



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 2 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

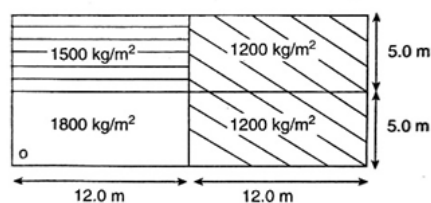
1a) Explain causes & types of earthquakes

(6) CO1 L1 L2

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) CO2 L3

Question No. 3 Attempt following Question

3a) Explain stepwise procedure of Time history method

(6) CO3 L4 L5

OR

3b) Explain code based procedure for Equivalent static analysis

(6) CO3 L4 L5

- 3c) The G+2 story RCC (SMRF) residential building is founded on hard soil and situated in zone IV. The seismic weight on floors are W_1 roof = 294.3 KN, W_2 = 1863.9 KN W_3 = 1079.1 KN The story heights are, Ground storey = 4m, first story = 3.2 m and second storey = 3.2 m. Determine Seismic load distribution on structure by Equivalent Lateral force procedure (10) CO3 L4 L5

OR

- 3d) Explain in detail the step by step procedure of Response Spectrum analysis (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 the various factors which affects ductility. (8) CO4 L3 L4
- 4c) A RC Rectangular beam for 6 m span to support a distributed live load of 20 KN/m in addition to its own weight and a dead load of 25 KN/m. The maximum bending moment and shear force due to earthquake are 60 KN-m and 40 KN respectively. Design the beam using M20 grade concrete and Fe 415 steel. (8) CO4 L6

OR

- 4d) Explain ductile detailing for beam & column as per IS 13920. (8) CO4 L6

Question No. 5 Attempt following Question

- 5a) What are structural walls? explain with neat sketches different types of shear walls. (8) CO5 L2 L3

OR

- 5b) Explain spring mass model of elevated water tank. Draw neat sketches for pressure distribution of elevated tank for hydrodynamic- Impulsive & Convective pressure under seismic force. (8) CO5 L2 L3
- 5c) Write step by step design procedure of rectangular shear wall with enlarged ends & draw neat sketch showing ductile detailing of shear wall. (8) CO5 L6

OR

- 5d) An elevated tank with circular cylindrical container has internal diameter of 12 m and water height is 4.5 m. Weight of container is 3,000 KN and weight of staging is 1,700 KN. Lateral stiffness of staging is 50,000 KN/m. Obtain two mass model and find time period of impulsive and convective modes. Consider values of $m_i/m = 0.43$, $m_c/m = 0.545$ and $K_c h/mg = 0.665$ for ratio $h/D = 0.375$. (8) CO5 L4 L5