

Total No. of Questions : 12]

SEAT No. :

**P2147**

**[5059]-512**

[Total No. of Pages : 3

**B.E. (Civil)**

**EARTHQUAKE ENGINEERING**

**(2012 Course) (Semester-I) (Elective-II) (401005-D) (ENDSEM)**

*Time : 2½ Hours]*

*[Max. Marks : 70*

*Instructions to the candidates:*

- 1) *Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10 and Q.11 or Q.12.*
- 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: [3]**

- i) Soft Storey and Weak storey
  - ii) Epicenter
  - iii) Iso-seismal
- b) Explain the causes and types of earthquake based on various parameters. [3]

OR

**Q2) a) Classify and describe different types of waves generated during earthquake. [3]**

- b) What do you understand by Intensity of earthquake? Classify the earthquake based on magnitude. [3]

**Q3) What are different types of vibrations? Explain the concept of 'Logarithmic Decrement'. [6]**

OR

**P.T.O.**

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

b) A vibratory system is defined by following parameters-

Mass = 3 kg, spring stiffness = 100 kN/m, and damping coefficient = 3 N.sec/m.

Determine:

i) Damping factor

ii) Natural frequency of damped vibrations. [3]

**Q5)** Explain the following (Any Two): [8]

a) Seismic Zoning.

b) Vertical irregularity in buildings.

c) Tectonic Features of India.

OR

**Q6)** A three storeyed symmetrical RC School building situated at Bhuj with the following data.

a) Plan Dimensions: 7m × 7m,

b) Storey Height: 3.5m,

c) Total weight of beams/ storey = 130 kN,

d) Total weight of slab / storey = 250 kN,

e) Total weight of columns / storey = 50 kN,

f) Total weight of walls / storey = 530 kN,

g) Total Live Load = 130 kN. Additional weight on terrace floor is 655 kN. The structure is resting on hard rock. Determine seismic weight of building and hence find the total base shear and lateral loads at each floor levels using seismic coefficient method. [8]

**Q7)** A 500 mm × 500 mm column is supported on isolated footing. The load coming on the footing is 550 KN and a moment of 50 KN-m due to lateral loads. The SBC of the soil is 150 kN/m<sup>2</sup> using M25 grade of concrete and steel of grade Fe 415, design the footing. [16]

OR

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- Q8) a)** Write types and effects of soil 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 is disaster management? Explain various phases of disaster management? [8]
- b) What are the basic precaution to be followed in rescue operations. [8]

OR

- Q10)a)** What are the various methods available to control the lateral forces acting on a structure? Explain in details. [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 of structures? Explain its need for the buildings? [8]
- b) Explain any three retrofitting techniques used for traditional buildings. [10]

OR

- Q12)a)** Explain the techniques used for strengthening RCC beams and Columns. [8]
- b) Define and explain the RCC Shear Wall and its behavior. [10]

