

Seventh Semester

Civil Engineering

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

(Regulation 2008)

Time : Three hours

Maximum : 100 marks

(IS 1893 and IS 13920 codes are permitted)

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Explain Frequency Ratio.
2. Explain Critical Damping.
3. Describe briefly the modal super position method.
4. What is the fundamental frequency and fundamental mode?
5. What is Elastic rebound theory?
6. Explain Modified Mercalli Intensity.
7. Describe dynamic behavior of soil.
8. Explain settlement of dry sand.
9. What is meant by Occupancy factor?
10. Explain Story drift.

11. (a) Show that the log-decrement is also given by the equation, $\delta = 1/n \log(U_o/U_n)$ where U_n represents the amplitude after n cycles have elapsed.

Or

- (b) A machine foundation weighs 60 KN. The spring constant is 11000 KN/M and dash pot (damper) constant $C = 200$ KN S/M. Determine,
- whether the system is over damped, undamped or critically damped
 - logarithmic decrement
 - ratio of two successive amplitudes
 - damped natural frequency
 - if the initial displacement is 10 mm and initial velocity is zero displacement at $t = 0.1$ S.

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

Or

- (b) In a two storeyed building frame, the mass, $M_1 = M_2 = 1000$ Kg, and stiffnesses are $K_1 = K_2 = 1$ MN/M. If a horizontal force of 20 KN is applied at the top of ground storey level, determine the displacement of masses M_1 and M_2 .

13. (a) Describe the two approaches followed for the prediction of earthquakes. Name the major plates of the earth.

Or

- (b) On what is the assignment of an earthquakes magnitude based? Is magnitude the same as intensity? Explain.

14. (a) Describe briefly the factor affecting liquefaction characteristics.

Or

- (b) Derive an expression for the condition which a structure will sink during earthquake.

15. (a) What is the effect of ignoring the contribution of masonry infill in the lateral load analysis of a multi-storey frame?

Or

- (b) In what manner is the behavior of a soft storey construction likely to be different from a regular construction in the event of an earthquake?