Reg. No. :

Question Paper Code: 31174

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

Seventh Semester

Civil Engineering

01UCE704 - STRUCTURAL DYNAMICS AND EARTHQUAKE ENGINEERING

(Regulation 2013)

(IS 13920:193, IS 4326:1993 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.

2. State the D' Alembert Principle of dynamic equilibrium.

3. What is meant by shear building?

4. What is meant by mode shape?

5. How do you classify the faults?

6. Differentiate between magnitude and intensity.

7. What is meant by bouchinger effects?

8. Define the term response spectra.

9. Name the failure pattern of masonry structures during earthquake.

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)

(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) A cantilever bar is to be modeled by a mass less uniform bar to which are attached with two lumped masses representing the mass of original system as $k = 2AE/L$ and $m = \rho AL$. Determine the natural frequencies and the normal modes of this model. (16)

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

Or

(b) Write detailed notes on plate tectonic theory. (16)

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

Or

(b) Discuss in detail about the lessons learnt from the past earthquakes. (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)

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