Total No. of Questions : 12]

SEAT No. :

P2643

[Total No. of Pages : 3

[5154]-12
B.E. (Civil)
EARTHQUAKE ENGINEERING
(2008 Course) (401005D) (Elective - II) (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 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 are the causes of an earthquake? Explain with neat sketches the Elastic Rebound Theory. **[6]**

b) Classify and describe with suitable sketches, different types of waves generated by an earthquake. **[6]**

c) Explain philosophy behind earthquake resistant design of structures? Describe the difference between magnitude and intensity of an earthquake? **[4]**

OR

Q2) a) Explain with examples, the lessons learnt from past earthquakes? **[8]**

b) Explain the interior of the earth with neat sketches? Classify the earthquakes based on different parameters? **[8]**

Q3) a) What are different types of vibrations? Define natural frequency, Natural time period, Natural circular frequency and Damping ratio. **[8]**

b) Explain with examples, Over damped system, critically Damped system and Under damped system giving example of each for free but damped SDOF. **[8]**

OR

P.T.O.

Q4) For the two degree freedom system shown in Figure 4.1, obtain natural frequencies and amplitude ratios. Assume K = 20 kN/m. **[16]**

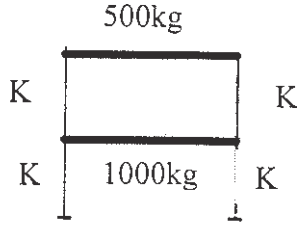

Figure 4.1

Q5) Determine the design eccentricity in X-direction for a three storey building as shown in Figure 5.1. The total seismic weight / floor = 450 kN. The column size = 400mm × 600 mm. Assume grade of concrete = M25. **[18]**

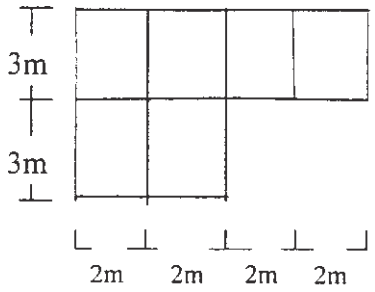

Figure 5.1

OR

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 = 3000kg and soil of Type III. **[18]**

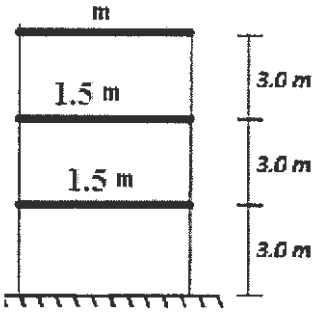

Figure6.1

SECTION - II

Q7) a) What is the necessity of ductile detailing? Explain with neat sketches the detailing for Beam-Column joint as per IS 13920(1993). **[9]**

b) Explain the effects and various methods to reduce the effects of liquefaction of soil? **[9]**

OR

Q8) a) Define the shear wall and its classification? Describe the structural behavior of shear wall? **[9]**

b) What is Base Isolation? Explain energy dissipation devices to improve earthquake resistance of buildings? **[9]**

Q9) a) What is strengthening and retrofitting? Explain in brief the techniques for retrofitting of RCC build constructions? **[8]**

b) Explain the terms active and passive control system? What are different types of steel frames used in earthquake prone areas? **[8]**

OR

Q10)a) Explain Tuned Mass Dampers? **[8]**

b) Explain various techniques for local retrofitting of RC buildings? Give reasons for poor performance of masonry buildings? **[8]**

Q11)a) Differentiate between retrofitting and strengthening? What are techniques for retrofitting of RC buildings? **[8]**

b) A 400mm × 400mm column is supported on an isolated footing. The load coming on footing is 600kN and a moment 30kN.m. The SBC is 150kN/m^2. Using M25 grade of concrete and steel grade Fe500, design footing and sketch the details. **[8]**

OR

Q12)Write notes on: **[16]**

a) Factors Controlling liquefaction.

b) Irregularities in buildings.

c) Response spectrum analysis.

d) Load Resisting systems as per IS13920.

e) Tuned Mass Dampers.