

Code No: 154CB

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech II Year II Semester Examinations, September/October - 2023

STRUCTURAL ANALYSIS – I

(Civil Engineering)

Time: 3 Hours

Max. Marks: 75

Note: i) Question paper consists of Part A, Part B.

ii) Part A is compulsory, which carries 25 marks. In Part A, Answer all questions.

iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.

PART – A

(25 Marks)

- 1.a) What is Tension coefficient method? [2]
- b) Compare between the method of joints and the method of sections using for Truss analysis [3]
- c) State the difference between unit load and strain energy method in the determination of structures. [2]
- d) State the various methods for computing the joint deflection of a perfect frame. [3]
- e) Explain with the aid of a sketch, the normal thrust and radial shear in an arch rib. [2]
- f) What are the types of arches according to their geometrical shapes? [3]
- g) What are the merits and limitations of the theorem of three moments? [2]
- h) Write the different reasons to cause sway in the frames. [3]
- i) Draw the influence line diagram for a shear force at any section of a simply supported beam. [2]
- j) Define the influence line. Draw I.L.D for a simply supported beam for finding the reactions at the supports. [3]

PART – B

(50 Marks)

2. Determine the forces in the truss shown in the below figure 1. Which is subjected to inclined loads? [10]

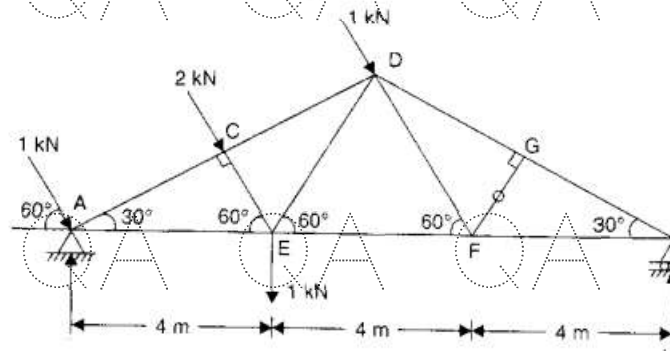


Figure 1
OR

QA QA QA QA QA QA QA QA QA QA QA

3. Find the forces in the members of the truss BC, BG and CG shown below by Method of joints figure 2. [10]

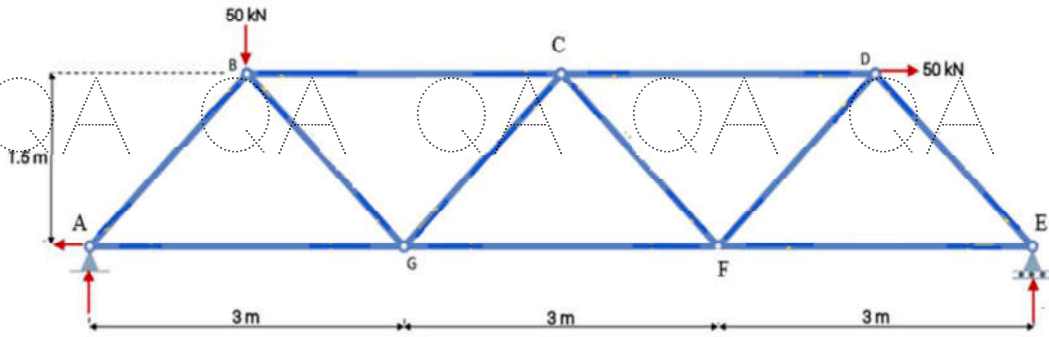


Figure 2

4. Compute the vertical deflection of joint E by unit load method figure 3. [10]

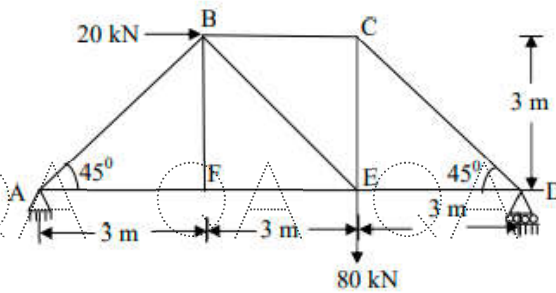


Figure 3

OR

5. A beam AB is simply supported over a span 5m in length. A concentrated load of 30kN is acting at a section 2m from support. Calculate the deflection under the load point. Take $E = 200 \times 10^6 \text{ kN/m}^2$. And $I = 13 \times 10^{-6} \text{ m}^4$. (As shown in figure 4). [10]

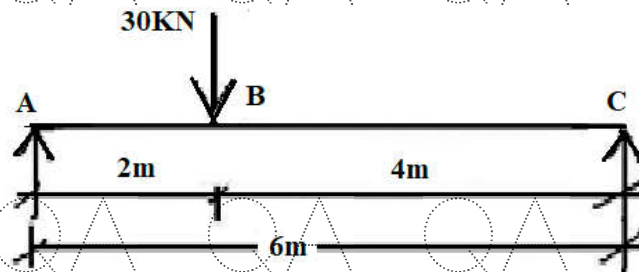


Figure 4

6. A circular (three hinged) arch of span 25 m with a central rise of 5 m is hinged at the crown and the end supports. It carries a point load of 100 kN at 6 m from the left support. Calculate a) The reaction at the supports and b) Moment at 5 m from the left support. (As shown in figure 5). [10]

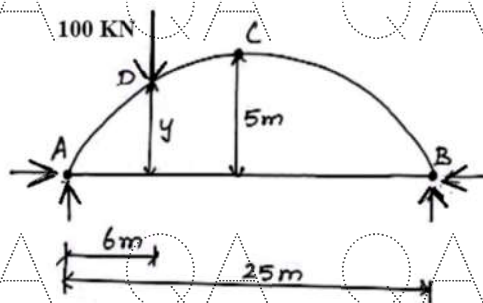


Figure 5

QA QA QA QA QA QA QA QA QA QA QA



OR

7. A fixed beam with three point loads shown in below. Solve the beam and draw the B M and S F Diagrams figure 6. [10]

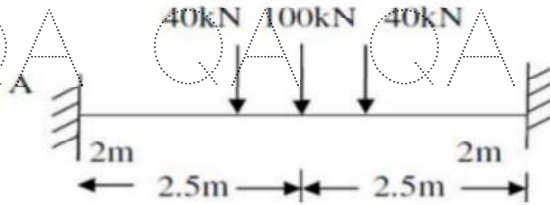
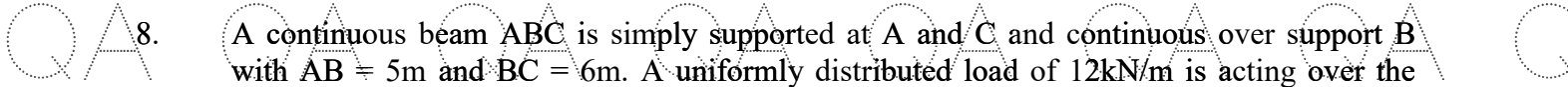


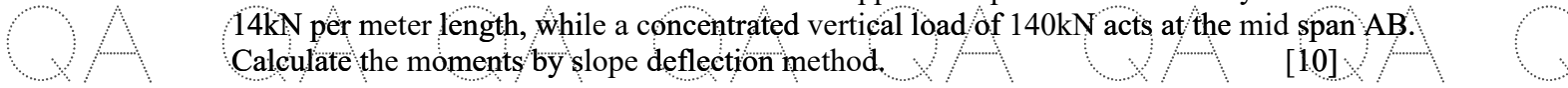
Figure 6



8. A continuous beam ABC is simply supported at A and C and continuous over support B with $AB = 5m$ and $BC = 6m$. A uniformly distributed load of $12kN/m$ is acting over the beam. The moment of inertia is I throughout the span. Analyse the continuous beam and draw S.F.D and B.M.D. use Clapeyron's theorem of three moments. [10]

OR

9. ABC is a continuous beam with constant EI throughout its length. The end supports A and C are fixed and beam is continuous over middle support B. Span BC is uniformly loaded with $14kN$ per meter length, while a concentrated vertical load of $140kN$ acts at the mid span AB. Calculate the moments by slope deflection method. [10]



10. Construct the ILD for continuous beam as shown in figure 7 for the following cases,
a) Reaction @ A (V_A) b) Reaction @ B (V_B)
c) Shear force @ C (V_C) d) Bending moment @ C (M_C) [10]

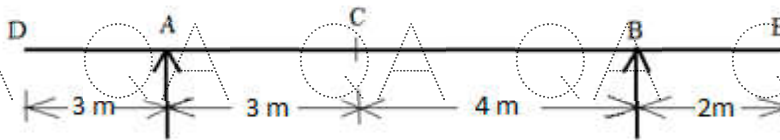
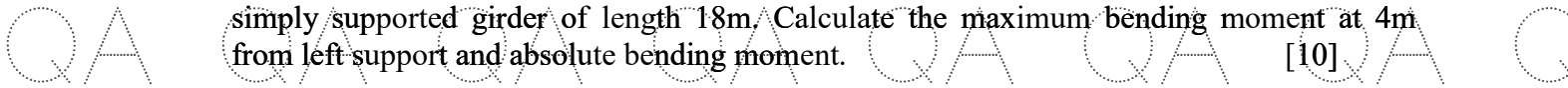


Figure 7

OR

11. A uniformly distributed load of $40kN/m$ and of length $3m$ transverse across the span of simply supported girder of length $18m$. Calculate the maximum bending moment at $4m$ from left support and absolute bending moment. [10]



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