

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TERM 3 EXAMINATIONS-2022

M.Tech.-II Semester (Structural Engineering)

COURSE CODE (CREDITS): 12M1WCE214 (3)

MAX. MARKS: 25

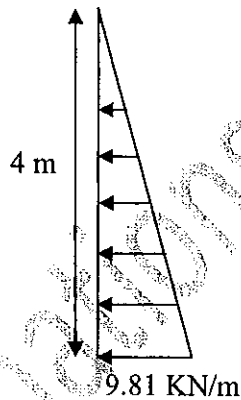
COURSE NAME: Theory of Plates and Shells

COURSE INSTRUCTORS: Sugandha Singh

MAX. TIME: 2 Hours

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

1. A rectangular plate in a dam gate of dimensions 3m x 4 m x 3 mm with longer length towards the depth of the water, is subjected to hydrostatic pressure as shown below. Convert the two-dimensional load into Fourier series. [10]



2. For the plate shown above, assume the boundary conditions as simply supported, calculate M_{xx} , M_{yy} , and M_{xy} , at the coordinates $x = 1.5m$, $y = 2.5m$ using first three terms of the Fourier series. [10]
3. For the dam gate plate, show that the total load is balanced by the total shear force. [5]
4. For a rectangular plate of dimension 'b' in x-direction and 'a' in y-direction undergoing bidirectional bending under the sinusoidal load, $p_{oz}(z) = p_o \sin \frac{\pi x}{b} \sin \frac{\pi y}{a}$, prove that the total Kirchhoff Shear is given by the following equation: [10]

$$V = \frac{4}{\pi^2} p_o ab - \frac{8(1-\nu)p_o}{\pi^2 ab \left(\frac{1}{a^2} + \frac{1}{b^2} \right)^2}$$