Con. 5429-13 **LJ-10310**

(Old Course)

(3 Hours) **[Total Marks : 100**

N.B. : (1) **Question** No. **1** is **compulsory**.

(2) Attempt any **four** from remainig **six** questions.

(3) Assume any **suitable** data if **required**.

1. (a) Explain briefly :- **5**

Point of Contraflexure and Bulk modulus. **5**

(b) State the nature or characteristics of SFD and BMD under different types of loading. **5**

(c) Derive the relation between 3 elastic constants E K and G. **5**

(d) Write a note on advantages of welded joints over rivetted joint. **5**

10

2. (a) Find the stresses in the wires shown in **fig. 1**

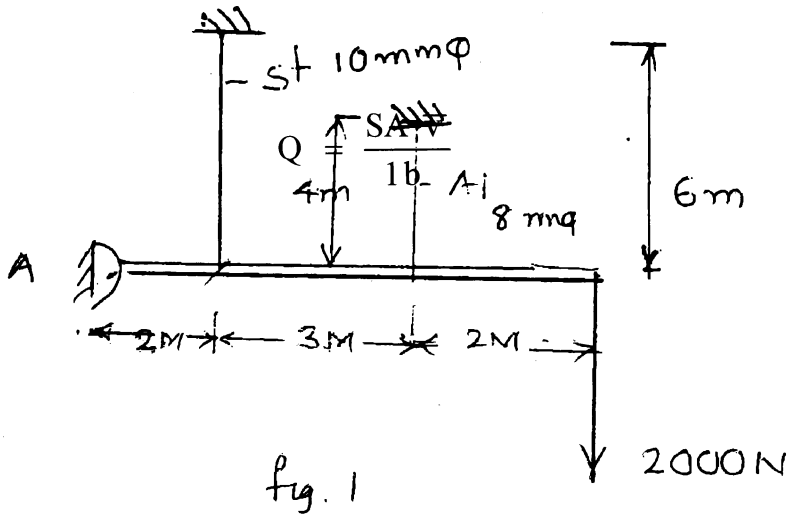

fig. 1

Assume E = 2 x 10^5 N/mm^2.

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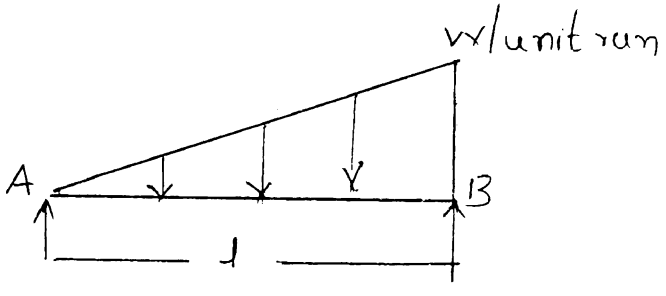
(b) Sketch SFD and B.M.D. for a beam shown in **fig.**



3. (a) Show that **or** Derive the equation. **5**

$$\frac{M}{\pm} = \frac{F}{Y} = \frac{E}{R}$$ with usual notation.

(b) Find the safe value of W that can be applied on the beam shown in **fig. 3** and the cross-section is shown in **fig. 4.** Assume permissible stresses in compression and tension as 40 N/mm^2 and 28 N/mm^2 respectively. **15**

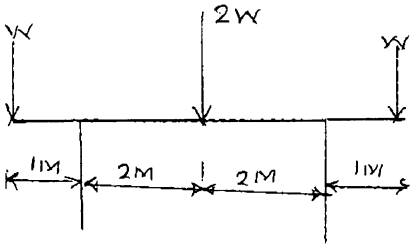


fig. (3)

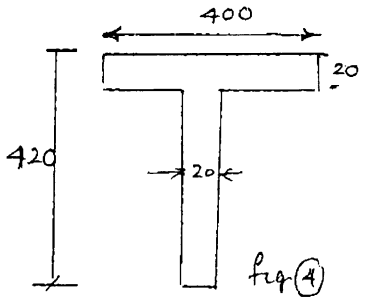


fig (4)

All dimn. in mm

4. (a) Assuming shear force of 100 kN on the c/s^n sketch shear stress distribution for the section shown, keeping :— **15**

(i) Web. vertical

(ii) Web. horizontal

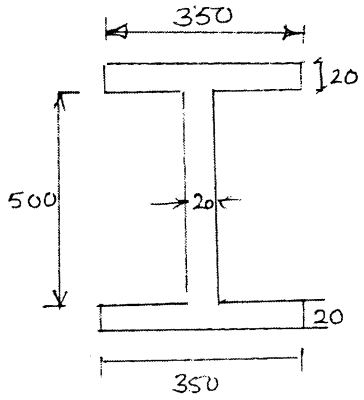


Fig. (5)

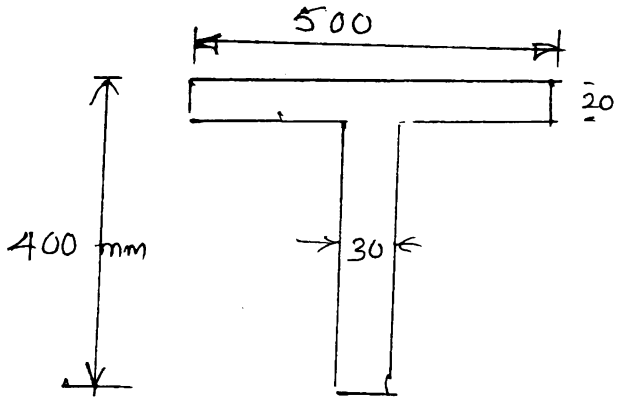
(b) Derive the Equation **5**

$$Q = \frac{SA\bar{V}}{Ib}$$ with usual rotation

5. (a) A solid shaft transmitts 350 kW at 2Hz, if is subjected to shear stress of 40 N/mm^2 and the angle of twist must not exceed 1° in a shaft length of 2 m. Design suitable diameter of the shaft. **10**

Take G = 0.85 x 10^5 MPa

(b) Find the Cox of a T-section shown **fig. (6)**. **10**



6. (a) **10**

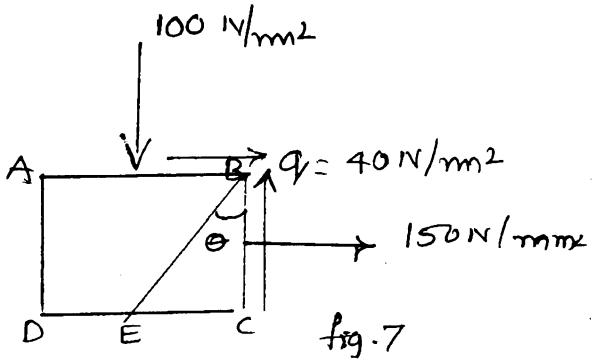


fig.7

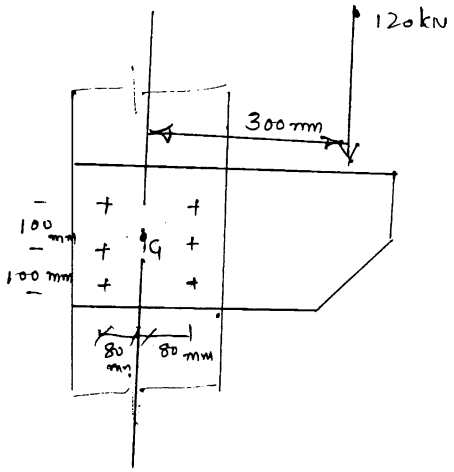
For a two dimensional strained element shown above calculate,

(i) Normal and tangential stresses on any plane BE,

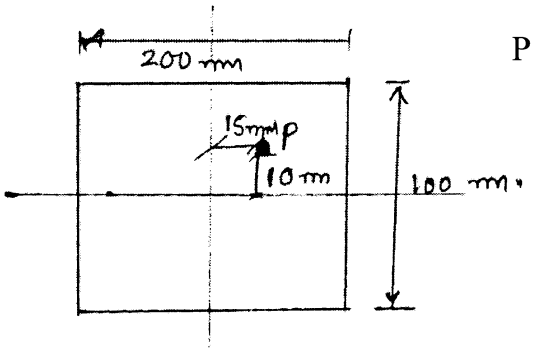
(ii) Max. and Min. principal stresses and their orientations.

(b) A thin cylinder 800 mm Internal diameter and 10 mm thick subjected to a Internal fluid pressure of 2 N/mm^2, assuming μ = 0.27 and E = 2 x 10^5 N/mm^2 find the change in dimension of the cylinder. Take the length of the cylinder 4 m. **10**

7. (a) A bracket riveted to a column by 6 rivets of equall size as shown **fig. (8)** below. **10**
Carries a load of 120 kN at a distance of 300 mm from the centre of the column.
Calculate the loads carried by top two rivets



(b) Find the stresses at all corners of a column section shown in **fig. (9)**. **10**



P = 500 kN