Total No. of Questions : 12]

SEAT No. :

P3680

[Total No. of Pages : 4

[4759]-12
B.E. (Civil)
EARTHQUAKE ENGINEERING
(2008 Course) (Semester-I) (Elective-II)

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 an earthquake? Explain in details the causes and classification of the earthquake. **[8]**

b) Explain elastic rebound theory. **[8]**

OR

Q2) a) Explain basic difference between Magnitude and intensity of earthquake with example. **[8]**

b) Classify and describe with suitable sketches the different types of waves generated by an earthquake and their effects on structures. **[8]**

Q3) a) Derive general equation of SDOF System subjected to free vibration. **[12]**

b) Define vibration. What is free and Forced Vibration? **[6]**

OR

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Q4) Explain the procedure for obtaining the natural frequencies for a 3 DOF system subjected to Free Vibration? **[18]**

Q5) a) What is earthquake analysis and why we considered only horizontal forces while designing. **[6]**

b) A multistory building has the following data: **[10]**

Plan dimension (overall)	= 20m × 15m
Number of boys in X-direction	= 4 @ 5m each
Number of boys in Z-direction	= 3 @ 5m each
Floor to floor height in Y direction	= 3.2m
No. of storeys	= 4 Nos.
Total height of building	= 12.8m
Size of column & beam	= 300mm × 600mm
Slab thickness	= 150mm
Live load floor	= 3 kN/sq.m.

RCC Frame infield with brick masonry

Seismic Zone - IV

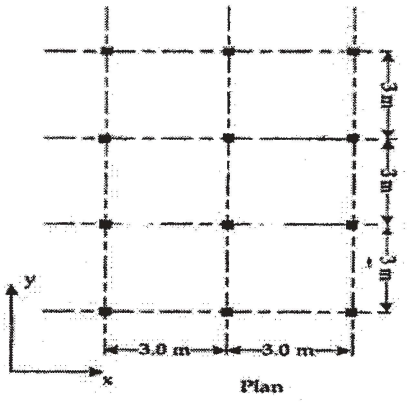
Hard strata & 5% damping

Estimate the seismic forces at each floor level as per IS: 1893-2002 by seismic coefficient method. Assume suitable data if necessary.

OR

Q6) a) Explain in details the effect of configuration of the buildings on performance in an earthquake. **[6]**

b) The G+3 building shown in figure below is located in seismic zone IV. The floor-to-floor height is 3.5m. The building is supported on hard strata. The R.C. frames are in - filled with masonry walls. The lumped weight due to dead loads is 8 kN/m^2 on floors and 5 kN/m^2 on the roof. The floor slabs are designed for a live load of 3.5 kN/m^2 and the roof is designed 2 kN/m^2. Estimate the seismic forces at each floor level as per IS: 1893-2002 by seismic coefficient method. Assume suitable data if necessary. **[10]**



SECTION-II

Q7) Design a rectangular isolated footing for a column of size 250mm × 750 mm carrying axial characteristics load 2000 kN and reinforced with 8.12 mm Φ bars in M30 grade concrete. The allowable bearing pressure of soil is 220 kN/m^2 at 2m depth. Use M20 & HYSD steel. **[16]**

OR

Q8) a) Describe the phenomenon of liquefaction. Explain the measure taken to reduce the effect of liquefaction. **[8]**

b) Explain static analysis and dynamic analysis of structure for seismic loads. **[8]**

Q9) a) Explain Active, Passive and Hybrid control systems. **[9]**

b) State merits and demerits of base isolation. **[9]**

OR

Q10)a) Explain need of isolation. Why the base isolation is effective. **[10]**

b) Explain with neat sketches **[8]**

i) Structural walls (shear walls).

ii) Moment resisting frames.

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

b) Explain strengthening of slab and wall for RCC buildings. (Draw neat sketch). **[8]**

OR

Q12) Write short notes on (Any Four): **[16]**

a) Tuned mass dampers.

b) Torsional irregularity.

c) Aging and Weathering.

d) Evaluation of existing buildings.

e) Various types of repair materials.

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