



**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: Theory of Plates and Shells	Course Code: CIV225107
Max. Marks: 60	Duration: 2.50 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 02 pages.
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.

**Question No. 1 Attempt following Question**

- 1a) Derive the equations of the stresses of rectangular plate. (6) CO1

**Question No. 2 Attempt following Question**

- 2a) Distinguished between Navier's and Levy's Plate Theory (6) CO2

**Question No. 3 Attempt following Question**

- 3a) Derive the Governing equation of the Circular Plate. (8) CO3

**OR**

- 3b) Derive the equation of deflection for circular plate subjected to central concentrated load. (8) CO3

- 3c) Derive the equation of deflection for circular plate with circular hole subjected to edge moments. (8) CO3

**OR**

- 3d) Derive the equation of deflection for simply supported circular plate subjected to UDL. (8) CO3

**Question No. 4 Attempt following Question**

- 4a) Describe and classify the shell elements on the basis of aspect ratio. And draw the diagram of surface revolution of shell. (8) CO4

**OR**

- 4b) Derive the equilibrium equation of surface revolution of shell along the direction of tangent to the meridian curve. (8) CO4

4c) Derive the equilibrium equation of surface revolution of shell along the radial direction. (8) CO4

**OR**

4d) Derive the equilibrium equation along the tangent to parallel of latitude ( $\theta$  direction) (8) CO4

**Question No. 5 Attempt following Question**

5a) Derive expressions for the strains at a point due to the bending and membrane (stretching) action in a shell. Hence obtain expressions for the stress resultants in terms of strain. (8) CO5

**OR**

5b) Evaluate the suitability of beam theory and membrane theory, for analyzing different types of cylindrical shell structures. (8) CO5

5c) Derive the equilibrium equations for general theory of cylindrical shell, considering actions on an infinitesimal element. (8) CO5

**OR**

5d) Evaluate the suitability of beam theory and membrane theory, for analyzing different types of cylindrical shell structures. (8) CO5

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