

Regulations and Curriculum for
Master of Technology (M. Tech.)
in
Construction Technology



(Deemed to be University under Section 3 of UGC Act, 1956)

(Placed under Category 'A' by MHRD, Govt. of India, Accredited with 'A+' Grade by NAAC)

University Enclave, Medical Sciences Complex, Deralakatte,

Mangalore – 575 018, Karnataka INDIA

Tel: +91-824-2204300/01/02/03, Fax: 91-824-2204305

Website: www.nitte.edu.in E-mail: info@nitte.edu.in

VISION

To build a humane society through excellence in the education and healthcare

MISSION

To develop

Nitte (Deemed to be University)

As a centre of excellence imparting quality education,

Generating competent, skilled manpower to face the scientific and social challenges with a high degree of credibility, integrity, ethical standards and social concern



NITTE
(Deemed to be University)

**NMAM INSTITUTE
OF TECHNOLOGY**

Off-campus Centre, Nitte (Deemed to be University)
NITTE-574110, Karkala Taluk, Udupi District, Karnataka, India

Vision Statement

Pursuing Excellence, Empowering people, Partnering in Community Development

Mission Statement

To develop N.M.A.M. Institute of Technology, Nitte, as Centre of Excellence by imparting Quality Education to generate Competent, Skilled and Humane Manpower to face emerging Scientific, Technological, Managerial and Social Challenges with Credibility, Integrity, Ethics and Social Concern.

M. Tech. Regulations and Curriculum

Batch
2022 – 2024

With Scheme of Teaching & Examination

REGULATIONS: 2022
for
M. Tech. Programs
(Academic year 2022-23)

COMMON TO ALL
M.Tech. DEGREE PROGRAMS
CHOICE BASED CREDIT SYSTEM (CBCS)

Key Information

Program Title	Master of Technology, abbreviated as M.Tech. (Construction Technology)
Short description	Two-year, four semester Choice Based Credit System (CBCS) type of Postgraduate Engineering Degree Program with English as medium of instruction
Program Code	22ENGR12D2
Revision version	2022.02 These regulations may be modified from time to time as mandated by the policies of the University. Revisions are to be recommended by the Board of Studies for Civil Engineering and approved by the Academic Council.
Effective from	12-09-2022
Approvals	<ul style="list-style-type: none">• Approved in the 50th meeting of Academic Council of NITTE (Deemed to be University), held on 30-05-2022 and vide Notification of NITTE (DU), N(DU)/REG/N-MCE/2022-23/76B dated 19-08-2022.• Notification of Nitte (DU), N(DU)/REG/AC/-SA/2022-23/909 dated 24-04-2023.
Program offered at	NMAM Institute of Technology, Nitte Off Campus centre, Nitte (Deemed to be University)
Grievance and dispute resolution	All disputes arising from this set of regulations shall be addressed to the Board of Management. The decision of the Board of Management is final and binding on all parties concerned. Further, any legal disputes arising out of this set of regulations shall be limited to jurisdiction of Courts of Mangalore only

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1. INTRODUCTION:

- 1.1 The general regulations are common to all Degree of Master of Technology Program under Outcome Based Education (OBE) and Choice Based Credit System (CBCS) conducted by Nitte (Deemed to be University), at the NMAM Institute of Technology, Nitte off Campus Centre and shall be called "Nitte (DU) Regulations for M.Tech.- 2022".
- 1.2 The provisions contained in this set of regulations govern the policies and procedures on the Registration of students, imparting instructions of course, conducting of the examination and evaluation, and certification of students' performance and all amendments thereto leading to the said degree program(s)
- 1.3 This set of Regulations, on approval by the Academic Council and Governing Council, shall supersede all the corresponding earlier sets of regulations of the M.Tech. Degree program (of Nitte (DU)) along with all the amendments thereto, and shall be binding on all students undergoing M.Tech. Degree Program (s) (Choice Based Credit System) conducted at the NMAMIT, Nitte with effect from its date of approval and is applicable for students admitted to 1st year after September 2022. This set of regulations may evolve and get modified or changed through appropriate approvals from the Academic Council / Governing Council from time to time, and shall be binding on all stake holders, (the Students, Faculty, Staff of Departments of NMAMIT, Nitte). The decision of the Academic Council/ Governing Council shall be final and binding.
- 1.4 In order to guarantee fairness and justice to the parties concerned in view of the periodic evolutionary refinements, any specific issues or matters of concern shall be addressed separately, by the appropriate authorities, as and when found necessary.
- 1.5 The Academic Council may consider any issues or matters of Concern relating to any or all the academic activities of the NMAMIT courses for appropriate action, irrespective of whether a reference is made here in this set of Regulations or otherwise.
- 1.6 The course shall be called **Master of Technology** program abbreviated as M.Tech. (subject of specialization) – Choice Based Credit System.

2. DEFINITIONS OF KEYWORDS: The following are the definitions/descriptions that have been followed for the different terms used in the Regulations of M.Tech. Programs:

- 2.1 **Program:** Is an educational program in a particular stream/branch of Engineering/branch of specialization leading to award of Degree. It involves events/activities, comprising of lectures/ tutorials/ laboratory work/ field work, outreach activities/ project work/ vocational training/ viva/ seminars/ Internship/ assignments/ presentations/ self-study etc., or a combination of some of these.
- 2.2 **Branch:** Means Specialization or discipline of M. Tech Degree Program, like Electrical Vehicle Technology, Structural Engineering, Machine Design, etc.
- 2.3 **Semester:** Refers to one of the two sessions of an academic year (vide: serial number 4), each session being of sixteen weeks duration (with working days greater than or equal to 90). The odd semester may be scheduled from August/September and even semester from February/March of the year.

- 2.4 Academic Year:** Refers to the sessions of two consecutive semesters (odd followed by an even) including periods of vacation.
- 2.5 Course:** Refers to usually referred to as 'subjects' and is a component of a program. All Courses need not carry the same credit weightage. The Courses should define learning objectives and learning outcomes. A Course may be designed to comprise lectures/ tutorials/ laboratory work/ field work/ outreach activities/ project work/ vocational training/ viva/ seminars/ term papers/ assignments/ presentations/ self-study etc. or a combination of some of these.
- 2.6 Credit:** Refers to a unit by which the Course work is measured. It determines the number of hours of instructions required per week. One credit is equivalent to one hour of lecture or two hours of laboratory/ practical Courses/ tutorials/ fieldwork per week etc.
- 2.7 Audit Courses:** Means Knowledge/ Skill enhancing Courses without the benefit of credit for a Course.
- 2.8 Choice Based Credit System (CBCS):** Refers to customizing the Course work, through Core, Elective and soft skill Courses, to provide necessary support for the students to achieve their goals.
- 2.9 Course Registration:** Refers to formal registration for the Courses of a semester (Credits) by every student under the supervision of a Faculty Advisor (also called Mentor, Counsellor etc.,) in each Semester for the Institution to maintain proper record.
- 2.10 Course Evaluation:** Means Continuous Internal Evaluation (CIE) and Semester End Examinations (SEE) to constitute the major evaluations prescribed for each Course. CIE and SEE to carry 50 % and 50 % respectively, to enable each Course to be evaluated for 100 marks, irrespective of its Credits.
- 2.11 Continuous Internal Evaluation (CIE):** Refers to evaluation of students' achievement in the learning process. CIE shall be by the Course Instructor and includes tests, homework, problem solving, group discussion, quiz, mini-project and seminar throughout the Semester, with weightage for the different components being fixed at the University level.
- 2.12 Semester End Examinations (SEE):** Refers to examination conducted at the University level covering the entire Course Syllabus. For this purpose, Syllabi to be modularized and SEE questions to be set from each module, with a choice confined to the concerned module only. SEE is also termed as university examination.
- 2.13 Make Up Examination:** Refers to examination conducted for the candidates who has a CIE ≥ 35 marks and may have missed to attend the SEE covering the entire course syllabus. The standard of Make Up Examination is same as that of the SEE.
- 2.14 Supplementary Examination:** Refers to the examination conducted to assist slow learners and/or failed students through make up courses for a duration of 8 weeks. This comprises of both the CIE & SEE and will be conducted after the completion of First year M.Tech. even semester.
- 2.15 Credit Based System (CBS):** Refers to quantification of Course work, after a student completes teaching – learning process, followed by passing in both CIE and SEE. Under CBS, the requirement for awarding Degree is prescribed in terms of total number of credits to be earned by the students.

2.16 Credit Representation: Refers to Credit Values for different academic activities considered, as per the Table.1. Credits for seminar, project phases, project viva-voce and internship shall be as specified in the Scheme of Teaching and Examination.

Table 1: Credit Values				
Theory/Lectures (L) (hours/week/Semester)	Tutorials (T) (hours/week/ Semester)	Laboratory /Practical (P) (hours/week/ Semester)	Credits (L: T:P)	Total Credits
4	0	0	4:0:0	4
3	0	0	3:0:0	3
2	2	0	2:1:0	3
2	0	2	2:0:1	3
2	2	2	2:1:1	4
0	0	2	0:0:1	1

NOTE: Activities like, practical training, study tour and participation in Guest lectures not to carry any credits.

2.17 Letter Grade: It is an index of the performance of students in a said Course. Grades are denoted by letters O, A+, A, B+, B, C and F.

2.18 Grading: Grade refers to qualitative measure of achievement of a student in each Course, based on the percentage of marks secured in (CIE+SEE). Grading is done by Absolute Grading. The rubric attached to letter grades are as follows:

Letter Grade	O	A+	A	B+	B	C	F
Academic Level	Outstanding	Excellent	Very Good	Good	Above Average	Average	Fail

2.19 Grade Point (GP): Refers to a numerical weightage allotted to each letter grade on a 10-point scale as under.

Letter Grade and corresponding Grade Points on a typical 10 – Point scale							
Letter Grade	O	A+	A	B+	B	C	F
Grade Point	10	09	08	07	06	05	00

2.20 Passing Standards: Refers to passing a Course only when getting GP greater than or equal to 05 (as per serial number 2.20).

2.21 Credit Point: Is the product of grade point (GP) and number of credits for a Course i.e., Credit points CrP = GP × Credits for the Course.

2.22 Semester Grade Point Average (SGPA): Refers to a measure of academic performance of student/s in a semester. It is the ratio of total credit points secured by a student in various Courses of a semester and the total Course credits taken during that semester.

- 2.23 Cumulative Grade Point Average (CGPA):** Is a measure of overall cumulative performance of a student over all semesters. The CGPA is the ratio of total credit points earned by a student in various Courses in all semesters and the sum of the total credits of all Courses in all the semesters. It is expressed up to two decimal places.
- 2.24 Grade Card:** Refers to a certificate showing the grades earned by a student. A grade card shall be issued to all the registered students after every semester. The grade card will display the program details (Course code, title, number of credits, grades secured) along with SGPA of that semester and CGPA earned till that semester.
- 2.25 University:** Nitte (Deemed to be University), Mangalore. NMAM Institute of Technology is an off-campus centre of Nitte (DU) and located at Nitte.

3. CLAUSE									
CLAUSE	PARTICULARS								
22NMT1.0	<p>DURATION AND CREDITS OF THE PROGRAM OF STUDY</p> <p>There shall be one category of program: Full-time Program (FT)</p> <p>Full-time Program: The Program shall extend over a period of four semesters (2 years).</p> <p>First Semester:</p> <ul style="list-style-type: none"> i) 16 weeks – Class Work according to the scheme. ii) 4 weeks – Revision holidays and examinations iii) 2 weeks – Vacation <p>Second Semester:</p> <ul style="list-style-type: none"> i) 16 weeks – Class Work according to the scheme ii) 4 weeks – Revision holidays and examinations. <p>Summer Semester/Vacation</p> <ul style="list-style-type: none"> i) 4 weeks — Class work, Examination & Display of Grades <p>Third Semester: 20 weeks</p> <ul style="list-style-type: none"> i) 8 weeks — Industrial Training/Mini Project ii) 12 weeks — Project Part-I <ul style="list-style-type: none"> — Industrial Training/Mini Project evaluation, Seminar on Special Topic Evaluation & Project Part-I Evaluation <p>Fourth Semester: 24 weeks</p> <ul style="list-style-type: none"> i) 22 weeks — Project Part-II ii) 2 weeks – Submission, viva -voce <p>Prescribed Number of Credits for the Program: 80</p> <p>The number of credits to be completed for the award of Degree shall be 80.</p>								
22NMT1.1	<p>M.Tech Degree Programs are offered in the following specialization and the respective program hosting departments are listed below:</p> <table border="1"> <thead> <tr> <th><u>Program</u></th> <th><u>Department</u></th> </tr> </thead> <tbody> <tr> <td>i) Computer Science & Engineering</td> <td>Computer Science & Engineering</td> </tr> <tr> <td>ii) Constructional Technology</td> <td>Civil Engineering</td> </tr> <tr> <td>iii) Structural Engineering</td> <td>Civil Engineering</td> </tr> </tbody> </table>	<u>Program</u>	<u>Department</u>	i) Computer Science & Engineering	Computer Science & Engineering	ii) Constructional Technology	Civil Engineering	iii) Structural Engineering	Civil Engineering
<u>Program</u>	<u>Department</u>								
i) Computer Science & Engineering	Computer Science & Engineering								
ii) Constructional Technology	Civil Engineering								
iii) Structural Engineering	Civil Engineering								

	iv) VLSI Design & Embedded Systems v) Machine Design vi) Energy Systems Engineering vii) Cyber security viii) Electric Vehicle Technology	Electronics and Communication Engineering Mechanical Engineering Mechanical Engineering Computer Science Engineering Electrical and Electronics Engineering
	The provisions of these Regulations shall be applicable to any new specialization that may be introduced from time to time and appended to the above list.	
22NMT1.2	Maximum Duration for Program Completion: A full-time candidate shall be allowed a maximum duration of 4 years from the I semester of admission to become eligible for the award of master's degree, failing which he/she may discontinue of register once again as a fresh candidate to I semester of the program.	
22NMT2.0	ELIGIBILITY FOR ADMISSION (As per the Government orders issued from time to time): Admission to I year/ I semester Master of Technology Program shall be open to all the candidates who have passed B.E./ B. Tech. Examinations (in relevant field) or any other recognized University/ Institution. AMIE in respective branches shall be equivalent to B.E./ B. Tech. Programs for admission to M.Tech. The decision of the equivalence committee shall be the final in establishing the eligibility of candidates for a particular Program. For the foreign Degrees, Equivalence certificate from the Association of Indian Universities shall be a must.	
22NMT2.1	Admission to M.Tech. Program shall be open to the candidates who have passed the prescribed qualifying examination with not less than 50% of the marks in the aggregate of all the years of the Degree examination. Rounding off percentage secured in qualifying examination is not permissible.	
22NMT2.2	For admissions under GATE/ NUCAT qualification The candidates should be GATE qualified or should have appeared for the NUCAT Entrance Examination conducted by Nitte (Deemed to be University) [Nitte (DU)]	
22NMT2.3	For admissions under Sponsored Quota: The candidates should be GATE qualified or should have appeared for the NUCAT Entrance Examination conducted by Nitte (DU)	
22NMT2.4	The candidates, who are qualified in the GATE Examination for the appropriate branch of engineering, shall be given priority. They are exempted from taking NUCAT Entrance Examination. In case a GATE qualified Candidate appears for entrance examination and become qualified to claim a seat under entrance examination quota, he/she will be considered in the order of merit along with other candidates appeared for the entrance examination.	

22NMT2.5	If sufficient number of GATE qualified candidates are not available, the remaining vacant seats shall be filled from amongst the candidates appeared for NUCAT Entrance Examination in the order of merit.																																								
22NMT2.6	Engineering graduates other than the Karnataka candidates shall get their Eligibility verified from Nitte (DU) to seek admission to M.Tech. Program at NMAMIT, Nitte																																								
22NMT2.7	Admission to vacant seats: Seats remaining vacant (unfilled), after the completion of admission process through GATE/NUCAT Entrance Exam, the remaining seats shall be filled by Candidates based on merit in the entrance test conducted at the Institution level. An admission Committee, consisting of the Principal, Head of the concerned Department and the subject experts, shall oversee admissions.																																								
22NMT3.0	REGISTRATION: Every student after consulting his Faculty-Advisor in parent department is required to register for the approved courses with the Departmental Post Graduate Committee (DPGC) of Parent Department at the commencement of each Semester on the days fixed for such registration and notified in the academic calendar.																																								
22NMT3.1	<p>Lower and Upper Limits for Course Credits Registered in a Semester. Course Credit Assignment: All courses comprise of specific Lecture/ Tutorial/ Practical (L-T-P) schedule. The course credits are fixed based on the following norms. Lecture/Tutorials/ Practical:</p> <ul style="list-style-type: none"> (i) a 1-hour Lecture per week is assigned 1.0 Credit. (ii) a 2-hour Tutorial session per week is assigned 1.0 Credit. (iii) a 2-hour Lab. session per week is assigned 1.0 credits. <p>For example, a theory course with L-T-P schedule of 3-2-0 hours will be assigned 4.0 credits. A laboratory practical course with L-T-P schedule of 0-0-2 hours will be assigned 1.0 credit.</p> <p>Calculation of Contact Hours / Week – A Typical Example</p> <table border="1" data-bbox="424 1507 1414 2051"> <thead> <tr> <th colspan="5">Typical Academic Load (I & II Semester)</th> </tr> <tr> <th>No. of Courses</th> <th>LTP</th> <th>Credits Per course</th> <th>Total Credits</th> <th>Contact Hours per Week</th> </tr> </thead> <tbody> <tr> <td>2 Lecture Courses</td> <td>4-0-0</td> <td>04</td> <td>08</td> <td>08</td> </tr> <tr> <td>2 Lab Courses</td> <td>0-0-2</td> <td>01</td> <td>02</td> <td>04</td> </tr> <tr> <td>1 Research based Course</td> <td>0-0-4</td> <td>02</td> <td>02</td> <td>04</td> </tr> <tr> <td>3 Elective Courses</td> <td>3-0-0</td> <td>03</td> <td>09</td> <td>09</td> </tr> <tr> <td>1 Audit Course</td> <td>2-0-0</td> <td>0</td> <td>0</td> <td>02</td> </tr> <tr> <td>Total: 9 Courses</td> <td></td> <td></td> <td>21</td> <td>27</td> </tr> </tbody> </table>	Typical Academic Load (I & II Semester)					No. of Courses	LTP	Credits Per course	Total Credits	Contact Hours per Week	2 Lecture Courses	4-0-0	04	08	08	2 Lab Courses	0-0-2	01	02	04	1 Research based Course	0-0-4	02	02	04	3 Elective Courses	3-0-0	03	09	09	1 Audit Course	2-0-0	0	0	02	Total: 9 Courses			21	27
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	<p>A student must register, as advised by Faculty Advisor, between a minimum of 16 credits and up to a Maximum of 28 credits. However, the minimum/maximum Credit limit can be relaxed by the Dean (Academic) on the recommendations of the DPGC, only under extremely exceptional circumstances.</p>
22NMT3.2	<p>Mandatory Pre-Registration for higher semester:</p> <p>In order to facilitate proper planning of the academic activities of the Semester, it is necessary for the students to declare their intention to register for courses of higher semesters (2nd and above) at least two weeks before the end of the current semester choosing the courses offered by each department in the next higher semester which is displayed on the Departmental Notice Board at least 4 weeks prior to the last working day of the semester. Students who fail to register on or before the specified date will have to pay a late fee. Registration in absentia is allowed only in exceptional cases with the permission of the Dean (Academic).</p> <p>Registration to a higher semester is allowed only if the student fulfills the following conditions-</p> <ol style="list-style-type: none"> i) Satisfied all the academic requirements to continue with the program of studies without termination. ii) Cleared all institute, hostel and library dues and fines, if any, of the previous semester. iii) Paid all required advance payments of the Institute and the hostel for the current semester. <p>Has not been debarred from registering on any specific grounds by the Institute.</p>
22NMT3.3	<p>Course Pre-Requisites:</p> <p>In order for a student to register for some course(s), it may be required either to have completed satisfactorily or to have prior earned credits in some specified course(s). In such instances, the DPGC shall specify clearly, any such course pre-requisites, as part of the curriculum.</p>
22NMT3.4	<p>Students who do not register before the dead line day of registration may be permitted LATE Registration up to the notified day in academic calendar on payment of late fee.</p>
22NMT3.5	<p>REGISTRATION in ABSENTIA will be allowed only in exceptional cases on the recommendation of DPGC through the authorized representative of the student.</p>
22NMT3.6	<p>Medium of Instruction/Evaluation/etc. shall be English.</p>
22NMT4.0	<p>COURSES:</p> <p>The curriculum of the Program shall be any combination of following type of courses:</p> <ol style="list-style-type: none"> i) Professional Core Courses (PCC) - relevant to the chosen specialization/ branch [May be split into Hard (no choice) and Soft (with choice), if required]. The core course is to be compulsorily studied by a student and is mandatory to complete the requirements of a program in a said discipline of study.

	<p>ii) Professional Electives Courses (PEC) - relevant to the chosen specialization/ branch: these are the courses, which can be chosen from the pool of papers. It shall be supportive to the discipline/ providing extended scope/enabling an exposure to some other discipline / domain / nurturing student skills.</p> <p>iii) Research Experience Through Practice-I and Research Experience Through Practice-II</p> <p>iv) Project Work</p> <p>v) Seminar</p> <p>vi) Audit Courses (AC):</p> <p>a) The Audit course can be any credit course offered by the program to which the candidate is admitted (other than the courses considered for completing the prescribed program credits) or other programs offered in the institution, where the student is studying.</p> <p>b) The students are required to register for one audit course during I and II semesters. Students who have registered to audit the courses, considered on par with students registered to the same course for credit, must satisfy attendance and CIE requirements. However, they need not have to appear for SEE.</p> <p>c) Registration for any audit course shall be completed at the beginning of I and II semesters. The Department should intimate the Controller of Examination about the registration at the beginning of the semester and obtain a formal approval for inclusion of the audit course/s in the Grade card issued to the students</p> <p>vii) Internship/ Mini Project: Preferably at an industry/ R&D organization/IT company/ Government organization of significant repute or at the Research Centre of parent Institution for a specified period mentioned in Scheme of Teaching and Examination.</p>																					
22NMT4.1	<p>Program Structure:</p> <p>The number of credits to be registered in a semester is between 16 and 28 Minimum Credit Requirement for the M.Tech. Degree is 80.</p> <p>The total course package for an M.Tech. Degree Program will typically consist of the following components.</p> <table border="1" data-bbox="435 1626 1402 2020"> <thead> <tr> <th>Course type</th> <th>Range %</th> <th>Suggested Credits</th> </tr> </thead> <tbody> <tr> <td>i) Program Core Courses</td> <td>20 - 25</td> <td>20</td> </tr> <tr> <td>ii) Program Elective Courses</td> <td>18 - 20</td> <td>15</td> </tr> <tr> <td>iii) Elective Courses (MOOCS)</td> <td>4</td> <td>03</td> </tr> <tr> <td>iv) Industrial Internship/Research Internship/Mini Project</td> <td>10</td> <td>08</td> </tr> <tr> <td>v) Project</td> <td>35</td> <td>28</td> </tr> <tr> <td>vi) Seminar</td> <td>2.5</td> <td>02</td> </tr> </tbody> </table>	Course type	Range %	Suggested Credits	i) Program Core Courses	20 - 25	20	ii) Program Elective Courses	18 - 20	15	iii) Elective Courses (MOOCS)	4	03	iv) Industrial Internship/Research Internship/Mini Project	10	08	v) Project	35	28	vi) Seminar	2.5	02
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v) Project	35	28																				
vi) Seminar	2.5	02																				

vii) Research Experience Through Practice	5	04
viii) Audit courses (two courses)	-	-
Total credits		80

The Department Post Graduate Committee (DPGC) will discuss and recommend the exact credits offered for the program for the above components, the semester-wise distribution among them, as well as the syllabi of all postgraduate courses offered by the department from time to time before sending the same to the Board of Studies (BOS).

The BOS will consider the proposals from the departments and make recommendations to the Academic Council for consideration and approval.

Mandatory Learning Courses:

These are courses that must be completed by the student at appropriate time as suggested by the Faculty Adviser or the DPGC. Courses that come under the category are as following:

Industrial Training:

This is a 08-credit course. A full-time student will complete the Industrial Training (or a Mini Project) at appropriate time stipulated by DPGC and register for it in the following Semester and shall also submit a bound copy of training report certified by the authority of Training Organization. The duration and the details, including the assessment scheme, shall be decided by the faculty advisor, with approval from DPGC.

Seminar:

This also carries 2-credits to be completed at appropriate time stipulated by DPGC. The student will make presentations on topics of academic interest, as suggested by DPGC.

Research Experience through Practice-I and Research Experience through Practice-II:

- Research Experience through Practice-I and II are 2-credit courses in the first and second semesters respectively.
- The student will work under a faculty supervisor approved by the DPGC and submits a research proposal at the end of the first semester which is evaluated jointly by the faculty supervisor and a co-examiner.
- Students shall be offered inputs like how to conduct a literature survey, how to identify a research problem, how to write a research paper, research report, research proposal, and systematic way of conducting research etc.
- Department specific/PG Program specific skill sets required for carrying out a research work may be offered to the students like software tools for system/device simulation and analysis, software/ hardware tools for signal acquisition, data processing, control simulation, Testing/measuring equipment used in research and Testing/measuring procedure.
- At the end of Research Experience through Practice-I in the first semester, M. Tech. students should be able to identify a research problem, with clear objectives and methodologies backed by extensive literature review.

	<ul style="list-style-type: none"> • Two internal examiners will evaluate the Research Experience through Practice-I out of which one will be the guide and the other examiner will be a faculty member who is having expertise in the research area of the student being evaluated. The research proposal report and the research proposal presentation are evaluated for 100 marks in the first semester. • The student will work on the proposed research in the second semester and submit a research paper at the end of the second semester which is evaluated jointly by the faculty supervisor and a co-examiner. • In the second semester, the students are expected to carry out Mathematical modelling / Design calculations / computer simulations / Preliminary experimentation / testing of the research problems identified during Research Experience through Practice-I carried out in the first semester. At the end of the second semester, students are expected to write a full research paper based on the Mathematical modelling/ Design calculations/computer simulations/Preliminary experimentation/testing carried out during second semester. <p>The research paper submitted by the student and the presentation of the research work carried out is evaluated for 100 marks in the second semester.</p>
22NMT5.0	<p>INTERNSHIP/MINI PROJECT:</p> <p>The student shall undergo Internship/Mini Project as per the Scheme of Teaching and Examination.</p> <ol style="list-style-type: none"> 1. The internship can be carried out in any industry/R&D Organization/Research Institute/Institute of national repute/R&D Centre of Parent Institute. 2. The Department/college shall nominate a faculty to facilitate, guide and supervise students under internship. 3. The students shall report the progress of the internship/Mini Project to the internal guide in regular intervals and seek his/her advice. 4. The Internship shall be completed during the period specified in Scheme of Teaching and Examination. 5. After completion of Internship/mini project, students shall submit a report to the Head of the Department with the approval of both internal and external guides and with the approval of internal guide if the Internship/Mini-Project is carried out in the Institute. 6. The Internship/Mini Project will be evaluated jointly by two internal examiners appointed by the Head of the Department/Controller of Examination. 7. The Internship/Mini Project report and the presentation by the student will be evaluated for 50 marks each immediately after completion of the Internship/Mini Project. <p>The students are permitted to carry out the internship anywhere in India or Abroad. The Institution will not provide any kind of Financial Assistance to any student for Internship/Mini Project and for the conduct of Viva-Voce on internship.</p>
22NMT5.1	<p>Failing to undergo Internship/Mini Project:</p>

	<p>Securing a pass grade in Internship/Mini Project is mandatory as a partial requirement for the award of Degree.</p> <p>Internship/Mini Project Securing a pass grade in Internship/Mini Project is mandatory. If any student fails to undergo/complete the Internship/Mini Project, he/she shall be considered as fail in that Course.</p>
22NMT6.0	<p>SEMINAR:</p> <p>Securing a pass grade in Seminar is mandatory as a partial requirement for the award of Degree.</p> <p>i) Each candidate shall deliver seminar as per the Scheme of Teaching and Examination on the topics chosen from the relevant fields for about 30 minutes.</p> <p>The Head of the Department shall make arrangements for conducting seminars through concerned faculty members of the department. The Panel of Examiners constituted for the purpose by the Head of the Department shall award the CIE marks for the seminar.</p>
22NMT7.0	<p>PROJECT WORK:</p> <p>Securing a pass grade in Project Work is mandatory as a partial requirement for the award of Degree.</p> <p>Project work shall be on individual basis.</p> <p>Project Part-I and Part-II:</p> <p>Project Part-I: (In third Semester)</p> <p>The duration of the Project Part-I is of 12 weeks as notified in the academic calendar. The evaluation of the Project Part-I will be done during the end of third semester.</p> <p>Each department will prepare the Panel of Examiners in advance and also prepare the Project Part-I evaluation schedule indicating the names of the students, their USN, Title of the Project, Name of the Examiners, and time and Venue of the evaluation which will be submitted to the Controller of Examination Office in advance.</p> <p>Project Part-I evaluation will be done by two internal Examiners, one of them will be the Guide and other is preferably one of the experts in the area of PG Project being evaluated.</p> <p>The mark distribution of Project Phase-I evaluation is: 100 marks for report and 100 marks for presentation jointly awarded by the both the examiners.</p> <p>Project Part-II: (In the fourth Semester)</p> <p>The total duration of Project Part-II is of 22 weeks as notified in the academic calendar. There will be two Continuous Internal Evaluation of Project Part-II in fourth semester followed by Semester End Evaluation of the Project Phase-II, namely, Project Progress Evaluation-I (PPE-I), Project Progress Evaluation -II(PPE-II) and SEE.</p> <p>The same Panel of Examiners which was formed during Project Part-I evaluation is to be continued for the Project Progress Evaluation in the fourth semester.</p>

	<p>PPE-I and PPE-II will be scheduled as per the academic calendar and will be evaluated for 100 marks each (50 marks for report and 50 marks for presentation jointly conducted by the two internal examiners).</p> <p>Each department will prepare the Panel of Examiners in advance and also prepare the Project Part-II Project Progress Evaluation Schedule indicating the names of the students, their USN, Title of the Project, Name of the Examiners, and time and Venue of the evaluation as per the format which will be submitted to the Controller of Examination Office in advance.</p> <p>For the Off-Campus projects, the Internal Guide should visit the organization in which the M.Tech Student is carrying out his Project at least once during the project term.</p> <p>The candidate shall submit a soft copy of the dissertation work to the Institute. The soft copy of the dissertation should contain the entire Dissertation in monolithic form as a PDF file (not separate chapters).</p> <p>The Guide, after checking the report for completeness shall check the report for Plagiarism content. The allowable plagiarism index is less than or equal to 25%. If the check indicates a plagiarism index greater than 25%, the guide should advice the student to resubmit the dissertation after modifying the report. The report has to be once again checked for the plagiarism content and the signed hard copy of the Plagiarism Report along with the two hard copies of the dissertation is to be submitted to the Head of the Institution through the Head of the Department. The dissertation will be evaluated by two examiners, one of the examiners shall be the Guide of the candidate and the other examiner shall be an external expert in the area of the dissertation being evaluated.</p> <p>The guide shall submit panel of two approved external examiners to the office of the Controller of Examination through the head of the Department. The Controller of Examination will randomly select one of the external examiners and invites him/her formally for the evaluation of the dissertation and Viva-Voce examination giving sufficient time for the external examiner for reading the dissertation.</p>
22NMT7.1	<p>The dissertation will be evaluated by two examiners, one of the examiners shall be the guide of the candidate and the other examiner shall be preferably an external expert in the area of the dissertation being evaluated. The evaluation of the dissertation shall be made independently by each examiner.</p>
22NMT7.2	<p>Examiners shall evaluate the dissertation normally within a period of not more than two weeks from the date of receipt of dissertation through email.</p>
22NMT7.3	<p>The examiners shall independently submit the marks for the dissertation during the viva-voce examination date</p>
22NMT7.4	<p>Sum of the marks awarded by the two examiners shall be the final evaluation marks for the Dissertation.</p>
22NMT7.5	<p>(a) Viva-voce examination of the candidate shall be conducted, if the dissertation work and the reports are accepted by the external examiner.</p> <p>(b) If the external examiner finds that the dissertation work is not up to the expected standard and the minimum passing marks cannot be awarded, the dissertation shall not be accepted for SEE.</p>

	<p>(c) If the dissertation is rejected during the Project Part II, then the Second Examiner (external) will be appointed by the COE against whom the candidate has to re-present the same dissertation. The decision of the Second Examiner (external) will be final.</p> <p>If the second examiner (external) accepts the dissertation, then the viva-voce examination of the candidate shall be conducted as per the norms. If the second examiner (external) rejects the dissertation, then the student has to take an extension for a minimum period of 3 months and re-work on the project. After the completion of the extension period, viva-voce examination of the candidate shall be conducted as per the norms, if the dissertation work is accepted by the external examiner.</p>
22NMT7.6	The candidate, whose dissertation is rejected, can rework on the same topic or choose another topic of dissertation under the same Guide or new Guide if necessary. In such an event, the report shall be submitted within four years from the date of admission to the Program.
22NMT7.7	Viva-voce examination of the candidate shall be conducted jointly by the external examiner and internal examiner/ guide at a mutually convenient date.
22NMT7.8	The relative weightages for the evaluation of dissertation and the performance at the viva-voce shall be as per the scheme of teaching and examination.
22NMT7.9	The marks awarded by both the Examiners at the viva-voce Examination shall be sent jointly to the office of Controller of Examination immediately after the examination.
22NMT7.10	Examination fee as fixed from time to time by the Institute for evaluation of dissertation report and conduct of viva-voce shall be remitted to the Institute as per the instructions of Dean-Academics, from time to time.
22NMT7.11	The candidates who fail to submit the dissertation work within the stipulated time have to apply for the extension of the Project duration through the Guide and the head of the department to the Office of the Controller of Examination. Such candidate is not eligible to be considered for the award of rank.
22NMT8.0	<p>ATTENDANCE REQUIREMENT:</p> <ol style="list-style-type: none"> 1. Each semester is considered as a unit and the candidate has to put in a minimum attendance of 85% in each subject with a provision of condoning 10% of the attendance by Principal for reasons such as medical grounds, participation in University level sports, cultural activities, seminars, workshops and paper presentation etc. 2. The basis for the calculation of the attendance shall be the period of term prescribed by the institution in its calendar of events. For the first semester students, the same is reckoned from the date of admission to the course. 3. The students shall be informed about their attendance position in the first week of every month by the College so that the students shall be cautioned to make up the shortage. 4. The head of the department shall notify regularly, the list of such candidates who fall short of attendance. The list of the candidates falling

	<p>short of attendance shall be sent to the Principal with a copy to Controller of Examinations.</p> <ol style="list-style-type: none"> 5. A candidate having shortage of attendance (<75%) in any course(s) registered shall not be allowed to appear for SEE of such course(s). Such students will be awarded 'N' grade in these courses. 6. He/she shall have to repeat those course(s) with 'N' grade and shall re-register for the same course(s) core or elective, as the case may be when the particular course is offered next either in a main (odd/even) or summer semester. 7. If a candidate, for any reason, discontinues the course in the middle he/she may be permitted to register to continue the course along with subsequent batch, subject to the condition that he/she shall complete the class work, lab work and seminar including the submission of dissertation within maximum stipulated period. Such candidate is not eligible to be considered for the award of rank.
22NMT9.0	<p>ADD/ DROP/ AUDIT OPTIONS:</p> <ol style="list-style-type: none"> 1. ADD-option: A student has the option to ADD courses for registration till the date specified for late registration. 2. DROP-option: A student has the option to DROP courses from registration until one week after the mid-semester examination. <p>AUDIT-option: A student can register for auditing a course, or a course can even be converted from credit to audit or from audit to credit, with the consent of faculty advisor and course instructor until one week after the mid-semester exam. However, CORE courses shall not be made available for audit. It is not mandatory for the student to go through the regular process of evaluation in an audit course. However, the student has to keep the minimum attendance requirement, as stipulated by the corresponding DPGC for getting the 'U' grade awarded in a course, failing which that course will not be listed in the Grade Card.</p>
22NMT10.0	<p>ABSENCE DURING THE SEMESTER:</p> <p>Leave of Absence</p> <p>(a) If the period of leave is more than two days and less than three weeks, prior application for leave shall have to be submitted to the Head of the Department concerned, with the recommendation of the Faculty-Advisor stating fully the reasons for the leave request along with supporting documents.</p> <p>It will be the responsibility of the student to intimate the course instructors, Head of the Department and also Chief Warden of the hostel, regarding his absence before availing leave.</p>
22NMT10.1	<p>Absence during Mid-Semester Examinations:</p> <p>A student who has been absent from a Mid-Semester Examination (MSE) due to illness and other contingencies may give a request for additional MSE within two working days of such absence to the office of the respective Head of the Department (HOD) with necessary supporting documents and certification from authorized personnel. The HOD may consider such requests depending</p>

	on the merits of the case, may permit the additional Mid-Semester Examination for the concerned student.
22NMT10.2	<p>Absence during Semester End Examination:</p> <p>In case of absence for a Semester End Examination, on medical grounds or other special circumstances the student can apply for 'I' grade in that course with necessary supporting documents and certifications by authorized personnel to the Controller of Examination through Chairman of The Department. The Controller of Examination may consider the request depending on the merits of the case and permit the make-up Semester End Examination for the concerned student. The student may subsequently complete all course requirements within the date stipulated by DPGC (which may be extended till first week of next semester under special circumstances) and 'I' grade will then be converted to an appropriate letter grade. If such an application for the 'I' grade is not made by the student, then a letter grade will be awarded based on his in-semester performance.</p>
22NMT11.0	<p>WITHDRAWAL FROM THE PROGRAM:</p> <p>Temporary Withdrawal: A student who has been admitted to a Post Graduate Degree program of the College may be permitted to withdraw temporarily, for a period of one semester or more on the grounds of prolonged illness or grave calamity in the family etc. The student should abide by the applicable rules and regulations of the college/University at the time of Temporary Withdrawal.</p>
22NMT11.1	<p>Permanent Withdrawal:</p> <p>Any student who withdraws admission before the closing date of admission for the Academic Session is eligible for the refund of the deposits only. Fees once paid will not be refunded on any account.</p> <p>Once the admission for the year is closed, the following conditions govern withdrawal of admissions:</p> <p>a) A student who wants to leave the College for good, will be permitted to do so (and can take Transfer Certificate from the College, if needed), only after remitting the Tuition fees as applicable for all the remaining semesters and clearing all other dues, if any.</p> <p>b) Those students who have received any scholarship, stipend or other forms of assistance from the College shall repay all such amounts in addition to those mentioned in (a) above.</p> <p>The decision of the Principal of the Institute regarding withdrawal of a student is final and binding.</p>
22NMT12.0	<p>EVALUATION SYSTEM:</p> <p>Continuous Internal Evaluation (CIE) and Semester End Evaluation (SEE)</p>
22NMT12.1	<p>For all the theory and laboratory courses, the CIE marks shall be 50.</p> <p>For Research Experience through Practice-I, Research Experience through Practice-II, Seminar, Industrial Training/Mini Project, the CIE marks shall be 100.</p>

	For Project Phase-I, the CIE Marks shall be 200 For Project Phase-II, the CIE Marks shall be 200 and for SEE 200
22NMT12.2	CIE Marks for courses shall be based on a) Tests MSE-I and MSE-II (for 30 Marks): MSE in a theory course, for 30 marks, shall be based on two tests covering the entire syllabus. Assignments, Quizzes, Simulations, Experimentations, Mini project, oral examinations, field work etc., (for 20 Marks) conducted in respective courses.
22NMT12.3	a) An additional MSE may be conducted for those students absent for valid reasons/ with prior permission. b) For those students who could not score minimum required CIE marks (25 marks), an additional MSE may be conducted, however the maximum CIE marks shall be restricted to 25 out of 50.
22NMT12.4	The candidates shall write the Tests in Blue Book/s. The Blue book/s and other documents relating to award of CIE marks shall be preserved by the Head of the Department for at least six months after the announcement of University results and made available for verification at the directions of the Controller of Examination.
22NMT12.5	Every page of the CIE marks list shall bear the signatures of the concerned Teacher and Head of the Department.
22NMT12.6	The CIE marks list shall be displayed on the Notice Board and corrections, if any, shall be incorporated before submitting to the office of the Controller of Examination (COE).
22NMT12.7	The CIE marks shall be sent to the office of the COE well in advance before the commencement of Semester End Examinations. No corrections of the CIE marks shall be entertained after the submission of marks list to the Office of the COE.
22NMT12.8	Candidates obtaining less than 50% of the CIE marks in any course (Theory /Laboratory/ Seminar/ Internship/ Project) shall not be eligible to appear for the Semester end examination in that course/s. In such cases, the Head of the Department shall arrange for the improvement of CIE marks in the course/ Laboratory when offered in the subsequent semester subject to the maximum duration allowed for completion of a M.Tech. program.
22NMT12.9	Semester End Evaluation: There shall be a Semester End Examination at the end of each semester.
22NMT12.10	There shall be double valuation of theory papers. The theory Answer booklets shall be valued independently by two examiners appointed by the Controller of Examination.
22NMT12.11	If the difference between the marks awarded by the two examiners is not more than 15 per cent of the maximum marks, the marks awarded to the candidate shall be the average of two evaluations.
22NMT12.12	If the difference between the marks awarded by the two examiners is more than 15 per cent of the maximum marks, the answer booklet shall be evaluated by a third Examiner appointed by the Controller of Examination. The average of the marks of nearest two valuations shall be considered as the marks secured by

	the candidate. In case, if one of the three marks falls exactly midway between the other two, then the highest two marks shall be taken for averaging.								
22NMT12.13	Summer Semester: Summer semester is primarily to assist weak and/or students having N/F grade in courses, for a duration of 4 weeks after the completion of regular even SEE. The institute may also offer Add-on/ Audit Courses during this semester.								
22NMT12.14	Each candidate shall obtain not less than 50% of the maximum marks (25 marks) prescribed for the CIE of each subject, including seminars. CIE Marks shall be based on assignments, tests, oral examinations and seminar (minimum of two are compulsory) conducted in respective subjects. The candidates obtaining less than 50% of the CIE marks in any subject shall not be eligible to appear for the SEE in that subject(s). Only in such cases, the Controller of Examination may arrange for reregistering the subject(s) in subsequent semester or may refer to DPGC for necessary remedial measures. The candidates shall write the Internal Assessment Test in Blue Books, and this shall be maintained by the Head of the Department for at least six months after the announcement of result and is available for verification. The CIE marks sheet shall bear the signature of the concerned Teacher and the Chairman of the Department. The CIE marks list shall be displayed on the Notice Board and corrections, if any, shall be incorporated before sending to the Controller of Examinations.								
22NMT12.15	<p>The Academic Performance Evaluation of a student shall be according to a Letter Grading System, based on the Class Performance Distribution. The Letter grades O, A+, A, B+, B, C and F indicate the level of academic achievement, assessed on a decimal (0-10) scale. The Letter grade awarded to a student in a course, for which he has registered shall be based on his performance in quizzes, tutorials, assignments etc., as applicable, in addition to two mid-semester examination and one semester end examination. The distribution of weightage among these components may be as follows:</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 70%;">Semester End Examination (SEE)</td> <td style="text-align: right;">50%</td> </tr> <tr> <td colspan="2">Continuous Internal Evaluation (CIE)</td> </tr> <tr> <td>(i) Quizzes, Tutorials, Assignments etc.,</td> <td style="text-align: right;">20%</td> </tr> <tr> <td>(ii) Mid-semester Examination:</td> <td style="text-align: right;">30%</td> </tr> </table> <p>Any variation, other than the above distribution, requires the approval of the pertinent DPGC and Academic Council.</p> <p>The letter grade awarded to a student in a 0-0-P (Practical) course, is based on an appropriate continuous evaluation scheme that the course instructor shall evolve, with the approval of the pertinent DPGC.</p> <p>The course Instructor shall announce in the class, and/or display in the display boards or at the website, the details of the Evaluation Scheme, including the distribution of the weightage for each of the components, and method of conversion from the raw scores to the letter-grades; within the first week of the semester in which the course is offered, so that there are no ambiguities in communicating the same to all the students concerned.</p>	Semester End Examination (SEE)	50%	Continuous Internal Evaluation (CIE)		(i) Quizzes, Tutorials, Assignments etc.,	20%	(ii) Mid-semester Examination:	30%
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22NMT12.16	<p>The Transitional Grades 'I', 'W' and 'X' would be awarded in the following cases. These would be converted into one or the other of the letter grades (O-F) after the student completes the course requirements.</p> <p>Grade "I": To a student having attendance $\geq 85\%$ and CIE $\geq 70\%$, in a course, but remained absent from SEE for valid & convincing reasons acceptable to the College, like:</p> <ol style="list-style-type: none"> i. Illness or accident, which disabled him/her from attending SEE. ii. A calamity in the family at the time of SEE, which required the student to be away from the College. iii. However, the committee chaired by the Principal is authorized to relax the requirement of CIE $\geq 70\%$ if the student is hospitalized or advised long term rest after discharge from the hospital by the Doctor. iv. Students who remain absent for Semester End Examinations due to valid reasons and those who are absent due to health reasons are required to submit the necessary documents along with their request to the Controller of Examinations to write Make up Examinations within 2 working days of that examination for which he or she is absent, failing which they will not be given permission. <ul style="list-style-type: none"> • Grade "W": To a student having satisfactory attendance at classes but withdrawing from that course before the prescribed date in a semester as per Faculty Advice. • Grade "X": To a student having attendance $\geq 85\%$ and CIE $\geq 70\%$, in a course but SEE performance could result in a 'F' grade in the course. (No "F" grade awarded in this case, but student's performance record will be maintained separately).
22NMT12.17	<p>The Make Up Examination facility would be available to students who may have missed to attend the SEE of one or more courses in a semester for valid reasons and given the 'I' grade. Also, students having the 'X' grade shall also be eligible to take advantage of this facility. The makeup examination would be held as per dates notified in the Academic Calendar. However, it should be made possible to hold a make-up examination at any other time in the semester with the permission of the Academic Council of the College. In all these cases, the standard of SEE would be the same as the normal SEE.</p>
22NMT12.18	<p>All the 'W' grades awarded to the students would be eligible for conversion to the appropriate letter grades only after the concerned students re-register for these courses in a main/summer semester and fulfil the passing standards for their CIE and (CIE+SEE).</p>
22NMT12.19	<p>The suggested passing standards are CIE to have $\geq 50\%$ and CIE+SEE to have a grade better or at least equal to C. For maintaining high standards, the students scoring less than 50% in CIE are advised to withdraw and to reregister for the course when offered next. The letter grade 'W' to be entered in the grade card against the subject and not to be taken into account while calculating SGPA & CGPA</p>
22NMT12.20	<p>Rules for grace marks</p>

	<p>Grace marks up to 1% of the maximum total marks of the courses for which he/she is eligible and have registered (non-credit courses excluded) in the examination or 10 marks whichever is less shall be awarded to the failed course(s), (with a restriction of a maximum of 5 marks per course) provided on the award of such grace marks the candidate passes in that course(s)</p>																																				
22NMT13.0	<p>LETTER GRADES AND GRADE POINTS:</p> <p>The Institute adopts absolute grading system wherein the marks are converted to grades, and every semester result will be declared with semester grade point average (SGPA) and Cumulative Grade Point Average (CGPA). The CGPA will be calculated for every semester, except for the first semester.</p> <p>The grading system with the letter grades and the assigned range of marks under absolute grading system are as given below:</p> <table border="1" data-bbox="414 768 1420 1339"> <thead> <tr> <th>Letter Grade</th> <th>Grade- Points</th> <th>Raw Scores %</th> <th>Level of Academic Achievement</th> </tr> </thead> <tbody> <tr> <td>O</td> <td>10</td> <td>≥90</td> <td>Out standing</td> </tr> <tr> <td>A+</td> <td>09</td> <td>80-89</td> <td>Excellent</td> </tr> <tr> <td>A</td> <td>08</td> <td>70-79</td> <td>Very Good</td> </tr> <tr> <td>B+</td> <td>07</td> <td>60-69</td> <td>Good</td> </tr> <tr> <td>B</td> <td>06</td> <td>55-59</td> <td>Above average</td> </tr> <tr> <td>C</td> <td>05</td> <td>50-54</td> <td>Average</td> </tr> <tr> <td>F</td> <td>00</td> <td><50</td> <td>Fail</td> </tr> <tr> <td>U</td> <td></td> <td></td> <td>Audited</td> </tr> </tbody> </table> <p>A student obtaining Grade F in a Course shall be considered fail and is required to reappear in subsequent SEE. Whatever the letter grade secured by the student during his /her reappearance shall be retained. However, the number of attempts taken to clear a Course shall be indicated in the grade cards/transcripts.</p> <p>Earned Credits:</p> <p>This refers to the credits assigned to the course in which a student has obtained any one of the letter grades O, A+ A, B+, B and C</p>	Letter Grade	Grade- Points	Raw Scores %	Level of Academic Achievement	O	10	≥90	Out standing	A+	09	80-89	Excellent	A	08	70-79	Very Good	B+	07	60-69	Good	B	06	55-59	Above average	C	05	50-54	Average	F	00	<50	Fail	U			Audited
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22NMT14.0	PROMOTION AND ELIGIBILITY:																																				
22NMT14.1	<p>Promotion:</p> <p>a) All students are promoted to their next semester or year of their program, irrespective of the academic performance.</p> <p>However, for submission for M.Tech. Major Project report in 4th semester, student should have completed all the courses up to 3rd semester</p>																																				
22NMT14.2	<p>The mandatory non-credit courses, if any, shall not be considered for the award of class, calculation of SGPA and CGPA. However, a pass grade (PP) in the above courses is mandatory for the award of Degree.</p>																																				

22NMT15.0	ELIGIBILITY FOR PASSING AND AWARD OF DEGREE:
22NMT15.1	<p>1. A student who obtains any grade O to C shall be considered as passed and if a student secures F grade in any of the head of passing, he/she has to reappear in that head for SEE</p> <p>2. A student shall be declared successful at the end of the program for the award of Degree only on obtaining $CGPA \geq 5.00$, with none of the courses remaining with F grade.</p> <p>In case, the CGPA falls below 5.00, the student shall be permitted to appear again for SEE for required number of courses (other than seminar and practical) and times, subject to the provision of University, to make up $CGPA \geq 5.0$. The student should reject the SEE results of previous attempt and obtain written permission form the Controller of Examinations to reappear to the subsequent SEE.</p>
22NMT15.2	For a pass in a theory course, the student shall secure a minimum of 40% of the maximum marks prescribed in the Semester End Examination and 50% of marks in CIE and 50% in the aggregate of CIE and SEE marks. The minimum passing grade in a course is C.
22NMT15.3	For a pass in Internship/ Practical/ Project/ Dissertation/ Viva-voce examination, a student shall secure a minimum of 50% of the maximum marks prescribed for the SEE in Internship/ Practical/ Project/ Dissertation/ Viva-voce. The minimum passing grade in a course is C.
22NMT15.4	For a pass, a candidate shall obtain a minimum of 50% of maximum marks in Seminar.
22NMT15.5	IV Semester full time candidates having backlog courses are permitted to upload the dissertation report and to appear for SEE. The IV semester grade card shall be released only when the candidate completes all the backlog courses and become eligible for the award of Degree.
22NMT15.6	<p>Eligibility for Award of Degree:</p> <p>A student shall be declared to have completed the Degree of Master of Technology, provided the student has undergone the stipulated course work as per the regulations and has earned the prescribed credits, as per the scheme of teaching and examination of the program</p>
22NMT16.0	<p>EVALUATION OF PERFORMANCE:</p> <p>Computation of SGPA and CGPA</p> <p>SGPA and CGPA: The credit index can be used further for calculating the Semester Grade Point Average (SGPA) and the Cumulative Grade Point Average (CGPA), both being important academic performance indices of the student. While SGPA is equal to the credit index for a semester divided by the total number of credits registered by the student in that semester, CGPA gives the sum total of credit indices of all the previous semesters divided by the total number of credits registered in all these semesters. Both the equations together facilitate the declaration of academic performance of a student, at the end of a semester and at the end of successive semesters respectively.</p> <p>SGPA is computed as follows:</p>

	<p><i>SGPA</i></p> $= \frac{\sum[(Course\ Credits) \times (Grade\ Point)]}{\sum[Course\ Credits]}$ <p>(for all courses with letter grades including F grades in that semester)</p> <p>(for all courses with letter grades including F grades in that semester)</p> <p>CGPA is computed as follows:</p> $CGPA = \frac{\sum[(Course\ Credits) \times (Grade\ Point)]}{\sum[Course\ Credits]}$ <p>(for all courses excluding those with F grades until that semester)</p> <p>(for all courses excluding those with F grades until that semester)</p>
22NMT16.1	<p>Communication of Grades:</p> <ul style="list-style-type: none"> The SGPA and CGPA respectively, facilitate the declaration of academic performance of a student at the end of a semester and at the end of successive semesters. Both of them would be normally calculated to the second decimal position, so that the CGPA, in particular, can be made use of in rank ordering the students' performance in the Institute. <p>If two students get the same CGPA, the tie could be resolved by considering the number of times a student has obtained higher SGPA, But, if it is still not resolved, the number of times a student has obtained higher grades like O, A, B etc. could be taken into account.</p>
22NMT16.2	<p>Challenge evaluation</p> <p>If a student is not satisfied with the marks allotted to him/her in the semester end examinations, he/she could apply for challenge evaluation within the prescribed time specified. In such cases the answer papers will be valued by the DPGC committee and marks secured by the students in the challenge evaluation will be final.</p>
22NMT16.3	<p>Grade Card: Based on the secured letter grades, grade points, SGPA and CGPA, a grade card for each semester shall be issued. On specific request on paying prescribed fee, a transcript indicating the performance in all semesters may be issued.</p>
22NMT16.4	<p>Conversions of Grades into Percentage and Class Equivalence</p> <p>Conversion formula for the conversion of CGPA into percentage is given below:</p> <p>Percentage of marks secured, $P = CGPA\ Earned \times 10$</p> <p>Illustration: for CGPA of 8.18:</p> <p>$P = CGPA\ Earned\ 8.18 \times 10 = 81.8\ %$</p>
22NMT17.0	<p>DEGREE REQUIREMENTS:</p> <p>The Degree requirements of a student for the M.Tech Degree program are as follows:</p> <ol style="list-style-type: none"> College Requirements: <ol style="list-style-type: none"> Minimum Earned Credit Requirement for M.Tech. Degree is 80 Satisfactory completion of all Mandatory Learning courses

	<p>2. Program Requirements:</p> <ol style="list-style-type: none"> i) Minimum Earned Credit Requirements on all core courses, ii) Elective Courses and major project as specified by the DPGC. <p>The maximum duration for a student for complying to the Degree requirements is 8 semesters from the date of first registration for his first semester.</p>												
22NMT18.0	<p>TERMINATION FROM THE PROGRAM/READMISSION:</p> <p>A student shall be required to leave the College without the award of the Degree, under the following circumstances:</p> <ol style="list-style-type: none"> ii) Failing to complete the degree requirements in double the duration of the program <p>Based on disciplinary action suggested by the Academic Council/Governing Council.</p>												
22NMT19.0	<p>GRADUATION REQUIREMENTS AND CONVOCATION:</p> <ol style="list-style-type: none"> 1. A student shall be declared to be eligible for the award of the Degree if he has <ol style="list-style-type: none"> a) Fulfilled Degree Requirements b) No Dues to the College, Departments, Hostels, Library Central Computer Centre and any other center c) No disciplinary action pending against him. 2. The award of the Degree must be recommended by the Academic council and approved by Governing Council of Nitte (DU) <p>Convocation: Degree will be awarded in person for the students who have graduated during the preceding academic year. Degrees will be awarded in absentia to such students who are unable to attend the Convocation. Students are required to apply for the Convocation along with the prescribed fees, after having satisfactorily completed all the Degree requirements within the specified date in order to arrange for the award of the Degree during convocation.</p>												
22NMT20.0	<p>AWARD OF CLASS, PRIZES, MEDALS & RANKS:</p> <ul style="list-style-type: none"> • Award of Class: Sometimes, it would be necessary to provide equivalence of SGPA and CGPA with the percentages and/or Class awarded as in the conventional system of declaring the results of University examinations. This can be done by prescribing certain specific thresholds in these averages for Distinction, First Class and Second Class as described below. Percentage Equivalence of Grade Points (For a 10-Point Scale) <table border="1" data-bbox="416 1675 1361 1895"> <thead> <tr> <th>CGPA</th> <th>Percentage of Marks*</th> <th>Class</th> </tr> </thead> <tbody> <tr> <td>≥ 7.00</td> <td>$\geq 70\%$</td> <td>Distinction</td> </tr> <tr> <td>≥ 6.00</td> <td>$\geq 60\%$</td> <td>First Class</td> </tr> <tr> <td>$5.0 \geq \text{CGPA} < 6.00$</td> <td>$50 \geq \text{Percentage} < 60\%$</td> <td>Second Class</td> </tr> </tbody> </table> <p>Percentage * = (CGPA) x 10</p> <ul style="list-style-type: none"> • For the award of Prizes, Medals and ranks: The conditions stipulated by the Donor may be considered as per the statutes framed by the University for such awards. 	CGPA	Percentage of Marks*	Class	≥ 7.00	$\geq 70\%$	Distinction	≥ 6.00	$\geq 60\%$	First Class	$5.0 \geq \text{CGPA} < 6.00$	$50 \geq \text{Percentage} < 60\%$	Second Class
CGPA	Percentage of Marks*	Class											
≥ 7.00	$\geq 70\%$	Distinction											
≥ 6.00	$\geq 60\%$	First Class											
$5.0 \geq \text{CGPA} < 6.00$	$50 \geq \text{Percentage} < 60\%$	Second Class											

	<ul style="list-style-type: none"> ○ An attempt means the appearance/registration of a candidate for an examination in one or more courses either in part or failing a particular examination. ○ A candidate who fails/remaining absent (after submitting exam application) in the main examination and passes one or more subjects/courses or all subjects/courses in the supplementary/Make-up examination such candidates shall be considered as taken more than an attempt. ○ Merit Certificates and University Medals/ will be awarded on the basis of overall CGPA, governed by the specific selection criteria that may be formulated by the University for such Medals / Awards ○ Only those candidates who have completed the Program and fulfilled all the requirements in the minimum number of years prescribed (i.e., 2 years) and who have passed each semester in the first attempt are eligible for the award of Merit Certificates and /or Ranks and University Medals. <p>Candidates with W, N, I, X & F grades and who passes the courses in the subsequent/supplementary/make up examinations are not eligible for the award of Gold Medal or Merit Certificate.</p>
22NMT21.0	<p>CONDUCT AND DISCIPLINE:</p> <ol style="list-style-type: none"> 1. Students shall conduct themselves within and outside the premises of the Institute, in a manner befitting the students of an Institution of National Importance 2. As per the order of Honorable Supreme Court of India, ragging in any form is considered as a criminal offence and is banned, any form of ragging will be severely dealt with. 3. The following acts of omission/ or commission shall constitute gross Violation of the code of conduct and are liable to invoke disciplinary measures: <ol style="list-style-type: none"> a) Ragging b) Lack of courtesy and decorum; indecent behavior anywhere within or outside the campus. c) Willful damage or stealthy removal of any property /belongings of the Institute /Hostel or of fellow students/ citizens d) Possession, consumption or distribution of alcoholic drinks or any kind of hallucinogenic drugs. e) Mutilation or unauthorized possession of Library books. f) Noisy and unseemly behavior, disturbing studies of fellow Students. g) Hacking in computer systems (such as entering into other Person's area without prior permission, manipulation and/or Damage of computer hardware and software or any other Cybercrime etc.,). h) Plagiarism of any nature. i) Any other act of gross indiscipline as decided by the University from time to time. j) Smoking in College Campus and supari chewing. k) Unauthorized fund raising and promoting sales

	<p>4. Commensurate with the gravity of offense, the punishment may be: reprimand, expulsion from the hostel, debarment from an examination, disallowing the use of certain facilities of the College, rustication for a specified period or even outright expulsion from the College, or even handing over the case to appropriate law enforcement authorities or the judiciary, as required by the circumstances.</p> <p>i) For an offence committed in</p> <p>a) A hostel</p> <p>b) A department or in a classroom</p> <p>c) Elsewhere,</p> <p>the Chief Warden, the Head of the Department and the Dean (Students Welfare), respectively, shall have the authority to reprimand or impose fine.</p> <p>ii) All cases involving punishment shall be reported to the Principal.</p> <p>5. Cases of adoption of unfair means and/or any malpractice in an examination shall be reported to the Controller of Examination.</p> <p>o Note: Students are required to be inside the examination hall 20 minutes before the commencement of examination. This is applicable for all examinations (Semester end/Supplementary/makeup) henceforth. Students will not be allowed inside the examination hall after the commencement, under any circumstances.</p>
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**Scheme & Syllabus for
M. Tech. (Construction Technology)**

CIVIL ENGINEERING
2022-24

Institution Vision

Pursuing Excellence, Empowering people, Partnering in Community Development.

Institution Mission

To develop NMAM Institute of Technology, Nitte, as Center of Excellence by imparting Quality Education to generate Competent, Skilled and Humane Manpower to face emerging Scientific, Technological, Managerial and Social Challenges with Credibility, Integrity, Ethics and Social Concern.

Department Vision

To uphold the Department as a leader in community development through innovation and excellence in diverse areas of Civil Engineering to meet the global challenges and market demands.

Department Mission

1. To provide the students a strong theoretical knowledge and practical skills to understand the basic concept and fundamentals of various Civil Engineering subjects.
2. To be competent and skilled enough to take the challenges in Research, Consultancy and Entrepreneurship.
3. To encourage the students in developing professional ethics through discipline and principles.

Programme Educational Objectives (PEO)

PEO 1.	Equipped to pursue professional career in the constantly changing field of construction, Engineering, Technology and Management.
PEO 2.	Competent enough to contribute knowledge base through Learning and Research.
PEO 3.	Continue to practice and promote the needs and challenges of real world problems and come up with sustainable solutions for social needs.

Programme Outcomes (PO)

At the end of M.Tech in Construction Technology Programme Students will have

PO1.	An ability to independently carry out research /investigation and development work to solve practical problems
PO2.	An ability to write and present a substantial technical report/document
PO3.	Students should be able to demonstrate a degree of mastery over the area as per the specialization of the program. The mastery should be at a level higher than the requirements in the appropriate bachelor program
PO4.	Demonstrate knowledge and understanding of engineering and management principles and apply the same to one's own work, as a member and leader in a team, manage projects efficiently in respective disciplines and multidisciplinary environments after consideration of economical and financial factors
PO5.	Acquire professional and intellectual integrity, professional code of conduct, ethics of research and scholarship, consideration of the impact of research outcomes on professional practices and an understanding of responsibility to contribute to the community for sustainable development of society.
PO6.	Communicate with the engineering community, and with society at large, regarding complex engineering activities confidently and effectively, such as, being able to comprehend and write effective reports and design documentation by adhering to appropriate standards, make effective presentations, and give and receive clear instructions.

Programme Specific Outcomes (PSO)

PSO 1.	Apply knowledge of various domains of Construction Technology; conduct experiments, analyze, interpret data, and design.
PSO 2.	Competent with skills and knowledge for Research and Innovative practices

DEPARTMENT: CIVIL ENGINEERING

Sl. No	Name of Faculty	Qualification	Designation
1.	Dr. I. Ramesh Mithanthaya	Ph.D.	Prof./ Vice Principal /Dean(Aca)
2.	Dr. A.N. Parameswaran	Ph.D.	Professor/ Director (III)
3.	Dr. Arun Kumar Bhat	Ph.D.	Professor/HOD
4.	Dr. Udayakumar G.	Ph.D.	Professor
5.	Dr. Srinath Shetty K.	Ph.D.	Professor
6.	Dr. Radhakrishnan K.	Ph.D.	Professor
7.	Mr. Bhandage A R	M.Tech.	Associate Professor
8.	Dr. Bhojaraja B E.	Ph.D.	Associate Professor
9.	Dr. Ranjith A	Ph.D.	Associate Professor
10.	Dr. Shaik Kabeer Ahmed	Ph.D.	Associate Professor
11.	Mr. J.K. Lokesh	M.Tech	Asst. Prof. Gd III
12.	Dr. Pushparaj A Naik	Ph.D.	Asst. Prof. Gd III
13.	Dr. Mithun B.M.	Ph.D.	Asst. Prof. Gd III
14.	Dr. Saranya P	Ph.D.	Asst. Prof. Gd III
15.	Dr. Shriram P Marathe	Ph.D.	Asst. Prof. Gd III
16.	Mr. Sundip Shenoy R.	M.Tech., (Ph.D.)	Asst. Prof. Gd II
17.	Mr. Gururaj Acharya	M.Tech.	Asst. Prof. Gd II
18.	Mr. Rakshith Kumar Shetty	M.Tech.	Asst. Prof. Gd II
19.	Mr. Manjunath M.	M.Tech., (Ph.D.)	Asst. Prof. Gd II
20.	Mr. Roshan Rai	M.Tech.	Asst. Prof. Gd II
21.	Mr. Janakaraj M	M.Tech.	Asst. Prof. Gd II
22.	Mr. Arjun K Punja	B. E., MBA.	Asst. Prof. Gd II
23.	Mr. Sabyath P Shetty	M.Tech., (Ph.D.)	Asst. Prof. Gd II
24.	Mr. Prashantha Kumar K.	M.Tech., (Ph.D.)	Asst. Prof. Gd I
25.	Mr. Prithviraj H.K.	M.Tech.	Asst. Prof. Gd I
26.	Mr. Thushar S. Shetty	M.Tech., (Ph.D.)	Asst. Prof. Gd I
27.	Mr. Pradeep Karanth	M.Tech., (Ph.D.)	Asst. Prof. Gd I
28.	Mr. Shanmukha Shetty	M.Tech., (Ph.D.)	Asst. Prof. Gd I
29.	Ms. Thanushree Hegde	M.Tech.	Asst. Prof. Gd I
30.	Ms. Deekshitha M	M.Tech., (Ph.D.)	Asst. Prof. Gd I
31.	Mr. Ekanath P.	M. Tech.	Visiting Faculty
32.	Mr. Rajesh D. Maistry	M. Tech.	Visiting Faculty

CREDIT DISTRIBUTION

No.	Course Category	Suggested Credits
1.	Professional Courses (PCC) – core	16
2.	Professional Courses (PEC) – elective	18
3.	Research Methodology & IPR/RETP	04
4.	Labs	04
5.	Project Work (UCC) (Phase 1 & 2)	08+20
6.	Audit Courses	00 (2 Audit Courses)
7.	Seminar on Current Topic (UCC)	02
8.	Internship (UCC)	08
Total Credits to be earned:		80

M.Tech. (CCT): Scheme of Teaching and Examinations 2022-24
Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
 (Effective from the academic year 2022 - 23)

1st Year Scheme

I SEMESTER												
Sl. No	Course Type	Course Code	Course Title	Teaching Department	Teaching Hours /Week			Examination				Credits
					Lecture	Tutorial	Practical	Duration Hrs	CIE Marks	SEE Marks	Total Marks	
					L	T	P					
1	PCC	22CCT101	Construction Planning & Control Management	CV	4	0	0	3	50	50	100	4
2	PCC	22CCT102	Construction Economics & Finance	CV	4	0	0	3	50	50	100	4
3	RETP	22CCT103	Research Experience Through Practice -I	CV	Four contact hours /week for carrying out Research and Interaction between the faculty and students			-	100	0	100	2
4	PEC	22CCT11X	Elective – I	CV	3	0	0	3	50	50	100	3
5	PEC	22CCT12X	Elective - II	CV	3	0	0	3	50	50	100	3
6	PEC	22CCT13X	Elective - III	CV	3	0	0	3	50	50	100	3
7	PCC	22CCT104	Land Survey and Terrain Mapping	CV	0	0	2	3	50	50	100	1
8	PCC	22CCT105	Project Management Lab	CV	0	0	2	3	50	50	100	1
9	AUDIT	22CCTAU1X	Audit Course-I	CV	2	0	0	0	0	0	0	0
Total					19	0	4	21	450	350	800	21

II SEMESTER												
Sl. No	Course Type	Course Code	Course Title	Teaching Department	Teaching Hours /Week			Examination				Credits
					Lecture	Tutorial	Practical	Duration Hrs	CIE Marks	SEE Marks	Total Marks	
					L	T	P					
1	PCC	22CCT201	Construction Quality and Safety Management	CV	4	0	0	3	50	50	100	4
2	PCC	22CCT202	Construction and Contract Management	CV	4	0	0	3	50	50	100	4
3	RETP	22CCT203	Research Experience Through Practice -II	CV	Four contact hours /week for carrying out Research and Interaction between the faculty and students			-	100	0	100	2
4	PEC	22CCT21X	Elective – IV	CV	3	0	0	3	50	50	100	3
5	PEC	22CCT22X	Elective – V	CV	3	0	0	3	50	50	100	3
6	PEC	22CCT23X	Elective - VI	CV	3	0	0	3	50	50	100	3
7	PCC	22CCT204	Building Information Modelling (BIM) Lab	CV	0	0	2	3	50	50	100	1
8	PCC	22CCT205	Advanced Concrete Technology Lab	CV	0	0	2	3	50	50	100	1
9	AUDIT	22CCTAU2X	Audit Course-II	CV	2	0	0	0	0	0	0	0
Total					19	0	4	21	450	350	800	21

Note: PCC: Professional Core Course, PEC: Professional Elective Course, AUDIT (AU): Non-credit Audit course, RETP: Research Experience Through Practice. L –Lecture, T – Tutorial, P- Practical/ Drawing, CIE: Continuous Internal Evaluation, SEE: Semester End Examination.

Established under Section 3 of UGC Act 1956 Off-Campus Centre, Nitte - 574 110, Karkala
Accredited with 'A+' Grade by NAAC

M.Tech. (CCT): Scheme of Teaching and Examinations 2022-24
Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
(Effective from the academic year 2022 - 23)

2nd Year Scheme
III SEMESTER

Sl. No	Course Type	Course Code	Course Title	Teaching Department	Teaching Hours /Week			Examination				Credits
					Lecture	Tutorial	Practical	Duration Hrs	CIE Marks	SEE Marks	Total Marks	
					L	T	P					
1	UCC	22CCT301	Industry Internship/ Research Internship/Mini Project	CV	8 Weeks Full Time [32Hrs/week]			3	100	0	100	8
2	UCC	22CCT302	Seminar on Special Topic	CV	0	0	2	3	100	0	100	2
3	UCC	22CCT303	Project Part -1	CV	8 Weeks Full Time [32Hrs/week]			3	200	0	200	8
				Total	0	0	2	9	400	0	400	18

Note: L –Lecture, T – Tutorial, P- Practical/ Drawing, S – Self Study Component, CIE: Continuous Internal Evaluation, SEE: Semester End Examination.

Internship: CIE Evaluation is for 100 Marks where 50 Marks is for Report and 50 Marks for the Presentation

Project Part-1: CIE Evaluation is for 200 Marks where 100 Marks is for Report and 100 Marks for the Presentation

IV SEMESTER

Sl. No	Course Type	Course Code	Course Title	Teaching Department	Teaching Hours /Week			Examination				Credits
					Lecture	Tutorial	Practical	Duration Hrs	CIE Marks	SEE Marks	Total Marks	
					L	T	P					
1	UCC	22CCT401	Project Part -2	CV	20 Weeks Full Time [40Hrs/week]			3	200	200	400	20
				Total	0	0	0	3	200	200	400	20

Note: L –Lecture, T – Tutorial, P- Practical/ Drawing, S – Self Study Component, CIE: Continuous Internal Evaluation, SEE: Semester End Examination.

Project Part-2: CIE Evaluation is for 200 Marks having Project Progress Evaluation (PPE)-1 and PPE-2 each for 100 Marks.

M.Tech. (CCT): Scheme of Teaching and Examinations 2022-24
Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
(Effective from the academic year 2022 - 23)

List of Domain Specific Skill Development Audit Course (AUDIT)			
Audit Course-I		Audit Course-II	
Course Code	Course Title	Course Code	Course Title
22CCTAU11	National Building Code –Part I	22CCTAU21	National Building Code –Part II

List of Electives [PEC]			
Elective - I		Elective - II	
Code	Course Title	Code	Course Title
22CCT111	Special Concretes	22CCT121	Operation Research
22CCT112	Disaster Management	22CCT122	Remedial Engineering
22CCT113	Human Resource Management	22CCT123	Pavement Design & Construction
Elective - III		Elective - IV	
Code	Course Title	Code	Course Title
22CCT131	Mechanization in Construction	22CCT211	Risk Management
22CCT132	Structural Masonry	22CCT212	Infrastructure Development–Programmes, Planning and Appraisal
22CCT133	Advanced Reinforced Concrete Design	22CCT213	Valuation Technique in Engineering
Elective - V		Elective – VI	
Code	Course Title	Code	Course Title
22CCT221	Global Business Management	22CCT231*	Characterization of Construction Materials
22CCT222	Reuse & Recycle Technology	22CCT232	Organizational Behaviour
22CCT223	Building Service & Maintenance	22CCT233**	Ground Improvement, Tunnelling & Precast Technique

* NPTEL course

** Industry offered course

SEMESTER I

CONSTRUCTION PLANNING AND CONTROL MANAGEMENT			
Course Code:	22CCT101	Course Type	PCC
Teaching Hours/Week (L: T: P: S)	4:0:0:0	Credits	04
Total Teaching Hours	50	CIE + SEE Marks	50+50
Teaching Department: Civil Engineering			
Course Objectives:			
1.	Understand various organizational forms/structures Bar charts, Milestone charts and Work breakdown structure. Have the knowledge of Activity, Event, Different type of floats, forward pass, backward pass.		
2.	Construction of network diagrams, Determine activity start and finish times. Know about CPM, the project management tool		
3.	Know three time estimates referring to PERT, Scheduling, Monitoring and Updating. Resource Planning-levelling and allocation.		
4.	Acquire the knowledge of Cost control in construction, linear programming, Transportation models.		
5.	Know about Material Management, Store management, Purchase management and Inventory control management.		
UNIT-I			
			10 Hours
Project Organization, Formal and Informal organization, Organization Structures, Bar chart, Milestone chart, Work Breakdown Structure, Cost breakdown structure. Activity and event, Activity start and finish times, Forward and backward pass, Floats – Definition, Different types. Line and staff organizations, AON & AOA diagrams			
UNIT-II			
			10 Hours
Network Analysis, Construction of network diagrams using predecessor relationships, Fulkerson's rule of numbering events, CPM Analysis – Significance. Determination of Earliest and Latest Event Times, Critical Path and various floats.			
UNIT-III			
			10 Hours
PERT Analysis - Importance, Time Estimates-Optimistic time, Pessimistic time, most likely time, Scheduling, Monitoring and Updating. Line of Balance Scheduling. Resource Planning-levelling Allocation, Introduction to Risk Management, Risk Register.			
UNIT-IV			
			10 Hours
Project cost analysis, Time-Cost Trade-off. Cost Control in Construction, Linear programming-Graphical method. Theory of simplex method, Transportation models			
UNIT-V			
			10 Hours
Material Management- Scope, objectives and functions, Store Management-Objectives and functions, Purchase management and inventory control Management. Inventory control techniques, A B C analysis			
Course Outcomes: At the end of the course student will be able to			

1.	To develop bar charts, milestone charts and WBS
2.	To analyze and solve problems on activities and events
3.	To determine the project completion period and to estimate the probability of completing the project within the specified period.
4.	To optimize the project cost and duration by time cost trade off method
5.	To apply the knowledge to procure and manage material for the project.

Course Outcomes Mapping with Program Outcomes & PSO

Program Outcomes →	1	2	3	4	5	6	PSO ↓	
							1	2
↓ Course Outcomes								
22CCT101-1.1	2	2	1	1		2		1
22CCT101-1.2	1			2		2	1	
22CCT101-1.3	2	1			2	2		2
22CCT101-1.4			2	2		2		1
22CCT101-1.5	2	2	2		1	2	1	

1: Low 2: Medium 3: High

TEXTBOOKS:

1. Peurifoy. R L, "Construction Planning, Equipment and Methods", Mc Graw Hill. (March 2010)
2. Srinath L.S, "PERT and CPM", East West Press Private Ltd New Delhi. (2010)

REFERENCE BOOKS:

1. Frank Harris and Ronald McCaffer, "Modern Construction Management", 6th Ed., Blackwell Science Ltd. (March 2013)
2. B.C Punmia, "Pert and CPM", Lakshmi publication.(December 2001);
3. Paul Harris, Planning & Control Using Microsoft Project (2016)
4. Chatfield, Johnson Microsoft Project 2016 Step ByStep (2016)
5. Construction Planning and Management Paperback by U K Srivastava (May 2000)

E Books / MOOCs/ NPTEL/IS Codes

1. IS 14580-1 (1998): Use of Network Analysis for Project Management, Part 1: Management, Planning, Review, Reporting and Termination Procedures.
2. IS 14580-2 (2006): Use of network analysis for projects management, Part 2: Use of graphic technique.
3. IS 15883-1 (2009): Construction project management - Guidelines, Part 1: General.
4. IS 15883-2 (2013): Construction project management - Guidelines, Part 2: Time Management.

CONSTRUCTION ECONOMICS AND FINANCE			
Course Code:	22CCT102	Course Type	PCC
Teaching Hours/Week (L: T: P: S)	4:0:0:0	Credits	04
Total Teaching Hours	50	CIE + SEE Marks	50+50
Teaching Department: Civil Engineering			
Course Objectives:			
1.	Understand the concepts of engineering economics and elementary economic analysis		
2.	Study the capital budgeting and interpret the time value of money		
3.	Study the replacement and maintenance analysis of existing asset		
4.	Study the account process, preparation of journal, ledger and balance sheet		
5.	Study the sources of funds and preparation of Final Accounting-International Financial Reports Standards (IFRS).		
UNIT-I			
			10 Hours
Economics – Flow in an economy, Law of supply and demand. Concepts of Engineering Economics – Types of efficiency, Definition and scope of engineering economics, Elements of cost, other costs/Revenues – Marginal cost, Marginal Revenue, sunk cost, Opportunity cost, Break even Analysis – concept of decision making, Profit/volume ratio.			
Elementary Economic Analysis – Material selection for a product/substitution of raw material, Design selection for a product, Building material selection, Process planning/ Process modification.			
UNIT-II			
			10 Hours
Capital Budgeting – Phases of Capital Budgeting, Objectives of Capital Budgeting, Planning of Capital Expenditures, Control for Capital Expenditure, Time value of money, Present worth method, Future worth method, Annual equivalent method, Rate of return method. Evaluation of public alternatives			
UNIT-III			
			10 Hours
Replacement and Maintenance Analysis – Types of maintenance, Types of replacement problem, Determination of economic life of an asset, Replacement of existing asset with a new asset – capital recovery with return, concept of challenger and defender.			
UNIT-IV			
			10 Hours
Account process: Equation, Rules, Preparation of Journal and Ledger			
Balance sheet – classification of assets and liabilities, accounting equation, classification of accounts, Rules of Debit and Credit, Meaning and format of journal – Meaning of journalizing, Compound Journal Entry, Opening entry, Goods account. Ledger – Relationship between journal and ledger, posting, rules of posting, balancing of an account			
Trial Balance – Objectives, limitations, methods of preparation, accounting errors.			
UNIT-V			
			10 Hours
Trading Account, Profit and loss account, understanding cash flows and fund flows, sources of funds, working capital management, Business plan, Venture capital – kinds, sources and operation. Preparation of Final Accounting-International Financial Reports Standards (IFRS).			

Course Outcomes: At the end of the course student will be able to

1.	Explain the concepts of engineering economics and elementary economic analysis.
2.	Explain the capital budgeting and interpret the time value of money.
3.	Summarize the replacement and maintenance analysis of an existing asset.
4.	Classify the account process, preparation of journal, ledger and balance sheet.
5.	Summarize the sources of funds and explain the preparation of final accounting international financial reports standards (IFRS)

Course Outcomes Mapping with Program Outcomes & PSO

Program Outcomes →	1	2	3	4	5	6	PSO ↓	
							1	2
↓ Course Outcomes								
22CCT102-1.1		1		1		2		1
22CCT102-1.2	1			2		2	1	
22CCT102-1.3		1			2	2		2
22CCT102-1.4			2	2		2		1
22CCT102-1.5			2		1	2	1	

1: Low 2: Medium 3: High

TEXTBOOKS:

1.	R. Paneerselvam, "Engineering Economics", PHI learning private limited. 2nd edition (2014).
2.	I. M. Pandey, "Financial Management:, Vikas publishing house, 7th edition (2017).
3.	Courtland A Collies and William B-Ledbetter (2011), "Engineering Economics and Cost Analysis", Horper and Row
4.	Kuchhal S.C (2013), "Financial Management–Analytical and Conceptual Approach", Chaitanya Publicity House, Allahabad

REFERENCE BOOKS:

1.	Prasanna Chandra (2015), "Projects Planning, Analysis, Selection, Financing, Implementation and Review, "McGraw Hill Education (India) Private Ltd., New Delhi.
2.	Gerald J. Thueson and W.J Fabrycky,(2014) "Engineering Economy", 9th Edition, Prentice Hall of India, New Delhi.
3.	Horne and Wachowicz (2008), "Fundamentals of Financial Management," Prentice Hall of India, New Delhi.

RESEARCH EXPERIENCE THROUGH PRACTICE -1									
Course Code:	22CCT103	Course Type				RETP			
Teaching Hours/Week (L: T: P)	0:0:4	Credits				2			
Total Teaching Hours	0+0+52	CIE				100			
Teaching Department: Any									
Course Objectives: The research purposes are									
1. To foresee future problems through pursuit of truth as a "global centre of excellence for intellectual creativity". 2. To respond to current social demands, and to contribute to the creation and development of scientific technologies with the aim of realizing an affluent society and natural environment for humanity. 3. At the same time, the course aims to create excellent educational resources and an excellent educational environment through frontline researches 4. To Understand professional writing and communication contexts and genres, analyzing quantifiable data discovered by researching, and constructing finished professional workplace documents.									
Individual PG Students are to be allotted to the individual faculty members based on student's area of research interest, specialization of faculty members in the beginning of the first semester.									
MODULE -1									
Defining the research problem – Selecting the problem – Necessity of defining the problem - Techniques involved in defining the problem – Importance of literature review in defining a problem – Survey of literature – Primary and secondary sources – Reviews, treatise, monographs patents – web as a source – searching the web – Identifying gap areas from literature review – Development of working hypothesis, systematic way of conducting research, write a review / research paper, research proposal, preparation of research report.									
MODULE-2									
<ul style="list-style-type: none"> • Introduction various simulation tools related to Construction Technology • Use of software tools (Primavera, BIM Tools, MATLAB-Simulink) • Introduction to typesetting tool (Latex). • At the end of the course students should submit a research proposal and should present the idea. The Research proposal report prepared based on the work carried out by the PG Student is evaluated for 50 marks and 20 minutes presentation on the research work carried out will be evaluated for 50 marks jointly by the examiners. 									
Course Outcomes: At the end of the course student will be able to									
1.	Identify and define the problem statement based on the literature reviewed.								
2.	Formulate the objectives specific to the defined problem statement.								
3.	Develop the methodology for achieving the objectives.								
Course Outcomes Mapping with Program Outcomes & PSO									
	Program Outcomes→	1	2	3	4	5	6	PSO↓	
	↓Course Outcomes							1	2
	22CCT103-1.1	2	2	2	1	2	2	1	2
	22CCT103-1.2	2	2	2	1	2	2	1	2
	22CCT103-1.3	2	2	2	1	2	2	1	2
1: Low 2: Medium 3: High									
REFERENCE BOOKS:									
1.	Gina Wisker, "The Undergraduate Research Hand book", 2018.								
E Books / MOOCs/ NPTEL									
1.	https://www.classcentral.com/course/swayam-research-methodology-17760								

SPECIAL CONCRETES			
Course Code:	22CCT111	Course Type	PEC
Teaching Hours/Week (L: T: P: S)	3:0:0:0	Credits	03
Total Teaching Hours	40	CIE + SEE Marks	50+50
Teaching Department: Civil Engineering			
Course Objectives:			
1.	Learn the principles of concrete mix design with admixtures.		
2.	To understand the importance of light weight concrete and designing the mix proportion.		
3.	To gain the knowledge of Ferrocement materials, testing and serviceability aspects in civil constructions.		
4.	To acquaintance the Fiber reinforced concrete and its material characterization with detailed testing methods and application.		
5.	To have knowledge about High Performance concrete, Self-compacting concrete and other special varieties of concrete		
UNIT-I			
			15 Hours
Development in cements and cement replacement materials, pozzolona, fly ash, silica fume, rice husk ash, recycled aggregates, industrial waste aggregates, chemical admixtures. Mix proportioning of Standard grade concrete: Principles and methods. Light Weight concrete: Introduction, classification, properties, strength and durability, mix proportioning and problems. High density concrete: Radiation shielding ability of concrete, materials for high density concrete, mix proportioning, properties in fresh and hardened state, placement methods.			
UNIT-II			
			15 Hours
Self-Compacting Concrete: Introduction, properties, Qualifying Criteria, Testing Methods, Mix proportioning. Engineered Cementations Composites: Fibre materials, properties in fresh state, mechanical properties, crack arrest and toughening mechanism, applications, mix proportioning,.			
UNIT-III			
			10 Hours
High Strength concrete: constituents, mix proportioning, properties in fresh and hardened states, applications and limitations. Ready Mixed Concrete, Reactive powder concrete, Bacterial concrete			
Course Outcomes: At the end of the course student will be able to			
1.	Identify the Properties, factors influencing for the use of recycled, industrial waste aggregates in concrete and explain the properties, applications and design standard grade concrete.		
2.	Design Light weight and high density concrete mixes and explain their materials, properties, applications, factors affecting the mix design, Manufacturing Methods		
3.	Explain Ferrocement properties, manufacturing methods, behavior in tension, compression and design a simple ferrocement slab		
4.	Explain factors affecting the mix design, behavior of FRC in compression, flexure, crack arrest, toughening mechanism and design fibre reinforced concrete mix proportioning.		
5.	Design Mix Proportioning of High strength concrete and explain the detailed concept of SCC, RPC and bacterial concrete.		

Course Outcomes Mapping with Program Outcomes & PSO

Program Outcomes→	1	2	3	4	5	6	PSO↓	
							1	2
↓ Course Outcomes								
22CCT111-1.1	3	2	3	2	3	2	1	3
22CCT111-1.2	3	2	3	2	3	2	2	1
22CCT111-1.3	3	2	3	2	3	2	1	2
22CCT111-1.4	3	2	3	2	3	2	2	1
22CCT111-1.5	3	2	3	2	3	2	1	2

1: Low 2: Medium 3: High

TEXTBOOKS:

1. Neville A.M, "Properties of Concrete", Pearson Education, Asis, 2010.
2. P. Kumar Mehta, Paul J.N. Monterio, CONCRETE (2017), "Microstructure, Properties and Materials"- Tata McGraw Hill

REFERENCE BOOKS:

1. A.R.Santhakumar, (2007) "Concrete Technology"-Oxford University Press, New Delhi, 2007.
2. Short A and Kinniburgh.W, "Light Weight Concrete"- Asia Publishing House, 1963
3. Aitcin P.C. "High performance concrete"-E and FN, Spon London 1998
4. Rixom.R. and Mailvaganam.N., "Chemical admixtures in concrete"- E and FN, Spon London 1999
5. Rudnai.G., "Light Weight concrete"- Akademiaikiado, Budapest, 1963.
6. IS: 10262: 2019 Concrete Mix Proportioning – Guidelines
7. IS 456-2000 Plain and Reinforced Concrete - Code of Practice

DISASTER MANAGEMENT			
Course Code:	22CCT112	Course Type	PEC
Teaching Hours/Week (L: T: P: S)	3:0:0:0	Credits	03
Total Teaching Hours	40	CIE + SEE Marks	50+50
Teaching Department: Civil Engineering			
Course Objectives:			
1.	Describe the basic types of hazards and their potential consequences to India		
2.	Understand the planning and assessment of Hazard, Risk, Vulnerability and disaster		
3.	Describe the basic concepts of the emergency management cycle (mitigation, preparedness, response, and recovery)		
4.	Critically understand the various disaster management acts and policies and approaches in both national and state level scenario.		
5.	To build skills to respond to disasters in an effective, humane and sustainable manner		
UNIT-I			
			15 Hours
Hazard, Risk, Vulnerability, Disaster and Disaster Management. Types of Disasters: Hazard and vulnerability profile of India. Relevance of Disaster Risk, Vulnerability & Capacity Assessment in Planning, Concepts of Hazard Assessment, Vulnerability Assessment, Risk Assessment and Capacity Assessment, Hazard Identification and analysis.			
UNIT-II			
			15 Hours
Four elements of comprehensive disaster management (Preparedness, Response, Recovery and Mitigation), Concept of Mitigation and its importance (Structural and Non Structural mitigation measures, identification of mitigation measures relating to different types of hazards and implementing strategies). Land use Management tools for disaster risk reduction. (building codes, GDCR, zoning ordinances, land acquisition, transfer of development rights, Recovery and reconstruction plan). National Disaster Management Act, Various State Disaster Management Acts (Gujarat, Uttar Pradesh, Uttaranchal, Bihar, Karnataka) and State disaster management policies (e.g. Orissa, Gujarat, Uttaranchal, Karnataka, Tamil Nadu, Delhi, Uttar Pradesh). Relevance of Rehabilitation and Resettlement Policy in Recovery and reconstruction phase of disaster management. Coastal zoning regulation for construction and reconstruction phase in the coastal areas.			
UNIT-III			
			10 Hours
Role of Government/Civil Society/International Organizations/Communities and Approaches to Community Based Disaster Risk Management and Planning. (Local coping mechanisms, Importance of Mock Drills and On site volunteer management in Community level disaster preparedness activities). Projects implemented general description of projects carried out in India following natural disasters. Disaster resistant buildings & measures. Recent developments. Case studies			
Course Outcomes: At the end of the course student will be able to			
1.	Develop an understanding of the key concepts, definitions a key perspectives of All Hazards, Disasters, Risk and Vulnerability		

2.	Develop a deep understanding of disaster resilience, risk mitigation, and recovery policies as they arise from natural hazards around the globe
3.	Develop a basic understanding of Prevention, Mitigation, Preparedness, Response and Recovery
4.	Understand the various acts and policies related to Indian disaster management
5.	Explain the role of public and private partnerships

Course Outcomes Mapping with Program Outcomes & PSO

Program Outcomes →	1	2	3	4	5	6	PSO ↓	
	↓ Course Outcomes						1	2
22CCT112-1.1	1	1		2			1	
22CCT112-1.2	2	1			2	2	2	
22CCT112-1.3	1	1		2			1	
22CCT112-1.4	1	1			2	2	1	
22CCT112-1.5	1	1		2			1	

1: Low 2: Medium 3: High

REFERENCE BOOKS:

1.	Emergency Management: A Reference Handbook by Jeffrey B. Bumgarner ABC-Clio, 2008
2.	Lessons of Disaster: Policy Change after Catastrophic Events by Thomas A. Birkland Georgetown University Press, 2006
3.	The Indian Ocean Tsunami: The Global Response to a Natural Disaster by Pradyumna P. Karan; Shanmugam P. Subbiah University Press of Kentucky, 2011.
4.	Chaos Organization and Disaster Management by Alan Krischenbaum Marcel Dekker, 2004.
5.	Emergency Relief Operations by Kevin M. Cahill Fordham University Press, 2003
6.	A Comprehensive Approach to Emergency Planning By Worsely, Tracy L.; Beckering, Don College and University, Vol. 82, No. 4, January 1, 2007.

HUMAN RESOURCE MANAGEMENT									
Course Code:		22CCT112		Course Type			PEC		
Teaching Hours/Week (L: T: P: S)		3:0:0:0		Credits			03		
Total Teaching Hours		40		CIE + SEE Marks			50+50		
Teaching Department: Civil Engineering									
Course Objectives:									
1.	To introduce the basic concepts, functions and processes of human resource management								
2.	To create an awareness of the role, functions and functioning of human resource department of the organizations								
3.	To familiarize the students with the basic concepts, tools and techniques of qualitative measurement of human resources requirements.								
4.	To enable the students to acquire the knowledge necessary for preparing the manpower plan of a business enterprise and subsequent plans of actions.								
5.	To train them in application of human resource planning techniques.								
UNIT-I									
									15 Hours
Human Resource Management: Concept and Challenges, Scope, Objectives' HR Planning Job Analysis and Design. Recruitment, Selection, Placement, Training Performance appraisal, Employee remuneration and Benefits. Industrial relations: Trade unions, Disputes and their resolution. HR Profession, and HR Department Line Management Responsibility in HRM HR Philosophy, Policies, Procedures and Practices Designing HR systems Functional Areas of HRM Human Resource Development: Values and Tools HR as a Factor of Competitive Advantage Accountability in HR									
UNIT-II									
									15 Hours
Productivity Management Quantitative determination of Human Resource requirements: Work Study. The Human Factor in the Application of Work Study. Working Conditions and the Working Environment. Methods Study; the Approach to Methods Study. Work Measurement; the Purpose and the Basic Procedure. The Techniques of Work Measurement; Work Sampling, Structured Estimating, Time Study and Pre-determined Time Standards. Strategic Planning and Human Resource Planning. Human Resource Planning in Changing Context									
UNIT-III									
									10 Hours
Qualitative determination of human resource requirements: Job Analysis. Human Resource Demand Forecasting. Human Resource Supply Estimates. Action Plans – Separation. Action Plans – Retention, Training, Redeployment & Staffing									
Course Outcomes: At the end of the course student will be able to									
1.	Describe the basic concepts, functions and process in human resource management.								
2.	Explain the functioning of human resource.								
3.	Describe the qualitative measurement of human resources.								
4.	Prepare the manpower plan of a business enterprise and plan of action.								
5.	To execute the application of human resource planning technique.								
Course Outcomes Mapping with Program Outcomes & PSO									
		Program Outcomes →					PSO ↓		
		1	2	3	4	5	6	1	2
↓ Course Outcomes									

	22CCT113-1.1	2			1			1	
	22CCT113-1.2	1	2	1	2			2	
	22CCT113-1.3	2			1			1	
	22CCT113-1.4	1		1	2			2	
	22CCT113-1.5	3	2		1			1	

1: Low 2: Medium 3: High

TEXTBOOKS:

1.	Mirza S. Sayadin, (1988) "Human Resource Management", Tata McGraw Hill Book Company, New Delhi.
2.	Suri S.K. (1988) "Human Resource Development and Productivity: New Perspective", National Productivity Council, Delhi.

REFERENCE BOOKS:

1.	Rao Subba P, (1999) Essential of HRM and Industrial Relations, "Text cases and Games", Himalaya Publishing house, II Edition.
2.	Gupta C.B., (2003) "Human Resource Management", Sultan Chand and Sons, New Delhi.

OPERATION RESEARCH										
Course Code:		22CCT121		Course Type			PEC			
Teaching Hours/Week (L: T: P: S)		3:0:0:0		Credits			03			
Total Teaching Hours		40		CIE + SEE Marks			50+50			
Teaching Department: Civil Engineering										
Course Objectives:										
1.	The use of operation research in civil engineering.									
2.	The linear programming methods in solving engineering problems.									
3.	The non-linear programming methods in solving engineering problems.									
4.	The dynamic programming methods in solving engineering problems.									
5.	The network analysis and post optimality analysis.									
UNIT-I										
									15 Hours	
<p>Use of Operations Research in Civil Engineering and Managerial Decision making process. Introduction to Optimization Techniques and their application in Engineering Planning, Design and Construction. Various models; Objective function and constraints, convex and concave functions, regions and sets.</p> <p>Linear programming: Formulation of Linear optimization models, Civil engineering applications. Simplex method, special cases in simplex method, Method of Big M, Two phase method, duality, sensitivity analysis. Transportation Model and its variants, Assignment Model and its variants. Games Theory.</p>										
UNIT-II										
									15 Hours	
<p>Non-Linear programming: Single variable unconstrained optimization –Local & Global optima, Uni-modal Function- Sequential Search Techniques: Dichotomous, Fibonacci, Golden Section methods. Multivariable optimization without constraints-The gradient vector and Hessian Matrix, Gradient techniques, steepest ascent/decent technique, Newton’s Method. Multivariable optimization with equality Constraints-Lagrange Multiplier Technique.</p> <p>Dynamic Programming: Introduction – Recursive equation approach, solution of Discrete DPP, Solution of LPP by Dynamic Programming Waiting line models: Poisson - Exponential single server model – infinite and finite population, Poisson - Exponential multiple server model – infinite population.</p>										
UNIT-III										
									10 Hours	
<p>Network Analysis: Introduction- Minimum Span Problems, Shortest- Route problems, Maximal- Flow Problems. Post optimality analysis: Monte - Carlo system simulation</p>										
Course Outcomes: At the end of the course student will be able to										
1.	Describe the importance of operation research in civil engineering.									
2.	Integrate the linear programming methods in solving engineering problems.									
3.	Involve the non-linear programming methods in solving engineering problems.									
4.	Integrate the dynamic programming methods in solving engineering problems.									
5.	Design a network and analyze the post optimality.									
Course Outcomes Mapping with Program Outcomes & PSO										
		Program Outcomes→		1	2	3	4	5	6	PSO↓

↓ Course Outcomes							1	2
22CCT121-1.1	2	2	2				2	
22CCT121-1.2		1	2	2			2	
22CCT121-1.3	2	1	1				1	
22CCT121-1.4	1	1	2	2			2	
22CCT121-1.5	1	2	2	2			2	

1: Low 2: Medium 3: High

TEXTBOOKS:

1. Operations Research by J. K. Sharma
2. Quantitative Techniques in Management by N. D. Vohra

REFERENCE BOOKS:

1. N.D. Vohra., (2001) Quantitative Techniques in Management – Tata McGraw Hill Book Co.
2. Gupta R.C. (1986) Quantitative methods and operations Research – CBS Management Series
3. Operations Research by Hamdy A. Taha
4. Engineering Optimization Theory & Practice – S.S. Rao., Wiley.
5. Engineering Optimization—Methods and Applications—Ravindran, Wiley
6. Principles of Construction Management by R. Pilcher
7. Operations Management by E.S. Buffa
8. Principles of Operations Management by H. M. Wangner

REMEDIAL ENGINEERING										
Course Code:			22CCT122		Course Type			PEC		
Teaching Hours/Week (L:T:P: S)			3:0:0:0		Credits			03		
Total Teaching Hours			40		CIE + SEE Marks			50+50		
Teaching Department: Civil Engineering										
Course Objectives:										
1.	Know about causes of deteriorations of concrete and various NDT methods for investigations.									
2.	Have vast information about the design and construction errors, corrosion mechanism and corrosion protection.									
3.	Know about different types of concrete for repairing of damaged building.									
4.	Know about crack pattern, different techniques of crack repairing of damaged structures.									
5.	Demonstrate various methods of retrofitting of RC members and demolition technique.									
UNIT-I										
									15 Hours	
Introduction, Cause of deterioration of concrete structures, Diagnostic methods & Analysis, preliminary investigations, experimental investigations using NDT Influence on Serviceability and Durability: Effects due to climate, temperature, chemicals, wear and erosion, Design and construction errors, corrosion mechanism, Effects of cover thickness and cracking, methods of corrosion protection, corrosion inhibitors, corrosion resistant steels, coatings, cathodic protection										
UNIT-II										
									15 Hours	
Materials for Repair: Special concretes and mortar, concrete chemicals, special elements for accelerated strength gain, Expansive cement, polymer concrete, sulphur infiltrated concrete, Ferro cement, Fiber reinforced concrete. Techniques for Repair: Rust eliminators and polymers coating for rebar during repair, foamed concrete, mortar and dry pack, vacuum concrete, Guniting and Shot Crete, Epoxy injection, Mortar repair for cracks, shoring and underpinning										
UNIT-III										
									10 Hours	
Examples of Repair: To Structures Repairs to overcome low member strength, Deflection, Cracking, Chemical disruption, weathering wear, fire, leakage, marine exposure, engineered demolition techniques for dilapidated structures - case studies										
Course Outcomes: At the end of the course student will be able to										
1.	Identify the defects in concrete by using various NDT methods and propose proper remedial measures.									
2.	Identify the design and construction errors and suggest appropriate solution to repair.									
3.	Idea of using appropriate materials for repair and restoration of damaged structure.									
4.	Identification of crack pattern and suggest various techniques of crack repairing for damaged structures.									
5.	Suggest suitable methods of retrofitting of damaged RC members and safe demolition technique for severely damaged buildings.									
Course Outcomes Mapping with Program Outcomes & PSO										
			Program Outcomes →							PSO ↓
			1	2	3	4	5	6		

↓ Course Outcomes							1	2
22CCT122.1	3			1	1	3	1	3
22CCT122.2	2	3	1	2	2	2	2	1
22CCT122.3	3	2		1	1	3	1	2
22CCT122.4	2	3	1	2	2	2	2	1
22CCT122.5	3	2		1	1	3	1	2

1: Low 2: Medium 3: High

TEXTBOOKS:

1. Sidney., M. Johnson "Deterioration Maintenance and Repair of Structures"
2. R.N. Raikar "Rehabilitation of Structures"- Edited by, Vol. 1, 2 and 3, Proc., Int. Symposium, Maharashtra Indian Chapter of ACI, Bombay

REFERENCE BOOKS:

1. Denison Campbell, Allen & Harold Roper," Concrete Structures– Materials, Maintenance and Repair"- Longman Scientific and Technical
2. CPWD Hand book on Repair and Rehabilitation of RCC Buildings, DG(W), Central Public Works Department, New Delhi, 2002.

PAVEMENT DESIGN AND CONSTRUCTION			
Course Code:	22CCT123	Course Type	PCC
Teaching Hours/Week (L:T:P: S)	3:0:0:0	Credits	03
Total Teaching Hours	40	CIE + SEE Marks	50+50
Teaching Department: Civil Engineering			
Course Objectives:			
1.	Know the factors to be considered in designing a good highway and airfield pavement, and their requirements.		
2.	Understand the analysis of various types of stresses in flexible pavements and to design the thickness of various layers as per IRC:37-2001. Also, to know the guidelines in design of the flexible pavement as per some famous standard International methods.		
3.	Impart the knowledge on analyzing various types of stresses in rigid pavements and to design the pavement slab thickness as per IRC:58-2002.		
4.	Get the knowledge in designing the various elements of rigid pavements as per IRC:58-2002.		
5.	Understand the working principle of various equipments used for highway construction and also to describe the different steps involved in preparing sub-grade, embankment, and tests used to check its quality.		
6.	To describe the different steps involved in preparing sub-grade, embankment, and tests used to check its quality.		
7.	Study the specifications, construction methods and quality control checks used for rigid pavement construction, and various components of rigid pavements.		
UNIT-I			
Introduction			06 Hours
Highway and airport pavements, objects of pavement design, Desirable characteristics and requirements of a well-designed Pavement. Types and component parts of pavements, their differences - Factors affecting design and performance of flexible and rigid pavements. Significance and determination of CBR value and modulus of sub-grade reaction value in pavement design.			
Analysis and design of flexible pavements			10 Hours
Stresses and deflections in homogeneous single layer and two-layer masses. ESWL concept for dual and tandem wheel load assembly, Effect of wheel-load repetitions-EWLF and its applications. General approach, Vehicle damage factor- significance and its determination from axle-load distribution data. CBR method of pavement design-Principle – Design steps and Problems on IRC: 37-2001,			
UNIT-II			
Analysis and design of rigid pavements			10 Hours
Basic principle and concepts. Effect of wheel load and its repetitions, Westergaard's analysis of stresses, Modified Westergaard's (IRC) equations- Concept of Wheel load stresses-Warping stresses-Frictional stresses-Combined stresses. Introduction, Types of joints and their functions, joint spacing; Design of joint details for longitudinal joints, contraction joints, expansion joints and load transfer joints. IRC method of design by stress ratio method (IRC: 58-2002).			
Subgrade and cement concrete pavements			06 Hours
Earthwork grading and construction of embankments and cuts for roads. Preparation of subgrade, quality control tests. Introduction, Specifications of materials and method of cement concrete pavement construction as per IRC (MORT&H) guidelines ; Quality control tests; Construction of various types of joints in CC pavement.			

UNIT-III
Flexible pavements:
05 Hours

Introduction, Interface treatment-Prime coat and tack coat; Specifications of materials, construction method and field control checks for the following flexible pavement layers – GSB, WBM, WMM, BM, DBM, SDBC and BC as per IRC (MORT&H) guidelines.

Structural evaluation using BBD Method: General approach, Field data collection, statistical analysis, Corrections and overlay design using BBD studies using IRC-81 guidelines.

Course Outcomes: At the end of the course student will be able to

1.	Describe the requirements and the factors to be considered in designing a good highway and airfield pavements.
2.	Analyze the stresses in various layers of flexible pavements and design the pavement as per IRC:37-2001.
3.	Analyze the various types of stresses in rigid pavements and design the pavement thickness and components as per IRC:58-2002.
4.	Select the suitable equipment for the construction of pavement based on necessity and their working principle, and narrate the different steps involved in preparing sub-grade embankment, and tests used to check its quality. Also to explain construction and quality control measures of jointed cement concrete pavement
5.	Explain the specifications, construction methods, and quality control checks during the construction of flexible pavement. Also, execute an overlay design of flexible pavement from BBD studies as per IRC guidelines.

Course Outcomes Mapping with Program Outcomes & PSO

Program Outcomes→ ↓ Course Outcomes	1	2	3	4	5	6	PSO↓	
							1	2
22CCT123.1	3			1	1	3	2	3
22CCT123.2	3	3	1	2	2	2	2	2
22CCT123.3	3	3	1	1	1	3	2	2
22CCT123.4	2	3	1	2	2	2	2	1
22CCT123.5	2	3	3	1	1	3	2	2

1: Low 2: Medium 3: High

TEXTBOOKS:

1. Khanna. S. K, Justo. C.E.G, Veeraragavan. A, "Highway Engineering", Revised 10th edition, Nem Chand and Bros, 2014.
2. Kadiyali L. R., Lal. N.B, "Principles and Practices in Highway Engineering", Khanna Publishers, New Delhi. Revised Edition. 2012.

REFERENCE BOOKS:

1. Sharma S K," Principles, Practice and Design of Highway Engineering", S Chand and Company Ltd., New Delhi, 2006.
2. Yoder E.J. and Witczak, "Principle of pavement design", 2nd edition, John Wiley and Sons, 1975.
3. Relevant publications of Bureau of Indian Standards, New Delhi.
4. Yang H. Huang, "Pavement Analysis and Design", Pearson Prentice Hall, 2004
5. Khanna, Justo. C.E.G, "Highway Engineering", 8th edition, Nem Chand and Bros, 2001.

MECHANIZATION IN CONSTRUCTION			
Course Code:	22CCT131	Course Type	PEC
Teaching Hours/Week (L: T: P: S)	3:0:0:0	Credits	03
Total Teaching Hours	40	CIE + SEE Marks	50+50
Teaching Department: Civil Engineering			
Course Objectives:			
1.	To understand the importance of mechanization in construction projects, study the different classification of the equipments in construction projects, calculating costs related to the equipments in construction.		
2.	To understand how to reduce to costs related to the equipments in the construction projects, estimating the productivity of the equipments.		
3.	To understand the different types of aggregate production, types of bar bending techniques, workability and its assessment of concrete in fresh state and during its production, and costs related to the concrete productions.		
4.	To know the different types of constriction of bridges, understand different types of tunneling methods.		
5.	To know and understand the types of form work, design of form work for the construction projects, difference between prefab/prefab construction, and safety related to the construction.		
UNIT-I			
			15 Hours
Introduction to mechanization: Definition, advantages and limitations of mechanization, Indian scenario and Global scenario. Mechanization through construction equipment: standard and special, equipments cost: ownership and operating, Depreciation: definition and methods of assessing depreciation. Mechanization through construction equipments: Production Cycle: Dozers, scrapers, Excavators, Finishing equipment, Trucks and Hauling equipment, Hoisting equipment, Draglines and Clamshells.			
UNIT-II			
			15 Hours
Mechanization in Aggregate manufacturing: Natural aggregates and recycled aggregates Mechanization in - Rebar fabrication, Concrete production and placement Mechanization through construction methods/technologies: segmental construction of bridges/flyovers, box pushing technology for tunneling, trench-less technology			
UNIT-III			
			10 Hours
Formwork and scaffolding- types, materials and design principles. Precast/Prefab construction. Safety and Environmental issues in different equipment usages.			
Course Outcomes: At the end of the course student will be able to			
1.	Explain the importance of mechanization in construction projects, classify the equipment's in construction projects and calculate equipment costs.		
2.	Describe costs related to the equipments and estimate the productivity of the equipments.		
3.	Illustrate different types of aggregate production, bar bending techniques, and improvise costs related to the concrete productions.		
4.	Explain the different types in constriction of bridges, tunneling methods.		

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|-----------|---|
| 5. | Summarize the types of form work, design of form work for the construction projects, difference between prefab/prefab construction, and safety aspects. |
|-----------|---|

Course Outcomes Mapping with Program Outcomes & PSO

Program Outcomes→	1	2	3	4	5	6	PSO↓	
							1	2
↓ Course Outcomes								
22CCT131-1.1	1	2	2	2			2	
22CCT131-1.2	2	2			1		2	
22CCT131-1.3			2				2	
22CCT131-1.4		2			1		2	
22CCT131-1.5	2	2	1			2	2	

1: Low 2: Medium 3: High

REFERENCE BOOKS:

- | | |
|-----------|--|
| 1. | Construction Equipment and its Planning and Applications”, Mahesh Varma, Metropolitan Book Co.(P) Ltd.,New Delhi. India. |
| 2. | Construction Machinery and Equipment in India”. (A compilation of articles Published in Civil Engineering |
| 3. | Construction Review” Published by Civil Engineering and Construction Review, New Delhi, 1991. |
| 4. | Sharma S.C. “Construction Equipment and Management”, Khanna Publishers, Delhi, 1988 |
| 5. | Peurifoy R L, “Construction Planning, Equipment and Methods”, Mc Graw Hill |
| 6. | James F Russell, “Construction Equipment”, Prentice Hall |
| 7. | Peurifoy R L, “Construction Planning, Equipment and Methods”,Mc Graw Hill |
| 8. | Chithkara K.K, “Construction Project Management. |

STRUCTURAL MASONRY			
Course Code:	22CCT132	Course Type	PEC
Teaching Hours/Week (L: T: P: S)	3:0:0:0	Credits	03
Total Teaching Hours	40	CIE + SEE Marks	50+50
Teaching Department: Civil Engineering			
Course Objectives:			
1.	To learn performance of masonry structures		
2.	To learn masonry structural design.		
3.	To evaluate the strength and stability of the masonry structures		
4.	To learn the load bearing masonry design		
5.	To study the design procedure for earthquake resistant masonry		
UNIT-I			
			15 Hours
<p>Introduction, Masonry units, materials and types: History of masonry Characteristics of Brick, stone, clay block, concrete block, stabilized mud block masonry units – strength, modulus of elasticity and water absorption. Masonry materials – Classification and properties of mortars, selection of mortars.</p> <p>Strength of Masonry in Compression: Behaviour of Masonry under compression, strength and elastic properties, influence of masonry unit and mortar characteristics, effect of masonry unit height on compressive strength, influence of masonry bonding patterns on strength, prediction of strength of masonry in Indian context, Failure theories of masonry under compression. Effects of slenderness and eccentricity, effect of rate of absorption, effect of curing, effect of ageing, workmanship on compressive strength.</p>			
UNIT-II			
			15 Hours
<p>Flexural and shear bond, flexural strength and shear strength: Bond between masonry unit and mortar, tests for determining flexural and shear bond strengths, factors affecting bond strength, effect of bond strength on compressive strength, orthotropic strength properties of masonry in flexure, shear strength of masonry, test procedures for evaluating flexural and shear strength.</p> <p>Design of load bearing masonry buildings: Permissible compressive stress, stress reduction and shape reduction factors, increase in permissible stresses for eccentric vertical and lateral loads, permissible tensile and shear stresses, Effective height of walls and columns, opening in walls, effective length, effective thickness, slenderness ratio, eccentricity, load dispersion, arching action, lintels; Wall carrying axial load, eccentric load with different eccentricity ratios, wall with openings, freestanding wall; Design of load bearing masonry for buildings up to 3 to 8 storeys using BIS codal provisions.</p>			
UNIT-III			
			10 Hours
<p>Earthquake resistant masonry buildings: Behaviour of masonry during earthquakes, concepts and design procedure for earthquake resistant masonry, BIS codal provisions. Masonry arches, domes and vaults: Components and classification of masonry arches, domes and vaults, historical buildings, construction procedure.</p>			
Course Outcomes: At the end of the course student will be able to			
1.	Achieve Knowledge of design and development of problem solving skills.		
2.	Understand the principles of design and construction of masonry structures		
3.	Design and develop analytical skills.		

4.	Summarize the masonry Characteristics.																																																															
5.	Evaluate the strength and stability of the masonry structures.																																																															
Course Outcomes Mapping with Program Outcomes & PSO																																																																
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22CCT132-1.5	2	1		2		2	2																																																									
TEXTBOOKS:																																																																
1.	Hendry A.W., "Structural masonry"- Macmillan Education Ltd., 2nd edition																																																															
2.	Sinha B.P & Davis S.R., "Design of Masonry structures"- E & FN Spon																																																															
3.	Dayaratnam P, "Brick and Reinforced Brick Structures"- Oxford & IBH																																																															
REFERENCE BOOKS:																																																																
1.	Curtin, "Design of Reinforced and Prestressed Masonry"- Thomas Telford																																																															
2.	Sven Sahlin, "Structural Masonry"-Prentice Hall																																																															
3.	Jagadish K S, Venkatarama Reddy B V and Nanjunda Rao K S, "Alternative Building Materials and Technologies"- New Age International, New Delhi & Bangalore																																																															
E Books / MOOCs/ NPTEL/IS Codes																																																																
1.	IS 1905, BIS, New Delhi.																																																															
2.	SP20(S&T),New Delhi																																																															

ADVANCED REINFORCED CONCRETE DESIGN			
Course Code:	22CCT133	Course Type	PEC
Teaching Hours/Week (L: T: P: S)	3:0:0:0	Credits	03
Total Teaching Hours	40	CIE + SEE Marks	50+50
Teaching Department: Civil Engineering			
Course Objectives:			
1.	Understand the underlying concepts for the design of elements subjected to shear and Torsion		
2.	Use the concept of redistribution of moments in design		
3.	Develop equations for the design of compression members of arbitrary sections subjected to general loading		
4.	Compute effective length of columns based on structural framing, instead of simplified values.		
5.	Select proper method for Design of Flat slab systems		
UNIT-I			
			15 Hours
Behaviour of RC Beams in Shear and Torsion: Modes of Cracking, Shear Transfer Mechanisms, Shear Failure Modes, Critical Sections for Shear Design, Influence of Axial Force on Design Shear Strength, Shear Resistance of Web Reinforcement, Compression Field Theory, Strut-and-Tie Model. Equilibrium Torsion and Compatibility Torsion, Design Strength in Torsion, Design Torsional Strength with Torsional Reinforcement- Space Truss Analogy and Skew Bending Theory Redistribution of Moments in RC Beams: Conditions for Moment Redistribution – Final shape of redistributed bending moment diagram – Moment redistribution for a two-span continuous beam – Advantages and disadvantages of Moment redistribution – Modification of clear distance between bars in beams (for limiting crack width) with redistribution – Moment – curvature Relations of Reinforced Concrete sections. Curtailment of tension Reinforcement - code procedure – Numerical Example.			
UNIT-II			
			15 Hours
Design of Reinforced Concrete Deep Beams: Introduction – Minimum thickness -Steps of Designing Deep beams – design by IS 456 - Detailing of Deep beams. Behaviour and Analysis of Compression Members: Effective Length Ratios of Columns in Frames, Code Charts – Numerical Examples, Short Columns - Modes of Failure in Eccentric Compression, Axial Load - Moment Interaction equation, Interaction Surface for a Bi-axially Loaded Column, Concept of Equilibrium approach and application to Non rectangular columns. Slender Column: Braced and Unbraced, Design Methods as per IS 456 – Strength Reduction and Additional Moment Method			
UNIT-III			
			10 Hours
Flat Slab Design: Behaviour of Slab supported on Stiff, Flexible and no beams, Equivalent Frame Concept, Proportioning of Slab Thickness, Drop Panel and Column Head, Transfer of Shear from Slab to column, Direct Design Method, Equivalent Frame Method – Design Examples. FE analysis and design of Slab Panels based on Wood-Armer equations.			
Course Outcomes: At the end of the course student will be able to			
1.	Design R C beams subjected to critical shear and torsional moment.		

2.	Analyzing continuous R C beams using moment redistribution concepts.
3.	Design of reinforced concrete R C deep beams.
4.	Design of compression members.
5.	Design of flat slabs

Course Outcomes Mapping with Program Outcomes & PSO

↓ Course Outcomes	Program Outcomes →	1	2	3	4	5	6	PSO ↓	
								1	2
22CCT133-1.1		3			1	1	3	1	3
22CCT133-1.2		2	3	1	2	2	2	2	1
22CCT133-1.3		3	2		1	1	3	1	2
22CCT133-1.4		2	3	1	2	2	2	2	1
22CCT133-1.5		3	2		1	1	3	1	2

1: Low 2: Medium 3: High

TEXTBOOKS:

1.	S. Pillai, Devdas Menon- REINFORCED CONCRETE DESIGN 3/ED 3rd Edition
2.	Varghese. P.C., Advanced Reinforced Concrete design, prentice, Hall of India, Neevpeth.

REFERENCE BOOKS:

1.	Srinath. L.S., Advanced Mechanics of Solids, Tata McGraw-Hill Publishing Co Ltd., New Delhi
2.	Krishna Raju – “Advanced R.C. Design”, CBSRD,1986,
3.	Park R. and Paulay, T., Reinforced Concrete Structures, John Wiley and Sons.

LAND SURVEY AND TERRAIN MAPPING											
Course Code:			22CCT104			Course Type:			PCC Lab		
Teaching Hours/Week (L: T: P: S):			0:0:2:0			Credits:			01		
Total Teaching Hours:			26			CIE + SEE Marks:			50+50		
Teaching Department: Civil Engineering											
Course Objectives:											
1.	Create a file and record the Rectangular and Polar Co-ordinates using Total Station; Setout a building using coordinate method.										
2.	Use software like Digital Terrain Modeling (Open Source) for Terrain Mapping in Auto CAD.										
Module I											
								10 Hours			
Introduction to Total Station, components, Temporary Adjustments, Measurement of Horizontal Angle, Vertical Angle, Orientation, Measurements of Co-ordinates (N, E, Z), Setting out works.											
Module II											
								16 Hours			
Terrain mapping – using Digital Terrain Modelling in AutoCAD.											
Course Outcomes: At the end of the course student will be able to											
1.	Make use of Total Station to record the Rectangular and Polar coordinates; setout for a building using coordinate method.										
2.	Prepare an area map using Digital Terrain Modeling and AutoCAD.										
Course Outcomes Mapping with Program Outcomes & PSO											
		Program Outcomes →		1	2	3	4	5	6	PSO ↓	
		↓ Course Outcomes								1	2
		22CCT104-1.1			1	2	1	1	2	1	1
		22CCT104-1.2		1		2	2	1	2	1	1
1: Low 2: Medium 3: High											
REFERENCE BOOKS:											
1.	Manual of SW_DTM: Digital Terrain Modeling / Contouring, softwel (P) Ltd.										
2.	Manual of Irrigation Canal Longitudinal & Cross Section Drawing and Quantity Offtake Package, softwel (P), Ltd.										
3.	Pentax Instruction Manual, R-300X series Basic, Pentax Industrial Instruments Co., Ltd.										
4.	Surveying made easy by Karl Zeiske, Leica Geosystems.										
5.	Learn About AutoCAD - An Introduction to AutoCAD for Beginners, Autodesk.										

PROJECT MANAGEMENT LAB										
Course Code:		22CCT105				Course Type:		PCC Lab		
Teaching Hours/Week (L: T: P: S):		0:0:2:0				Credits:		01		
Total Teaching Hours:		26				CIE + SEE Marks:		50+50		
Teaching Department: Civil Engineering										
Course Objectives:										
1.	Define the project activities, draw network diagram, Define EPS, OBS, WBS in Primavera.									
2.	Understand the project duration estimation, control and report preparation.									
Module I										
									10 Hours	
Creating a Simple Project, Setting Up a Project File, Identifying the activities. Network Analysis - Activity and event, Floats; Precedence diagrams, Activity definition, Enterprise Project Structure (EPS), Organisational Breakdown Structure (OBS), Work break down structures (WBS).										
Module II										
									16 Hours	
Estimation – Resources, duration. Project management plan, Progress reporting, Cost control, Earned value analysis. Building a Schedule, building a Team for Project, Assigning Resources to Tasks, Setting Up a Project Budget, Tracking Status, Managing Change.										
Course Outcomes: At the end of the course student will be able to										
1.	Create a project and define the Enterprise Project Structure, Organization Breakdown Structure, Work Breakdown Structure.									
2.	Develop the schedule of a project, assign resource and track the status of the project and compile the report.									
Course Outcomes Mapping with Program Outcomes & PSO										
		Program Outcomes →						PSO ↓		
↓ Course Outcomes		1	2	3	4	5	6	1	2	
22CCT105-1.1		1	1	2	1	2	2	2	1	
22CCT105-1.2		1	1	2	2	2	2	1	2	
1: Low 2: Medium 3: High										
REFERENCE BOOKS:										
1.	Project Planning and Control Fourth Edition (2003) Eur Ing Albert Lester, CEng, FICE, FIMechE, FIPStructE, FAPM, Elsevier Butterworth-Heinemann Linacre House, Jordan Hill, Oxford OX2 8DP									
2.	Practice standard for work breakdown structures, Project Management Institute, Newtown square, Pennsylvania USA, 2001.									
3.	Thomas E Uher, Programming and scheduling techniques, UNSW press book, 2003.									
4.	Paul Eastwood Harris, Planning and Control using Microsoft® PROJECT 2013 and 2016, East wood Harris Pty Ltd, 2016.									
5.	Bonnie Biafore, Microsoft Project 2013 The missing manual, O'Reilly Media, Inc., first edition 2013.									
6.	Primavera® P6™ Project Management, Reference Manual.									

NBC 2016 PART I									
Course Code:		22CCTAU11		Course Type			AUDIT		
Teaching Hours/Week (L: T: P: S)		2:0:0:0		Credits			02		
Total Teaching Hours		30		CIE + SEE Marks			50+50		
Teaching Department: Civil Engineering									
Course Objectives:									
1.	To apply provisions of the NBC								
2.	The Fire and Life Safety in Solving Engineering Problems.								
3.	The Building Services in Solving Engineering Problems.								
4.	The Plumbing Services in Solving Engineering Problems.								
UNIT-I									
									15 Hours
Prerequisite for Applying Provisions of the Code, Organization and Enforcement Development Control Rules and General Building Requirements. Fire and Life Safety									
UNIT-II									
									15 Hours
Building Services. Lighting and Ventilation Electrical and Allied Installations Air Conditioning, Heating and Mechanical Ventilation Acoustics, Sound Insulation and Noise Control Installation of Lifts and Escalators									
UNIT-III									
									10 Hours
Water Supply, Drainage and Sanitation, Solid Waste Management, Gas Supply									
Course Outcomes: At the end of the course student will be able to									
1.	Use and Apply the NBC to Civil Engineering								
2.	Solve Engineering Problems								
Course Outcomes Mapping with Program Outcomes & PSO									
		Program Outcomes →						PSO ↓	
↓ Course Outcomes		1	2	3	4	5	6	1	2
22CCTAU11-1.1		3	2	2	1	2	2	1	1
22CCTAU11-1.2		2	3	1	1	2	2	2	1
1: Low 2: Medium 3: High									
TEXTBOOKS:									
1.	National Building Code of India 2016 Volume I, Bureau of Indian Standards								

SEMESTER II

CONSTRUCTION QUALITY AND SAFETY MANAGEMENT			
Course Code:	22CCT201	Course Type	PCC
Teaching Hours/Week (L: T: P: S)	4:0:0:0	Credits	04
Total Teaching Hours	50	CIE + SEE Marks	50+50
Teaching Department: Civil Engineering			
Course Objectives:			
1.	To provide an insight into the basic concepts and importance of TQM in construction industry.		
2.	The need for quality planning in present scenario		
3.	To study the Quality Assurance and Quality Improvement techniques		
4.	To study the safety systems and common hazards.		
5.	To study planning for safety in construction project.		
UNIT-I			
			10 Hours
QUALITY MANAGEMENT Introduction – Definitions and objectives – Factors influencing construction quality –Responsibilities and authority – Quality plan – Quality Management Guidelines – Quality circles. QUALITY SYSTEMS: Introduction - Quality system standards – ISO 9000 family of standards – Requirements – Preparing Quality System Documents – Quality related training – Implementing a Quality system – Third party Certification. Quality function deployment; Quality Audit.			
UNIT-II			
			10 Hours
QUALITY PLANNING: Quality Policy, Objectives and methods in Construction industry - Consumers satisfaction, Ergonomics - Time of Completion - Statistical tolerance – Taguchi’s concept of quality – Codes and Standards – Documents – Contract and construction programming – Inspection procedures -Processes and products – Total QA / QC programme and cost implication.			
UNIT-III			
			10 Hours
QUALITY ASSURANCE AND QUALITY IMPROVEMENT TECHNIQUES : Objectives – Regularity agent, owner, design, contract and construction oriented objectives, methods – Techniques and needs of QA/QC – Different aspects of quality – Appraisals, Factors influencing construction quality – Critical, major failure aspects and failure mode analysis, –Stability methods and tools, optimum design – Reliability testing, Reliability coefficient and reliability prediction - Life cycle costing – Value engineering and value analysis. Quality Improvement Tools and Techniques.			
UNIT-IV			
			10 Hours
SAFETY SYSTEMS: Fundamental of safety management, construction safety, safety in scaffolding and working platform, welding and handling, excavation work, concreting and cementing work. Building construction, TAC and NBC rules, High rise building. Safety Management in Construction Industry- Safety rules in construction. Safety policy - Safety Organization, Safety laws and standards, Legal requirements. SAFETY REMEDIES FOR COMMON HAZARDS: Dust, Vibration, Lead poisoning, Noise, Movement, Material, Lighting. Safety in Use of Construction equipments. Equipment Reliability considerations.			

UNIT-V								10 Hours	
PLANNING FOR SAFETY IN CONSTRUCTION PROJECTS: Safety survey, safety inspection, safety sampling, Safety Audit. Safety Hazards and cost effectiveness Site management with regard to safety recommendations; Training for safety awareness and implementation; Incentives, Zero accident concepts, Planning for safety, Occupational health and ergonomics, Reportable and non-reportable accidents, Reporting occurrence of accidents and hazards, Action to be taken by site engineer in case of accidents, First aid/ Ambulance room/ dispensary, unsafe act and condition principles of accident prevention, Overall accident investigation process.									
Course Outcomes: At the end of the course student will be able to									
1.	Describe the importance of Quality Management.								
2.	Discuss the various tools and techniques used for quality planning.								
3.	Explain the Quality Assurance and Quality Improvement Techniques.								
4.	Discuss safety systems and common hazards and suggest preventive measures.								
5.	Explain the importance of planning for safety and laws of safety in construction projects and report the accidents in construction.								
Course Outcomes Mapping with Program Outcomes & PSO									
	Program Outcomes →	1	2	3	4	5	6	PSO ↓	
	↓ Course Outcomes							1	2
	22CCT201-1.1	2		1	1		3	1	
	22CCT201-1.2	2	3	1	2		2	2	2
	22CCT201-1.3	2	2	3	1		3	1	2
	22CCT201-1.4	2	3	1	2		2	2	
	22CCT201-1.5		2		1		3	1	
1: Low 2: Medium 3: High									
TEXTBOOKS:									
1.	N. Logothetis, "Managing for Total Quality", Prentice Hall. 2012								
2.	David Gold Smith, "Safety Management in Construction and Industry", Mc Graw Hill. 2011								
3.	K.N.Vaid, "Construction Safety Management"- NICMAR, Bombay. 2015								
4.	Dr. B. S. Grewal, Higher Engineering Mathematics, 36th Edition.2010								
5.	Hamdy A. Taha, Operations Research, 5th Edition, PHI.2015								
6.	William Feller, An Introduction to Probability Theory and its Applications, Vol.1, 3rd Edition. 2014								
REFERENCE BOOKS:									
1.	K. Shridhar Bhat "Total Quality Management", Himalaya Publishing House, revised edition 2010.								
2.	Oakland John S (2006) "TQM", Text with cases, Butterworth- Heinemann, Oxford.								
3.	Vaid K.N. (1988) "Construction Safety Management" National Institute of Construction management, Mumbai.								
4.	Krishna, N.V., (1983) "An Introduction to Safety Engineering and Management" OPS Publishers Limited , Hare street, Calcutta, first Edition.								
5.	David Goldsmith (1987) "Safety Management in Construction and Industry" McGraw Hill book company.								
6.	James J. Adrian,P.E. "Quantitative methods in construction management", American Elsevier.								
7.	Alfredo H.S. and Wilson H.Tang "Probability concepts in Engineering, Planning and Design", Vol.1, John Willy& sons.								

CONSTRUCTION AND CONTRACT MANAGEMENT			
Course Code:	22CCT202	Course Type	PCC
Teaching Hours/Week (L: T: P: S)	4:0:0:0	Credits	04
Total Teaching Hours	50	CIE + SEE Marks	50+50
Teaching Department: Civil Engineering			
Course Objectives:			
1.	To understand ethics, preliminary cost estimation and concept of building cost index in construction project.		
2.	To know concept of detailed estimation, different cost involved in construction project.		
3.	To understand bidding strategies to develop bidding model and know law of contract.		
4.	To understand different types of contract and FIDIC contract forms.		
5.	To understand concept involved in contract administration and management and also to resolve disputes in contract.		
UNIT-I			
			10 Hours
<p>Ethics: Definition of ethics, Ethical principles, Ethics in construction, Unethical practices in construction, Professional and Engineering Ethics. Concept of Cost and Cost engineering: Lifecycle cost, Different stages for Evolution of Project. Types of Estimates: Design Estimate, Bid Estimate and Control Estimate. Preliminary Cost Estimation or Rough estimation: various methods like Area method, Volume Method, Cost indices method, Power sizing method, typical problems on Preliminary/Rough estimates.</p> <p>Concept of Building Cost Index number and how it is used in Rough or Preliminary Estimation</p>			
UNIT-II			
			10 Hours
<p>Detailed Estimation: Quantity Takeoff, BOQ, Costing Philosophy: Direct cost, Indirect Cost and Other Cost parameters. Direct Cost: Components of direct cost, Labor, Materials, Plant and Machinery, Estimation of labor cost, Labor Production rate or Productivity, Estimation of Material Unit Basic Cost Indirect Cost: Office establishment and running cost, Taxes, Risks, Escalation, other costs including Profit. Plant and Machinery: Estimation of Plant and Machinery Unit basic cost, P&M Productivity based on Time Cycle & Production rate analysis.</p> <p>Understanding how indirect costs are computed: Building Project, Road Project or any Infrastructure Projects, Developing Top Sheet & getting Unit Total cost by Balanced Bid.</p>			
UNIT-III			
			10 Hours
<p>Bidding Models: Concept of unbalanced bid using Front end loading, back end loading and quantity error exploitation methods. Merits and demerits of each method with applicability. Problems based on GATES model. Bidding strategies: Detailed concept about bidding strategies followed in a contracting company, Principles of Competitive Bidding & Factors impacting bidding competition, Bidding Prequalification and its Process, Prequalification requirement, Bid Capacity. Types of Tender and tendering process: Open competitive Bidding, Serial Tendering, Selective tendering and Negotiated tendering. Process adopted in a contracting company for preparation and submission of tender. Item rate tender, EPC Tender, BOT Tender. Law of Contract: Indian Contract Act 1872 - Contract, Offer, Acceptance, Promise, Agreement, Essentials of valid contract + Valid, Void, Voidable and Unenforceable contracts, Contingent contracts.</p> <p>Performance of Contract, Delay or non-performance of contract, Breach of contract, Damages-Liquidated and Un-liquidated, Termination of Agreements.</p>			

UNIT-IV									
									10 Hours
Types of Contract: All in contract or Entire contract, Lump sum contract or Fixed Price Contract, Item rate or Unit price contract, Percentage rate contract, Cost Plus Contract, Cost plus percentage rate contract, Cost plus fixed fee contract, cost plus fluctuating fee contract, Target contract, The Schedule Contracts, Terms Contracts. Problems on: Percentage rate contract, Cost plus contract, Cost plus percentage rate contract, Ccost plus fixed fee contract, Cost plus fluctuating fee contract, Target contract.									
Understanding about FIDIC & its contract forms used for different types, Brief Discussion about FIDIC Sliver Book: EPC Contracting: Various Contract Clauses Provision in Silver Book									
UNIT-V									
									10 Hours
Contract Management & Contract administration: Detailed discussion about Process of Contract management and administration Extra work and Change order, Claims and Claim management Disputes and Dispute resolution mechanism including Arbitration and reconciliation based on Arbitration and Conciliation Act 1996									
Course Outcomes: At the end of the course student will be able to									
1.	To inculcate ethics, and apply concept of preliminary cost estimation and building cost index in construction project.								
2.	To estimate and identify costs involved in construction project.								
3.	To apply laws of contract and bidding strategies to develop bidding model.								
4.	To identify and apply types of contract and FIDIC contract forms.								
5.	To utilize concepts involved in contract administration, management, and techniques to resolve disputes in contract.								
Course Outcomes Mapping with Program Outcomes & PSO									
	Program Outcomes →	1	2	3	4	5	6	PSO ↓	
	↓ Course Outcomes							1	2
	22CCT202-1.1	1			1	1	2	1	
	22CCT202-1.2	2	3	1	2	2	2	2	
	22CCT202-1.3	1	2		1	1	2	1	
	22CCT202-1.4	2	3	1	2	2	2	2	2
	22CCT202-1.5	1	2		1	1	2	1	
1: Low 2: Medium 3: High									
TEXTBOOKS:									
1.	Civil engineering contracts and estimates 3rd edition B. S Patil								
2.	Rains's construction & contract management practices – 2nd Edition Dr.V.K.Raina								
REFERENCE BOOKS:									
1.	Contracts and their Management 3 rd edition , BS Ramaswamy								
2.	Estimating Construction Costs 5 th edition , R.L.Peurifoy , Garold D oberlender								
3.	Construction and contract management practies 2 nd edition , Dr V.K.Raina								
4.	Construction project management :2 nd edition , K.K. Chitkara								
5.	Roshan Namavathi, "Professional Practice"								
6.	Gajaria GT, "Law Relating to Building & Civil Engg. Contracts in India"								

7.	Collier, Kieth, "Managing Construction Contracts"
8.	Construction Equipment and its Management S.C Sharma
9.	Construction Planning and management P.S GAHLOT and B.M. DHIR
10.	Handbook of Construction Management 2 nd edition by PK Joy
11.	FIDIC Contract Red Book 2004& Silver Book , Indian Contract Act 1872, Indian arbitration act 1996
12.	Any other books , reference manual , articles related to above topic

RESEARCH EXPERIENCE THROUGH PRACTICE -2

Course Code:	22CCT203	Course Type	RETP
Teaching Hours/Week (L: T: P)	0:0:4	Credits	2
Total Teaching Hours	0+0+52	CIE	100

Teaching Department: Civil Engineering

Course Objectives: The research purposes are

1. To foresee future problems through pursuit of truth as a "global centre of excellence for intellectual creativity".
2. To respond to current social demands, and to contribute to the creation and development of scientific technologies with the aim of realizing an affluent society and natural environment for humanity.
3. At the same time, the course aims to create excellent educational resources and an excellent educational environment through frontline researches.
4. To Understand professional writing and communication contexts and genres, analyzing quantifiable data discovered by researching, and constructing finished professional workplace documents.

The students are expected to carry out Mathematical Modelling/Design calculations/computer simulations/Preliminary experimentation/testing of the research problems identified during Research Experience through Practice-I carried out in the first semester.

At the end of the second semester, students are expected to submit a full research paper based on the Mathematical modelling/Design calculations/computer simulations/Preliminary experimentation/testing carried out during second semester.

The research paper prepared based on the work carried out by the PG Student is evaluated for 50 marks and 20 minutes presentation on the research work carried out will be evaluated for 50marks jointly by the examiners.

Course Outcomes: At the end of the course student will be able to

- | | |
|-----------|--|
| 1. | Create a model/prototype through fabrication, simulation, data analysis, Experimentation for the proposed problem. |
| 2. | Analyse and validate the results obtained. |
| 3. | Compose a technical paper as per the given format. |

Course Outcomes Mapping with Program Outcomes & PSO

	Program Outcomes →	1	2	3	4	5	6	PSO ↓	
	↓ Course Outcomes							1	2
	22CCT203-1.1		2	2	2	1	2	2	1
22CCT203-1.2		2	2	2	1	2	2	1	2
22CCT203-1.3		2	2	2	1	2	2	1	2

1: Low 2: Medium 3: High

REFERENCE BOOKS:

- 1.** Gina Wisker, "The Undergraduate Research Hand book", 2018.

E Resource

- 1.** <https://www.coursera.org/learn/academic-writing-capstone>

RISK MANAGEMENT			
Course Code:	22CCT211	Course Type	PEC
Teaching Hours/Week (L: T: P: S)	3:0:0:0	Credits	03
Total Teaching Hours	40	CIE + SEE Marks	50+50
Teaching Department: Civil Engineering			
Course Objectives:			
1.	The role of project risk management in managing project.		
2.	To illustrate project risk management process.		
3.	To perform qualitative risk analysis.		
4.	To perform quantitative risk analysis		
5.	To plan risk responses in projects.		
UNIT-I			
			15 Hours
<p>Project Risk Management Definition, Role of Project Risk Management in Project Management, Good Risk Management Practice, Critical Success factors for Project Risk Management, Individual risks and overall project risk, stakeholder risk attitudes, iterative process, communication, responsibility for project risk management, project manager's role for project risk management</p> <p>Project risk management processes, purpose and objectives of the plan risk management process, Tools and techniques for the plan risk management process, documenting the results of the plan risk management process</p>			
UNIT-II			
			15 Hours
<p>Perform Qualitative Risk Analysis - Purpose and objectives of the perform qualitative risk analysis process, critical success factors for the perform qualitative risk analysis process – use agreed upon approach, use Agreed upon definitions of risk terms, collect high quality information about risks, perform iterative qualitative risk analysis, Tools and techniques for the perform qualitative risk analysis process – select risk characteristics that define risk importance, collect and analyse data, prioritize risks by probability and impact on specific objectives, prioritize risks by probability and impact on overall project, categorize risk causes .Document the results of the perform qualitative risk analysis process</p> <p>Perform Quantitative Risk Analysis – purpose and objectives of the perform quantitative risk analysis process, critical success factors for the perform quantitative risk analysis process – prior risk identification and qualitative risk analysis, appropriate project model, commitment to collecting high quality risk data, unbiased data, overall project risk derived from individual risks, interrelationships between risks in quantitative risk analysis. Tools and techniques for the perform quantitative risk analysis process – comprehensive risk representation, risk impact calculation, quantitative method appropriate to analyzing uncertainty, data gathering tools, effective presentation of quantitative analysis results, iterative quantitative risk analysis, information for responding planning. Documenting the results of the perform quantitative risk analysis process</p>			
UNIT-III			
			10 Hours
<p>PLAN RISK RESPONSES - Purpose and Objectives of the Plan Risk Responses Process, Critical Success Factors for the Plan Risk Responses Process, Risk Response Strategies, Tools and Techniques for the Plan Risk Responses Process, monitor and control risks</p>			
Course Outcomes: At the end of the course student will be able to			

1.	Manage project risk as project manager.
2.	Outline the process of risk management to manage various stages of project.
3.	Organize qualitative analysis and document the risk in a project.
4.	Organize quantitative analysis and document the risk in a project.
5.	Prepare and make use of the risk response plan at site.

Course Outcomes Mapping with Program Outcomes & PSO

	Program Outcomes →	1	2	3	4	5	6	PSO ↓	
	↓ Course Outcomes							1	2
	22CCT211-1.1	2		2			3		2
	22CCT211-1.2	2		2			2		2
	22CCT211-1.3	2		2			2		2
	22CCT211-1.4	2		2			2		2
	22CCT211-1.5	2		2			3		2

1: Low 2: Medium 3: High

TEXTBOOKS:

1.	Project Risk Analysis and Management Guide by John Bartlett APM Publishing Limited, 2004 2nd Edition.
2.	PRACTICE STANDARD FOR PROJECT RISK MANAGEMENT, Project Management Institute, Published by: Project Management Institute, Inc.
3.	Construction Project Management, K. K. Chitkara, Tata Mcgraw Hill Publ.

REFERENCE BOOKS:

1.	Industrial Engineering and Management of Manufacturing Systems. - Dr. Surendra Kumar; Satya Prakashan.
2.	RAMP Handbook by Institution of Civil Engineers and The Faculty and Institute of Actuaries Thomas Telford Publishing, London.
3.	Construction Engineering and Management – Seetharaman
4.	Projects Planning Analysis Selection Implementation and Review – Prasanna Chandra.
5.	Construction Management Practice, Dr.V.K.Raina, Shroff Publ. Projects, Prasanna Chandra, Tata McGraw Hill Publishers.

INFRASTRUCTURE DEVELOPMENT–PROGRAMMES, PLANNING AND APPRAISAL									
Course Code:	22CCT212	Course Type	PEC						
Teaching Hours/Week (L: T: P: S)	3:0:0:0	Credits	03						
Total Teaching Hours	40	CIE + SEE Marks	50+50						
Teaching Department: Civil Engineering									
Course Objectives:									
1.	Study the policies of central and state governments in India.								
2.	Study various programmes and initiatives for infrastructure in India.								
3.	Study the development and alternatives for planning infrastructure in India.								
4.	Study the project appraisal and impact assessment								
5.	Study the concepts of sustainable infrastructure and risk assessments.								
UNIT-I									
			15 Hours						
Overview on infrastructure development policies of central and state governments in India. Programmes and initiatives for development of roads, railways, airports, and urban infrastructure in India. Planning of infrastructure projects-contexts, perspectives, and objectives.									
UNIT-II									
			15 Hours						
Project-wise studies and development of alternatives. and - Introduction, screening, merits and demerits. Master planning. Overview of various planning tools. Project appraisal by financial analysis, economic analysis. Social Costs – Benefits Analysis. Environmental and societal impact assessments.									
UNIT-III									
			10 Hours						
Concept of sustainable infrastructure development. Considerations to uncertainty and risk assessments.									
Course Outcomes: At the end of the course student will be able to									
1.	Highlight the policies of central and state governments in India.								
2.	Discuss the various programmes and initiatives for infrastructure in India.								
3.	Discuss the development and alternatives for planning infrastructure in India.								
4.	Prepare project appraisal and impact assessment report.								
5.	Prepare the risk assessment report and implement the concepts of sustainable infrastructure.								
Course Outcomes Mapping with Program Outcomes & PSO									
	Program Outcomes →	1	2	3	4	5	6	PSO ↓	
	↓ Course Outcomes							1	2
	22CCT212-1.1	1			1	1	3		3
	22CCT212-1.2	2	2		2	2	2		1
	22CCT212-1.3	2	2		1	1	3		2
	22CCT212-1.4	2	2		2	2	2		1
	22CCT212-1.5	3	2		1	1	3		2
1: Low 2: Medium 3: High									
REFERENCE BOOKS:									

1.	Alvin S. Goodman and Makarand Hastak, Infrastructure Planning, Engineering, and Economics, Second Edition, McGraw-Hill Education, 2015
2.	Amrish Gupta, Project Appraisal and Financing, PHI Learning.

VALUATION TECHNIQUES IN ENGINEERING			
Course Code:	22CCT213	Course Type	PEC
Teaching Hours/Week (L: T: P: S)	3:0:0:0	Credits	03
Total Teaching Hours	40	CIE + SEE Marks	50+50
Teaching Department: Civil Engineering			
Course Objectives:			
1.	To understand and know the necessity of valuation, types of value and determine depreciation by various methods.		
2.	To know and decide suitability of different methods of valuing open urban lands.		
3.	To know the different types of outgoings, understand standard rent determination.		
4.	To describe the different methods of valuation of land with buildings and to Know valuation of hotel and cinema.		
5.	To understand concepts of market values, easements and valuation of land acquisition.		
UNIT-I			
			15 Hours
Purpose of valuation, forms of values, obsolescence, amortization, depreciation and its methods: straight line, constant percentage, declining balance, sinking fund and sum of years method. Problems on valuation using Year's Purchase, Capitalized value Methods of valuation of open urban land, factors affecting intrinsic values of land, Comparative method, Abstractive method, belting method, hypothetical building scheme, developer's method, flat rate techniques. Problems on above methods.			
UNIT-II			
			15 Hours
Outgoings: Municipal & Government Taxes, insurance, Loss of rent, collection charges, annual repairs & maintenance. Problems on outgoings. Rent: definition, types of rent, problems on standard rent of buildings. Cost of structure-BIS rules for measuring plinth area and cubical contents. Valuation of land with buildings: Rental method, Valuation by reference to profit, Direct comparisons of capital value, Residual or developmental method, valuation based on cost or contractor's method. Leasehold properties and freehold Properties. Rights and Liabilities of Lessor & Lessee. Valuation of licensed premises. Problems on valuation of cinema and hotel			
UNIT-III			
			10 Hours
Easements- self-imposed, legally created, Dominant and servient heritage- effect of easements on valuation. Market- Real Estate market and market value-fair market value, open market value-parameters affecting Investments- Bonds, debentures, capital gains, wealth Tax and Income Tax. Valuation on land acquisition			
Course Outcomes: At the end of the course student will be able to			
1.	Make use of necessity of valuation, types of value and determine depreciation by suitable methods.		
2.	Choose and apply suitable methods to value open urban lands.		
3.	Determine standard rent of premises.		
4.	Summarize methods of valuation of land with buildings and to value hotel and cinema.		
5.	Identify market values, easements and value for land acquisitions.		
Course Outcomes Mapping with Program Outcomes & PSO			

	Program Outcomes→	1	2	3	4	5	6	PSO↓	
	↓ Course Outcomes							1	2
	22CCT213-1.1	3			1		3	1	
	22CCT213-1.2	2	2	3	2		2	2	
	22CCT213-1.3	3	2		1		3	1	
	22CCT213-1.4	2	2	3	2		2	2	
	22CCT213-1.5	3	2		1		3	1	

1: Low 2: Medium 3: High

TEXTBOOKS:

1. Namavati, R., (1991), "Theory and Practice of Valuation", Lakhani Book Depot, Mumbai.
2. S.C. Rangwala, "Valuation of Real Properties" Charotar Publishing House Pvt Ltd, Anand. Ninth edition (2015).
3. Shyamales Dutta, "Valuation of Real Property" Eastern Law House, Kolkata Second edition (2004).

REFERENCE BOOKS:

1. S.C. Rangwala, "Elements of Estimating and Costing", Charotar Publishing House, Anand. (2011).
2. Sabapathy, B.K., (1996), "Practical Valuation", Ezhilarasi Prestige Flats, Tiruchirapalli.

GLOBAL BUSINESS MANAGEMENT									
Course Code:		22CCT221		Course Type			PEC		
Teaching Hours/Week (L: T: P: S)		3:0:0:0		Credits			03		
Total Teaching Hours		40		CIE + SEE Marks			50+50		
Teaching Department: Civil Engineering									
Course Objectives:									
1.	The types of International business and cultural dimensions.								
2.	The global trade and financial environment								
3.	The determinants of exchange rates.								
4.	Joint ventures, research and developments in global markets.								
5.	Negotiation in International Business and Multilateral settlements								
UNIT-I									
									15 Hours
Introduction to International Business-Globalization of World Economy-World Trade & Foreign Investment Trends-Technological Changes-Types of International Business-The Cultural Dimensions of International Business. The global trade and investment environment-Trading Practices-World Financial Environment-Tariff and Non-Tariff Barriers-WTO, Regional Blocks.									
UNIT-II									
									15 Hours
Global financial environment-Determinants of exchange rates-International banks-Non-banking financial institutions. Global competitiveness: Export and Import Financing-Licensing and Joint Ventures-Research and Development in Global Market.									
UNIT-III									
									10 Hours
Globalization with Social Responsibility-World Economic Growth and Environment-Negotiation in International Business-Multilateral settlements.									
Course Outcomes: At the end of the course student will be able to									
1.	Discuss the different types of International business and cultural dimensions.								
2.	Highlight the importance of global trade and financial environment								
3.	Define the exchange rates.								
4.	Discuss the joint ventures, research and development in global markets.								
5.	Negotiate in International Business and multilateral settlements.								
Course Outcomes Mapping with Program Outcomes & PSO									
		Program Outcomes →						PSO ↓	
↓ Course Outcomes		1	2	3	4	5	6	1	2
22CCT221-1.1		3			1	1	3	1	3
22CCT221-1.2		2	3	2	2	2	2	2	1
22CCT221-1.3		3	2	2	1	1	3	1	2
22CCT221-1.4		2	3	2	2	2	2	2	1
22CCT221-1.5		3	2		1	1	3	1	2
1: Low 2: Medium 3: High									

TEXTBOOKS:

- | | |
|----|---|
| 1. | Hill Charles, International Business: Competing in the Global Marketplace, Irvin McGraw Hill |
| 2. | Bhalla V. K. & Shivaramu S., International Business Environment and Business, Anmol, New Delhi. |
| 3. | |

REFERENCE BOOKS:

- | | |
|----|--|
| 1. | Abel Adekola and Bruno S. Sergi, Global Business Management – A Cross cultural perspective, Innovative Business text books |
|----|--|

REUSE & RECYCLE TECHNOLOGY									
Course Code:		22CCT222		Course Type			PEC		
Teaching Hours/Week (L:T:P: S)		3:0:0:0		Credits			03		
Total Teaching Hours		40		CIE + SEE Marks			50+50		
Teaching Department: Civil Engineering									
Course Objectives:									
1.	To learn the waste as a resource and govt. role in waste management.								
2.	To learn the system designing of waste resource.								
3.	To learn the energy recovery methods.								
4.	To study the analysis of waste.								
5.	To learn different categories of demolition waste.								
UNIT-I									
								15 Hours	
Waste as a Resource: Resource Economics, Disposable Materials, Classification of wastes Recycling Collection, Processing, Governmental Role in Waste Management, Potential for Reuse System Design: Design of Recycling Systems, Collection System, Process Train Design and Complexity, Product Design of Recycling, Conveyance, Transport Safety, Efficiency of Operation Systems.									
UNIT-II									
								15 Hours	
Energy Recovery: Combustion, Energy Losses, Energy Recovery Analysis Emission Control, Residue Control, In-Plant Operations, Refuse Derived Fuel Waste Analysis: waste sampling, sampling mechanics, waste composition, waste properties, hazardous waste aspects									
UNIT-III									
								10 Hours	
Construction Demolition Wastes: Classifications, Reuse as fine aggregate, coarse aggregate, Properties of Construction Demolition Wastes, Properties of concrete products, Specifications, Standards, National Policy etc.									
Course Outcomes: At the end of the course student will be able to									
1.	Describe the govt. role in waste management and using waste as a resource.								
2.	Design a system for using waste resource.								
3.	Describe the energy recovery methods.								
4.	Analyze the waste for utilization in construction.								
5.	Segregate the different kinds of demolition waste.								
Course Outcomes Mapping with Program Outcomes & PSO									
		Program Outcomes →						PSO ↓	
↓ Course Outcomes		1	2	3	4	5	6	1	2
22CCT222.1		2		2		3		2	
22CCT222.2		2			2	2		2	
22CCT222.3		2		2		2		1	
22CCT222.4		2			2	2		2	
22CCT222.5		2		2		2		2	
1: Low 2: Medium 3: High									

REFERENCE BOOKS:

- | | |
|-----------|--|
| 1. | Springer, "Recycling and Resource Recovery Engineering", Springer-Verlag Berlin Heidelberg (1996). |
| 2. | Kut, and Hase C, "Waste Recycling for Energy conservation", John Wiley and Sons Inc. |
| 3. | Current Literature |

BUILDING SERVICE & MAINTENANCE										
Course Code:			22CCT223		Course Type			PCC		
Teaching Hours/Week (L:T:P: S)			3:0:0:0		Credits			03		
Total Teaching Hours			40		CIE + SEE Marks			50+50		
Teaching Department: Civil Engineering										
Course Objectives:										
1. To understand the terms related to Fire and Life Safety.										
2. To know the classification of buildings based on occupancy, various fire alarm systems.										
3. To understand the installations of various services to the buildings such as lifts, Escalators, Fire extinguishers.										
4. To acquire knowledge about water supply services to buildings such as cold and hot water systems, Waste water systems, Solid waste disposal, Energy supply –Gas and Renewable sources.										
5. To understand the importance of building maintenance, Deterioration aspects, Investigation of defects in buildings, Maintenance problems and Route causes.										
UNIT-I										
								15 Hours		
Fire resistance, Classification of buildings based on occupancy, Means of escape, Fire alarm systems, Provisions of NBC. Classification of building according to fire load, Engineering services in a building as a system, Lifts, Escalators, Fire Extinguishers - Portable Fire extinguishers, Automatic carbon dioxide fire extinguishing system, Halon or B T M system.										
UNIT-II										
								15 Hours		
Water supply services to buildings - Cold and Hot water systems, Waste water systems, Solid waste disposal, Energy supply - Gas and Renewable sources. Building Maintenance: Importance of building maintenance, Principles of maintenance management and quality assurance, Agencies causing deterioration, Investigation of defects in buildings, Maintenance problems and Route causes.										
UNIT-III										
								10 Hours		
Materials for repair, Maintenance and protection. Preventive maintenance and Special precautions, Common techniques of building repair.										
Course Outcomes: At the end of the course student will be able to										
1. To describe the terms related to Fire and Life Safety.										
2. To explain the classification of buildings based on occupancy, various fire alarm systems.										
3. To describe how to provide essential installations of various services to the buildings including legal aspects.										
4. To execute installations of services to buildings such as cold and hot water systems, Waste water systems, Solid waste disposal, Energy supply – Gas and Renewable sources.										
5. To undertake repair and maintenance works of buildings in order to protect them from deterioration.										
Course Outcomes Mapping with Program Outcomes & PSO										
		Program Outcomes→		1	2	3	4	5	6	PSO↓

↓ Course Outcomes							1	2
22CCT223.1		1				2		
22CCT223.2		2	1			2	1	
22CCT223.3		2					2	
22CCT223.4		2	1			2	2	
22CCT223.5		1				2	2	

1: Low 2: Medium 3: High

TEXTBOOKS:

1.	P.S Gahlot, Sanjay Sharma "Building repair and Maintenance Management"
2.	Jain V K, "Services in Building Complex and High Rise Buildings", Khanna Pub.

REFERENCE BOOKS:

1.	NBC-2016, Relevant Parts, BIS New Delhi
2.	Pchelinstev V. A., "Fire Resistance of Buildings."

CHARACTERIZATION OF CONSTRUCTION MATERIALS				
Course Code:	22CCT231	Course Type	PEC	
Teaching Hours/Week (L: T: P: S)	3:0:0:0	Credits	03	
Total Teaching Hours	40	CIE + SEE Marks	50+50	
Teaching Department: Civil Engineering				
Course Objectives:				
1.	Understand the characterization of construction materials and their behavior, that govern the performance of these materials.			
2.	Study of Calorimetry, X-ray diffraction, Thermal analysis, Surface area measurement			
3.	Study of microscopy and image analysis			
4.	Study of various Spectroscopy techniques and their applications			
5.	Study on porosity and pore structure			
UNIT I				
Introduction – Characterization of construction materials			15 Hours	
Introduction to characterization of construction materials, Structure of Construction Materials-an overview. Calorimetry: Introduction and types of Calorimeters, Sample preparation, Practical note and Heat of hydration, applications of calorimetry X Ray diffraction: Introduction to X Rays and crystallography, Crystal systems and History of XRD, Diffractogram-Calculations, Qualitative Phase Analysis _ Sample Preparation and Application in study of cements.				
UNIT II				
Microscopy and Image Analysis			15 Hours	
Thermal Analysis, Application of thermal analysis to study construction materials. Surface Area Measurement: Sampling and particle size distribution, Different techniques, calculation and applications. Optical and Scanning Microscopy- Introduction and specimen preparation Features and functions, Types of optical microscopy. Scanning electron microscope, Parts and Functioning, Working Principles, Analysis of cementitious systems, Application of characterization techniques to assess composite binder, Image analysis - Introduction and image mapping, Basic operations				
UNIT III				
Spectroscopy and Pore Structure			10 Hours	
Spectroscopy Techniques - AAS, AES, UV and IR spectroscopy, FTIR and NMR spectroscopy, Spectroscopy techniques - Principle of NMR spectroscopy. Porosity and pore structure - Introduction, significance of pore distribution. Working of mercury intrusion porosimeter, Principle and different methods, Deliverables and Interpretation. Electrochemical testing (Corrosion) using EIS.				
Course Outcomes: At the end of the course student will be able to				
1.	Understand and discuss the basic principles of advanced characterization techniques			Descr gover
2.	Discuss the basic principles of advanced characterization techniques;			Explai
3.	Apply and select appropriate techniques for characterizing specific chemical and physical properties of materials; and			

4.	Explain and correlate the structure-property of materials at the nanoscale by different characterization techniques
5.	Define the basic properties and characteristics of materials by analyzing their properties through a set of characterization techniques

Course Outcomes Mapping with Program Outcomes & PSO

Program Outcomes → ↓ Course Outcomes	1	2	3	4	5	6	PSO ↓	
							1	2
22CCT231-1.1	1	3					1	3
22CCT231-1.2	2	2	2				2	2
22CCT231-1.3	3	2	2				2	3
22CCT231-1.4	2	3	3				3	3
22CCT231-1.5	2	3	2				3	3

1: Low 2: Medium 3: High

TEXT BOOKS:

1. "Materials Characterization Techniques" by Sam Zhang et al, CRC Press 2009
2. Yang Leng, "Materials Characterization: Introduction to Microscopic and Spectroscopic Methods" Wiley 2020

REFERENCE BOOKS:

1. Karen Scrivener, Ruben Snellings, Barbara Lothenbach, A Practical Guide to Microstructural Analysis of Cementitious Materials, CRC Press, 2015.
2. V. S. Ramachandran and James J. Beaudoin, Eds., Handbook of Analytical Techniques in Concrete Science and Technology, William Andrew Publishing, New York, 2001.
3. D A St. John, A. W. Poole, and I. Sims, Concrete Petrography – A Handbook of Investigative Techniques, Arnold Publishing. London, 1998.
4. William D. Callister, Materials Science and Engineering: An Introduction, Sixth Edition, John Wiley and Sons, 2003.
5. J. M. Illston and P. L. J. Domone, Construction Materials – Their Nature and Behaviour, Third Edition, Spon Press, 2001.
6. Jan Skalny, Editor, Materials Science of Concrete, Volumes I – VII, American Ceramic Society, 1989 – 2005.
7. J.F. Young, S. Mindess, R.J. Gray and A. Bentur, The Science and Technology of Civil Engineering Materials, Prentice Hall, 1998.

NPTEL/MOOCs/COURSERA

1. <https://www.classcentral.com/course/youtube-metallurgy-materials-characterization-47914>
2. <https://www.classcentral.com/course/swayam-scanning-electron-ion-probe-microscopy-in-materials-characterization-23107>
3. https://onlinecourses.nptel.ac.in/noc22_ce40/preview (Basic construction materials - Course (nptel.ac.in))
4. <https://nptel.ac.in/courses/105106200> (ARCHIVED: Characterization of Construction Materials - Course (nptel.ac.in))

ORGANIZATIONAL BEHAVIOUR									
Course Code:			22CCT232		Course Type		PEC		
Teaching Hours/Week (L: T: P: S)			3:0:0:0		Credits		03		
Total Teaching Hours			40		CIE + SEE Marks		50+50		
Teaching Department: Civil Engineering									
Course Objectives:									
1.	To distinguish organizational behaviour and management as different yet related disciplines.								
2.	To know issues related to motivation in employee.								
3.	To know the significance of individual decision making that systematically influences their behaviors in a group.								
4.	To know the importance of communication to work different organizational structure.								
5.	To understand the effects of organizational culture in job environment.								
UNIT-I									
								15 Hours	
Approaches to Organizational Behaviour: Overview of the Field of Organization Development; Individuals in Organizations. Motivation and Behaviour; Motivation at work; Designing motivating jobs.									
UNIT-II									
								15 Hours	
Creating and individual decision making; Group Dynamics; Group behaviour, Inter-group relation and conflict. Communication; Leadership in Organizations; Characteristics of Organizations: Organization Structure and Design, Organizational Change and Development;									
UNIT-III									
								10 Hours	
Organizational Culture and climate. Managing Innovation and Technology in changing environments.									
Course Outcomes: At the end of the course student will be able to									
1.	Select the approaches to organizational behavior.								
2.	Explain the motivational theories in order to design the motivating job								
3.	Identify the link between perception and decision making to organize work in a group								
4.	Solve the barriers to communication for motivating group effectively as a leader.								
5.	Choose an organizational culture for adapting the change in environment.								
Course Outcomes Mapping with Program Outcomes & PSO									
		Program Outcomes →						PSO ↓	
↓ Course Outcomes		1	2	3	4	5	6	1	2
22CCT232-1.1		1			1		3	1	
22CCT232-1.2		2	2	1	2		2	2	1
22CCT232-1.3		1	2		1		3	1	
22CCT232-1.4		2	1	1	2		2	2	1
22CCT232-1.5		1	2		1		3	1	2
1: Low 2: Medium 3: High									

TEXTBOOKS:

- | | |
|----|---|
| 1. | Stephen. P. Robbins, "Organizational Behaviour", 15th edition, Pearson Education Asia, New Delhi 2018 |
| 2. | Jit. S. Chander "Organizational Behaviour", 3rd edition, Vikas Publishing House Pvt. Ltd. New Delhi, 2016 |

REFERENCE BOOKS:

- | | |
|----|---|
| 1. | Gregery Moorhead and Ricky W. Griffin, "Organizational Behaviour: Managing People and Organizations", 3rd Edition, Houghen Mifflin Company, Boston 2000. |
| 2. | Wendell L French and Cecil H Bell, Jr., "Organization Development: Behavioural Science Interventions for Organization Improvement", 6th edition, Pearson Education Asia, New Delhi 2001 |

GROUND IMPROVEMENT, TUNNELLING & PRECAST TECHNIQUE			
Course Code:	22CCT233*	Course Type	PEC
Teaching Hours/Week (L: T: P: S)	3:0:0:0	Credits	03
Total Teaching Hours	40	CIE + SEE Marks	50+50
Teaching Department: Civil Engineering			
Course Objectives:			
1.	Develop ability to analyze weak and compressible soil and provide proper treatment to improve its characteristics.		
2.	Understand the underlying principle in dynamic consolidation. Select proper method for anchors, grouting and vacuum consolidation.		
3.	Study of preliminary analysis of and requirements of different types of Tunnels		
4.	Excavation and Construction of various Tunnels.		
5.	Understand the advances in pre-cast constructions.		
UNIT-I			
Ground Improvement Techniques			16 Hours
Engineering properties of soft & weak and compressible deposits; principles of treatment; Methods of soil improvement-lime stabilization and injection; thermal, electrical and chemical methods. Dynamic consolidation; vibroflotation; compaction by blasting; pre-consolidation with vertical drains; Granular piles; soil nailing. Anchors; Grouting; Electro-osmosis; Soil freezing; Vacuum consolidation; Case histories Soil confinement			
UNIT-II			
Tunnelling			08 Hours
Scope and application, art of tunnelling, future tunnelling considerations, size, shape, purpose, geological aspects, Types and purpose of tunnels; factors affecting choice of excavation technique; Methods: soft ground tunnelling, hard rock tunnelling, shallow tunnelling, deep tunnelling; Shallow tunnels – cut and cover, cover and cut, pipe jacking, jacked box excavation techniques, methods of muck disposal, supporting, problems encountered and remedial measures			
Excavation of large and deep tunnels			08 Hours
Introduction; purpose and use; excavation issues; excavation methods- unit operations, different equipment, types of rock pressure and methods to deal, roof and wall supports, case studies from hydrel, road and rail tunnels, ground treatment for adverse conditions. Introduction and advantages of shield tunneling; classification; different types of shield tunneling techniques-Conventional shields, EPBS, segmental lining, cost calculations Tunneling by Road headers and Impact Hammers: Cutting principles, method of excavation, selection, performance, limitations and problems. Tunneling by Tunnel Boring Machines: Boring principles, method of excavation, selection, performance, limitations and problems; TBM applications.			
UNIT-III			
Precast Constructions			08 Hours
Ecowall, elements, Benefits and Application			
Course Outcomes: At the end of the course student will be able to			
1.	Propose proper treatment method for soft, weak and compressible soil strata.		
2.	Planning and design of suitable method of advanced soil stabilization for a site.		
3.	Describe the tunnelling procedures for various conditions.		
4.	Explain the operations and functioning of Tunnel boring machine.		
5.	Interpret the advances in pre-cast technology in construction sector.		

Course Outcomes Mapping with Program Outcomes & PSO									
↓ Course Outcomes	Program Outcomes→						PSO↓		
	1	2	3	4	5	6	1	2	
22CCT233-1.1	3			1	1	3	1	3	
22CCT233-1.2	2	3	2	2	2	2	2	1	
22CCT233-1.3	3	2	2	1	1	3	1	2	
22CCT233-1.4	2	3	2	2	2	2	2	1	
22CCT233-1.5	3	2		1	1	3	1	2	

1: Low 2: Medium 3: High

TEXTBOOKS:

1. Purushotham Raj, "Ground Improvement Techniques".
2. Design and construction of tunnels by Pietro Lunardi, Springer-Verlag Berlin Heidelberg 2008

REFERENCE BOOKS:

1. Manfredd RH, "Engineering Principles of Ground Modification", Mc Graw Hill
2. R. Srinivasan, "Harbour, Dock and Tunnel Engineering", Charotar Publishing House Pvt. Ltd., Anand (Gujarat), 27th Revised edition, 2015.
3. C Venkatramaiah, "Transportation Engineering", Volume II: Railways, Airports, Docks and Harbours, Bridges and Tunnels, Oxford University Press, New Delhi, 1st edition 2016.
4. Kim S. Elliott, "Precast Concrete Structures" 2nd edition, CRC Press, 2019.

BUILDING INFORMATION MODELLING (BIM) LAB											
Course Code:		22CCT204				Course Type:		PCC Lab			
Teaching Hours/Week (L: T: P: S):		0:0:2:0				Credits:		01			
Total Teaching Hours:		26				CIE + SEE Marks:		50+50			
Teaching Department: Civil Engineering											
Course Objectives:											
1.	Understand the use of Autodesk Revit for 2D and 3D modelling.										
2.	Understand the use of Autodesk Navisworks for 4D simulation at runtime.										
Module I											
									10 Hours		
Introduction to 3D BIM, Autodesk Revit, Basic Drawing and editing tools, Modelling walls, working with doors and windows, working with views, modelling floors, ceiling, roofs, stairs and railing.											
Module II											
									16 Hours		
Introduction to 4D BIM, Autodesk Navisworks, Create a 4D simulation at run-time											
Course Outcomes: At the end of the course student will be able to											
1.	Develop a 3D BIM model using Autodesk Revit.										
2.	Develop the 4D simulation at runtime.										
Course Outcomes Mapping with Program Outcomes & PSO											
		Program Outcomes →		1	2	3	4	5	6	PSO ↓	
		↓ Course Outcomes								1	2
		22CCT204-1.1		3			1	1	3	1	3
		22CCT204-1.2		2	3	1	2	2	2	2	1
1: Low 2: Medium 3: High											
REFERENCE BOOKS:											
1.	Autodesk Revit 2017 for Architecture No experience required, Eric Wing, Autodesk Authorized Publisher.										
2.	Autodesk Revit Getting Started Guide, Autodesk Authorized Publisher.										
3.	Autodesk Navisworks Basic Training, Autodesk Authorized Publisher.										
4.	Plan it right before you build on site, The five top workflows for Navisworks, , Autodesk Authorized Publisher.										

ADVANCED CONCRETE TECHNOLOGY LAB									
Course Code:		22CCT205				Course Type:		PCC Lab	
Teaching Hours/Week (L: T: P: S):		0:0:2:0				Credits:		01	
Total Teaching Hours:		26				CIE + SEE Marks:		50+50	
Teaching Department: Civil Engineering									
Course Objectives:									
1.	Make students to learn principles of laboratory experiments.								
2.	Understand the importance of laboratory testing of materials.								
Module I									
								10 Hours	
Fresh and Hardened Properties Testing of Special Concretes; Concrete using partial replacement of fly-ash or GGBS; Self-Compacting Concrete; High Strength Concrete; Fibre-Reinforced Concrete									
Module II									
								16 Hours	
Engineered Cementitious Composites; Accelerated Curing; Shrinkage of Cement; Rebound Hammer Test.									
Course Outcomes: At the end of the course student will be able to									
1.	Determine the fresh and hardened properties of special concretes								
2.	Determine the concrete strength and shrinkage properties using destructive and non-destructive methods								
Course Outcomes Mapping with Program Outcomes & PSO									
		Program Outcomes →						PSO ↓	
↓ Course Outcomes		1	2	3	4	5	6	1	2
22CCT205-1.1		3			1	1	3	1	3
22CCT205-1.2		2	3	1	2	2	2	2	1
1: Low 2: Medium 3: High									
IS CODE BOOKS:									
1.	IS: 516 – 1959(2020) - Methods of tests for strength of concrete								
2.	IS: 1199-1959 - Methods of sampling and analysis of concrete								
3.	SP: 23- 2017 - Hand book of concrete mixes								

NBC 2016 PART II										
Course Code:		22CCTAU21		Course Type			AUDIT			
Teaching Hours/Week (L: T: P: S)		2:0:0:0		Credits			02			
Total Teaching Hours		30		CIE + SEE Marks			50+50			
Teaching Department: Civil Engineering										
Course Objectives:										
1.	The use of Landscape planning and development in civil engineering.									
2.	The sustainability approach in solving engineering problems.									
3.	The Asset and Facility Management									
4.	The prefabrication and composite construction for advanced construction.									
UNIT-I										
									15 Hours	
Landscape Development, Signs and Outdoor Display Structures: Landscape Planning, Design and Development, Signs and Outdoor Display Structures.										
UNIT-II										
									15 Hours	
Approach to Sustainability, Asset and Facility Management										
UNIT-III										
									10 Hours	
Prefabrication, Systems Building, Mixed/Composite Construction										
Course Outcomes: At the end of the course student will be able to										
1.	Use and Apply the NBC to Civil Engineering									
2.	Apply in solving engineering problems									
Course Outcomes Mapping with Program Outcomes & PSO										
		Program Outcomes →						PSO ↓		
↓ Course Outcomes		1	2	3	4	5	6	1	2	
22CCTAU21-1.1		3	2	2	1	2	2	1	1	
22CCTAU21-1.2		2	3	1	1	2	2	2	1	
1: Low 2: Medium 3: High										
REFERENCE BOOKS:										
1.	National Building Code of India 2016 Volume II, Bureau of Indian Standards									