

M. SC MATHEMATICS (TWO YEAR)-ASSIGNMENT

Course Code: MAT616C **Course Title:** Mechanics of solids-II **Sem.:** IVth

UNIT-I

- Q.1. Derive Beltrami-Michell compatibility conditions for plane strain deformation.
- Q.2. Derive general solution of biharmonic equation.
- Q.3. Construct a biharmonic boundary value problem.
- Q.4. Discuss the arbitrariness in selection of two analytic function

UNIT-II

- Q.1. Define spring and dashpot and derive constitutive equation for Maxwell model
- Q.2. Explain strain response under constant stress and vice versa for Kelvin model
- Q.3. Explain deformation of thick-walled tube, when the material of the tube is elastic in dilatation and Maxwell viscoelastic in distortion.

UNIT-III

- Q.1. Show that twisting moment is proportional to the angle of twist per unit length.
- Q.2. Show that in the torsion of an elliptic cylinder $\tau = 2\mu aab\sqrt{a^2 - e^2x^2}/(a^2 + b^2)$ and maximum shearing stress occurs on the ends points of minor axis
- Q.3. Show that stress vector is normal to the radius vector and also find maximum stress in torsion of circular shaft
- Q.4. Determine the wavelength and velocity of a system of plane waves given by $\phi = a \sin (Ax+By+Cz-Dt)$, where a, A,B,C,D are constant

UNIT-IV

- Q.1. State and prove theorem of minimum complementary energy
- Q.2. Explain the deflection of central lines of a beam
- Q.3. Explain Ritz method in one and two-dimensional and using Ritz method, find the approximate solution to the problem of extremising the functional:

$$I(z) = \iint_D [z_x^2 + z_y^2 - 2z] dx dy, \text{ where the region } R \text{ is a sequence } -a \leq x \leq a, \\ -a \leq y \leq a \text{ and } z = 0 \text{ on the boundary of the sequence.}$$