

**B.Tech. 4th Semester (ME)-F-Scheme Examination,
May-2018
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
- Resilience
 - Deflection
 - Shear stress and shear strain ?
 - Mohr's circle
 - What is most important assumption in beam ?
 - Torsion
 - Bending Moment
 - In what beams, point of contraflexure occurs ?
 - Hook's law
 - What are concentric load ?

Section-A

2. A bar, having cross-sectional area of 1100 mm^2 is subjected to axial forces as shown in fig. 1. Find the total change in length of the bar. Take $e = 1 \times 10^5 \text{ N/mm}^2$. 20

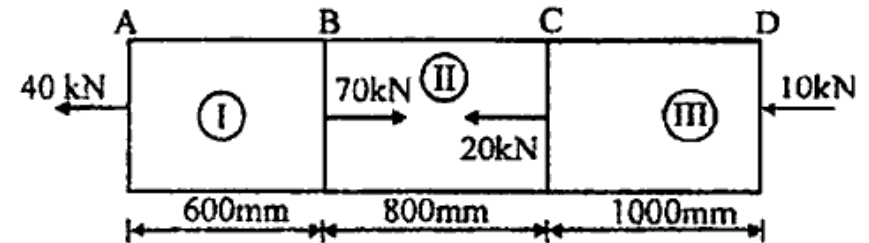
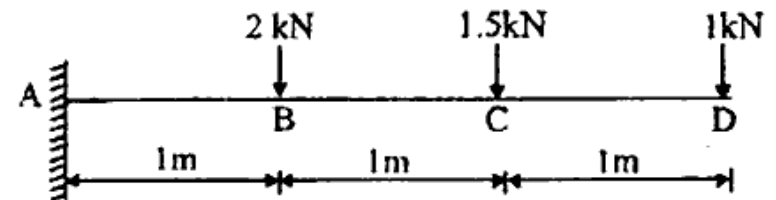


fig.1.

3. Explain the graphical method to determine principal stresses, principal angles and normal and shear stresses on any inclined planes with respect to a given references plane. 20

Section-B

4. A cantilever beam of length 3 m carries the point loads as shown in figure as given below. Draw the shear force and bending moment diagrams. 20



5. A solid steel shaft of 80 mm diameter and 600 mm long transmits 40kW at 200 r.p.m. Calculate : 20

- (i) The maximum shear stress induced
(ii) Angle of twist in degrees.

Take $G = 8 \times 10^4 \text{ N/mm}^2$.

Section-C

6. Derive an expression of shear stresses in beam with combined bending, torsional and axial loading of beam. 20
7. Derive an expression of Gordon's formulac Johnson's empirical formula for axial loading columns and their applications. 20

Section-D

8. Explain Macaulay's method. Derive the expression for calculation of concentrated load on cantilevers beam. 20
9. A fixed beam of span 4m carries a distributed load whose intensity varies from 30 kN/m at the left end to 60 kN/m at the right end. Find the fixing moments and reactions at the ends. 20