Form A : Paper-setting Blank Ref. No. ...*EX/CE/T/126/2018*

.....*BECivil Engineering 1st Year*... EXAMINATION, *2018*
(1st / 2nd Semester / ~~Repeat / Supplementary / Annual / Bi-Annual~~)

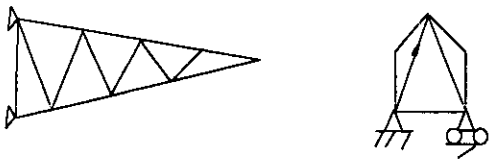
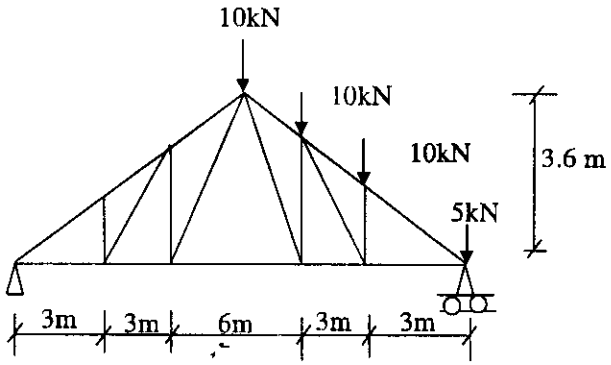
SUBJECT .....*Structural Mechanics - I*
(Name in full)

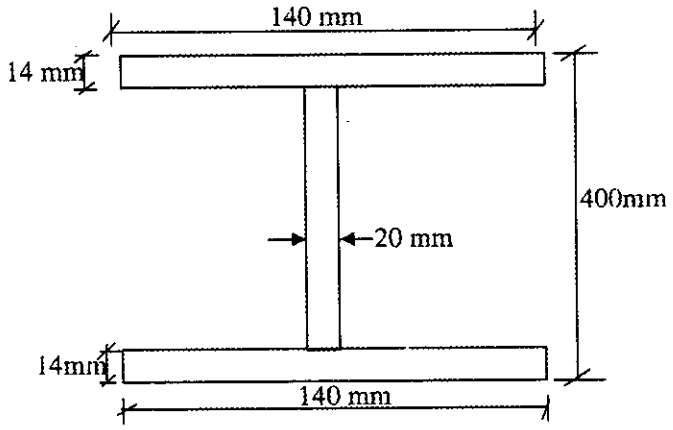
PAPER .....*XX*.....

Full Marks 100
(60 marks for part 1)

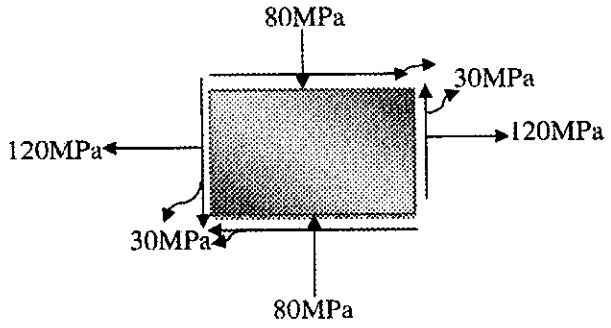
Time: ~~Two hours~~/Three hours/~~Four hours/Six hours~~

Use a separate Answer-Script for each part

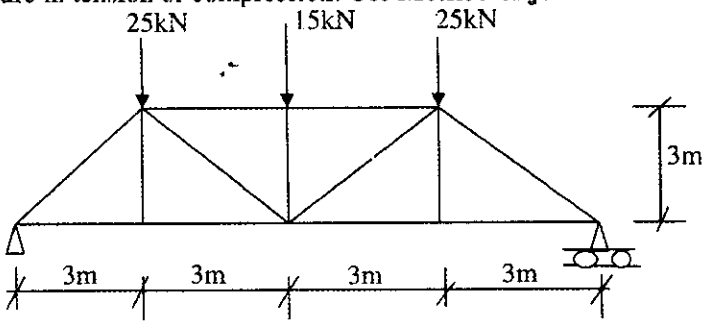
No. of Questions	PART I **Answer Q.1 and any two from the rest**	Marks
1.		
a)	State the assumptions for theory of pure bending.	5
b)	Prove that $\tau = \frac{VQ}{Ib}$, the notations have their usual meaning.	5
c)	Determine the total, internal and external indeterminacies of the trusses sown bellow. 	5
d)	Identify the zero force members of the truss shown below. 	5
e)	Show that for rectangular section, $\tau_{max}=1.5\tau_{av}$, where, τ_{max} and τ_{av} are maximum shear stress and average shear stress respectively.	5
f)	A bar of rectangular section 200mm × 400mm is subjected to an axial tensile force of 1500kN. Find the maximum shear stress in the bar and on which plane does it act?	5
2.	Draw the shear stress distribution for I-section given below. The section is subjected to a shear force of 350 kN. Also find the maximum shear stress and the location where the maximum shear stress occurs.	15



3. Draw the Mohr's circle for the stress element given bellow. From this Mohr's circle find the stresses on the plane whose normal is inclined at 25^0(anticlockwise) to the positive X-axis. Find maximum shear stress and the planes at which it acts. Also find the normal stress on these planes. 15



4. Determine the force in each member of the truss shown in figure given bellow. State if the members are in tension or compression. Use **Method of joints**. 15



Form A: Paper –Setting Blank Ref No. –Ex/CE/T/126/2018

CIVIL ENGG. 1ST YEAR 2ND SEMESTER EXAM 2018
(1st / 2nd Semester ~~/ Repeat / Supplementary / Annual / Bianual~~)
SUBJECT: Structural Mechanics-I
(Name in full)

Full Marks 40

Time: ~~Two hours~~/Three hours/~~Four hours/ Six hours~~

Use a separate Answer-Script for each part

Question	PART – II	No.
	Answer any FOUR	
1.	Draw labeled SFD and BMD of the following simply supported beam loaded as shown in Figure 1. Also show the position and value of maximum SF and BM.	10
2.	Analyze the hinged beam as shown in Figure 2 and draw labeled SF and BM diagram. Show the maximum bending moment and shear force values.	10
3. i)	Young's Modulus of Elasticity and Poisson's ratio of a material are 25000N/mm^2 and 0.16 respectively. What is its Modulus of Rigidity?	2
ii)	What is Proof Stress?	3
iii)	Obtain loading pattern from the available SFD for the beam as shown in Fig. 3.	5
4. i)	Find equivalent steel section of the flitched beam as shown in the figure 4.	4+6= 10
ii)	Hence find maximum moment of resistance if the stresses in steel and wood are not to exceed 130 N/mm^2 and 6.5 N/mm^2 respectively. Given $E_s = 2\times10^5$N/mm^2 , $E_w = 1\times10^4$N/mm^2.	
5.i)	A solid circular shaft has a length of 2m and diameter of 80mm. calculate maximum shear stress and the angle of twist due to a torque of 10KN-m. Given G=85GPa.	5
ii)	Explain the term Equivalent Torque and Equivalent Bending Moment.	5

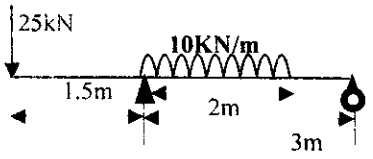


Figure 1

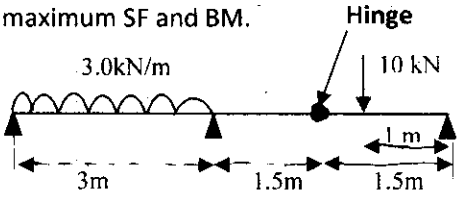


Figure 2

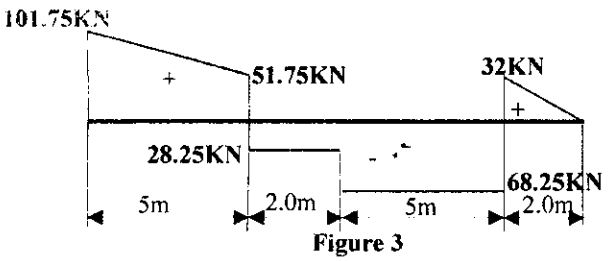


Figure 3

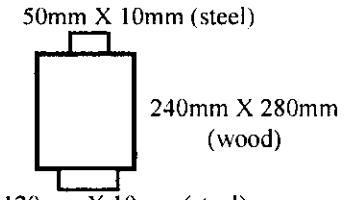


Figure 4