

Total No. of Questions : 8]

SEAT No. :

P4571

[Total No. of Pages : 2

[4860] - 1033

M.E. (Civil - Structures)

THEORY OF PLATES AND SHELLS

(2013 Credit Pattern)

*Time : 3 Hours]*

*[Max. Marks : 50*

*Instructions to the candidates:*

- 1) *Attempt any five questions from the following.*
- 2) *Neat diagram must be drawn wherever necessary.*
- 3) *Figure 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) Write assumption for the analysis of thin plate with small deflection. [3]  
b) Derive an expression for maximum deflection using Naviers solutions when a load distributed on small area of simply supported square plate.[7]
- Q2)** a) State the steps involved in the Naviers solutions. [3]  
b) Derive 4<sup>th</sup> order differential equation for a thin plate in Cartesian coordinate with usual notation. [7]
- Q3)** a) Derive an expression for deflection by Levis method for simply supported on opposite edges and subjected to uniformly distributed load. [7]  
b) Differentiate clearly difference between Navier's and Levy's solution in the analysis of rectangular plates. [3]
- Q4)** a) Starting from the basic principle, determine the internal forces and deflection of a circular plate loaded with uniformly distributed load if plate is fixed at the edges. [6]  
b) Find transverse deflection  $w$  for the simply supported circular plate of radius  $a$  subjected to central point load  $P$ . [4]

**P.T.O.**

- Q5)** a) State and explain the assumption in the general theory of thin elastic shells. [3]  
b) State and explain membrane theory and hence derive an equation of equilibrium. [7]
- Q6)** a) Using membrane theory, analyze a cylindrical open roof shell supported at the four corners for its dead weight only. [8]  
b) State the merits and demerits of a shell structures against a plate structures. [2]
- Q7)** a) Derive equation of equilibrium for bending theory of cylindrical shells. [7]  
b) Explain application of bending theory of shells to pressure vessels and pipes. [3]
- Q8)** a) Differentiate between membrane theory and bending theory for analysis of shells. [6]  
b) Explain Beam theory of cylindrical shells with assumptions. [4]

