

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 14 government office having building frame with following data by collector office seismic coefficient method. also draw lateral load distribution diagram & shear diagram. 14
- (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/m²
 - (i) Location:- Gandhinagar
- Q.2 (a) (i)What points should be kept in mind while designing earthquake resistant brick masonry structure? 07
- (ii)Describe seismic waves in detail.
- (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 $X_0=0$, $\dot{X}_0=4$ m/s, $t=0$. 07
- (a)Find natural period and frequency
 - (b)The displacement and velocity at any time t.
- 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 07
- (ii)Define: Focus, Epicenter and Foreshocks
- (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: 07
- (i) Short column effect and its implications in seismic design
 - (ii) Strong column weak beam design

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 versus shear failure of Beam . 07

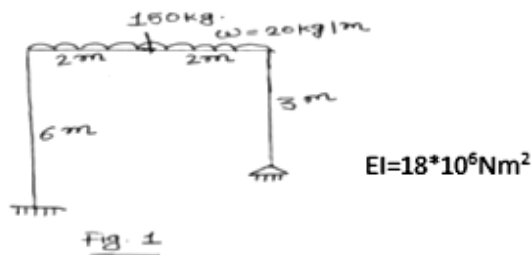


Fig 1

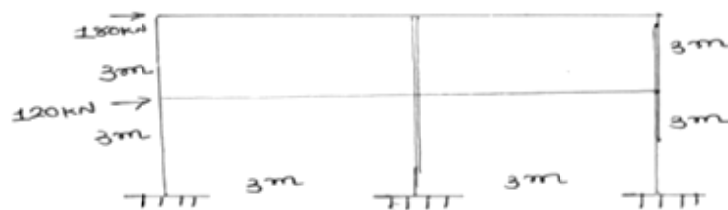


Fig 2
