Reg. No. : ☐☐☐☐☐☐☐☐☐☐☐☐

Question Paper Code : 80221

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2016.

Seventh Semester

Civil Engineering

CE 6701 – STRUCTURAL DYNAMICS AND EARTHQUAKE ENGINEERING

(Regulations 2013)

Time : Three hours   Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. State D'Alemberts principle of dynamic equilibrium.

2. List the types of vibration.

3. Write the equation of motion for an undamped two degree of freedom.

4. What are eigen values and eigen vectors?

5. What is a Seismogram? Write its uses.

6. What is meant by Epicentre?

7. What do you mean by ductility?

8. Explain basic concept of Peak acceleration.

9. Explain "strong column – week beam" design concept.

10. Write down seismic design philosophy of IS 4326.

PART B — (5 × 16 = 80 marks)

11. (a) A damped free vibration test is conducted to determine the dynamic properties of a one storey building. The mass of the building is 100000 N Initial displacement of the building is 7.02 mm Maximum displacement on the first cycle is 5.3 mm and period of this displacement cycle is 1.7 s. Determine

    (i) Undamped frequency,

    (ii) Logarithmic decrement, damping ratio, damping coefficient,

    (iii) Damped frequency and the amplitude after 6 cycles. (16)

Or

(b) Derive the equation of motion of SDOF system for free vibration and find the solution for

    (i) Under damped system

    (ii) Over damped system

    (iii) Critically damped system. (16)

12. (a) Determine the natural frequencies and mode shapes of the building shown below. (16)

Or
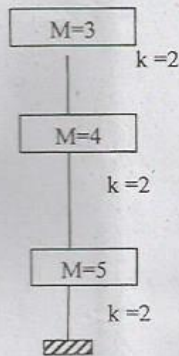
(b) Derive the equation of motion of a two degree of freedom system for free vibration. (16)

13. (a) (i) What are seismic waves? Explain the type of seismic waves with neat sketches. (8)

    (ii) Explain the details of Magnitude and intensity of scales. (4)

    (iii) Explain the details about the Spectral Acceleration. (4)

    Or

    (b) Write notes on :

    (i) Plate Tectonic Theory (6)

    (ii) Elastic Rebound theory (5)

    (iii) Causes of earthquake. (5)

14. (a) (i) Explain the concept of Peak Acceleration and Design spectrum with neat sketches. (8)

    (ii) Explain in details about Lessons learnt from past earthquakes. (8)

    Or

    (b) Write notes on different methods of introducing ductility into the RC structure. (16)

15. (a) (i) Write short notes on Earthquake resistant design for Masonry structures. (8)

    (ii) Explain briefly about various Guidelines for Earthquake resistant design. (8)

    Or

    (b) A four storey R.C frame building as shown in figure is situated at Chennai. The height between the floors is 3.5 m and total height of a building is 14 m. The dead load and normal live load is lumped at respective floor. The soil below the foundation is assumed to be hard rock. Assume building is intended to be used as a hospital. Determine the total base shear distributed lateral force as per IS 1893. (16)

2500 kN

3000 kN	3.5 m
3000 kN	3.5 m
3000 kN	3.5 m
	3.5 m

3

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