Total No. of Questions : 8] *[Total No. of Printed Pages : 3*

Roll No .....

CE-3003-CBGS

B.E., III Semester

Examination, June 2020

Choice Based Grading System (CBGS)

Strength of Materials

Time : Three Hours

Maximum Marks : 70

Note: i) Attempt any five questions.
ii) All questions carry equal marks.
iii) Assume data suitably.

1. a) A point is subjected to a tensile stress of 250MPa in the horizontal direction and another tensile stress of 100MPa in the vertical direction. The point is also subjected to a simple shear stress of 25MPa. Such that when it is associated with the major tensile stress, it tends to rotate the element in the clockwise direction what is the magnitude of the normal and shear stresses on a section inclined at an angle of 20^{o}, with the major tensile stress". 7

   b) Write short notes on: 7
   i) Hooke's Law
   ii) Modulus of Elasticity

2. a) A rectangular beam 60mm wide and 150mm deep is simply supported over a span of 4 meters. If the beam is subjected to a uniformly distributed load of 4.5 kN/m. Find the maximum bending stress induced in the beam. 7

   b) Distinguish between Direct Stress and Bending Stress.7

3. a) A cantilever 2.4m long carries a point load of 30kN at its free end. Find the slope and deflection of the cantilever under the load. Take Flexural Rigidity for the cantilever beam as 25×10^{12} N-mm^2. 7

   b) Give the relation between an actual beam and a conjugate beam when the former has a fixed end. 7

4. a) A steel rod 5m long and 40mm diameter is used as a column, with one end fixed and other free. Determine the crippling load by Euler's formula. Take E as 200GPa7

   b) Explain the failure of long columns and short columns.7

5. a) Calculate the maximum torque that a shaft of 125mm diameter can transmit, if the maximum angle of twist is 1^o in a length of 1.5m. Take C = 70GPa. 7

   b) A hollow shaft of external and internal diameter of 80mm and 50mm is required to transmit torque from one end to the other. What is the safe torque it can transmit, if the allowable shear stress is 45 MPa? 7

6. a) What do you understand by the term 'Point of contraflexure'? 7

   b) Define principal planes and principal stresses and explain their uses. 7

7. a) A circular alloy bar 2m long uniformly tapers from 30mm diameter to 20mm diameter. Calculate the elongation of the rod under an axial force of 50kN. Take E for the alloy as 140GPa. 7

   b) What is a conjugate beam? Discuss its utilities. 7

8. Write short notes on: 14
   a) Carry over Factor
   b) Sinking of a Prop.
   c) Slenderness Ratio
   d) Torque

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