



K. K. Wagh Institute of Engineering Education & Research, Nashik
(An Autonomous Institute From A.Y. 2022-23)

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

	<p>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.</p> <ol style="list-style-type: none"> 1. This question paper contains 3 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. IS 1893 is allowed. 	
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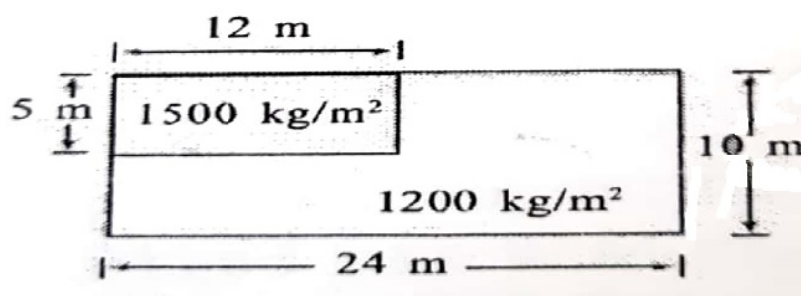
Question No. 1 Attempt following Question

- 1a) Explain difference between Magnitude & Intensity

(6) C01 L1
L2

Question No. 2 Attempt following Question

- 2a) A Building having non uniform distribution of mass as shown in fig. Locate its Centre of mass



(6) CO2 L3

Question No. 3 Attempt following Question

- 3a) Explain code-based procedure for Response Spectrum analysis (6) CO3 L4
L5

OR

- 3b) Explain Capacity based design & performance based design (6) CO3 L4
L5

- 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 W_1 roof = 3000 KN, $W_2 = W_3 = W_4 = 4200$ KN & the story heights are, Ground storey = 4.2 m, all upper storey heights = 3.2m respectively. Determine Seismic load distribution on structure by Equivalent Lateral force Procedure. (10) CO3 L4
L5

OR

- 3d) Plan of a single storey 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 on all shear walls due to seismic load in in x direction only. (10) CO3 L4
L5

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 L6

OR

- 4b) Explain with ductile detailing considerations as per IS 13920 for lap splices in beam, column & joint detailing (8) CO4 L6

- 4c) A RC 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. Centre to centre distance between supports is 5m. Design the beam using M20 Concrete & Fe415 steel. (8) CO4 L6

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 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 L6

Question No. 5 Attempt following Question

- 5a) Explain types of shear walls with sketches. Differentiate between structural behavior of Slender & Squat shear walls (8) CO5 L2
L3

OR

- 5b) State IS 3370 Code provisions for water tanks. Write design procedure for water tank. (8) CO5 L6

- 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) CO5 L6

OR

- 5d) Explain step by step procedure of Seismic analysis of elevated water Tank

(8) CO5 L4
L5

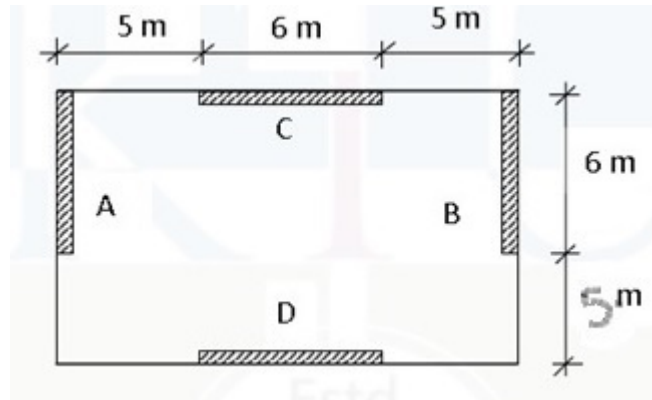


fig: 1

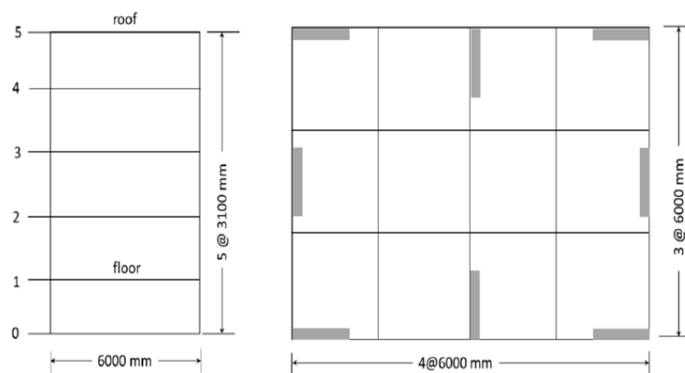


Fig: 2

