

8. Explain Galerlein method and solve the problem :

$$\nabla^2 u = -1$$

in the rectangle :

$$-a \leq x \leq a$$

$$-b \leq y \leq b$$

where $u = 0$ on the boundary.

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JJ347

M. Sc. EXAMINATION, May 2019

(5 Year Integrated)

(Tenth Semester)

(B Scheme) (Main & Re-appear)

B. Sc. (Hons.) M. Sc. (Mathematics)

MATHEMATICS

MAT624H

APPLIED MECHANICS OF SOLIDS

Time : 3 Hours]

[Maximum Marks : 75

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

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

Unit I

1. (a) Explain Generalized Plane Stress.
(b) Derive general solution of Biharmonic equation.
2. (a) Derive stresses and displacements in terms of complex potentials.
(b) Explain in short the Rotating Shaft.

Unit II

3. (a) Solve the problem of bonding of a beam by terminal couples.
(b) Derive Newmann's Problem.
4. (a) Define Torsional Rigidity, Torsion, Stress function and lines of sharing stress.
(b) Maximum shearing stress of cylindrical bar occurs on the boundary of the cross-section.

Unit III

5. (a) Write a short note on harmonic wave in phase and cut of phase.
(b) Derive the wavelength and velocity of a system of plane wave given by $\phi = a \sin (Ax + By + Cz - Dt)$, where a, A, B, C, D are constant.
6. Explain Propagation of Love Wave.

Unit IV

7. Explain Ritz method in two dimensional case and find the approximate solution to the problem of extremising the functional :

$$I(z) = \iint_D [z_x^2 + z_y^2 - 2z] dx dy$$

where the region R is a sequence $-a \leq x \leq a, -a \leq y \leq a$ and $z = 0$ on the boundary of the sequence D .