SUBJECT CODE NO:- P-140

FACULTY OF ENGINEERING AND TECHNOLOGY

S.E.(Mech/Prod) Examination May/June 2017

Strength of Material

(Revised)

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

Please check whether you have got the right question paper.

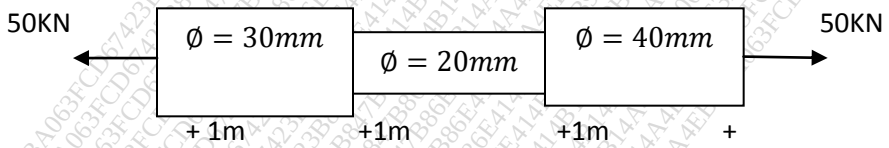
N.B i) Q.No.1 and Q.No.6 are compulsory. Attempt any two questions from the remaining questions in each section
ii) Figure to the right indicate full marks
iii) Assume suitable data if necessary

Section A

Q.1 Attempt any five 10

1) Define sagging bending moment
2) Explain Poisson ration
3) Define lateral strain
4) Define modulus of elasticity
5) Define section modulus
6) Define thermal stress
7) Define point of contra flexure

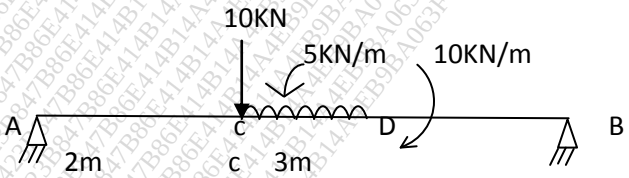
Q.2 a) A copper bar loaded as shown in figure determine total elongation. E=150 GPa 07



b) A steel cube of 150mm side is subjected to force of 12KN(T), 14KN (C) & 10KN (T) along X, Y, Z direction respectively determine the changes in volume of steel cube E=200 KN/mm^2 $\mu = 0.25$ also find strain in X-direction 08

Q.3 a) Write down the different types of load 03

b) Draw S.F.D & B.M.D for the following loaded beam & also calculate maximum Bending moment 12



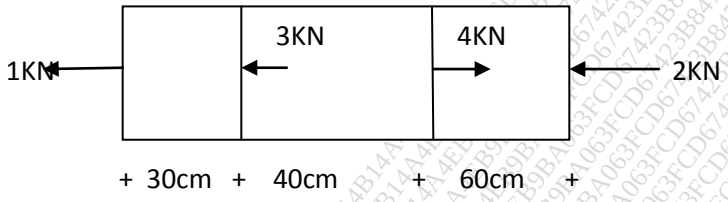
Q.4 a) A simply supported beam is required to carry a central concentrated load of 70 KN. span of beam is 4m if allowable stress is 20mpa & radius of curvature is 120mm . find minimum dimension of cross –section of the beam if it is to be 08

i) Rectangular (dept =2 width)
ii) Circular (E=200Gpa)

b) Show that bending shear stress at a point within C/S is given by $\tau = \frac{SA\bar{Y}}{Ib} with$ usual notations 07

2017

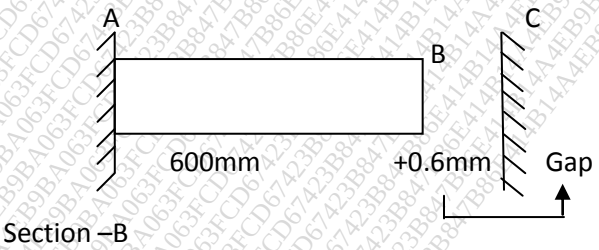
Q.5 a) A bar of uniform C/S area 10cm^2 is subjected to the forces as shown in figure, calculate change in length of the bar. take E=2 X 10 ^{5}N/mm^2 07



b) Figure shows copper rod AB of length 600mm when the temperature of rod is 25^{o}C the gap of BC is 0.6mm determine stress & strain in rod when its temperature is 100^{o}C 08

E=100Gpa

$\propto = 16 \times 10^{-6/c}$



Section –B

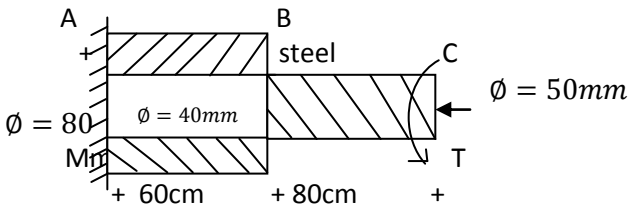
Q.6 Attempt <u>any five</u> 10

1) Define condition for no tension
2) Torsional rigidity
3) Define polar modulus
4) Define middle third rule
5) What is core or kernel of a section
6) Why hollow shaft is economical than solid shaft
7) Define strain energy

Q.7 a) A short column of external diameter 450mm and internal diameter 225mm carries on eccentric load 90KN .find the greatest eccentricity which the load can have without producing tension of the cross –section 07

b) Hallow shaft is to have an outside diameter is 'd' and inside diameter is d/2 calculate the minimum value of 'd' if is to be transmit 350kW at 100 RPM with working stress of 35N/mm^2 determine twist in length 10 times the external diameter 08
Take G=8X10^4 N/mm^2

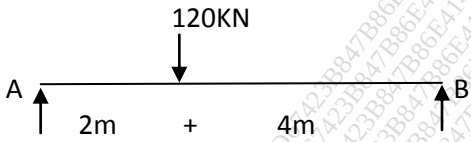
Q.8 a) A compound shaft is made of steel shaft & brass tube as shown in fig. what is twisting moment at free end if allowable shear stress in steel & brass are 70 MPa &50 mpa respectively maximum angle of twist should not exceed 2^o 08
G steel= 80X10^{3}mpa
G brass = 35 X10^{3}mpa



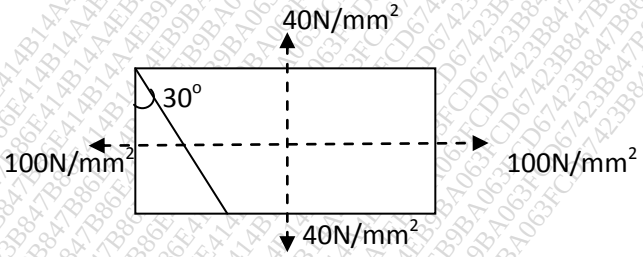
2017

b) A bar of 60mm diameter 200cm long is fixed at upper end and provided with a collar at the lower end. A weight of 500 KN is dropped on the collar from the height ot 250mm take E=200Gpa & find 07
Instances stress, elongation & strain energy

Q.9 A simple supported beam carrying a point load is shown in fig. determine slope at point A & B and maximum deflection .using Mc culays method take E=200 GPa 15
I=60 X $10^6 mm^4$



Q.10 The tensile stresses at a point across two mutually perpendicular planes are $100N/mm^2$ & $40N/mm^2$ find graphically the normal and tangential stresses on a plane inclined at 30^o with the major principal plane 15
Also find resultant stress & angle of obliquity use Mohr's circle method



2017