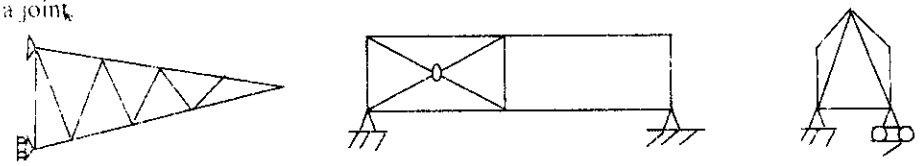
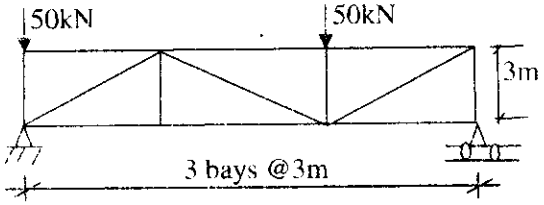
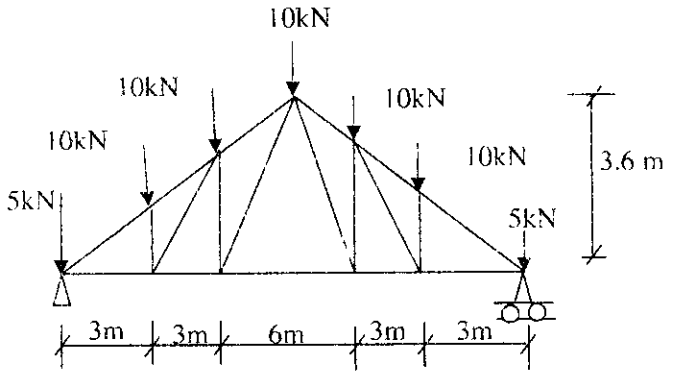
.....*B. Civil Engineering 1st Year*... EXAMINATION. *2017*
(1st / 2nd Semester / ~~Repeat / Supplementary / Annual / Bi-Annual~~)

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

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

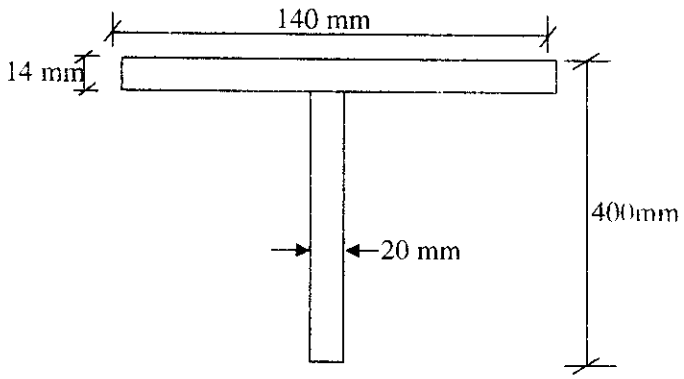
Full Marks 100
(60 marks for part II)

Time ~~Two hours~~/Three hours/~~Four hours/Six hours~~
Use a separate Answer-Script for each part

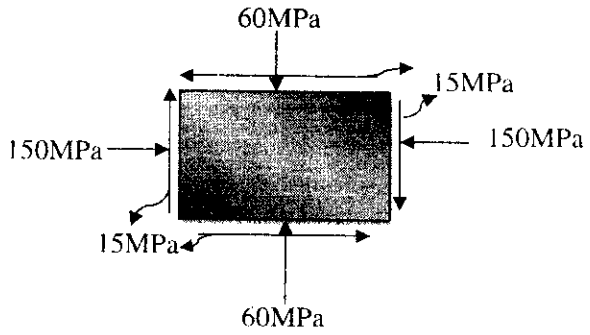
No. of Questions	PART I **Answer Q.1 and any two from the rest**	Marks
1. a)	Determine the total, internal and external indeterminacies of the given trusses. This " 0" is not a joint. 	5
b)	Identify the zero force members of the truss shown below. 	5
c)	Determine the force in each member of the roof truss shown in figure given bellow. State if the members are in tension or compression. 	20
2. a)	A short bar of rectangular cross section (25mm × 50mm) is subjected to an axial compressive force of 50 kN. Find the stresses on a plane whose normal makes angle of 40^0(anticlockwise) with longitudinal axis. What is the maximum shear stress in the bar and on which plane does it act?	8

b) A rectangular section of 250mm × 450mm is used in a beam. Find the moment of resistance of the section. Permissible stresses are 15 N/mm^2 in compression and 8 N/mm^2 in tension. 7

3. Draw the shear stress distribution for T-section given below. The section is subjected to a shear force of 250 kN. Also find the maximum shear stress and the location where the maximum shear stress occurs. 15



4. 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 15^0(clockwise) 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



Form A: Paper –Setting Blank Ref No. –Ex/CE/T/126/2017

CIVIL ENGG. 1ST YEAR 2ND SEMESTER EXAM 2017

(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

No. of 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)	Draw and explain the stress-strain diagram of Mild Steel Bar subjected to axial tension.	5+5= 10
ii)	The figure shows the SFD over a simply supported beam as shown in figure 3. What can you say about the loading over this length? Draw the corresponding BMD.	
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 140 N/mm^2 and 7 N/mm^2 respectively. Given $E_s = 2\times10^5$N/mm^2 , $E_w = 1\times10^4$N/mm^2 .	
5.i)	Prove that, for pure torsion, $\zeta/r = G\theta/L = T/J$ where, ζ = shear stress at radius r, G= Modulus of rigidity θ= angle of twist, L=length of shaft T= Torsional moment, J= Polar moment of Inertia	6+4= 10
ii)	A hollow steel shaft has outer diameter 100mm and thickness 15mm. calculate shear stress developed on elements at the outer and inner surfaces respectively, due to a torque of 7000N-m.	

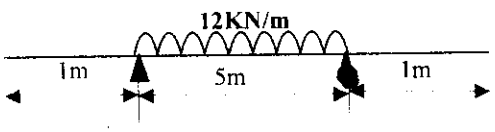


Figure 1

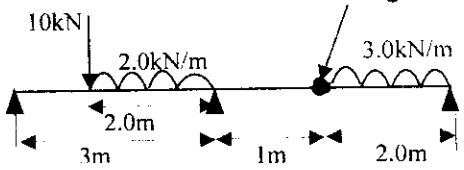


Figure 2

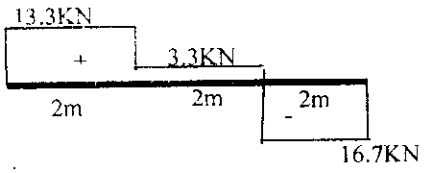


Figure 3

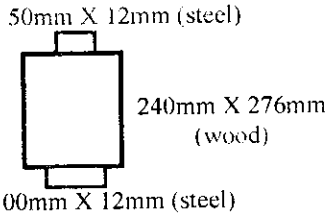


Figure 4