Total No. of Pages 2
THIRD SEMESTER
SUPPLEMENTARY EXAMINATION

Roll No. ....
B.Tech.(ME)
Feb,2019

ME-201 MECHANICS OF SOLIDS

Time: 3 hrs

Max Marks : 40

Note: Answer any five questions.
All questions carry equal marks.

1(a) Calculate axial force in each bar of the truss shown in Fig. 1.

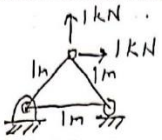

Fig 1

1(b) For the bar shown in Fig. 2, find the change in length when $E = 210$ G Pa. Find the strain energy stored in the bar.

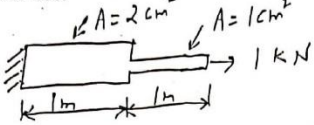

Fig 2

2(a) Draw shear force and bending moment diagrams for the cantilever shown in Fig. 3.

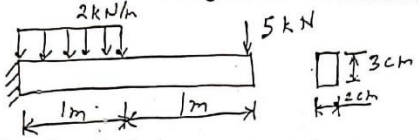

Fig 3

2(b) Find maximum bending stress in the beam in Q 2(a). Find equation of deflection curve of the beam.

3(a) A plane element (Fig. 4) is subjected to the stresses σ_{xx}=5 MPa, σ_{yy}=10 MPa, σ_{xy}=5 MPa. Find principal stresses and maximum shear stress existing in the element. Find $\sigma_{x'x'}$.

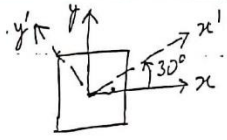

Fig 4

3(b) A hollow shaft of inside diameter equal to one-half of outside diameter is subjected to a torque of 35 kNm. If outside diameter of the shaft is 10 cm, find the maximum shear stress in the shaft. Find the twist in the shaft if length of shaft is 1 m and shear modulus is 70 GPa.

4(a) A pin-ended strut of aluminum (E=80 GPa) with length 3m is constructed of a circular tubing with outside diameter 100 mm and thickness 10 mm. Determine the Euler buckling load.

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4(b) Find radial and tangential stresses at inner and outer radii in a thick cylinder of outer radius 0.5m and thickness 0.1m for an internal pressure 5 MPa. Find radial and tangential strains. Find dilation of the cylinder.

5(a) Derive Euler's buckling load for fixed-free column.

5(b) Derive expression for strain energy for bending of a circular rod.

6 Write short notes on any two:
(a) Theories of failure
(b) Stress-strain diagram of mild steel
(c) Theory of bending