

Sub Code: **CET-302**

ROLL NO.....

SEMESTER EXAMINATION, 2022-23 YEAR

Programme – I year M.Tech – STRUCTURE ENGEERING

Advance Solid Mechanics

Duration : 3:00 hrs

Max Marks: 100

Note:-Attempt all questions. All Question carry equal marks. In case of any ambiguity or missing data, the same may be assumed and state the assumption mad in the answer.

Q 1. Answer any four parts of the following.

- a) What is scalar matrix explain.
- b) Explain Principle stress and volumetric strain.
- c) Explain anisotropic material model.
- d) Derive field equation for boundary value problem.
- e) What do you mean by principle of total potential energy ?
- f) Explain body force with example.

Q 2. Answer any four parts of the following.

- a) Derive Cayley Hamilton theorem.
- b) What is plain stress and plain strain?
- c) Discuss the shear centre for axisymmetric and unsymmetric section.
- d) What is Isotropic hook's law? Explain with example.
- e) Derive relationship between Young's modulus, Bulk modulus, and modulus of Rigidity.
- f) Explain term point of contraflexure.

Q 3. Answer any two parts of the following

- a) Draw stress distribution diagram for following section
 1. L-section.
 2. T-section
- b) Explain Terms:
 1. Resilance.
 2. Modulus of Resilance.
- c) A T section beam having flange of 80mm×10mm and web 130mm×10mm. Find maximum shear stress if it's has to resist a shear force of 60kN.

Q 4. Answer any two parts of the following.

- a) Derive the expression for Circumferential and longitudinal stress in thin cylinder subjected to internal pressure.
- b) A hollow circular Shaft with internal dia=0.7m external Dia transmits 294kW at 200r.p.m. find the Dia of the Shaft if it's shear stress is not to exceed 68.6MPa. Take $G=80$ GPa.
- c) Draw stress-strain curve for ductile and brittle material giving the significance of all salient points .

Q 5. Answer any two parts of the following.

- a) Derive the relationship for volumetric strain in terms of longitudinal strain for 3-D state of stress.
- b) A cantilever of span L carries a concentrated load P at free end. Find the deflection under the load by strain energy method.
- c) Derive from the first principle the shear stress distribution for the rectangular section.