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SE-6127

B. E. - II (Sem. - III) (Chemical) Examination

April / May – 2011

Strength of Materials - I

Time : **3** Hours] [Total Marks : **100**

Instructions :

(1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ B. E. - 2 (SEM. - 3) (CHEMICAL)

Name of the Subject :

☛ STRENGTH OF MATERIALS - 1

☛ Subject Code No. : 6 1 2 7 ☛ Section No. (1, 2,.....) : Nil

Seat No. :

Student's Signature

(2) Answer must be written in same answer book.
(3) Figures to the **right** indicates full marks.
(4) Assume any additional data if required and mentioned it clearly.
(5) Justify your answers with suitable diagrams.

1 (a) Fill in the blanks : **5**

(i) The ratio of change in volume of body to its original volume is called _____.

(ii) The point at which the B.M.D. changes the sign from positive to negative is termed as _____.

(iii) _____ is defined as the ratio of load and cross sectional area.

(iv) The equation of Tortional strength is _____.

(v) Resistance to impact is called as _____.

(b) State following statements are true or False : **5**

(i) The ratio of change in length to original length is termed as volumetric strain.

(ii) The shear force diagram changes the sign in continuous beam.

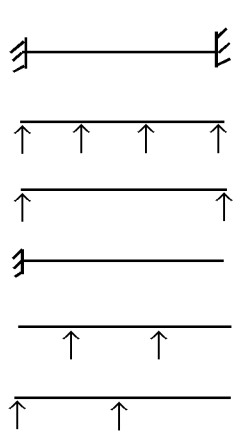
(iii) Percentage elongation is the measure of bending moment.

(iv) Torsion induce shear stress in the material of shaft.

(v) The stress is always inversly proportional to strain within elastic limit.

(c) Match list A with B. **6**

A		B
(i)	Cantilever beam	(a)
(ii)	Simply supported beam	(b)
(iii)	Over hanging beam	(c)
(iv)	Fixed beam	(d)
(v)	Continuous beam	(e)
(vi)	Over hanging beam (on both side)	(f)



2 Draw S.F.D. and B.M.D. for the beam as shown in figure No.1. Also locate the point of contraflexure if any. **14**

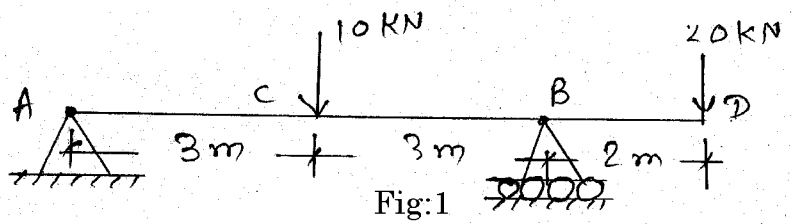


Fig:1

3 Attempt any **two** : **20**

(i) Derive the equation of deformation of uniformly tappering bar, subjected to axial force P.

(ii) Define following :

(a) Elasticity

(b) Ductility

(c) Hardness

(d) Toughness

(e) Strength

(iii) Determine the diameter of a solid shaft which will transmit 50 kw at 100rpm. if the shear stress in the shaft is limited to 50 N/mm^2. Find also length of the shaft, if the twist must not exceed 0.5 degree over the entire length.

Take C=80,000 N/mm^2

(iv) Find the force 'P' for the bar as shown in Figure No.2. Also find the elongation of bar. Take E=2$\times$10^{5}N/mm^2. The cross sectional area of the bar is 4727 mm^2.

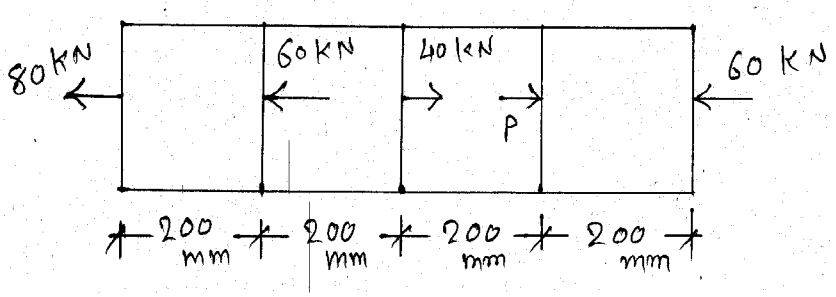


Fig 2

4 (a) Explain following : **6**

(i) Importance of laboratory testing of materials.

(ii) Modulus of rupture, modulus of elasticity, modulus of rigidity.

(b) A simply supported beam has span of 2 m and carries a UDL of 200 KN/m over the entire span. The cross section of beam is a T section as shown in Figure 3. Calculate the maximum shear stress in the beam. Draw the shear stress distribution diagram. **10**

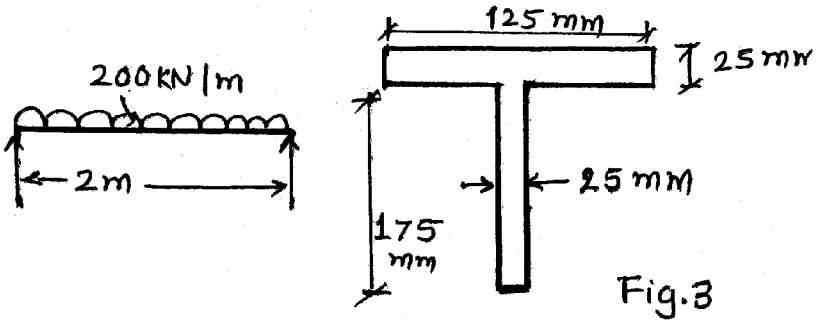


Fig.3

5 (a) Attempt any two of the following : **18**

(i) Explain with neat sketches end/support conditions and failure patterns observed in column under compression.

(ii) In a two dimensional stress system, a body is subjected to two perpendicular stresses and a shear stress as shown in Figure. 4. Determine magnitude and direction of principal stresses. Also plot Mohr's circle diagram.

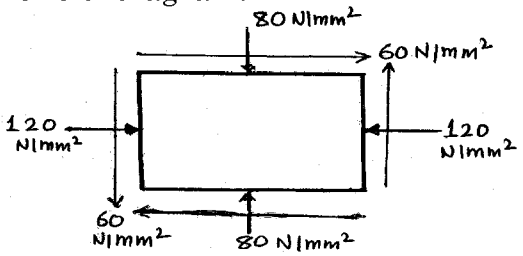


Fig.4

(iii) Compare the crippling loads given by Rankine's and Euler's formulae for tubular strut 225 cm long having outer and inner dia of 37.5 mm and 32.5mm respectively, loaded through pin joints at both ends, (yield stress = 315 MPa, $\alpha = \frac{1}{7500}$, E=200 GPa)
If elastic limit for the material is taken as 200 MPa, below what length of the strut does the Euler formula ceases to apply ?

6 (a) Explain following : **6**

(i) Sketch loading arrangement in transverse test on wooden beam. Also draw SFD and BMD for this test.

(ii) BHN and VHN. Draw the punching images obtain in this two tests.

(b) Two wooden planks of 5 cm X 15 cm each connected together to form a cross section of a beam as shown in Figure 5. If a bending moment of 3400 N.m. is applied around the horizontal neutral axis. Find the stresses at the extreme fibers of the beam. Also calculate the tensile force on the cross section. **10**

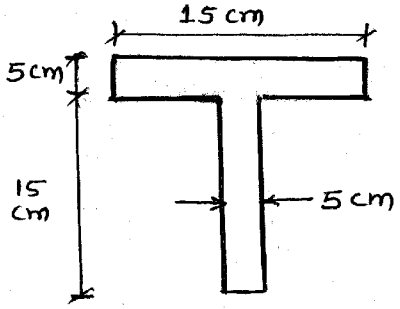


Fig.5