Faculty of Engineering and Technology

Bachelor of Technology

Effective from Academic Year: 2019-20

Branch Name:	Civil Engineering
Semester/Year:	Semester VIII / Forth Year
Subject Title:	Structural Design - II
Subject Code:	1ET1060801
Pre-requisite:	Mechanics of Solids, Structural Analysis-I, II, III & Structural Design - I

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
				Theory (Marks)		Practical (Marks)		
Lecture (L)	Tutorial (T)	Practical (P)	Credit	University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	Total (Marks)
04	00	02	05	70	30	30	20	150

Subject Contents			
Sr. No	**Topic**	**Total Hours**	**Weightage (%)**
1	**RC Design**	**28**	**50**
	(A) Building Layout and Design: Loads as per I.S., distribution & flow of loads, lateral load due to wind and seismic as per latest IS standards, load combinations, guide lines for preparation of structural layout for building. Analysis, design & detailing of G + 3 RC framed building for residential /commercial purpose including ductile detailing	**08**	
	(B) Design of Retaining wall: Types, behavior and application of retaining wall, stability criteria, design & detailing of cantilever & counterfort type retaining wall for various ground conditions.	**08**	
	(C) Design of Water Tank: Classification of water tank and method of analysis, permissible stresses, codal provisions, Design of circular and rectangular under-ground water tanks using IS code method, Design of elevated water tank with Intze type of container, frame and shaft type of staging and foundation considering effect of earthquake and wind forces.	**08**	
	(D) Design of Flat Slab: 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 and two-way shears, Limitations of Direct design method, Introduction to Equivalent frame method.	**04**	
2	**Steel Design**	**28**	**50**
	(A) Loads & Load Combinations: Appraisal of loading standards such as I.S, I.R.C., Effect of wind and earthquake on structure.	**02**	

	(B) Design of Industrial Building: Structural layout of industrial building, Various types of trusses and their selection, effect of wind loads on purlin and trusses, bracing systems, columns, foundations, gantry girder – static and moving loads, selection & design of section.	**08**	
	(C) Design of plate girders: Modes of failure: Elastic buckling, bending in the plane of web, Local buckling, buckling in the plane of web, Vertical buckling of the compression flange, Shear buckling Design of bolted, welded plate girder by Tension field Method & Simple Post Critical Method including design of vertical & horizontal stiffeners, Splices, Curtailment	**06**	
	(D) Design of foot-over bridges: Structural system of through & deck type bridges, design of foot-over bridge & its Supporting system.	**06**	
	(E) Plastic Design: Introduction to plastic method of analysis, Design of continuous beams and portal frame using plastic design approach.	**06**	

Term-Work:

Term work shall consist of not less than 2 designs suitably selected from topics of course. The report shall consist of full analytical treatment, design procedure, references and all necessary drawings in form of neat dimensioned sketches. In addition to one detailed working drawing shall be prepared on full imperial size drawing sheet.

Course Outcome:

After learning the course, the students should be able to:

1. Assess loads, prepare layout, analyses, design and detail of various structural elements for RC framed structure up to G+3.
2. Identify the typical failure modes of RC building, retaining walls, water tanks, flat slabs & prestressed concrete sections.
3. Apply the principles, procedures and current Indian code requirements to the analysis and design.
4. Design & detail RC structures like Retaining Wall, Water Tank and Flat slab.
5. Prepare structural layout of Industrial steel structures, plate girder, foot-over bridge.
6. Determine the loads acting on it and identify the typical failure modes.
7. Apply the principles, procedures and current Indian codal provisions to the analysis and design of Industrial structures, plate girder & foot-over bridges.
8. Apply the principles of plastic design in steel beams & portal frames

Reference Books (RC Design)

1. Shah & Karve; Limit State Theory & Design of Reinforced Concrete; Structure Pub., Pune
2. Shah & Karve; Design of Multi-storied Building (G+3); Structure Pub., Pune
3. KrishanaRaju N.; Advanced Design of Concrete Structures; Tata Mc-Graw Hill, Delhi
4. KrishanaRaju N.; Prestressed Concrete; Tata Mc-Graw Hill,
5. Dr. H.J. Shah; Reinforced concrete Vol-II; Charotar Pub. Anand,
6. IS: 456 - Code of practice for plain and reinforced concrete
7. IS: 875 (Part I to V) - Code of practice for structural safety of Buildings Loading standards
8. IS: 1893 - Criteria for earthquake resistant design of structures
9. IS: 13920 -Code of Practice for ductile detailing of RC structure subjected to seismic force

10. IS: 3370- Code for concrete Storage tanks.
11. SP: 16 - Design aids for reinforced concrete
12. SP: 34 - Reinforcement detailing

Reference Books (Steel Design)

1. Shah & Karve; Limit State Theory & Design of Reinforced Concrete; Structure Pub., Pune
2. Shah & Karve; Design of Multi-storied Building (G+3); Structure Pub., Pune
3. KrishanaRaju N.; Advanced Design of Concrete Structures; Tata Mc-Graw Hill, Delhi
4. KrishanaRaju N.; Prestressed Concrete; Tata Mc-Graw Hill,
5. Dr. H.J. Shah; Reinforced concrete Vol-II; Charotar Pub. Anand,
6. IS: 456 - Code of practice for plain and reinforced concrete
7. IS: 875 (Part I to V) - Code of practice for structural safety of Buildings Loading standards
8. IS: 1893 - Criteria for earthquake resistant design of structures
9. IS: 13920 -Code of Practice for ductile detailing of RC structure subjected to seismic force
10. IS: 3370- Code for concrete Storage tanks.
11. SP: 16 - Design aids for reinforced concrete
12. SP: 34 - Reinforcement detailing

E-Resources (If any):

www.nptel.iitm.ac.in/courses/