Reg. No. :

Question Paper Code: 37014

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2017

Seventh Semester

Civil Engineering

01UCE704 - STRUCTURAL DYNAMICS AND EARTHQUAKE ENGINEERING

(Regulation 2013)

(IS 13920:193 and IS1893:2002 are permitted)

Duration: Three hours   Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 2 = 20 Marks)

1. State D'Alembert's principle.

2. Define the term degree of freedom.

3. What is meant by shear building?

4. Define resonance.

5. How do you classify the faults?

6. Distinguish between epicentre and hypocentre.

7. State Bouchinger effects on steel.

8. Define the term response spectra.

9. Write any two factors that increase the ductility in RC structures with seismic building.

10. What is meant by capacity design?

PART - B (5 x 16 = 80 Marks)

11. (a) The damped frequency of a system is obtained as 9.8 *Hz* from a free vibration test during the forced vibration test with constant exciting force on the same system, the maximum amplitude of vibration is found to be at 9.6 *Hz*. Find the damping factor for the system and its natural frequency. (16)

(b) An SDOF system is subjected to free vibration with an initial velocity V_o without any initial displacement. Determine the subsequent motion of the system for the three damping ratios. $\rho = 2.5$, $\rho = 1.0$, $\rho = 0.1$. (16)

12. (a) State and prove the orthogonality and normality property of mode shapes. (16)

Or

(b) In a three storeyed building frame, the mass *M1, M2* and *M3* are 1 *kg*, 1.5 *kg* and 2 *kg* respectively and stiffness are *K1, K2* and *K3* are 600 *kN/m*, 1200 *kN/m* and 1800 *kN/m*. Determine the natural frequencies and mode shapes for the shear building. (16)

13. (a) Explain briefly about the characteristics of strong ground motions. (16)

Or

(b) Describe briefly the tectonic plate theory. How is it related to earthquake? (16)

14. (a) Briefly explain about the behavior of RCC and Steel building under earthquake loading. (16)

Or

(b) Explain the plan irregularities and vertical irregularities with neat sketch. (16)

15. (a) A three storeyed symmetrical RC school building situated at Bhuj with the following data: plan dimensions-7*m*, storey height-3.5*m*, total weight of beams, slab and column and walls are 130 *kN*, 250 *kN*, 50 *kN* and 530 *kN* respectively. Live load and weight of terrace floor are 130 *kN* and 655 *kN* respectively. The structure is resting on hard rock. Determine the total base shear and lateral loads at each floor levels for 5 % of damping using seismic coefficient method. (16)

Or

(b) Write the importance of ductility in earthquake resistant design of RC buildings. And also explain the ductile detailing considerations in column members as per IS 13920:1993. (16)

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