**Seat No: _____** **Enrollment No: _____**

# PARUL UNIVERSITY

## FACULTY OF ENGINEERING & TECHNOLOGY

### M.Tech. Winter 2019 - 20 Examination

**Semester: 2** **Date: 19/12/2019**
**Subject Code: 03209155** **Time: 2:00 pm to 4:30 pm**
**Subject Name: Theory of Plates & Shells** **Total Marks: 60**

**Instructions:**
1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

**Q.1** A) Enlist the Kirchhoff-Love Assumptions for shells. **(05)**
B) Explain the difference between thin plate and thick plate. **(05)**
C) Explain in brief the load carrying mechanism of shells. **(05)**

**Q.2** **Answer the following questions**. (Attempt any three) (Each five mark) **(15)**
A) Write down the Equations of Codazzi and Gauss. Mention their Significance.
B) Explain different boundary conditions exist in plate theory with neat sketches and necessary equations.
C) Differentiate between beam and plate.
D) State the fundamental assumptions of the linear, elastic, small-deflection theory of bending for thin plates given by Kirchhoff.

**Q.3** A) Write a note on Membrane Theory of Shells. Write down the fundamental equations of the membrane theory for thin shells. **(07)**
B) Give the classification of shell based on geometric form and shell curvature with neat sketches. **(08)**

**OR**

B) Enlist all the stress resultants generated in a shell element with proper notation and meaning. **(08)**

**Q.4** A) Derive expressions for deflection in simply supported rectangular plate subjected to uniformly distributed load using Navier's method. **(07)**

**OR**

A) Derive the basic fourth order partial differential equation for a plate (Cartesian Coordinates). Also write down the equation for shear and corner forces. **(07)**
B) Obtain the equation of deflection for a thin circular plate subjected to concentrated load "P"at the centre. The plate is fixed all around the edges. Also find the maximum deflection in plate if r = 2 m, t= 50 mm $\mu$= 0.3 E=200 GPa and P= 50kN. **(08)**