Ref. No. Ex. EX/CON/T/213/2018

B.E. CONSTRUCTION ENGINEERING SECOND YEAR FIRST SEMESTER-2018

SUBJECT STRENGTH OF MATERIALS

Time : Three hours **Full Marks : 100**

Part-I

Use Separate Answer scripts for each Part

No of Questions	Question	Marks
	Answer any Four Questions	
Q1.	a) Draw the stress-strain diagram of structural steel and mark the relevant points. b) Define (i) Proportional limit, (ii) Elastic limit, (iii) Modulus of resilience. c) Explain what do you understand by ductile and brittle material.	12.5
Q2.	A steel specimen of 15mm diameter extends by 0.081mm over a gauge length of 150mm when subjected to an axial load of 15 KN. The same specimen undergoes a twist of 0.307° over a length of 150mm for a twisting moment of 15N-m. Using the above data, determine the elastic modulus E, Poisson's ratio μ, shear modulus G and bulk modulus K.	12.5
Q3.	A plane element is subjected to stresses as shown in Fig. A. Draw Mohr's Circle and determine a) The principal stress and their directions. b) The maximum shear stress and the direction of the planes on which they occur.	12.5

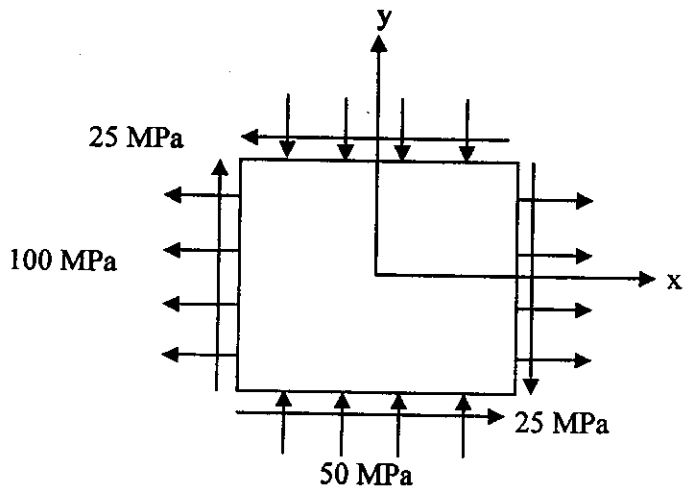


Fig. A

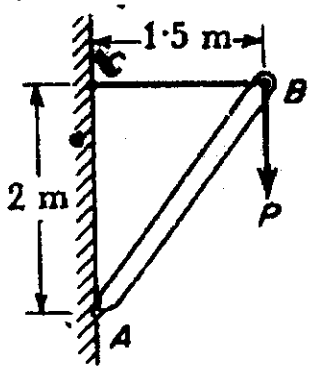
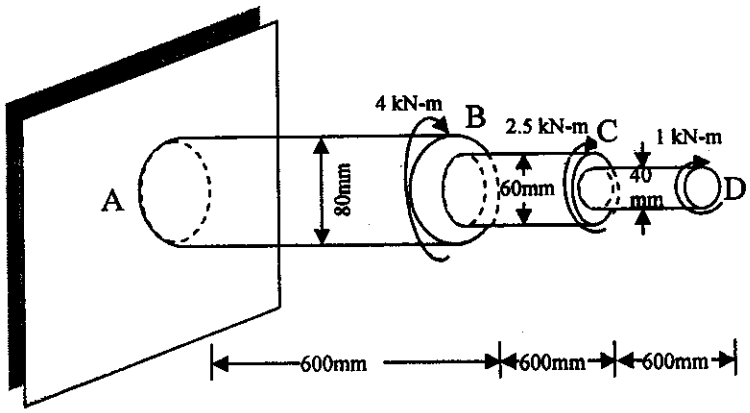
Ref. No. Ex. EX/CON/T/2

B.E. CONSTRUCTION ENGINEERING SECOND YEAR FIRST SEMESTER-2018

SUBJECT STRENGTH OF MATERIALS

Time : Three hours **Full Mark**

Part-I

No of Questions	Question	Mark
Q4.	For the simple structure shown in Fig. B, member BC is a steel wire having diameter d = 3 mm and member AB is a wood strut of 25 mm x 25 mm square cross section. Calculate the horizontal and vertical components of the displacement of point B due to a vertical load P = 2 KN acting as shown. For steel $E_s = 2 \times 10^5$ N/mm², for wood $E_w = 1 \times 10^3$ N/mm².	12.5
	 **Fig. B**	
Q5.	A thin cylindrical shell is 1.5m in diameter and 3.0m in length. The thickness of the cylinder is 20mm. A uniform presence of 4 N/mm² is applied inside the cylinder. Find the i) Hoop stress and strain, ii) longitudinal stress and strain Assume $\mu = 0.3$, $E = 2 \times 10^5$ N/mm²	12.5
Q6.	A stepped shaft is subjected to couples in same directions at change in the section and at free ends as shown in fig. C. The length of each prismatic circular portion is 600mm and diameters are 80mm, 60mm and 40mm from the fixed end to the free end respectively. Find (i) the angle of twist ϕ in degree at the free end (ii) calculate the maximum shear stress in the shaft. Assume G = 80 GPa,	12.5
	 **Fig. C**	
Q7.	A solid brass rod of diameter d = 63mm has a steel sleeve with wall thickness t = 6mm solidly fused onto it for reinforcement. What is the safe torque for the compound shaft if $G_s = 84(10)^3$ N/mm², $G_b = 35(10)^3$ N/mm², $(T_w)_s = 84$ N/mm², $(T_w)_b = 52.5$ N/mm². What is the ratio of this torque to that which the brass rod alone could safely carry?	12.5

EX/CON/T/21

R-2018

Full Mark

ef no: Ex/CON/T/213/2017

Year : **B.E. Construction Engineering - Second Year - First Semester , Subject code:CON/T/213**

ubject :**Strength of Materials**

PART - II

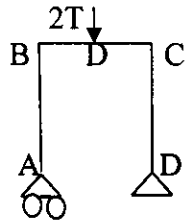
nswer all **5X7=35**

i) What do you mean by determinate and indeterminate structures? Give examples of two determinate and ir indeterminate structures?
) Mention with sketches the types of support and their reactions?
(iii) M/I=E/R=α/y, mention each notation through a neat sketch where notation have their usual meaning.
(iv) A simply supported beam is uniformly loaded with 1T.Mtr/Mtr **u.d.m** all through the beam (Length L). Draw its B.M.D.
(v) Depth of a beam is generally more than its width- give your explaination.
(vi) What do you mean by point of contraflexure? Establish the relationship between B.M &S.F.
(vii) What are the types of loading ? Can we tell the type of loading from B.M.D?

7.5X2=15

ABC is a beam –hinged at A & roller support at B and end C is free. AB=2.5 mtr, BC= 0.75mtr. There is a concentrated load of 1 Ton at point C. Draw the B.M.D and S.F.D.

Draw the free body diagrams for the following determinate portal members i.e. for AB, BC & CD.



AB=BC=CD=2BD=3Mtr