[4959]-1012

B.E. (Civil)

EARTHQUAKE ENGINEERING

(2012 Course) (Semester - I) (401005D) (End Sem) (Elective - II)

Time : 2½ Hours]   *[Max. Marks : 70*

Instructions to the candidates:

1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10, and Q11, or Q12.*
2) *Figures to the right indicate full marks.*
3) *IS 456, IS 1893, IS 13920 are allowed in the examination.*
4) *Neat diagrams must be drawn wherever necessary.*
5) *If necessary, assume suitable data and indicate clearly.*
6) *Use of electronic pocket calculator is allowed.*

Q1) a)   Define   **[4]**

    i)   Magnitude of earthquake

    ii)   Intra plate Earthquake

   b)   Explain the interior of earth? What are different types of seismic waves?**[6]**

OR

Q2) a)   Define Isoseismal and describe their uses?   **[4]**

   b)   Explain different causes of earthquake?   **[6]**

Q3) A cantilever beam 3 m long supports mass of 100kg at the free end. Find the natural period and natural frequency. $E = 2.1 \times 10^6$ kg/cm^2 & EI=10,000 kN.m^2. **[6]**

OR

P.T.O.

Q4) a) Derive the equation of motion for un-damped but free vibration of a SDOF system. **[3]**

b) Convert the mass m=20, 000kg supported as shown in figure 4.1 into a mass and equivalent spring system (SDOF). Assume stiffness of each column 3kN/m for first and second storey and 2k N/m for top storey.**[3]**
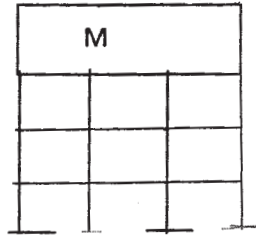

Figure 4.1

Q5) Explain the following terms (Any two) **[4]**

a) Seismic Zoning.

b) Vertical irregularity in buildings.

c) Weak storey and Soft Storey.

OR

Q6) Calculate the distribution of base shear at each floor level as per seismic coefficient method for the OMRF without brick infill building of three storey shown in Fig.6.1. The building is located in Zone III. The frames are spaced at 3m c/c. Assume soil of Type II and floor height 3.5 m at ground floor and 3m at remaining storey. The floor slabs are designed for a live load of 2 kN/ m^2 and the roof is designed 1.5 kN/m^2. **[4]**
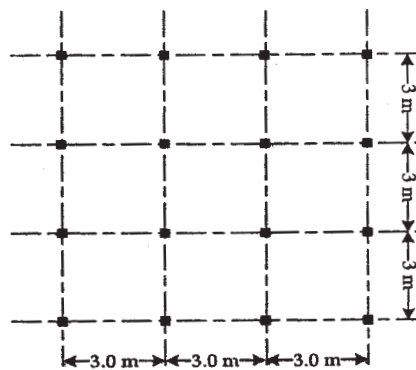

Figure 6.1

Q7) A (300x 300) mm column is reinforced with 8 -16mm φ. It is supported on isolated footing. The load coming on the footing is 500 KN and a moment of 30 KN-m. The SBC of the soil is 150 kN/m². Using M 25 grade of concrete and steel of grade Fe 415 Design footing. **[16]**

OR

Q8) a) What is Liquefaction? Explain types of liquefaction? **[4]**

b) What are the different methods to reduce liquefaction. **[6]**

c) Explain the techniques of soil improvement? **[6]**

Q9) a) What are the various methods available to control the lateral forces acting on a structure? Explain in details. **[8]**

b) What are the basic precaution to be followed in rescue operations. **[8]**

OR

Q10) a) What is disaster management? Explain qualities of rescuer? **[8]**

b) Define Active and Passive control. Write different types of the passive control system and explain any one example. **[8]**

Q11) a) Explain need of retrofitting? **[8]**

b) Explain the Shear Wall and its behavior? **[10]**

OR

Q12) a) Explain the techniques used for Local Retrofitting? **[8]**

b) What is retrofitting and rehabilitation of structures? **[10]**

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