

B.E. CIVIL ENGINEERING  
SECOND YEAR -SECOND SEMESTER - 2018

Theory of Structures I

Time – 3hours

Full marks – 100

Figures in the margin indicates marks

Assume reasonable values of data , if required

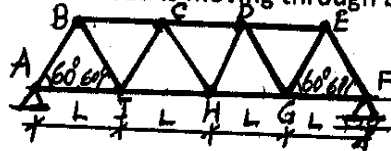
PART I ( 65 marks )

1. (a) What is the difference ILD and BMD? 4½ + (16 + 16½) = 32½  
(b) A train of wheel load 50KN, 40KN, 35KN, 55KN is moving from left to right (55KN leading) through a simply supported girder of span 45m. The distances between the loads is 2m. Calculate ( i ) Maximum bending moment, positive & negative shear forces at a section 15m from left support. (ii) Absolute maximum bending moment and shear force.

OR

2. (a) What is the application of ILD? 4½ + (16 + 16½) = 32½  
(b) A train of wheel load 40KN, 30KN, 35KN, 32KN, 45KN is moving from left to right (45KN leading) through a simply supported girder of span 48m. The distances between the loads is 2m. Calculate ( i ) Maximum bending moment, positive & negative shear forces at a section 16m from left support. (ii) Absolute maximum bending moment and shear force.

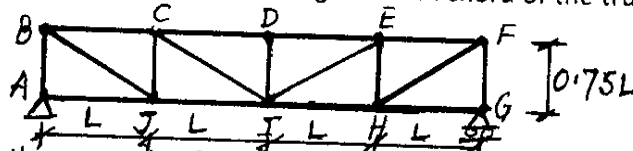
3. (a) Draw ILD of the bar forces CD, CH, IH, AB and AI of the truss as supported shown below. Unit load is moving through bottom chord of the truss. 18 + 10 + 4½ = 32½



- (b) Deduce the expression for deflection profile of a beam-column having both end hinged carrying a concentrated load 'W' at mid-span.  
(c) Discuss 'Rankine's theory' comparing with 'Euler's theory'

OR

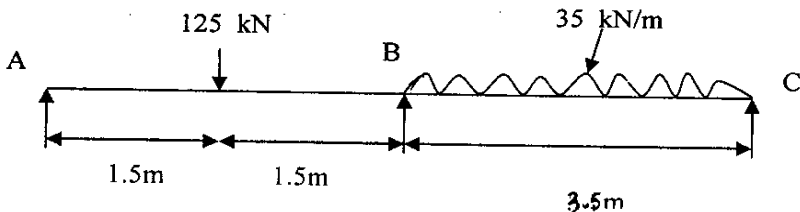
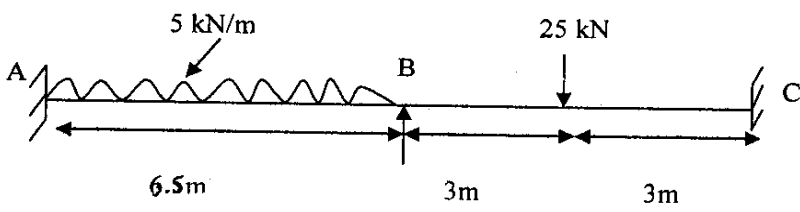
4. (a) Draw ILD of the bar forces CD, CI, II, DI and AB of the truss as supported shown below. Unit load is moving through bottom chord of the truss. 18 + 10 + 4½ = 32½



- (b) Deduce the expression for deflection profile of a beam-column having both end hinged carrying an uniformly distributed load on the entire span.  
(c) Discuss the limitations of 'Euler's theory'.

## PART-II (MARKS-35)

Use a separate Answer-Script for each part

No. of questions	Answer question no. 1 and 2	M
1.	<b>Answer question no. 1 and 2</b>	25
1.	<b><u>Answer either question a) or question b)</u></b>	25
a)	<p>A continuous beam ABC is loaded as shown in figure 1. Find the moment over the continuous support of the beam using theorem of three moments and draw the bending moment and shear force diagram. EI constant.</p>  <p style="text-align: center;">Figure 1.</p>	
b)	<p>A continuous beam ABC is loaded as shown in figure 2. Find the moments at supports of the beam using theorem of three moments and draw the bending moment and shear force diagram. EI constant.</p>  <p style="text-align: center;">Figure 2.</p>	

2.	<p style="text-align: center;"><b><u>Answer either question a) or question b)</u></b></p> <p>a) Show that sum of moments of inertia about any two mutually perpendicular axis of an angle section remains constant.</p> <p>b) 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.</p>	10
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