R09

Code No: C2003

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.TECH I - SEMESTER EXAMINATIONS, APRIL/MAY-2012
THEORY AND ANALYSIS OF PLATES
(STRUCTURAL ENGINEERING)

Time: 3hours **Max. Marks: 60**

Answer any five questions
All questions carry equal marks
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1. a) State the assumptions made in the small deflection theory of thin plates.
   b) Derive the differential equation for the cylindrical bending of plates.
   c) From first principles, obtain the expression for deflection for a uniformly loaded rectangular plate with simply supported edge.

2. In case of pure bending of thin rectangular plates, obtain the 'Bending Moment' and 'Curvature' relationships. Hence, obtain expressions for maximum bending and shear stresses.

3. Derive the expression for maximum deflection for a square plate fixed at boundaries subjected to a uniform load of intensity, using Ritz method (energy method).

4. A circular plate fixed at the edges is subjected to a uniform load of intensity "w" per unit area. If it's radius = a, thickness = h, and flexural rigidity = D, obtain the general expressions for deflection, radial & transverse moments. Also find their maximum values.

5. Derive from first principles, the fourth order governing differential equation for bending of Orthotropic Plates.

6. Using Navier's solution, obtain the expression for deflection of the rectangular plate simply supported on all the four edges and resting on elastic foundation.

7. Derive the governing differential equation for the bending of rectangular plates subjected to simultaneous action of lateral loads and in-plane forces.

8. A simply supported rectangular plate of size 4 m × 2 m supports a udl of 3 kN/m^2 at the centre of the plate over an area 2 m × 2 m. Using Finite Difference Method, determine the approximate deflections at nodal points. Use a grid size of 0.5 m. Assume flexural rigidity as constant.

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