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:2.5 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) Sketch the free body diagram of a plate element representing lateral loads, moments and shear.   (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

<div align="center">OR</div>

3b) Derive the equation of deflection for circular plate subjected to uniformly distributed load.   (8)   CO3

3c) Derive the equation of deflection for circular plate subjected to central concentrated load.   (8)   CO3, CO4

<div align="center">OR</div>

3d) Derive the equation of deflection for circular plate with circular hole subjected to edge moments.   (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

<div align="center">OR</div>

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 (ɵ direction). (8) CO4

Question No. 5 Attempt following Question

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

OR

5b) Describe the following (8) CO5
   1. Singly rule surface and Doubly ruled surface
   2. Membrane action and Gaussian Curvature.

5c) 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

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

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