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Question Paper Code: 37104

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2018

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. Define the term degree of freedom.
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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) A system vibrating with a natural frequency of 6 Hz starts with initial amplitude of 2 cm and an initial velocity of 25 cm/sec. Determine the natural period, amplitude, maximum velocity, maximum acceleration and phase angle. Also write the equation of motion of a vibrating system. (16)

Or

- (b) An SDOF system is subjected to free vibration with an initial velocity V_0 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 M_1 , M_2 and M_3 are 1 kg, 1.5 kg and 2 kg respectively and stiffness are K_1 , K_2 and K_3 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 RCC beam of rectangular section has to carry a distributed live load of 20 kN/m in addition to its own weight and a dead load of 25 kN/m. The maximum bending moment and shear force due to the earthquake are 60 kN-m and 40 KN respectively. Center to center distance between supports is 6 m. Design the beam using M-20 grade and Fe 415 steel. (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)