Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

PDDC– SEMESTER V– • EXAMINATION – SUMMER - 2016

Subject Code: X50602 **Date:24/11/2016**

Subject Name: Earthquake Engineering

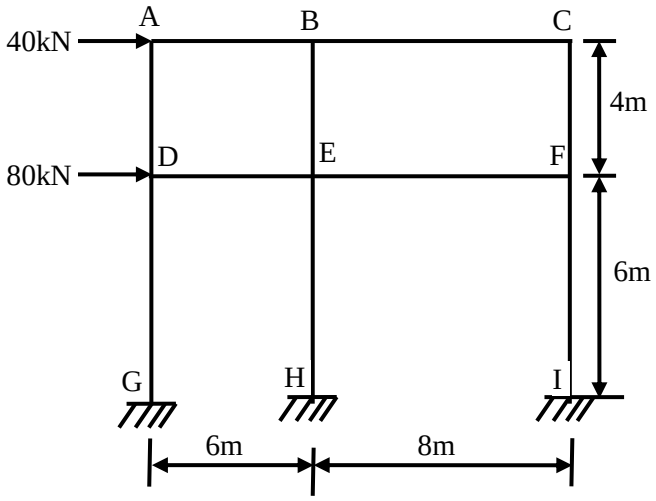
Time:10:30 AM to 1:00 PM **Total Marks: 70**

Instructions:

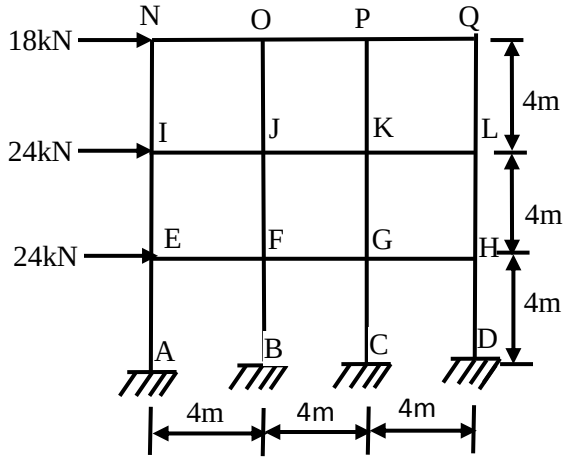
1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **IS 1893 Part 1 2002 & IS 13920-1993 are allowed in the examinations**

Q.1	**(a)**	Explain elastic Rebound theory with sketch.	**07**
	(b)	Write short note on seismic waves.	**07**
Q.2	**(a)**	A water tank is idealized as a single degree of freedom having equivalent weight of 10000 kN. Damping ratio as 4 % and stiffness factor as 20000 kN/m. Calculate (i) the natural time period, (ii) the damped time period, (iii) the damping constant and (iv) the maximum horizontal displacement at the top of the water tank if it is loaded by a seismic force equivalent to 20,000 sin (5t) N.	**07**
	(b)	What is mathematical model? Give its elements. Explain mathematical model with suitable example.	**07**
		OR	
	(b)	A one storey building is idealized as a rigid girder having weight W and weightless column. During the jacking operation while carrying out a free vibration test, A horizontal force of 9072 kg displaces the girder laterally by 0.508 cm. After the instantaneous release of this displacement, the maximum displacement at the end of the first cycle is 0.406 cm and the time period is 1.4 sec. Determine: (i) The effective weight of the girder (ii) Undamped frequency of vibration. (iii) Damping coefficient (iv) Amplitude after first 6 cycles.	**07**
Q.3	**(a)**	Analyse the frame shown in Figure:-1 by cantilever method and draw SFB, BMD, AFD.	**14**
	(b)	Analyse the building frame shown in Figure:-2 by portal method and draw shear force, bending moment and axial force diagrams.	**14**
		OR	
Q.3	**(a)**	Explain 'Rigid diaphragm' and 'Flexible diaphragm'	**07**
	(b)	What do you mean by torsionally coupled and torsionally uncoupled system?	**07**
Q.4	**(a)**	What is soil liquefaction? Explain theory of liquefaction in detail.	**07**
	(b)	What are the various bearings used for base isolation in structures?	**07**
		OR	
Q.4	**(a)**	Discuss various repair materials used for repairs of earthquake damaged structures.	**07**
	(b)	Explain with neat sketch 'Beam Jacketing'.	**07**
Q.5	**(a)**	Write short note on behavior of brick masonry construction during earthquake.	**07**
	(b)	Determine rigidity of the shear wall as shown in Figure:-3 in terms of Et.	**07**
		OR	
Q.5	**(a)**	Differentiate between shear wall and flexural wall.	**07**

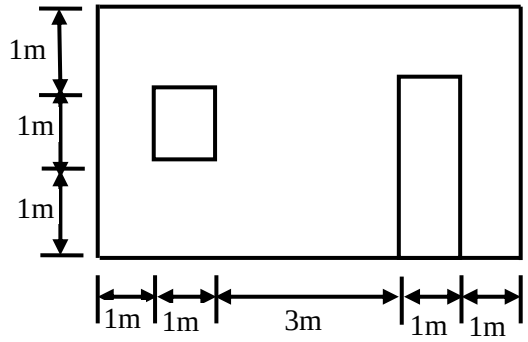
(b) Discuss provision of horizontal reinforcement in masonry walls as per IS:4326-1993. **07**



Q:-3 (a) Fig.:-1



Q:-3 (b) Fig.:-2



Q:-5 (b) Fig.:-3

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