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**Eighth Semester B.E. Degree Examination, June/July 2014**  
**Earthquake Resistant Design of Structures**

Time: 3 hrs.

Max. Marks: 100

**Note: 1. Answer FIVE full questions, selecting  
atleast TWO question from each part.  
2. US 1893 – 2002 code is permitted.**

**PART – A**

- 1
  - a. What is an earthquake? Explain the interior of the earth. (06 Marks)
  - b. With a neat figure, explain the concept of elastic rebound theory. (06 Marks)
  - c. What are seismic waves? Explain the significant characteristics of seismic waves. (08 Marks)
- 2
  - a. Explain the difference between magnitude and intensity of an earthquake. (06 Marks)
  - b. Explain the different ground motion characteristics. (06 Marks)
  - c. Explain the tripartite plot of response spectrum and significance of spectral regions. (08 Marks)
- 3
  - a. What are the different types of structural modulus to simulate the seismic behavior of a frame building? (06 Marks)
  - b. Explain the different code – based methods for seismic design. (06 Marks)
  - c. What are the different methods available for seismic evaluation and retrofitting? Explain the same. (08 Marks)
- 4
  - a. What are the possible structural irregularities which effects on seismic performance of RC buildings. (06 Marks)
  - b. Explain the different lateral load resisting systems. (06 Marks)
  - c. Explain the effects of building characteristics on its seismic performances. (08 Marks)

**PART – B**

- 5
  - a. What are the different methods of seismic analysis of structures? (06 Marks)
  - b. Provide the step wise procedure of computation of earthquake forces using :
    - i) the equivalent static force procedure and (08 Marks)
    - ii) the dynamic analysis procedure. (06 Marks)
  - c. Summarize the philosophy of seismic design. (06 Marks)
- 6
 

A three storeyed symmetrical RC (SMRF) school building situated in zone – V with the following data : plan dimensions = 7 m, storey height = 3.5 m, total weight of beam in a storey = 130 kN, total weight of slab in a storey = 250 kN, total weight of column in a storey = 50 kN, total weight of walls in a storey = 530 kN. Live load = 130 kN and total weight of roof floor = 655 kN. The structure is resting on hard rock. Determine the total base shear and lateral loads at each floor levels for 5% of damping using equivalent static lateral force method. Consider infill paneled frame. (20 Marks)

- 7 For the RCC (SMRF, with importance factor = 1) building as shown in Fig.Q7. Founded on soft soil and situated in zone – V. Determine the seismic forces by dynamic analysis procedure for the following free vibration results of the building.

| Natural period (sec) | Mode – 1 | Mode – 2 | Mode – 3 |
|----------------------|----------|----------|----------|
|                      |          | 0.883    | 0.404    |
| Roof                 | 1.000    | 1.000    | 1.000    |
| Second floor         | 0.791    | 0.000    | -0.791   |
| First floor          | 0.250    | -1.000   | 0.250    |

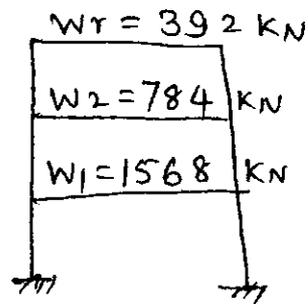


Fig. Q7

(20 Marks)

- 8 a. Explain the different elastic properties of masonry structures. (06 Marks)
- b. Differentiate between rigid and flexible diaphragm in the masonry building. (06 Marks)
- c. Explain the step by step seismic analysis and design of two-storeyed masonry buildings. (08 Marks)

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