

Day: Friday
Date: 19/01/2018

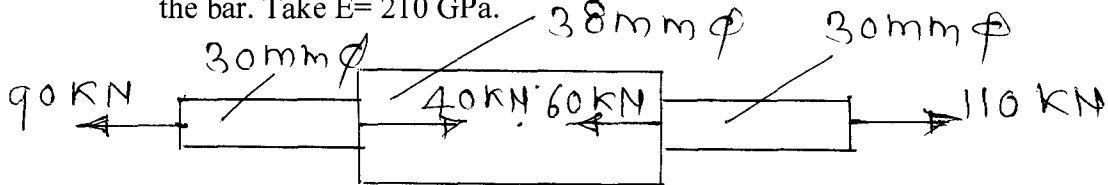
Time: 10.00 AM TO 01.00 PM
Max. Marks: 60

W-2017-2025

N.B.:

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Draw neat labelled diagrams **WHEREVER** necessary.
- 4) Assume suitable data if necessary.

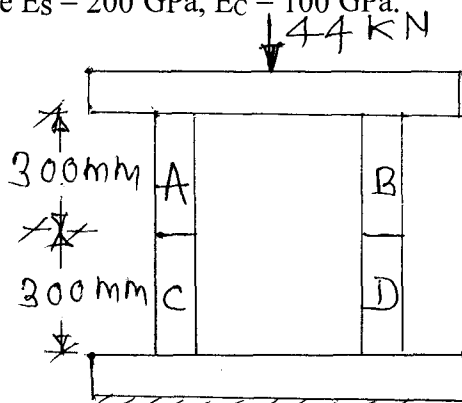
- Q.1 a) Explain typical stress- strain curve for mild steel. (04)
 b) A steel bar 1.6 m long is acted upon by forces as shown. Find the elongation of the bar. Take $E = 210 \text{ GPa}$. (06)



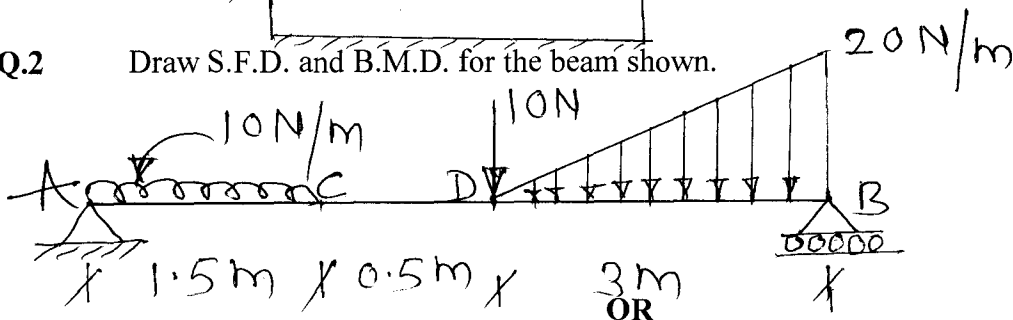
OR

- Q.1 A and B are copper rods and C and D are steel rods as shown in the fig. Each rod is 300 mm long and 20 mm in diameter. The system carries an axial load of 44 kN, compute: (10)

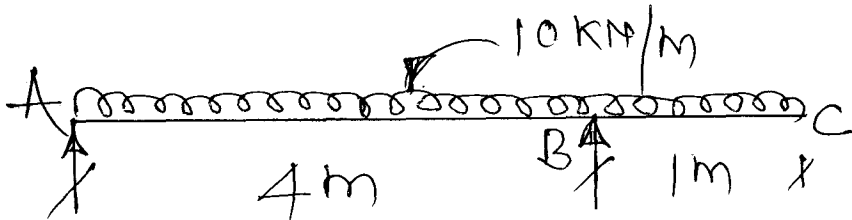
- i) Stress in A
 - ii) Strain in B
 - iii) Change in length of C
- Take $E_s = 200 \text{ GPa}$, $E_c = 100 \text{ GPa}$.



- Q.2 Draw S.F.D. and B.M.D. for the beam shown. (10)



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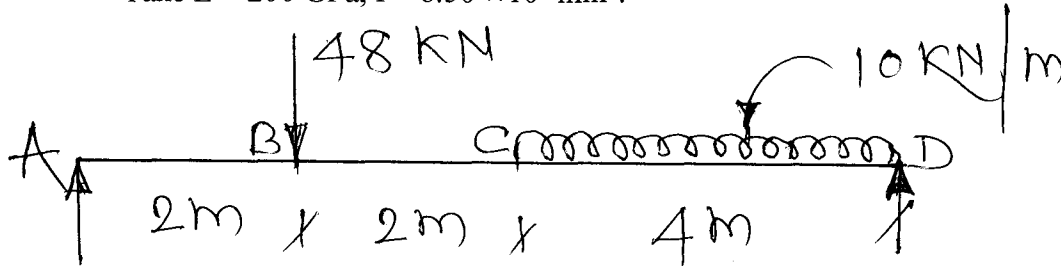


P. T. O.

- Q.3** A simply supported beam of 8 m span carries a u.d.l. of 3 kN/m over entire span. Find the maximum bending stresses in the 'T' section and draw bending stress variation diagram. (10)
 Top flange – 100 × 50 mm
 Web – 125 × 50 mm

OR

- Q.3** A simply supported beam shown in fig. find: (10)
 i) Slope at each end.
 ii) Deflection at C and D.
 Take $E = 200 \text{ GPa}$, $I = 6.50 \times 10^8 \text{ mm}^4$.



- Q.4** A T- section simply supported beam of span 10m carries udl $w = 35 \text{ kN/m}$. Flange is 100 mm wide, 10 mm thick and web is 8 mm thick. Overall depth is 400 mm. Calculate shear stress induced and draw shear stress distribution diagram with all salient values. (10)

OR

- Q.4** Compare the weights of equal lengths of hollow and solid shafts to resist same torsional moment for same maximum shear stress. Assume internal diameter 0.8 times the external diameter for hollow shafts and cross sectional area to be same for both shafts. (10)

- Q.5** Derive an expression for Euler crippling load on a column with both ends hinged with the help of neat sketch. (10)

OR

- Q.5** Compare crippling load by Euler and Rankine's formula for tubular steel strut 3 m long with external diameter 40 mm and internal diameter 32 mm. The strut fixed at one end and hinged at the other end. (10)

Take $\sigma_c = 350 \text{ MPa}$, $E = 200 \text{ GPa}$, $\alpha = \frac{1}{7500}$.

- Q.6** At a point in a strained material the normal stresses are + 50 MPa and -30 MPa on the planes at right angles to each other with shear stress of 20MPa. Determine : (10)

- i) Principal stresses
 ii) Normal and tangential stresses on a plane inclined at 25° with the plane of + 50 MPa stress.

OR

- Q.6** At a point in a strained material, principal stresses are + 180 MPa and + 60 MPa respectively. Find normal and tangential stresses on the plane inclined that 20° with major principal plane, using Mohr circle method. (10)

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