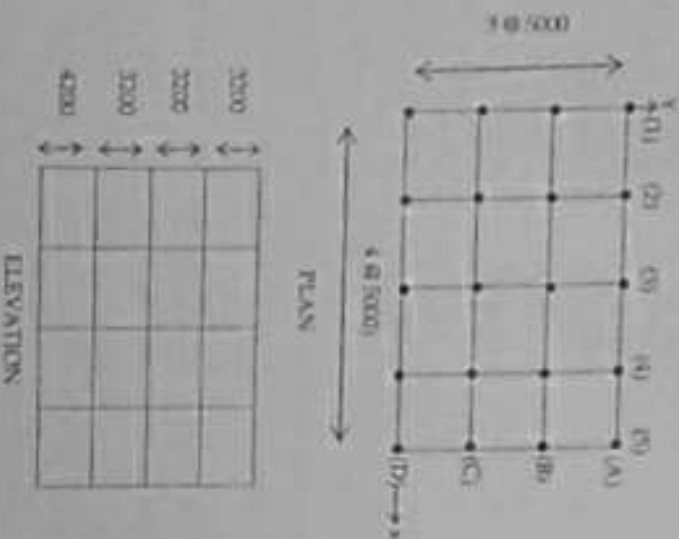


8. Consider a four-storey reinforced concrete office building shown in Fig. The building is located in Manipur (seismic zone V). The soil conditions are medium stiff and the entire building is supported on a brick-masonry. The R. C frames are infilled with floors are to cater for a live load of 4 kN/m^2 on floors and 1.5 kN/m^2 on the roof. Determine design seismic load on the structure as per new code. 20



23722-100-(P-4)/(O-8)/(22) (4)

Roll No. _____

23722

M. Tech. 1st Semester (Civil)
Engg. Computer Aided Structural
Engineering)

Examination – February, 2022

COMPUTER AIDED REINFORCED CONCRETE DESIGN

Paper : 21MTCASE2C2

Time : Three Hours]

[Maximum Marks : 100

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt any five Questions. All questions carry equal marks.

1. A rectangular simply supported beam $300\text{ mm} \times 500\text{ mm}$, spanning over 5 m is subjected to a maximum moment of $150\text{ kN}\cdot\text{m}$ at the mid-span. The beam is reinforced with four bars of 25 mm diameter, on the tension side at an effective depth of 450 mm . The bars are spaced at 50 mm center to center. Check the beam for serviceability limit state of cracking. If M20 concrete and Fe 415 steel are used. 20

23722-100-(P-4)/(O-8)/(22)

P. T. O

2. What does the seismic code IS-19720:1993 deal with? Why is it necessary to incorporate ductile detailing for Earth quake resistant design? 20

3. A rectangular beam section 200 mm wide and 450 mm overall depth is reinforced with 3 bars of 16 mm diameter at an effective depth of 420 mm. Two hanger bars of 12 mm diameter are provided at the compression face. The effective span of the beam is 5m. The beam supports a service load of 10 kN/m. If $f_{ck} = 20 \text{ N/mm}^2$ and $f_y = 415 \text{ N/mm}^2$. Compute the short term deflection, long term deflection and check the limit state of deflection. 20

4. Design a deep beam 300 mm wide and 4m deep, simply supported over a clear span of 6m. The beam carries a live load of 160kN/m at the service state and is supported on walls of 600 mm thick on each end. Use M20 grade concrete and Fe 415 steel having permissible tensile stress of 230 N/mm^2 . 20

5. Design a shear wall of length 6 m and thickness 275 mm subjected to the following forces. Assume moderate exposure condition. Assume $f_{ck} = 30 \text{ Mpa}$ and $f_y = 415 \text{ N/mm}^2$ and the wall is a high wall with the following loadings. Sketch the reinforcement details. 20

23172-100-P-4(Q-8/22) (2)

Loading	Axial Force (kN)	Moment (kNm)	Shear (kN)
Dead Load + Live Load	2050	450	40
Seismic Load	300	5200	600



6. Discuss the analysis and design procedure of building frames using advanced software ETAB. Also discuss comparative analysis of STAAD and SAP. 20

7. An R.C.C. section $200 \times 400 \text{ mm}$ is subjected to a characteristic load twisting moment of 2.5 kNm and a transverse shear of 600 kN . Assuming the use of grade 25 concrete Fe 415 steel, determine the reinforcement required according to IS 456. 20

23172-100-P-4(Q-8/22) (3)

P. T. O.