**VIII Semester B.E. (Civil Engineering) Degree
Examination, December 2016
(2K11 Scheme)
CE-801 : FUNDAMENTALS OF EARTHQUAKE ENGINEERING**

Time : 3 Hours

Max. Marks : 100

Instructions : *i)* *IS-1893 and IS 13920 codes are* ***allowed****.*
　　　　　　　ii) *Assume* ***any*** *missing data* ***suitably****.*
　　　　　　　iii) *Answer* ***any five full*** *questions.*

1. Write short notes for the following :　　　　　　　　　　　　　　　　**(4×5=20)**

　 i) Free and forced vibrations.

　ii) Single and multi degrees of freedom.

　iii) Natural frequency and resonance.

　iv) P-waves and S-waves.

2. a) Obtain the differential equation for undamped free vibration.　　　　**10**

　 b) Determine the frequency of the bridge with 10T lorry stationed at mid span. The bridge itself may be considered as a simply supported beam of uniform section having a total weight of 200T. From a static analysis of the bridge it was found that the deflection at mid span due to a force of 1.0 kN applied at mid span is 1.5 mm.　　　　　　　　　　　　　　　　　　　　　　**10**

3. a) Explain D'Alembert's principle.　　　　　　　　　　　　　　　　　**10**

　 b) Define logarithmic decrement and derive an expression for the same.　　**10**

4. a) Explain under damped, over damped and critically damped system.　　**12**

　 b) A machine of weight 20 kN is mounted at the centre of a simply supported steel beam of span 3 m. A piston which moves up and down in the machine produces a harmonic force of amplitude 31 kN and frequency 60 rad/sec. Neglecting the height of the beam and assuming 10% of critically damping. Determine :　　　　　　　　　　　　　　　　　　　　　　　　　**8**

　　 i) The amplitude of the motion of machine.

　　 ii) Force transmitted to the beam supports E = 2 × 10^5 N/mm^2 and I = 5 × 10^7 mm^4.

5. Explain plan and vertical irregularities with neat diagrams. **20**

6. Explain the detailing for footing, column and beam as per IS 13920-1993 with neat diagrams. **20**

7. Calculate the design lateral force for each storey with the following data : **20**

    i) No. of storeys – 8

    ii) Height of each storeys = 3 m

    iii) Type of building – SMRF, RC structure

    iv) Load of each floor – 3000 kN

    v) Hospital building

    vi) Hard soil

    vii) No. of bays – 3

    viii) Each bay width – 4 m

    ix) Location – New Delhi.

8. Plot the response spectrum curve for the following data. **20**

    i) Zone 2 and zone 5.

    ii) Residential building.

    iii) Medium soil.

    iv) OMRF, RC structure.

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