May 2016

(13)

Total No. of Questions : 8]

SEAT No. :

P4639

[Total No. of Pages : 2

[4960]-1033

M.E. (Civil - Structures)

THEORY OF PLATES AND SHELLS

(2013 Pattern) (Credit System)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Attempt any five questions from the following.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate 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 clearly difference between Navier's and Levy's solution in the analysis of rectangular plates. **[2]**

b) Derive 4^{th} order differential equation for a thin plate in Cartesian coordinate with usual notation. **[8]**

Q2) a) Derive an expression of flexural rigidity for thin shell. **[2]**

b) A rectangular plate of size $a \times b$ with four edges simply supported carries a central concentrated load P. Derive an expression for the deflection of the plate using Navier's method. **[8]**

Q3) a) 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. **[8]**

b) Differentiate between thick and thin plates. **[2]**

Q4) a) Derive a governing differential equation of circular plate in polar co-ordinates with usual notations. **[7]**

b) State and explain moment curvature relations for circular plates under axi-symmetric loading. **[3]**

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Q5) a) State and explain classification of shells on geometry with suitable sketches. **[4]**

b) Derive an expression for equilibrium equations for chylindrical shell using membrane theory. **[6]**

Q6) a) Explain membrane theory and derive equilibrium equation for circular cylindrical shell. **[6]**

b) Explain strain displacement relations and boundary conditions for cylindrical shells. **[4]**

Q7) a) State and explain principles of Lundgren's beam theory. **[5]**

b) Differentiate between membrane and bending analysis of shells. **[5]**

Q8) a) Explain in brief application bending theory to pipes and pressure vessels. **[5]**

b) Explain in brief application of beam theory to cylindrical roof shells. **[5]**

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