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B. Tech. 4th Semester (ME) Examination, May-2016

STRENGTH OF MATERIALS-I

Paper-ME-206 F

Time allowed : 3 hours] [Maximum marks : 100

Note : There are nine questions in total having four sections.

*Q. 1 is compulsory. Each question carries equal marks. Students have to attempt 5 questions in total at least **one** question from each section.*

1. Define and mention :

- (a) Stress
- (b) Strain
- (c) Bending moment
- (d) Torsion
- (e) Deflection
- (f) Hook's law
- (g) Shear force
- (h) Mohr's circle
- (i) Moment area method
- (j) Poison's ratio.

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Section-A

2. Explain stress strain diagram for ductile and brittle materials. 20
3. A mild steel plate 20 mm thick and 20 cm wide at the top, tapers uniformly to 10 mm thickness and 15cm. width over a length of 2m. Find the elongation under a pull of 15 kN. Take $E=210$ GPa. 20

Section-B

4. Derive the relationship between intensity of loading, shear force and Bending moment. 20
5. Derive the torsion formula for shafts of circular cross-section. 20

Section-C

6. Explain bending stresses in beams along with derivation. 20
7. Explain Euler's theory of buckling of columns. Derive the expression of columns. Derive the expression of column hinged at both ends. 20

Section-D

8. Explain Macaulay's method. Derive the expression for calculation of point load on simply supported beam.

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9. A beam AB of 6m span is fixed at both ends and carries a load of 30 kN at C, 2 m from A. For portion AC, $I = 12$ cm⁴ and for portion BC, $I = 2400$ cm⁴. Find the fixed end moments and central deflection.

Take $E= 210$ GPa.

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