

USN

| | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|
| | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|

10CV834

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 at least 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: (06 Marks)
- (i) Response spectrum method (04 Marks)
- (ii) Equivalent static analysis (05 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)

1 of 2

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

10CV834

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

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

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

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

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

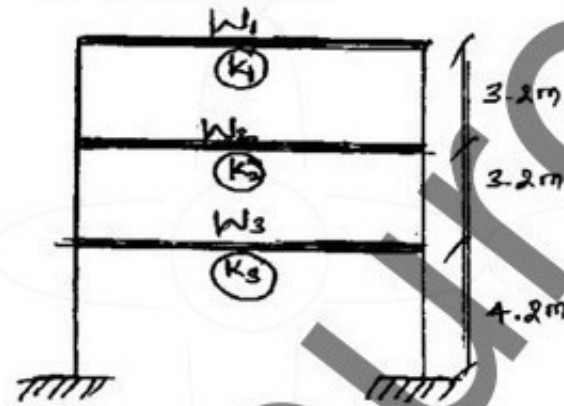


Fig.Q6

(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)
