Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI • EXAMINATION – SUMMER 2014

Subject Code: 160605 **Date: 26-05-2014**

Subject Name: Earthquake Engineering

Time:10.30 am to 01.00 pm **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1	(a)	Calculate lateral forces in the critical direction at each floor level for a building of government office having building frame with following data by collector office seismic coefficient method. also draw lateral load distribution diagram & shear diagram. (a) No. of storeys =5 (b) No. of bay of X & Y direction=7 (c) Storey height=3.5 m (d) width of each bay in X & Y direction=6 m (e) Size of beam=0.3 m × 0.45 m (f) Size of column=0.45 m × 0.45 m (g) Wall thickness =0.230 meter (h) L.L.=4 KN/m^2 (i) Location:- Gandhinagar	14
Q.2	(a)	(i)What points should be kept in mind while designing earthquake resistant brick masonry structure? (ii)Describe seismic waves in detail.	07
	(b)	Derive an equation for single degree undamped vibration system.	07
		OR	
	(b)	Rigid frame shown in Fig.1, having infinitely rigid girder which is disturbed horizontally by initial condition of X_0=0, X_0=4 m/s, t=0. (a)Find natural period and frequency (b)The displacement and velocity at any time t.	07
Q.3	(a)	Explain base isolation techniques in details.	07
	(b)	Explain how “ductility of building” can be effectively designed	07
		OR	
Q.3	(a)	(i) Discuss Seismography and its applications (ii)Define: Focus, Epicenter and Foreshocks	07
	(b)	Explain how rigid diaphragm effect can be considered while analyzing buildings for seismic forces.	07

Q.4	(a)	A mobile tower is pulled by a steel cable by applying 35kN force horizontally and displaced by 40 mm. The cable suddenly breaks and the resulting free vibration recorded. At the end of five cycles the time is 3.0 second and the amplitude is 30mm. Determine damping ratio, natural period of an damped vibration, effective stiffness. , effective weight, and damping coefficient.	07
	(b)	Give technical reasons for following: (i) Short column effect and its implications in seismic design (ii) Strong column weak beam design	07

OR

Q.4	(a)	With Neat sketches discuss the concept of ductile detailing in columns.	07
	(b)	Analyze building shown in Fig. 2 and draw shear, bending and axial force diagrams.	07
Q.5	(a)	Draw neat sketches of 2 rigid jointed frames and 2 pin jointed trusses and find degrees of freedom for each	07
	(b)	How does "Elastic Rebound theory" play a role in design for seismic forces	07

OR

Q.5	(a)	What are the known causes of Earthquakes? Explain with neat sketches	07
	(b)	Discuss flexural verses shear failure of Beam .	07

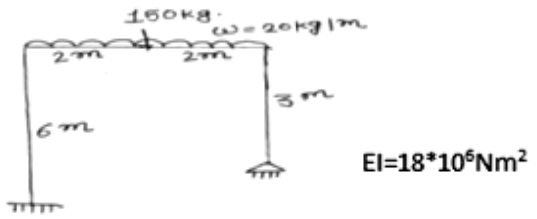

Fig. 1

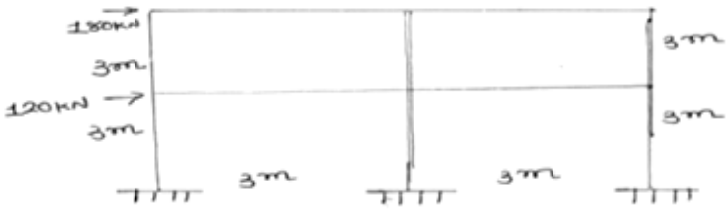

Fig. 2

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