Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER–VI (NEW) EXAMINATION – WINTER 2024

Subject Code:3160621 Date:05-12-2024

Subject Name:Earthquake Engineering

Time:02:30 PM TO 05:00 PM Total Marks:70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

			Marks
Q.1	**(a)**	Explain Ductility and Flexibility	**03**
	(b)	Discuss the need of seismic zones in India	**04**
	(c)	Define (i) isoseismal (ii) soft storey (iii) epicenter (iv) magnitude (v) resonance (vi) seismogram (vii) Intensity	**07**
Q.2	**(a)**	Explain 'Rigid diaphragm' and 'Flexible diaphragm'.	**03**
	(b)	Distinguish between 'centre of mass' and 'centre of stiffness'.	**04**
	(c)	Enlist the various seismic waves and explain about all.	**07**
		OR	
	(c)	A spring mass model consists of 6 kg mass and spring of stiffness 3 N/mm was tested for viscous damped vibration. The test recorded two consecutive amplitude is 1.5 cm and 1.2 cm respectively. Determine (i) natural frequency of undamped system (ii) logarithmatic decrement (iii) damping ratio (iv) damping coefficient (v) damped natural frequency of system.	**07**
Q.3	**(a)**	Explain crack repair by epoxy injection grouting.	**03**
	(b)	Write a brief note on 'Beam Jacketing'.	**04**
	(c)	What is soil liquefaction? Explain theory of liquefaction in detail.	**07**
		OR	
Q.3	**(a)**	Define repair, restoration and retrofitting of structures.	**03**
	(b)	Discuss various dampers used for energy dissipation.	**04**
	(c)	Explain torsionally coupled and torsionally uncoupled system.	**07**
Q.4	**(a)**	What is base isolation? Explain concept of base isolation in structures.	**03**
	(b)	How design eccentricity is calculated as per IS 1893(1) – 2002.	**04**
	(c)	Explain effect of structural irregularities under lateral loading.	**07**
		OR	
Q.4	**(a)**	Calculate the base shear for a five storey hospital building having special moment resisting frame (SMRF) located in Ahmedabad on medium soil with following data using seismic coefficient method.	**07**

(i) No. of bay in x and y-direction = 4 (ii) Width of each bay = 5m (iii) Thickness of slab =150 mm (iv) Storey height = 3 m (v) Size of beam and column = 300 mm x 450 mm (vi) Amount of damping = 10 % of critical damping (vii) Live load = 4 kN/m^2 Assume any additional data if required and neglect the weight of the infill wall panels

(b) Calculate the lateral forces at each floor level of hospital building of Q.1 (a) using seismic coefficient method. **07**

Q.5 **(a)** Discuss, "How Architectural Features Affect Buildings During Earthquakes?" **07**

(b) Explain the earthquake resistance feature of masonry structures **07**

OR

Q.5 **(a)** Enlist different approximate methods used for lateral load analysis. Analyse the frame shown in the figure - 1 using an appropriate approximate method and construct Bending Moment, Shear Force and Axial Force diagrams. All columns are of same cross section 300 x 300 mm . Assume appropriate data if necessary. **07**

(b) How we can make Buildings Ductile for Good Seismic Performance? **07**

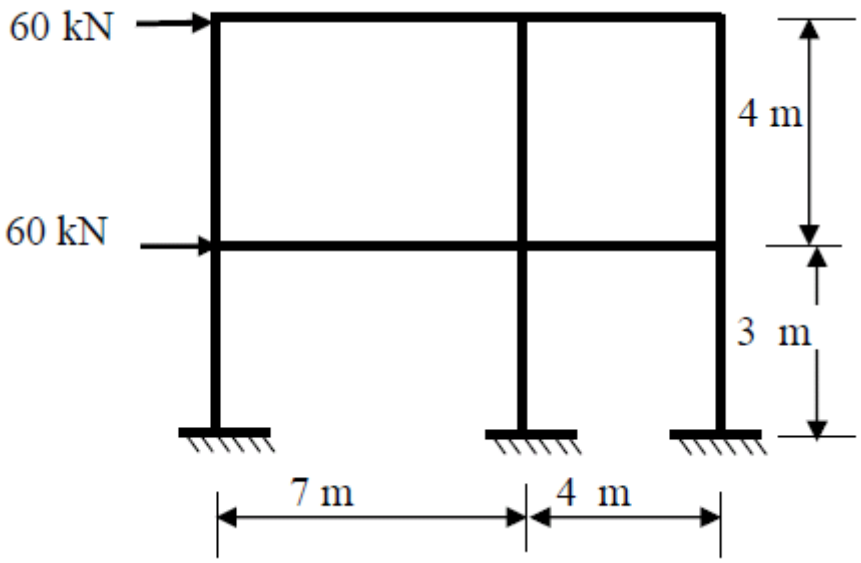

Figure -1

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