GUJARAT TECHNOLOGICAL UNIVERSITY
BRANCH NAME: B.ARCH.
SUBJECT CODE: 2X65004
SUBJECT NAME: STRUCTURE - V
3rd Year, Semester : VI

Type of course: B.Arch.

Prerequisite: Structure – I, II, III & IV

Rationale: This subject is applications of structural engineering principles to design basic structural elements using of reinforced concrete as materials. This subject is specifically aim to develop understanding of various design philosophy, Indian codal provisions, design basis used in design of basic elements of framed structures and its detailing requirement.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE (E)	PA (M)	ESE (V)	PA (I)	
2	1	0	3	50	50	0	0	100

Content:

Sr. No.	Topics	Teaching Hrs.	Weightage %
1	Earthquake Resistant Design: Philosophy of earthquake resistant design, earthquake proof v/s earthquake resistant design, four virtues of earthquake resistant structures (strength, stiffness, ductility and configuration), seismic structural configuration, Capacity design concept, Introduction to IS: 1893 (Part I).	**06**	**20**
2	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 purpose including ductile detailing.	**08**	**30**
3	Design of Retaining wall: Types, behavior and application of retaining wall, stability criteria, design & detailing of cantilever type retaining wall for various ground conditions.	**06**	**20**
5	Types of foundations, importance of soil & other factors while recommending type of foundation	**03**	**10**
7	Ductile Detailing: Concepts of Detailing of various structural components as per IS: 13920 provisions.	**04**	**10**
8	Special Topics: Introduction to Earthquake Resistant Features of un-reinforced & reinforced masonry Structure, Confined Masonry, Soil liquefaction, Structural controls, Seismic strengthening.	**04**	**10**

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
10	**20**	**30**	**20**	**10**	**10**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate

C: Create and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books/ Indian Standards:

1. Earthquake Resistant Design of Structures by Shrikhande and Agrawal.
2. Shah & Karve; Limit State Theory & Design of Reinforced Concrete; Structure Pub., Pune
3. Dr. H. J. Shah; Reinforced concrete Vol-I & II; Charotar Pub. Anand.
4. IS: 456 - Code of practice for plain and reinforced concrete.
5. IS: 875 (Part I to V) - Code of practice for structural safety of Buildings Loading standards.
6. IS: 1893 - Criteria for earthquake resistant design of structures.
7. IS: 13920 -Code of Practice for ductile detailing of RC structure subjected to seismic force.
8. EQ Tips; IIT Kanpur & BM &TPC New Delhi.

Course Outcome:

Sr.No	CO Statement	Marks % Weightage
Upon completion of this course, the students should be able to:		
1	Apply the concept of earthquake resistant design in the building.	20
2	Assess loads, prepare layout, Analyse, design and detail of various structural elements for RC framed structure up to G+3.	35
3	Design & detail RC structures like Retaining Wall.	20
4	Behaviors and requirement of various types of foundation and requirement effect of ductile details in structure.	25

Term Work:

The students will have to solve at least full design of (1) design of G+3 building (design manually & check with software) (2) Retaining wall at least five examples from remaining topics of the syllabus. The students have to draw detailing of full design problems A2/A3 size drawing sheet and sketches of various structural components with proper detailing in sketch book.

List of Tutorials:

1. Prepare model showing reinforcement detail of G+3 Story Model for better understanding of load transfer mechanism.
2. Prepare model based on ductile detailing of various structural components.
3. Site visit related to construction stages and report preparation.