

M.E. (Civil - Structures)
THEORY OF PLATES AND SHELLS
(2013 Credit Course) (Semester-II)

Time : 3 Hours]

[Max. Marks : 50

Instructions to the candidates:

- 1) Answer ant five questions from the following.*
- 2) Neat diagrams must be drawn wherever necessary.*
- 3) Figures to the right indicates full marks.*
- 4) Assume suitable data, if necessary and clearly state.*
- 5) Use of cell phone is prohibited in the examination hall.*
- 6) Use of electronic pocket calculator is allowed.*

Q1) a) Differentiate small and large deflections of thin plate. Explain the assumption of small deflection theory of thin plates. **[5]**

b) Derive an appropriate expression for pure bending of plates. **[5]**

Q2) a) Explain boundary condition for the analysis of plates. **[3]**

b) A rectangular plate of size $a \times b$ with four edges simply supported carries a uniformly distributed load q . Derive an expression for moments using Navier's method. **[7]**

Q3) a) Derive an expression for maximum deflection of the rectangular plate with simply supported edges subjected to moments M distributed along the edge at $y = \pm b/2$ by Lavy's method. **[8]**

b) Explain in brief moment curvature relationship for first order shear deformation theory. **[2]**

Q4) a) Develop moment curvature relations for a circular plate. **[5]**

b) Describe the boundary condition for the circular plate and a circular plate with central hole. **[5]**

- Q5)** a) State and explain in brief classification of shell with sketches. [4]
b) Differentiate cylindrical, conical and spherical shells on the basis of analysis. [6]
- Q6)** a) Explain application of membrane theory for the analysis of Circular cylindrical shells. [5]
b) Derive equilibrium equations for circular cylindrical shells using membrane theory. [5]
- Q7)** a) Derive governing differential equation for circular cylindrical shells using bending theory. [5]
b) Analyze pipes and pressure vessels using bending theory. [5]
- Q8)** a) Explain in brief principle of Lundgren's beam theory and its application for the analysis of cylindrical shell. [5]
b) Differentiate beam analysis and arch analysis using beam theory. [5]

