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10CV834

**Eighth Semester B.E. Degree Examination, Feb./Mar. 2022**  
**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 IS 1893-2002 code is permitted.**

**PART – A**

- 1 a. Explain the different sources of Earthquakes. (08 Marks)  
b. What are the seismic waves? Explain types of seismic waves. (12 Marks)
- 2 a. Explain the factors that influencing seismic ground motions. (06 Marks)  
b. Explain the types of earthquakes. (08 Marks)  
c. What is a response spectra? Explain the Tripartite response spectra. (06 Marks)
- 3 a. Explain the seismic design criteria for performance levels. (06 Marks)  
b. Explain the different earthquake protective systems for Response control. (08 Marks)  
c. What are the different seismic evaluation methods? (06 Marks)
- 4 a. Explain the plan configuration problems. (08 Marks)  
b. Explain the different lateral load resisting systems. (06 Marks)  
c. What are the major aspects involved in seismo resistant building construction. (06 Marks)

**PART – B**

- 5 a. What are the objectives of Earthquake Resistant Design philosophy criteria? (06 Marks)  
b. Explain the step by step procedure for equivalent static force analysis. (08 Marks)  
c. Explain the types of Dynamic analysis method. (06 Marks)
- 6 A RCC (OMRF) office building subjected to load on the floors Dead load =  $8\text{ kN/m}^2$  on each floor and  $7.5\text{ kN/m}^2$  of roof. Live load =  $4\text{ kN/m}^2$  on each floor and  $1.5\text{ kN/m}^2$  on roof. The storey height are, Ground floor = 4.2m, first floor = 3.2m, second floor = 3.2m and third floor = 3.2m. The building frame if of four bays each of 5m in both directions founded on hard soil, situated in zone – IV. The plan dimensions of building are  $20\text{ m} \times 20\text{ m}$  and total height of building is 13.8m. The damping in the structure is 7%. Determine the seismic forces by equivalent lateral force procedure. (20 Marks)
- 7 A 3-storey RCC (SMRF) residential building,  $W(\text{roof}) = 392\text{ kN}$ ,  $W(\text{second floor}) = 784\text{ kN}$ ,  $W(\text{first floor}) = 1568\text{ kN}$  founded on soft soil and situated in zone V. Determine the seismic forces by dynamic analysis procedure. The free vibration results of the building is

Natural period (sec)	Mode 1	Mode 2	Mode – 3
	0.883	0.404	0.302
Mode shapes			
Roof	1.00	1.00	1.00
Second floor	0.791	0.00	-0.791
First floor	0.250	-1.00	0.250

(20 Marks)

- 8 a. Explain elastic properties of structural masonry. (06 Marks)  
b. Explain rigid and flexible diaphragms in masonry buildings. (06 Marks)  
c. Explain the step by step seismic analysis and design of masonry buildings. (08 Marks)

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