GUJARAT TECHNOLOGICAL UNIVERSITY

PDDC - Civil Engineering

SEMESTER: V

Subject Name: **Earthquake Engineering**
Subject Code: **X50602**

Teaching Scheme				Evaluation Scheme		
Theory	**Tutorial**	**Practical**	**Total**	**University Exam (E)**	**Mid Sem Exam (Theory) (M)**	**Practical (Internal)**
4	0	2	6	70	30	50

Sr. No	Course Content
1.	**Earthquake Basics:** Earth interior, plate tectonics, faults, consequences of earthquake, Earthquake parameters, magnitude & intensity, scales, Seismic zones of India, damages caused during past earthquakes (world wide).
2.	**Fundamentals of Earthquake Vibrations of buildings**: static load v/s Dynamic load, (force control and displacement control), simplified single degree of freedom system modeling of buildings, natural frequency, resonance v/s increased response, responses of buildings to different types of vibrations like free and forced, damped and undamped vibration, response of building to earthquake ground motion, introduction to multi degree of freedom systems (mode shape).
3.	**Earthquake Loads on Building and Lateral load Analysis:** Philosophy of earthquake resistant design, earthquake proof v/s earthquake resistant design, Four virtues of earthquake resistant structures (strength, stiffness, ductility and configuration), Introduction to IS: 1893 (Part I), Seismic structural configuration. Seismic coefficient method – base shear and lateral force distribution along height, Load combinations, Concepts of ductile detailing of RC building Methods of Analysis: approximate method, matrix – computer method
4.	**Special topics:** Introduction to soil liquefaction, structural control & Seismic strengthening
5.	**Earthquake resistant Masonry features :** Un-reinforced Masonry, Basics of masonry: units of masonry, good construction practice, Earthquake resistant features: bands and vertical reinforcement IS 4326, IS 13827, IS 13828

Term Work:

Term work shall consist of Seismic design of RC multi-storey frame building with ductile detailing in A3 CAD drawings, at least 25 problems based on the course under Earthquake Engineering and Preparation of various models of structural systems OR seminar/project.

IS Codes :

1. Criteria for earthquake resistant design General provision & Building - IS: 1893 (Part I 2002)
2. Code of Practice for Ductile Detailing of RC Structures - IS: 13920 (1993).
3. Code of Practice for earthquake resistant design & Construction of buildings - IS 4326 (1993)
4. Improving Earthquake Resistance of Earthen Buildings - IS 13827(1993)
5. Guide lines for Improving Earthquake Resistance low strength masonry buildings - IS 13828 (1993)

Reference Books:

1. A.K.Chopra; *Dynamics of structures*
2. Clough & Penzin; *Dynamics of structures*
3. Manish shrikhande & Pankaj Agrawal; *Earth quake resistant design of structures*
4. Park & Pauly; *Behavior of RC structure*
5. John M.Biggs; *Introduction to Structural Dynamics*
6. Mario Paz; *Structural Vibrations - Theory*