- **Department Name :- Department of Civil Engineering**

- **PG Program Name: M Tech Structural Engineering**

- **Vision and Mission :-**

Department Vision:

To be an outstanding department devoted to provide high end research, technical education in Civil engineering which will produce socially aware professionals to provide solutions to global community.

Department Mission:

- To design curriculum based on changing needs of stakeholders & provide excellence in delivery & assessment to ensure holistic development of civil engineering students.
- To enhance research & consultancy resulting in solving problems related to civil engineering infrastructure as well as society at large.
- To mentor students in pursuit of higher education, entrepreneurship and global professionalism.

Sr. No.	Program Outcomes
1.	An ability to independently carry out research /investigation and development work to solve practical problems.
2.	An ability to write and present a substantial technical report/document.
3.	Students should be able to demonstrate a degree of mastery over the area as per the specialization of the program. The mastery should be at a level higher than the requirements in the appropriate bachelor program.

Sr. No.	Program Specific Outcomes
1.	An ability to design civil engineering structures and execute the projects.
2.	An ability to use modern tools and techniques, skills, instrumentation and software packages necessary to predict and solve complex engineering problems.
3.	An ability to perform efficiently with others as part of collaborative and/or multidisciplinary team with ethics.

Sr. No.	Semester	Course Code	Course Name	Course Outcome
1.	I	**CES1012**	**Advanced structural analysis**	1. Construct of ILD for reactions, S.F. and B.M. for indeterminate structures. 2. Draw SFD, BMD and TMD for beams curved in plan for various loading and support condition. 3. Analyze the beam-columns. 4. Analyze the skeleton **structures** by using matrix method. 5. Solve civil engineering boundary value problems.
2.	I	**CES1022**	**Advanced solid mechanics**	1. Analyze bodies for stresses and strains. 2. Analyze prismatic bars and tubes subjected to torsion. 3. Analyze beams and thick cylinders for elasto-plastic loading.
3.	I	**CES1032**	**Structural Dynamics & Earthquake Engineering**	1. Analyze single and multi-degree freedom systems by fundamental theory and equations of motion. 2. Analyze single and multi-degree freedom systems by numerical methods. 3. Apply principles of planning, structural systems for seismic resistant to structures. 4. Determine causes of earthquake and its effect on human. 5. Evaluate lateral loads developed on multi-storied structures by the Response Spectrum Analysis Method and Static Equivalent Method.
4.	**I**	**CES1042**	**Structural Design Lab – I**	1. Analyze and design of the steel structures such as truss, Towers, Steel Building Frame and Hoarding Board etc. using standard software packages. 2. Interpret the results of analysis and design obtained from the software. 3. Prepare drawings of detailing of structural elements.

Sr. No.	Semester	Course Code	Course Name	Course Outcome
5.	I	CES1052	Advanced Concrete Technology Lab	1. Perform quality control tests on various ingredient of concrete and special concrete. 2. Design ordinary and special concretes using existing and new methods of mix design. 3. Evaluate quality of concrete using NDT. 4. Recommend appropriate methods / techniques for repair and strengthening works.
6.	I	CES1062	Mini Project I	1. Identify research problem. 2. Prepare and present statement of Purpose. 3. Perform analysis work. 4. Communicate with outside agencies. 5. Write report and Present the work carried out. 6. Develop self-learning ability
7.	I	CES1072	Advanced Design of Steel Structures (PE I)	1. Design steel structures and frames by varying methods. 2. Design various connectivity of structure as per code provisions.

Sr. No.	Semester	Course Code	Course Name	Course Outcome
8.	I	**CES1092**	**Advanced concrete technology**	1. Illustrate the micro-structural aspects associated with concrete/concrete ingredients and their effect on concrete quality, strength and durability properties. 2. Design special concretes using existing and new methods of mix design. 3. Explain various types of special concretes, their properties and methods of manufacturing and placing. 4. Describe various special processes and new techniques involved in various concreting jobs. 5. Analyze qualities of fresh and hardened concrete / concrete elements using appropriate destructive or non-destructive testing methods for evaluating quality. 6. Identify and discuss various mechanisms affecting durability of concrete / concrete structures /elements
9.	I	**SHP517**	**Numerical Methods for Structural Engineers**	1. Estimate the error. 2. Apply the relevant numerical method for interpolating the polynomial 3. Develop the equation to be fitted and fit the curve for given data 4. Estimate numerically the solution of given algebraic equation. 5. Use the relevant method for solving the simultaneous linear equations and compute the Eigen values. 6. Construct the fuzzy set for given linguistic variable and apply fuzzy logic.
10.	I	**SHP551**	**Technical Communication**	1. Acquire skills required for good oral and written communication. 2. Demonstrate improved writing and reading skills. 3. Ensure the good quality of oral and written communication.

Sr. No.	Semester	Course Code	Course Name	Course Outcome
11.	II	CES2012	Finite Element Analysis in Structural Engineering	1. Analyze structure using finite element method. 2. Solve continuum problems using finite element analysis. 3. Execute the Finite Element Program/ Software.
12.	II	CES2022	Research Methodology& Intellectual Property Rights(IPR)	1. Formulate a research problem. 2. Analyze research related information. 3. Prepare and present research proposal/paper by following research ethics. 4. Make effective use of computers and computing tools to search information, Analyze information and prepare report. 5. Describe nature and processes involved in development of intellectual property rights.
13.	II	CES2032	Structural design LabII	1. Analyze and design of the RCC structures such as building, retaining wall, flat slab and foundations using standard software packages. 2. Interpret the results of analysis and design obtained from the software. 3. Prepare drawings of detailing of structural elements. 4.
14.	II	CES2042	Structural Dynamics and Earthquake Engineering Lab	1. Examine damping effect on beam model. 2. Perform testing of various models of structures for dynamic loading
15.	II	CES2052	Mini project II	1. Identify research problem 2. Prepare and present statement of Purpose 3. Perform analysis work. 4. Communicate with outside agencies. 5. Write report and Present the work carried out. 6. Develop self-learning ability

Sr. No.	Semester	Course Code	Course Name	Course Outcome
16.	II	CES2062	Advanced Earthquake Engineering (PE-II)	1. Design RCC structural elements for ductility requirements as per IS 13920 2916. 2. Apply new techniques for controlling the vibrations of the structures. 3. Evaluate natural frequency of continuous elements/systems. 4. Design elevated water tank for dynamic loading. 5. Apply IS code clauses masonry structures for improving resistance to earthquake forces.
17.	II	CES2072	Theory and Applications of Cement Composites(PE-II)	1. Formulate constitutive behavior of composite materials – Ferro cement, SIFCON and Fiber Reinforced Concrete - by understanding their strain- stress behavior. 2. Classify the materials as per orthotropic and anisotropic behavior. 3. Estimate strain constants using theories applicable to composite materials. Analyze and design structural elements made of cement composites
18.	II	CES2082	Structural Optimization (PE-II)	1. Use variational principle for optimization. 2. Apply optimization techniques to structural steel and concrete members. 3. Design using frequency constraint
19.	II	CES2092	Design of Bridges and Flyovers (PE-III)	1. Study various components and loadings on bridge. 2. Analyze and design of super-structure of various bridges and flyovers. 3. Analyze and design of sub-structure of various bridges and flyovers.

Sr. No.	Semester	Course Code	Course Name	Course Outcome
20.	II	CES2102	**Design of Pre-stress Concrete Structures(PE-III)**	1. Explain the concept of pre-stressing, behavior of the pre-stressed structures vis-à-vis that of the RCC structure. 2. Choose the decision with respect to the choice of pre-stressed section over RCC. 3. Describe the application of these techniques in civil engineering construction. 4. Analyze the various pre-stressed components of the structures and design the same. 5. Design the various pre-stressed components of the structures and design the same.
21.	II	CES2122	**Design of Advanced Concrete Structures (PE-IV)**	1. Analyze the special R.C.C. structures. 2. Design and prepare detail structural drawings.
22.	II	CES2132	**Design of Industrial Structures(PE-IV**	1. Design the Steel Gantry Girders. 2. Design the Steel Portal, Gable Frames. 3. Design Steel Bunkers and Silos. 4. Design Chimneys and Water Tanks
23.	III	CES3011	**Industrial Training**	1. Identify training area. 2. Prepare on site work report of training. 3. Perform analysis work. 4. Communicate with agencies. 5. Generate report and Present the work carried out
24.	III	CES3021	**Certificate course**	1. Develop technical competence in skills of structural engineering field. 2. Apply the techniques for structural engineering practice. 3. Develop oral and written presentation skills for structural engineering projects. 4. Design and interpret data for structural engineering projects.
25.	III	CES3031	**Dissertation Phase-I**	1. Identify research problem from literature survey. 2. Prepare research design for identified problem. 3. Prepare synopsis report. 4. Present the work plan to be carried out.

Sr. No.	Semester	Course Code	Course Name	Course Outcome
26.	III	**CES3051**	**Dissertation Phase-II**	1. Prepare the set up for experimentation/ develop/ learn software. 2. Perform experimental/software analysis for validation of research work. 3. Generate report of work carried out. 4. Present the work carried out.
27.	IV	**CES4011**	**Dissertation phase- III**	1. Perform experimental/software analysis for developing research work. 2. Generate report work carried out. 3. Present the work carried out
28.	IV	**CES4021**	**Dissertation phase-IV**	1. Perform experimental/software analysis for developing research work. 2. Generate report work carried out. 3. Publish a research paper in journals/conference. 4. Prepare report using total work done as dissertation report. 5. Present the work carried out.