Total No. of Questions : 12]

SEAT No. :

P3160

[Total No. of Pages : 4

[4859] - 12

B.E. (Civil)

Earthquake Engineering

(Elective - II) (2008 Pattern) (Semester - I)

Time : 3 Hours] *[Max. Marks : 100*

Instructions to the candidates:

1) ***From Section - I answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and from Section - II answer Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.***
2) ***Answers to the two sections should be written in separate answer books.***
3) ***Figures in bold to the right, indicate full marks.***
4) ***IS 456, IS 1893, IS 13920 are allowed in the examination.***
5) ***Neat diagrams should be drawn wherever necessary.***
6) ***If necessary, assume suitable data and indicate clearly.***
7) ***Use of electronic pocket calculator is allowed.***

SECTION - I

Q1) a) What is the difference between Intensity and Magnitude of an earthquake? Explain MMS measurement of earthquake in brief. **[8]**

b) Explain the Plate Tectonic theory. **[8]**

OR

Q2) a) Classify and describe with suitable sketches different types of waves generated by an earthquake and their effects on structure. **[8]**

b) What are the learning from past earthquakes? Explain design philosophy behind earthquake resistant design of structures. **[8]**

Q3) a) Obtain the response for a SDOF system subjected to forced but un-damped vibration. **[8]**

b) 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. **[8]**

OR

P.T.O.

Q4) a) Draw the mathematical model for the structure shown in Fig. 4 1 and obtain governing equation of motion. Assume m = 2000kg. **[8]**

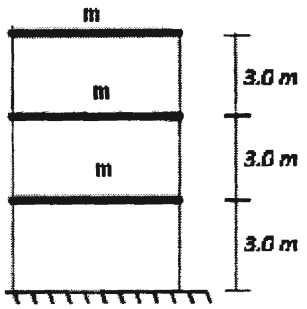


Fig.4.1

b) A cantilever beam AB of length 'L' carries a mass 'M' as shown in figure 4. 2. Write the equation of motion and find the expression for the frequency of motion. **[8]**

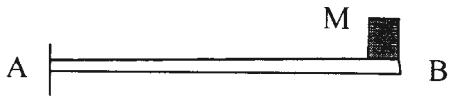


Fig.4.2

Q5) a) Explain R.C.C. shear walls with neat sketches. **[9]**

b) Explain the various factors used in seismic coefficient method. **[9]**

OR

Q6) A symmetrical three storey RC school building located in Zone V with following data : **[18]**

a) Plan Dimensions = 7m x 7m.

b) Storey Height = 3.5 m.

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

d) Total weight of columns/storey = 50kN.

e) Total weight of walls/storey = 530 kN.

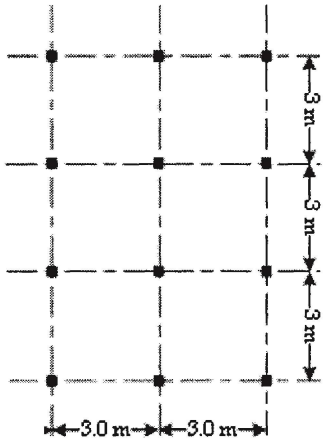
f) Live load = 130 kN.

g) Weight of terrace floor = 655 kN.

Assuming Hard Rock, determine total base shear for 5% damping using seismic coefficient method.

SECTION - II

Q7) A G+2 building is located in seismic zone III. The floor-to-floor height is 3.10 m. The building is supported on Type-II strata. The R.C. frames are in-filled with brick walls. The lumped weight due to dead loads is 5kN/m^2 on floors and 2.5 kN/m^2 on the roof. The floor slabs are designed for a live load of 2.5 kN/m^2 and the roof is designed 1.5 kN/m^2. Calculate the base shear and distribute along the floors along X-direction. **[16]**



OR

Q8) a) What is liquefaction of soil? Describe the remedial measures for reducing liquefaction of soils. **[8]**

b) Explain static analysis and dynamic analysis for structures. **[8]**

Q9) What is Seismic Isolation? Discuss in details with the sketches, the concept of Active and Passive control systems? **[16]**

OR

Q10) Explain the various techniques of retrofitting and rehabilitation of structures. **[16]**

Q11) A (250 X 500) mm column is reinforced with 8-16#. It is supported on an isolated footing. The load coming on the footing is 350 kN and a moment of 35 kNm. The SBC of the soil is 164 kN/m^2. Use M20 grade of concrete and steel of grade Fe 415 and design the footing. **[18]**

OR

Q12) Write notes on following with neat sketches (Any Three): **[18]**

a) Load Resisting systems.

b) Response Spectrum Analysis.

c) Eccentrically Braced Frames.

d) Ductile Detailing of Beam-Column Joints.

e) Tuned Mass Dampers.