[4960]-48
M.E. (Civil) (Structures)
EARTHQUAKE RESISTANT DESIGN OF BUILDINGS
(2008 Pattern)

Time : 4 Hours]   *[Max. Marks : 100*
Instructions to the candidates:
1) *Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 from section I and Q.7 or Q.8, Q.9 or Q.10. and Q.11 or Q.12 from section II.*
2) *Answers to the two sections must be written in separate books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the write indicate full marks.*
5) *Use of electronic pocket calculator is allowed.*
6) *Assume suitable data, if necessary*
7) *Use of IS 1893-2002 (Part-1) is permitted*

SECTION - I

Q1) a) What are the causes and types of earthquake? **[6]**

b) What are the different major plates? Explain the Plate Tectonic Theory in details? **[6]**

c) Describe the approaches used to measure the size of an earthquake? **[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) Write a note on body waves and surface waves in an earthquake? **[6]**

Q3) a) Explain in brief some of the earthquakes occurred in India? What lessons are learnt from them? **[8]**

b) What are the criteria or demands of seismic resistant design of structures? **[8]**

<div align="center">OR</div>

Q4) 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 measures taken to reduce it. **[8]**

Q5) A plan of five storey SMRF building for T.V. Centre is as shown in figure 3.1. The Dead Load including self weight of slab etc. is 5 kN/m² and Live Load 4 kN/m² on each floor and 1.5 kN/m² on the roof. The building is situated in Zone IV .Assuming soil type II and storey height 3.5 m, determine lateral forces and shears at different storey levels. **[16]**

<div align="center">2@7m   4@7m
Figure2.1</div>
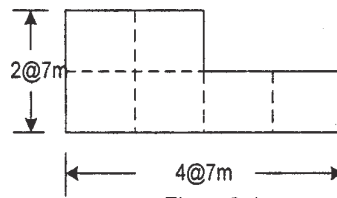
<div align="center">OR</div>

Q6) Determine frequency and design seismic coefficient for an ordinary masonry shear wall in primary health centre at Killari, given the following data- Roof Load- 20 KN/m, Height of Wall - 3.5 m, Width of wall - 0.3 m , Unit weight of wall -20 KN/m2,Type of soil - Rocky **[16]**

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SECTION - II
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Q7) a) How would you carry the assessment of RC building to ascertain the requirements and level of retrofitting? **[8]**

b) Describe with suitable sketches the various methods of retrofitting. **[10]**

<div align="center">OR</div>

Q8) a) What are the causes of instability of steel buildings? Discuss in detail 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]**

Q9) a) Give reasons for poor performance of masonry buildings? How to improve the seismic performance of masonry building? **[8]**

b) Describe the restoration of masonry buildings? **[8]**

<div align="center">OR</div>

*Q10)*a) 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 Fe 250 grade steel. **[16]**

*Q11)*a) What is necessity of ductile detailing? Explain with sketches ductile detailing of flexural member? **[8]**

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

OR

*Q12)*a) How would you carry the assessment of RC building to ascertain the requirement of level of retrofitting? **[8]**

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

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