

BRANCH-CIVIL ENGINEERING**Specialization: Structural Engineering/
Structural and Foundation Engineering**

Second Semester							
Course Name	Theory				Practical		
	Hours/ Week L/T	Credit Theory	University Marks	Internal Evaluation	Hours/ Week L/T	Credit Practical	Marks
Specialization Core-1 Advanced Reinforced Concrete Design	4-0	4	100	50	-	-	-
Specialization Core-2 Matrix Methods of Analysis of Structure	4-0	4	100	50	-	-	-
Elective I (Specialization related) 1. Structural Dynamics 2. Advanced Steel Structure 3. Bridge Engineering 4. Earthquake Resistance Design of Structure	4-0	4	100	50	-	-	-
Elective II (Departmental related) 1. Advance Construction Materials 2. Offshore Engineering 3. Tall Structures 4. Optimization Methods & its Application in Civil Engineering	4-0	4	100	50	-	-	-
Elective III (from any department) 1. Composite Structure 2. Hydropower Engineering 3. Non-conventional Energy 4. Advanced Numerical Method 5. Green Building Concepts	4-0	4	100	50	-	-	-
Lab-2 (Specialization lab to be decided by the department)					4	4	150
Seminar/Project					4	4	150
Total							
Total Marks: 1050							
Total Credits: 28							

ADVANCED REINFORCED CONCRETE DESIGN

Module I:

Limit state design concepts in flexure, shear, torsion and combined stresses. Slender column

Module II:

Safety and serviceability, control of cracks and deflections.

Module III:

Yield line theory analysis of slabs, work and equilibrium methods.

Module IV:

Introduction to limit design of beams and frames. General principles and philosophies of design with special references to the codal provisions. Serviceability and stability requirements.

Books:

- 1) Park & Paunlay, "Reinforced Concrete Structures".
- 2) Ramakrishna & Arthur, "Ultimate strength design for structural concrete".
- 3) B.I.S. Codes

MATRIX METHODS OF ANALYSIS OF STRUCTURES

Module I:

Introduction, equilibrium, static and kinematic indeterminacy, kinematics, virtual work, concepts of stiffness and flexibility, analysis by displacement and force methods.

Module II:

Application of flexibility method to beams and plane trusses.

Module III:

Application of stiffness method to beams, plane frames and plane trusses.

Module IV:

Application of stiffness method to space truss, space frames and grids, basic concepts associated with computer implementation of stiffness method.

Books:

1. H.C.Martin," Introduction to Matrix Methods of Structural Analysis.
2. M.B.Kanchi, "Matrix Methods of Structural Analysis", New Age International Publishers, New Delhi Kardestuncer ,
3. "Elementary Matrix Analysis of Structures" Gere & Weaver,"Matrix Structural Analysis'

ADVANCED CONSTRUCTION MATERIALS

Module I:

Fresh concrete and its rheology. Mechanical, deformational behavior and microstructure of hardened concrete. Creep and shrinkage. Testing of concrete. mix design and properties of concrete; High strength concrete; High density and lightweight concretes; admixtures

Module II:

Industrial waste materials in concrete, their influence on physical and mechanical properties and durability of concrete, Concreting under extreme weather conditions, High strength concrete. Changes in concrete with time, Corrosion of concrete in various environments. Corrosion of reinforcing steel. Ferro-cement, material and properties.

Module III:

Foams and light weight materials, fibre reinforced concrete. Types of fibres, workability, mechanical and physical properties of fibre reinforced concrete. Polymers in Civil Engineering, Polymers, fibres and composites,

Module IV:

Fibre reinforced plastic in sandwich panels, modeling. Architectural use and aesthetics of composites. Adhesives and sealants. Structural elastomeric bearings and resilient seating. Moisture barriers, Polymer foams and polymers in Building, Polymer concrete composites.

Books:

1. Neville A.M., 'Properties of concrete', 3rd ed., 1985, ELBS Lea F.M.,
2. 'Chemistry of cement and concrete', 3rd ed., 1970, Edward Arnold Proceedings of recent seminars etc. and journals.

BRIDGE ENGINEERING

Module I:

Introduction and selection of type of bridges, longitudinal arrangement and economical span, bridge components, Design preliminaries: Layout, types of loads including wind and seismic loads, standard specifications for road bridges, substructures, superstructures, IRC provisions on loads and stresses, specification for single/double multi lane railway and road bridges, Abutments, piers and their foundations .

Module II:

Design of reinforced concrete slab culvert, box culvert bridge.

Module III:

Tee beam and slab bridge deck, design of prestressed concrete bridge.

Module IV:

Design of balanced cantilever bridge, design of continuous bridge, Introduction to long span bridges.

Books:

- 1) N.K.Raju, " Design of bridges", Oxford & IBH Publishing Co. pvt. ltd. D.J.Victor, " Essentials of bridge engineering", Oxford & IBH Publishing Co. pvt. ltd. Indian Road Congress Codes No.5,6,18,21,24, Jamnagar House, Shah Jahan Road, New Delhi.

Green Building Concepts

Module I

Environmental implications of buildings energy, carbon emissions, water use, waste disposal; Building materials: sources, methods of production and environmental Implications. Embodied Energy in Building Materials: Transportation Energy for Building Materials; Maintenance Energy for Buildings.

Module II

Implications of Building Technologies Embodied Energy of Buildings: Framed Construction, Masonry Construction. Resources for Building Materials, Alternative concepts. Recycling of Industrial and Buildings Wastes. Biomass Resources for buildings.

Module III

Comforts in Building: Thermal Comfort in Buildings- Issues; Heat Transfer Characteristic of Building Materials and Building Techniques. Incidence of Solar Heat on Buildings-Implications of Geographical Locations.

Module IV

Utility of Solar energy in buildings concepts of Solar Passive Cooling and Heating of Buildings. Low Energy Cooling. Case studies of Solar Passive Cooled and Heated Buildings. Unit V Green Composites for buildings: Concepts of Green Composites. Water Utilization in Buildings, Low Energy Approaches to Water Management. Management of Solid Wastes. Management of Sullage Water and Sewage. Urban Environment and Green Buildings. Green Cover and Built Environment.

TEXT BOOKS

- [1] K.S.Jagadish, B. U. Venkataramareddy and K. S. Nanjundarao. Alternative Building Materials and Technologies. New Age International, 2007.
- [2] Low Energy Cooling For Sustainable Buildings. John Wiley and Sons Ltd, 2009.
- [3] Green My Home!: 10 Steps to Lowering Energy Costs and Reducing Your Carbon Footprint, by Dennis C. Brewer, ISBN:9781427798411, Publisher: Kaplan Publishing, Publication Date: October 2008.
- [4] B. Givoni, Man, Climate and Architecture Elsevier, 1969.
- [5] T. A. Markus and E. N. Morris Buildings Climate and Energy. Pitman, London, 1980. Arvind Kishan et al (Ed)
- [6] Climate Responsive Architecture. TataMcGraw Hill, 2001.
- [7] Sustainable Building Design Manual. Vol 1 and 2, Teri, New Delhi, 2004.
- [8] O. H. Koenigs Berger, T. G. Ingersoll, Alan Mayhew and S. V. Szokolay. Manual of Tropical Housing and Building. Orient Long man, 1975.

REFERENCE BOOKS

- [1] Osman Attmann Green Architecture Advanced Technologies and Materials. McGraw Hill, 2010.
- [2] Michael F. Ashby Materials and the Environment, Elsevier, 2009.
- [3] Jerry Yudelson Green building Through Integrated Design. McGraw Hill, 2009.
- [4] Mili M. Ajumdar (Ed) Energy Efficient Building in India. Teri and Mnes, 2001/2002.
- [5] T. N. Seshadri et al Climatological and Solar Data for India. CBRI and Sarita Prakashan, 1968. 34
- [6] Fundamentals of Integrated Design for Sustainable Building By Marian Keeler, Bill Burke

- [7] The New Solar Electric Home: The Photovoltaics How-To Handbook, by Joel Davidson, ISBN: 9780937948095, Publisher: Aatec Publications, Publication Date: July 1987.

TENTATIVE
Likely to be Modified