B.Tech. (ME) 4th Semester F-Scheme
Examination, May-2019

STRENGTH OF MATERIALS-I

Paper-ME-206-F

Time allowed : 3 hours] *[Maximum marks : 100*

Note : *Attempt **five** questions in all, selecting **one** question from each section. **Question No. 1 is compulsory.** All questions carry equal marks.*

1. Define and Mention : 10×2=20

(a) Stress

(b) Poisson's ratio

(c) Mohr's circle

(d) Point of contraflexure

(e) Torsion

(f) Shear stress

(g) Slenderness ratio

(h) Moment area method

(i) What is concentrated load ?

(j) Gordon's Formulae

Section-A

2. Derive the relationship between elastic constants. 20

3. An element in a strained body is subjected to a tensile stress of 150 MPa and a shear stress of 50 MPa tending to rotate the element in an anticlockwise direction. Find : 20

   (a) The magnitude of the normal and shear stresses on a section inclined at 40° with the tensile stress; and

   (b) The magnitude and direction of maximum shear stress that can exist on the element.

Section-B

4. A simply supported beam 6 m long is carrying a uniformly distributed load of 5 kN/m over a length of 3 m from the right end. Draw the S.F. and B.M. diagrams for the beam and also calculate the maximum B.M. on the section. 20

5. Derive the torsion formula for shafts of circular cross-section. 20

Section-C

6. Derive an expression of shear stresses in beam with combined bending, torsional and axial loading of beam. 20

7. Explain Euler's theory of buckling of columns. Also derive the expression of column hinged at both ends. 20

Section-D

8. A cantilever AB 2 m long is carrying a load of 20 kN at free end and 30 kN at a distance 1 m from the free end. Find the slope and deflection at the free end. Take $E = 200$ GPa and $I = 150 \times 10^6$ mm^4. 20

9. Derive and explain moment area method for fixed beam. 20