

*Note: There are three pages in the questions, carefully check beforehand.*

- All questions are compulsory. Marks are indicated against each question in square brackets.
- IS 1893:2002 code is allowed during the examination.

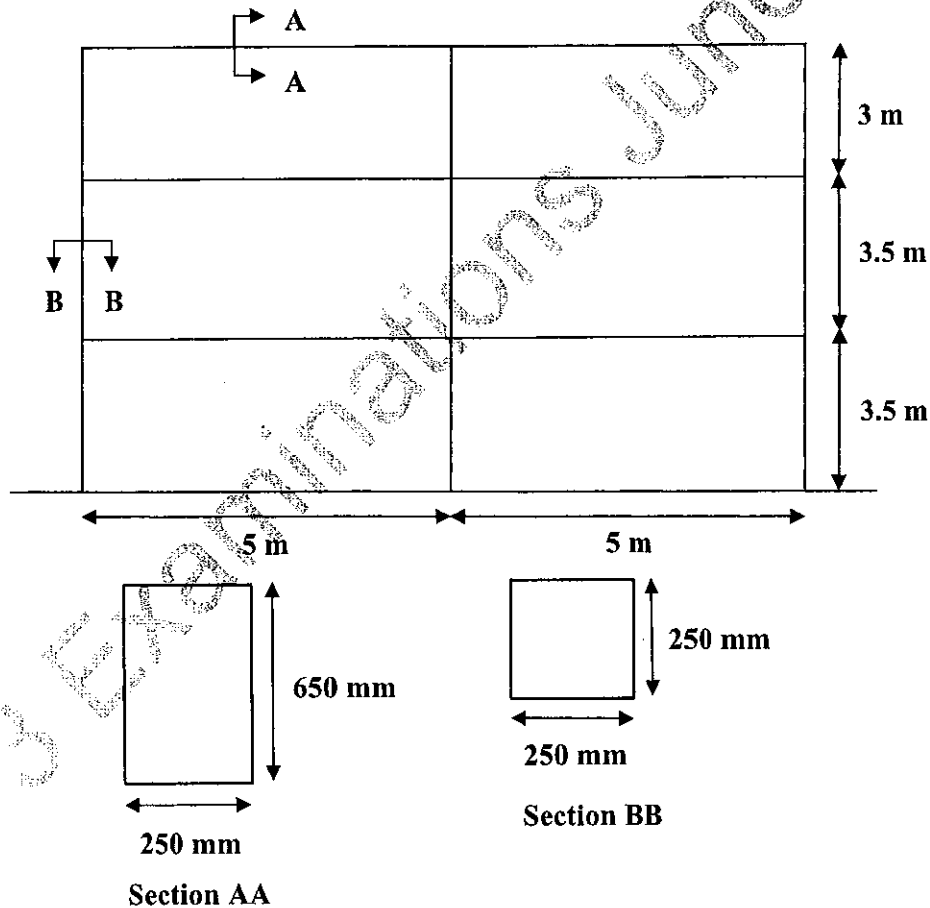


Fig. 1. RC Moment Resisting Frame

1. For the RC structure shown in fig. 1, find the fundamental frequency in Hz. Assume that section of all beams is as shown in section AA and columns are shown in section BB. [5]

2. Using IS 1893:2002, find the following for the structure in fig.1. Make appropriate assumptions and mention them in your answers.
- Fundamental Time Period (s). Compare it with the fundamental period calculated in the question 1. [2]
  - Assuming that the structure is constructed on a medium soil, find the pseudo-spectral acceleration in 'g' units. [2]
  - Assuming that the structure is a mall which is being built in Panjim, find the design horizontal seismic coefficient if the damping ratio for the structure is assumed to be 4%. [3]
  - Assuming that the live load on each floor of the building is  $4 \text{ KN/m}^2$ , find the design base shear on the building. [5]
  - Lateral force on every floor. [3]
3. How is Section Ductility measured? Discuss in detail the factors that influence the Section Ductility Capacity. [6]
4. What is a RotD spectrum? For the data given below, find the following: [4]
- RotD00 for period 0.05s
  - RotD50 for period 0.25s
  - RotD100 for period 1s

| Period (s) | 0°   | 18°  | 36°  | 54°  | 72°  | 90°  | 108° | 126° | 144° | 162°  | 180° |
|------------|------|------|------|------|------|------|------|------|------|-------|------|
| 0.05       | 0.5g | 0.4g | 0.3g | 0.6g | 0.7g | 0.2g | 0.1g | 0.6g | 0.3g | 0.45g | 0.5g |
| 0.25       | 1.5g | 0.5g | 0.6g | 2.7g | 3g   | 4g   | 2.5g | 2.5g | 2.6g | 3.5g  | 0.4g |
| 1.0        | 1.0g | 1.8g | 1.9g | 1.5g | 1.2g | 1.4g | 1.6g | 1.9g | 2.0g | 1.8g  | 1.7g |

5. Observe the reinforcement details for the beam at section AA in figure 1 and list any 5 mistakes in the detailing as per IS 13920:2016. [5]

