Total No. of Printed Pages:3

SUBJECT CODE:- 501
FACULTY OF ENGINEERING AND TECHNOLOGY
S.E.(Mech/Prod) Examination Nov/Dec 2015
Strength of Material
(Revised)

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

"Please check whether you have got the right question paper."

N.B i) Check whether you have got the right question paper.
ii) Question No. 1 &6 are compulsory.
iii) Solve any two questions from remaining questions for each section.
iv) Assume suitable data if necessary.

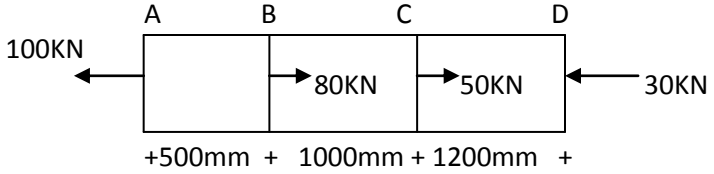
Section A

Q.1 Attempt any five 10

1) Define lateral strain.
2) Define modulus of elasticity.
3) Explain concept of pure bending.
4) Define point of contra flexure.
5) Define poisson's ration.
6) Define shear force.
7) Define neutral axis.
8) Write down assumptions in theory of pure bending.

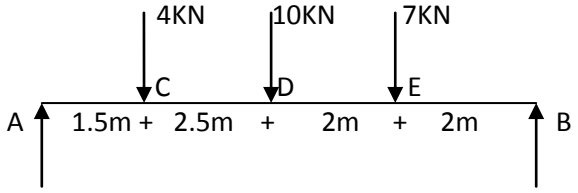
Q.2 a) Derive the relation between modulus of elasticity, Bulk modulus &Poisson's ratio. i.e.$E = 3K(1-2\mu)$. 07

b) A steel bar ABCD of C/S area of 500mm^2 is shown find elongation in the bar. Take$E = 80 \times 10^3 MPa$. 08



Q.3 a) Enlist different types of load 03

b) Draw S.F.D & B.M.D for the given beam. 12

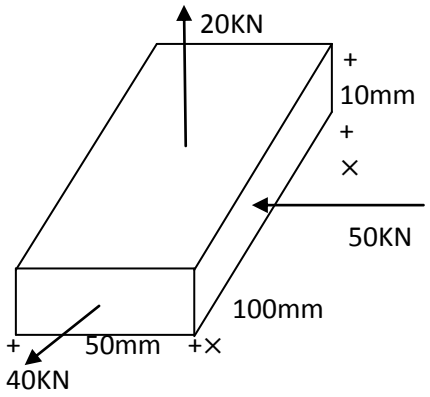


Q.4 a) Proof with usual notation that the shear. Stress at a layer in the section of beam is given by. $= \frac{S_{A\bar{Y}}}{I_B}$ 07

b) A steel beam of hollow section of outer side 1200mm & inner side 100mm is used on a span of 5m. The beam is subjected to U.d.l on entire span of intensity 25 KN/m & point load 50 KN at a distance of 2.5m from left end. Determine the max^m bending stress in the beam. 08

Q.5 a) A steel rod 20mm in dia& 200mm long is heated through 100^0C & at the same time subjected to load P(pun). If the total extension of rod, is 0.3mm, what should be the magnitude of 'P' Take $E = 2 \times 10^5 mpa$. $\alpha = 12 \times 10^{-6}/^0$C. 07

b) Forces acting on a piece of material. Find strain in each direction & change in volume. 08



Take
E=150Gpa
$\mu = 0.25$

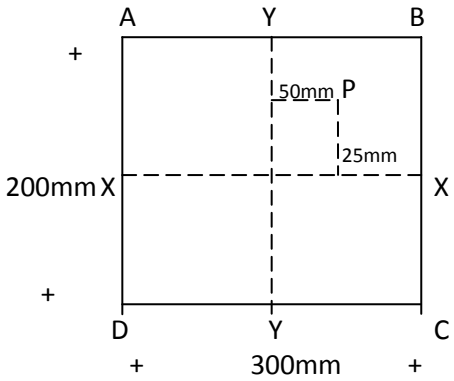
SECTION-B

Q.6 Attempt any five. 10

1) Define Hoop stress.
2) Define strain energy.
3) Define (Impact/dropping) load.
4) Define principal plane.
5) Define angle of obliquity for principal stress.
6) Define slope & deflection.
7) Define angle of twist.
8) Write down the assumptions in theory of torsion.

Q.7 a) A hollow circular shaft 200mm external. Diameter & 160mm internal diameter transmitting power at 180 RPM the angle of twist on a length of 2m is found tube 0.550. Calculate power transmitted &max^m shear stress. Take$G = 0.8 \times 10^5 mpa$. 07

b) A rectangular column $300mm \times 200mm$ is subjected. To a compressive load of 450KN at a point 'P' as shown in fig. find intensities of stress at all the four corner of the column. 08

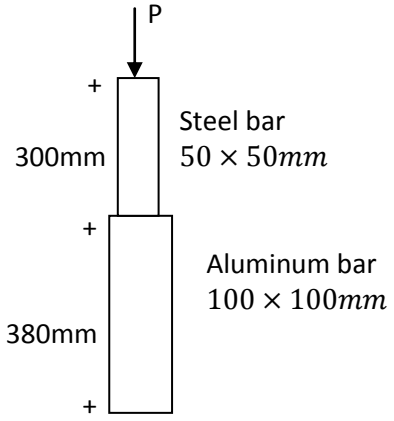


Q.8 a) A cylindrical thin drum 1m in diameter & 3m long has a shell thickness of 10mm. if the drum is subjected to an internal pressure of 2.5 N/mm2. Determine 07

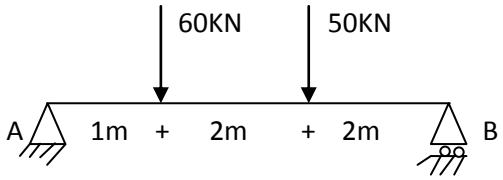
i) Change in diameter
ii) Change in length
iii) Change in volume

Take $E = 2 \times 10^5 N/mm^2$ $\mu = 0.3$

b) A member formed by connecting a steel bar to an alluminium bar is shown in fig. assuming thatbar's are prevented from buckling sidewise calculate the magnitude of force 'P' that will cause the total length of member to decrease by 0.25 mm. the values of the elastic modulus for steel &alluminium are $2.1 \times 10^5 mpa$ & $0.7 \times 105\ mpa$ resp. what is total work done by force 'P'. 08

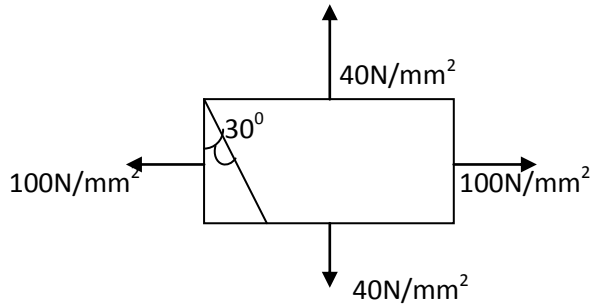


Q.9 A simply supported beam AB is loaded. With two point loads 60KN & 50KN at a distance 1m & 3m resp. from 'A'. Determine position & magnitude of max^m deflection by using. McCausley's method. 15



E=200GPa
I=8500*10^4mm^4

Q.10 a) The tensile stresses at a point across two mutually perpendicular planes are 100N/mm^2& 40 Nmm^2. Find graphically the normal & tangential stresses on a plane inclined at 300 with the major principal plane. Also find resultant stress & angle of obliquity. Use Mohr's circle method. 08



b) Find the maximum torque that can be safely applied to a shaft of 80mm dia. The permissible angle of twist is 1.50 in a length of 5m & shear stress not to exceed 42 mpa. Take G=84 Gpa. 07