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 4^{th} 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]**

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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 meridianal 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]**