CBCS Scheme

USN | | | | | | | | | | |

15MT33

Third Semester B.E. Degree Examination, June/Jul 2018
Mechanics of Materials

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing one full question from each module.

Module-1

1 a. Define the following: i) Stress ii) Poisson's ratio iii) Hooke's law. **(06 Marks)**

b. Derive the expression for analysis of deformation of uniformly tapering circular bar. **(10 Marks)**

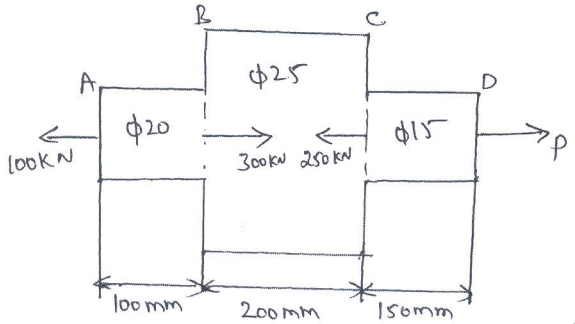
OR

2 a. Explain the stress-strain curve for mild steel. **(04 Marks)**

b. Define: i) Bulk Modulus ii) Modulus of Rigidity. **(04 Marks)**

c. Determine the stresses in various segments of circular bar shown in Fig.Q.2(c). Compute the total Elongation taking Youngs modulus = 195 GPa. **(08 Marks)**

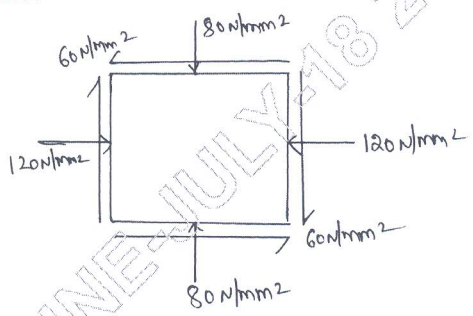
Fig.Q.2(c)



Module-2

3 The state of stress in a 2D stressed body as shown in Fig.Q.3(a). Determine principal stresses, principal planes, maximum shear stress and shear planes also find above parameters by constructing Mohr's circle. **(16 Marks)**

Fig.Q.3



OR

4 a. Derive an expression for circumferential stress and longitudinal stress in case of thin cylinders. **(08 Marks)**

b. A pipe of 500mm internal diameter and 75mm thick is filled with a fluid at a pressure of $6N/mm^2$. Find the maximum and minimum Hoop stress across the cross section of the cylinder. Also sketch the radial pressure and Hoops stress distribution across the section. **(08 Marks)**

Module-3

5 a. Define Beam. Explain the types of Beams. **(06 Marks)**

b. A simply supported Beam of 6m long is subjected to loads 2kN, 5kN and 4kN at distance 1.5m, 3m and 4.5m from left support as shown in Fig.Q.5(b). Draw shear force and bending moment diagram. **(10 Marks)**

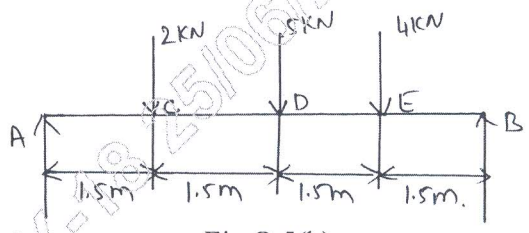


Fig.Q.5(b)

OR

6 a. Explain Sagging and Hagging moment. **(06 Marks)**

b. Draw shear force and bending moment diagram for a beam shown in Fig.Q.6(b). Locate point of contra flexure if any. **(10 Marks)**

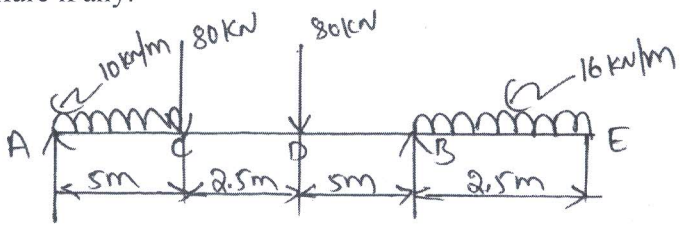


Fig.Q.6(b)

Module-4

7 a. Explain theory of pure bending. **(04 Marks)**

b. Explain the assumptions of simple bending. Derive an impression for bending moment equation. **(12 Marks)**

OR

8 a. Derive the expression for differential equation for deflection curve. **(08 Marks)**

b. Derive an expression for slope and deflection of a cantilever beam with point load at the free end. **(08 Marks)**

Module-5

9 a. Derive an expression for Torsion equation for a circular shaft. **(08 Marks)**

b. A Hallow circular shaft 200mm external diameter and metal thickness 25mm is transmitting power at 200rpm. The angle of twist over a length of 2m was found to be 0.5°. Calculate the power transmitted and the maximum shear stress induced. Take G = 84 kN/mm^2. **(08 Marks)**

OR

10 a. Explain the assumptions in Euler's column theory. **(06 Marks)**

b. Derive an expression for Euler's crippling load for a column when one end of the column is fixed and other end hinged or pinned. **(10 Marks)**

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