JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATION- 2024

PhD CE

COURSE CODE (CREDITS): 12M1WCE213(3) MAX. MARKS: 35

COURSE NAME: Earthquake Resistant Design of Structures

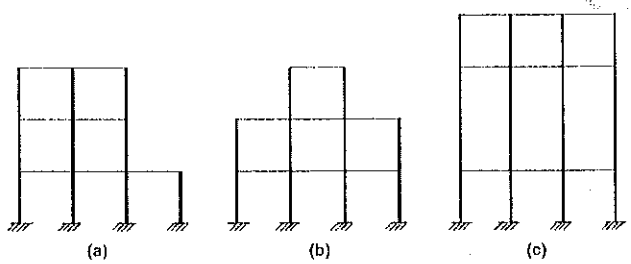
COURSE INSTRUCTORS: Dr. Tanmay Gupta MAX. TIME: 2 Hours

Note: *(a) All questions are compulsory.*

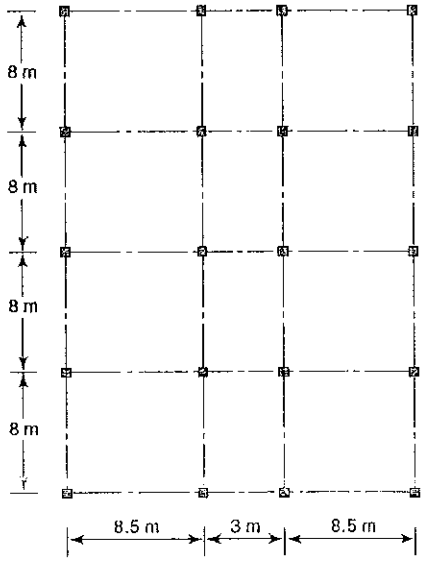
(b) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems. Use of IS 1893 part 1, IS 13920 and IS 456 are allowed

---

Q.1 What type of problems will an engineer face with the design of building frames shown in Figure below: **[3]**



Q.2 Plan of a five-storey building is shown in Figure below. Dead load including self-weight of slab, finishes, etc. can be assumed as 3 kN/m^2 and live load as 4 kN/m^2 on each floor and as 1.5 kN/m^2 on the roof. Weight of partitions is 2 kN/m^2. Determine the lateral forces and shears at different storey levels. **[7]**



Q.3 What are the possible damages to RC buildings in earthquake-prone regions? Describe, with the help of neat sketches, restoration and strengthening of RC beams and columns. **[5]**

Q.4 Determine the frequency and design seismic coefficient for an ordinary masonry shear wall in a primary health centre at Dehradun, given the following data (assume any data necessary)

Roof load = 20 kN/m

Height of wall = 3.0 m

Width of wall = 0.3 m

Unit weight of wall = 20 kN/m^3

The building is situated on rocky soil. [7]

Q.5 A simple one-storey building having two shear walls in each direction is shown in Figure below All the four walls are in M-25 grade concrete and 200 mm thick. Two walls are 5 m long and the remaining two are 4 m long. Storey height is 3.5 m. The floor consists of cast in situ reinforced concrete. Design shear force on the building is 100 kN in either direction. Compute design lateral forces on different shear walls using the torsion provisions of IS 1983 (Part 1) for the following data (assume any data necessary) [8]

Grade of concrete: M-25

E = 25000 N/mm^2

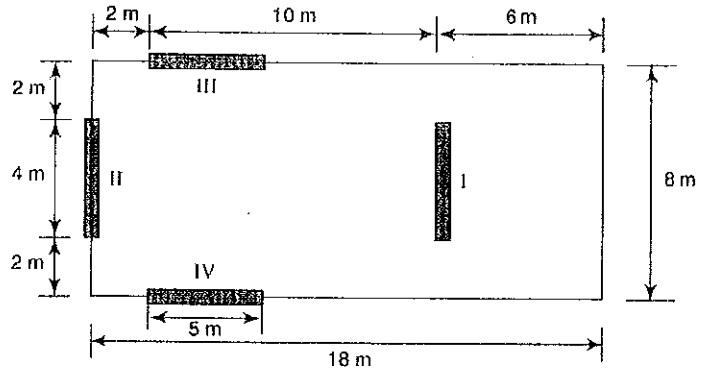
Thickness of wall t = 200 mm

Length of walls L = 4000 mm

Self-weight of the roof = 3.0 kN/m^2

Self-weight of the wall = 5 kN/m^2

All the walls have same lateral stiffness k



Q.6 Discuss the following: [5]

(a) Response factors (b) Response spectra (c) Resonance (d) Restoring force (e) Damping