Annexure - II

GITAM UNIVERSITY

(Declared as Deemed to be University U/S 3 of UGC Act, 1956)

REGULATIONS & SYLLABUS

OF

M.Tech.

(Structural Engineering & Natural Disaster Management)

(w.e.f 2012-13 admitted batch)

Programme Code : EPRSE200801

Gandhi Nagar Campus, Rushikonda

VISAKHAPATNAM – 530 045

Website: www.gitam.edu
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Name of the Course</th>
<th>Credits</th>
<th>Scheme of Instruction</th>
<th>Scheme of Examination</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>L</td>
<td>P</td>
<td></td>
</tr>
<tr>
<td>EPRSE 101</td>
<td>Theory of Elasticity</td>
<td>4</td>
<td>4</td>
<td>Total 4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Sem end exam Marks 60</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Continuous Evaluation Marks 40</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>TOTAL 100</td>
</tr>
<tr>
<td>EPRSE 102</td>
<td>Advanced Reinforced Concrete Design</td>
<td>4</td>
<td>4</td>
<td>Total 4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Sem end exam Marks 60</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Continuous Evaluation Marks 40</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>TOTAL 100</td>
</tr>
<tr>
<td>EPRSE 103</td>
<td>Finite Element Methods of Analysis</td>
<td>4</td>
<td>4</td>
<td>Total 4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Sem end exam Marks 60</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Continuous Evaluation Marks 40</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>TOTAL 100</td>
</tr>
<tr>
<td>EPRSE 104</td>
<td>Structural Dynamics</td>
<td>4</td>
<td>4</td>
<td>Total 4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Sem end exam Marks 60</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Continuous Evaluation Marks 40</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>TOTAL 100</td>
</tr>
<tr>
<td>EPRSE 111</td>
<td>*Computer Applications in Structural Engg.</td>
<td>2</td>
<td>4</td>
<td>Total 4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Sem end exam Marks 40</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Continuous Evaluation Marks 60</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>TOTAL 100</td>
</tr>
<tr>
<td>EPRSE 112</td>
<td>*Bridge Engineering</td>
<td>2</td>
<td>4</td>
<td>Total 4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Sem end exam Marks 40</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Continuous Evaluation Marks 60</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>TOTAL 100</td>
</tr>
</tbody>
</table>

**TOTAL 20 16 8 24 320 280 600**

**II SEMESTER**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Name of the Course</th>
<th>Credits</th>
<th>Scheme of Instruction</th>
<th>Scheme of Examination</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>L</td>
<td>P</td>
<td>Total 4</td>
</tr>
<tr>
<td>EPRSE 201</td>
<td>Stability of Structures</td>
<td>4</td>
<td>4</td>
<td>Total 4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Sem end exam Marks 60</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Continuous Evaluation Marks 40</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>TOTAL 100</td>
</tr>
<tr>
<td>EPRSE 202</td>
<td>Structural Reliability</td>
<td>4</td>
<td>4</td>
<td>Total 4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Sem end exam Marks 60</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Continuous Evaluation Marks 40</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>TOTAL 100</td>
</tr>
<tr>
<td>EPRSE 203</td>
<td>Earthquake Engineering</td>
<td>4</td>
<td>4</td>
<td>Total 4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Sem end exam Marks 60</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Continuous Evaluation Marks 40</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>TOTAL 100</td>
</tr>
<tr>
<td>EPRSE 204</td>
<td>Disaster Management</td>
<td>4</td>
<td>4</td>
<td>Total 4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Sem end exam Marks 60</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Continuous Evaluation Marks 40</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>TOTAL 100</td>
</tr>
<tr>
<td>EPRSE 211</td>
<td>*Repairs, Renovation and Rehabilitation of Structures</td>
<td>2</td>
<td>4</td>
<td>Total 4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Sem end exam Marks 40</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Continuous Evaluation Marks 60</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>TOTAL 100</td>
</tr>
<tr>
<td>EPRSE 212</td>
<td>*Theory of Plates and Shells</td>
<td>2</td>
<td>4</td>
<td>Total 4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Sem end exam Marks 40</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Continuous Evaluation Marks 60</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>TOTAL 100</td>
</tr>
</tbody>
</table>

**TOTAL 20 16 8 24 320 280 600**

* Viva-voce shall be conducted at the end of the semester based on the project report submitted by the student.
## M.Tech. (SE&NDM) - III SEMESTER

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Name of the Course</th>
<th>Credits</th>
<th>Scheme of Instruction</th>
<th>Scheme of Examination</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>L</td>
<td>P</td>
<td>Total</td>
</tr>
<tr>
<td>EPRSE 301</td>
<td>Foundations for Dynamic Loading</td>
<td>4</td>
<td>4</td>
<td>-</td>
</tr>
<tr>
<td>EPRSE 302</td>
<td>Hydraulic Structures</td>
<td>4</td>
<td>4</td>
<td>-</td>
</tr>
<tr>
<td>EPRSE 321-324</td>
<td>Elective (Any one of the following)</td>
<td>4</td>
<td>4</td>
<td>-</td>
</tr>
<tr>
<td>EPRSE 311</td>
<td><strong>Project Phase-I</strong></td>
<td>8</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>EPRSE 312</td>
<td>Advanced Structural Engineering Lab</td>
<td>2</td>
<td>-</td>
<td>3</td>
</tr>
<tr>
<td>EPRSE 313</td>
<td>Seminar</td>
<td>2</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>TOTAL</td>
<td>24</td>
<td>12</td>
<td>3</td>
</tr>
</tbody>
</table>

**Project shall be initiated and problem must be defined (Supported by Literature Survey) with evaluation and presentation in the third semester.**

### Electives:

- EPRSE 321: Environmental Impact Analysis
- EPRSE 322: Advanced design of Structures
- EPRSE 323: Fire Resistant Design of Structures
- EPRSE 324: Wind Analysis and Design of Tall Structures
### IV SEMESTER

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Name of the Course</th>
<th>Credits</th>
<th>Scheme of Instruction</th>
<th>Scheme of Examination</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>L</td>
<td>P</td>
</tr>
<tr>
<td>EPRSE 411</td>
<td>***Project Phase-II</td>
<td>18</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>18</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

***Final Project/ Dissertation for the problem defined in previous semester shall be completed and report submission and presentation with evaluation shall be done in the fourth semester.

Total credits: 20+20+24+18 = 82
UNIT-I:

**Plane stress and plane strain:** Components of stress, strain. Hooke’s law, Stress and Strain at a point, Plane stress, Plane strain, Equations of equilibrium, Boundary conditions, Compatibility equations, stress foundation.

UNIT-II:

**Two Dimensional Problems in Rectangular Coordinates:** Solution by polynomials, Saint Venant’s principle determination of displacements, Bending of cantilever loaded at the end, Bending of a beam subjected to uniform load.

UNIT-III:

**Two Dimensional Problem in Polar Coordinates:** General equations of equilibrium, stress function and equation of compatibility with zero body forces. Analysis of thick cylindrical shells with symmetrical loading about the axis, Pure bending of curved bars, Strain components in polar coordinates, Rotating disks.

UNIT-IV:


UNIT-V:

**Torsion:** Torsion of straight bars – St. Venant solution; Stress function; Warp function – Elliptic cross section – Membrane analogy torsion of bar of narrow rectangular cross section.

Photoelasticity: Polarisation – Polarizer, Analyser, Photoelastic law, Fringes Circular polariscope, Determination of principal stresses.

**BOOKS:**

UNIT-I:


UNIT-II:

**Design of 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 shear-Introduction to equivalent frame method. Limitations of direct design method- Distribution of moments in column strips and middle strip.

UNIT-III:

**Design of Reinforced Concrete Members for Fire Resistance:** Introduction, ISO 834 standard heating conditions, grading or classifications, effect of high temperature on steel and concrete, effect of high temperatures on different types of structural members, fire resistance by structural detailing from tabulated data, analytical determination of the ultimate bending moment, capacity of reinforced concrete beams under fire, other considerations.

UNIT-IV:

**Earthquake Forces and Structural Responses:** Introduction, Bureau of Indian Standards for earthquake design, Earthquake magnitude and intensity, Historical development, Basic seismic coefficient and seismic zone factors, determination of design forces, Choice of method for multi-storeyed buildings, Difference between wind and earthquake forces, Partial safety factors for design, Distribution of seismic forces, Analysis of structures other than buildings.

UNIT-V:

Ductile detailing, Increased values of seismic effect for vertical and horizontal projections, Proposed changes in IS 1893 (Fifth revision). Ductile Detailing of Frames for Seismic Forces: Introduction, General principles, Factors that increase ductility, Specifications for material for ductility, ductile detailing of beams – Requirements.

REFERENCES:

1. “Advanced Reinforced Concrete Design” by P.C.Varghese, Prentice Hall of India
3. “Reinforced Concrete” by Park & Paulay
UNIT-I:

**Introduction:** A brief history of FEM, Need of the method, Review of basic principles of solid mechanics – principles, equations of equilibrium, boundary conditions, compatibility, strain – displacement relations, constitutive relationship.

UNIT-II:

**Theory relating to the formation of FEM:** Coordinate system (local & global); Basic components – A single element, Derivation of stiffness matrix, Assembly of Stiffness, matrix boundary conditions – All with reference to trusses under axial forces.

UNIT-III:

**Concept of element:** various element shapes, Triangular element, discretisation of a structure, Mesh refinement vs higher order element; inter connections at nodes of displacement models on inter element compatibility.

UNIT-IV:

**Three Dimensional Analysis:** Various elements used; tetrahedron, hexahedron

UNIT-V:

Requirements on Representation of element behaviour functions, Polynomial series, Isoparametric presentation and its formulation.

BOOKS:

UNIT-I:

**Introduction:** Mass- spring-damper idealization of structural systems, equation of motion for SDOF system, solution of the differential equations viscous damping, dry friction damping and negative damping, under-damped, critically damped and over-damped systems, logarithmic decrement, determination of damping in the system.

UNIT-II:

**Lumped mass MDOF systems:** Rayleigh method of determination of natural frequencies, Stodola-Vianelle method, Rayleigh method, Modified Rayleigh-Ritz method; multistory rigid frames subjected to lateral loads, damping in multi degree systems.

UNIT-III:

**Structures with distributed mass and load:** Introduction, free vibration, frequency and motions of SSB, cantilever beam, fixed beam, propped cantilever beam, forced vibration of beams, Beams, with variable cross-section and mass.

UNIT-IV:

**Approximate design methods:** Idealized system; transformation factors; dynamic reaction response calculations; Design example (RC beam, steel beam), Stiffened method and flexibility method.

UNIT-V:

**Response to impulse loading:** General nature of impulsive loading, sine-wave impulse, Rectangular impulse, square pulse of finite duration, triangular impulse, response to general force pulse, greens function, forced vibration.

**BOOKS:**

1. “Structural Dynamics” by John M. Biggs.
2. “Structural Analysis” by A. Ghali & A.M. Neville.
3. “Dynamics of structures” by Anil k Chopra
4. “Structural dynamics” by Mario Paz and Leigh
5. “Elements of earthquake engineering” by Chandra and Jai Krishna

Flexibility Method: Developing a Computer Program for the analysis of Portal Frames by using Flexible Method.

Finite Difference Method (FDM): Determination of deflections of plates by using FDM, & Determination of Natural Frequency in a Beam.

Finite Element Method: Discussion of engineering problems to demonstrate the versatility of finite element method. Coordinate system (local & global) definition of stiffness matrix for a truss element and a beam element, element assembly into global stiffness matrix, Boundary conditions.

Soft Ware Applications In Structural Engineering (by Using STAAD, STRAP, STRUDS etc.,): Analysis of Reinforced Concrete (RCC) & Steel Structures.

Analysis of Plane and Space Truss and Frames subjected to Gravity and lateral loads

Determination of Natural Frequency of a Beam

Dynamic Analysis (Response Spectrum) of Plane Frames

Analysis of Water Tanks by Using Plate Elements

Design Of Reinforced Concrete Members: Design, Detailing and Estimation of Beams, Slabs, Columns and Foundations Shear Wall Design

Design Of Steel Members: Design of Truss Members, Design of Beams and Columns.

REFERENCES:

2. “Concepts and Applications of Finite Element Analysis” by Cook, R.D.
3. Reference Manual for STADD, STRAP, STRUDS, ANAYS, NISA, etc.
UNIT–I:
Introduction and Investigation for Bridges
Components of a Bridge; Classification; Standard Specifications; Need for Investigation; Selection of Bridge Site; Preliminary Data to be collected; Preliminary Drawings; Determination of Design Discharge; Economical Span; Location of Piers and Abutments; Vertical clearance above HFL; Scour depth; Choice of Bridge Type; Importance of Proper Investigation.

UNIT–II:
Design considerations of RCC bridges
Various types of bridges (brief description of each type), Design of R.C.C. culvers and T-beam bridges.

UNIT–III:
Design considerations of steel bridges
Various types of steel bridges (brief description of each type), Design of plate girder bridge.

UNIT–IV:
Sub Structure for Bridges
Pier and abutment caps; Materials for piers and abutments; Design of pier; Design of abutment; Backfill behind abutment; Approach slab

UNIT–V:
Bearings for Bridges
Importance of bearings; Bearings for slab bridges; Bearings for girder bridges; Expansion bearings; Fixed bearings; Design of elastomeric pad bearing.
Foundations for Bridges
Scour at aburments and piers; Grip length; Types of foundations; Design of well foundation

Reference Books:
M.Tech. (SE&NDM) - II SEMESTER

EPRSE 201: STABILITY OF STRUCTURES

UNIT-I:
**Buckling of Columns**: Method of neutral equilibrium, Critical load of the Euler column, Linear column theory - An Eigen value problem, Effective length concept, Higher order differential equation for columns initially bent columns, effect of shear stress on buckling, eccentrically loaded columns. Inelastic buckling of columns, Double modulus theory, Tangent modulus theory, Shanley theory of inelastic column behaviour.

UNIT –II :
Beam columns (Beam columns with concentrated lateral load, distributed, load end moment),

UNIT –III :
**Approximate methods of analysis**: Conservation of energy principles; calculation of critical loads using approximate deflection curve; Principle of stationery potential energy, Raleigh – Ritz method, Buckling load of column with variable cross section, Galerkin’s method; Calculation of critical load by finite differences, Unevenly spaced pivot points, Matrix stiffness method; effect of axial load on bending stiffness – slope deflection equations, Buckling of column loaded along the length using energy methods.

UNIT-IV:
**Buckling of Frames**: Modes of Buckling, Critical load of simple frame using neutral equilibrium, Slope deflection equations and matrix analysis.

UNIT-V:
**Buckling of Plates**: Differential equation, Strain energy of bending, Critical load, Finite difference approach inelastic buckling of plates.

REFERENCES:

UNIT–I:


UNIT–II:


Probabilities Analysis of Loads: Gravity loads, wind load.

UNIT–III:

**Basic Structural Reliability**: Introduction, Computation of Structural reliability. Monte Carlo Study of Structural Safety: General, Monte Carlo method, Applications.

Reliability of structural systems: Preliminary concepts as applied to simple structures.

UNIT–IV:

**Level 2 Reliability Methods**: Introduction, Basic variables and failure surface, First-order second-moment methods (FOSM).

UNIT–V:

**Reliability Based Design**: Introduction, Determination of partial safety factors, Safety checking formats, Development of reliability based design criteria, Optimal safety factors, Summary of results of study for Indian standard – RCC Design.

REFERENCES:

1. “Structural Reliability Analysis and Design” By Ranganatham, R.
2. “Structural Reliability” by Melchers, R.E.
UNIT-I:

Earthquakes, Epicenter, Hypocenter and earthquake waves, Measurement of ground motion, Seismic Regions, Intensity and Isoseismals of an earthquake, Magnitude and energy of an earthquake, Consequences of earthquakes, Seismic zoning.

UNIT-II:


UNIT-III:

**Earthquake Analysis of Linear Systems**:

**Part-A**: Response history analysis, Modal analysis, Multistorey buildings with symmetric plan. Multistorey buildings with unsymmetric plan, Torsional response of symmetric plan builds, response analysis for multiple support excitation, structural idealization and earthquake response.

Part-B: Response Spectrum Analysis: Peak response from earthquake response spectrum, Multistorey buildings with symmetric plan, Multistorey buildings with unsymmetric plan.

Earthquake Response of Linear Elastic Buildings: Systems analysed, Design spectrum and response quantities, Influence of $T_1$ and $p$ on response, Modal contribution factors, Influence of $T_1$ on higher-mode response, Influence of $p$ on higher-mode response, Heightwise variation of higher-mode response, How many modes to include.

UNIT-IV:


UNIT-V:


BOOKS:

M.Tech. (SE&NDM) - II SEMESTER

EPRSE 204 – DISASTER MANAGEMENT

UNIT-I:

Concept of Disaster Management. Types of Disasters. Disaster mitigating agencies and their organizational structure at different levels.

UNIT-II:

Overview of Disaster situations in India: Vulnerability of profile of India and Vulnerability mapping including disaster – prone areas, communities, places. Disaster preparedness – ways and means; skills and strategies; rescue, relief reconstruction and rehabilitation. Case Studies: Lessons and Experiences from Various Important Disasters in India

UNIT-III:


UNIT-IV:


UNIT-V:

Cyclone resistant house for coastal areas. Disaster resistant construction role of insurance sector. Response of buried steel pipelines carrying water subjected to earthquake ground motion. Preparedness and planning for an urban earthquake disaster. Urban settlements and natural hazards. Role of knowledge based expert system in hazard scenario.

BOOK:

2. Techniques to test the existing strengths: Destructive and Non destructive tests on concrete.
3. Repairs of Multistorey structures: Cracks in concrete, possible damages to the structural elements beams, slab, column, footing etc., Repairing techniques like Jackchu, Grouting, external prestressing, use of chemical admixtures, repairs to the fire damaged structure.
4. Repairs to masonry structures & Temples: Damages to masonry structures – repairing techniques, Damages to temples – repairing techniques.
7. Temporary structures: Need for temporary structures under any Hazard, various temporary structures, Case studies

REFERENCE BOOKS:

1. Renovation of Structures – by Perkins.
2. Repairs of Fire Damaged Structures – R.Jagadish
UNIT-I:

Bending of Long Rectangular Plates to a Cylindrical Surface: Differential equation for cylindrical bending of plates – Uniformly loaded rectangular plates with simple supported edges and with built in edges.

UNIT-II:


UNIT-III:

Simply supported rectangular plates under sinusoidal loading – Naviers solution and its application to concentrated load – Levy’s solution for uniformly distributed load or hydrostatic pressure.

UNIT-IV:

Membrane analysis: a) Shells of revolution (axi-symmetrical loading), Spherical shells, Conical Shells, Elliptical shell of revolution. Torus, Hyperboloid of revolution of one sheet, shells of uniform strength membrane deformation. b) Membrane analysis of shells of translation, circular cylinder, Directrix, Parabola, Cycloid, Catenary and Membrane deformations.

UNIT-V:

Bending analysis of cylindrical shell: Beam method, Schorer method

TEXT BOOK:


REFERENCES:

1. “Stresses in Shells” by Flugge.

2. “Design of Shells and Construction” by Ramaswamy, G.S.
UNIT-I:

**Elements of Soil Dynamics**: Free and forced vibrations with and without damping for single degree of freedom, Natural frequency of foundation soil system – Barken, Pressure bulb concept, Pauw’s analogy. Dynamic magnification factor and logarithm of decrement.

UNIT-II:

**Wave Propagation**: Waves in elastic half space, and characteristics of classification of seismic/elastic waves. Measurement of shear wave velocity, SASW (Spectral Analysis Of Surface Waves) technique. Vibration isolation, types and methods, material characteristics pertains to vibration control, Base isolation concepts.

UNIT-III:

**Elastic Properties of Soil**: Determination of dynamic characteristics of soil by Field and laboratory methods, Stress strain characteristics of soil under dynamic loads, Damping properties, seismic zone map of India, Bearing capacity of soil under dynamic loads by pseudo static analysis.

UNIT-IV:

**Liquefaction and Ground Improvement**: Mechanism, condition vulnerable to liquefaction, Estimation of liquefaction potential in the field, determination of FOS against liquefaction, CRR, CSR, Factors affecting liquefaction, Anti liquefaction measures, Ground improvement in cohesion less soils – dynamic compaction, Vibroflotation, blasting, etc.,

UNIT-V:

**Foundations**: Foundation types and classifications, resonance and it effect, general requirements of machine foundations, requirements considering practical point of view, Design Principles, Special foundations for high speed/impact machines.

Text Books:
1. “Soil Dynamics & Machine Foundations” by Swami Saran
2. “Soil Dynamics” by Shamsher Prakash
4. “Foundation Dynamics”by Jumkies

References:
1. “Dynamics of Bases and Foundations” by Barken
2. “Vibration of soil and foundation” by Richart
3. Relevant IS Codes
4. “Foundations Engineering Hand Book” by Nayak, N.V
5. Foundation Engineering Hand Book
UNIT–I:

Gravity Dams: Forces acting on gravity dam, Elementary profile of a gravity dam, step by step method of determination of profile of a dam, safety criteria, stability analysis of gravity dam including earthquake effects, internal stress calculations, and stress distribution around openings in a gravity dam.

UNIT–II:

Earth Dams: Causes of failure of earthen dams, seepage analysis for homogeneous dams, stability analysis for earthen dam by slip circle method, ordinary method of slices and Bishop’s method.

UNIT–III

Floods: Estimation of design flood, flood frequency analysis – Gumble’s distribution method, Flood routing in reservoirs and rivers, Dam-break / breach flood routing – Flood control

UNIT–IV:

Water Conductor System: Intake Structure, Trash rack, Design of trash Rack, intakes through Concrete dam, Design of Intake Structure, Surge tank, Functions and types of surge tanks.

UNIT–V:

Spillways & Gates: Types of spillways, Design of ogee spillway profile, types of hydraulic gates, Components of radial gates, Design of radial gate.

Reference :

M.Tech. (SE&NDM) - III SEMESTER

EPRSE 321: ENVIRONMENTAL IMPACT ANALYSIS


UNIT-II: Elements of Environmental Impacts, Agency activities, Environmental settings, Environmental Attributes: Air, Water, land, Ecology, Noise, Socio-Economics, Culture and Human aspects (Settlements/ Rehabilitations)


UNIT-V: Environmental Protection Act and Standards, State laws and local Ordinances, Land use planning, priorities and management, Environmental Audit.

REFERENCES:


UNIT-II: Shell: Lundgren beam method, Shore method.

UNIT-III: Design of Quay walls

UNIT-IV: Moorings, Breakwaters Simplified.

UNIT-V: Design of transmission towers.

REFERENCES:


UNIT-II: Design structural assemblies exposed to fire – Frames – Redundancy – Disproportionate collapse – continuity – plastic design.

UNIT-III: Mechanical properties steel at elevated temperatures Components of strain, Thermal strain Creep strain, Stress – related strain

Design of steel buildings exposed to fire – Multi-storey steel framed buildings

UNIT-IV: Concrete structures – behaviour of concrete structures in fire.

Fire resistance ratings, verification methods, Generic ratings Projection system

Mechanical properties of concrete at elevated temperature Test methods, Components of strain, Thermal strain, Stress related strain.

UNIT-V: Design of Concrete members exposed to fire member design, Simply supported slabs and beams.

REFERENCES:
1. “Fire Safety in Buildings” by Jain, V.K

UNIT-II: Design of shear wall: Introduction, Types of shear walls, behaviour of cantilever walls with rectangular cross section, Flange cantilever shear walls, Moment – Axial load interaction for shear wall section, Interaction of shear walls and Rigid jointed frames, Shear walls with openings, Coupled shear walls.


UNIT-IV: Design of Chimneys (RCC): Introduction, Wind pressure, Stresses in chimney shaft due to self weight and wind, Stress in horizontal reinforcement due to wind shear, Stresses due to temperature difference. Design of RC chimney.

UNIT-V: Design of steel chimneys: Introduction, Types of chimneys, Forces acting on steel chimneys, design of various components, Stability of steel chimney.

BOOKS:
1. Reinforced Concrete Structures – R.Park & T.Paulay
2. Design of Steel Structures vol-II – Ramachandra
3. Reinforced Concrete Structures – Punmia, Jain & Jain
4. Tall Chimneys – S.N. Manohar.
1) Assessment of compressive strengths by Rebound hammer test
2) Calibration of Rebound hammer for compressive strength
3) Assessment of compressive strengths by UPV
4) Calibration of UPV for compressive strength
5) Rapid Estimation of compressive strength of concrete using Accelerated curing tank
6) Study on Behavior of a RC beam using loading frame
7) Study on behavior of RC column using loading frame
8) Split tensile test on a cylindrical concrete specimen
9) Stress-strain curve for concrete
10) Fatigue test on mild steel specimen