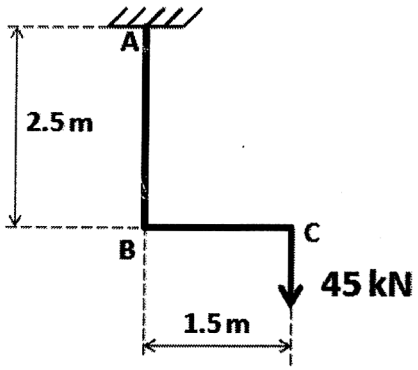
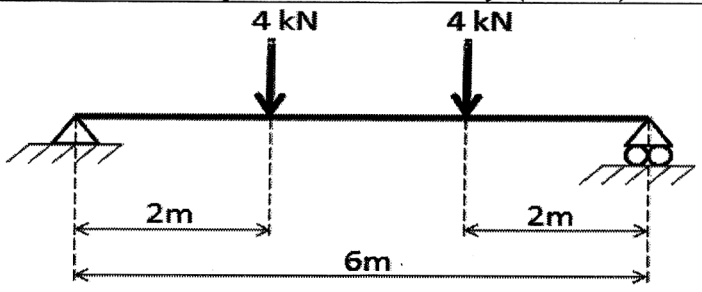
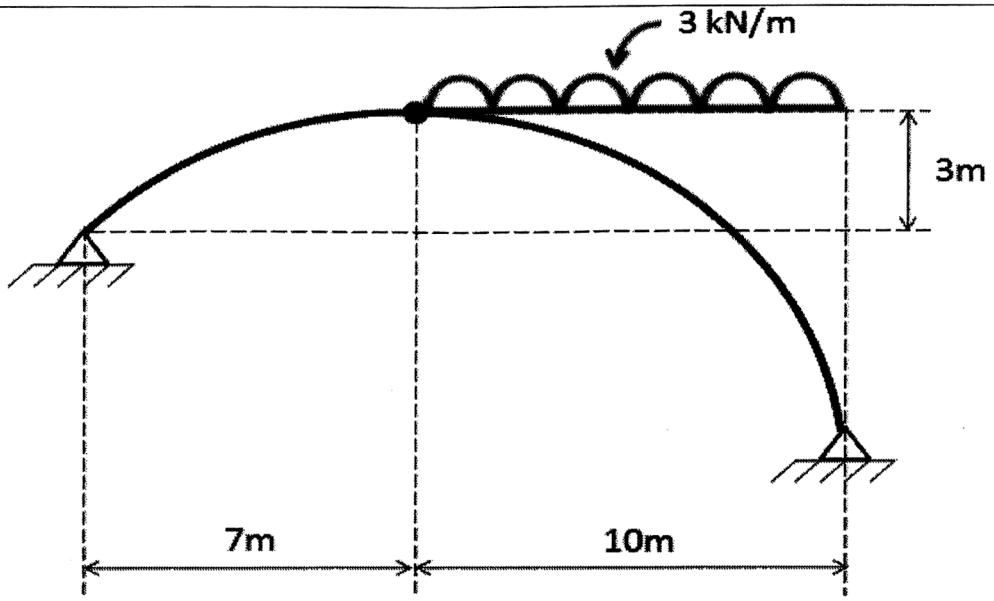
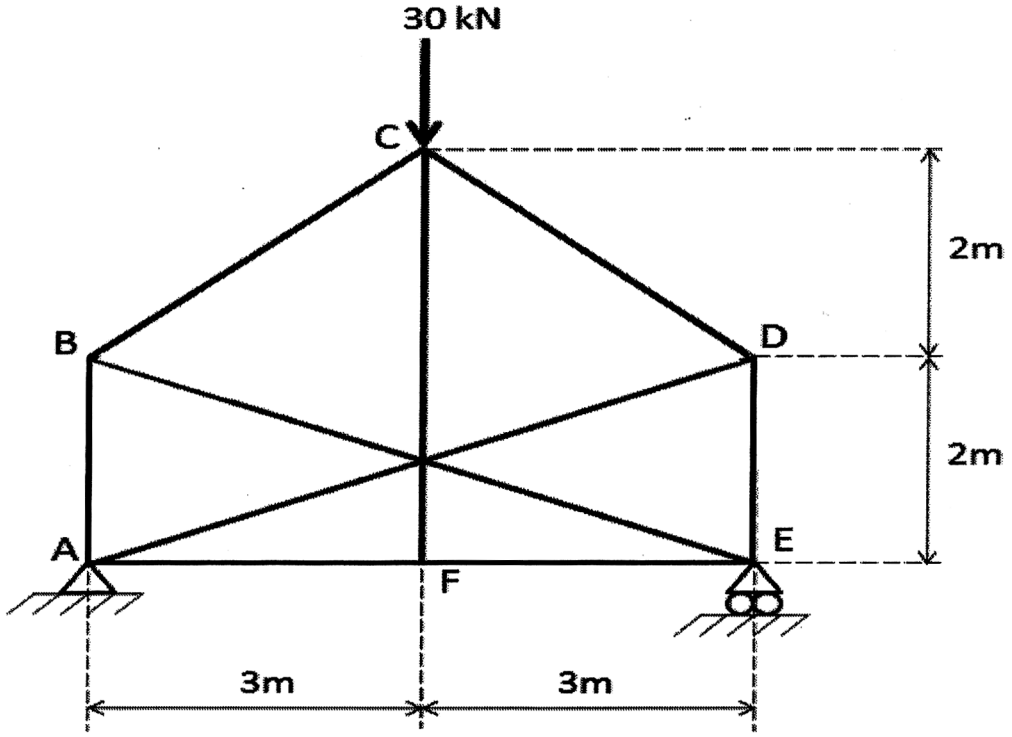
Ref. No.: Ex/CE/5/T/105/2022

Name of the Examination: BACHELOR OF ENGINEERING (CIVIL ENGINEERING)
Subject : STRUCTURAL MECHANICS- II

Full Marks: 100

Instructions:	
I	All notations represent their standard relevant meaning.
II	If you feel that any data or condition is/are missing in any question, please assume relevant inputs and mention the same.

Sl No	**Question**	**Marks**
1	 Figure: 01 (No Scale) Consider the system from Figure: 01 and determine the vertical deflection (in mm) in the direction of loading at C using Elastic Strain Energy. The flexural rigidity (EI) of member AB and BC are respectively 3.6×10^{13} N-mm^2 and 1.8×10^{13} N-mm^2. (15 marks) For a system like above, how the complementary elastic strain energy relates to slope/deflection at any point? Explain by Castigliano's theorem. (5 marks)	20
2	Consider a cantilever beam of length L and flexural rigidity EI where a concentrated load P is acting vertically at free end. Find the slope and vertical deflection at mid-point of the beam using Double Integration Method. (8 marks) If load P is applied vertically at mid-point instead of free end, determine the slope and vertical deflection at free end of the beam using Moment area method. (8 marks) Can the relationships of force and displacement of the above two cases together be justified by Clark Maxwell's reciprocal theorem? Justify. (4 marks)	20
3	 Figure: 02 (No Scale) Consider the simply supported beam subjected to concentrated loads from Figure:02 and determine slopes at supports and vertical deflection at mid point of the beam using Conjugate Beam Method. Consider the flexural rigidity (EI) of the member as 1.8×10^{13} N-mm^2.	20

4	 Figure: 03 (No Scale) Consider the 3 hinged parabolic arch with supports at different levels from Figure: 03 and determine bending moment, normal thrust and radial shear at a point on the arch which is located at a distance of 4m inwards from the left support.	20
5	 Figure: 04 (No Scale) Consider the truss from Figure: 04 where the joints of the truss A,B,C,D,E & F are shown and determine all the member forces and mention the same with the figure with proper notations showing the nature of member forces.	20