



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

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 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. Use of IS 1893-2016 is permitted.

Question No. 1 Attempt following Question

- 1a) What is liquefaction? State its effects on structures. (6) C01, CO2

Question No. 2 Attempt following Question

- 2a) Explain philosophy of earthquake resistant design. (6) C01, CO2

Question No. 3 Attempt following Question

- 3a) State stepwise procedure of Seismic analysis of frame by Equivalent linear static method (8) CO2, CO3

OR

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

- 3c) The G+2 story RCC building having Center to Center plan dimensions as 8m x 8m with 4m spacing between columns in both directions. The building is located in seismic zone V. The soil is medium stiff & special moment resisting frame design is proposed. The intensity of DL is 10 KN/m² and live load on floors is 3 KN/m². Determine Seismic load distribution on structure by Static Analysis. (8) CO3

OR

- 3d) Explain in brief stepwise procedure for seismic analysis of structure by Response spectrum method (8) 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) What is necessity of ductile detailing? Explain with neat sketches ductile detailing of flexural members as per IS 13920. (8) CO4, CO5

- 4c) A RCC beam of rectangular section has to carry a distributed L.L. of 20 KN/m in addition to its own weight and a D.L. of 25 KN/m. The maximum Bending moment & Shear force due to earthquake are 60 KN-m and 40 KN-m. Centre to Centre distance between supports is 6m. Design the beam using M20 Concrete & Fe415 steel. (8) CO4, CO5

OR

- 4d) Design the reinforcement of column size 300mm x 450mm subjected to the following forces. The column has an unsupported length of 4m and is braced against side sway in both directions. Use M25 Concrete & Fe415 steel. Total axial loads due to DL, LL & seismic loads are 800 KN, 700KN & 500KN. Moments due to DL, LL & seismic loads are 40 KN-m, 30KN-m & 80 KN-m respectively. (8) CO4, CO5

Question No. 5 Attempt following Question

- 5a) Describe with neat sketches structural failure of shear walls. Explain the concept of flanged shear wall. (8) CO4, CO5

OR

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

- 5c) Explain step by step procedure of design of rectangular shear walls with boundary elements as per IS-13920. (8) CO4, CO5

OR

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

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