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**Eighth Semester B.E. Degree Examination, June/July 2017**  
**Earthquake Resistant Design of Structures**

Time: 3 hrs.

Max. Marks:100

**Note: 1. Answer any FIVE full questions, selecting atleast TWO questions from each part.**  
**2. Use of IS1893-2002 is permitted.**

**PART – A**

- 1 a. What is plate tectonic theory of origin of earthquakes and explain associated type of movement at the plate boundaries. (10 Marks)  
b. Explain the characteristics of different types of seismic waves. (10 Marks)
- 2 a. How are the earthquakes classified based on different aspects? (05 Marks)  
b. Explain the different earthquake ground motion characteristics. (08 Marks)  
c. Discuss about the response spectrum and design spectrum. (07 Marks)
- 3 a. Write a short note on following code based seismic analysis:  
(i) Response spectrum method (06 Marks)  
(ii) Equivalent static analysis (04 Marks)  
b. Explain briefly about the seismic design philosophy. (05 Marks)  
c. What is base isolation? Discuss briefly the principles of base isolation. (05 Marks)
- 4 a. Explain briefly about different types of vertical irregularities and their consequences. (10 Marks)  
b. Explain /discuss about any five building configuration problems and suggest remedial measures. (10 Marks)

**PART – B**

- 5 Compute the seismic forces for each storey of a building situated in a seismic zone-IV by equivalent lateral force method as per IS 1893(2002) with following details:  
Type of building – 0 MRF (Office building)  
No. of storages – 04  
Height of the building – 12 m (ht. of each floor = 3m)  
Seismic weights  
Roof – 2500 kN  
All other floors – 3000 kN  
Foundation on – Hard rock  
(Assume without brick infill condition) (20 Marks)

- 6 For an RCC (SMRF) building with foundation on a soft soil, situated in zone – V as shown in Fig.Q6. Compute the seismic forces for each storey using dynamic analysis procedure.

Given, Free vibration results

Frequency :  $\{ W \} = \{ 47.832, 120.155, 167.0 \}$

Modes :  $\{ \phi_1 \} = \{ 1, 0.759, 0.336 \}$

$\{ \phi_2 \} = \{ 1, -0.805, -1.157 \}$

$\{ \phi_3 \} = \{ 1, -2.427, 0.075 \}$

$W_1 = W_2 = W_3 = 196.2 \text{ kN}$

$K_1 = K_2 = 160 \times 10^3 \text{ kN/m}; \quad K_3 = 240 \times 10^3 \text{ kN/m}$

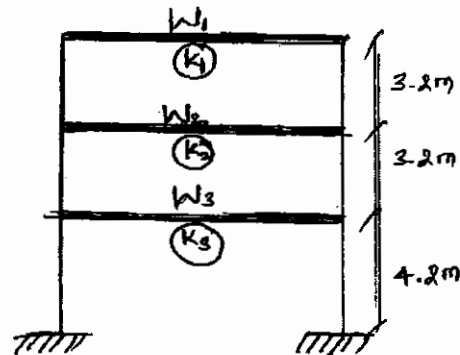


Fig.Q6

(20 Marks)

- 7 a. What are the different load combinations to be used for seismic analysis of RCC buildings as per IS1893(2002). (04 Marks)
- b. What is ductility? Discuss different factors which are helpful in ductility of RC structures [Reinforced concrete]. (08 Marks)
- c. Briefly describe soft storey and explain how a frame with soft storey behave under earthquake. Explain special design provisions as per IS 1893. (08 Marks)
- 8 a. Discuss the behavior of masonry buildings during earthquakes representing failure patterns. (10 Marks)
- b. Discuss the various lateral load resisting features that can be introduced in a masonry building for enhanced performance during an earthquake. (10 Marks)

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