RV COLLEGE OF ENGINEERING®

(Autonomous Institution Affiliated to VTU, Belagavi)
R.V. Vidyaniketan Post, Mysore Road
Bengaluru – 560 059

Scheme and Syllabus of III & IV Semesters

(Autonomous System of 2018 Scheme)

Master of Technology (M. Tech)
in
STRUCTURAL ENGINEERING

DEPARTMENT OF
CIVIL ENGINEERING

R V COLLEGE OF ENGINEERNG, BENGALURU-560 059
(Autonomous Institution Affiliated to VTU, Belagavi)

DEPARTMENT OF CIVIL ENGINEERING

M.Tech in

STRUCTURAL ENGINEERING

THIRD SEMESTER CREDIT SCHEME							
Sl. No.	**Course Code**	**Course Title**	**BoS**	**Credit Allocation**			
				L	**T**	**P**	**Total Credits**
1	18MST 31	Special Construction Materials	CV	4	1	0	**5**
2	18MST 3EX	Elective E	CV	4	0	0	**4**
3	18MST 33	Internship/Industrial training/Industrial Visits	CV	0	0	5	**5**
4	18MST 34	Dissertation Phase I	CV	0	0	5	**5**
Total number of Credits				**8**	**1**	**10**	**19**
Total Number of Hours / Week				**8**	**2**	**10**	

FOURTH SEMESTER CREDIT SCHEME							
Sl. No.	**Course Code**	**Course Title**	**BoS**	**Credit Allocation**			
				L	**T**	**P**	**Total Credits**
1	18 MST41	Major Project	CV	0	0	20	**20**
2	18 MST42	Technical Seminar	CV	0	0	2	**2**
Total number of Credits				**0**	**0**	**22**	**22**
Total Number of Hours / Week				**0**	**0**	**22**	

Sl. No.	**Course Code**	**Course Title**
		GROUP E: CORE ELECTIVES
1.	18MST 3E1	Advanced Design of Steel Structures
2.	18MST 3E2	Stability of Structures
3.	18MST 3E3	Earthquake Resistant Design

Semester:III		
SPECIAL CONSTRUCTION MATERIALS (Theory)		
Course Code:18MST31		**CIE Marks:100**
Credits: L: T: P : 4:1:0		**SEE Marks :100**
Hours:48L:12T		**SEE Duration:3 Hrs**

Course Learning Objectives: Students are able to

1	Understand various modern construction materials and methods
2	Apply the knowledge of different materials to modify the properties
3	Select appropriate materials for particular application
4	Proportion and estimate materials for different mixes

Unit – I — **9 Hours**

Review of conventional concrete. Design concrete mix by IS and ACI method, mineral and chemical admixtures, new cementitious materials used for making building materials.

Unit – II — **10Hours**

Geopolymers – Paste, mortar, concrete and masonry units. Concept, advantages, Proportioning, Geopolymer masonry, Applications. Ready Mixed Concrete, Advantages, Components of RMC Plant, Quality aspects of RMC.

Unit – III — **10Hours**

Fibre reinforced concrete, Behaviour in compression and flexure. Types of fibres, Action of fibres, Failure of fibres, Simple Design and Application.

Light weight concrete, types, Materials used, Design of light weight concrete, Properties and Applications.

Unit – IV — **10 Hours**

Ferro cement- Concept, materials, construction methods, Behaviour in tension, Simple design, Applications. High Density concrete- Necessity, Radiation shielding, materials, methods of placement.

Unit-V — **9 Hours**

Nanotechnology and Concrete – Nono-Engineering, Manipulation of materials at nano scale, hydrate-hybridization, nano materials in concrete – Nano SiO_2, NanoTiO_2, Nano Al_2O_3, Nano clay, Carbon nano tubes, nanofibres, Properties and applications.

Course Outcomes:

After going through this course the student will be able to

CO1:	Explain the properties of modern construction materials.
CO2:	Illustrate the use of construction materials
CO3:	Identity suitable materials for specific application.
CO4:	Design and conceptualize mixes for structural components.

Reference Books:

1	Concrete Microstructure, properties and Materials, P. Kumar Mehta, Paulo J. M. Monteiro McGraw Hill Education India Private Limited, New Delhi, Fourth Edition, 2015. ISBN-13: 978-93-393-0476-1.
2	Concrete Technology , A R Santhakumar, Oxford University Press, 2012,ISBN-13:978-0-19-567153-7.
3	Properties of concrete, Neville. A.M, IV Edition, Pearson Education, Inc, and Dorling Kindersley Publishing Inc. 1995.
4	Concrete Technology Theory and Practice, Shetty. M.S, S.Chand & Co Ltd., New Delhi, 2007.

Code Books:

1	IS 10262 : 2009, Concrete Mix proportioning guidelines, First Revision.2009. ACI Committee 211, Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass

	Concrete, ACI 211.1-91, American Concrete Institute, Farmington Hills, Michigan, 1991

Continuous Internal Evaluation (CIE); Theory (100 Marks)
CIE is executed by way of quizzes (Q), tests (T) and assignments. A minimum of two quizzes are conducted and each quiz is evaluated for 10 marks adding up to 20 marks. Faculty may adopt innovative methods for conducting quizzes effectively. The three tests are conducted for 50 marks each and the sum of the marks scored from three tests is reduced to 50 marks.A minimum of two assignments are given with a combination of two components among 1) solving innovative problems 2) seminar/new developments in the related course 3) Laboratory/field work 4) mini project.
Total CIE is 20+50+30=100 Marks.

Semester End Evaluation (SEE): Total marks: 100
Scheme of Semester End Examination (SEE) for 100 marks:
The question paper will have FIVE questions with internal choice from each unit. Each question will carry 20 marks. Student will have to answer one full question from each unit.

ADVANCED DESIGN OF STEEL STRUCTURES (Elective E) (Theory)		
Course Code:18MST 3E1		**CIE Marks:100**
Credits:L: T: P: 4:0:0		**SEE Marks :100**
Hours:48		**SEE Duration:3Hrs**

Course Learning Objectives (CLO):

Student will be able to:

1. Develop a loading model on different types of steel structures.
2. Apply the principles of behavior of steel members to analyze structural steel components.
3. Evaluate the behaviour of cold formed sections.
4. Design steel components in accordance with standards and codal guidelines.

Unit – I	**10Hrs**
Components of industrial structure, assessment of dead loads, live loads and wind loads on a mill bent frame. Analysis and design of knee brace, column and purlins.	
Unit – II	**9Hrs**
Analysis and design of gantry girder subjected to single and two wheel loads, Splices for bending moment and shear force.	
Unit – III	**9Hrs**
Components self supporting steel chimneys, assessment of wind loads, moments at base, assessment of seismic loads. Analysis and Design of self supporting circular steel chimneys.	
Unit – IV	**10Hrs**
Forms of light guage sections, Effective width computation of unstiffened, stiffened, multiple stiffened compression elements of cold formed light guage sections. Concept of local buckling of thin elements. Limiting width to thickness ratio. Post buckling strength. Design of compression and tension members of cold formed light guage sections, Design of flexural members (Laterally restrained / laterally unrestrained).	
Unit – V	**10Hrs**
Design of open web flexural structures (triangular and rectangular), Concept of Pre- engineered buildings.	

Expected Course Outcomes:

After successful completion of this course the student will be able to:

CO1: Apply the knowledge of various components of different types of steel structures to identify them.

CO2: Analyze the steel components for different loads acting on them.

CO3: Design various types of steel structural components using provisions of standards, codes of practice for ethical design of steel components and develop professional competencies.

CO4: Propose design solution of industrial steel structures at component and system level.

Reference Books:

1.	Bureau of Indian Standards, IS800-2007, IS875-1987, IS-801-1975. Steel Tables, SP 6 (1) – 1984, IS6533(Part 1 and 2),IS1893(part 4):2005.
2.	Design of Steel Structures, N.Subramanian, Oxford University Press,2011, ISBN: 9780198068815.

3.	Design of Steel Structures, Ramchandra and Virendra Gehlot ,Vol 1 and Vol.2, Scientific Publishers, Jodhpur, 2010
4.	Limit State Design of Steel Structures, Duggal S K,TMH publication, New Delhi, ISBN (13):978-0-07-070023-9. 2009

Continuous Internal Evaluation (CIE); Theory (100 Marks)

CIE is executed by way of quizzes (Q), tests (T) and assignments. A minimum of two quizzes are conducted and each quiz is evaluated for 10 marks adding up to 20 marks. Faculty may adopt innovative methods for conducting quizzes effectively. The three tests are conducted for 50 marks each and the sum of the marks scored from three tests is reduced to 50 marks.A minimum of two assignments are given with a combination of two components among 1) solving innovative problems 2) seminar/new developments in the related course 3) Laboratory/field work 4) mini project.

Total CIE is 20+50+30=100 Marks.

Semester End Evaluation (SEE): Total marks: 100

Scheme of Semester End Examination (SEE) for 100 marks:

The question paper will have FIVE questions with internal choice from each unit. Each question will carry 20 marks. Student will have to answer one full question from each unit.

STABILITY OF STRUCTURES(Elective E) (Theory)		
Course Code:18MST 3E2		**CIE Marks:**100
Credits :L: T: P : 4:0:0		**SEE Marks :**100
Hours :48		**SEE Duration:3Hrs**

Course Learning Objectives (CLO): Graduates shall be able to

1	Learn principles of stability of structures
2	Study the concept of buckling
3	Analyse the structural elements for stability
4	Evaluate the use of strain energy in plate bending and stability

Unit – I	**9Hrs**

Buckling of columns: Euler's equation for buckling of elastic column, Buckling of columns with various boundary conditions, Deflection shapes of buckled columns. Energy method, Concepts of stable and unstable equilibrium of systems. Simple column model with a lateral spring, Approximate calculation of critical loads by energy method.

Unit – II	**10Hrs**

Inelastic Buckling: Effect of shear force on the critical load of column. Application to buckling of built up columns, Inelastic buckling. Limitations of Euler's theory, Reduced modulus theory and shenley's tangent modulus theory, comparison with experimental results.

Unit – III	**10Hrs**

Buckling of Eccentrically loaded columns: Effect of initial imperfections, perry Robertson approach to column failure. Influence of eccentricity and secant formula. Multiple column formulas. Multiple column curves of IS code for various imperfection factors. Selection of sections for compression members.

Unit – IV	**9Hrs**

Lateral buckling of beams: Lateral buckling of beams in pure bending, Lateral buckling of cantilever beam and narrow rectangular beams. Simply supported beam of I section subjected to central concentrated load. Pure Torsion of thin – walled bars of open cross section. Non – uniform Torsion of thin – walled bars of open cross section

Unit – V	**10Hrs**

Buckling of thin Plates: Simply supported rectangular plate with uniform compression in one direction. Buckling of rectangular plates under the action of shearing stresses. Practical implication in the design of compression members and beams

Expected Course Outcomes:

1. Explain the principles of strength, stability and phenomenon of buckling
2. Apply the principles of stability to calculate buckling load.
3. Calculate the buckling load on column, beam – column, frames and plates using classical and approximate methods.
4. Develop analytical skills

Reference Books:

1	Stephen P.Timoshenko, James M Gere, "Theory of Elastic Stability"-2nd Edition, Tata McGraw Hill, New Delhi,2010, ISBN-10 0-07-070241-1 ISBN-13 978-0-07-070241-7
2	F.Bleich, Buckling strength of Metal structures, Tata McGraw Hill,1952

3	T.V.Galambos, Guide to stability design criteria for metal structures,5th Edition, John Wiley&Sons,Newyork,1998. ISBN 1-4196-5207-9.
4	F.R.Shanley,Strength of Materials,Tata McGraw Hill,1957,ISBN-0-471-46890-8

Continuous Internal Evaluation (CIE); Theory (100 Marks)

CIE is executed by way of quizzes (Q), tests (T) and assignments. A minimum of two quizzes are conducted and each quiz is evaluated for 10 marks adding up to 20 marks. Faculty may adopt innovative methods for conducting quizzes effectively. The three tests are conducted for 50 marks each and the sum of the marks scored from three tests is reduced to 50 marks.A minimum of two assignments are given with a combination of two components among 1) solving innovative problems 2) seminar/new developments in the related course 3) Laboratory/field work 4) mini project.

Total CIE is 20+50+30=100 Marks.

Semester End Evaluation (SEE): Total marks: 100

Scheme of Semester End Examination (SEE) for 100 marks:

The question paper will have FIVE questions with internal choice from each unit. Each question will carry 20 marks. Student will have to answer one full question from each unit.

EARTHQUAKE RESISTANT STRUCTURES (Elective E) (Theory)		
Course Code:18MST 3E3		**CIE Marks:100**
Credits: L:T:P : 4:0:0		**SEE Marks :100**
Hours :48		**SEE Duration:3 Hrs**

Course Learning Objectives (CLO):

1. Discuss the concepts in Engineering Seismology, response spectrum, structural configuration, ductility and seismic analysis
2. Classify lateral load resisting structural systems.
3. Assess and develop earthquake resistant structures.
4. Test the structural response of building under seismic loads

Unit – I	**09Hrs**

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

Unit – II	**10Hrs**

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 multistoreyed buildings – using procedures (Equivalent lateral force and dynamic analysis) as per IS-1893

Unit – III	**10Hrs**

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, concepts for earthquake resistant masonry buildings – Codal provisions

Unit – IV	**10Hrs**

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 IS-1893. Structural behavior, design and ductile detailing of shear walls.

Unit – V	**09Hrs**

Seismic response control concepts – Seismic demand, seismic capacity, Overview of linear and nonlinear procedures of seismic analysis. Performance Based Seismic Engineering methodology, Seismic evaluation and retrofitting of structures

Expected Course Outcomes:

After successful completion of this course the student will be able to:

1. Explain the concepts in Engineering Seismology, response spectrum, structural configuration, ductility and seismic analysis
2. Apply and illustrate lateral load resisting structural systems using codal provisions and seismic response control concepts.
3. Formulate and design earthquake resistant structures.

4. Evaluate the structural response of building under seismic loads

Reference Books:

1	Dynamics of Structures – Theory and Application to Earthquake Engineering- 2nd ed. – Anil K. Chopra, Pearson Education, 2011, ISBN-10: 0132858037; ISBN-13: 978-0132858038
2	Earthquake Resistant Design of Building Structures, Vinod Hosur, WILEY (India), 2013, ISBN 13, : 9788126538591
3	Earthquake resistant design of structures – Pankaj Agarwal, Manish Shrikande - PHI India, 2006, ISBN 10: 8120328922
4	Seismic Design of Reinforced Concrete and Masonry Buildings, T Paulay and M J N Priestley, John Wiley and Sons, 1992, ISBN 0-471-54915-0
5	ISCodes:IS – 1893 (Part I): 2016, IS – 13920: 1993, IS – 4326: 1993, IS-13828: 1993

Continuous Internal Evaluation (CIE); Theory (100 Marks)

CIE is executed by way of quizzes (Q), tests (T) and assignments. A minimum of two quizzes are conducted and each quiz is evaluated for 10 marks adding up to 20 marks. Faculty may adopt innovative methods for conducting quizzes effectively. The three tests are conducted for 50 marks each and the sum of the marks scored from three tests is reduced to 50 marks.A minimum of two assignments are given with a combination of two components among 1) solving innovative problems 2) seminar/new developments in the related course 3) Laboratory/field work 4) mini project.

Total CIE is 20+50+30=100 Marks.

Semester End Evaluation (SEE): Total marks: 100

Scheme of Semester End Examination (SEE) for 100 marks:

The question paper will have FIVE questions with internal choice from each unit. Each question will carry 20 marks. Student will have to answer one full question from each unit.

INTERNSHIP / INDUSTRIAL TRAINING/INDUSTRIAL VISITS		
Course Code:18MST 33		**CIE Marks:100**
Credits: L:T:P: 0:0:5		**SEE Marks:100**
Hours :60		**SEE Duration :30 min**

GUIDELINES FOR INTERNSHIP

Course Learning Objectives (CLO):
The students shall be able to:

1	Understand the process of applying engineering knowledge to produce product and provide services.
2	Explain the importance of management and resource utilization
3	Comprehend the importance of team work, protection of environment and sustainable solutions.
4	Imbibe values, professional ethics for life long learning.

1) The duration of the internship shall be for a period of 8 weeks on full time basis between II semester final exams and beginning of III semester.
2) The student must submit letters from the industry clearly specifying his / her name and the duration of the internship on the company letter head with authorized signature.
3) Internship must be related to the field of specialization or the M.Tech program in which the student has enrolled.
4) Students undergoing internship training are advised to use ICT tools such as skype to report their progress and submission of periodic progress reports to the faculty members.
5) Every student has to write and submit his/her own internship report to the designated faculty.
6) Students have to make a presentation on their internship activities in front of the departmental committee and only upon approval of the presentation should the student proceed to prepare and submit the hard copy of the internship final report. However interim or periodic reports and reports as required by the industry / organization can be submitted as per the format acceptable to the respective industry /organizations.
7) The reports shall be printed on bond paper – 80GSM, back to back print, with soft binding – A4 size with 1.5 spacing and times new roman font size 12.
8) The broad format of the internship final report shall be as follows

    - Cover Page
    - Certificate from College
    - Certificate from Industry / Organization
    - Acknowledgement
    - Synopsis
    - Table of Contents
    - Chapter 1 - Profile of the Organization – Organizational structure, Products, Services, Business Partners, Financials, Manpower, Societal Concerns, Professional Practices,
    - Chapter 2 - Activities of the Department -
    - Chapter 3 – Tasks Performed – summaries the tasks performed during 8 week period
    - Chapter 4 – Reflections – Highlight specific technical and soft skills that you acquired during internship

- References & Annexure

Course Outcomes:
After going through the internship the student will be able to:

CO1	Apply engineering and management principles
CO2	Analyze real-time problems and suggest alternate solutions
CO3	Communicate effectively and work in teams
CO4	Imbibe the practice of professional ethics and need for lifelong learning

Scheme of Continuous Internal Evaluation (CIE):
A committee comprising of the Head of the Department / Associate Dean, Associate Professor, Assistant Professor and Guide would review the presentation and the progress reports in two phases. The evaluation criteria shall be as per the rubrics given below:

Scheme for Semester End Evaluation (SEE):
The evaluation will be done by ONE senior faculty from the department and ONE external faculty member from Academia / Industry / Research Organization. The following weightages would be given for the examination. Evaluation will be done in batches, not exceeding 6 students.

Explanation of the application of engineering knowledge in industries	**35%**
Ability to comprehend the functioning of the organization/ departments	**20%**
Importance of resource management, environment and sustainability	**25%**
Presentation Skills and Report	**20%**

GUIDELINES FOR INDUSTRIAL TRAINING

Course Learning Objectives (CLO):

The students shall be able to:

1	Understand the process of applying engineering knowledge to industrial products & processes
2	Explain the importance of skilling, training and resource management.
3	Comprehend the importance of team work, communication and sustainable solutions.
4	Imbibe values, professional ethics for life long learning.

1) The duration of industrial training must be for a minimum of 1 week and maximum of 8 weeks on full time basis.
2) Industrial Training in which students pays a fee to the organization / industry will not be considered.
3) He/she can undergo training in one or more industry /organization.
4) The student must submit letters from the industry clearly specifying his / her name and the duration of the training provided by the company with authorized signatures.
5) Industrial training must be related to the field of specialization or the M.Tech program in which the student has enrolled.
6) Students undergoing industrial training are advised to use ICT tools such as Skype to report their progress and submission of periodic progress reports to the faculty members.
7) Every student has to write and submit his/her own industrial training report to the designated faculty.
8) Students have to make a presentation on their industrial training in front of the departmental committee and only upon approval of the presentation should the student proceed to prepare and submit the hard copy of the final report.
9) The reports shall be printed on bond paper – 80GSM, back to back print, with soft binding – A4 size with 1.5 spacing and times new roman font size 12.
10) The broad format of the industrial training report shall be as follows

- Cover Page
- Certificate from College
- Training Certificate from Industry / Organization
- Acknowledgement
- Executive Summary
- Table of Contents
- Chapter 1 - Profile of the Organization –Organizational structure, Products, Services, Business Partners, Financials, Manpower, Societal Concerns, Professional Practices
- Chapter 2 – Details of the Training Modules
- Chapter 3 – Reflections – Highlight specific technical and soft skills that you acquired

References & Annexure

Course Outcomes:

After going through the industrial training the student will be able to:

CO1:	Understand the process of applying engineering knowledge to solve industrial problems
CO2:	Develop skills +++++++9+through training relevant to industrial requirement
CO3:	Communicate effectively and work in teams
CO4:	Imbibe ethical practices and develop it as life skill.

Scheme of Continuous Internal Evaluation (CIE):

A committee comprising of Head of the Department / Associate Dean, Associate Professor, Assistant Professor and Guide would review the presentation and the progress reports in two phases. The evaluation criteria shall be as per the rubrics given below:

Scheme for Semester End Evaluation (SEE):

The evaluation will be done by ONE senior faculty from the department and ONE external faculty member from Academia / Industry / Research Organization. The following weightages would be given for the examination. Evaluation will be done in batches, not exceeding 6 students.

Explanation on the application of engineering knowledge	**25%**
Ability to comprehend the importance of skilling and training	**25%**
Importance of communication, professional ethics, sustainability	**20%**
Oral Presentation and Report	**30%**

GUIDELINES FOR INDUSTRIAL VISITS

Course Learning Objectives (CLO):

The students shall be able to:

1	Understand the role of industries and service organization in meeting the demands of the society.
2	Explain the working of different industries and organizations with an engineering perspective
3	Comprehend the importance of team work, communication and sustainable solutions.
4	Imbibe values, professional ethics for life long learning.

1) Student must visit a minimum of THREE organizations/industry. The duration of the visit per organization must be for ONE full day, during which he/she must comprehend the importance of organization structure, function of various departments, application of engineering knowledge, resource management, importance to environment and safety, professional ethics.

2) It is mandatory to visit ONE private multi-national company or public sector industry / organization, ONE medium-small enterprise and ONE rural based or NG organization.
3) The student must submit letter from the industry clearly specifying his / her name and the date of visit to the industry with authorized signatures.
4) Industrial visit must be related to the field of specialization or the M.Tech program in which the student has enrolled.
5) Every student has to write and submit his/her own report on each industrial visit and submit the report to the designated faculty advisor for evaluation.
6) A photograph outside the industry with the name and logo of the industry in the background along with the students and faculty members could be included in the report.
7) Students have to make a presentation on their industrial visit in front of the departmental committee and only upon approval of the presentation should the student proceed to prepare and submit the hard copy of the final report.
8) The reports shall be printed on bond paper – 80GSM, back to back print, with soft binding – A4 size with 1.5 spacing and times new roman font size 12.
9) The broad format of the industrial visit report shall be as follows
    - Cover Page
    - Certificate from College
    - Acknowledgement
    - Synopsis / Executive Summary
    - Table of Contents
    - Chapter 1 - Profile of the PSU or MNC – must include Organizational structure, Products, Services, Financials, Manpower, Societal Concerns, Professional Practices
    - Chapter 2 – Profile of the SME – must include Organizational structure, Products, Services, Financials, Manpower, Societal Concerns, Professional Practices
    - Chapter 3 - Profile of the NGO – must include Organizational structure, services, Manpower, Societal Concerns, Professional Practices
    - Chapter 4 – Comparative Analysis of PSU/MNC – SME – NGO
    - References & Annexure (Permission letters from the organizations for the visit & photographs)

Course Outcomes:

After going through this course the student will be able to:

CO1:	Classify the role of different industries and organization in addressing the needs of the society.
CO2:	Explain the process of applying engineering knowledge in industries and organizations.
CO3:	Describe the importance of communication and team work
CO4:	Recognize the importance of practicing professional ethics and need for life skills.

Scheme of Continuous Internal Evaluation (CIE):

A committee comprising of Head of the Department / Associate Dean, Associate Professor, Assistant Professor and Guide would review the presentation and the progress reports in two phases. The evaluation criteria shall be as per the rubrics given below:

Scheme for Semester End Evaluation (SEE):

The evaluation will be done by ONE senior faculty from the department and ONE external faculty member from Academia / Industry / Research Organization. The following weightages would be given for the examination. Evaluation will be done in batches, not exceeding 6 students.

Explanation of the application of engineering knowledge in industries	**25%**
Ability to comprehend the functioning of the organization/ departments	**30%**
Importance of resource management, environment and sustainability	**20%**

Presentation Skills and Report	**25%**

Semester:IV				
MAJOR PROJECT				
Course Code:18MST 41		**CIE Marks**	**:**	**100**
Credits: L:T:P :0:0:20		**SEE Marks**	**:**	**100**
Hours :240		**SEE Duration**	**:**	**3 Hours**

Course Learning Objectives:

The students shall be able to

1	Understand the method of applying engineering knowledge to solve specific problems.
2	Apply engineering and management principles while executing the project
3	Demonstrate good verbal presentation and technical report writing skills.
4	Identify and solve complex engineering problems using professionally prescribed standards.

GUIDELINES

Major project will have to be done by only one student in his/her area of interest.

1. Each student has to select a contemporary topic that will use the technical knowledge of their program of specialization.
2. Allocation of the guides preferably in accordance with the expertise of the faculty.
3. The number of projects that a faculty can guide would be limited to three.
4. The project can be carried out on-campus or in an industry or an organization with prior approval from the Head of the Department.
5. The standard duration of the project is for 16 weeks, however if the guide and the evaluation committee of the department, after the assessment feel that the work is insufficient and it has to be extended, then the student will have to continue as per the directions of the guide and the committee.
6. It is mandatory for the student to present his/her work in one of the international conferences or publish the research finding in a reputed unpaid journal with impact factor.

Course Outcomes:

After going through this course the students will be able to

CO1:	Conceptualize, design and implement solutions for specific problems.
CO2:	Communicate the solutions through presentations and technical reports.
CO3:	Apply project and resource managements skills, professional ethics, societal concerns
CO4:	Synthesize self-learning, sustainable solutions and demonstrate life long learning

Scheme of Continuous Internal Examination (CIE)

Evaluation will be carried out in THREE Phases. The evaluation committee will comprise of: guide, two senior faculty members, one industry member and Head of the Department.

Phase	Activity	Weightage
I 5th week	Synopsis, Preliminary report for the approval of selected topic along with literature survey, objectives and methodology.	20%
II 10th week	Mid-term progress review shall check the compliance with the objectives and methodology presented in Phase I, review the work performed.	40%
III 15th week	Oral presentation, demonstration and submission of project report. After this presentation, the student will have one week time to correct / modify his report to address the issues raised by the committee members.	40%

CIE Evaluation shall be done with marks distribution as follows:

Selection of the topic & formulation of objectives	**10%**
Design and simulation/ algorithm development/experimental setup	**25%**
Conducting experiments / implementation / testing / analysis	**25%**
Demonstration & Presentation	**20%**
Report writing	**20%**

Scheme for Semester End Evaluation (SEE):

The evaluation will be done by ONE senior faculty from the department and ONE external faculty member from Academia / Industry / Research Organization. The following weightages would be given for the examination. Evaluation will be done in batches, not exceeding 6 students.

Brief write-up about the project	**5%**
2. Formulation of Project Objectives & Methodology	**20%**
3. Experiments / Analysis Performed; Results & Discussion	**25%**
4. Report	**20%**
5. Viva Voce	**30%**

TECHNICAL SEMINAR		
Course Code:18MST 42		**CIE Marks:50**
Credits: L:T:P : 0:0:2		**SEE Marks:50**
Hours :24		**SEE Duration :30min**

Course Learning Objectives (CLO):
The students shall be able to:

1	Understand the technological developments in their chosen field of interest
2	Explain the scope of work and challenges in the domain area
3	Analyze these engineering developments in the context of sustainability, societal concerns and project management.
4	Improve his/her verbal presentation and report writing skills

GUIDELINES

1) The presentation will have to be done by individual students.
2) The topic of the seminar must be in one of the thrust areas with in-depth review and analysis on a current topic that is relevant to industry or on-going research.
3) The topic could be an extension or complementary to the project topic.
4) Topics could be in multidisciplinary areas and strongly address the technical design issues.
5) The student must be able to highlight or relate these technological developments with sustainability and societal relevance.
6) The students must mandatorily address legal, ethical issues as related to the topic of study.
7) The student shall make an attempt to perform financial / cost analysis or apply project management tools as related to his/her topic of study.
8) Each student must submit both hard and soft copies of the presentation.

Course Outcomes:
After going through this course the student will be able to:

CO1:	Identify topics that are relevant in the present context of the world and relate it to sustainability and societal relevance
CO2:	Perform literature/market/product survey and analyse information to the field of study
CO3:	Enhance presentation and report writing skills.
CO4:	Develop creative thinking abilities

Scheme of Continuous Internal Evaluation (CIE): Evaluation would be carried out in TWO phases. The evaluation committee shall comprise of TWO senior faculty members. The evaluation criteria shall be as per the rubrics given below:

Scheme for Semester End Evaluation (SEE):
The evaluation will be done by ONE senior faculty from the department and ONE external faculty member from Academia / Industry / Research Organization. The following weightages would be given for the examination. Evaluation will be done in batches, not exceeding 6 students.

Rubrics for Evaluation:

• Topic – Technical Relevance, Sustainability and Societal Concerns	15%
• Literature Review	25%
• Presentation Skills	35%

• Report	25%