Roll No. .....

23378

M. Tech. 1st Semester (Civil Engg.) Examination – January, 2023

ANALYSIS AND DESIGN OF PLATES & SHELLS

Paper : CE-613

Time : Three hours] *[Maximum Marks : 100*

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt any *five* questions in all. All question carry equal marks.

1. Conclude an expression for the deflection under a sinusoidal loading on rectangular plates with edges simply supported with sides *a* and *b* using Naviers approach. 20

2. A thin simply supported plate of circular cross section with clamped edges is subjected to uniformly distributed load of intensity 'p' per unit area over its entire surface. Assuming the deflection of the plate to be small in comparison to thickness determine from the fundamentals the maximum deflection and maximum bending moment in the plate. 20

3. (a) Explain the general case of deformation of a cylindrical cell. 10

(b) Conclude the membrane equations of equilibrium for shells of revolution. 10

4. Explain about membrane theory of anti-elastic shells (hyperbolic paraboloid). 20

5. Derive the general equations for axisymmetric shells of revolution. 20

6. Find the deflection equation for a plate subjected to hydrostatic pressure use Levy's basic equation for calculating deflection. 20

7. (a) What are the assumptions made in pure bending of thin plates ? 10

(b) Derive the differential equation for plate subjected to cylindrical bending. 10

8. Derive the differential equation for deflection for the symmetrical bending of a circular plate with lateral loads of the type. $\frac{d^3w}{dr^3} + \frac{1}{r}\frac{d^2w}{dr^2} - \frac{1}{r^2}\frac{dw}{dr} = \frac{Q}{D}$ where Q = total shear force on the plate = $\int_0^r qrdr$, q = intensity of lateral loading, r = radius, D = Flexural rigidity of the plate. 20
