Total number of printed pages – 4 **B. Tech**

PECE 8412

Eighth Semester Examination – 2008

PLATE AND SHELLS

Full Marks – 70

Time : 3 Hours

*Answer Question No. **1** which is compulsory and any **five** from the rest.*

The figures in the right-hand margin indicate marks.

1. Write short notes on the following : 2×10

   (i) Gaussian curvature

   (ii) Translation Shells

   (iii) Pseudo stress resultants

   (iv) Membrane theory

   (v) Elliptical paraboloid

   (vi) Ring beam in spherical dome

   (vii) Shear deformation in plates

   (viii) Anticlastic shell

   (ix) Projected element of shell

   (x) Flexural rigidity of plate

2. Establish the relation between bending moment and curvature in pure bending of plates. Also derive an expression for strain energy in pure bending of plates. 10

3. Derive an expression for deflection and stresses of simply supported circular plates of radius ‘r’ subjected to uniformly distributed load of intensity ‘q’ over the entire surface of the plate. Prove that the central deflection is 4 times as great as that for the plate with clamped edges for a plate with Poisson’s ratio $\nu = 0.3$. 10

4. Find an expression for deflection and moments of simply supported rectangular plates subjected to a sinusoidal load of load intensity q_0 at the center. Also compute the central deflection of a square plate of size 30 cm, subjected to uniform loading $q_0 = 0.5\ kN/m^2$ thickness 3.0 mm, E = $0.7e11N/mm^2$, Poisson's ratio ν = 0.3, Density=$2700kg/m^3$. 10

5. Derive an expression for maximum deflection of a simply supported square plate subjected to load in form of isosceles triangle of maximum q_0 using Levy's approach. 10

6. Derive the equations of equilibrium of shells in the form of a surface of revolution and loaded symmetrically with respect to their axis using membrane theory. 10

7. Describe the membrane theory of cylindrical shells of radius 'a' and find the membrane stresses. 10

8. Derive an expression for the membrane forces of a hyperbolic paraboloidal umbrella roof. Under the action of dead weight 'g' of the shell with edges free of normal forces. 10

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