

Code: CE3T3

**II B.Tech - I Semester–Regular/Supplementary Examinations –
November 2017**

**MECHANICS OF SOLIDS-I
(CIVIL ENGINEERING)**

Duration: 3 hours

Max. Marks: 70

PART – A

Answer *all* the questions. All questions carry equal marks

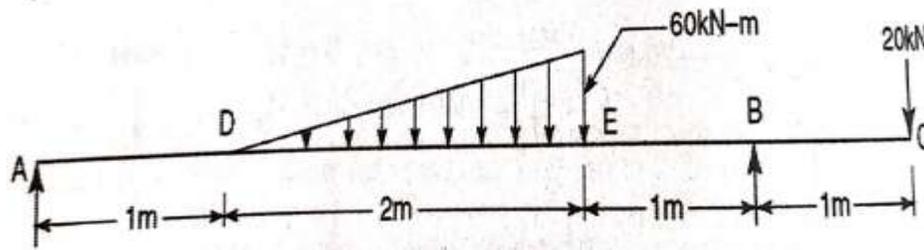
11 x 2 = 22 M

1. a) What is factor of safety?
- b) Draw stress – strain diagram for mild steel and state salient points.
- c) What is point of contraflexure?
- d) Draw and name different types of loads.
- e) Define Kernel of a section.
- f) Draw the diagrams for Sagging Moment and Hogging Moment in the case of Beam.
- g) A circular section is used as a beam. What is the magnitude of maximum shear stress and where does it occur?
- h) What is Resilience?
- i) What are the assumptions in torsion equation?
- j) What is the combined stiffness, when two springs are connected in series?
- k) What is the formula for deflection of close coiled helical springs?

PART – B

Answer any **THREE** questions. All questions carry equal marks. 3 x 16 = 48 M

2. a) A specimen of steel 25 mm in diameter with gauge length of 200mm is tested to destruction. It has an extension of 0.16mm under a load of 80KN and the load at elastic limit is 160KN. The maximum load is 180KN. The total extension at fracture is 56mm and diameter at the neck is 18mm. Find 10 M
- i) The stress at elastic limits
 - ii) Young's modulus
 - iii) Percentage elongation
 - iv) Percentage reduction in area
 - v) Ultimate tensile stress
- b) A circular rod of diameter 20mm and 500mm long is subjected to a tensile force 45KN. The modulus of steel may be taken as 200KN/mm^2 . Find stress, strain and elongation of the bar due to applied load. 6 M
3. a) Draw the BMD and SFD for the overhanging beam shown in the following figure. Also, indicate all significant values including the point of contraflexure. 10 M

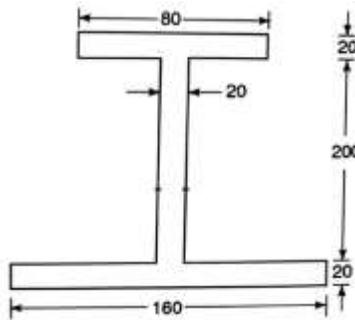


b) Draw the SFD and BMD of a cantilever beam of span 3.5m carrying point loads of 10kN and 20kN at a distance of 1.5m and 2.5m from free end. 6 M

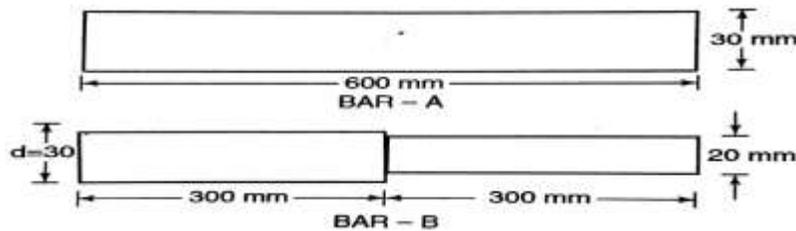
4. a) A symmetrical *I*-Section has flanges of size 180mmx10mm and its overall depth is 500mm. Thickness of the web is 8mm. It is strengthened with a plate of size 240mmx12mm on compression side. Find the moment of resistance of the section, if permissible stress is 150 N/mm^2 . How much uniformly distributed load can it carry if it is used as a cantilever of span 3m? 10 M

b) State the assumptions in simple theory of bending. 6 M

5. a) The unsymmetrical *I*-section shown in the following figure is subjected to a shear force of 40kN. Draw the shear stress variation diagram across the depth. 10 M



- b) Compare the strain energy stored in two bars of the same material as shown in the following figure, if the gradually applied load is same. 6 M



6. a) A closed coil helical spring is made with 12 mm diameter wire and is having mean diameter of 150 mm and 10 complete turns. The modulus of rigidity of the material of the spring is 80kN/mm^2 . When a load of 450 N is applied, find maximum shear stress, strain energy stored, deflection produced and stiffness of the spring. 10 M
- b) During tests on a sample of steel bar 25mm in diameter, it is found that the pull of 50kN produces an extension of 0.095mm on a length of 200mm and a torque 200 N-m produces an angular twist of 0.9 degree on a length of 250mm. Find the poisson's ratio of steel. 6 M