attain Skill Development through Participative Learning Techniques.						
Course Out Comes	On successful completion of the course the students shall be able to: 1) Explain the advantages, limitations, and applicability of mechanization in construction projects. 2) Choose appropriate construction equipment for given site conditions and constraints. 3) Determine the suitability of precast and modular construction systems for a given project. 4) Choose suitable trenchless or pile driving methods for specified subsurface construction scenarios. 5) Compare drilling methods and equipment for tunneling and excavation works. 6) Apply concepts of robotics, drones, automation, and tower cranes to select suitable technologies for given construction scenarios.						
Course Content:							
Module 1	Introduction to Mechanization	Assignment	Case study	14 Sessions			
Topics: Definition, advantages and limitation of mechanization. Indian and Global Scenario. Factors involved in Renting, Leasing and purchase of a machinery, Specifications for ordering a machinery/equipment. Commonly used construction equipment and their uses. Reasons behind the deterioration of Machinery/Equipment and their Preventive measures. Mechanization in aggregate manufacturing: Selection of crushing equipment, crushing and screen plant- Stone Crushers, jaw crushers, impact crushers, roll crushers, cone crushers, and gyratory crushers. Mechanization in rebar fabrication, Mechanization in concrete production and placement, Concrete mixers, concrete batching and mixing plant- concreting, pumping, vibrators.							
Module 2	Latest Techniques in Surface and Sub-surface Construction	Case Study	Data Collection and Analysis	12 Sessions			
Topics:							

Mechanization through Construction technologies: -Precast Flat Panel System, 3D Volumetric Modules, Flat Slabs, Precast Cladding Panels, Concrete Wall and Floors, Twin Wall Technology, Precast Concrete Foundation, Concrete Formwork Insulation. Subsurface Construction Techniques:- Box pushing technology for tunneling, Trenchless technology and Pile driving techniques-Pile hammers, selecting a pile hammer, energy loss due to impact and due to causes other than impact.				
Module 3	Drilling, Blasting and Securing of Tunnels	Assignment	Data Collection and Analysis	10 Sessions
Topics: Mechanization through methods of Drilling, Blasting and Tunneling:- Definition of terms, selecting the drilling method and equipment; Different drilling patterns-selecting drilling pattern. Tower Cranes- Types of Tower cranes-Selection, erection and operation of tower cranes				
Module 4	Robotics and Automated systems in Construction	Case Study	Seminars	9 Sessions
Topics: On – site Automated and Robotic systems: Single task construction robots (STCRs) for bricklaying, steel-truss assembly, steel welding, façade installation, wall painting, concrete laying, etc., Swarms and robots for building component assembly, Drones or Terrestrial, aerial or nautical vehicles (Piloted or autonomous), Impact and Opportunities of automation in Construction. Exoskeletons- Purpose, Types of Construction Exoskeletons, Functions, Benefits, Practical implications. Assignment: Enquire about the latest techniques in Construction using Robotics and Automation				
Targeted Application & Tools that can be used: Infrastructure projects such as tunnels, underground passages below railways, large scale project foundations etc Tools used: - HDD Software for Trenchless technology – Drillers toolbox software				
Text Book: T1. Mahesh Varma, <i>Construction Equipment and its Planning and Applications</i> , Metropolitan Book Co. (P) Ltd., New Delhi. India. T2. Sharma S.C., <i>Construction Equipment and Management</i> , Khanna Publishers, Delhi, 1988. T3. Arora S. P and Bindra S. P, <i>A Text Book of Building Construction</i> , Dhanpat Rai Publication, New Delhi, 2013.				
References: R1: Sharma & Kaul, "Building Construction", S. Chand & Company Pvt, New Delhi, 1998 R2: Varghese P.C, Building Constructions, Prentice Hall. R3: Feng Han et al,, "Application of Energy-Concentrated Hydraulic Blasting Technology in Tunnel Construction in China", May 2022 (https://doi.org/10.1155/2022/4724343) R4: James F Russell, "Construction Equipment", Prentice Hall. Weblinks: https://rdso.indianrailways.gov.in/works/uploads/File/WKS-R-1.pdf https://onlinecourses.nptel.ac.in/noc21_ce21/preview E-Books: Concrete Formwork Systems https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=11532&site=ehost-live Beyond Mechanization: Work and Technology in a Postindustrial Age https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=50417&site=ehost-live Robotics and Automated Production Lines https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=1281530&site=ehost-live&ebv=EB&ppid=pp_a				
Topics relevant to the development of "Employability Skills": Mechanization through methods of Drilling, Blasting and Tunneling Box pushing technology for tunneling, Trenchless				

technology and Pile driving techniques for Employability Skills through Participative Learning techniques. This is attained through assessment component mentioned in course handout.	
Catalogue prepared by	Mr. Gopalakrishnan N
Recommended by the Board of Studies on	BoS No. 12 held on 07 August 2021
Date of Approval by the Academic Council	Academic Council Meeting No. 16 held on 23 October 2021

Course Code: BCT4007	Course Title: Pre- Engineered Construction		L-T-P-C	3	0	0	3
Version No.	1.1						
Course Pre-requisites	Basics of precast building components and materials.						
Anti-requisites	NIL						
Course Description	This course deals with the pre-fabrication and to develop the basic abilities of modular coordination. The course is more of conceptual in nature and needs fair knowledge of building components. The course develops the critical thinking and conceptual knowledge on precast construction. By participating in this course student can understand the significance of prefabrication in construction industry with all its advantages over conventional technique for building huge repetitive construction project. Student can have an ideology of pre-engineered buildings (PEB) and can design for the suitable application that will help student to apply the knowledge of standardization in field of steel and concrete prefab industry. They can even describe about the new trends in prefab such as segmental construction, bridge and flyover construction using precast segments.						
Course Objective	The objective of the course is to familiarize the learners with the concepts of Pre-Engineered Construction and attain <u>Employability Skills</u> through <u>Participative Learning techniques</u> .						
Course Outcomes	On successful completion of the course the students shall be able to: 1) Describe principles and components of prefabricated structures. 2) Choose different prefabricated elements based on the project requirement. 3) Apply the knowledge of design, production and hoisting technology of prefabricated member.						
Course Content:							
Module 1	General Principles of Prefabrication	Assignment	Data Collection	12 Sessions			
Topics: Introduction, Comparison with monolithic construction – Types of prefabrication – site and plant prefabrication, Economy of prefabrication, different types of stresses acting on the structures while lifting the prefabricated structures: Modular coordination – Standardization – Planning for Components of prefabricated structures – planning and handling of simple rectangular beams and I beams – Handling and erection, Pre-Engineered Buildings Vs Conventional Steel Buildings							
Module 2	Prefabricated Elements	Case Study	Data Collection	12 Sessions			
Topics: Roof and floor panels, ribbed floor panels – wall panels – footings – Joints for different structural Connections – Effective sealing of joints for water proofing–Expansion joints in pre-cast construction. Precast units –Purlins, Principal rafters, roof trusses, lattice girders, gable frames – Foundation, Floor, Wall, Stairs							
Module 3	Production Technology	Case Study	Data Collection	12 Sessions			

Topics:

Choice of production setup – Stationary and mobile production – Planning of production setup – Storage of precast elements – Dimensional tolerances – Acceleration of concrete hardening. Precast sandwich Panels, Prestressed concrete solid flat slabs, Hollow core slab/panels, Prestressed concrete Double “T”, Precast segmental Box Girders, Specifications and Seismic considerations. Equipment for hoisting and erection, Vacuum lifting pads. Application of Mechanisation in PEB

Text Book

1. L. Mokka, “Prefabricated Concrete for Industrial and Public Structures”, Publishing House of the Hungarian Academy of Sciences, Budapest, 2017.
2. Marta Serrats, “PreFab Houses Design”, 2012.

References

1. T. Koncz, “Manual of Precast Concrete Construction”, Vol. I, II, III & IV, Berlin, 1971.
2. B. Lewicki, “Building with Large Prefabricates”, Elsevier Publishing Company, Amsterdam, London, New York, 1998.
3. Betor Verlag, “Structural Design Manual, Precast Concrete Connection Details”, Society for the Studies in the use of Precast Concrete, Netherland, 2009.
4. Hass, A.M, “Precast concrete design and Applications”, Applied Science Publishers, 1983.

Weblink:

1. <https://nptel.ac.in/courses/105/106/105106113/>
2. <https://web.p.ebscohost.com/ehost/ebookviewer/ebook/ZTAwMHh3d19fMTIzODQ0N19fQU41?sid=b81e2543-0496-424e-81ee-1a83bb5ff548@redis&vid=9&format=EB&rid=3>
3. <https://web.p.ebscohost.com/ehost/resultsadvanced?vid=7&sid=b81e2543-0496-424e-81ee-1a83bb5ff548%40redis&bquery=Prefabricated+Concrete&bdata=JmRiPWUwMDB4d3cmdHlwZT0xJnNIYXJjaE1vZGU9U3RhbmRhcmQmc2l0ZT1laG9zdC1saXZl>
4. <https://web.p.ebscohost.com/ehost/resultsadvanced?vid=4&sid=b81e2543-0496-424e-81ee-1a83bb5ff548%40redis&bquery=pre-engineered+construction&bdata=JmRiPWUwMDB4d3cmdHlwZT0xJnNIYXJjaE1vZGU9UmVsZXZhbmN5JnNpdGU9ZWVhvc3QtbGl2ZQ%3d%3d>

Topics relevant to development of “Employability”: Modular coordination, Standardization. Production and Hoisting Technology of pre-engineered building members for developing **Employability Skills** through **Participative Learning techniques**. This is attained through **assessment component mentioned in course handout**.

Catalogue prepared by	Mrs. Sowmyashree T
Recommended by the Board of Studies on	BoS No. 14 held on 30 July 2022
Date of Approval by the Academic Council	Academic Council Meeting No. 18 held on 03 August 2022

Course Code: BCT5001	Course Title: Retrofitting and Repair Techniques Type of Course: Discipline Elective & Theory only			L-T-P-C	3	0	0	3
Version No.	1.1							
Course Pre-requisites	Basic knowledge of Concrete technology and Building Materials.							
Anti-requisites	NIL							
Course Description	This course deals with the methods of assessing the deterioration mechanisms, management of repairs of concrete structures, investigative methods and causes of deterioration and durability aspects, condition survey & non-destructive evaluation, various aspects of non-destructive, partially-destructive tools to assess the condition of the structures. Guidelines on selecting repair materials and related specifications of commonly used repair items, rehabilitation and retrofitting methods, typical practices for near-surface repair, corrosion protection, structural strengthening, guidelines for framing terms and conditions for retrofitting will be discussed in detail.							
Course Objective	The objective of the course is to familiarize the learners with the concepts of Retrofitting and Repair Techniques and attain Employability Skills through Participative Learning techniques .							
Course Outcomes	On successful completion of the course the students shall be able to: 1. Describe the cause(s) for deterioration of structures. 2. Explain the Non-Destructive Test (NDT) methods available for conditional field assessment of a structure 3. Choose repair material(s) to retrofit a deficient member. 4. Demonstrate appropriate method for retrofitting a distressed structure.							
Course Content:								
Module 1	Causes for deterioration, Inspection and NDT of structures	Assignment	Data collection, Case study on application of NDT and Data analysis	10 Classes				
Topics: Introduction – Physical causes, Causes of distress in concrete structures, types of failure in concrete structures, concrete defects, durability aspects, distress identification and repair management - Causes of distress in concrete structures - Holistic Models for deterioration of concrete. Condition Survey- Definition, objectives, different stages - Preliminary inspection, planning stage, visual inspection, field and laboratory testing. Non-Destructive evaluation tests - Concrete strength assessment- Rebound hammer test - Ultrasonic pulse velocity tests, penetration resistance, pull out tests, core sampling and testing - Chemical Tests - Carbonation and chloride content, Corrosion potential assessment- cover meter survey, half-cell potentiometer test, resistivity measurement, Evaluation of reserve strength of existing structures.								
Module 2	Repair Materials	Assignment	Theory based question	7 Classes				
Topics: Selection of repair materials for concrete - performance requirements of repair systems, Strength and durability aspects, cost and suitability aspects, Materials for repair - Premixed cement concrete and mortars, polymer modified mortars and concrete, epoxy systems including epoxy mortars and concrete, polyester resins, coatings.								
Module 3	Repair Methods	Assignment	Case study on RCC jacketing techniques	10 Classes				
Topics								

Repair methods - Chemical and electrochemical method of repair, Guniting, shotcreting, Resin/polymer modified slurry injection, polymer concrete system, reinforcement replacement, plate bonding technique, polymer and epoxy overlays, fiber-wrap technique, ferrocement jacketing, RCC jacketing, propping and supporting, foundation rehabilitation methods, NSM method. Guidelines for framing terms and conditions for repair and rehabilitation works contracts - engagement of consultants, contractors, execution of work, post repair inspection.				
Module 4	Retrofitting Techniques	Assignment	Article review on recent retrofitting techniques from E-Resources	9 Classes
Need for retrofitting, Design philosophy of strengthening structures, strengthening of existing structures; Techniques available for strengthening including conventional and innovative techniques. Repairs to overcome low member strength, deflection, cracking, chemical disruption, weathering, wear, fire, leakage, marine exposure. Seismic retrofit of concrete structures: Local & global deficiencies in structure requiring seismic retrofit, Design philosophy, Techniques to enhance the seismic resistance of structures.				
Targeted Application & Tools that can be used: The Course enables the students to identify the cause of deterioration and distress in the structures. Use of appropriate NDT equipment for obtaining the data such as reserve strength and corrosion penetration and estimation of extent of chemical attack. The course also enables the students to choose an appropriate material for repair of structures and suitable methods of strengthening the structures.				
Text Books: 1. "CPWD Handbook on Repair and Rehabilitation of RCC buildings", Govt of India Press, New Delhi, 2002. 2. R.N. Raika, "Learning from failures - Deficiencies in Design, Construction and Service" Rand Centre (SDCPL), Raikar Bhavan, Bombay, 1987 3. Dr. B. Vidivelli, "Rehabilitation of Concrete Structures", Standard Publishers, 2009.				
References 1. Santhakumar A.R., "Concrete Technology" Oxford University Press, New Delhi, 2007 2. J.G. Teng, J.F. Chen, S.T. Smith, L. Lam, "FRP: Strengthened RC Structures", Wiley Publications. 3. 440.2R-10/17: Guide for the Design and Construction of Externally Bonded FRP Systems for Strengthening Concrete Structures.				
Web and E-Resources 1. Michaela Kostelecká, "Rehabilitation and Reconstruction of Buildings", Trans Tech Publications Ltd. 2018 https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=1884051&site=ehost-live 2. https://nptel.ac.in/courses/105/106/105106202/ 3. https://nptel.ac.in/courses/105/105/105105213/ 4. https://onlinecourses.nptel.ac.in/noc20_ce26/preview				
Topics related to Employability: NDT tests, Selection of suitable materials for repairs, Methods of repair, Retrofitting/Jacketing techniques for developing Employability Skills through Participative Learning techniques. This is attained through assessment component mentioned in course handout.				
Catalogue prepared by	Dr. Nakul R/ Mr. Gopalakrishnan N			
Recommended by the Board of Studies on	BoS No. 14 held on 30 July 2022			
Date of Approval by	Academic Council Meeting No. 18 held on 03 August 2022			

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Course Code: BCT4008	Course Title: Formwork and Scaffolding Design Type of Course: Discipline Elective / Theory only		L-T-P-C	3	0	0	3
Version No.	1.2						
Course Pre-requisites	Nil						
Anti-requisites	NIL						
Course Description	The course deals with the importance of Formwork management in civil engineering and covers the basics of formwork design and scaffolding design for construction projects. The course is both conceptual and analytical in nature and needs fair knowledge of Construction techniques. The course develops the critical thinking and basic skills required for a project in charge. The course also enhances the analytical skills through assignments and usage of case studies.						
Course Objective	The objective of the course is to familiarize the learners with the concepts of Formwork and Scaffolding Design and attain Employability Skills through Problem Solving methodologies.						
Course Outcomes	On successful completion of the course the students shall be able to: 1) Identify various formwork and scaffolding used in construction. 2) Articulate the design concepts for formwork and scaffolding. 3) Recognize modern and special formworks. 4) Interpret the safety requirements in design and erection of formwork.						
Course Content:							
Module 1	Introduction to Formwork	Assignment	Data collection and analysis	8 Sessions			
Topics: Introduction: Formwork and false work, Temporary work systems, Construction planning and site constraints, Materials and construction of the common formwork and false work systems, Special and proprietary forms. Formwork Materials, Shoring Towers, and Scaffolds.							
Module 2	Formwork Design	Assignment	Data Collection and Analysis	8 Sessions			
Topics: Conventional and Proprietary (timber and steel) Formwork Design: Foundation, Wall, Column, Slab and Beam formworks. Design of Decks and False works. Effects of various loads. Loading and moment of formwork, IS Code provisions.							
Module 3	Introduction to special formwork and safety in formwork	Assignment	Case studies	6 Sessions			
Topics: Flying Formworks such as Table Forms, Tunnel Formwork System, Column Mounted Shoring System, Gang Forms, Slip form, Formwork for Precast Concrete. Formwork Failure, Construction Sequence and Safety in use of Formwork.							
Module 4	Proprietary formwork systems and components	Case Study	Seminars	8 Sessions			
Topics:							

Formwork systems from PERI- its specifications and applications: Slab formwork systems, wall formwork systems; Aluminium formwork systems from MIVAN- advantages, disadvantages and Economics of aluminium formwork.	
Targeted Application and Tools used: All civil engineering construction of buildings, bridges and other infrastructure. Professionally used software: ArchiCAD, Autodesk Revit	
Text Book T1 Jha, K.N., " <i>Formwork for Concrete Structures</i> ", First Edition, McGraw Hill. 2012 T2 Austin, C.K., " <i>Formwork for concrete</i> ", Cleaver - Hume Press Ltd., London, 1996 T3 Michael P. Hurst, " <i>Construction Press</i> ", London and New York., 2003	
References R1 Robert L. Peurifoy and Garold D. Oberiender, " <i>Formwork for Concrete Structures</i> ", McGrawHill, 1996. R2 Tudor Dinescu and Constantin Radulescu, " <i>Slip Form Techniques</i> ", Abacus Press, Turn Bridge Wells, Kent, 2004.	
Web-based and E-Resources W1 Dr Janardan Jha and Prof S K Sinha " <i>Modern Practices in Formwork for Civil Engineering Construction Works</i> ", Laxmi Publications Pvt Ltd. https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=1227253&site=ehost-live W2 https://nptel.ac.in/courses/105/102/105102088/ W3 https://egyankosh.ac.in/bitstream/123456789/28755/1/Unit-4.pdf W4 https://web.iitd.ac.in/~bishwa/LEC_PDF_774/LEC18.pdf	
Topics relevant to the development of "Employability Skills": Conventional and Proprietary (timber and steel) Formwork Design, Formwork erection and safety for developing Employability Skills through Problem Solving methodologies. This is attained through assessment component mentioned in course handout.	
Catalogue prepared by	Mr. Ahamed Sharif/ Mrs. Sowmyashree T
Recommended by the Board of Studies on	BoS No. 14 held on 30 July 2022
Date of Approval by the Academic Council	Academic Council Meeting No. 18 held on 03 August 2022

Course Code: BCT5002	Course Title: Building Automation and 3D Printing Type of Course: Discipline Elective & Theory only		L-T-P-C	3	0	0	3
Version No.	1.1						
Course Pre-requisites	Nil						
Anti-requisites	NIL						
Course Description	The purpose of this course is to enable the students to appreciate the importance of Building automation in civil engineering and to develop the basic abilities required for understanding design, operation & application of various automation packages in Buildings. The course is both conceptual and analytical in nature and needs fair knowledge of Building services. The course develops the critical thinking and basic skills required for a project manager. The course also enhances the analytical skills through assignments and usage of case studies. This course also enables the student to understand the concept of 3D printing and its application in civil engineering. It helps the student in realizing the challenges while adopting 3D printing in civil engineering through various case studies.						
Course Objective	The objective of the course is to familiarize the learners with the concepts of Building Automation and 3D Printing and attain <u>Employability Skills</u> through <u>Participative Learning techniques</u> .						
Course Out Comes	On successful completion of the course the students shall be able to: 1) Outline the basic concepts of Building automation. 2) Summarize the various aspects of automation in building services. 3) Identify the need of integrated Building management systems. 4) Describe the basics of 3D printing and its application in civil engineering.						
Course Content:							
Module 1	Introduction to Building Automation	Assignment	Data collection and analysis	7 Sessions			
Topics: Concept and application of Building Management System (BMS) and Automation, requirements and design considerations, architecture and components of BMS. Building Automation Hardware: controllers, sensors, actuators. Communication network. Building Automation Software, Communication protocols, Building Management Systems (BMS).							
Module 2	Fire alarm system, Access control systems	Assignment	Algorithms and flowcharts	7 Sessions			
Topics: Fundamentals: What is Fire? Fire modes, History, Components, and Principles of Operation. FAS Components: Different fire sensors, smoke detectors and their types, Fire control panels, design considerations for the FA system. Design aspects and components of PA system. Access Control System: Access Components, Access control system Design. CCTV: Camera: Operation & types, Camera Selection Criteria, Camera Applications, CCTV Applications.							
Module 3	Energy Management systems and Integrated BMS	Assignment	Algorithms and flowcharts	8 Sessions			
Topics:							

Energy Management System: Energy Savings concept & methods, Lighting control, Building Efficiency improvement, Green Building (LEED) Concept & Examples. IBMS (HVAC, Fire & Security) project cycle, Project steps BMS. Verticals: Advantages & Applications of BMS, Examples Integration: IBMS, Advantages of BMS.				
Module 4	Introduction to 3D printing	Case Study	Seminars	8 Sessions
Topics: Basic concepts of 3D printing: Model visualization, Layers, Material requirement. Application of 3D printing in civil Engineering: Concept of printable buildings, Building components, advantages, limitations and scope for research.				
Targeted Application: Buildings of various application such as residential, commercial, retail, institutional etc.				
Text Book T1 Shengwei Wang, Intelligent buildings and building automation, Spon Press, 2010 T2 Intelligent Building Systems by Albert Ting-Pat So, WaiLok Chan, Kluwer Academic publisher, 3rd ed., 2012.				
References R1 Derek Clements-Croome, Intelligent Buildings: Design Management and Operation, 2004. R2 Jim Sinopoli, Smart Buildings, Spicewood Publishing, May 23, 2006. R3 Jim Sinopoli, Smart Building Systems for Architects, Owners, and Builders, Butterworth Heinemann; 1 edition, 2009.				
Web based and E-Resources W1 https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=607370&site=ehost-live W2 https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=199390&site=ehost-live				
Topics relevant to the development of “ Employability Skills ”: Fire alarm systems, Access control systems, HVAC systems, Energy Management systems, 3D printing in civil Engineering for developing Employability Skills through Participative Learning techniques. This is attained through assessment component mentioned in course handout				
Catalogue prepared by	Mr. Ahamed Sharif			
Recommended by the Board of Studies on	BoS No. 14 held on 30 July 2022			
Date of Approval by Academic Council	Academic Council Meeting No. 18 held on 03 August 2022			

Course Code: BCT4009	Course Title: Advanced Design of RC Structures Type of Course: Discipline Elective & Theory only		L-T-P-C	3	0	0	3
Version No.	1.2						
Course Pre-requisites	Strength of Materials, Structural analysis and Design of RCC Structures						
Anti-requisites	NIL						
Course Description	This course enables understanding of the concepts for designing special RC structural elements for different loading conditions. The course is both conceptual and analytical in nature which enable applying mathematical and engineering knowledge to understand the behavior of the structure. The course focuses on computing the internal forces which are required to determine the required cross-sectional dimensions and reinforcement to carry the external load or to resist the induced internal forces.						
Course Objective	The objective of the course is to familiarize the learners with the concepts of Advanced RCC Structures and attain Employability Skills through Problem Solving.						
Course Out Comes	On successful completion of the course the students shall be able to: 1. Apply advanced IS code provisions to reinforced concrete design of portal frames, flat slabs, footings, and retaining walls. 2. Analyze and design portal frames for various loading conditions and detail the reinforcement. 3. Design flat slabs using Direct Design Method with consideration for punching shear and detailing 4. Design combined footings and mat foundations by applying soil- structure interaction principles and proportioning requirements. 5. Design cantilever retaining walls with stability checks (sliding, overturning, and bearing capacity) and reinforcement detailing 6. Prepare detailed structural drawings and reinforcement layouts for execution in professional practice.						
Course Content:							
Module 1	Concepts of Limit State Design and Design concepts of Portal Frames	Assignment	Numerical problems with Software Programming		15 Sessions		
Topics: Basic concept of R.C. design and behavior of R.C members under different loading conditions. Transmission of Load path in rigid frames, Analysis of Portal frames with different end conditions and design concepts of portal frame as per BIS codal provisions.							
Module 2	Analysis and Design concepts of Flat Slab	Assignment	Numerical problems with Software Programming		10 Sessions		
Topics: Introduction, need for flat slab, general notes on flat slabs, advantages and disadvantages of flat slabs components, BIS code provisions, design methods, design for flat slabs with drops, Design of flat slabs without drops							
Module 3	Analysis and Design of Combined foundation and Mat foundation	Assignment	Numerical problems with Software Programming		10 Sessions		
Topics:							

Design of combined foundations - Introduction to combined foundations, Types of combined foundations, Design of rectangular and trapezoidal combined footings. Introduction to raft foundation, need for raft foundation-definitions, types, analysis and design of raft foundation.				
Module 4	Analysis and Design of Retaining wall	Assignment	Numerical problems with Software Programming	12 Sessions
Topics: Types of Retaining walls, Forces acting on retaining walls, stability requirement, Design of Cantilever Retaining wall, Design of Stem, Design of Toe Slab, Design of Heel Slab, Design of Shear key, Check for Shear. Reinforcement detailing. Concepts on Design of counterfort- Horizontal ties, Vertical stirrups.				
Targeted Application & Tools that can be used: The knowledge acquired by the students help in designing the structural components which are provided in Warehouses, Hangars, Factories, Large retail units etc. Flat slab will be provided in commercial buildings for longer spans and also to enhance the aesthetic appearance of the structure. The Mat and combined foundation are adopted for multistoried buildings and where soil is soft. Professionally Used Software: STAAD Pro, ETABS, MATLAB, SAP 2000 and Auto CAD Software.				
Text Book: T1. Unnikrishna Pillai and Menon "Reinforced concrete Design', Tata McGraw Hill Publishers Co. Ltd., New Delhi, 2016. T2. Varghese.P.C, "Advanced Reinforced Concrete Design", Prentice Hall of India, Second Edition, 2009				
References: R1. Purushothaman. P, "Reinforced Concrete Structural Elements: Behaviour Analysis and Design", Tata McGraw Hill, 1998. R2. Web Based Resource: NPTEL Course on "Design of Concrete Structures", Prof. J.N. Bandopadhyay https://nptel.ac.in/courses/105/105/105105104/				
E-Books: Design of Liquid Retaining Concrete Structures https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=1107599&site=ehost-live Advanced R.C.C. Design (RCC Volume- II) https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=2706885&site=ehost-live Reinforced Concrete : Design, Performance and Applications https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=1488063&site=ehost-live				
Topics relevant to development of "Employability Skills": Design concept for flat slabs with and without drops, design of portal frames, Design concept of combined footings and Mat foundation, Design concept of retaining walls for developing Employability Skills through Problem Solving methodologies. This is attained through assessment component mentioned in course handout.				
Catalogue prepared by	Dr. S.B. Anadinni			
Recommended by the Board of Studies on	14 th BOS held on 30/07/2022			
Date of Approval by the Academic Council	Academic Council Meeting No. 18, Dated 03/08/22			

Course Code: BCT5003	Course Title: Seismic Analysis and Design of Buildings Type of Course: Discipline Elective Theory Only Course			L-T-P-C	3	0	0	3
Version No.	1.0							
Course Pre-requisites	Engineering Geology, Geotechnical Engineering, Design of RCC Structural Elements, Design of Steel Structures							
Anti-requisites	NIL							
Course Description	This Course is designed to give an idea of basic seismology and its effects on structures. The objective of this course is to teach the students how to design a structure resistant to the natural force of an earthquake. The course includes basics of engineering seismology, conceptual design, linear earthquake analysis and response spectra, load combinations. The course finds its application in effective design of Reinforced Concrete Structures resistant to natural earthquake forces resulting from tectonic plate movements. Also, a glimpse into the latest seismic response control methods and retrofitting techniques will be studied							
Course Objective	The objective of the course is to familiarize the learners with the concepts of Seismic Analysis and Design of Buildings and attain Employability Skills through Problem Solving methodologies.							
Course Out Comes	On successful completion of the course the students shall be able to: 1] Apply the basic principles of structural dynamics to calculate mode shapes 2] Describe the basic concepts of engineering seismology. 3] Recognize the detrimental effects of structural irregularity on seismic performance of a structure. 4] Apply the Indian Standard code provisions for the seismic analysis of reinforced concrete structures. 5] Comprehend the various seismic response control and retrofitting concepts							
Course Content:								
Module 1	Engineering Seismology	Case Study	Case Study of any relevant past earthquake with presentation.	10 Sessions				
Topics: Causes of Earthquake – Elastic Rebound Theory, Theory of Plate Tectonics; Types of Seismic waves; Basic terms, Magnitude and intensity of Earthquake; Characteristics of Ground Motion; Classification of Earthquakes; Seismic zoning; Vertical irregularity and plan configuration problems, Conceptual Design - Building configuration – building characteristics – Quality of construction and materials.								
Module 2	Code Based Seismic Analysis Methods	Programming Assignment	Write a program to calculate base shear distribution for regular buildings using static and dynamic method.	15 Sessions				
Topics: Seismic design philosophy, Design Earthquake Loads and Load Combinations; Basic Assumptions, Methods of Elastic Analysis – Equivalent lateral force method, response spectrum method. Step-by-step Procedure for Seismic Analysis of a Multi-storeyed RC Building. Lateral Force Path; Requirements of efficient earthquake-resistant structural system, Seismic response control concepts – passive, active, semi-active and hybrid systems, Seismic evaluation and retrofitting of structures.								

Module 3	Design and detailing of RC Building Structures	Programming Assignment	Write a program to calculate core confining concrete	10 Sessions
Topics: Ductility Considerations in Earthquake Resistant Design of RC Buildings, Ductile detailing as per IS 13920: 2016, Step-by-step Procedure for Seismic Design of a Multi-storeyed RC Building. Reinforced Concrete Shear Walls: Structural behaviour, failure pattern, design and detailing.				
Targeted Application & Tools that can be used: Applied in structural engineering consultancies to provide earthquake resistant design of structures. Tools: ETABS, Staad Pro.				
Text Book 1. Pankaj Agarwal and Manish Shrikande, "Earthquake Resistant Design of Structures", Prentice Hall of India Private Ltd, New Delhi 2. Duggal S K, "Earthquake Resistant Design of Structures". Oxford University Press, New Delhi				
References 1. Anil K Chopra, "Dynamics of Structures", Pearson Education, Asia, New Delhi 2. Dr. Vinod Hosur, "Earthquake-Resistant Design of Building Structures", Wiley Precise Textbook, New Delhi 3. https://nptel.ac.in/courses/105/101/105101004/ 4. https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=2013888&site=ehost-live				
Topics relevant to development of "Employability Skills": Step-by-step Procedure for Seismic Analysis of a Multi-storeyed RC Building, Seismic response control concepts – passive, active, semi-active and hybrid systems, Seismic evaluation and retrofitting of structures. Ductile detailing as per IS 13920: 2016, Step-by-step Procedure for Seismic Design of a Multi-storeyed RC Building for developing Employability Skills through Problem Solving methodologies. This is attained through assessment component mentioned in course handout.				
Catalogue prepared by	Ms. Anju Mathew			
Recommended by the Board of Studies on	BoS No. 14 held on 30 July 2022			
Date of Approval by the Academic Council	Academic Council Meeting No. 18 held on 03 August 2022			

Course Code: BCT4011	Course Title: Elements of Pre-Stressed Concrete Structures Type of Course: Discipline Elective Theory Only Course		L-T-P-C	3	0	0	3
Version No.	1.0						
Course Pre-requisites	CIV 211 - Design of RCC Structural Elements						
Anti-requisites	NIL						
Course Description	The main objective of this course is to provide civil engineering students with the knowledge of pre-stressed concrete structures. This course is an introduction to design of pre-stressed concrete structures. It deals with the characteristics of high strength concrete and steel, basic principles of pre-stressing, pre-tensioning and post-tensioning system, analysis of section for flexure, stresses in concrete due to self-weight, normal force and bending, losses of pre-stress, deflection of pre-stressed structures, losses in pre-tensioning and post-tensioning members, design of pre-stressed concrete structures using limit state of collapse, design of end blocks and beams. This Course helps to design pre and post tensioned concrete structures used for bridges and other important places.						
Course Objective	The objective of the course is to familiarize the learners with the concepts of Elements of Pre-Stressed Concrete Structures and attain <u>Employability Skills</u> through <u>Problem Solving</u> methodologies.						
Course Out Comes	On successful completion of the course the students shall be able to: 1] Summarize the pre-stressing systems and analytical procedure involved in determining stresses and cracking moments 2] Predict losses and deflections in prestressed concrete members 3] Illustrate design principles of prestressed concrete sections under flexure and shear 4] Estimate transmission length, bond stresses, anchorage zone stress and dimensions of prestressed flexural members						
Course Content:							
Module 1	Introduction, Pre-stressing systems, Analysis of PSC Beams	Assignment	Data Analysis Task	13 Sessions			
Topics: Basic concepts of pre stressing, historical development need for high strength of steel and concrete, terminology, advantages and applications. High strength concrete and high tensile steel Tensioning device, post tensioning systems, thermo electric pre stressing, chemical pre stressing. Basic assumptions, analysis of pre-stress, resultant stresses at a section, pressure line or thrust line. Concept of load balancing, stresses in tendons, cracking moments.							
Module 2	Losses of pre-stress, Deflection, Flexural and shear strength of pre-stressed concrete members	Assignment	Data Collection	15 Sessions			
Topics: Nature of losses of pre stress, losses due to elastic deformation, loss due to shrinkage, creep, relaxation of stresses in steel, friction, anchorage slips, and total losses allowed for design, Factors influencing the deflections, Importance of control of deflection. Short-term and long-term deflections.							

Types of flexural failure, strain compatibility, code procedures, Full and partial pre-stressed sections. Principal stresses, design of section for Flexure, ultimate shear resistances, design of shear reinforcements				
Module 3	Transfer of pre-stress, Anchorage zone stresses, Design of prestressed flexural members	Assignment	Programming Task, Data Analysis Task	12 Sessions
Topics: Transmission of prestressing force by bond, transmission length, bond stresses, end zone reinforcement, and flexural bond stresses as per code practice. Stress distribution in end block, investigation of anchorage zone stresses, anchorage reinforcement. Dimensioning of flexural members, estimation of self-weight of the beam, design of pre and post tensioned beams.				
Targeted Application & Tools that can be used: Application Area is Infrastructure developing companies, Design and Construction Companies, Structural Consultancy Servicing Firms, Central and State Public Works Department. Professionally Used Software: Excel, MATLAB, SAP 2000, STAAD Pro-RCDC, ETABS, ProConcrete, PRE-Stress, RAM Concept and Auto CAD Software.				
Text Book T1. N.Krishna Raju, "Prestressed concrete", 6th Edition, Tata McGraw Publishers.				
References R1. T.Y.Lin and Ned H. Burns, "<i>Design of Pre-stressed concrete structures</i>", John Wiley and sons, New York. R2. K.U. Muthu, Ibrahim Azmi, Janardhana Maganti and Vijayanand M, "<i>Prestressed Concrete</i>", 2016, Prentice Hall India Learning.				
Web Resources: 1. https://nptel.ac.in/courses/105/106/105106118/ 2. https://presiuniv.knimbus.com/user#/viewDetail?searchResultType=ECATALOGUE_BASED&unique_id=NAP_1_4412				
Topics relevant to development of "Employability Skills": Analysis of losses of pre-stressing force in Pre-stressed concrete beams, Determination Short term and Long term deflections in Pre stressed concrete beams, Analysis and Design of Pre stressed concrete subjected to Flexure and shear for developing Employability Skills through Problem Solving methodologies. This is attained through assessment component mentioned in course handout.				
Catalogue prepared by	Ms. Anju Mathew			
Recommended by the Board of Studies on	BoS No. 14 held on 30 July 2022			
Date of Approval by the Academic Council	Academic Council Meeting No. 18 held on 03 August 2022			

Course Code: BCT4010	Course Title: Human Resource Management Type of Course: Discipline Elective and Theory only		L-T-P-C	3	0	0	3
Version No.	1.2						
Course Pre-requisites	NIL						
Anti-requisites	NIL						
Course Description	This course focuses on strategic and operational human resource management practices in construction and civil engineering projects . Emphasis is placed on managing people in project-based environments, including workforce planning, recruitment, employee relations, safety, diversity, training, and performance improvement. The course equips civil engineering students with the skills required to manage engineers, supervisors, subcontractors, and site labor effectively while improving project performance and organizational outcomes.						
Course Objective	The objective of the course is to familiarize the learners with the concepts of Human Resource Management in construction project and attain Employability Skills through Participative Learning techniques .						
Course Outcomes	On successful completion of the course the students shall be able to: 1) Explain the distinctive human resource management challenges in construction projects 2) Interpret strategic human resource management approaches adopted by construction organizations. 3) Summarize recruitment, training and development, reward, and employee relations practices in project-based construction settings. 4) Implement workforce diversity, participation, and empowerment strategies to improve engagement and inclusiveness in construction projects 5) Apply safety management, welfare, and strategic HR development practices to address emerging human resource challenges in construction						
Course Content:							
Module 1	Introduction to Human Resource Management in Civil Engineering	Assignment	Case Study	9 Sessions			
Topics: Human Resource Management: Definition, functions, and scope, Characteristics of the construction industry and project-based work, Human resource challenges in construction projects, Role of project managers in HRM, Workforce mobility, labour market issues, and project environments, HRM as a driver of project and organizational performance							
Module 2	Management Theory and Strategic HRM in Construction	Assignment	Case Study	8 Sessions			
Topics: Evolution of management and organizational theory, Strategic Human Resource Management (SHRM) concepts, HRM vs personnel management in construction, Strategic HR planning for construction organizations, Aligning HR strategy with business and project objectives							
Module 3	Resourcing, Development, Reward, and Employee Relations	Assignment	Case study	8 Sessions			
Topics: Workforce resourcing and recruitment in construction, Training, development, and reward management, Employee relations, trade unions, and collective bargaining, Subcontracting and self-employment issues, and communication in construction project teams							
Module 4	Workforce Diversity, Participation, and Empowerment	Assignment	Seminars	10 Sessions			

Topics: Employee participation and empowerment in construction, Workforce diversity and equal opportunity, Gender, inclusion, and multicultural workforce issues, Work-life balance in project environments, Organizational culture and employee engagement				
Module 5	Health, Safety, Welfare, and Strategic HR Development	Assignment	Seminars	10 Sessions
Topics: Occupational health and safety in construction projects, Safety management systems and human error, Employee welfare and well-being, Strategic human resource development (SHRD), Future HRM challenges in construction				
Targeted Application & Tools that can be used: HR Cloud that enables businesses to create, modify and manage HR processes in an efficient way Tools used: - • HRMS tools for construction workforce management • Digital tools for attendance, payroll, and site labor monitoring • Performance and compliance tracking systems used in construction firms				
Text Book: T1. Loosemore, M., Dainty, A., & Lingard, H., <i>Human Resource Management in Construction Projects: Strategic and Operational Approaches</i>, Spon Press, 2003. T2. Mondy RW, Martocchio JJ, <i>Human Resource Management (14th edition)</i>. New Delhi: Pearson education, 2016.				
References: R1. Gujrati, R. (2025). Human Resource Management Practices in Construction Projects. In: Bajaj, D. (eds) <i>Handbook of Construction Project Management</i>. Springer, Singapore. https://doi.org/10.1007/978-981-96-7631-6_34 R2. Mullins, L. J., <i>Management and Organisational Behaviour</i>, Pearson. R3. Lingard, H., <i>Occupational Health and Safety in Construction Projects</i>, Routledge. Weblinks: https://onlinecourses.nptel.ac.in/noc20_mg15/preview https://onlinecourses.swayam2.ac.in/cec21_mg06/preview E-BOOKS: 1. UGC NET/SET DIGEST : HUMAN RESOURCE MANAGEMENT https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=1941689&site=ehost-live 2. Strategic Human Resource Development https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=251415&site=ehost-live 3. Electronic HRM in the Smart Era https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=1429379&site=ehost-live				
Topics relevant to the development of “Employability Skills”: Construction workforce planning, project leadership, safety management, employee relations, communication, and ethical people management by developing Employability Skills through Participative Learning techniques. This is attained through assessment component mentioned in course handout.				
Catalogue prepared by	Dr. Blesson S			
Recommended by the Board of Studies on	21 st BOS held on 24/12/2025			
Date of Approval by the Academic Council	Academic Council Meeting No. 128, Dated 29-12-2025			

Course Code: BCT4013	Course Title: Applications of Remote Sensing and GIS in Construction		L-T-P-C	1	0	4	3
	Type of Course: 1] Discipline Elective 2] Theory Integrated						
Version No.	1						
Course Pre-requisites	Fundamental knowledge of Surveying CIV2101						
Anti-requisites	NIL						
Course Description	This course introduces the principles of UAV structure, flight dynamics, and remote sensing techniques as essential tools for addressing challenges in civil engineering and construction. Students will learn the anatomy of drones, UAV frame types, propulsion systems, flight controllers, batteries, sensors, and communication modules that together influence flight performance, stability, and data acquisition. The course also covers UAV surveying methods and the foundational concepts of satellite remote sensing, enabling accurate terrain modelling, site monitoring, land-use assessment, and infrastructure mapping. By integrating UAV-based data, satellite imagery, and GIS techniques, learners gain the ability to analyze structural health, assess building performance, track construction progress, and evaluate materials using thermal and multispectral imaging. These technologies support efficient decision-making by providing timely, precise, and accessible spatial information for applications such as urban planning, infrastructure management, new road alignment, site selection, and hazard assessment. Through hands-on exposure to sensors, telemetry, communication systems, and flight-time estimation methods, students develop skills in data acquisition, interpretation, and visualization. The course equips future engineers with advanced geospatial competencies that enhance project planning, resource optimization, monitoring efficiency, and overall sustainability in civil engineering and building construction projects.						
Course objective	The objective of the course is to familiarize the learners with the concepts of Applications of Remote Sensing and GIS in Construction and attain Employability Skills through Experiential Learning techniques.						
Course Outcomes	On successful completion of this course the students shall be able to: 1) Describe UAV and satellite remote sensing concepts, photogrammetry processes, and image interpretation methods used in engineering case studies 2) Illustrate the relationship between UAV structural configuration, propulsion system, and flight performance through numerical analysis 3) Compare photogrammetry results obtained through fixed reference points, DGPS, and elevation model variations. 4) Classify spatial data using raster and vector models to support image processing and GIS-based analysis. 5) Analyze GIS module selection and feature extraction methods in ArcGIS Pro to interpret spatial patterns and mapping results from multi-source geospatial data.						
Course Content:							
Module 1	UAV, Satellite Remote Sensing and Photogrammetric Techniques	Assignment	Data Analysis task	5 Classes			

Topics: UAV & Satellite Remote Sensing Fundamentals, Image Acquisition and Photogrammetry Workflow, Image Classification, Interpretation, and Analysis, Case Studies and GIS Integration.				
Module 2	UAV Anatomy, Flight Control, and Power Systems	Case Studies on Image Generation, Experiment	Data Creation and analysis task	5 Classes
Topics: Drone anatomy and structural configuration, UAV frame types, Advanced flight controller, Electronic speed controllers (ESC), Flight mechanics, Propulsion dynamics and propeller aerodynamics, Motor performance characteristics, Battery technologies and power management, flight time and battery capacity correlation, Transmitter/receiver				
Module 3	Digital image Processing and Introduction to Geographic Information System	Assignment, Experiment	Data Collection and Analysis	5 Classes
Topics: Introduction to digital image: Principles, stages, Image registration, enhancement, filtering, and image transformation, Basic principles, Raster and vector data, Map projection, Topology creation, Overlay analysis.				
List of Lab Task: 1. Preprocessing PPK based UAV data-Geotagging UAV images and initial analysis 2. Initial Processing of PPK based UAV Geotagged Images in Pix4D Mapper 3. Georeferencing and Calibration/ Reoptimization using Manual Tie Points/2D or 3D GCP's in Pix4D Mapper 4. Georeferencing and Calibration/ Reoptimization using 3D GCP's in Pix4D Mapper by taking reference Google Earth Pro 5. Generation of Densified Point Cloud and 3D Mesh in Pix4D Mapper 6. Generation of DSM, Orthomosaic and Contour Map in Pix4D Mapper 7. Introduction and basics of QGIS 8. Georeferencing of a satellite map or toposheets to overlay in QGIS for encroachment analysis 9. Generation of 2D Vector Contour Map and Grid Pattern Using Raster DSM Data in QGIS 10. DGPS Survey for Collection of Grid Intersection Points on Site 11. Generation of Contour Map, Longitudinal Section (LS), and Cross Section (CS) Using DGPS Data in QGIS 12. Understanding the Components of PPK-Based UAV and UAV Surveying of University Area				
Targeted Application & Tools that can be used: The benefits of UAV Remote Sensing and GIS are very real in the construction industry especially for project managers, site engineers and also clients. Planning, managing and executing the infrastructural projects in the construction industry in a new era of globalization and economic liberalization demands for new skills, approach and technology. Professionally used software: Pix4D, ARCGIS Pro / QGIS, MS Office.				
Text Books T1 Remote Sensing and GIS- Lillesand and Kiefer, John Wiley 2008. T2 Introduction to Geographic Information System – Kang-Tsung Chang, McGraw-Hill 2015 T3 Photogrammetry Essentials by Pix4D				
References 1. Remote Sensing and Geographic Information System, M. Anji Reddy, Fourth Edition, BS Publications 2. Fundamentals of Remote Sensing, George Joseph and C Jeganathan, Fourth Edition, The Orient Blackswan				

3. C. P. Lo, Albert K. W. Yeung, "Concept and Techniques of Geographic Information Systems", Second Edition, Pearson, 2016.

Web resources

<https://www.iirs.gov.in/https://bhuvan.nrsc.gov.in/>
<http://edc.usgs.gov/http://www.cr.usgs.gov/http://www.earthsat.com/>
<https://www.qislounge.com/https://www.esri.com/en-us/what-is-gis/overviewhttps://www.usgs.gov/products/data-and-tools/gis-datahttps://www.qgis.org/https://www.qgistutorials.com/>

E-resources:

<https://search.ebscohost.com/login.aspx?direct=true&db=e000xww&AN=167467&site=ehost-live>
<https://search.ebscohost.com/login.aspx?direct=true&db=e000xww&AN=1790627&site=ehost-live>

Topics related to development of "**EMPLOYABILITY**": The course provides powerful tools for understanding the past and present conditions of Earth systems and components, as well as the interplay between them. Thus, remote sensing could assist us to solve environmental problems, address and mitigate risks, and deliver skillful predictions of the future behaviors of Earth systems (natural disasters, state of oceans, atmosphere, land, vegetation, food, public health, etc.). And by translating these Earth observations into decision making, remote sensing could help mobilize actions to mitigate effects to the benefit of human race for developing **Employability Skills** through **Experiential Learning techniques**. **This is attained through assessment component mentioned in course handout.**

Catalogue prepared by	Dr. Shwetha A, Mr. Karthik MH
Recommended by the Board of Studies on	19th BoS held on 28 Dec 2024
Date of Approval by the Academic Council	Academic Council Meeting No. XX dated

Course Code: BCT4502	Course Title: Sustainable Construction Materials and Characterisation		L-T-P-C	3	0	0	3
	Type of Course: Discipline Elective and Theory only						
Version No.	1.0						
Course Pre-requisites	NIL						
Anti-requisites	NIL						
Course Description	This course provides a practical and research-oriented exploration of sustainable construction materials and the laboratory and analytical techniques used to characterise them. Beginning with foundational principles of sustainability, standards, and green-building awareness, the course moves into innovative supplementary cementitious materials and their roles in improving durability, strength, and environmental performance. The final module develops hands-on competence in material characterisation techniques from calorimetry and XRD to SEM-EDX, thermal analysis, surface area and porosity measurements—so students can interpret microstructure, performance, and life-cycle implications. Learning is driven by assignments, case studies, and data collection projects that connect theory to real-world design and research challenges.						
Course Objective	The objective of the course is to familiarise learners with the concepts of Sustainable Construction Materials and Material Characterisation techniques, and to develop employability and Practical Research Skills through Participatory Learning techniques.						
Course Out Comes	On successful completion of the course the students shall be able to: 1. Describe the basic principles of sustainability and sustainable construction. 2. Identify innovative and sustainable construction materials used in concrete. 3. Explain the properties and benefits of supplementary cementitious materials. 4. Apply material characterisation techniques to test and study sustainable construction materials. 5. Illustrate experimental data to assess the performance and sustainability of construction materials.						
Course Content:							
Module 1	Basics of Sustainability	Assignment	Memory recall and theory-based questions	7 Sessions			
Topics: Introduction to Sustainability, Principles of Sustainable Materials, Traditional vs. Modern Materials, Green Concrete Overview, Renewable Resources, Standards & Certifications (LEED, GRIHA, – awareness level)							
Module 2	Innovative and Sustainable Construction Materials	Assignment	Memory recall and theory-based questions	15 Sessions			
Topics: Introduction to sustainable construction materials, Role of supplementary cementitious materials in sustainability, Properties, production, and applications in concrete, Durability, strength, and sustainability benefit (GGBS, fly ash, Silica fume, Rice husk ash, and other Sustainable Materials)							

Module 3	Material Characterisation Techniques	Presentation	Presentation on case study using Characterisation Techniques	23 Sessions
Topics: Introduction to Micro Characterisation, Microstructure of hydrated cement paste and other types of binder, Calorimetry: types of calorimeter, heat of hydration, applications of calorimetry, X Ray Diffraction: history of XRD, diffractogram, qualitative phase analysis, application in sustainable construction materials, Thermal analysis: application of thermal analysis to study construction materials, Surface area measurement: Sampling and particle size distribution, different techniques, calculation and application, Scanning Electron Microscopy- EDX: Working principles, analysis of cementitious system, Spectroscopy techniques: FTIR and NMR Spectroscopy, Porosity and pore structure: significance of pore distribution, working of mercury intrusion porosimeter				
Targeted Application & Tools that can be used: Sustainable Construction Materials Analysis Platform that enables students to test, analyse, and evaluate innovative building materials for performance and sustainability. Tools used: – •XRD Software – Phase identification and mineral analysis. •SEM–EDX Tools – Microstructure imaging and elemental analysis. •Thermal & Calorimetry Software – Study hydration and thermal behaviour of materials. •Particle Size & Surface Area Tools – Measurement of fineness and reactivity. •Data Analysis Tools (Excel, MATLAB, Origin) – Data processing, analysis, and reporting.				
Text Book: T1. Neville, A. M., <i>Properties of Concrete</i> (5th edition). New Delhi: Pearson Education, 2011. T2. Mehta, P. K. and Monteiro, P. J. M., <i>Concrete: Microstructure, Properties and Materials</i> (4th edition). New Delhi: McGraw-Hill Education, 2014.				
References: R1. Ramezani pour, Ali Akbar and others. <i>Cement Replacement Materials: Properties, Durability, Sustainability</i>. Springer, 2014. R2. Editors, MDPI Books. <i>Supplementary Cementitious Materials in Concrete</i>. MDPI, 2022. R3. <i>Materials Characterisation Techniques</i>, S Zhang, L. Li and Ashok Kumar, CRC Press (2008). Weblinks: nptel.ac.in/courses/105106200 https://onlinecourses.nptel.ac.in/noc23_ce20/preview E-BOOKS: 1. Materials Characterization Techniques — S. Zhang, L. Li & Ashok Kumar (2008) — available via e-book retailers. https://www.vitalsource.com/products/materials-characterization-techniques-sam-zhang-lin-li-ashok-kumar-v9781040069714 2. Physical Methods for Materials Characterisation — Peter E. J. Flewitt & Robert K. Wild (3rd ed., 2017) — available as e-Book. https://www.routledge.com/Physical-Methods-for-Materials-Characterisation/Flewitt-Wild/p/book/9781482245233 3. Materials Characterization — Ramiro Pérez Campos, Antonio Contreras Cuevas, Rodrigo Esparza Muñoz (eds., 2015) — covers structural and chemical characterization methods for various materials. https://link.springer.com/book/10.1007/978-3-319-15204-2?error=server_error				
Topics relevant to the development of “Employability Skills”: Sustainable construction materials, laboratory testing and material characterisation techniques, data analysis and				

interpretation, and technical report preparation for developing employability skills through participative learning techniques. This is attained through the assessment components mentioned in the course plan.	
Catalogue prepared by	Dr. Blesson S.
Recommended by the Board of Studies on	21 st BOS held on 24/12/2025
Date of Approval by the Academic Council	Academic Council Meeting No. 128, Dated 29-12-2025

Course Code: CIV4012	Course Title: Advanced Design of Steel Structures Type of Course: Discipline Elective & Theory only		L-T-P-C	3	0	0	3
Version No.	1.1						
Course Pre-requisites	Structural analysis and Design of Structural Steel elements						
Anti-requisites	NIL						
Course Description	The objective of this course is to understand the importance of connections in steel structures and the principles of plastic analysis of structures as well as to expose to design of industrial steel structures. This course is a second level course on steel structures. It also deals with the design of structural sections for adequate fire resistance as per Indian codal provisions. The basic knowledge of structural analysis and design of steel structures will help to easily understand this course. This Course also covers the design of steel trusses for supporting the roof of industrial structures, railway stations and to design gantry girders used in factories and manufacturing industries to lift and move heavy machinery/equipment.						
Course Objectives	The objective of the course is to familiarize the learners with the concepts of Advanced Steel Design and attain Employability Skills through Problem Solving methodologies.						
Course Outcomes	On successful completion of this course the students shall be able to: 1) Design the different types of connections in steel structures 2) Understand the concept of plastic analysis of steel structure 3) Apply design principles in analysis and design industrial buildings 4) Design structural sections for adequate fire resistance						
Course Content:							
Module 1	Connections	Assignment	Numerical problems	08 Sessions			
Topics: Bearing type joints - unstiffened and stiffened seat connections - moment resisting connection of brackets-bolted and welded-semi-rigid connections.							
Module 2	Plastic Analysis	Assignment	Numerical problems	10 Sessions			
Topics: Introduction to plastic behaviour of Structural steel, Plastic theory, Plastic hinge concept, Plastic collapse load, load factor, Shape factor, Theorem of plastic collapse, Methods of Plastic analysis, conditions of plastic analysis, Plastic analysis of Beams.							
Module 3	Industrial Buildings	Assignment	Numerical problems	10 Sessions			
Topics: Industrial buildings-braced and unbraced - Gable frames with Gantry-Rigid industrial Frames-Fire-Fatigue resistant design.							
Module 4	Fire resistance	Assignment	Numerical problems	08 Sessions			
Topics: Fire resistance level, Period of Structural Adequacy, Properties of steel with temperature, Limiting Steel temperature, Protected and unprotected members, Methods of fire protection, Fire resistance ratings- Numerical Examples.							
Targeted Application & Tools that can be used:							

Application area is application of design of steel trusses and industrial buildings as per limit state of design following the Indian codal provisions and design of steel trusses for supporting the roof of industrial structures, railway stations and to design gantry girders used in factories.	
Text Books: 1 . Duggal S.K, "<i>Limit State Design of Steel Structures</i>", Tata Mac Graw Hill, New Delhi, 2010. 2. N. Subramanian "<i>Design of Steel Structures</i>"- Oxford, 2008.	
References 1 . Dayaratnam. P, "Design of Steel Structures," Chand. S, Limited, New Delhi. 2008. 2. Web Based Resource: NPTEL Course on "Design of Steel Structures II", Prof. S.R.Satish Kumar and Prof. A.R.Santha Kumar. https://nptel.ac.in/courses/105/106/105106113/ PU Web Resources: https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=691972&site=ehost-live	
Topics relevant to "Employability Skill": Design of unstiffened and stiffened seat connections, Design of industrial structures including fatigue resistance, Fire resistance of steel structures. Design of industrial structures including connections, Plastic Analysis of steel structures and usage of relevant IS codes for developing Employability Skills through Problem Solving methodologies. This is attained through assessment component mentioned in course handout.	
Catalogue prepared by	Mr. Dayalan J
Recommended by the Board of Studies on	BoS No. 13 held on 30 December 2021
Date of Approval by the Academic Council	Academic Council Meeting No. 18 held on 03 August 2022

Course Code: BCT5004	Course Title: Design Concepts of substructures Type of Course: Discipline elective Theory only		L-T-P-C	3	0	0	3
Version No.	1.1						
Course Pre-requisites	Foundation Engineering, Design of RCC and PSC Structural Elements						
Anti-requisites	NIL						
Course Description	This Course is intended to cover the various concepts of substructures and marine substructures. The students need to have a prior knowledge of Foundation engineering and Reinforced Concrete Design to pursue the Course.						
Course Objective	The objective of the course is to familiarize the learners with the concepts of Design Concepts of substructures and attain <u>Employability Skills</u> through <u>Problem Solving</u> methodologies						
Course Outcomes	On successful completion of this course the students shall be able to: 1) Study different types of foundations for sub structures 2) Recognize the importance of subsoil exploration in substructures 3) Evaluate the design parameters required for well foundation 4) Understand the bridge sub structures						
Course Content:							
Module 1	Introduction to substructures	Assignment	Collection of data of substructures	08 Sessions			
Topics: Substructures – Definition and purpose, Role of Foundation Engineer, General Requirements of Substructures, Scope, Types of Foundations, Selection of type of foundation, Basic requirements of a foundation, Terminology, computation of loads, design steps.							
Module 2	Subsoil Exploration	Assignment	Collection of subsoil exploration report	07 Sessions			
Topics: Introduction, Site investigation, In-situ testing of soils, Subsoil exploration, Classification of foundations systems. Concept of soil shear strength parameters, Settlement analysis of footings, Shallow foundations in clay, Shallow foundation in sand & C-Φ soils. In – situ methods of bearing capacity: SPT, SCPT, DCPT and Plate Bearing Tests. Footings on layered soils and sloping ground, Design for Eccentric or Moment Loads.							
Module 3	Introduction to bridge foundations	Assignment	Collection of data on bridge substructures	07 Sessions			
Topics: Discharge for design of foundations, determination of the maximum depth of scour, depth of foundation, allowable bearing pressure, loads to be considered.							
Module 4	Concepts of Well / Caisson foundations:	Case study	Data collection on Case studies on construction of well foundation	08 Sessions			
Topics: Lateral stability of well foundation, design of pier cap, design of pier and abutments, types of well foundation, sinking stresses in well							
Targeted Application & Tools that can be used: This course is emphasizing the design of sub structures used in various civil engineering structures.							

Professionally Used Software: Plaxis 2D	
Text Book: T1. Swami Saran, Analysis and Design of Substructures, Second edition, Oxford & IBH publishing co. pvt ltd. (2006) T2. V.N.S.Murthy, Advanced Foundation Engineering, CBS publishers & distributors, first edition (2007)	
References R1. Bowles, J.E. – Foundation Analysis and Design, 5th Edition, BBS Publisher, 2009. R2. Donald P Coduto – Foundation Design Principles and Practices, 2 nd edition, Pearson, Indian edition, 2012 Weblink: https://nptel.ac.in/courses/105/101/105101083/ E book link: https://puniversity.informaticsglobal.com:2229/login.aspx?direct=true&db=nlebk&AN=541555&site=ehost-live&ebv=EB&ppid=pp_Cover	
Topics relevant to “Employability Skills”: Advising on design and the suitability of substructures along with its construction materials for developing Employability Skills through Problem Solving methodologies. This is attained through assessment component mentioned in course handout.	
Catalogue prepared by	Mr. Jagdish B Biradar/Mrs. Madhavi T
Recommended by the Board of Studies on	BoS No. 12 held on 07 August 2021
Date of Approval by the Academic Council	Academic Council Meeting No. 16 held on 23 October 2021

Course Code: BCT4014	Course Title: Sustainable Smart Cities Type of Course: Open Elective and Theory only		L-T-P-C	3	0	0	3
Version No.	1						
Course Pre-requisites	NIL						
Anti-requisites	NIL						
Course Description	This course helps the students learn to identify urban problems, effective and feasible ways to coordinate urban technologies, various types of models and methods for effective implementation of smart cities concepts with new technologies for urban utilities, communication and dissemination. New forms of Urban Governance and Organization.						
Course Objectives	The objective of the course is to familiarize the learners with the concepts of Sustainable Smart Cities and attain Entrepreneurial Skills through Participative Learning techniques .						
Course Out Comes	On successful completion of the course the students shall be able to: 1. Identify the latest technology enabled systems for the management of cities. 2. Interpret the dynamic behavior of the urban system in context to physical appearance and by focusing on representations, properties and impact factors. 3. Demonstrate the urban infrastructure systems to benefit the citizens, based on smart cities concept as responsive cities.						
Course Content:							
Module 1	Urban Infrastructure	Assignment	Data Collection	14 Sessions			
Topics: Components of Urban Infrastructure, Smart City: Concepts, Benefits and Challenges, Evolution of smart city; Dimensions of smart city development; Smart City Taxonomy; Smart city documentation of GOI; Smart Cities: Mission Statement and Guidelines; Disruptive technologies for smart city; Case Study - Smart Cities Lighthouse projects.							
Module 2	Planning interventions of Urban Infrastructure	Case Study	Data Interpretation	14 Sessions			
Topics: Urban Planning; Understanding Inclusive Planning: components; process of urban consultations; urban strategic planning for smart, sustainable, biophillic and resilient cities; Smart governance; Traffic dashboards; Data cycle for dashboards; Capability Framework and Maturity Model for Smart Cities.							
Module 3	Smart Urban Infrastructure	Minor projects	Data Collection /Analysis/ Smart solutions	12 Sessions			
Topics: Innovative Approaches for Smart Cities; Perspectives: Technical infrastructure, Application domain, System integration, Data processing. Advanced Decision Support for Smart Governance; Smart mobility; Smart Living, Water supply, Sanitation, Environment and Safety, Energy, Urban disaster management.							
Targeted Application & Tools that can be used: Application areas: Decision Support for Smart Governance; city transport for all; water supply, sanitation, environment and safety, energy, urban disaster management. Professionally used software/Platform: MATLAB/GIS/Python/IoT							

Text Books

1. Joseph N. Pelton; Indu B. Singh (2018), "Smart Cities of Today and Tomorrow: Better Technology, Infrastructure and Security" publication: Copernicus; 1st ed. 2019 edition.
2. UN-Habitat; "Inclusive and sustainable urban planning: a guide for Municipalities"; Volume 3: Urban Development Planning (2007); United Nations Human Settlements Programme (ISBN: 978- 92-1-132024-4).
3. Giffinger, Rudolf; Christian Fertner; Hans Kramar; Robert Kalasek; Nataša Pichler- Milanovic; Evert Meijers (2007), "Smart cities – Ranking of European medium-sized cities". Smart Cities. Vienna: Centre of Regional Science.

References

1. "Draft Concept Note on Smart City Scheme". Government of India - Ministry of Urban Development (http://indiansmartcities.in/downloads/CONCEPT_NOTE-3.12.2014_REVISED_AND_LATEST_.pdf)
2. Kent E. Calder (2016), "Singapore Smart City, Smart State" Brookings Institution Press publication.

PU e-Library Resource

1. <https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=1586504&site=ehost-live>

Topics relevant to development of "Entrepreneurial Skills": Traffic dashboards, System integration, Data processing, Advanced Decision Support for Energy, water, waste, and disaster management for developing **Entrepreneurial Skills** through **Participative Learning techniques. This is attained through assessment component mentioned in course handout**

Catalogue prepared by	Dr. Jagdish H Godihal/ Mr. Ajay H A
Recommended by the Board of Studies on	BoS No. 12 held on 07 August 2021
Date of Approval by the Academic Council	Academic Council Meeting No. 16 held on 23 October 2021

Course Code: BCT4015	Course Title: Systems design for sustainability Type of Course: Open elective/ Theory only course	L-T-P-C	3	0	0	3
Version No.	1.1					
Course Pre-requisites	Environmental studies.					
Anti-requisites	Nil					
Course Description	The purpose of this course is to provide impetus in enhancing design thinking process among students for widening the boundaries of the objective of design so as to contribute positively to sustainable development. This course includes the Design approaches, methods and tools along with case examples with reference to Selection of resources with low environmental impact; Design of products with low environmental impact; and Product-Service System Design for eco-efficiency. This course has been designed to teach about environment, energy and economy through the use of case studies and seminars from the point of view of sustainable development and changing societal, industrial demands. Case studies provide the basis for group projects as well as individual projects. The course is theory only course.					
Course Objective	The objective of the course is to familiarize the learners with the concepts of Systems design for sustainability and attain Entrepreneurial Skills through Participative Learning techniques .					
Course Out Comes	On successful completion of the course the students shall be able to: 1) Discuss the sustainability and engineered systems for resource and energy recovery. 2) Describe the various levels of design, redesign and Sustainable water management in view of LEED requirements. 3) Explain the resource management, approaches to sustainable development and Case studies.					
Course Content:						
Module 1	Introduction	Assignment	Data collection	13 sessions		
Topics: Sustainability -Definition, Elements, The 3Es model, Problems, Solutions, Key concepts for sustainable development and measures for sustainability. Engineered systems for resource and Energy recovery - Selection of suitable energy resources and waste to energy techniques which will result in sustainability.						
Module 2	Design for environment	Assignment	Presentation on topics	15 sessions		
Topics: The various levels of design, Redesign of processes versus redesign of products to reduce impact on environment. Sustainable water management in view of LEED requirements-Water efficiency credits, Innovative wastewater technologies, Water use reduction, Storm water design(Quality and Quantity control) and LEED with respect to sustainable water systems and water quality cascade.						
Module 3	Resource management and Environment	Case Study	Data collection and interpretation	15 sessions		
Topics: Approaches in resource management: ecological approach, economic approach, ethnological approach, implications of the approaches, integrated resource management strategies, concept of sustainability science, different approach towards sustainable development and its different						

constituents, sustainability of society, resources and framework, sustainable energy strategy, principles of energy conservation. Case Studies: R and D efforts in solid by product management in SAIL, Water pollution control and disposal of wastewater in HPCL refinery, Reuse of wastewater in small paper mills etc	
Targeted Application & Tools that can be used: Application area of Systems designs for environment and sustainability is for data collection from various industries and of environment. In companies environmental sustainability engineer gets post of Sustainability specialist, environmental engineer, sustainability manager, and sustainability director etc. Professionally used software: ArcGIS.	
Text Book T1: <i>Metcalf and Eddy, "Wastewater Engineering", McGraw Hill Publication 2017.</i>	
References R1: <i>S. C. Bhatia, "Environmental pollution and control in chemical process industries", Khanna Publishers 2017.</i> Web Source: https://search.ebscohost.com/login.aspx?direct=true&db=e000xww&AN=456241&site=ehost-live	
Topics related to " Entrepreneurial Skills ": Selection of suitable energy resources and waste to energy techniques for developing Entrepreneurial Skills through Participative Learning techniques. This is attained through assessment component mentioned in course handout.	
Catalogue prepared by	Mr. Bhavan Kumar
Recommended by the Board of Studies on	BoS No. 12 held on 07 August 2021
Date of Approval by the Academic Council	Academic Council Meeting No. 16 held on 23 October 2021

Course Code: BCT4016	Course Title: Self-Sustainable Buildings Type of Course: Open Elective/ Theory based Course		L-T-P-C	3	0	0	3
Version No.	1.1						
Course Pre-requisites	1) Basic knowledge of environmental sciences with concept of sustainability. 2) Basic knowledge about different building construction materials.						
Anti-requisites	NIL						
Course Description	This course delves into various emerging delivery systems for high performance green buildings, as well as the foundational concepts for evaluating their sustainability. The course provides an overview of; introduction and definition of sustainability, carbon cycle and the role of construction materials such as concrete and steel, CO2 contribution from cement and other construction materials. It also investigates the ideas regarding indoor air quality, no/low cement concrete, recycled and manufactured aggregate, life cycle and sustainability. This is a theory based course which will give understanding of efforts that can be made at the Industry and Government level to improve the environment, the economy and the quality of life of biotic and abiotic communities etc.						
Course Objective	The objective of the course is to familiarize the learners with the concepts of Self-Sustainable Buildings and attain Entrepreneurial Skills through Participative Learning techniques .						
Course Out Comes	On successful completion of the course the students shall be able to: 1] Recognize the importance of sustainability and prepare Life Cycle Analysis. 2] Discuss the construction materials of green building and their properties. 3] Infer the performance rating of green building with zero energy to overcome harmful impacts of Indoor air pollution.						
Course Content:							
Module 1	Introduction to sustainability and life cycle analysis	Assignment	Data Collection/ Data Analysis	10 Sessions			
Topics: Sustainability - Concept and Terms, Challenges and Opportunities, Population : Impact formula, Malthusian catastrophe, Point of crisis, Neo-Malthusianism, J-curves, S-curves, Carrying capacity Embodied Energy – Concept, Components and Calculations for Building materials, Introduction to Ecological footprint. Life Cycle Analysis - Scope, Purpose, Stages; Environmental Management standards, ISO 14000 Series; Carbon Footprint, Carbon-dioxide Contribution from Construction materials; Carbon Cycle; Global Warming –Concept, Greenhouse Gases, Effects, Preventive Measures, Indian Scenario and Projections, Case Studies.							
Module 2	Green Building construction and materials	Case study	Data Interpretation/ Analysis	12 Sessions			
Topics: Introduction, Construction materials and techniques, Supplementary Cementitious material(No/Low Cement Concrete), Recycled and Manufactured Aggregates, GGBS Concrete, High performance concrete, High volume Fly ash Concrete, Geopolymer Concrete, Green Concrete, Ferro-cement concrete, Case Studies; Role of insulation and thermal properties of construction materials. Influence of moisture content.							
Module 3	Performance Rating of Green Buildings and Indoor Air Quality	Quiz	Interpretation	12 Sessions			

Topics: Introduction to Green Buildings, Role of Quality Control and durability in Green Buildings, Green Building Certifications, LEED (Leadership in Energy and Environmental Design) ,GRIHA and IGBC certifications; Zero Energy Building –Introduction, Zero Energy Buildings’ design and construction, Case Studies. Indoor Air pollution –Causes, Sources, Consequences and Health Hazards, List of pollutants and their limits, Ventilation –Types; Protocols and Environmental Agreements, Environmental Legislation in India –Air Act and Water Act. Energy sources: Basic concepts-Conventional and Non-Conventional Energy, Solar ,Wind, Bio-fuel Energy; Case Studies; Life Cycle Energy use, Control of Energy use in Buildings	
Targeted Application & Tools that can be used: [Mention here the application area of the contents of the Module and the name of any specialized professionally used tools (Like software, Hard ware, any other form of tool) relevant to the contents of the module.] Professionally Used Software: MS office, Autodesk Insight 360, Autodesk Revit, and Autodesk FormIt 360.	
Text Book T1 Charles J. Kibert, <i>Sustainable Construction: Green Building Design and Delivery</i>”, Wiley Publication. 2016. T2 K. S. Jagadeesh, B. V. Venkatarama Reddy & K. S. Nanjunda Rao, <i>Alternative building material and technology</i>, New Age International Publishers. 2017.	
References R1 Traci Rose Rider, “Understanding Green Building Guidelines: For Students and Young Professionals”, W.W Norton and Company. 2010. R2 D S Chauhan, S K Sreevastava, “Non-conventional Energy resources”, New age international publishers. 2017. Case study link: https://www.slideshare.net/vinaymandaloju/green-building-case-study-on-teribangalore E book link R1: https://web.s.ebscohost.com/ehost/detail/detail?vid=3&sid=cbc51846-7bf7-482b-8aac-fbd99ab97ee4%40redis&bdata=JnNpdGU9ZWWhvc3QtbGl2ZQ%3d%3d# E book link R1: https://web.s.ebscohost.com/ehost/detail/detail?vid=4&sid=cbc51846-7bf7-482b-8aac-fbd99ab97ee4%40redis&bdata=JnNpdGU9ZWWhvc3QtbGl2ZQ%3d%3d# Web Resources: https://nptel.ac.in/courses/105/102/105102195/ IIT Delhi Dr. B. Bhattacharjee Web Resources: https://onlinecourses.nptel.ac.in/noc19_ce40/preview_by_Prof.B.Bhattacharjee,IIT_Delhi	
Topics relevant to “ENTREPRENEURIAL SKILLS”: Life Cycle Analysis - Scope, Purpose, Stages; Environmental Management standards, ISO 14000 Series for developing Entrepreneurial Skills through Participative Learning techniques. This is attained through assessment component mentioned in course handout.	
Catalogue prepared by	Ms. Shwetha A / Dr. Venkatesh Raju
Recommended by the Board of Studies on	BoS No. 12 held on 07 August 2021
Date of Approval by the Academic Council	Academic Council Meeting No. 16 held on 23 October 2021

Course Code: CIV5004	Course Title: Energy and Buildings Type of Course: Open Elective/ Theory Course		L-T-P-C	3	0	0	3
Version No.	1.1						
Course Pre-requisites	Basic knowledge of sustainability.						
Anti-requisites	NIL						
Course Description	The purpose of the Course is providing an overview of emerging delivery systems for high performance green buildings and the basis on which their sustainability can be evaluated. There are various benefits and advantages of sustainable construction, deals with Cost Reduction, Increased productivity, Improved health, Waste minimization, better use of materials, Environmental protection, Lesser noise pollution, Higher quality of life Emerging market, and Room for experimentation. This is a theory based course which will give an idea of what is sustainable construction and its advantages etc.						
Course Objective	The objective of the course is to familiarize the learners with the concepts of Energy and Buildings and attain Entrepreneurial Skills through Participative Learning techniques .						
Course Out Comes	On successful completion of the course the students shall be able to: 1) Recognize the importance of sustainability and prepare Life Cycle Analysis. 2) Select the Green building materials for construction. 3) Explain the performance rating of green building, the harmful impact of Indoor air pollution and the Life cycle energy use.						
Course Content:							
Module 1	Introduction to sustainability and life cycle analysis	Assignment	Data Collection/ Data Analysis	10 Sessions			
Topics: Sustainability - Concept and Terms, Challenges and Opportunities, Embodied Energy – Concept, Components and Calculations for Building materials, Introduction to Ecological footprint. Life Cycle Analysis - Scope, Purpose, Stages; Environmental Management standards, ISO 14000 Series; Carbon Footprint, Carbon-dioxide Contribution from Construction materials.							
Module 2	Green Building construction and materials	Case study	Data Interpretation/ Analysis	18 Sessions			
Topics: Introduction to Green Buildings, Energy sources: Basic concepts - Conventional and Non-Conventional Energy, Solar, Wind, Bio-fuel Energy; Green building techniques. Sustainable Materials: Supplementary Cementitious Materials (No/Low Cement Concrete), Recycled and Manufactured Aggregates, GGBS Concrete, High performance concrete, High volume Fly ash Concrete, Geopolymer Concrete, Green Concrete, Ferro-cement, etc., Case Studies.							
Module 3	Performance Rating of Green Buildings and Indoor Air Quality	Quiz	Interpretation	15 Sessions			
Topics: Introduction, Role of Quality Control and durability in Green Buildings, Green Building Certifications, LEED (Leadership in Energy and Environmental Design) ,GRIHA and IGBC certifications; Zero Energy Building –Introduction, design and construction, Case Studies. Indoor Air Quality, Indoor Air pollution –Causes, Sources , Consequences and Health Hazards, List of pollutants and their limits, Ventilation –Types; Control of Energy use in Buildings-Role of insulation, thermal properties of construction materials. Influence of moisture content and modeling.							

Targeted Application & Tools that can be used: Professionally Used Software: MS office, Autodesk Insight 360, Autodesk Revit, and Autodesk FormIt 360.	
Text Book T1 Charles J. Kibert, <i>Sustainable Construction: Green Building Design and Delivery</i> ", Wiley Publication. 2016. T2 K. S. Jagadeesh, B. V. Venkatarama Reddy & K. S. Nanjunda Rao, <i>Alternative building material and technology</i> , New Age International Publishers. 2017.	
References R1 Traci Rose Rider, "Understanding Green Building Guidelines: For Students and Young Professionals", W.W Norton and Company. 2010. R2 D S Chauhan, S K Sreevastava, "Non-conventional Energy resources", New age international publishers. 2017. Web Resources: https://nptel.ac.in/courses/105/102/105102195/ Web Resources: https://onlinecourses.nptel.ac.in/noc19_ce40/preview E book link R1: https://web.s.ebscohost.com/ehost/detail/detail?vid=3&sid=cbc51846-7bf7-482b-8aac-fbd99ab97ee4%40redis&bdata=JnNpdGU9ZWWhvc3QtbGl2ZQ%3d%3d# E book link R1: https://web.s.ebscohost.com/ehost/detail/detail?vid=4&sid=cbc51846-7bf7-482b-8aac-fbd99ab97ee4%40redis&bdata=JnNpdGU9ZWWhvc3QtbGl2ZQ%3d%3d#	
Topics relevant to development of " Entrepreneurial Skills " : Regulatory bodies: GBC (Indian Green Building Council), United States Green Building Council (USGBC), TERI (The Energy and Resources Institute), Construction Site visits for developing Entrepreneurial Skills through Participative Learning techniques. This is attained through assessment component mentioned in course handout.	
Catalogue prepared by	Ms. Shwetha A / Dr. Venkatesh Raju / Dr. Jagdish Godihal
Recommended by the Board of Studies on	BoS No. 14 held on 30 July 2022
Date of Approval by the Academic Council	Academic Council Meeting No. 18 held on 03 August 2022

Course Code: RES5001	Course Title: Research Methodology Type of Course: Open Elective and Theory only		L-T-P-C	3	0	0
Version No.	1.1					
Course Pre-requisites	NIL					
Anti-requisites	NIL					
Course Description	The course will equip the candidates with the capability to select suitable research types, design research questions, and devise the research design. The aspirants will be fortified to construct their research process, identify sources and collect the data relevant to the research question. This course prepares the candidate to demonstrate the ability to review the literature and document and publish without plagiarism. Participants will be enabled to sketch the requirements of tools for creative research, analyze the data using optimization techniques, and exhibit and summarize the findings. The course also aims for the competencies needed to evaluate the results, infer scientific truth, and generate models using modern software.					
Course Objectives	This objective of the course is SKILL DEVELOPMENT by using Participative Learning techniques.					
Course Out Comes	On successful completion of the course the students shall be able to: 1. Apply the knowledge of review of literature in research problem definition 2. Analyse the methodology referring to hypothesis, strategies and approach of research 3. Develop the key the rationale for research ethics, plagiarism.					
Course Content:						
Module 1	Introduction to research methodology	Assignment	Data Collection/ Programming	12 Sessions		
Topics: Philosophy and approach to research, Research Process overview and framing research problems. Literature survey in research: Resources for information and literature, Critical review of available literature.						
Module 2	Research Hypotheses, Approach and Strategies	Case Study	Programming	16 Sessions		
Topics: Hypothesis: meaning, nature, kinds, importance, Variables, formulating etc. Approach: background, qualitative and quantitative, mixed etc. Strategies: Selection, case studies, experiments, action etc. Research documentation and presentation: Scientific writing and report writing, Tables and illustrations, Concept of a research proposal, Seminar presentation, research paper writing, cite and list literature in documents.						
Module 3	Data, Ethics, Plagiarism	Minor projects	Data Collection/ Analysis/ Smart solutions	12 Sessions		
Topics: Data Collection Methods, Interpretation, sampling methods, Ethics in research, Importance of ethics in research, plagiarism, originality in research, conflict of interest.						

Targeted Application & Tools that can be used: Application areas: Decision Support for systems problem definition, Research Hypotheses, Approach and Strategies Professionally used software/Platform: SAS / R / SPSS	
Text Books T1. "Research Methodology: Methods and Techniques", Kothari, C.R., 1990. New Age International. T2. Introducing Research Methodology: A Beginner's Guide to Doing a Research Project by Uwe Flick Second Edition, e-book	
References "How to Write and Publish a Scientific Paper", Day, R.A. Cambridge University Press, 1992. Additional web-based resources 1. https://www.classcentral.com/course/swayam-introduction-to-research-5221/course/swayam-introduction-to-research-5221 (Web) https://swayam.gov.in/nd1_noc20_ge22/preview 2. https://presiuniv.knimbus.com/user#/viewDetail?searchResultType=ECATALOGUE_BASED&unique_id=SPRINGER_OPEN_1_06082022_1083 3. https://search.ebscohost.com/login.aspx?direct=true&db=e000xww&AN=503632&site=ehost	
Topics relevant to "Skill Development": Research Hypotheses, Approach and Strategies, Data, Ethics, Plagiarism for Skill Development through Problem Solving methodologies . This is attained through assessment component mentioned in course handout.	
Catalogue prepared by	Dr. PravinthRaja
Recommended by the Board of Studies on	BoS No. 12 held on 07 August 2021
Date of Approval by the Academic Council	Academic Council Meeting No. 16 held on 23 October 2021