

**B. Tech. Sem - III (Chemical Engg.) 2014 COURSE) (CBCS) :  
WINTER - 2018**

**SUBJECT: STRENGTH OF MATERIAL**

Day: Monday  
Date: 26/11/2018

**W-2018-2281**

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

**N.B:**

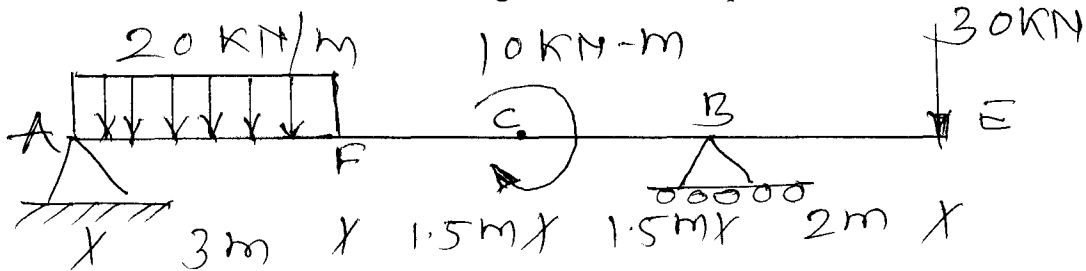
- 1) All questions are **COMUPLSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Assume suitable data if necessary.

- Q.1 a)** Draw and explain stress-strain diagram for mild steel. **(04)**
- b)** A 50mm square steel bar is subjected to an axial tensile load of 250KN. **(06)**  
Determine the decrease in the lateral dimensions. If  $E = 200\text{Gpa}$  and  $\mu = 0.30$ .

**OR**

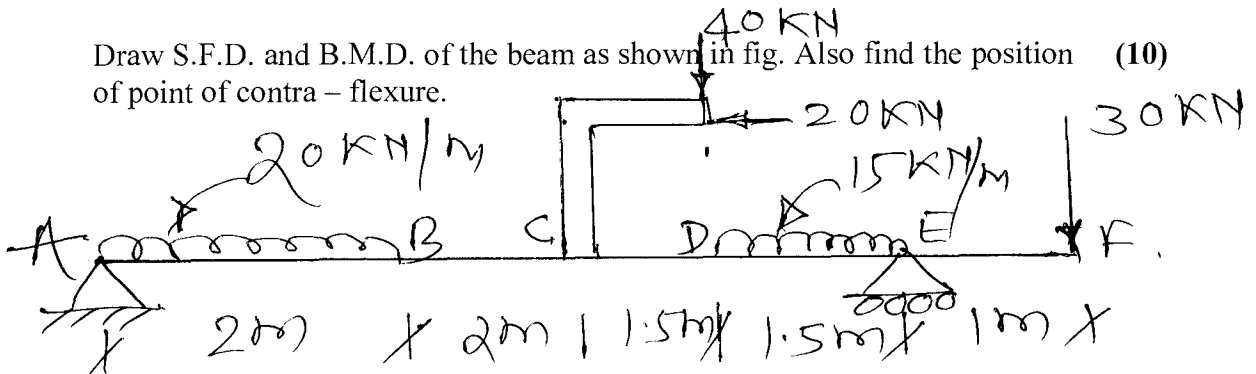
- Q.1** A hollow steel tube of 50mm in external diameter and 3mm thickness enclosed centrally a solid copper bar of 35mm diameter. The bar and tube are rigidly connected together at the ends at a temperature of  $25^{\circ}\text{C}$ . Find the stress in each metal when heated to  $170^{\circ}\text{C}$ . Find the increase in length, if the original length of assembly is 350mm **(10)**  
 $\alpha_s = 1.08 \times 10^{-5}/^{\circ}\text{C}$ ,  $\alpha_c = 1.7 \times 10^{-5}/^{\circ}\text{C}$ . Take  $E_s = 2 \times 10^5\text{Mpa}$   $E_c = 1 \times 10^5\text{Mpa}$ .

- Q.2** Draw S.F.D and B.M.D as to in fig. Also locate the points of inflection. **(10)**



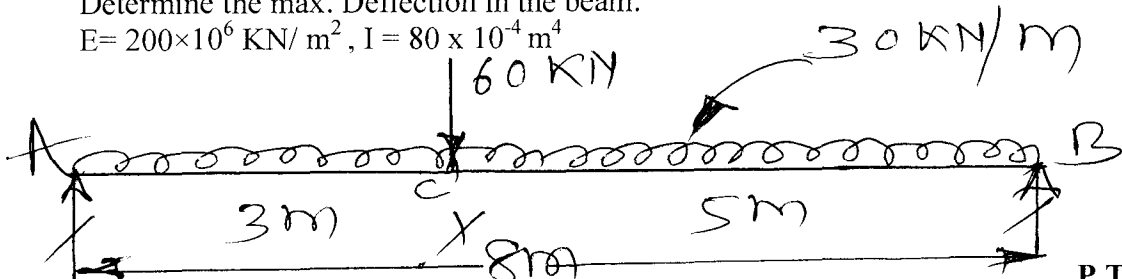
**OR**

- Q.2** Draw S.F.D. and B.M.D. of the beam as shown in fig. Also find the position of point of contra - flexure. **(10)**



- Q.3** A beam AB of span 8m is simply supported at the ends as shown in fig. **(10)**  
Determine the max. Deflection in the beam.

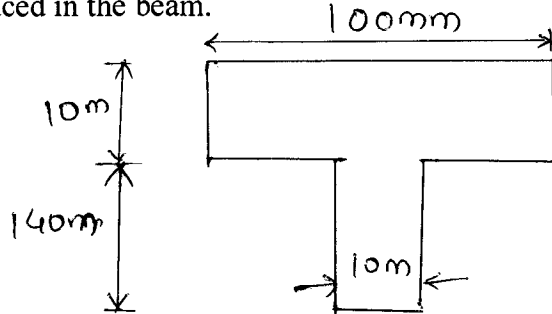
$E = 200 \times 10^6 \text{ KN/m}^2$ ,  $I = 80 \times 10^{-4} \text{ m}^4$



**P.T.O.**

OR

- Q.3 A simply supported beam of 5m span a u.d.l. 2 KN/ m over entire span. (10)  
The cross section of beam is shown in fig. Find out max. bending stress induced in the beam.



- Q.4 Draw shear stress distribution on a T-section 160×15 mm deep (web) and 200×30 mm wide. The section is symmetric about vertical axis. The Shear force applied is 110KN. (10)

OR

- Q.4 A hollow shaft whose internal diameter is 0.55 times it's external diameter and his to replace a solid shaft of the same material to transmit the same power after same speed. Find the ratio of external diameter of hollow shaft to the diameter of solid shaft. Find also the % saving in the weight. (10)
- Q.5 Find the greatest length of mild steel rod 25mm × 25mm which can be used as a compression member with one end fixed and other end free to carry a working load of 50KN. Allow factor safety of 5. Take  $\alpha = \frac{1}{7500}$ ,  $f_c = 320N / mm^2$  (10)

OR

- Q.5 A hollow cast iron column, 5m long is fixed at both end and has an external diameter of 30mm. The column supports an axial load of 1200KN. Find the internal diameter of the column. Assume  $\alpha = 1/1600$  and  $f_c = 550Mpa$ . (10)
- Q.6 At a point in a strained material the normal stresses acting are + 50Mpa and -30Mpa at a plane right angle to each other with a shear stresses of 20Mpa. Determine (10)
- Principal stresses and their nature
  - Normal and tangential stress on a plane inclined at angle of  $25^\circ$  with the plane of + 50Mpa.

OR

- Q.6 Define equivalent torque and equivalent moment. A solid shaft of 60mm diameter has to resist a bending moment of 450 KN-m accompanied by torque 360KN-m calculate maximum principal stress induced in the shaft. Also calculate the maximum shear stress reduced. (10)

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