Ex/CE/T/222/2017

Bachelor of Engineering Civil Engineering

Second year , Second Semester examination , 2017

Theory of Structures I

Time: 3 hours | Use separate answer script for each part

Full marks : 100

The figures in the margin indicate full marks

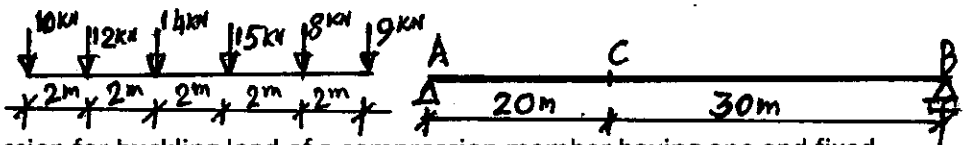
Part I (65 marks)

Assume reasonable value of any data if required

Answer any two questions

$25+7\frac{1}{2} = 32\frac{1}{2}$

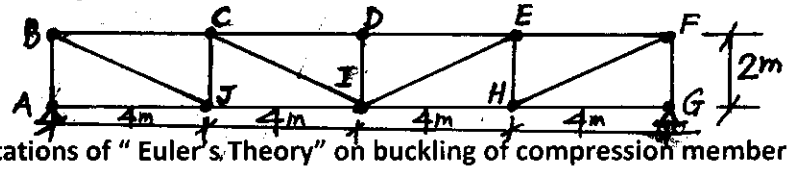
1. (a) A train of wheel load is moving from left to right through a simply supported girder AB as shown below. Find out (i) Maximum bending moment at ' C ' (ii) Maximum positive and negative shear force at ' C ' (iii) Absolute maximum bending moment (iv) Absolute maximum shear force



(b) Deduce the expression for buckling load of a compression member having one end fixed and the other end hinged.

$25+7\frac{1}{2} = 32\frac{1}{2}$

2. (a) Draw ILD of the bar force CJ,CB, CD, CI and JI of the truss as supported shown below. Unit load is moving through the bottom chord of the truss.



(b) Discuss the limitations of " Euler's Theory" on buckling of compression member .

$15+7\frac{1}{2}+10 = 32\frac{1}{2}$

3. (a) Deduce the expression for deflection of a beam-column carrying a uniformly distributed load and an axial compressive load .

(b) A steel bar , both ends hinged, 35mm x 40mm , 3m long , is subjected to a gradually increasing axial compressive load . Find the maximum lateral deflection under buckling condition. Consider E_s = 2.2 x 105 N/mm^2 and yield stress of steel = 300 N/mm^2.

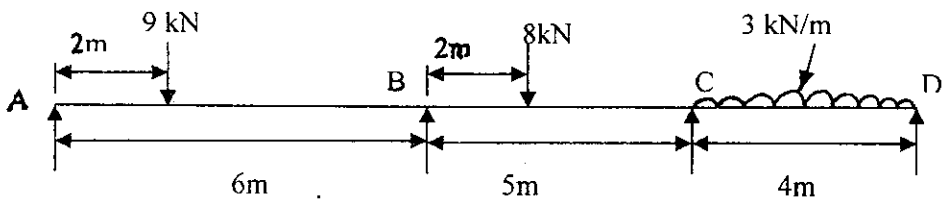
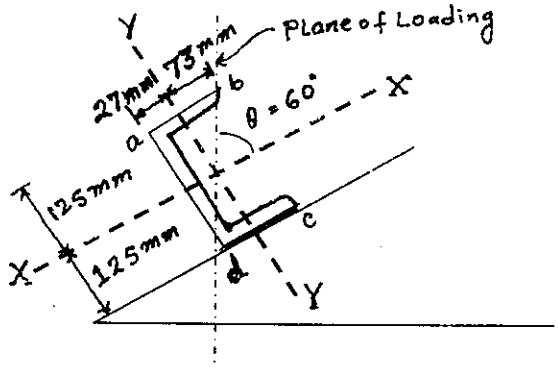
(c) Calculate the buckling load of a compression member of length 5m having both the ends fixed. Cross section of the member is a T-section having flange 500mm x 20mm and web 15mm x 280mm. E = 2 x 10^5 N/mm^2

B.E.CIVIL ENGINEERING SECOND YEAR SECOND SEM. EXAM. -2017

Subject: THEORY OF STRUCTURES- I **Time: Three Hours** **Full Marks 100**

PART-II (MARKS-35)

Use a separate Answer-Script for each part

No. of questions	Answer any 2 questions	Marks 17.5x2=35
1.	A continuous beam ABCD, Simply supported at A, B, C and D is loaded as shown in figure 1. Find the moments over the continuous support of the beam using theorem of three moments and draw the bending moment and shear force diagram  Figure 1.	17.5
2.	A channel section placed in an inclined position carries vertical loads as shown in figure 2. The applied moment is 8 kN-m. Calculate the extreme fiber stresses. It is given for the section Ixx = 3687.9 cm^4 and Iyy=298.4 cm^4. The plane of loading is inclined to the X-X axis at an angle 60 degree.  Figure 2	17.5

3.		12.5+5=17.5
a)	Show that for an I-section with unequal flanges shear centre lies on the axis of symmetry and divides the distance between the CG of the flanges in inverse ratio as to the moment of inertia of the flanges.	
b)	Find the shear centre for the I-section of unequal flanges as shown in figure 3.	

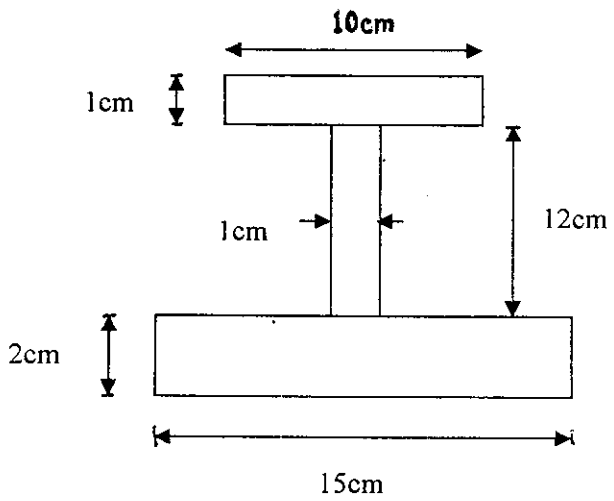


Figure 3