Total No. of Printed Pages:3

SUBJECT CODE NO:- H-429
FACULTY OF SCIENCE AND TECHNOLOGY
S.E. (Mechanical)
Strength of Material
(REVISED)

[Time: Three Hours] **[Max.Marks:80]**

Please check whether you have got the right question paper.

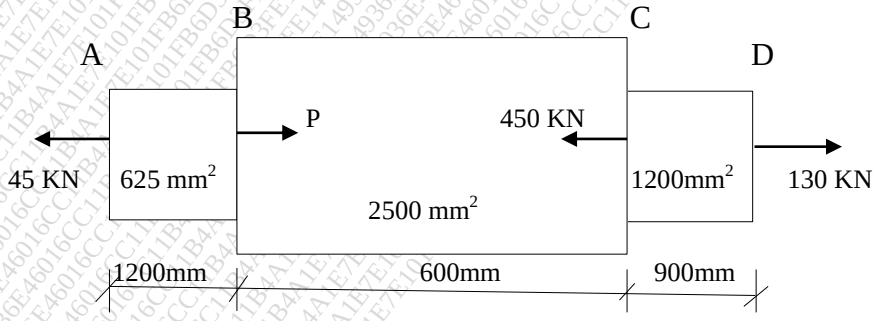
N.B i) Question No.1 & 6 are compulsory attempt any two from remaining each section.
ii) Figures to right indicate full marks.
iii) Assume suitable data if necessary.

Section A

Q.1 Attempt any Five 10

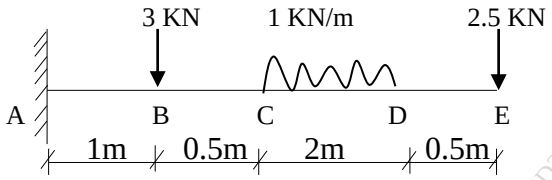
a) Define elasticity.
b) Define yielding.
c) State the relation between Bulk modulus and Young's modulus.
d) Define shear Force and bending moment
e) Define bending stresses.
f) Explain zero shear Force point
g) What is modulus of section for hollow rectangular and Hollow circular section?
h) Explain Poisson's Ratio.

Q.2 a. A member ABCD is subjected to a point load as shown in fig. Find force P necessary for equilibrium. Determine total elongation. 08
Take $E=2.1 \times 10^5$ N/mm^2.

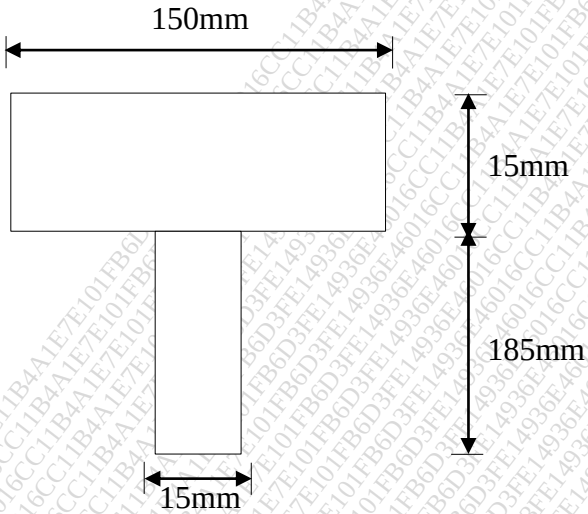


b. A steel rod 20mm in diameter and 1m long is heated through 100°C and at the same time subjected to a pull P. If the total extension of the rod is 2.5 mm, What should be the magnitude of P? Take $E=200 \times 10^3$ N/mm^2 07
$\alpha = 12 \times 10^{-6}$/°C.

Q.3 Draw SFD & BMD for simply supported beam shown in figure. 15



Q.4 Calculate the maximum tensile and compressive bending stresses for T section shown in figure 15



T section carries a UDL of 30 KN/M, over the entire span of 6m.

Q.5 a) The shear force acting on a section of beam is 50 KN. The section of the beam is of T-shaped having flange 100mm x 20mm and web 20mm x 100mm. Draw shear stress distribution diagram and find maximum shear stress. 08

b) Derive the relation $E=3K(1-2\mu)$. 07

Section B

Q.6 Attempt any Five 10

a) Define polar moment of inertia
b) Define Strain Energy
c) Define modulus of resilience
d) What is the limit of eccentricity for rectangular section.
e) Define Hoop Stress
f) Define moment by double integration method.
g) What is mohr circle?
h) State Strain Energy Stored in body, when load is gradually applied.

Q.7 a) A Hollow tube 3m long, 60mm outside diameter is required to transmit 50 KW at 3 R.p.s. The maximum stress is 50 N/mm^2. Find, (1) Inside diameter (2) Angle of twist, $G=85 \times 10^3$ N/mm^2. 08

b) A 28mm diameter rod is 2.4m long and suspended in vertical position with coller at lower end . If body freely sliding 800N on the coller through a height of 65mm Find. 07

(i) Maximum Value of Instantaneous stress.
(ii) Maximum instantaneous elongation.
(iii) Static force to induce. Same maximum stress
Take $E=2 \times 10^5$ N/mm^2

Q.8 a) A boiler is subjected to an internal steam pressure of $2N/mm^2$. The thickness of boiler plate is 2 cm and permissible tensile stress is $120N/mm^2$. Find out the maximum diameter, when efficiency of longitudinal joint is 90% and that of circumferential joints is 40%. 08

b) A hollow circular column having external and internal diameters of 300mm and 250mm respectively carries a vertical load of 100 KN at the outer edge of the column. Calculate the maximum intensities of stress in section. 07

Q.9 At a point in a strained material, the principal stresses are $100N/mm^2$ (tensile) and 40 N/mm^2 (compressive). Determine the resultant stress in magnitude and direction on a plane inclined at 60° to the axis of the major principal stress. What is the maximum Intensities of shear stress in material at the point? 15

Q.10 A cantilever beam AB supports two point loads of 10 KN and 5 KN as shown in fig. Calculate the deflections at points B and C. Take E=200 GPa and $I=20 \times 10^6$ mm^4. 15