Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 21265

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2015.

Seventh Semester

Civil Engineering

CE 2403 / CE 73/ 10111 CE 703 — BASICS OF DYNAMICS AND ASEISMIC DESIGN

(Regulations 2008/2010)

(Common to PTCE 2403/ 10111 CE 703 — Basics of Dynamics and Aseismic Design for B.E. (Part-Time) Fifth/ Seventh Semester Civil Engineering – Regulations 2009/2010)

Time : Three hours Maximum : 100 marks

(Use of IS 1893 – 2002 IS 13920 – 1993 (Reaffirmed 1999) and IS 4326 – 1993 is permitted)

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What do you understand by deterministic analysis?

2. What does Duhamal's integral represent?

3. State the concept of shear building.

4. What is meant by decoupling of equations?

5. What is tectonics?

6. What do you learnt from the past earthquakes for masonry building?

7. What are the properties of soil on which its spring constant depends?

8. Write the expression for global ductility.

9. Write the expression for design horizontal seismic coefficient for a structure.

10. Define: Viscous damping.

PART B — (5 × 16 = 80 marks)

11. (a) A block of weight 900 N (moving between vertical guides) is supported by a spring of stiffness 10^6 N/m. The block is given an initial displacement of 50 mm with a velocity of 300 mm/sec, determine the period of vibration, natural frequency, amplitude of motion, maximum velocity and maximum acceleration of the block. Assuming a damping of 20% determine the logarithmic decrement and the damping coefficient of the system. (16)

Or

(b) (i) A machine of 200 kg mass is supported on four parallel springs of total stiffness 750 N/m has a unbalanced rotating component which result in a disturbing force of 350 N at a frequency of 2121 rpm. If damping ratio is 0.2, determine:

(1) Amplitude of motion due to the unbalance,

(2) Transmissibility,

(3) Transmitted force. (3 × 4 = 12)

(ii) Write short notes on Coulomb damping. (4)

12. (a) Obtain the natural frequencies and the mode shapes for a single bay two storey shear frame with combined stiffness of ground and first floor columns as k=2000 kN/m and 1000 kN/m respectively. Mass of each floor is 2000 kg. (16)

Or

(b) Derive an expression for the free vibration of a damped two degree of freedom system. (16)

13. (a) (i) Neatly tabulate and elaborate the details of MSK intensity scale. (12)

(ii) Classify earthquakes based on focal depth and magnitude. (4)

Or

(b) (i) Write short notes on the lesson learnt from recently occurred earthquake. (8)

(ii) Write short notes on the following,

(1) Elastic rebound theory (4)

(2) Body waves and surface waves. (4)

14. (a) How will you construct response spectrum diagram. Explain the types of response spectrum with neat sketches. (16)

Or

(b) Briefly discuss with neat sketches about the plan irregularities and vertical irregularities normally occurred in buildings. (16)

15. (a) Write short notes on

(i) Capacity design, (8)

(ii) Techniques of aseismic design. (8)

Or

(b) Write short notes on :

(i) Base isolation system. (6)

(ii) Passive energy dissipation system. (6)

(iii) Active control system. (4)

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