JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TERM 3 EXAMINATIONS–2023

M.Tech.–II Semester (Structural Engineering)

COURSE CODE (CREDITS): 12M1WCE214 (3) MAX. MARKS: 35

COURSE NAME: Theory of Plates and Shells

COURSE INSTRUCTORS: Sugandha Singh MAX. TIME: 2 Hour

Note: *All questions are compulsory. Marks are indicated against each question in square brackets.*

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1. Show that the **Total Load** on a thin plate undergoing bidirectional bending is balanced by the shear forces on the edges of the plate. **[10]**

$$p_{0z}(x,y) = p_0 \sin\frac{\pi x}{a}\sin\frac{\pi y}{b}$$

$$Q_x = \frac{\frac{\pi}{a}p_0 \cos\frac{\pi x}{a}\sin\frac{\pi y}{b}}{\left(\frac{\pi}{a}\right)^2 + \left(\frac{\pi}{b}\right)^2}$$

$$Q_y = \frac{\frac{\pi}{b}p_0 \sin\frac{\pi x}{a}\cos\frac{\pi y}{b}}{\left(\frac{\pi}{a}\right)^2 + \left(\frac{\pi}{b}\right)^2}$$

2. For a 2D surface, derive the expression for curved length in the orthogonal curvilinear coordinates, α and β. **[8]**
3. Calculate the expressions for $\theta_1(\alpha_1,\alpha_2)$ and $\theta_2(\alpha_1,\alpha_2)$ as per Love Thin Shell Theory. **[8]**
4. Mention the assumptions in the Poisson Kirchoff Thin Plate Theory. **[4]**
5. Find the Fourier series for a thin plate of dimensions ***'a'*** and ***'b'*** subjected to a uniformly distributed load (UDL) of magnitude p_0. **[5]**