SUMMER-2024	
Exam Seat No.:	
Academic Year:2023-2024	Semester: II
Class: PG-I	Program: M.Tech
Branch Code: CIV	Pattern:2022
Name of Course: Analysis and Design of Earthquake Resistant Structures	Course Code:CIV225110A
Max. Marks:60	Duration:2.30 Hrs.

Instructions: Candidates should read carefully the instructions printed on the Question Paper and on the cover page of the Answer Book, which is provided for their use.
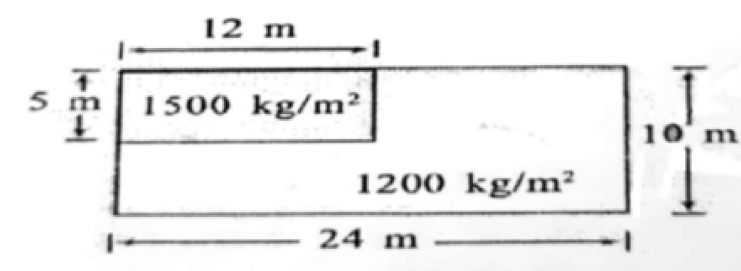
1. This question paper contains _____page(s).
2. Answer to each new question is to be started on a new page.
3. Assume suitable data wherever required, but justify it.
4. Draw the neat labelled diagrams, wherever necessary.
5. The last columns indicates the Course Outcome and level of Blooms Taxonomy of the Question/sub-question.
6. Use of IS 1893-2016 is allowed.

Question No. 1 Attempt following Question

1a) Elaborate basic difference between Magnitude & Intensity. (6) C01, CO2

Question No. 2 Attempt following Question

2a) A Building having non uniform distribution of mass as shown in figure below. Locate its Centre of mass. (6) C01, CO2

Question No. 3 Attempt following Question

3a) Explain code-based procedure for Response Spectrum analysis. (8) CO2, CO3

OR

3b) Explain Capacity based design & performance based design. (8) CO2, CO3

3c)	The G+3 story RCC office building (SMRF) is founded on hard soil and situated in zone IV. The seismic weight on floors are W1 roof = 3000 KN, W2 = W3 = W4 = 4200 KN & the story heights are, Ground story = 4.2 m, all upper story height = 3.2m respectively. Determine Seismic load distribution on structure by Equivalent Lateral force procedure.	(8)	CO2, CO3

OR

3d)	Plan of a single story building having two shear walls in each direction is shown in fig-1 The shear walls are 6 m long and 200 mm thick. Design shear force on the building is 120 KN in either direction. Determine the design lateral force in shear wall A & B using the torsion provisions of the IS code.	(8)	CO2, CO3

Question No. 4 Attempt following Question

4a)	Explain why strong column and weak beam combination are considered to be more earthquake resistant than weak column and strong beam combination.	(8)	CO4, CO5

OR

4b)	Explain with ductile detailing considerations as per IS 13920 for lap splices in beam, beam web reinforcement, column & joint detailing.	(8)	CO4, CO5

4c)	A RCC beam of rectangular section has to carry a distributed L.L. of 15 KN/m in addition to its own weight and a D.L. of 20 KN/m. The maximum Bending moment & Shear force due to earthquake are 55 KN-m and 35 KN-m. Center to center distance between supports is 5m. Design the beam using M20 Concrete & Fe415 steel.	(8)	CO4, CO5

OR

4d)	Design the reinforcement of column size 450mm x 450mm subjected to Dead load, Live load & Seismic load of 1000 KN, 800 KN & 550 KN for respectively. Column is also subjected to B.M. due to D.L., L.L., & Seismic loads of 50 KN-m, 40 KN-m & 100 KN-m respectively. The column has an unsupported length of 3m and is braced against side sway in both directions. Use M25 Concrete & Fe415 steel.	(8)	CO4, CO5

Question No. 5 Attempt following Question

5a)	Explain the difference between structural behavior of Slender & Squat shear walls.	(8)	CO4, CO5

OR

5b)	State IS 3370 Code provisions for water tanks. Write design procedure for water tank.	(8)	CO4, CO5

5c)	Calculate flexural strength of shear wall for a Five storey (G+4) apartment building as shown in figure 2. The unfactored axial loads due to D.L. & L.L. are 1980 KN & 648 KN respectively. The shear & B.M due to earthquake are 423 KN & 5276 KN-m respectively. The materials are M25 concrete & Fe 415 Steel.	(8)	CO4, CO5

OR

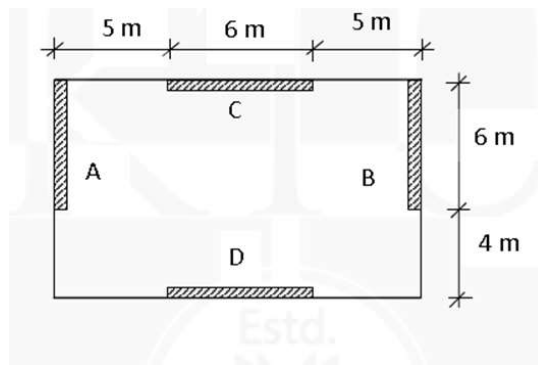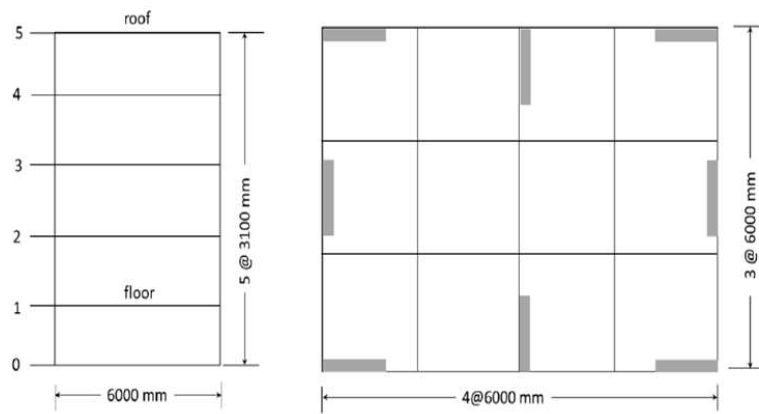|			
5d)	Explain step by step procedure of Seismic analysis of elevated water Tank.	(8)	CO4, CO5

fig: 1

fig: 2

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