Total No. of Questions : 8] *[Total No. of Printed Pages : 4*

Roll No .....

AU/ME-304-CBGS

B.Tech., III Semester

Examination, December 2020

Choice Based Grading System (CBGS)

Strength of Material

Time : Three Hours

Maximum Marks : 70

Note: i) Attempt any five questions.

ii) All questions carry equal marks.

iii) In case of any doubt or dispute the English version question should be treated as final.

1. a) Give the definition of principal plane and principal stress.

   b) What do you mean by Poisson's Ratio? Explain with examples.

2. a) An element cube is subjected to tensile stresses 60N/mm^2 and 20N/mm^2 acting on two mutually perpendicular planes and a shear stress of 20N/mm^2 on these plane. Draw the Mohr's circle of stresses and hence or otherwise determine the magnitude and directions of the principal stresses and also the greatest shear stress.

2

2

b) Explain the following
   i) Thermal Stress
   ii) Significance of yield point in a material

3. a) Explain moment area method used to determine the deflection of beams.

   b) Derive the relation between the bending moment and shear force in a beam. What do you mean by point of contraflexure?

4. Define and explain the following theories of failure:
   i) Maximum principal stress theory
   ii) Maximum principal strain theory
   iii) Maximum shear stress theory

5. a) Discuss the different theories of failure.

   b) A shaft is subjected to a maximum torque of 14kN-m and a maximum bending moment of 10kN-m at a particular section. Determine the diameter of the shaft according to maximum shear stress theory if the elastic limit in simple section is 180MPa.

6. a) At a point, stresses $\sigma_x = +100MN/m^2$, $\sigma_y = -80MN/m^2$ and $Z_{xy} = +40MN/m^2$ are acting. Find principal stresses.

   b) A wooden beam has cross section 10cm×10cm. If permissible stress in wood is 10MPa. Find the moment of resistance of cross section.

7. a) Prove that shear stress distribution in rectangular section in parabolic.

   b) What are assumption made in simple or pure torsion?