[5154]-512

B.E. (Civil)
EARTHQUAKE ENGINEERING
(2012 Course) (401005D) (Semester - I) (Elective - II) (End Sem.)

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) What is the difference between Intensity and Magnitude of an earthquake? Explain MMS measurement of earthquake in brief. **[4]**

   b) Explain the causes and types of earthquake. **[6]**

<div align="center">OR</div>

Q2) a) Classify and describe with suitable sketches different types of waves generated by an earthquake and their effects on structure? **[4]**

   b) Explain the elastic rebound theory. **[6]**

Q3) A simply supported beam 4 m long supports mass of 1000kg at the center. Find the natural period and natural frequency. $E = 2.1 \times 10^6$ kg/cm^2 & EI = 10,000 kN.m^2. **[6]**

<div align="center">OR</div>

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

   b) Draw the mathematical model for the structure shown in Fig. 4.1 and obtain governing equation of motion. Assume m = 1000kg. **[3]**
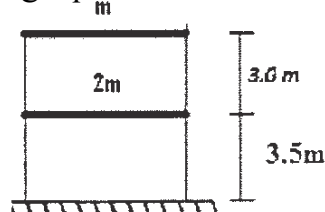

Figure 4.1

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

    a) Seismic Zoning.

    b) Vertical irregularity in buildings.

    c) Weak Storey and Soft Storey.

<p align="center">OR</p>

Q6) Calculate the distribution of base shear at each floor level as per seismic coefficient method for the OMRF with brick infill building shown in Fig. 6.1. The building is located in Zone V. The frames are spaced at 4m c/c. Assume m = 3000 kg and soil of Type II. **[4]**

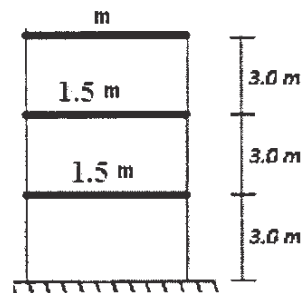Figure 6.1

Q7) A (350×350)mm column is supported on isolated footing. The load coming on the footing is 550 kN and a moment of 30 kN-m due to lateral loads. The SBC of the soil is 155 kN/m². Using M25 grade of concrete and steel of grade Fe 415, design the footing. **[16]**

<p align="center">OR</p>

Q8) a) What is Liquefaction? Write effects of liquefaction. **[4]**

    b) What are the different soil improvement techniques to reduce liquefaction. **[6]**

    c) What type of forces generated due to earthquake and Explain its effect on foundation. **[6]**

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

    b) What is disaster management? Explain various phases in it? **[8]**

<p align="center">OR</p>

*Q10)*a) What are the basic precautions to be followed in rescue operations. **[8]**

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

*Q11)*a) What is retrofitting and rehabilitation of structures? **[8]**

b) Explain the techniques used for strengthening RCC beams and Columns. **[10]**

OR

*Q12)*a) Explain the Shear Wall and its behavior. **[8]**

b) Explain any three retrofitting techniques used for masonry buildings.**[10]**

☛ ☛ ☛