Assignment No: 01

Date: 03/07/2019

ENERGY PRINCIPLES

Sub Code 2150608 **Title of Subject** STRUCTURAL ANALYSIS - II

#	Questions
	CASTIGLIANO'S FIRST THEOREM
1	State and explain Castigliano's first theorem.
2	Determine the vertical deflection at free end in the overhanging beam as shown in ***Figure – 1***. Assume constant EI. Use Castigliano's method.
3	Find the displacement at B, as shown in ***Figure – 2*** by using Castigliano's theorem. $E = 2 \times 10^5$ N/mm^2.
4	A continuous beam of two equal spans L is uniformly loaded over its entire length. Find the magnitude R of the middle reaction by using the Castiglione's theorem.
5	Determine the vertical and horizontal deflection at free end for ***Figure – 3***, by using unit load method. EI is constant.
6	Determine the Θ_A, Θ_B, δ_C, δ_D for a beam shown in ***Figure – 4***. Take $EI = 10 \times 10^{13}$ Nmm^2.
7	Discuss the Castigliano's theorem. How it will be useful for the analysis of truss?
	CASTIGLIANO'S SECOND THEOREM
1	For continuous beam ABC as shown in ***Figure – 5***, determine support reactions with the use of Castigliano's theorem.
2	Find fixed end moments and reactions at supports for a fix beam shown in ***Figure – 6***.
3	Determine reactions at supports for a beam shown in ***Figure – 7***.
4	Analyse the Portal frame shown in ***Figure – 8*** by Castigliano's Second Theorem method.
5	Find the forces in the members BE and FC of the Truss as shown in ***Figure – 9***. The ratio of length of cross sectional area for all the members is same.
	UNIT LOAD METHOD
1	Using unit load method, find horizontal and vertical displacement at D of frame as shown in ***Figure – 3***. Take $E = 2 \times 10^5$ N/mm2and $I = 2 \times 10^8$ mm^4
2	Calculate the vertical displacement at free end C for the cantilever bent as shown in the ***Figure – 10***.
3	Determine the vertical deflection of joint "C" of the truss shown in ***Figure – 11*** by unit load method. The cross-sectional area of each member is 400 mm^2. $E = 2 \times 10^5$ N/mm^2.

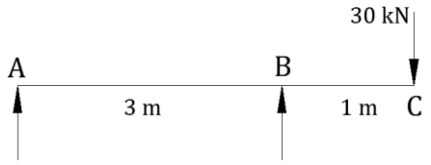


Figure- 1

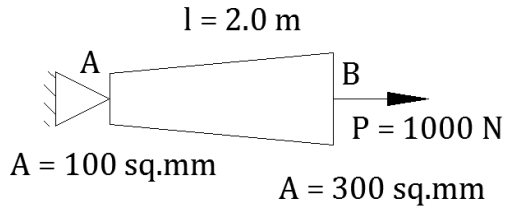


Figure- 2

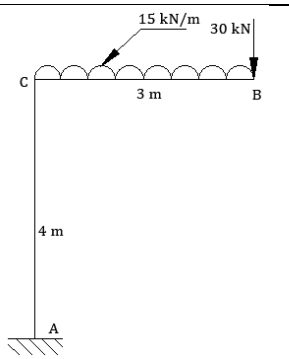


Figure- 3

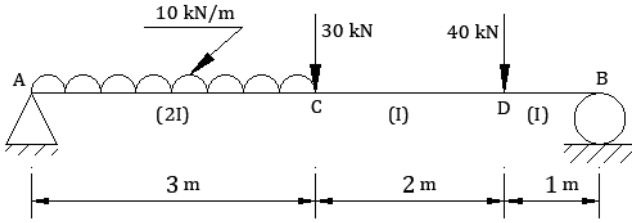


Figure- 4

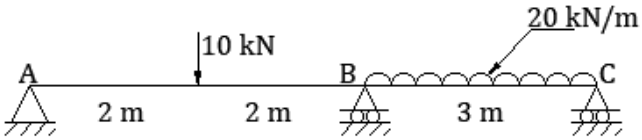


Figure- 5

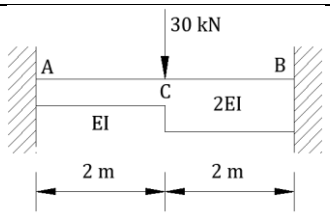


Figure- 6

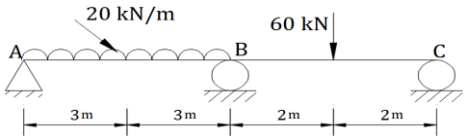


Figure- 7

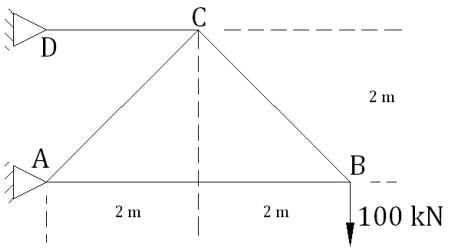


Figure – 11

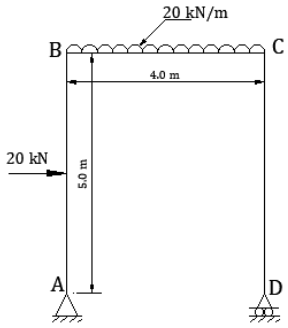


Figure- 8

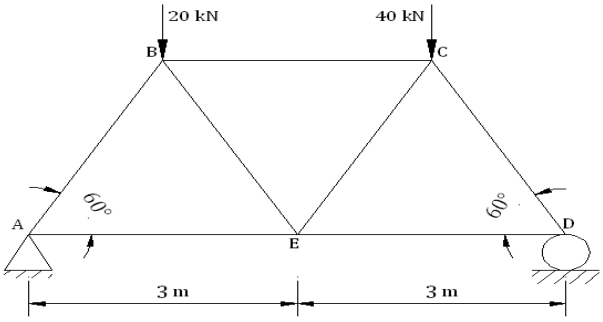


Figure – 9

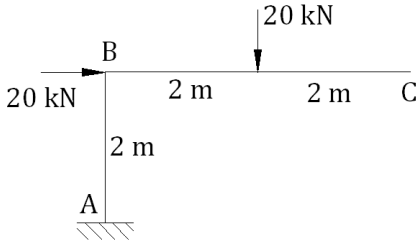


Figure – 10

Assignment No: 02
Date: 03/07/2019

MOMENT DISTRIBUTION METHOD

Sub Code 2150608 **Title of Subject** Structural Analysis - II

#	Questions
1	Explain: Carry over factor, Moment Distribution factor and Rotation contribution factor
2	Define the term 'sway'. Enlist the situation wherein say occur in portal frames.
3	Analyze the beam as shown in ***FIGURE – 1*** by moment distribution method and draw shear force and bending moment diagram. The beam has constant EI for both the spans.
4	Determine the support moment for a continuous beam as shown in ***FIGURE – 2*** by moment distribution method. Also draw bending moment diagram.
5	A beam AB is fixed at A and hinged at B. If the end B sinks by amount 'δ', what will be the moment developed at end A and at end B?
6	A fixed beam AB is of span 5 m. If one of the end settles by 10 mm, what will be the reaction developed at each support? E =200 X 10^3 N/mm^2, I = 3 X $10^7$$mm^4$.
7	For a continuous beam ABCD as shown in ***FIGURE – 3***, find the moments at all supports if , end A rotates by 0.002 radian in the clockwise order and the support B settles by 5 mm. E = 200 X 10^3 N/mm^2, I = 9 X 10^7 mm^4.
8	Analyze the frame as shown in ***FIGURE – 4***, by moment distribution method and draw shear force and bending moment diagram
9	Analyze the frame shown in ***FIGURE – 5*** with using moment distribution method. Draw bending moment diagram only
10	Analyse the portal frame shown in ***Figure – 6*** by moment distribution method and find only Final Moments.

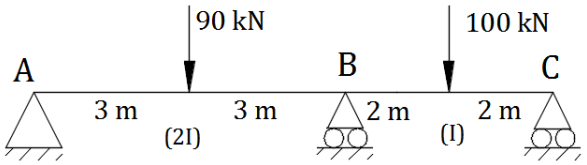


FIGURE – 1

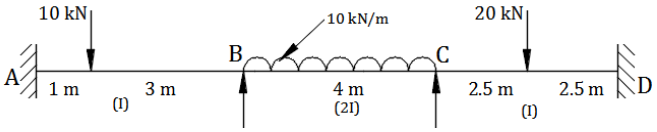


FIGURE – 2

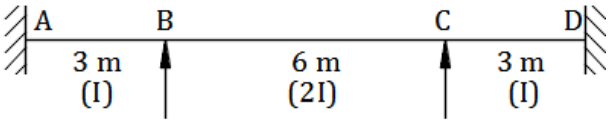


FIGURE – 3

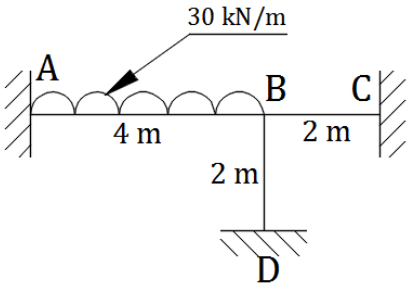


FIGURE – 4

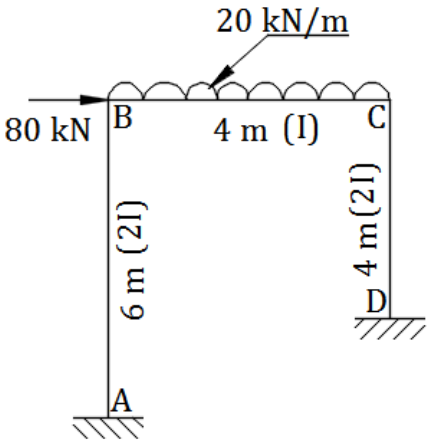


FIGURE – 5

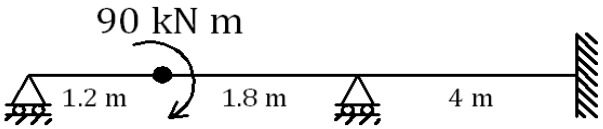


FIGURE - 6

Assignment No:	**03**	**SLOPE DEFLECTION METHOD**	
Date:	**03/07/2019**		
Sub Code	**2150608**	**Title of Subject**	**Structural Analysis - II**

#	Questions
1	Using slope deflection method analyses the beam as shown in ***FIGURE – 1***. Draw SFD and BMD both.
2	Analyse the beam shown in ***FIGURE – 2*** by slope deflection method and find unknown slopes at Joint B and C. Joint B sinks by 10 mm. E = 2 X 10^5 MPa and I = 16 X 10^7 mm^4.
3	Find the final moments at supports for the beam shown in ***FIGURE – 2*** and plot Shear Force and Bending Moment diagram both.
4	Determine the support moments using slope deflection method for the continuous girder shown in ***FIGURE – 3***, if the support B sinks by 2.5 mm. For all members Take E = 200 kN/mm^2 and I = 3.5 X 10 mm.
5	Determine the support moments using slope deflection method for the frame as shown in ***FIGURE – 4***. Also draw Bending Moment diagram.
6	A beam AB of uniform section of span 8 m and constant EI = 4.0 X 10^4 Nm^2 is partially fixed at ends when the beam carries a point load of 100 kN at distance of 4 m from the left end A. The following displacements were observed. (i) Rotation at A = 0.015 rad (clockwise) and settlement at A = 15 mm (ii) Rotation at B = 0.0080 rad (anticlockwise) and settlement at B = 20 mm Analyse using Slope Deflection Method.

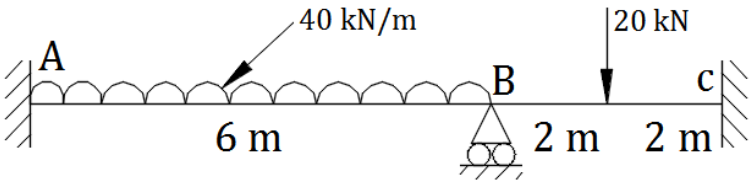


FIGURE – 1

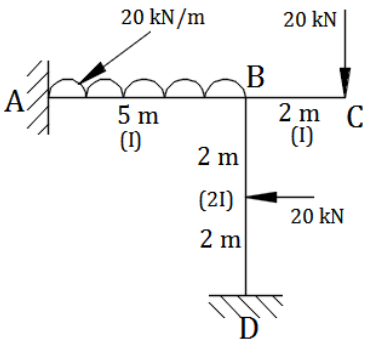


FIGURE – 4

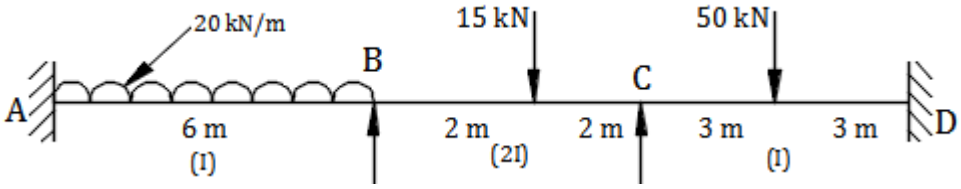


FIGURE – 2

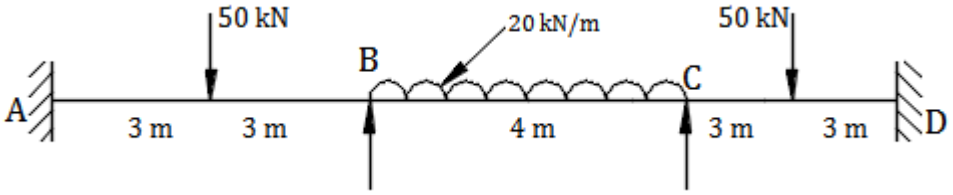
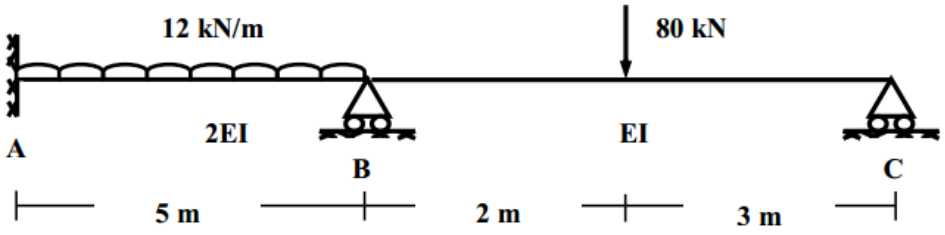
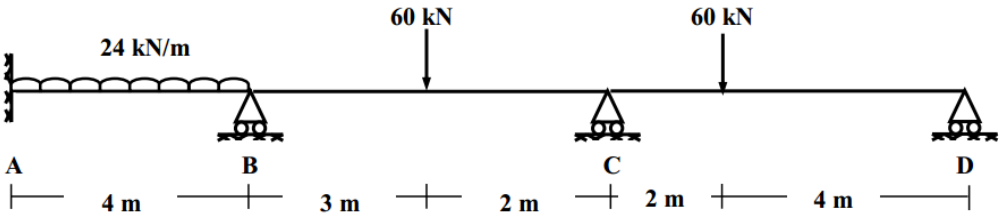
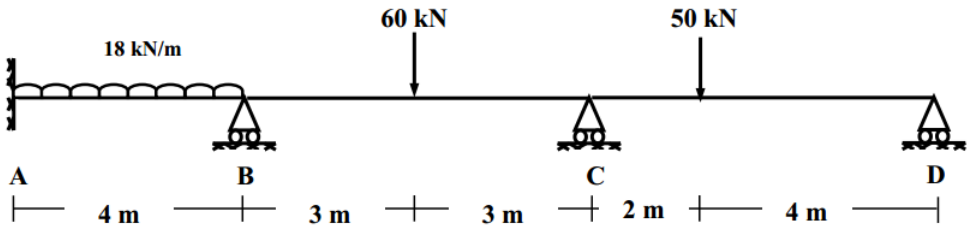
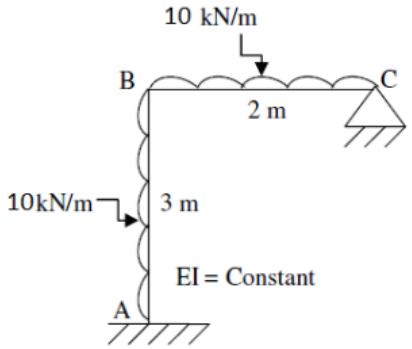
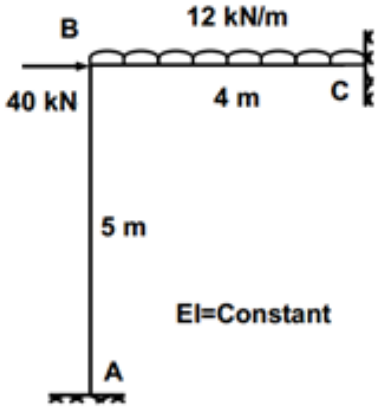


FIGURE – 3

Assignment No:	**04**	**MATRIX METHODS**	
Date:	**03/07/2019**		
Sub Code	**2150608**	**Title of Subject**	**STRUCTURAL ANALYSIS - II**

#	Questions
1	Differentiate between stiffness and flexibility.
2	Give characteristics of stiffness and flexibility matrix. Also prove the product of Stiffness and Flexibility is unit
3	Formulate Displacement Matrix for a propped cantilever beam of span 4 m subjected to a central point load of 40 kN.
4	A propped cantilever beam of span 6 m is subjected to point load at center. Analyse the beam using flexibility method and draw shear force and bending moment diagrams.
5	Analyse the beam as shown in **Figure** using stiffness method and draw SFD and BMD. 
6	Analyse the beam as shown in Figure using stiffness method and draw SFD and BMD. 
7	Using stiffness method formulate displacement matrix, reactions and draw Shear force and bending moment diagram for the beam shown in Figure. 

8	Analyse the plane frame as shown in **Figure** below using flexibility method. 
9	Analyse the plane frame as shown in Figure below using flexibility method. 

Assignment No:	**05**	**INFLUENCE LINES**	
Date:	**03/07/2019**		
Sub Code	**2150608**	**Title of Subject**	**Structural Analysis - II**

#	Questions
1	State the Importance of the Influence Lines. Give the Difference between Influence Line Diagram and Shear Force & Bending Moment Diagrams
2	A simply supported beam AB has a span of 8 m. Draw influence lines for R_A, R_B, V_X & M_X for a section 3 m from left end support
3	A train of loads as shown in ***Figure – 1*** crosses a simply supported girder of span 18 m from left to right. Calculate maximum SF & BM at section 8 m from left.
4	Draw the influence line diagram for the beam shown in ***Figure – 2***, (i) the reaction at A, (ii) the reaction at C, (iii) the shear at B.
5	Two wheel loads of 16 kN & 8 kN at a fixed distance apart of 2 m, cross a beam of 10 m span. Draw the influence line for B.M & S.F for a point 4 m from the left abutment & find the maximum B.M & S.F at that point.
6	A simple support beam of span 30 m is loaded by a train of six wheel loads each of equal magnitude 5 kN and separated by 2 m distance. Calculate the maximum positive and negative shear force and bending moment at 10 m from left support.
7	A uniformly distributed load of 12 kN/m and 3 m length crosses a simply supported girder of span 10 m from left to right. Draw influence line for shear force and bending moment at 4 m from left hand and find maximum shear force and bending moment at this section. Refer ***Figure - 3***.
8	Draw Influence Line diagram for forces in the members U_2U_3, L_1L_2, U_3L_3, U_2L_3 and L_1U_2 of a Truss as shown in ***Figure - 4***.

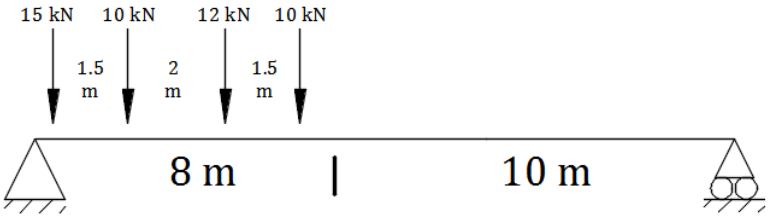


FIGURE – 1

FIGURE – 2

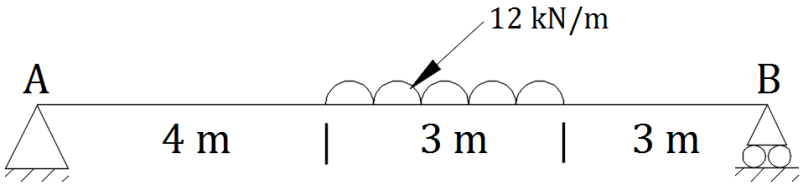


FIGURE – 3

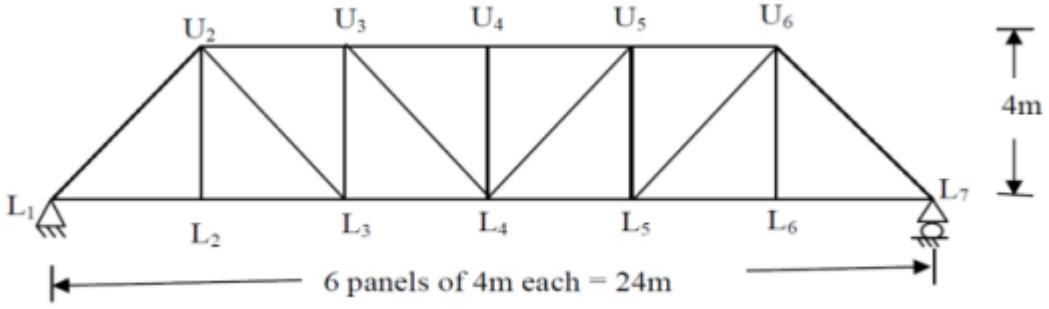


FIGURE – 4