M.Tech. (Structural Engineering) (2011 Syllabus)

Programme outcomes:

The Students will develop an ability

a) To be competent in applying systematic rigor to understanding an engineering problem, exploring its background, investigating possible solution methodologies and comparing their merits and demerits.

b) To adept at the use of the appropriate modern tools to rapidly prototype and deploy efficient solutions to real life problems. In doing so he should demonstrate sufficient knowledge of competing tools and their relative merits and demerits

c) To demonstrate the traits of learning and unlearning throughout his professional career, and be willing to learn new techniques, methods and processes.

d) To be sensitive to social, legal and ethical concerns and tune his knowledge to be a responsible engineer adhering to all established practices of his profession. She/he will display special concern for devising environment friendly solutions that shall make a positive impact on society.

Course outcomes:

Name of course	Course outcomes
MMA 1102 – Computational Mathematics	1. Formulate the continuous physical systems using mathematical notations as partial differential equations since most entities in the real world are dependent of 2. Handle real world dynamic problems with diversity and complexity which leads to boundary value problem 3. Handle huge amount of problems in science and engineering physics where one has to minimize the energy associated to the problem under 4. Gain an understanding of Eigen value problem and gain skills in modelling and solving Eigen value problem 5. Solve problems involving differential equations, ordinary and partial with regular as well as irregular boundaries

	6. Demonstrate a depth of understanding in advanced mathematical topics 7. Enhance and develop the ability of using the language of mathematics in engineering
MCE 1101 - Theory of Elasticity and Plasticity	1. A student can describe the elastic and plastic behavior from stress-strain curves for materials. 2. A student can understand the physical interpretation of material constants in mathematical formulation of constitutive relationship. 3. A student can solve analytically the simple boundary value problems with elasto-plastic properties. 4. A student can develop constitutive models based on experimental results on material behavior.
MCE 1105 – Theory of Plates and Shells	1. A student can apply the structural mechanics approximations of membrane, plates and shells. 2. A student can derive simple modifications to the membrane plate and shell theories. 3. A student can perform analysis and determine the static, dynamic, and non-linear motion of membrane, plate and shell structures. 4. A student will be able to apply numerical approximations.
MCE 1102 – Concrete Laboratory	1. Conduct Quality Control tests on 2. Conduct Quality Control tests on fresh & 3. Design and test concrete mix 4. Conduct Non-destructive tests on
MCE 1104 – Soil Mechanics Laboratory	1. Able to determine classification 2. Capable of finding out strength properties
MCE 1117 – Dynamics of Soils & Foundations	1. Develop skill in applying theory of vibrations to basic facets of soil behavior under dynamic loading together with the exposure of the fundamental principles of wave propagation in engineering examples 2. Calculate the dynamic properties of soil and perform relevant tests in laboratory and on field for the analysis & design of machine foundations which can tolerate dynamic loads by applying the general principles 3. Recognize & differentiate between the conventional behavior and the behavior under the influence of dynamic loads in the analysis of dynamic earth pressure & bearing capacity 4. Evaluate the liquefaction potential using simplified methodology and select appropriate mitigation measures based on

	nature of vibration which can be isolated and measures for achieving safety of adjacent foundations 5. Perform an equivalent-linear site response analysis
MCE 1119 – Prestressed Concrete	1. At the end of this course the student shall have a knowledge of methods of prestressing. 2. capability to justify the use of equipment and materials 3. Capability to control of the losses involved of pre-stressing concrete and ability to justify advantages and disadvantages. 4. Capability of design of pre-stressed concrete elements under codal provisions
MCE 1123 – Analysis & Design of Pavements	1. Identify the factors affecting the design and performance of diverse types of highways. 2. Evaluate the stresses and strains at various locations of flexible and rigid pavements under various axle load classes. 3. Designing flexible and rigid pavements applying various methods. 4. Designing longitudinal and transverse joints in rigid and flexible pavements
MCE 1223 – Rock Mechanics and Tunneling	1. Students should be conversant with scope and problems of Rock Mechanics. 2. Students should be exposed with Rock exploration, laboratory testing etc. 3. Student should be conversant with Deformation characteristics of rocks. 4. Student should be conversant with mechanical, thermal and electrical properties of rock mass 5. Student should be conversant with Rock mechanics application, bearing capacity of homogeneous as well as discontinuous rocks, Rock bolting plastic mechanics.
MCE 1203 – Advanced Shell Structures	1. A student can perform critical Analysis and Design of Typical Shell Structures. 2. A student will be able to apply numerical approximations.
MCE 1207 – Stability of Structures	1. A student can carry out stability analysis of various structural system. 2. A student will be able to idealize the correct model and select suitable analysis procedure.

	3. A student will be able to apply numerical approximations.
MCE 1211 – Structural Analysis	A student will be able to analyze and evaluate systems in structural engineering using force and displacement methods Perform plastic analysis of various structures
MCE 1204 – Shell Structures Design (S)	After successful completion of the course a student will be able to: 1. Apply mathematical technique to analyze the curved surfaces. 2. Understand and explain the behavior of shell elements used in practice. 3. Use commercial software for analysis and design of shells.
MCE 1206 – CAD Laboratory	Students will be able to design Civil Engineering Structure using software package
MCE 1217 – Structural Design of Foundations	1. Design and carry out the reinforcement detailing for several types of foundations. 2. Design special Foundations such as shell foundation, Well foundation etc.
MCE 1221 – Dynamics of Structures	1. An ability to apply knowledge of mathematics, science, and engineering by developing the equations of motion for vibratory systems and solving for the free and forced response. 2. Ability to identify, formulate and solve engineering problems. This will be accomplished by having students model, analyze and modify a vibratory structure order to achieve specified requirements. 3. Understanding professional and ethical responsibilities. This will be accomplished by emphasizing the importance of understanding how structural vibrations may affect safety and reliability of engineering systems. 4. An ability to use the techniques, skill and modern engineering tools necessary for engineering practice will be accomplished by giving students realistic problems which will require MatLab for solutions.
MCE 1125 – Limit State Design of Structures	1. Will be able to perform plastic analysis. 2. Given any beam loading and support conditions, be able to design and calculate short-term and long-term deflections and check them against code limitations 3. Given any set of axial loads and bending

	moments, be able to use design charts to design a column section to resist those loads 4. Given any shape of slab, be able to analyse and design the slab
MCE 1227 – Mining Engineering	1. Student shall be conversant with Mineral History of India. Geological aspects controlling selection of mining methods opencast and underground mining. Advantages and disadvantages of opencast mining and underground mining. Mining and Environment. Haul roads in opencast mining. 2. Student will be exposed with rock Slope Engineering like Structural discontinuities and its impact on rock slope stability.Wedge failure, plane failure, Circular failure and toppling failure. 3. Student will be exposed with waste dump Stability like External and Internal dump. Different types of failure modes in waste dumps. Factors influencing stability of external and internal dumps with case histories of rock slope and waste dump failures. 4. Student should be conversant with Air and Noise Pollution and air blast. 5. Student should be conversant with Land degradation and Subsidence, preparation of Mine closure plans.