

FIRST SEMESTER		ME CIVIL ENGINEERING				
COURSE CONTENTS						
CE-11001	Theory of Elasticity & Plasticity	L	T	P	Max. Marks	Min. Marks
Duration	3 Hours	3	0	0	70	28

Unit-I

Theory of Elasticity: Plain Stress & Strain – Introduction, Elasticity, hooks law, plane stress and strain, and Mohr's circle, different equation of equilibrium, boundary conditions, and compatibility equations stress function.

Unit-II

Two dimensional Problems: For rectangular coordinate- Solution by polynomial, Saint Venant principle, displacement and bending for various loads, solution Fourier series, gravity loading end effects, Eigen solutions for Polar Coordinates- General equations pure bending or curved bars, strain components, edge dislocations, stress in a circular and rotating disk, Eigen solutions of wedges and notches.

Unit-III

General Theorems and Elementary problems in three dimensions: Analysis of stress and strain in three dimensions, differential equation of equilibrium, compatibility, principal of super positions, strain energy principal of virtual work Castilian's theorem, principal of least work reciprocal theorem, uniform stress, stretching of prismatic bar by its own weight, twist of circular Shaft, pure bending of prismatic bars and plates.

UNIT-IV

Torsion & Bending of bars: Torsion of straight bars, membrane analogy, narrow rectangular cross section, rectangular bars, energy method, rolled profile sections, hollow shafts, thin tubes, circular shaft of variable diameter, bending of a cantilever, circular and elliptic cross section, shear center, displacements, bending of circular plate.

UNIT-V

Theory of plasticity: loading compression & tension, loading unloading reverse and reloading types, nominal stress, strain true stress, natural strain etc. Bauschinger effect, strain hardening, tensor, stress strain curve, maximum and octahedral shear stresses and stains, deviator, yield criteria on II – plane, C-curve, Rankines saint venant's, trease, Von mises, 2-D representation, Isotropic and kinematic hardening, prandtlrenss equations, plastic stress strain relations.

Reference Book –

1. Timoshenko & Goodier – Theory of Elasticity, Mc Graw Hill.
2. Advance Mechanics of Solids – L.S. Shrinath, Tata Mc Graw Hill.
3. Applied Elasticity – Zhilum Xu, Wiley Eastern limited.
4. C.R. Calladine, "Engineering Pasticity" Pergamoa press, 1969.
5. Amendelso " Plasticity theory & Application" Mcmillan 1968.
6. Lubliner, "Plasticity theory".
7. Charkraborty P.K., "Placticity' TMH.

FIRST SEMESTER		ME CIVIL ENGINEERING				
COURSE CONTENTS						
CE-11002	Advanced Structural Analysis	L	T	P	Max. Marks	Min. Marks
Duration	3 Hours	3	0	0	70	28

Unit-I

Basic concept of structural analysis and type of structures, static and kinematic indeterminacy, principle of superposition, principle of virtual work. Unit method, force and displacement method and choice of method in analysis.

Unit-II

Flexibility (Force) Method – Basic concept, evaluation of flexibility coefficient and basic equation, effect of temperature change and support displacement, equivalent joint loads energy approach in flexibility method.

Unit-III

Stiffness (Displacement) Method – Basic concept, evaluation of stiffness coefficient and basic equation, direct stiffness method, joint stiffness matrix, partitioning of stiffness matrix, transformation of co-ordinate system, effect of support displacement and temperature change energy approach in stiffness method.

Unit-IV

Application of flexibility (force) method and stiffness (displacement) method in analysis of continuous beam, plane truss, plane frame and grid frame.

Unit-V

Stiffness of space truss and space solution problem, comparison of force and displacement method no prismatic member, elastic shear deformation, Axial Flexural interaction, members with symmetrical and non symmetric cross section, computer programming consideration.

Reference Book-

1. James M. Gere and William weaver, journal – Matrix analysis of framed structures, CSS Pub.
2. Pandit & Gupta – Structural Analysis, A Matrix approach, Tata McGraw Hill.
3. C.S. Reddy – Basic structural analysis, Tata McGraw Hill.
4. V.N. Varirani & M.M. Tatwani – Advance theory of structure & Matrix Method of Analysis, Khanna Publication.
5. Madhu B. Karchi- Matrix Method of Structural Analysis, Wiley Eastern Publication.
6. F.W. Beaufair, W.H. Rown – Computer Method of Structural Analysis, Prentice

FIRST SEMESTER		ME CIVIL ENGINEERING				
COURSE CONTENTS						
CE-11003	Advanced Design of Concrete Structure	L	T	P	Max. Marks	Min. Marks
Duration	3 Hours	3	0	0	70	28

Unit-I

Earthquake and wind load analysis (Static and dynamic) and design of structures as per Indian standard code.

Unit-II

Redistribution of moment in RC beams. Design of deep beam, waffle slab. Slab of irregular shape by yield line theory and grid floor.

Unit-III

Design of cured beam, circular slab for different loading and edge conditions, design of intze tank, membrane analysis, continuity effect and design of staging

Unit-IV

Flat slab, RCC Chimney and Hyperbolic cooling tower.

Unit-V

Design of folded plates and shell, hyperbolic paraboloid shells.

Reference books:

1. Advanced reinforced concrete Design- P.C. Vershese – PHI Publication.
2. Advanced Reinforced concrete Design – N. Krishna Raju CBS Publication.
3. Advanced Reinforced concrete Design- Bhavikutty
4. Handbook of Reinforced Concrete Design – S.N. Sinha Tata McGraw Hill.
5. Reyonld's Reinforced Concrete Designer Handbook.
6. Relevant IS codes and specification such as IS:456, IS:875 (all parts), IS%1893 SP64, SP34 etc.

FIRST SEMESTER		ME CIVIL ENGINEERING				
COURSE CONTENTS						
CE-11004	Structural Dynamics	L	T	P	Max. Marks	Min. Marks
Duration	3 Hours	3	0	0	70	28

Unit-1

Single degree of freedom system I – Equation of motion, free vibration, undamped free vibration of SDFS, Damped free vibration of SDFS critical damping under damping and cover damping. Coulomb damper, linear viscous damper, logarithm decrement.

Unit-II

Single degree of freedom system II- Forced vibration response of SDFS to harmonic loading, response of undamped and damped system, dynamic magnification factor for undamped and damped. Support excitations vibration isolations and its transmissibility, vibration measuring seismic instrument. Response to a SDOF system to a general type of forcing system – Response due to periodic force – Fourier series periodic and non periodic excitation. Energy methods.

Unitl-III

Numerical method applied to SDOF system – direct integrations technique and numerical evaluation of dhumel integral

Two degree of of freedom system: Matrix formulation, free vibration undamped and damped, forced vibration, principle of Vibration absorber.

Unit-IV

Multi degree of Freedom System: Matrix formulation, orthogonally relationship, stiffness and flexibility influence coefficient, Eigen value problem, normal mode and their properties, Matrix interaction techniques for Eigen value Eigen Vector force and forced vibration by mode super position method and mode acceleration method.

Unit-V

Continuous System- Axial and longitudinal vibration of bars, Torsional vibration of shafts, Transverse vibration of strings and Flexural vibration of beams with different end condition – effect of rotatory inertia and shear deformation.

Reference Books-

1. Dynamics of structure Mario Paz, Van Nostrand Reinhold, Newyork.
2. Dynamics of Structure Clough and Penszien, Mcgraw Hill.
3. Vibration Analysis and systems of structures – Madhujit Mukhopadhyay.
4. Schaums outline – Theory and problems of Mechanical Vibrations – William Seto.

FIRST SEMESTER		ME CIVIL ENGINEERING				
COURSE CONTENTS						
CE-11008	Advance Mathematics & Numerical Analysis	L	T	P	Max. Marks	Min. Marks
Duration	3 Hours	3	0	0	70	28

Unit-I

Matrix and Vector Spaces- Vector spaces, subspaces, Linear Transformation, Matrix representation, change of basis, the Eigen problem $Av = \lambda v$ with A being a symmetric matrix, Vector and matrix norm, introduction to tensor

Unit-II

Eigen problems, Solution Method: Vector Iteration Method, Transformation methods, polynomial Iteration techniques, methods based on the sturm sequence property solution of large Eigen problems: The determinant search method, the subspace Iteration method.

Unit-III

Numerical Methods – Partial differential Equation : Finite difference Approximations parabolic, Hyperbolic, Elliptic Equation, integral equations Conversion, Conversion of BVP to IE using Green's function, Solution of IE, Successive approximation and finite difference methods

Unit-IV

Fourier Transform – Fourier integral Theorem, FTs, properties, application of Transforms to BVPs. Probability, Conditional probability, total probability and Bayes theorem, Random variables: Discrete, Continuous.

Unit-V

Classical and Fuzzy sets, Classical & Fuzzy relations, properties of MF, Fuzzification and Defuzzification, cuts, Genetic Algorithm and its application

Reference Books :

- 1- Theory and problems of Linear Algebra : Seymour Lipschutz
- 2- Introductory methods of Numerical Analysis : S.S. Sastry
- 3- Higher Engineering Mathematics : B.S. Grewal
- 4- Advanced Engineering Mathematics : Erwin Kreyszig.
- 5- Probability and statistics in engineering : William W. Hines et al.
- 6- Numerical methods in Finite Element Analysis : Klaus – Jurgen Bathe & Wilson