Total No. of Printed Pages:03

SUBJECT CODE NO:- H-428
FACULTY OF SCIENCE AND TECHNOLOGY
S.E. (Mech/Prod) (Sem-I)
Strength of Material
[OLD]

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

Please check whether you have got the right question paper.

N.B
1) Q.No.1 and Q.No.6 are compulsory.
2) Attempt any two questions from the remaining questions in each section.
3) Assume suitable data, if necessary

Section A

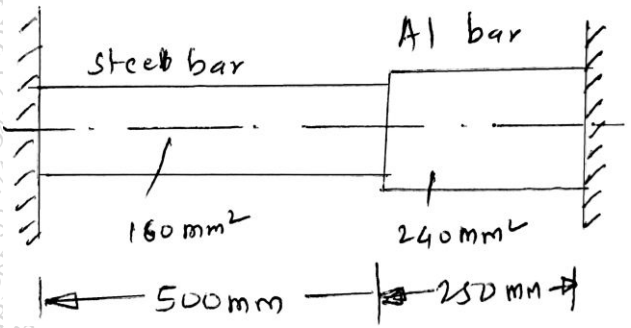
Q.1 Attempt any five 10

1. Define Hooks law
2. Define modulus of rigidity
3. What is yield point
4. Explain volumetric stress & strain
5. Define bulk modulus
6. State relation between shear force and Bending moment
7. State type of bending with example.
8. Explain type of beams
9. What is radius of gyration
10. Compare vertical and horizontal shear

Q.2 A composite bar made up of aluminium and steel is held between two supports a shown in figure 1. The bars are stress free at the temperature of 42^0c what will be the stresses in the two bars when the temperature drops to 24^0c if 15

a) The supports are un-yielding

b) The supports come nearer to each other by 0.1mm. The cross-sectional area of steel bar is 160 mm^2 and that of aluminium bar is 240 mm^2 Take E of aluminium as $0.7x10^5$ N/ mm^2 and steel $2x10^5$ N/ mm^2 $\alpha_{Al} = 24 \times 10^{-6}$ per^{0}c and $\alpha_{st} = 12 \times 10^{-6}$ per^{0}c



Q.3 a) Derive relation between modulus of elasticity and Bulk modulus 08

b) The modulus of rigidity for a material is 0.5×10^5 N/ mm^2 A 12 mm diameter 07

rod of the material was subjected to an axial pull of 14 KN and the change in diameter was observed to be 3.6×10^{-3} mm. Calculate Poisson's ratio and modulus of elasticity

Q.4 a) For the beam as shown in figure 2 draw BM and SF diagrams indicating principle values 10

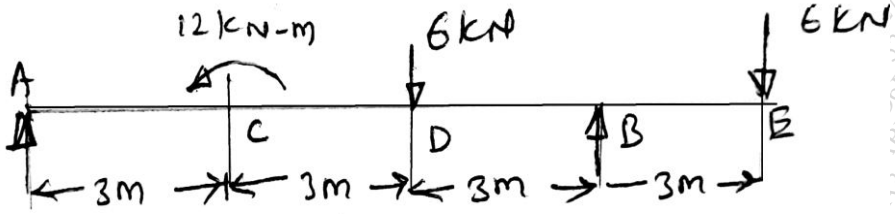


Figure 2

b) State assumption during analysing beam bending 05

Q.5 A 500×500 mm timber is strengthened by the addition of 500 mm $\times$ 8 mm steel plates secured to its top and bottom surface The composite beam is simply supported at its ends and carries a uniformly distributed load of 100 KN/m min over an effective span of 6m Find the maximum bending stresses in steel and timber at the mid span Take Es=2×10^5 N/ mm^2 $E_T = 0.1 \times 10^5$ N/ mm^2 15

Section B

Q.6 Attempt any five 10

1) Define Direct and bending stress
2) What is angle & twist
3) State torsional equation with usual notation
4) Define major principle stress
5) Define longitudinal stress
6) What is thin cylinder
7) Define proof resilience
8) Compare gradual and impact load
9) Define slope and deflection of beam
10) What is statically indeterminate beam

Q.7 a) A round steel rod ACB, 1.8 m long is firmly held at its ends A and B. AC is 1.2m and 50 mm dia, BC is 0.6 m and 40 mm dia. At C, a twisting couple of moment 580 NM is applied. Find the moment of resisting couples at A and B and the maximum shear stresses in parts AC and BC of the rod. 08

b) A hollow rectangular masonry pier 600 mm x 900 mm and 150 mm thick transmits a vertical load of 500 KN in a vertical plane bisecting the 900 mm side and at an eccentricity of 100 mm from the geometrical axes of the section. Determine the maximum and minimum stress intensities in the section. 07

Q.8 a) A piece of material is subjected to two perpendicular stresses as follows 08
a) Tensile stresses of 100 mpa and 60 mpa

b) Tensile stress of 100 mpa and compressive stress of 60 mpa
c) Compressive stress of 100 mpa and tensile stress of 60 mpa
d) Compressive stress of 100 mpa and 60 mpa
Determine normal and tangential stresses on a plane inclined at 30^0 to the plane of 100 MPa stress Also find the resultant and its indicators with the normal stress

b) What is principles plane and principles stresses? State its applications 07

Q.9 a) A hammer having a mass of 8 kg falls 1m on a 60 mm Cube iron block before coming to rest Find the distance the block will be compressed and the instantaneous stress induced in it Also, determine the velocity with which the hammer will strike the block $E=2.05x10^5$ N/mm^2 08

b) Derive an equation for change in dimension of thin cylinder due to internal fluid pressure 07

Q.10 For the given simply supported beam as shown in figure 3 Determine deflection of the free end and the maximum deflection between A and B 15
$E = 210$ GPa and $l = 20 \times 10^6$ mm^4