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10CV834

Eighth Semester B.E. Degree Examination, Dec.2018/Jan.2019
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 is permitted.***

PART – A

1 a. Explain the difference between Magnitude and Intensity of an earthquake. **(05 Marks)**
b. Explain fault and different types of faults with neat sketches. **(05 Marks)**
c. Explain the characteristics of different body waves and surface waves. **(10 Marks)**

2 a. Explain the different earthquake ground motion characteristics. **(06 Marks)**
b. Explain the construction of Tripartite plot of response. **(08 Marks)**
c. What is response spectra? Explain Design Spectrum and its different regions. **(06 Marks)**

3 a. What are the different methods available for seismic evaluation and Retrofitting? Explain the same. **(08 Marks)**
b. Explain the code-based methods for seismic design. **(06 Marks)**
c. Explain the different structural modeling. **(06 Marks)**

4 a. What are the soft storey and extreme soft storey? Explain design criteria for the building with soft storey as per IS-1893:2000. **(06 Marks)**
b. Explain the different lateral load resisting systems. **(06 Marks)**
c. Explain the different vertical and plan irregularities. **(08 Marks)**

PART – B

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

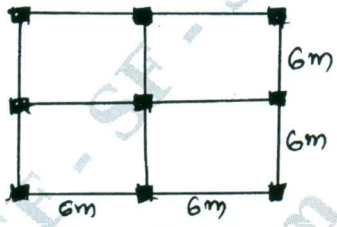
6 For the 3 storey RCC SMRF building frame founded on soft soil and situated in zone-V. Determine the seismic forces by Dynamic analysis procedure for the following data:
Importance factor = 1
W_3(roof) = 392 kN, W_2 = 784 kN, W_1 = 1568 kN.
Natural frequencies, $\omega_{n_1} = 7.116$ rad/sec ; $\omega_{n_2} = 15.552$ rad/sec ; $\omega_{n_3} = 20.8052$ rad/sec

	Mode Shapes		
	Mode – 1	Mode – 2	Mode – 3
Roof	1.0	1.0	1.0
Second floor	0.791	0.00	– 0.791
First floor	0.250	– 1.00	0.250

(20 Marks)

7 A four storied RCC ordinary moment resisting frame of residential building to be constructed in Mangalore, has spans of 6m c/c in both x and y direction as shown. Height of each storey is 3m. Consider 150mm thick brick masonry walls along only the periphery of building. Neglect the influence of stiffness of masonry infill in the computation of Natural period. Evaluate the base shear and lateral forces at each floor (Refer Fig.Q7).

Data: Size of column = 450 mm × 450 mm
Size of beam = 230 mm × 400 mm
Slab thickness = 150 mm
Weight of concrete = 25 kN/m^3
Weight of masonry = 20 kN/m^3
Live load on roof = 1.5 kN/m^2
Live load on floor = 5 kN/m^2
Soil type = Medium soil
Importance factor = 1



Plan of Building
Fig.Q7 **(20 Marks)**

8 a. Differentiate between rigid and flexural diaphragm in the masonry building. **(05 Marks)**

b. Determine the lateral forces on two storey un-reinforced brick masonry building situated in zone-IV for the following data:
Plan size = 20 × 8 m
Total height of building = 6.2 m
Storey height = 3.1 m
Weight of roof = 2.5 kN/m^2
Weight of wall = 5 kN/m^2
Live load on roof = 0
Live load on floor = 1 kN/m^2
Response reduction factor = 1.5
Consider = Medium soil type. **(15 Marks)**

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