

| Reg. No.: | |
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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.

 $PART A - (10 \times 2 = 20 \text{ marks})$

- 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.

| 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. |
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| | | \mathbf{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. $(3 \times 4 = 12)$ |
| | | (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. |
| | | \mathbf{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 |
| 10. | (α) | (i) Capacity design, (8) |
| | | (ii) Techniques of aseismic design. (8) |
| | (b) | Write short notes on: |
| | ` ' | (i) Base isolation system. (6) |
| - | | (ii) Passive energy dissipation system. (6) |
| | | (iii) Active control system. (4) |