Total No. of Questions : 12]

SEAT No. :

P3977

[Total No. of Pages : 3

[4860] - 48

M.E. (Civil - Structures)

EARTHQUAKE RESISTANT DESIGN OF STRUCTURES

(2008 Pattern)

Time : 4 Hours] *[Max. Marks : 100*

Instructions to the candidates:

1) ***Attempt 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, Q.11 or Q.12.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of non programmable electronic calculator is allowed.***
5) ***Assume suitable data, if necessary. Answers to each section must be written in seperate answer books.***
6) ***Use of IS1893 (2002) Part - I is permitted.***

SECTION - I

Q1) a) What is an earthquake? Explain the causes and classification of earthquake based on different parameters. **[6]**

b) Explain the lessons learnt from past earthquakes in India. **[6]**

c) Classify and describe types of seismic waves. **[6]**

OR

Q2) a) Describe code based methods of seismic analysis? **[6]**

b) What is non-structures? Explain various approaches to deal with non-structures. **[6]**

c) What are Isoseismal? Explain their uses? **[6]**

Q3) a) Describe with examples the effect of different irregularities in a structure in an earthquake prone area. **[8]**

b) What is soil liquefaction? What are the remedies taken to reduce it? **[8]**

OR

P.T.O.

Q4) Write notes on: **[16]**

a) Soft Storey.

b) Seismograms.

c) Seismic zoning.

Q5) Calculate the distribution of base shear at each floor level as per seismic coefficient method for the OMRF without brick infill building shown in Fig. 5.1 The building is located in Zone V. The frames are spaced at 4m c/c. Assume soil of Type II. **[16]**

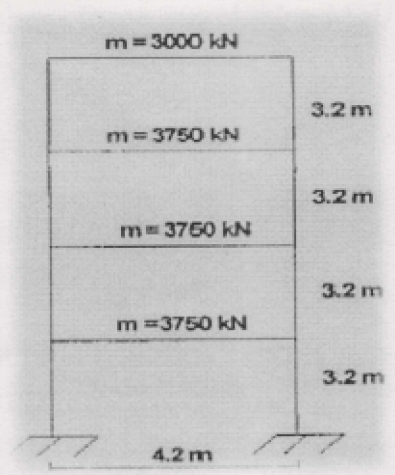

Figure 5.1

OR

Q6) The plan for three storey primary school building is shown in figure 6.1. Assuming OMRF construction and medium stiff soil, determine seismic loads in X-direction on structure. Take D.L. = 10 kN/m^2 LL = 3 kN/m^2 and floor height 3.2 m. **[16]**

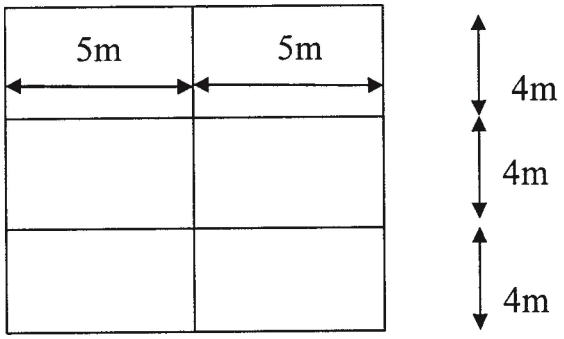

Figure 6.1

SECTION - II

Q7) a) Explain the causes of instability of steel building. Describe the P-Δ effect? **[8]**

b) Explain the procedure to carry dynamic analysis of multistory structure to obtain seismic forces and distribution along the height. **[10]**

OR

Q8) a) Give reasons for poor performance of masonry buildings. How to improve the seismic performance of RC building? **[8]**

b) Describe the restoration of masonry buildings. **[10]**

Q9) Design a RC rectangular beam of span 6m supported on RC columns to carry a point load of 150kN in addition to its self weight 3kN/m. The moment due to seismic load is 6kN.m and shear force 30kN. Use M20 grade concrete and Fe250 grade steel. **[16]**

OR

Q10) a) Define shear wall and their classification. Describe behavior of long shear wall. **[8]**

b) Discuss advantages and disadvantages of off different types of steel frames in building in earthquake prone area. **[8]**

Q11) a) What is necessity of ductile detailing? Explain with sketches ductile detailing of Beam-Column Joint. **[8]**

b) Explain concept of base isolation. Describe different techniques of base isolations. **[8]**

OR

Q12) a) Define Active and Passive control. Write different types of the passive control system and explain any one example. **[8]**

b) Explain in detail the non-conventional techniques for retrofitting of RC building. **[8]**