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06CV834

Eighth Semester B.E. Degree Examination, June/July 2013
Earthquake Resistant Design of Structures

Time: 3 hrs.

Max. Marks: 100

- Note:** 1. Answer FIVE full questions, selecting at least TWO questions from each part.
2. Use of IS-1893, IS-13920 and SP-16 are permitted.

PART - A

- 1 a. Differentiate between magnitude and intensity of earthquake. Explain briefly first five intensities of earthquakes. (10 Marks)
b. Explain seismic zones of India, their characteristics and basis on which the seismic zoning is done. (10 Marks)
- 2 a. Explain principal ground motion (strong motion) characteristics. (10 Marks)
b. Differentiate between response history and response spectrum. Explain with diagrams. On what factors, the response acceleration (s_a/g) depends. (10 Marks)
- 3 a. What are the requirements of building structures for good earthquake resistance? (10 Marks)
b. Explain response control concepts (damping and base isolation) in earthquake resistant design of building structures. (10 Marks)
- 4 a. Explain the plan irregularity (configuration) problems when does torsional irregularity occurs. (10 Marks)
b. For the moment resistant frames idealized as shear buildings, investigate the building structures shown in Fig.Q.4(b)(i) and (ii) has soft storey or extreme soft storey. MI of each column is indicated. (10 Marks)

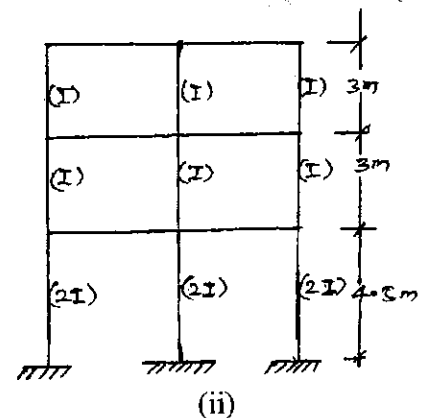
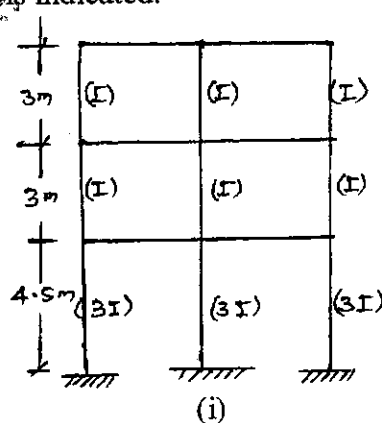


Fig.Q.4(b)

PART - B

- 5 a. What are the seismic and structural parameters influencing the horizontal seismic acceleration coefficient, A_h . Explain in detail. (10 Marks)
- b. For the residential RCC (special moment resisting frame, SMRF) building shown in Fig.Q.5(b). Compute the seismic forces by equivalent static procedure. Building is founded on hard soil (rock) and situated in zone IV. Given: $W_1 = 294.3$ kN, $W_2 = 1863.9$ kN, $W_3 = 1079.1$ kN. (10 Marks)

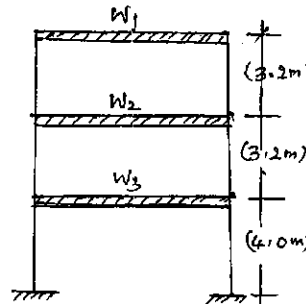


Fig.Q.5(b)

- 6 a. What are the different load combinations to be accounted for in the seismic design of RC structures, as per IS-1893? (05 Marks)
- b. For the residential, RCC (special moment resisting frame, SMRF) building shown in Fig.Q.6(b). Compute the seismic forces by dynamic analysis (response spectrum) procedure. The building is founded on hard soil (rock) and situated in zone IV. Given: the free vibration results. The frequencies $W_1 = 10.035$ rad/s, $W_2 = 40.347$ rad/s and $W_3 = 64.148$ rad/s. Modes: $\{\phi\}_1 = \{1.00 \ 0.970 \ 0.760\}$, $\{\phi\}_2 = \{1.00 \ 0.511 \ -1.311\}$, $\{\phi\}_3 = \{1.00 \ -0.235 \ 0.075\}$. (15 Marks)

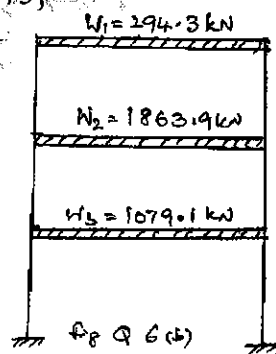


Fig.Q.6(b)

- 7 a. Explain the importance of confinement of concrete for ductility, What are the provision for special confining reinforcement in Indian standard? (10 Marks)
- b. Design and detail the beam conforming to ductile detailing provisions of IS-13920 for flexure only (design for shear not required). The max forces in beam AB are given below.
Maximum bending moment, at A = (+ 280 kNm and -369 kNm)
Maximum bending moment, at B = (+ 236 kNm and -371 kNm)
Maximum bending moment at centre = 65 kNm.
Use M20, Fe415, (10 Marks)
- 8 a. What is slenderness of the masonry wall? What are the measures to improve the slenderness of masonry walls? (10 Marks)
- b. What are the different failure modes of masonry structures? Explain with sketches. (10 Marks)
