Rama University Uttar Pradesh, Kanpur

Ref:RU/FET/CED/BOS/2014 **Dated: 06/05/2014**

Faculty of Engineering & Technology

Department of Civil Engineering

Minutes of Meeting

Boards of Studies

A meeting of Boards of Studies of Civil Engineering, FET was held on 04/05/2014 (Saturday) at 2:30 P.M. in conference room of FET. The following members were present:

1. Ms. Noopur Anand - Chairperson
2. Dr.Vinod Kumar Yadav - Member
3. Mr. Shailendra Kumar Prajapati - Member
4. Prof. Pradeep Kumar - External Member
5. Er.D,D.Pathak - External Member

Agenda:

1. Action Taken Report (ATR) on the basis of feedback from Stake holders/External members

The members of Civil Engineering department have been working on the evaluation scheme, curricula and syllabus and consider their feedback and suggestions of stake holders/External members. They suggested that the focus must be on fundamentals and practical courses having emphasis on research and development contributing to the welfare of the society.

2. To consider and approve the Evaluation Scheme and Syllabus.

S. No.	Item No.	Existing	Recommendation /Action Taken
1	To consider and approve the Evaluation Scheme and Syllabus for B.Tech. students to be admitted in the session 2014-15.	....	The BOS considered the Evaluation Scheme and Syllabus and discussed the credit of each course should be reflected in detailed syllabus of every subject. The BOS committee suggested following : 1. The provision of Departmental Electives in every Even Semester and VII Semester. 2. The provision of Open Elective in VII Semester 3. The provision of Mini Project, Seminar, Seminar Departmental, Industrial Training and Major Project for better exposure and employability. The BOS committee recommended Evaluation Scheme and Syllabus considering all the suggestions made in the meeting with their course code and subject codes.

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S. No.	Item No.	Existing	Recommendation /Action Taken
2	To consider and approve the Evaluation Scheme and Syllabus for M.Tech. (Civil with Specialization in Structural Engineering) students to be admitted in the session 2014-15..	....	The BOS considered the Evaluation Scheme and Syllabus and discussed the credit of each course should be reflected in detailed syllabus of every subject. The BOS committee suggested following : 1. The provision of Departmental Electives in every II and III Semester. 2. The main focus must be on research and innovation in Civil Engineering and therefore phasing of Dissertation into two, namely, Dissertation-I and Dissertation-II in III and IV Semester respectively. IV Semester must be fully dedicated for Dissertation Works. 3. The BOS committee recommended Evaluation Scheme and Syllabus considering all the suggestions made in the meeting. with their course code and subject codes.

The meeting concluded with a vote of thanks to the chair.

Date of the Next Meeting: to be decided and intimated thereafter

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(Chairman)

Encl.: Recommended Curricula attached for consideration and approval.

CC:
1. Dean, FET
2. Registrar Office

Rama University Uttar Pradesh, Kanpur

Faculty of Engineering & Technology

Department of Civil Engineering

Program Educational Objectives (PEOs)

PEO-1: Graduates of Civil Engineering will analyze, solve and deliver appropriate cost-effective sustainable solution for construction industry problems using basic principles of mathematics, science and engineering.

PEO-2: Graduates will attain necessary professional skills in design, simulation and execution, effective oral and written communication skills to be useful and successful engineers using fundamental knowledge and modern engineering tools

PEO-3: Graduates of Civil Engineering will work in intra and interdisciplinary projects with administrative skills, communication skills and also exhibit team spirit, human values and professional ethics in their work for development of new ideas and products to serve in contemporary societal contexts.

PEO-4: Graduates will be able to face challenges of the world economic order by incorporating expertise gained by faculty in consultancy work, teaching-learning process involving modern tools and techniques.

PEO-5: Graduates will achieve a high level of technical and managerial expertise to achieve excellence, outstanding leadership to succeed in positions in civil engineering profession with better employability

PROGRAM OUTCOMES (POs) Engineering Graduates will be able to:

PO-1: **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO-2: **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO-3: **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

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PO-4: **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO-5: **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO-6: **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO-7: **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO-8: **Human Values and Professional Ethics**: Apply all relevant principles and commit to human values and professional ethics and responsibilities and norms of the engineering practice.

PO-9: **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in intra and interdisciplinary settings.

PO-10: **Communication**: Communicate effectively on complex engineering activities with the engineering and non-engineering community i.e. with society as a whole, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO-11: **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO-12: **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSOs)

PSO-1: Graduates will be able to apply technical skills and modern engineering tools for civil engineering day to day practice.

PSO-2: Graduates will be able to participate in critical thinking and problem solving of civil engineering field that requires analytical and design requirements.

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PSO-3: Graduates will be able to pursue of lifelong learning and professional development to face the challenging and emerging needs of our society

RAMA UNIVERSITY, UTTAR PRADESH, KANPUR
FACULTY OF ENGINEERING & TECHNOLOGY
DEPARTMENT OF CIVIL ENGINEERING
Website: www.ramauniversity.ac.in
ACADEMIC REGULATIONS 2014
For M. Tech. Programmes

APPLICABILITY:

This ordinance shall apply to all programmes leading to Master`s Degrees in Technology.

1. DEFINITIONS:

(i) **Academic Programme/ Programmes** shall mean a programme of courses and/or any other component leading to a Master`s degree in Technology.

(ii) **An Academic Year** is a period of nearly 12 months devoted to completion of requirements specified in the Scheme of Teaching and the related examinations.

(iii) **Board of Studies (BoS)** shall mean the Board of Studies of the Institute concerned.

(iv) **Course** means a component of the academic programme, carrying a distinctive code number and specific credits assigned to it.

(v) **University** shall mean **Rama University Uttar Pradesh, Kanpur**

(vi) **External Examiner** shall mean an examiner who is not in the employment of the University.

(vii) **Semester System** – A programme wherein each academic year is apportioned into two parts known as semesters.

(viii) **Student** shall mean a person admitted and registered for a programme in the Institutes of the University.

2. ADMISSION

- The University will permit admission and award of M.Tech. degrees in only such courses which are duly approved by the Academic Council of the University
- Admission to M.Tech. First Semester will be made as per the rules prescribed by the Academic Council of the University.
- Admission on migration from any other university to the university is not permitted. However, a student of constituent Institution/College enrolled in any other university may be allowed to migrate to the University provided that he/she has failed. He/she will continue his/her study in the same Institution/College where he/she was previously studying.

3. ELIGIBILITY FOR ADMISSION

B.Tech. or an equivalent degree in the relevant branch of Engineering with a minimum of 50% marks from a recognized University.

OR

MCA or M.Sc. degree in a related branch with 55% or higher aggregate marks from a recognized University

4. CURRICULUM

M.Tech. courses shall be of any one of the following types:

(a) M.Tech. (Residential/Full-Time/Regular): It shall be a regular four-semester course in which students will be required to spend the entire study duration in the University campus or the Industry/

Institution/ R&D Organization where they shall be doing their dissertation/ project work.

(b) M.Tech. (Week-End): It shall be a regular four-semester course specially run by the University for working teachers, persons employed in Industry or Research and Development Organizations, who have a 5-day working week. The programme consists of three semesters of coursework in the University campus and one semester of dissertation/ project work in the University or in the Industry/ Institution/ R&D Organization. Number of contact hours in each subject will be the same as that of Residential M.Tech. Course. A candidate shall normally be required to submit a no objection certificate from his/her employer for this course.

(c) M.Tech. (Part Time): It shall be a six-semester part-time course meant for serving engineers/ teachers of the neighboring areas who can attend the classes during morning or evening hours only. A candidate shall normally be required to submit a no objection certificate from his/her employer for this course.

5. PROGRAMMES CONTENT & DURATION

(a) A Master's Degree programme shall comprise of a number of courses and/or other components as specified in the Teaching & Examination Scheme of the concerned programme duly approved by the Academic Council.

(b) The minimum period required for completion of a programme shall be the programme duration as specified in the Teaching & Examination Scheme for the concerned programme.

(c) The maximum permissible period for completing a programme for which the prescribed programme duration is n semesters, shall be (n+2) semesters. All the programme requirements shall have to be completed in (n+2) semesters. Under very special circumstances the duration of the total period may further be extended by a maximum of two (2) semesters with the approval of the Vice Chancellor. This excludes the period of expulsion or suspension by the University / medical leave.

(d)

(i) A student may be allowed to "audit" a course(s) not included in the Teaching & Examination Scheme, or one of the elective course(s) in the Teaching & Examination Scheme, which the student is not opting for as a credit course.

(ii) The University may ask a student to audit one or more courses as pre-requisite courses so as to make up any deficiency at the entry level.

(iii) Such audited course(s) shall be shown in the final mark-sheet under a distinct head of "Audited Course(s)" provided the attendance requirement of the course is duly certified to have been met by the concerned teacher(s).
However, a student shall neither be entitled to any credits for such course(s), nor these shall be considered for the purpose of declaration of results.

(e) Except for the first semester, registration for the next semester will be done during the first week of the next semester.

(f) From the second semester onwards, all students have to enroll on a specified day at the beginning of a semester. A student is eligible for enrolment if he has paid all the dues for the semester.

6.(a) MINIMUM REQUIREMENT TO CONTINUE IN THE PROGRAM

(i) The M. Tech. Program has a total of 80 credits and students are required to complete all courses. On completion of all courses, the students shall earn 80 credits and would be eligible for award of the M.Tech. Degree.

(ii) A student should have a minimum CGPA of 5.0 calculated for the courses successfully completed at the end of each semester. If CGPA continues to be less than 5.0, then his/her name will be struck off.

6.(b) SEMESTER DURATION

(i) An academic year shall be of two semesters, each of about 20 weeks duration. There shall be a break of 3 to 5 weeks after autumn semester and 6 to 10 weeks after the spring semester.

The Academic Calendar shall be notified by the University each year before the start of the Academic Session.

(ii) The academic break-up of the semesters shall be as follows:

Theory and Practical Classes (including Mid-Sem. tests) 16 – 18 Weeks

Semester-end Examination, including Practical / - 02 - 04 Weeks
Laboratory Examination

7. Examination:

7.1 The performance of a student in a semester shall be evaluated through continuous evaluation and end semester examination. The continuous evaluation shall be based on Mid Term Examination, assignments/tutorials, quizzes/viva-voce and attendance. The marks for continuous evaluation (Sessional marks) shall be awarded at the end of the semester. The end semester examination shall be comprised of written papers, practicals and viva-voce, inspection of certified course work in classes and laboratories, project work, design reports or by means of any combination of these methods.

7.2 The distribution of marks for Sessional, end semester theory papers, practicals and other examinations, seminar, project, industrial training shall be as prescribed.

7.3 The marks obtained in a subject shall consist of marks allotted in end semester theory paper, practical examination and sessional work.

7.4 The minimum pass marks in each theory subject (including sessional marks) shall be 50% with a minimum of 40% marks in each theory paper in the end semester examination. If there is no provision of sessional marks in any subject, the minimum pass marks in that subject shall be 50% in the end semester examination.

7.5 The minimum pass marks in a project/practical subject (including Sessional marks if any) shall be 50%.

7.6 A candidate, in order to pass, must secure 50% marks in the aggregate in a particular academic year inclusive of both semesters of the academic year subjected to conditions as bye laws.

(a) Carryover System: A candidate satisfying university clause shall be required to exercise his/her choice upto a maximum of four theory papers in year which he/she desires to appear in the examination to fulfill the requirements of clause . He/she shall inform the college about his/her choice within 15 days after the start of new session.

The highest marks secured in any subject in various attempts (end semester and carryover examinations) shall

be considered.

(b) Ex-studentship:

A candidate opting for ex-studentship shall be required to appear in all the theory & practical subjects in the end semester examinations of both semesters of the same academic year. However, the marks pertaining to Sessional, Industrial Training, and Seminar shall remain the same as those secured earlier.

A candidate opting for ex-studentship shall be required to apply to the FET by paying only examination fee within 15 days from the start of new session.

(c) Re-admission:

- A Candidate may be allowed for re-admission provided he/she satisfies one of the following conditions:
- A candidate is declared fail.
- A candidate did not appear in a semester examination / or he/she was not granted permission to appear in the examination.
- A candidate has been detained by the department and subsequently has been permitted to take re-admission.
- A candidate as an ex-student passed the examination of the academic year or qualified for carryover system.
- A candidate promoted with carry over subjects and he/she opted for re- admission.

8. ATTENDANCE

All students are normally expected to have attendance of 100% in each subject (Lectures, Tutorials and Practical`s). The attendance can be condoned upto 25% for genuine reasons. The Director of the concerned Institute/ Programme Coordinator may give further relaxation up to 10% on account of illness and other pre-approved occasions. Vice Chancellor may further condone attendance shortage up to 5% on genuine grounds. However, under no circumstances, a student with an attendance of less than 60% in a subject shall be allowed to appear in the semester-end examination of that subject. Provided that the late admitted students in the first semester of any course maintain at least 80% attendance (including medical and other reasons) from the date of their admission.

Director/Dean of the Institute / Programme Coordinator shall announce the names of all such students who are not eligible to appear in the subject(s) of semester-end examination, at least one week before the start of the semester-end examination and simultaneously intimate the same to the Controller of Examinations.

In case any student appears in the Examinations by default, who in fact has been detained by the Institute, his/ her result shall be treated as null and void.

9. Assessment Criteria (M.Tech.)

All courses of M.Tech. shall be evaluated for 150 marks, of which 50 marks shall be for Internal Assessment and 100 for Comprehensive sem End Examination. Internal Assessment for 50 marks shall be as per the criteria given below:

Criteria	Marks
Class Test I	15
Class Test II	15
Assignments, class participation and discussion	10
Attendance	10
Total Internal Assessment	**50**

Marks for Practical Assessment shall be awarded as per the criteria given below:

Criteria		Marks
Attendance	5	
File Record	5	
Practical Perform/Execution		5
Viva-Voce		5
Total Practical Assessment		**20**

All students should have a minimum of 75% attendance in all subjects, in order to appear in term end examination / viva voce. The 75% criterion includes all leaves of absence – whether approved or not approved.

Students failing to obtain 75% attendance shall be required to repeat the course in the subsequent year, along with the next batch, to make up for the shortage of attendance.

Under extraordinary circumstances, a student with attendance below 75% shall be allowed to appear in the term end exams / viva voce. This will be at the discretion of the Vice Chancellor of the University. Circumstances when such leniency shall be shown include:

a. Death of a blood relative – father, mother, grandfather, grandmother, brother or sister.
b. Extreme cases of health adversity requiring hospitalization of the student.

In such cases, the student shall be required to give a written application to the Vice Chancellor of the University, along with appropriate proof. In case of death of blood relative, an application from the parent(s) shall be considered.

All faculty members shall maintain appropriate records and make them available to the University's Examination Centre at the end of the semester.

Credits

The M. Tech. Program has a total of 80 credits and students are required to complete all courses. On completion of all courses, the students shall earn 80 credits and would be eligible for award of the M.Tech. Degree.

Final Year Dissertation-I Work (M. Tech 3rd Semester)

During the 3rd semester, each student shall undertake a pre thesis work to be pursued by him/ her under the supervision of a guide/ supervisor. The guide/ supervisor shall be appointed by the Dean, Faculty of Engineering & Technology. Minimum four copies of Project Report along with one soft copy on a CD shall be submitted at least two weeks prior to the commencement of the Term End Examination of the 3rd Semester. The Dissertation-I Work shall carry 500 marks and shall be evaluated by a Board of Internal and External Examiners, appointed by the Dean. The Dissertation-I Work shall be evaluated in the following manner:

Criteria	Internal	External	Total
Pre-Thesis Report	100	150	250
Viva Voce	100	150	250
Total	200	300	**500**

Note: to move into fourth semester, the candidate will have to opt minimum E Grade in Dissertation-I.

Final Year Dissertation-II Work (M.Tech. 4th Semester)

During the fourth semester, each student shall undertake a Thesis work to be pursued by him/ her under the supervision of a guide/ supervisor. The guide/ supervisor shall be appointed by the Dean, Faculty of Engineering & Technology. Minimum four copies of Project Report along with one soft copy on CD shall be submitted at least two weeks prior to the commencement of the Term End Examination of the 4th Semester. The Dissertation-I Work shall carry 800 marks and shall be evaluated by a Board of Internal and External Examiners, appointed by the Dean/ VC. The Board shall be consisting of two Internal Faculty Members. The Dissertation-II work shall be evaluated in the following manner:

Criteria	Internal	External	Total
Thesis Report	100	200	300
Viva Voce	200	300	500
Total	300	500	**800**

Note: for getting degree, the candidate will have to opt minimum E grade in Dissertation-II.

Guide Lines for Dissertation Work:

Student will follow any one of given below to complete M.Tech. Dissertation Work:

1. Candidate should present/ publish at least two papers in International Conferences.
2. Candidate should publish at least one paper in International Journals.
3. Candidate should publish at least one paper in National Journals & at least one paper present/ publish in International/ National Conferences.

Note: Dissertation Work Report should be documented in University Format & Norms.

Calculation of Grade Point and Grade Point Average

Relative grading shall be adopted at the Faculty of Engineering & Technology, Rama University. The list of alphabet grades, the grade points associated with them are given below:

Grade	Grade Point
A^+	10
A	9
B	8
C	7
D	6
E	5
F	4

In order to arrive at these alphabet grades, the total marks in a particular course for all the students pursuing the course are tabulated in the descending order (equivalently a histogram).

The performance of the course is analyzed in terms of the highest, lowest and the average marks and the dividing lines between the clusters of students.

Gaps and dips between the clusters and the nature of the clusters guide in drawing the dividing lines between the grades. In a normal class of large size, the C grade usually covers the average performance. This is, however not a hard and fast rule and exceptions may arise in case of small classes, skewed histogram etc. Borderline cases may be considered individually on the basis of regularity and the attendance, class room discussions, progressive good performance throughout the semester, etc.

How to Calculate of Semester Grade Point Average:

- Computation of the Semester Grade Point Average (SGPA) and Cumulative Performance Index (CPI):
  The SGPA is an indicator of the overall academic performance of a student in all the courses he/she has registered during a given semester. It is computed as follows: If the grades awarded to a student are G_1, G_2 etc in courses with corresponding credits C_1, C_2 etc, the SGPA is given by:

$$SGPA = \frac{C_1 \times G_1 + C_2 \times G_2 + \cdots + C_n \times G_n}{C_1 + C_2 + \cdots + C_n}$$

- The CPI indicates the overall academic performance of a student in all the courses registered upto and including the latest completed semester/summer term. It is computed in the same manner as the SGPA, considering all the courses (say, n) and is given by:

$$CPI = \frac{\sum_{i=1}^{n} C_i \times G_i}{\sum_{i=1}^{n} C_i}$$

- Percentage conversion of CPI :

$$\textbf{Percentage of Marks} = \textbf{CPI} \times 10$$

- Students should get a minimum grade E in each subject with 5CPI to clear the semester.
- CPI conversion

≥8 CPI	**Ist Division with Honours**
≥6 CPI	**Ist Division**
≥5 CPI	**IInd Division**
<5 CPI	**Fail**

- In case a student gets a F grade in more than one subject, he / she has to repeat one or more of the subjects by registering for "Guided Study" in the semester the courses are offered. Registration for Guided Study shall be made on the payment of Rs. 500 per subject as well as registering for the examination with a payment of Rs. 1000 per subject.
- If the students get F grade in four subjects in an academic session then he/ she will repeat the year.
- M. Tech. Course should be completed within Four Years. If a student does not complete the M. Tech. program in stipulated time, he / she will have to appear freshly in the program.

9 (b). Results:

- The result of a candidate shall be declared on the basis of performance of both semesters of the same academic year. However, a final year student, who is not permitted in any one of the final year semester examinations due to shortage of attendance, will be permitted in that particular semester of the next academic session to study as a regular student and appear at that semester examination.
- The Final Result shall be declared on the basis of working out Grand Total by adding marks of all the years and all the semesters of study.

Award of Division: The division shall be awarded on the basis of final result.

10. CANCELLATION OF ADMISSION

The admission of a student at any stage of study shall be cancelled if:

(i) He / She are not found qualified as per the eligibility criteria prescribed by the University.

OR

(ii) He / She are involved in ragging.

OR

(iii) He / She are found involved in creating indiscipline in the Institute/Institute or in the University.

11. BOARD OF STUDIES

The constitution of the Board of Studies of each Institute shall be:

(a) The Director/ Dean of the Institute (Chairperson)
(b) Two Professors
(c) Two Associate Professors
(d) Two Assistant Professors
(e) Two External Expert Members

12. ACADEMIC PROGRAMME COMMITTEE

(a) There shall be an Academic Programme Committee in the Institute/ Department/ Constituent Institutions of the University.

(b) All the teachers of a Institute of Study shall constitute the Academic Programme Committee of which the Director of the Institute shall act as its Chairperson. This Committee shall coordinate the implementation of the courses for optimum utilization of resources and shall also take care of the coordination of the Institute's programmes with the other programmes run by the different Institutes of the University.

(c) The Academic Programme Committees shall also perform other tasks as assigned to it by the Board of Studies of the concerned Institute of the University.

(d) The Academic Programme Committee shall meet as and when required but at least once every semester. The Chairperson of the Committee will convene the meetings.

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COURSE STRUCTURE

M. TECH.

CIVIL ENGINEERING

(STRUCTURAL ENGINEERING)

SEMESTER-I (FIRST YEAR)

S. NO.	Course Code	Course Name	Teaching Scheme			Evaluation Scheme			Total Marks	Credits
			L	T	P	CA	MTE	ETE		
1	MCE-101	Advanced Mathematics and Numerical Analysis	3	1	0	30	20	100	150	4
2	MCE-102	Advanced Strength of Material and Theory of Elasticity	3	1	0	30	20	100	150	4
3	MCE-103	Advanced Structural Analysis	3	1	0	30	20	100	150	4
4	MCE-104	Computer Aided Design	3	1	0	30	20	100	150	4
LABORATORIES										
6	MCE-153	Advanced Concrete Lab	0	0	4	20	0	30	50	2
7	MCE-154	CAD Lab	0	0	4	20	0	30	50	2
TOTAL			**12**	**4**	**8**	**160**	**80**	**460**	**700**	**20**

SEMESTER-II (FIRST YEAR)

S. NO.	Course Code	Course Name	Teaching Scheme			Evaluation Scheme			Total Marks	Credits
			L	T	P	CA	MTE	ETE		
1	MCE-201	Structural Dynamics	3	1	0	30	20	100	150	4
2	MCE-202	Finite Element Method in Structural Engineering	3	1	0	30	20	100	150	4
3	MCE-203	Theory of Plates and Shells	3	1	0	30	20	100	150	4
4	MCE-021-MCE-024	Departmental Elective-I	3	1	0	30	20	100	150	4
LABORATORIES										
8	MCE-251	Computational Lab	0	0	4	10	10	30	50	2
9	MCE-252	Structural Engineering Lab	0	0	4	10	10	30	50	2
			12	**4**	**8**	**160**	**80**	**460**	**700**	**20**

SEMESTER-III (SECOND YEAR)

S. NO.	Course Code	Course Name	Teaching Scheme			Evaluation Scheme			Total Marks	Credits
			L	T	P	CA	MTE	ETE		
1	MCE-031-MCE-034	Departmental Elective-II	3	1	0	30	20	100	150	4
2	MCE-035-MCE-038	Departmental Elective-III	3	1	0	30	20	100	150	4
LABORATORIES										
3	MCE-351	Dissertation-I	0	0	16	200	0	300	500	12
			6	**2**	**16**	**260**	**40**	**500**	**800**	**20**

SEMESTER-IV (SECOND YEAR)

S. NO.	Course Code	Course Name	Teaching Scheme			Evaluation Scheme			Total Marks	Credits
			L	T	P	CA	MTE	ETE		
1	MCE-401	Dissertation-II	0	0	24	200	0	600	800	20
TOTAL			**0**	**0**	**24**	**200**	**0**	**600**	**800**	**20**

DEPARTMENTAL PROGRAM ELECTIVE-I

S. NO.	CODE	SUBJECT	TEACHING SCHEME				EVALUATION SCHEME			TOTAL MARKS	CREDITS	CONTACT HRS/WK	PRE- REQUISITES
			L	T	P	J	CA	MTE	ETE				
THEORY													
1	MCE-021	Advance Concrete Technology	3	1	0	0	20	20	60	100	4	3	
2	MCE-022	Ground Improvement Techniques	3	1	0	0	20	20	60	100	4	3	
3	MCE-023	Matrix Method of Analysis	3	1	0	0	20	20	60	100	4	3	
4	MCE-024	Advance Concrete Design	3	1	0	0	20	20	60	100	4	3	

DEPARTMENTAL ELECTIVE-II

S. NO.	CODE	SUBJECT	TEACHING SCHEME				EVALUATION SCHEME			TOTAL MARKS	CREDITS	CONTACT HRS/WK	PRE- REQUISITES
			L	T	P	J	CA	MTE	ETE				
THEORY													
1	MCE-031	Pre-stressed Concrete Design	3	1	0	0	20	20	60	100	4	3	
2	MCE-032	Advanced Foundation Engineering	3	1	0	0	20	20	60	100	4	3	
3	MCE-033	Advanced Design of Steel Structures	3	1	0	0	20	20	60	100	4	3	
4	MCE-034	Design of Earthquake Resistant Structures	3	1	0	0	20	20	60	100	4	3	

DEPARTMENTAL ELECTIVE-III

S. NO.	CODE	SUBJECT	TEACHING SCHEME				EVALUATION SCHEME			TOTAL MARKS	CREDITS	CONTACT HRS/WK	PRE- REQUISITES
			L	T	P	J	CA	MTE	ETE				
THEORY													
1	MCE-035	Stability Theories in Structural Engineering	3	1	0	0	20	20	60	100	4	3	
2	MCE-036	Design of Tall Structures	3	1	0	0	20	20	60	100	4	3	
3	MCE-037	Design of Offshore Structures	3	1	0	0	20	20	60	100	4	3	
4	MCE-038	Reliability Based Civil Engineering Design	3	1	0	0	20	20	60	100	4	3	

L-Lecture, T-Tutorial, P- Practical, CA- Continuous Assessment, MTE-Mid Term Examination, ETE-End Term Examination

Evaluation Scheme:

Course with theory components only

For Continuous Assessment (CA) is such as: 30 Marks

a) Attendance : 10 Marks
b) Assignments: 10 Marks
c) Class Tests : 10 Marks

MTE - Mid Term Examination: 20 Marks

ETE - End Term Examination: 100 Marks

Course with practical components only

For Continuous Assessment (CA) is such as: 20 Marks

a) Attendance : 10 Marks
b) Performance : 10 Marks
c) Practical File : 10 Marks

ETE - End Term Examination: 50 Marks

SEMESTER-I (FIRST YEAR)
MAS-101: ADVANCE MATHEMATICS AND NUMERICAL ANALYSIS

L T P
3 1 0

Credits: 4

Course Objectives: This course deals with Numerical solution of Partial Differential Equation (PDE), Integral transforms, Integral equations Calculus of Variation and Finite Element Method.

Course Content:

Unit No.	Contents	Teaching Hours
I	**Numerical solution of Partial Differential Equation (PDE):** Numerical solution of Partial Differential Equation of hyperbolic, parabolic and elliptic types by finite difference method.	8
II	**Integral transforms:** general definition, introduction to Mellin, Hankel and Fourier transforms and Fast Fourier transforms. Application of transforms to boundary value problems in engineering.	8
III	**Integral equations:** Conversion of Linear Differential equation (LDE) to an integral equation (IE), Conversion of boundary value problems to integral equations using Green's function, solution of Integral equation, IE of convolution type, Abel's IE, Integral differential equations, IE with separable variable, solution of Fredholm Equation with separable kernels, solution of Fredholm and Volterra equations by Method of successive approximations.	8
IV	**Calculus of Variation:** Functional and their Variation, Euler's equation for function of one and two independent variables, application to engineering problems.	8
V	**Finite Element Method:** Variational functionals, Euler Lagrange's equation, Variational forms, Ritzmethods, Galerkin's method, descretization, finite elements method for one dimensional problem.	8

EXPECTED COURSE OUTCOME: *At the end of the course the student will be able to*

1. understand the nature and operations of Numerical Analysis,
2. demonstrates familiarity with theories and concepts used in Numerical Analysis, and
3. identifies the steps required to carry out a piece of research on a topic in Numerical Analysis.
4. apply appropriate theories, principles and concepts relevant to Numerical Analysis,
5. critically assess and evaluate the literature within the field of Numerical Analysis,
6. analyze and interpret information from a variety of sources relevant to Numerical Analysis

Reference Books/ Text Books:

1. CF Froberg: Introduction to numerical analysis.
2. SS Sastry: Introductory methods of numerical analysis

3. Krasnove, Kiselevanded Makarenho: Integral equations
4. Buchanan: Finite element Analysis (schaum Outline S), TMH
5. Krishnamurthy: Finite element analysis, TMH
6. B.V. Ramana : Higher Engineering Mathematics ; Tata McGraw Hill.
7. Ervin Kreszig : Advance Engineering Mathematics ; Wiley Eastern Edd.
8. Steven C Chapra, : Applied Numerical Methods with MATLAB by TMH
9. Salvadori and Baron : Numerical Methods in engineering.
10. Schied : Theory and problems of Numeric analysis (Schaum Outline S), , TMH

MCE-102: ADVANCED STRENGTH OF MATERIAL AND THEORY OF ELASTICITY

L T P
3 1 0

Credits: 4

Course Objectives: This course deals with Plane Stress and Plane Strain, Two Dimensional Problems in Rectangular and Polar Co-ordinates, Analysis of stress and strain in Three Dimensions and Torsion of Prismatic Bars.

Course Contents:

Unit No.	Contents	Teaching Hours
I	**Plane Stress & Plane Strain:** Plane Stress, Plane Strain, Stress and Strain at points, and Differential equations of equilibrium, Constitutive relation: Anisotropic materials linear elasticity; Stress, Strain, Constitutive relations; Boundary conditions, Compatibility equation, Stress function.	8
II	**Two Dimensional Problems in Rectangular Co-ordinates:** Solutions by Polynomials, Saint-Venant's Principle, Determination of displacements, Bending of beams, Solution of two dimensional problem in Fourier series.	8
III	**Two Dimensional Problems in Polar Coordinates:** General equations in Polar coordinates, Pure bending of curved bars, Displacements for symmetrical stress distributions, Bending of curved bar, Stress distribution in plates with circular holes, Stresses in a circular disc general solution.	8
IV	**Analysis of stress and strain in Three Dimensions:** Principal stress and strain, Shearing stress and strains, elementary equation of equilibrium , Compatibility conditions, problems of elasticity involving pure bending of prismatic bars.	8
IV	**Torsion of Prismatic Bars :** Torsion of prismatic bars, membrane analogy, torsion of a bar of narrow rectangular cross section, torsion of rectangular bars, solution of torsional problem, Torsion of rolled section, torsion of hollow shafts and thin tubes, torsion buckling torsional flexural buckling.	8

Expected Course Outcomes: At the end of the course, the student will be able to:
1. formulate and understand the differential equations governing the behavior of two dimensional elastic solids
2. solve the differential equations governing the bending of plates
3. Apply concepts of energy conservation to the solution of problems in solid mechanics; determine whether a crack in an elastic solid will propagate.
4. determine whether a solid will exceed the elastic limit and analyze the post-yield behavior

Reference Books / Text Books:
1. Timoshenko, S.P., Theory of Elasticity
2. Timoshenko, S.P., Theory of Elastic Stability
3. Iyenger N.G.R., Structural Stability of Columns & Plates.

MCE-103: ADVANCED STRUCTURAL ANALYSIS

L T P
3 1 0

Credits: 4

Course Objectives: This course deals with Matrix Method (Flexibility and Stiffness Method), Energy approach in stiffness method and Comparison of Force and Displacement methods of solution.

Course Contents:

Unit No.	Contents	Teaching Hours
I	Matrix Method (Flexibility Method): Force methods, Basic Concepts, evaluation of flexibility, transformation, Analysis of a single member of different types, Transformation of single member.	8
II	Applications to plane and space structures with pin joints and rigid joints, energy approach in flexibility method, Effect of support displacement and transformation.	8
III	Matrix Method (stiffness Method): Displacement methods, Basic concepts, Evaluation of stiffness coefficients, direct stiffness method.	8
IV	Energy approach in stiffness method, approach for global stiffness matrix and effect of support displacement and temperature.	8
V	Symmetrical & anti-symmetrical problems, Stiffness of plane & space frames solution of problems, Comparison of force and displacement methods of solution.	8

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

1. Use structural codes and standards such as ASCE-7 and IBC to model dead, live, snow, wind, and earthquake loads on structures.
2. Analyze statically determinate trusses, beams, and frames and cable and arch structures.
3. Analyze the influence lines for statically determinate and indeterminate structures.
4. Determine deflections of beams and frames using classical methods.
5. Ability to solve statically indeterminate structures using matrix (stiffness) method

Reference Books / Text Books:

1. S. Reddy , Basic Structural Analysis ,TMH, Publishers
2. W Wearer Jr. & James M. Gere, Matrix Analysis of Framed Structures, CBS Pub.
3. Rajsekeran, Sankarsubramanian, Computational Structural Mechanics, PHI
4. Pandit, Structural Analysis: A Matrix Approach, TMH

MCE-104: COMPUTER AIDED DESIGN

L T P
3 1 0

Credits: 4

Course Objectives: This course deals with C.P.P features and programming, Computer Aided drafting and Introduction to computer graphics.

Course Content :

Unit No.	Contents	Teaching Hours
I	C.P.P programming language: Basics of programming, loops, decisions, structures, functions, objects/ classes, arrays.	8
II	Overloading, inheritance, virtual functions and pointers, object oriented programming, turbo C.P.P features and programming.	8
III	Structure Engineering problems programming.	8
IV	Computer Aided drafting, 2-D and 3-D drawings, Introduction to CAD software, drawing of buildings.	8
V	Introduction to computer graphics, 3-D modeling software and analysis software.	8

Expected Course Outcomes : On completion of this course, the students will be able to
1. Describe basic structure of CAD workstation, Memory types, input/output devices and display devices and computer
2. Acquire the knowledge of geometric modeling and Execute the steps required in CAD software for developing 2D and 3D models and perform transformations.
3. be an effective user of a CAD system

Reference Books / Text Books:
1. Robert Lafore, Object oriented programming in CPP
2. E. Balaguruswamy, Programming in C
3. Syal and Gupta, Computer programming and engineering analysis.
4. S.S.Bhavikatti and M.V.Chitawadagi, Building Planning and Drawing
5. Raghunandan M.H., Basic Computer Aided Drafting in Civil Engineering

MCE-153: ADVANCE CONCRETE LABORATORY

L T P
0 0 4

Credits: 2

Course Objectives: This course deals with testing of cement, aggregates and concrete.

Course Content:

Module No.	Contents	Teaching Hours
I	**List of Experiments:** 1. Tests on cement - Consistency, Setting times, Soundness, Compressive Strength. 2. Gradation Charts of Aggregates. 3. Bulking of fine Aggregate. 4. Aggregate Crushing and Impact value 5. Workability Tests on Fresh self compacting concrete 6. Air Entrainment Test on fresh concrete. 7. Marsh cone test. 8. Permeability of Concrete. 9. Non Destructive Testing of Concrete. 10. Accelerated Curing of Concrete. 11. Influence of W/C ratio on strength and Aggregate / Cement ratio on workability and Strength 12. Influence of Different Chemical Admixtures on concrete	20

Expected Course Outcomes: Students who successfully complete this course will be able to:
1. understand concepts, testing procedures, quality standards for use and their applications in the lab while testing quality of materials.
2. generate formal technical report and convey the suitability of materials in engineering works.

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MCE-154: CAD LABORATORY

L T P
0 0 4

Credits: 2

Course Objectives: This course deals with use of various softwares used in analysis and design of beams, slabs, columns and footings, truss, multi-storeyed frame and bridge deck slab.

Course Content:

Module No.	Contents	Teaching Hours
I	**List of Experiments:** 1. Program using arrays and functions for matrix manipulation. 2. Programs to draw bending moment and shear force diagrams. Using graphic in C 3. Program for design of slabs. Using Excel 4. Program for design of beams. Using Excel 5. Program for design of column and footing using excel 6. Analysis of truss using STAAD Pro. 7. Analysis of multistoried space frame, using STAAD Pro. 8. Analysis of Bridge deck slab.	20

Expected Course Outcomes: Students who successfully complete this course will be able to:

1. Demonstrate basic concepts of the AutoCAD software
2. Apply basic concepts to develop construction (drawing) techniques
3. Ability to manipulate drawings through editing and plotting techniques
4. Understand geometric construction
5. Produce template drawings
6. Produce 2D Orthographic Projections
7. Understand and demonstrate dimensioning concepts and techniques
8. Understand Section and Auxiliary Views
9. Become familiar with the use of Blocks, Design Center, and Tool Palettes
10. Become familiar with Solid Modeling concepts and techniques.

SEMESTER-II (FIRST YEAR)
MCE-201: STRUCTURAL DYNAMICS

L T P
3 1 0

Credits: 4

Course Objectives: The objective of this course is to make students to learn principles of Structural Dynamics, implement these principles through different methods and to apply the same for free and forced vibration of structures and evaluate the dynamic characteristics of the structures

Course Contents:

Unit No.	Contents	Teaching Hours
I	**Single Degree of Freedom System:** Free and forced vibrations, Linear Viscous Damper, Coulomb Damper: Response to harmonic excitation, rotating unbalance and support excitations, Vibration isolation and transmissibility, single degree of freedom system as vibro-meter and accelerometer, response to periodic and arbitrary excitation.	8
II	Duhamel's integral, Impulse response function, Laplace transform Fourier transform methods, Frequency response function, Phase-Plane Techniques, Critical Speed of rotors, Energy methods, Rayleigh's method and Equivalent viscous damping.	8
III	Two Degree of Freedom System, Matrix Formulation, Free Vibration, Beat phenomenon, Principle of damped and un-damped vibration absorbers.	8
IV	Multi Degree of Freedom System: Matrix formulation, stiffness and flexibility influence coefficients, Eigen value problem, normal modes and their properties, Matrix iteration technique for Eigen value, and Eigen vectors, Free and forced vibration by modal analysis.	8
V	Continuous System: Axial vibration of bar, torsion of shafts, transverse vibration of strings and bending vibration beams, Forced vibration, Normal mode method, Lagrangle's equation, Approximate methods of Rayleigh-Ritz, Gale kin etc.	8

Expected Course Outcomes : On completion of this course, the students will be able to
1. Understand the fundamental theory of dynamic equation of motion fundamental analysis methods for dynamic systems dynamic properties and
2. Understand behavior of civil structures modeling approach of dynamic response in civil engineering applications.

Reference Books / Text Books:

1. RW Clough, J Penzien, Dynamics of structures
2. G Fertia, Dynamics and vibration of Structures
3. J M Biggs, Introduction to structural dynamic
4. G. C. Hart & K. Wang; John Wiley & Sons, Structural Dynamics for Structural Engineers
5. Structural Dynamics- Mario Paz: CBS publishers.
6. Structural Dynamics- Clough & Penzien: TMH
7. Vibration Problems in Engineering Timoshenko, S, Van-Nostrand Co

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MCE-202: FINITE ELEMENT METHOD IN STRUCTURAL ENGINEERING

L T P
3 1 0

Credits: 4

Course Objectives: *:* This course deals Solution of Finite Element Method: Solution of Equilibrium Problems, Iso-parametric Formulation and Static Analysis of Structures.

Course Contents:

Unit No.	Contents	Teaching Hours
I	Introduction to Finite Element Method: General Applicability and Description of Finite Element Method Comparison with other methods.	8
II	Solution of Finite Element Method: Solution of Equilibrium Problems, Eigen value problems, propagation problems, computer implementation of Gaussian eliminations, Choleski□s decomposition, Jocobi's and Ranga Kutta Method.	8
III	General Procedure of Finite Element Method: Descretization of the domain, Selection of Shapes, Types and Number of elements, node numbering technique, Interpolation Polynomials, their selection and derivation in terms of global and local coordinates, Convergence requirements. Formulation of Element Characteristic, matrices and vectors, Variational approach. Assembly of Element matrices and Vectors and Derivation system equations, computation of element resultants.	8
IV	Iso-parametric Formulation: Lagrange and Hermite interpolation functions, Isoparametric Elements, Numerical Integration	8
V	Static Analysis: Formulation of equilibrium equation, Analysis of truss, Frames, Plane Stress and Plane Strain Problems Plates and Shells.	8

Expected Course Outcomes : On completion of this course, the students will be able to

1. apply the procedure involved to solve a problem using Finite Element Methods, develop the element stiffness matrices using different approach
2. analyze a 2D problem using line, triangular, ax symmetric and quadrilateral element
3. Analyze a 3D problem using tetrahedral and hexahedral elements.

Reference Books / Text Books:

1. Weaver, Johnson, Finite element and structural analysis
2. HC Martin, Matrix structural analysis
3. CF Abel, CS Desai, Finite element methods
4. Buchanan, Finite element Analysis (schaum Outline S), TMH
5. Krishnamurthy, Finite element analysis, TMH

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MCE-203: THEORY OF PLATES & SHELLS

L T P
3 1 0

Credits: 4

Course Objectives: : This course deals Introduction to Plates and ShellsTheory, Rectangular plates-Levy's solution, Finite difference method, Energy methods and Bending theory of Cylindrical shells.

Course Contents:

Unit No.	Contents	Teaching Hours
I	Introduction to Plate Theory: Thin and Thick Plates, small and large deflection theory of thin plate-assumptions, moment-curvature relations, stress resultants, Governing Differential Equation for bending of plates, various boundary conditions Rectangular Plates-Navier's solution: Simply supported rectangular plates subjected to uniformly distributed and varying loads on entire area, parabolic loads, sinusoidal loads, partly loaded plates, concentrated loads, sinusoidal loads, partly loaded plates, concentrated loads and couples, distributed couples, symmetric & anti-symmetric loading.	8
II	Rectangular plates-Levy's solution: Plates subject to uniformly distributed and varying loads and sinusoidal parabolic loads between simply supported edges. Conditions for other two edges-simply supported, fixed, free, elastically restrained. Finite difference method: Solution of plate problems deviation of delta/pattern/stencil for bi-harmonic form for a rectangular mesh, two stage solutions, solution for various loadings and boundary conditions, use of symmetry & anti-symmetry	8
III	Energy methods: Use of potential energy principle, solution of rectangular plates with various boundary conditions and loadings. Circular Plates: Bending of circular plates with champed & simply supported edges, Plate with a central hole, uniformly distributed and varying loads,	8
IV	Introduction: Classification of shells on geometry, thin shell theory, equation of shell surfaces, Stress resultants, Stress-displacement relations, compatibility and equilibrium equations. Membrane Analysis : Equation of equilibrium for synclastic shells, solution for shells subject to self weight, live load. Equation of equilibrium in rectangular system, use of puchers function, simple problems on hyperbolic paraboloids. Elliptic paraboloidal shells, conoids	8
V	Bending theory of Cylindrical shells: Symmetrically loaded circular cylindrical shell derivation of governing differential equation, resembling that for beam on elastic foundation, beam theory, Finsterwalder's theory- derivation of governing differential equation of 8th order, D.K.J. theory- Donnell's equation, Characteristic equation, Schorer's theory- derivation of differential equation.	8

Expected Course Outcomes : On completion of this course, the students will be able to

1. To analyze and design thin shell structures including domes, hyperbolic, paraboloid, elliptic and cylindrical shells.
2. To formulate Finite Element Equations for solution of the structural response of plate bending problems and obtain solutions to shell structures.

3. To assess the strength of plate panels under point, linearly varying and uniformly distributed loads.
4. To analyze plates under different boundary conditions by various classical methods and approximate methods.
5. To be familiar with classification of shells and classical shell theories and apply them in engineering design

Reference Books / Text Books:

1. Timoshenko & W.Kreiger; Theory of Plates & Shells
2. G.S. Ramaswamy ; Design of R.C. Shell Roof
3. K Chandrashekhar ; Analysis of Thin Concrete Shells
4. Gould ; Analysis of Plates & Shells
5. Szilard ; Theory of Plates
6. Bennett ; Theory of Plates
7. Fluggee ; Stresses in Shells.

DEPARTMENTAL ELECTIVE-I
MCE-021: ADVANCE CONCRETE TECHNOLOGIES

L T P
3 1 0

Credits: 4

Course Objectives: This course deals with Cement & its properties, Properties of Fresh and hardened Concrete, Concreting at different temperatures, Special Concretes, Mix Design and Non-destructive Testing of Concrete.

Course Contents:

Unit No.	Contents	Teaching Hours
I	Cement & its properties, Properties of Fresh Concrete, Compaction of Concrete, Curing of Concrete.	8
II	Properties of Hardened Concrete, strength Characteristic, shrinkage, creep, durability, fattier.	8
III	Permeability & Durability of Concrete in detail, special concretes and their properties.	8
IV	Concrete at Low & High temperature. Air Entrained Concrete, High Performance Concrete	8
V	**Mix** Design, Non destructive Testing of Concrete.	8

Expected Course Outcomes : On completion of this course, the students will be able to

1. Discuss the concrete ingredients and its influence at gaining strength.
2. Design of concrete mix and grade as per IS codes.
3. Summarize the concepts of conventional concrete and its differences with other concretes like no fines, light weight etc.
4. Describe the application and use of fiber reinforced concrete.
5. Design and develop the self compacting and high performance concrete.

Reference Books / Text Books:

1. A.M. Neville, Concrete Technology , ELBS, London
2. M.L. Gambhir, Concrete Technology, Tata Mc Graw Hill Book Co.
3. Shetty M.S, "Concrete Technology: Theory and Practice", S.Chand & Company Ltd., 2005

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MCE-022: GROUND IMPROVEMENT TECHNIQUES

L T P
3 1 0

Credits: 4

Course Objectives: This course deals with different problematic soils, their geological formation, treatment of loose and expansive soils, soft clays, in-situ ground treatment for slopes and grouting techniques.

Course Contents:

Unit No.	Contents	Teaching Hours
I	**Introduction:** Different types of problematic soils and their geological formation, principles of treatment loading.	8
II	**Treatment of loose sands:** Compaction piles, dynamic compaction, vibro-float technique, controlled blasting for compaction.	8
III	**Grouting techniques:** Permeation grouting, Compaction technique, jet grouting, different varieties of grout materials, grouting in difficult conditions. **Treatment of expansive soils:** Lime treatment for expansive soils, injection method, lime-columns, chemical analysis.	8
IV	**Accelerated consolidation methods for soft clay soils:** Sand drains Pre-fabricated drains. Stone columns. Vacuum consolidation	10
V	**In-situ ground treatment for slopes:** Different types of in situ soil stabilization like soil nails, anchoring, Pre-stressed anchors, etc. Design methods and construction techniques. **Case studies:** Case studies of different ground improvement projects in India.	10

Expected Course Outcomes : On completion of this course, the students will be able to

1. Understand the different ground improvement techniques
2. Understand the methods of stabilisation
3. Understand the methods and properties of reinforced soil
4. Understand the basic concepts of geo-synthetics
5. Understand the basic concept of consolidation of soil
6. Understand the concept of shear strength in soil

Reference Books / Text Books:

1. Dr. P. Purushottama Raj, Ground Improvement Techniques
2. Jie Han, Principle and Practice of Ground Improvement
3. Bikash Chandra Chattopadhyay and Joyanta Maity, Ground Improvement Techniques
4. V. Saundararajan, Ground Improvement Techniques
5. Nihar Ranjan Patra, Ground Improvement Techniques

MCE-023: MATRIX ANALYSIS OF STRUCTURES

L T P
3 1 0

Credits: 4

Course Objectives: This course deals with Flexibility and Stiffness method, Analysis for imposed deformation, Transfer matrix method of analyzing framed structure, Hand computation of problems on beam, trusses, frames and grids .

Course Contents:

Unit No.	Contents	Teaching Hours
I	Introduction of Flexibility and Stiffness method, Hand computation of problems on beam	8
II	Hand computation of problems on trusses, frames and grids.	8
III	Generalized computer oriented treatment of stiffness method, Method of assembling the stiffness matrix, substructure technique for solving very large structures.	8
IV	Analysis for imposed deformation, temperature, support settlement, etc.	8
V	Transfer matrix method of analyzing framed structure.	8

Expected Course Outcomes : On completion of this course, the students will be able to

1. apply the basic concepts of matrix methods in structural analysis develop stiffness and flexibility matrices
2. analyze the structures using flexibility and stiffness method transform system coordinates to element coordinates
3. Determine the forces in various members due to lack of fit and thermal expansion.

Reference Books / Text Books:

1. Weaver & Gere , Matrix Analysis of Framed structures.
2. H.C. Matrix, Introduction to Matrix Methods, of structural Analysis, McGraw Hill, New York.
3. S.C. Chapra & R.P. Canale; Numerical Methods for Engineering
4. P Bhatt; Problems in structural Analysis by Matrix Methods, Wheeler Publication

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MCE-024: ADVANCED CONCRETE DESIGN

L T P
3 1 0 **Credits: 4**

Course Objectives: This course deals with Basic Design Concepts, Limit Analysis of R.C.Structures, Design of Ribbed slabs, Flat slabs, Design of Reinforced Concrete Deep Beams & Corbels, and Design of Compression members.

Course Contents:

Unit No.	Contents	Teaching Hours
I	**Basic Design Concepts:** Behaviour in flexure, Design of singly reinforced rectangular sections, Design of doubly reinforced rectangular sections, Design of flanged beams, Design of shear, Design for Torsion, Limit state of Serviceability: Deflections of Reinforced concrete beams and slabs, short term deflection and long term deflection, estimation of crack width in RCC members, calculation of crack widths.	8
II	**Analysis of R.C.Structures:** Rotation of a plastic hinge, Redistribution of moments, moment rotation characteristics of RC member, I.S. code provisions, applications for fixed and continuous beam. Yield line analysis for slabs: Upper bound and lower bound theorems – yield line criterion – Virtual work and equilibrium methods of analysis for square and circular slabs with simple and continuous end conditions.	8
III	**Design of Ribbed slabs, Flat slabs:** Analysis of the Slabs for Moment and Shears, Ultimate Moment of Resistance, Design for shear, Deflection, Arrangement of Reinforcements. Flat slabs: Direct design method – Distribution of moments in column strips and middle strip-moment and shear transfer from slabs to columns – Shear in Flat slabs-Check for one way-two way shears - Introduction to Equivalent frame method. Limitations of Direct design method, Distribution of moments in column strips and middle strip.	8
IV	**Design of Reinforced Concrete Deep Beams & Corbels:** Steps of Designing Deep Beams, Design by IS 456, Checking for Local Failures, Detailing of Deep Beams, Analysis of Forces in a Corbels , Design of Procedure of Corbels, Design of Nibs.	8
V	**Design of Compression members**: Estimation of effective length of a column-Code requirements on Slenderness Limits, Design of Short Columns under Axial Compression, Design of Short Columns with Uni-axial Bending, Design of Short Columns under Biaxial Bending, Design of Slender Columns. Design of Combined Footings- Distribution of soil Pressure – Geometry of Two Column Combined Footing – Design Considerations in Combined Footing for Two – Columns.	8

Expected Course Outcomes : On completion of this course, the students will be able to

1. understand the general mechanical behavior of reinforced concrete
2. analyze and design reinforced concrete flexural members
3. analyze and design reinforced concrete compression members
4. analyze and design for vertical and horizontal shear in reinforced concrete
5. analyze transfer and development length of concrete reinforcement

Reference Books / Text Books:

1. S. Unnikrishna Pillai & Menon, Reinforced concrete design by Tata Mc. Graw Hill
2. P.C. Varghese, Advanced Reinforced Concrete Design –Practice Hall, 2008

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3. Dr. S.R. Karve and Dr. V.L. Shah, Limit state theory and design of reinforced concrete Standard publishers, Pune, 3rd Edition, 1994
4. Kennath Leet, Reinforced concrete design by Tata Mc. Graw-Hill International, editions, 2nd edition, 1991.
5. P.Purushotham, Reinforced concrete structural elements – behaviour, Analysis and design by Tata Mc.Graw-Hill, 1994.
6. Arthus H. Nilson, David Darwin, and Chorles W. Dolar, Design of concrete structures –Tata Mc. Graw-Hill, 3rd Edition, 2005.
7. B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Reinforced concrete structures, Vol.1, by Laxmi Publications, 2004.

MCE-251: COMPUTATIONAL LABORATORY

L T P
0 0 4

Credits: 2

Course Objectives: This course deals with principles of Structural Analysis, analyze various types of structures and evaluate the force and displacement parameters of the structures.

Course Content:

Module No.	Contents	Teaching Hours
I	1. Development of Finite Element Programming for analysis of beams, trusses, frames. ; 2. Analysis of plates and shells using commercial software. 3. Computer programming in C++. ; Development of computer programs to solve problems related to civil engineering using matrix method.	20

Expected Course Outcomes: Students who successfully complete this course will be able to:
1. Achieve Knowledge of design and development of problem solving skills.
2. Understand the principles of Structural Analysis .
3. Design and develop analytical skills.
4. Summarize the Solution techniques.
5. Understand the concepts of structural behavior.

MCE-252: STRUCTURAL ENGINEERING LABORATORY

L T P
0 0 4

Credits: 2

Course Objectives: This course deals with principles of design of experiments, the performance of structural elements and different testing methods and equipments

Course Content:

Module No.	Contents	Teaching Hours
I	1. Model Analysis - Use of various types of strain gauges - Mechanical and Electrical strain gauges 2. Casting and testing of R.C. and pre-stressed concrete beams and study of their behavior 3. Experiments in 2-D photo elasticity - properties of concrete ingredients 4. Concrete Mix Design - Strength Tests on Concrete	20

Expected Course Outcomes: Students who successfully complete this course will be able to:
1. Achieve knowledge of design and development of experimenting skills.
2. Understand the principles of design of experiments.
3. Design and develop analytical skills.
4. Summarize the testing methods and equipments.

SEMESTER-III (SECOND YEAR)
DEPARTMENTAL ELECTIVE-II
MCE-031: PRE-STRESSED CONCRETE DESIGN

L T P
3 1 0

Credits: 4

Course Objectives: *:* This course deals with analysis and design of pre stressed concrete members and connections, analysis and design pre stressed concrete flexural members, analysis and design for vertical and horizontal shear in pre stressed concrete and design for deflection and crack control of pre stressed concrete members and pre-stress losses.

Course Contents:

Unit No.	Contents	Teaching Hours
I	Overview of reinforced and pre-stressed concrete construction. Design and detailing of precast/prefabricated building components.	8
II	Structural design and detailing of joints in prefabricated structures, Production of ready mixed concrete, quality assurance.	8
III	Use of equipments in precast prefabricated structure, Productivity analysis, Economics of form work, Design of Formwork and their reusability.	8
IV	Modular construction Practices, Fibonacci series, its handling and other reliable proportioning concepts.	8
V	Modular coordination, standardization, system building, Lamination and Advantages of modular Construction	8

Expected Course Outcomes : On completion of this course, the students will be able to

1. Identify and apply the applicable industry design codes relevant to the design of pre stressed concrete members.
2. Familiar with professional and ethical issues and the importance of lifelong learning in structural engineering.
3. Understand the behavior of prestressed concrete simple or continuous beams, columns and connections, upon learning the structural responses to different kinds of loads, particularly the prestressing effect at various stages.
4. To design such beams, columns and connection details, with confidence using existing codes of practice, taking into account of the structural strength, service life and durability.
5. know the limitations of the design methods used.

Reference Books / Text Books:

1. A K Lal : Handbook of Low Cost Housing
2. Kim Elliot : Precast Concrete Structures
3. T Y Lin and N H Burns : Design of Pre-stressed Concrete
4. Nagarajan : Pre-stressed Concrete Design
5. Naaman A E : Pre-stressed Concrete Analysis & Design

MCE-032: ADVANCED FOUNDATION ENGINEERING

L T P
3 1 0

Credits: 4

Course Objectives: This course deals with Deep Open Cuts, Shallow Foundations, Pile Foundation, Coffer Dams and Machine Foundations.

Course Contents:

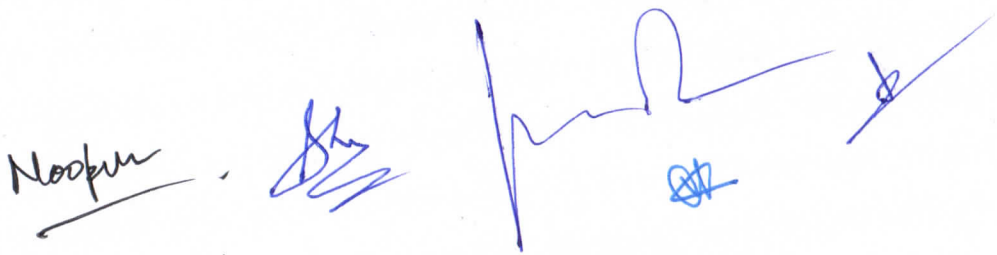
Unit No.	Contents	Teaching Hours
I	Deep Open Cuts: Introduction, Types of Coffer Dams, Design data for cellular cofferdam, Stability analysis of cofferdam, interlock stresses. Soil Exploration: Introduction, Methods of exploration, Direct Methods and techniques of exploration, Methods of boring types of samples, Disturbance of soil sample, Soil sampler and sampling techniques, Ground water observations, Boring records, Spacing and depth of bore holes, Indirect methods of soil exploration, Penetration tests, Geophysical methods, Dynamics methods, Sequence of exploration programs	8
II	Shallow Foundations: Introduction, General Requirements, Depth of foundation, Bearing capacity, Eccentric Inclined loads, Bearing capacity of stratified soils, Settlement of footings, Settlement of footings from constitutive laws, Settlement and tilt of eccentrically loaded footings, Allowable settlement, Plate bearing test, Standard penetration test Effect of water table, shallow foundation classification, Modulus of sub-grade reaction, Beams on elastic foundation, Raft foundation.	8
III	Pile Foundation: Introduction, Uses of piles, Types of piles, pile drivers, Bearing capacity of piles, Static analysis, Pile load test, Dynamic methods, Other methods, Negative skin friction, Pile group, Ultimate bearing capacity of pile groups, Settlement of pile group, Influence of pile cap. Laterally loaded piles, Ultimate resistance, Elastic methods, Pile groups under lateral load, batter pile under lateral load, Batter pile groups under inclined loads, pile under dynamic loads.	8
IV	Coffer Dams: Introduction, types of Coffer Dams, Design data for cellular cofferdam, Stability analysis of cofferdam, Interlock stresses.	8
V	Machine Foundations : Introduction, Criteria for satisfactory action of a machine foundation, Definitions, Degrees of freedom of a block foundation, Analysis of block foundation, Theory of linear weightless spring, Equivalent soil springs, Vertical vibration, Rocking vibration, Vibration in shear, Simultaneous rocking sliding and vertical vibrations for a foundation, Indian standard on design and construction of foundations for reciprocating machines, Foundations for impact type machines, Indian Standard on design and construction of foundations for impact type machines, Analysis of block foundation based on elastic half space theory.	8

EXPECTED COURSE OUTCOME: On completion of the course, the students will be able to
1. Understand the concepts of foundation and its design.
2. Design different types of foundation required for construction of structures.
3. Identify a suitable **foundation** system for a structure
4. Evaluate the importance of raft **foundation** and principles of design for buildings and tower structures.

5. Analyze and design pile **foundations**.

Reference Books/ Text Books:

1. Bowles, Foundation: Analysis and Design, McGraw Hill Book CO. Inc.
2. Peck , R.B. , W.E. Hanson and T.H. Thornburn, Foundation Engineering, Wiley , New York



MCE-033: ADVANCED DESIGN OF STEEL STRUCTURES

L T P
3 1 0

Credits: 4

Course Objectives: This course deals with Introduction to Limit States, design of Columns, Laterally Restrained Beams and Beams Subjected to Torsion and Bending *works.*

Course Contents:

Unit No.	Contents	Teaching Hours
I	**Introduction to Limit States**: Introduction, Standardization, allowable stress design, limit state design, partial safety factors, concept of section, classification; Plastic, compact semi compact& slender.	8
II	**Columns**: Basic concepts, strength curve for an ideal strut, strength of column members in practice effect of eccentricity of applied loading. Effect of residual stresses, concept of effective lengths, no sway columns, torsional and torsion, flexural buckling of columns, Robertson's design curve, modification to Robertson approach, design of columns using Robertson approach.	8
III	**Laterally Restrained Beams**: Flexural & shear behavior, web buckling & web crippling, effect of local buckling in laterally restrained plastic' or 'compact' beams, combined bending & shear, unsymmetrical bending. Unrestrained Beams: Similarity of column buckling of beams, lateral torsional buckling of symmetric section, factors affecting lateral stability, buckling of real beams , design of cantilever beams, continuous beams.	8
IV	**Beams Columns:** Short & long beam columns, effects of slenderness ratio and axial force on modes of failure, beam column under biaxial bending, strength of beam columns, local section failure & overall member failure.	8
V	**Beams Subjected to Torsion and Bending:** Introduction, pure torsion and warping, combined bending torsion, capacity check, buckling check, design methods for lateral torsional buckling.	8

EXPERCTED COURSE OUTCOME : At the end of this course the student will be able to-

1. Analyze beams in the cases of static and moving loads.
2. Design beams in the cases of static and moving load and design frame elements.
3. Design connections at different types of loads and straining actions.
4. To analyze and design hinged and fixed steel bases and bracing members.
5. An ability to develop technical workshop drawings and computer applications in the design.

Reference Books/ Text Books:

1. Moris L.J. Plum, D.R., Structural Steel Work Design
2. Sinha D.A. , Design of Steel Structures

Noopur

3. Yu, W.W. , Cold Formed Steel Structures Design

MCE-034: DESIGN OF EARTHQUAKE RESISTANT STRUCTURES

L T P
3 1 0

Credits: 4

Course Objectives: This course deals with analytical methods for evaluation of seismic resistance of buildings, deficiencies of existing multi-storey reinforced concrete buildings and available seismic retrofit strategies for the deficient buildings.

Course Contents:

Unit No.	Contents	Teaching Hours
I	Introduction to Engineering Seismology, Geological and tectonic features of India, Origin and propagation of seismic waves, characteristics of earthquake and its quantification – Magnitude and Intensity scales, seismic instruments. Earthquake Hazards in India, Earthquake Risk Evaluation and Mitigation. Structural behavior under gravity and seismic loads, Lateral load resisting structural systems, Requirements of efficient earthquake resistant structural system, damping devises, base isolation systems	6
II	The Response history and strong motion characteristics. Response Spectrum – elastic and inelastic response spectra, tripartite (D-V-A) response spectrum, use of response spectrum in earthquake resistant design. Computation of seismic forces in multi-storied buildings –using procedures (Equivalent lateral force and dynamic analysis) as per IS-1893.	10
III	Structural Configuration for earthquake resistant design, Concept of plan irregularities and vertical irregularities, Soft storey, Torsion in buildings. Design provisions for these in IS-1893. Effect of infill masonry walls on frames, modeling concepts of infill masonry walls. Behavior of masonry buildings during earthquakes, failure patterns, strength of masonry in shear and flexure, Slenderness concept of masonry walls, concepts for earthquake resistant masonry buildings – codal provisions.	8
IV	Design of Reinforced concrete buildings for earthquake resistance-Load combinations, Ductility and energy absorption in buildings. Confinement of concrete for ductility, design of columns and beams for ductility, ductile detailing provisions as per IS1893. Structural behavior, design and ductile detailing of shear walls.	8
V	Seismic response control concepts – Seismic demand, seismic capacity, Overview of linear and non linear procedures of seismic analysis. Performance Based Seismic Engineering methodology, Seismic evaluation and retrofitting of structures	8

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

1. Achieve Knowledge of design and development of problem solving skills.
2. Understand the principles of engineering seismology
3. Design and develop analytical skills.
4. Summarize the Seismic evaluation and retrofitting of structures.
5. Understand the concepts of earthquake resistance of reinforced concrete buildings.

Reference Books / Text Books:

1. Chopra A.K., Dynamics of Structures', Theory & Applications to Earthquake Engineering, Prentice Hall India, New Delhi-1995
2. Vinod Hosur, Earthquake Resistant Design of Building Structures, WILEY (India)
3. Minoru Wakabayashi, Design of Earthquake Resistant Buildings, McGraw Hill Publisher
4. S.Clough & Penzien, Dynamics of Structures, McGraw Hill Book CO. Inc.
5. Paz M, Structural Dynamics, Van Nostrand Reinhold, New York
6. Paz, M, International Handbook of Earthquake Engineering, Chapman & Hall, New York.
7. IS-1893-1984, Indian Standard Criteria for Earthquake Resistant Design of Structures, B.I.S., New Delhi.
8. IS-4326-1993, Indian Standard Code of Practice for Earthquake Resistant Design and Construction of Buildings, B.I.S., New Delhi.

DEPARTMENTAL ELECTIVE-III
MCE-035: STABILITY THEORY IN STRUCTURAL ENGINEERING

L T P
3 1 0

Credits: 4

Course Objectives: This course deals with Concepts of Stability, Torsional Buckling, Torsional Flexural Buckling and Application of Energy method and matrix method in stability problems.

Course Content:

Unit No.	Contents	Teaching Hours
I	Concepts of Stability, Euler Buckling Load, Critical Load of Laced, Battened and Tapped columns, Inelastic Buckling of column.	8
II	Torsional Buckling, Torsional Flexural Buckling.	8
III	Lateral Instability of Beams, Beam Columns	8
IV	Local Buckling and post buckling behaviour of plates.	8
V	Application of Energy method and matrix method in stability problems .	8

EXPECTED COURSE OUTCOME: *At the end of the course the student will be able to*

1. determine the buckling loads for simple columns and frames,
2. have an understanding of the concept of effective length and its use in design
3. Apply advanced numerical techniques to bucking analysis of structures.

Reference Books/ Text Books:

1. Timoshenko, Theory of Elastic Stability, TMH Pub.
2. Blunch, Stability of Metallic Structures - McGraw Hill
3. Chem. & Atste, Theory of Beam- Columns Vol. I, McGraw Hill
4. Ashwini Kumar, Stability Theory of Structures, Allied Publishers
5. Principles of Structural Stability Theory, Alexander Chajes, Prentice Hall, New Jersey

Noopur

MCE-036: DESIGN OF TALL STRUCTURES

L T P
3 1 0

Credits: 4

Course Objectives: This course deals Behavior of tall structures under static and dynamic loads, model analysis, Characteristics of wind and earthquake forces, Shear Walls, Frame Structures, Criteria for design of Tall Structures and Modeling of tall structures.

Course Content:

Unit No.	Contents	Teaching Hours
I	Behavior of tall structures under static and dynamic loads, model analysis.	8
II	Characteristics of wind and earthquake forces, gust factor and karman vortices. Approximate and Regorlons methods of analysis for wind and earthquake Forces.	8
III	Shear walls, Frame Structures, Coupled shear walls, Tabular Structures, Ductility and reinforcement details at joint.	8
IV	Criteria for design of Chimneys, T.V. Towers and other Tall Structures.	8
V	Modeling of tall structures, case studies.	8

EXPECTED COURSE OUTCOME: *At the end of the course the student will be able to*

1. apply all types loads on tall buildings according IS code
2. analyze and Design tall buildings.
3. understand behaviour of various structural systems under different loading conditions.
4. design towers, chimneys and shear walls.
5. check stability of tall structures against buckling, Torsion.

Reference Books/ Text Books:

1. Coull, Smith; Design of Tall buildings
2. Taranath; Design of Tall building
3. Pillai and Devdas Menon; Design of Reinforced Concrete Structures.

MCE-037: DESIGN OF OFFSHORE STRUCTURES

L T P
3 1 0

Credits: 4

Course Objectives: This course deals with Loads and structural forms of different types of offshore structures, single degree of freedom system subjected to free and forced vibration, Analysis for transient and steady state force, Behavior of concrete gravity platform as a rigid body on soil as a continuum and Static wind load.

Course Content:

Unit No.	Contents	Teaching Hours
I	Loads and structural forms of different types of offshore structures; Elements of single degree of freedom system subjected to free and forced vibration.	8
II	Analysis for transient and steady state force; Equivalent damping for nonlinear systems; Dynamics of multi degree of freedom systems; Eigen values and vectors; Iterative and transformation methods.	8
III	Mode superposition, Fourier series and spectral method for response of single single degree of freedom systems; Vibrations of bars, beams and cones with reference to soil as half space.	8
IV	Behavior of concrete gravity platform as a rigid body on soil as a continuum; short and long term statistics of wind;	8
V	Static wind load; Effect of size, shape and frequency; Aerodynamic admittance function and gust factor, spectral response due to wind for various types of structures; Wave loads by Morison's equation; Static and dynamic analysis of fixed structures; Use of approximate methods.	8

EXPECTED COURSE OUTCOME: *At the end of the course the student will be able to*

1. Understand the basic theoretical concepts in offshore engineering and apply them to actual problems.
2. calculate wave forces on fixed and floating structures and calculate the dynamic response.
3. use design codes to check the capacity of structural members.
4. be proficient in the use of finite element software to perform computer simulations, thus being prepared for the practical needs of the industry.

Reference Books/ Text Books:

1. Brebbia C.A. Walker, Dynamic Analysis of Offshore Str., Newnes Butterworth
2. Sarpakaya T and Isaacson M., Mechanics of wave forces on offshore structures,Van Nostrand Reinhold New York,
3. Hallam M.G., Heaf N.J. and Wootton, L.R., Dynamics of Marine Structures, CIRIA Publications Underwater Engg., Group , London
4. Graff W.J., Introduction to offshore Structures, Gulf Publishing Co., Houston, Taxas
5. Clough R.W. and Penzine J., Dynamic of Structures - II Ed., McGraw Hill Book CO.
6. Simiu E. and Scanlan R.H., Wind Effects on Structures, Wiley, New York 1978
7. Codes of Practice (latest versions) , Such as API RP-2A ,Bureau Veritas etc.
8. Proceedings of Offshore Technology Conference (OTC) Behavior of Offshore Structures (BOSS) and other Conferences on offshore Engineering.

MCE-038: RELIABILITY BASED CIVIL ENGINEERING DESIGN

L T P
3 1 0

Credits: 4

Course Objectives: This course deals with Probability Theory, Resistance Distribution and Parameters, Probabilistic Analysis of loads, Structural Reliability, Monte Carlo Study of Reliability, Reliability Based Design and Reliability of Structural Systems.

Course Content:

Unit No.	Contents	Teaching Hours
I	**Probability Theory:** Mutually exclusive events, set theory, sample points and sample space, laws of probability, toal probability theorem, Baye's rule, random variables discrete and continuous, jointly distributed discrete variables, marginal distribution, conditional distribution, jointly distributed continuous variables functions of random variables, moments and expectations, common probability distribution normal lognormal, Gamma and Beta distributions, external distributions.	8
II	**Resistance Distribution and Parameters**: Statics of properties of concrete and steel, statics of strength of bricks and mortar, characterization of variables, allowable stresses based on specified reliability. **Probabilistic Analysis of loads:** Load as a stochastic process, dead load, statistical analysis of live loads-maximum sustained load intensity model, maximum total load model, wind load-probability model for wind load.	8
III	**Structural Reliability :** General expression for reliability , expression for probability of failure: reliability when strength (S) and load (L) follow normal distribution, lognormal distribution, exponential distribution, extreme value distributions, factor of safety corresponding to a given reliability. **Monte Carlo Study of Reliability:** Monte Carlo Method-Inverse transformation technique, Application to columns beams and frames. Level 2 Reliability Method: Basic variables and failure surface, first order second moment methods-Hasofer and lind's method, Non normal distributions; determination of reliability index of structural elements.	8
IV	**Reliability Based Design:** Determination of partial safety checking formats, development of reliability based criteria, optimal safety factors, calibration of IS 456 and IS 800.	8
V	**Reliability of Structural Systems:** System reliability, modeling of structural systems, bounds on system reliability, automatic generation of a mechanism, generation of dominant mechanisms, reliability analysis of R.C.C. and Steel Frames.	8

EXPECTED COURSE OUTCOME: *At the end of the course the student will be able to*

1. understand the concepts of structural safety and reliability.
2. reinforce knowledge of probability and statistics
3. quantify reliability and safety in civil engineering application
4. design specifications are based on reliability theory
5. Perform reliability-based design of a civil engineering system

Reference Books/ Text Books:

1. Ranganathan, R. Reliability Analysis and Design of Structures, TMH
2. Rao. S.S. Reliability Based Design , McGraw Hill Book CO. Inc.
3. Ghosh , D.I., A Primer of Reliability Theory, john Wiley , New York
4. Lewis, E.E., Introduction to Reliability Engineering , John Wiley New York

MCE-351: DISSERTATION-I

L T P
0 0 16

Credits: 12

Course Objectives: This course deals with Literature Review, Problem Formulation, Methodology to be adopted and expected results of research.

Course Content:

Module No.	Contents	Teaching Hours
I	Students in consultation with the guide/co-guide if any, shall pursue Literature Survey, Problem Formulation, Methodology to be adopted and expected results of research and complete the preliminary requirements of selected Project work. Each student shall prepare relevant introductory project document, and present a seminar. CIE marks shall be awarded by a committee comprising of HoD as Chairman, Guide/co-guide if any, and a senior faculty of the department. The Internal Marks awarded for Dissertation-I, shall be based on the evaluation of Project Report, Project Presentation skill and Question and Answer session in the ratio 50:25:25. External Marks (University examination) shall be as per the University norms.	16

Expected Course Outcomes: Students who successfully complete this course will be able to:

1. design and manage a piece of original project work;
2. develop a research proposal and protocol;
3. discuss the ethical dimensions of their research and obtain appropriate ethical approval if needed;
4. synthesize knowledge and skills previously gained and applied to an in-depth study;
5. establish links between theory and methods within their field of study;
6. select from different methodologies, methods and forms of analysis to produce a suitable research design, and justify their design;
7. Present the findings of their project in a written report.

SEMESTER-IV (SECOND YEAR)

MCE-401: DISSERTATION-II

L T P
0 0 24

Credits: 20

Course Objectives: This course deals with Literature Review, Methodology adopted and results of research, discussion and conclusion of results obtained and future scope of research.

Course Content:

Module No.	Contents	Teaching Hours
I	A student has to make a latest technology based project in their respective stream. It may be hardware or software based. Internal Marks shall be awarded by a committee comprising of HoD as Chairman, Guide/co-guide, if any, and a senior faculty of the department. The Internal Marks awarded for Dissertation-II, shall be based on the evaluation of Project Report subjected to plagiarism check, Project Presentation skill and Question and Answer session in the ratio 50:25:25. External Marks (University examination) shall be at the end of IV semester. Project work evaluation and Viva-Voce examination, after satisfying the plagiarism check, shall be as per the University norms.	20

Expected Course Outcomes: Students who successfully complete this course will be able to:

1. design and manage a piece of original project work;
2. develop a research proposal and protocol;
3. discuss the ethical dimensions of their research and obtain appropriate ethical approval if needed;
4. synthesize knowledge and skills previously gained and applied to an in-depth study;
5. establish links between theory and methods within their field of study;
6. select from different methodologies, methods and forms of analysis to produce a suitable research design, and justify their design;
7. present the findings of their project in a written report.
8. A student has to make a latest technology based project in their respective stream. It may be hardware or software based.