

Total No. of Questions : 8]

SEAT No. :

P4603

[Total No. of Pages : 2

[4760]-1033

M.E. (Civil - Structures)

THEORY OF PLATES AND SHELLS

(2013 Pattern) (Semester - II)

Time : 3 Hours]

[Max. Marks : 50

Instructions to the candidates:

- 1) *Attempt any five questions from the following.*
- 2) *Answers should be written in one answer books.*
- 3) *Figures to the right indicate full marks.*
- 4) *Neat diagrams should be drawn wherever necessary.*
- 5) *If necessary, assume suitable data.*
- 6) *Use of nonprogrammable electronic pocket calculator is allowed.*
- 7) *Use of Cell phone is prohibited in examination hall.*

- Q1)** a) Differentiate clearly difference between thin and thick plate. [4]
b) A rectangular plate of size $a \times b$ with four edges simply supported carries a central concentrated load P . Derive the expression for the deflection of the plate using Navier's method. [6]
- Q2)** a) Derive an expression for the flexural rigidity of plate. [3]
b) Derive 4th order differential equation for a thin plate in Cartesian coordinate with usual notation. [7]
- Q3)** a) Explain in brief shear deformation theories for analysis of plates. [5]
b) Derive an expression for maximum deflection of the rectangular plate subjected to two equal and opposite couple applied at the ends by Lavy's method. [5]
- Q4)** a) Find transverse deflection w for the simply supported circular plate of radius a subjected to central point load P . [5]
b) Derive governing differential equation for circular plate under axisymmetric loading from first principle. [5]

P.T.O.

- Q5) a) State the advantage and disadvantage of shell structures compared to plates. [4]
b) Derive expression for the strains ϵ_x and ϵ_y at a point due to the bending and membrane action in a shell. Hence obtain expression for the stress resultants in terms of strains. [6]
- Q6) A horizontal cylindrical shell with closed ends is filled with liquid of density γ and is simply supported at ends. Derive expression for stress resultants N_x , N_ϕ and $N_{x\phi}$ for meridional angle ϕ in the shell. [10]
- Q7) a) Explain in brief beam and arch analysis of cylindrical shell with suitable example. [6]
b) State the assumption made in Finsterwalder bending theory of cylindrical shell and hence states the equation of equilibrium. [4]
- Q8) a) State and explain the assumption and advantage of Lundgren's beam theory in brief. [4]
b) Explain in brief application of membrane theory to cylindrical roof shells and hence derive expression for N_x , N_ϕ and $N_{x\phi}$. [6]

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