Reg. No. : | | | | | | | | | | |

Question Paper Code: 92061

M.E. DEGREE EXAMINATION, OCTOBER - 2014.

Elective

Structural Engineering

01PSE511 - THEORY OF PLATES

(Regulation 2013)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions.

PART A - (10 x 2 = 20 Marks)

1. What is the limit for small deflection theory?
2. State the advantages of plates.
3. Compare the method of analysis by Navier's solution and Levy's method.
4. Write the boundary condition equations for a fixed edge of a rectangular plate.
5. Write expressions for radial and tangential moments for a circular plate in polar coordinates.
6. What are the relationships between Cartesian and polar coordinates in the circular plates?
7. What are the advantages of finite difference method over classical methods?
8. Explain how the strain energy method can be applied to a simply supported rectangular plate with a point load at the centre.
9. Write expressions for the bending and twisting moments in orthotropic plates in terms of the displacement *w* and plate constants.
10. How the analysis of thick plates is different from thin plates?

PART - B (5 x 14 = 70 Marks)

11. (a) Derive a single equilibrium equation for a plate with lateral loads, from the three equilibrium equations $\sum M_x = 0$, $\sum M_y = 0$, $\sum F_z = 0$. (14)

Or

(b) Derive the moment curvature relationship in the case of pure bending of plates. (14)

12. (a) A square plate is subjected to UDL over left half of the area. Find out the deflection surface using Navior's solution. (14)

Or

(b) A simply supported square plate is subjected to UDL of q per unit area over the entire surface. Find the deflection surface using Levy's method. (14)

13. (a) A simply supported circular plate is loaded with UDL over the entire surface. Find out the deflection surface and maximum deflection. (14)

Or

(b) Determine the equation of the deflected surface of a simply supported circular plate of radius 'R' subjected to a rotationally symmetric lateral load which linearly increases from zero at the centre to 'q' at the supports. (14)

14. (a) A square plate 10m X 10m, simply supported at the edges carries a UDL of $3kN/m^2$. Using Finite difference method, find the central deflection and the moments at centre. Poisson's ratio = 0.3. (14)

Or

(b) Explain how RITZ method can be applied to a simply supported rectangular plate 6m X 12m with a point load of 18kN at the centre, to determine the central deflection. (14)

15. (a) Write short note on the following.

(i) Plates on elastic foundation (7)

(ii) Application of orthotropic plate theory to grids. (7)

Or

(b) Derive the differential equilibrium equation for an orthotropic plate under distributed loading. Assume the necessary parameters. (14)

PART - C (1 x 10 = 10 Marks)

16. (a) Derive the governing differential equation for plate bending. (10)

Or

(b) Derive the kirchoff's boundary condition for free edge. (10)

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