Reg. No. : ☐☐☐☐☐☐☐☐☐☐☐☐

Question Paper Code : 52781

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2019.

Seventh Semester

Civil Engineering

CE 6701 — STRUCTURAL DYNAMICS AND EARTHQUAKE ENGINEERING

(Regulation 2013)

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

Time : Three hours   Maximum : 100 marks

(Use IS : 1893 – 2002, IS 4326 – 1993, IS 13920 – 1993 are permitted)

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1.   List the various forms of damping.

2.   Write the difference between static loading and dynamic loading.

3.   Name the different modes of vibration.

4.   Recall modal superposition method.

5.   Rewrite the characteristic of earthquake.

6.   Name the element of engineering seismology.

7.   Compare Pinching effect with Bouchinger effect.

8.   Predict the effect of earthquake in masonry structures.

9.   Recall the causes of damage.

10. Write the concept of soft storey.

PART B — (5 × 13 = 65 marks)

11. (a) Free vibration test was conducted on an empty elevated water tank, through a cable attached to the tank, where a lateral force of 10 kN was applied it pulled the tank horizontally by 7.5 mm. The cable was suddenly cut and the resulting vibration was recorded. At the end of 4 complete cycles, the time was 2 sec and the amplitude was 5 mm. Determine.

   (i) Weight of the tank

   (ii) Absolute damping

   (iii) Damped frequency

   (iv) Number of cycles required for the displacement amplitude to decrease to 0.6 mm.

Or

(b) (i) Recall

      (1) Free vibration

      (2) Degree of freedom

      (3) Period.

   (ii) State and explain D'Alembert principle.

12. (a) Derive the equation of Motion of Multi Degree of Freedom (MDOF) systems.

Or

(b) Determine the natural frequencies and mode shape for the shear building as shown in figure.

2   52781
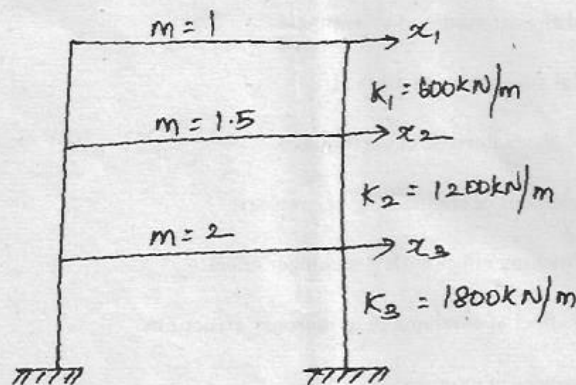
13. (a) Explain the following
    (i)   Plate Tectonic theory   (6)
    (ii) Elastic rebound theory.   (7)

Or

    (b) (i)   Recall the method for the estimation of magnitude and intensity of earthquake.   (7)
        (ii) List the causes of earthquake.   (6)

14. (a) Explain the behaviour of reinforced cement concrete structure under earthquake forces.   (13)

Or

    (b) Summarize the evaluation of earthquake forces as per IS 1893.   (13)

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 = 7×10^5 kg/m, $EI = 2 \times 10^{10}$ kN/m². Determine its response by treating it as a 2 DOF system. The height of the chimney is 16 m.   (15)

———————