



FACULTY OF ENGINEERING
DEPARTMENT OF CIVIL ENGINEERING
FIRST SEMESTER EXAMINATION (MARCH 2018)
2017/2018 ACADEMIC SESSION

HOD'S SIGNATURE

Instructions:

- 1) Attempt any four Questions
- 2) Time Allowed: 3 hours
- 3) SEVERE PENALTIES APPLY FOR MISCONDUCT,
CHEATING, POSSESSION OF UNAUTHORIZED
MATERIALS DURING EXAMINATION

Course Title: STRUCTURAL ANALYSIS I

Course Code: CVE 405

ELIZADE UNIVERSITY, ILARA-MOKIN
FACULTY OF ENGINEERING
DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING
FIRST SEMESTER 2017/2018 EXAMINATIONS

Course Title: STRUCTURAL ANALYSIS I **Course Code:** CVE 405

Instructions: Attempt ANY FOUR questions **Time allowed:** 3 hours. **Units:** 3

Question 1 (25 marks)

Determine the reactions for the frame shown in Figure Q1 by the method of least work. Take $EI = \text{Constant}$

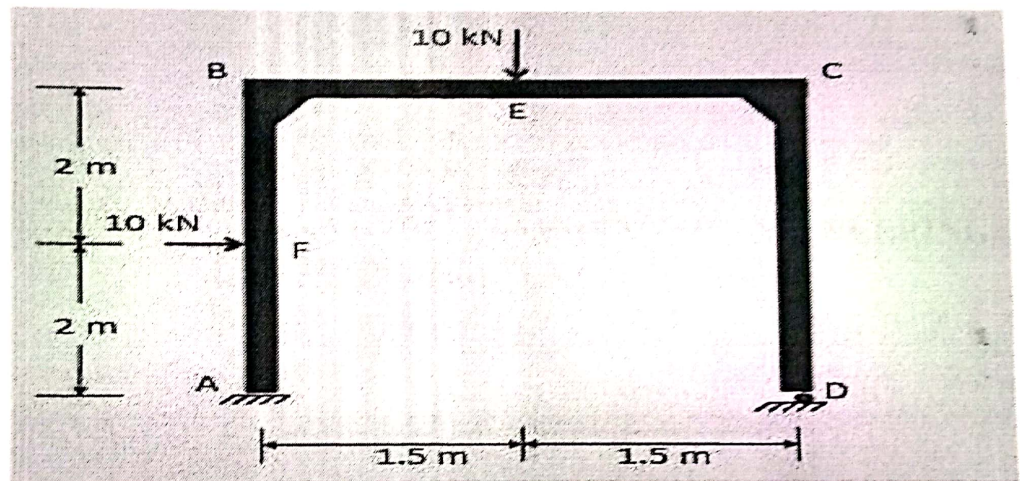


Figure Q1: A frame with 2 External Loads

Question 2 (25 marks)

Determine the reactions for the beam shown Figure Q2 by the method of least work. Take $EI = \text{Constant}$

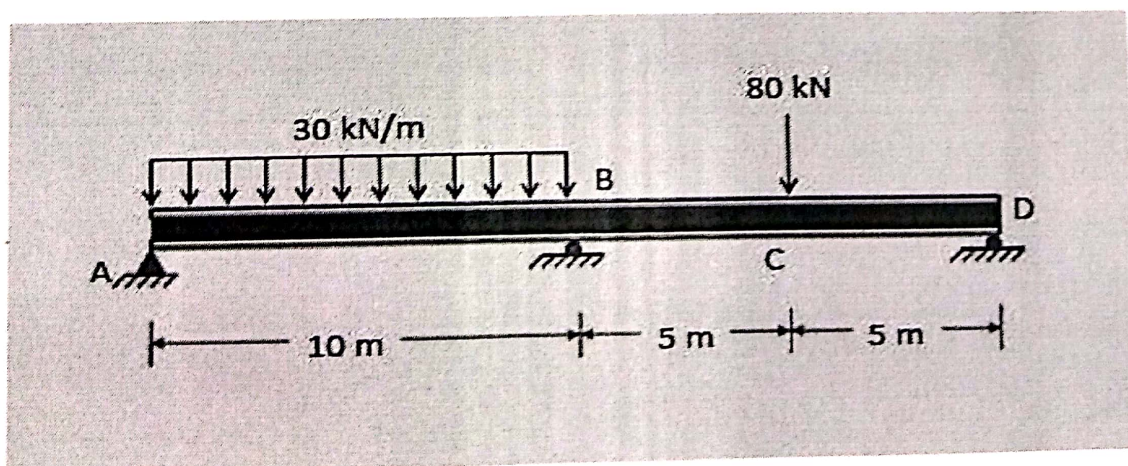


Figure Q2: A Beam with 2 External Loads

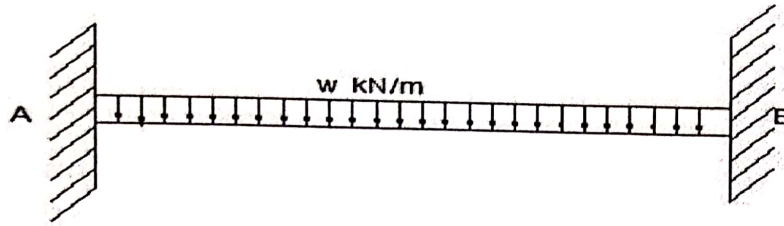


Figure Q4b: A Beam with a w uniform External Load

Question 5 (25 marks)

Determine the reactions for the truss shown in Figure Q5 by the method of least work. Number in brackets () are areas $\times 10^{-3}$ Take $E = 200 \text{ MNm}^2$

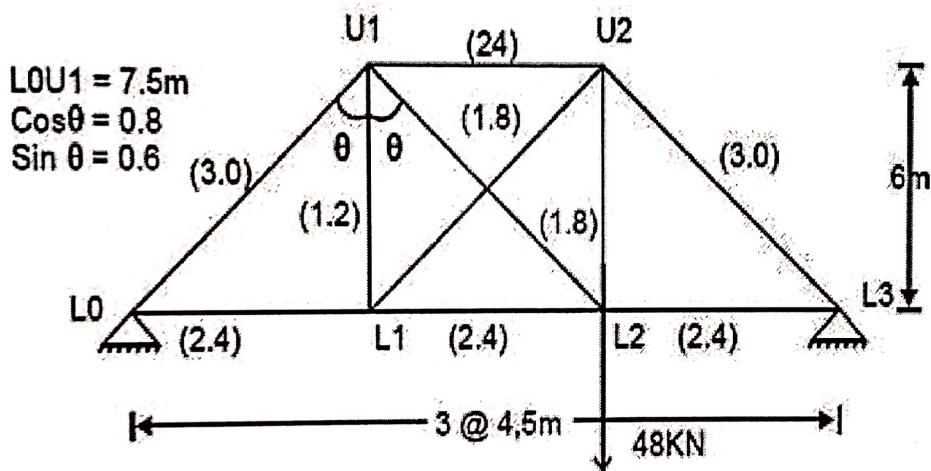


Figure Q5: A Truss with External Loads

Question 6 (25 marks)

Use the moment distribution method to determine the reactions for the frame in Figure Q6 and also draw the shear force and bending moment diagram. Take $E = 200 \text{ GPa}$, $I = 50 \times 10^6 \text{ mm}^4$.

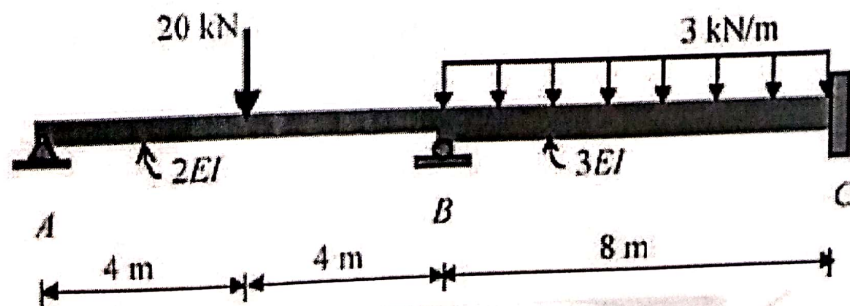


Figure Q6: A frame with 2 External Loads

Question 3 (25 marks)

- a) Show that the strain energy 'U' due to bending is $\frac{M^2 L}{2EI}$. (12.5 marks)
- b) Determine the strain energy and the deflection under the load for the beam as shown in Figure Q3. The flexural stiffness is 200 MNm^2 . (12.5 marks)

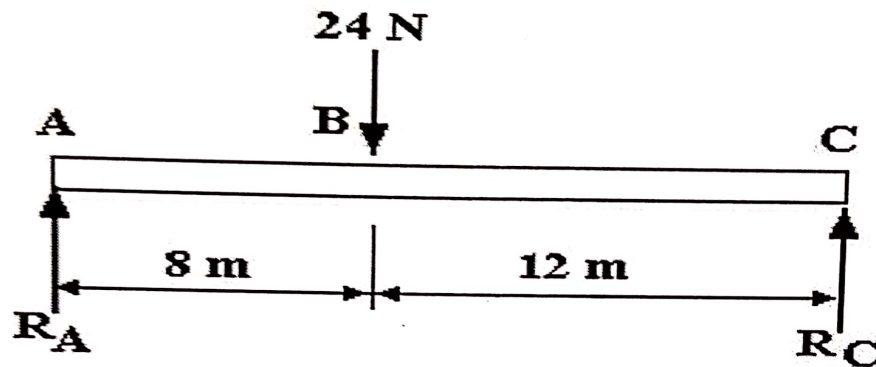


Figure Q3: A Beam with an External Load

Question 4 (25 marks)

- a) Determine the reactions for the beam shown in Figure Q4 by the method of least work. EI is constant. (12.5 marks)

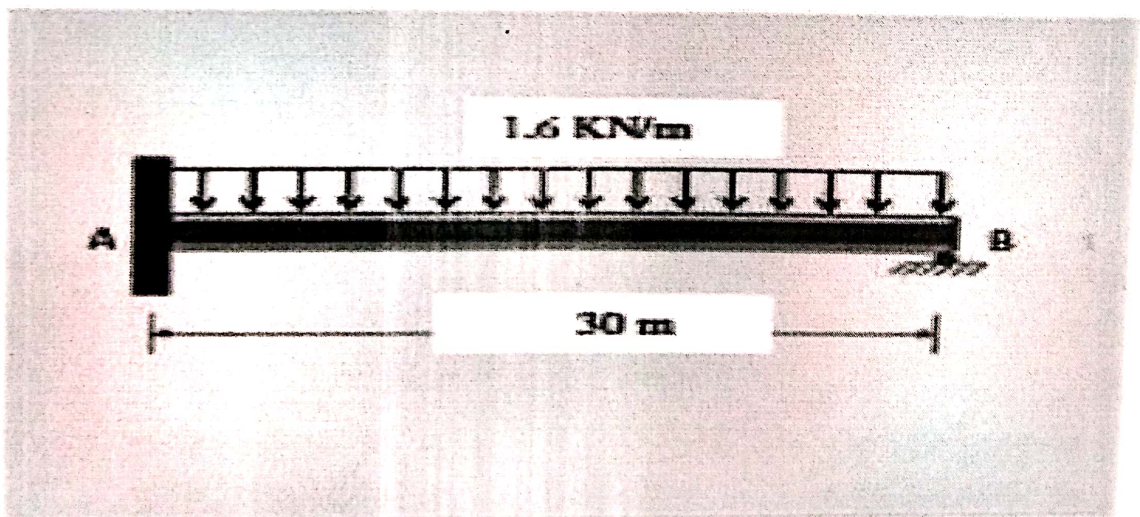


Figure Q4: A Beam with a uniform External Load

- b) Show that the fixed end moment of the built in beam as shown in Figure Q4b is $\frac{wL^2}{12}$ (12.5 marks)