Reg. No. : ☐☐☐☐☐☐☐☐☐☐☐☐☐

Question Paper Code : 70302

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2021.

Seventh Semester

Civil Engineering

CE 6701 — STRUCTURAL DYNAMICS AND EARTHQUAKE ENGINEERING

(Regulations 2013)

(Common to PTCE 6701 – Structural Dynamics and Earthquake Engineering for B.E. (Part-Time) – Civil Engineering – Fifth Semester – (Regulations 2014))

Time : Three hours   Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1.   Describe D-Alembert's principle.

2.   Classify 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.   Classify the faults based on the direction of the movement of blocks.

6.   What is meant by reservoir induced Earthquakes?

7.   Brief short column damage in RC buildings.

8.   Brief P–delta effects.

9.   Recall the causes of damage.

10. Write the concept of soft storey.

PART B — (5 × 13 = 65 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.

Or

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

    (i) Under damped system

    (ii) Over damped system

    (iii) Critically damped system.

12. (a) Determine the natural frequencies of vibration of MDOF system by using matrix method as shown in figure 12 (a). (13)

Figure 12 (a)

Or

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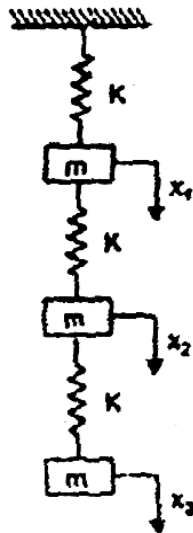
(b)   Determine the natural frequencies of the system as shown in figure 12 (b) by Holzer method.   (13)
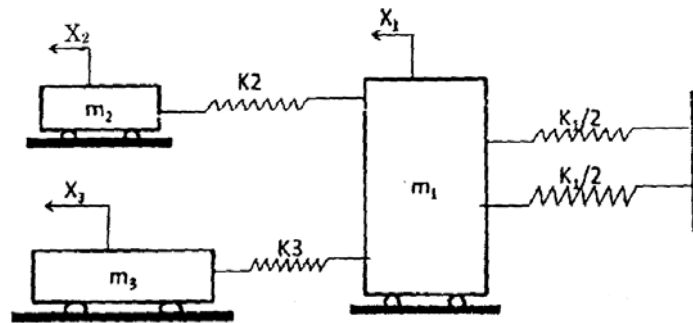

Figure 12 (b)

13. (a) (i)   Explain the seismic waves with neat sketch.   (7)

         (ii) Discuss about the elastic rebound theory.   (6)

Or

(b)   Describe about the characteristics of strong ground motion with neat graph.

14. (a) Enumerate the effect of earthquake on different types of structures with neat sketch.

Or

(b)   How will you construct a response spectrum diagram? Enumerate the characteristics of response spectrum in detail.

15. (a) Explain the detailing of structural elements and confinement as per IS 13920-2016.   (13)

Or

(b)   Describe the planning considering and architectural concepts as per IS : 4326.   (13)

PART C — (1 × 15 = 15 marks)

16. (a) Reproduce the guidelines for earthquake resistance design of masonry buildings.   (15)

Or

(b)   A RC chimney idealized as a lumped mass cantilever is subjected at the top level to a step force of $F(t) = 4500$ kN, Mass $= 7 \times 10^5$ kg/m, $EI = 2 \times 10^{10}$ kN/m^2. Determine its response by treating it as a 2 DOF system. The height of the chimney is 16 m.   (15)

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