



## II B.Tech II Sem Supply End Examination, July 2022

**Structural Analysis - I**

(CIVIL)

**Time: 3 Hours.****Max. Marks: 70**

Note: 1. Question paper consists: Part-A and Part-B.

2. In Part - A, answer all questions which carries 20 marks.

3. In Part - B, answer any one question from each unit.

Each question carries 10 marks and may have a, b as sub questions.

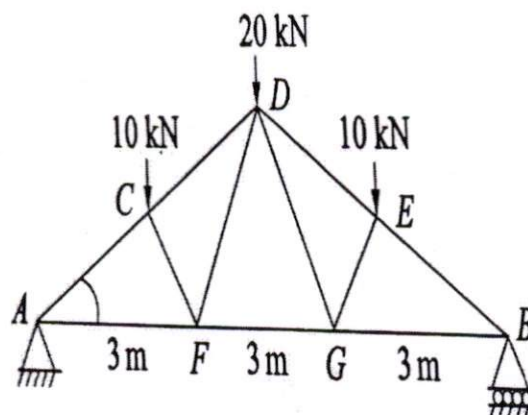
**PART- A****(10\*2 Marks = 20 Marks)**

- |   |    |     |      |
|---|----|-----|------|
| 1. a) What are all type of frames.  | 2M | CO1 | BL 1 |
| b) Differentiate Pin-Jointed Trusses based on their degree of static indeterminacy. | 2M | CO1 | BL 2 |
| c) Define Castigliano's Theorem I and II  | 2M | CO2 | BL 2 |
| d) What is radial shear and normal thrust in a three hinged arch?                   | 2M | CO2 | BL 1 |
| e) Define Eddy's Theorem  | 2M | CO3 | BL 1 |
| f) State Maxwell reciprocal theorem.  | 2M | CO3 | BL 2 |
| g) State Clapeyron's Theorem of Three Moments.                                      | 2M | CO4 | BL 2 |
| h) What is the effect of settlement of support in continuous beams.                 | 2M | CO4 | BL 1 |
| i) Draw influence line diagram for reactions.                                       | 2M | CO5 | BL 4 |
| j) What is an influence line.   | 2M | CO5 | BL 1 |

**PART- B****(10\*5 Marks = 50 Marks)**

- |  |    |     |         |
|--|----|-----|---------|
| 2. a) State the assumptions made in the analysis of plane trusses. | 5M | CO1 | BL<br>2 |
| Determine the forces in members graphically.                       |    |     |         |

b)

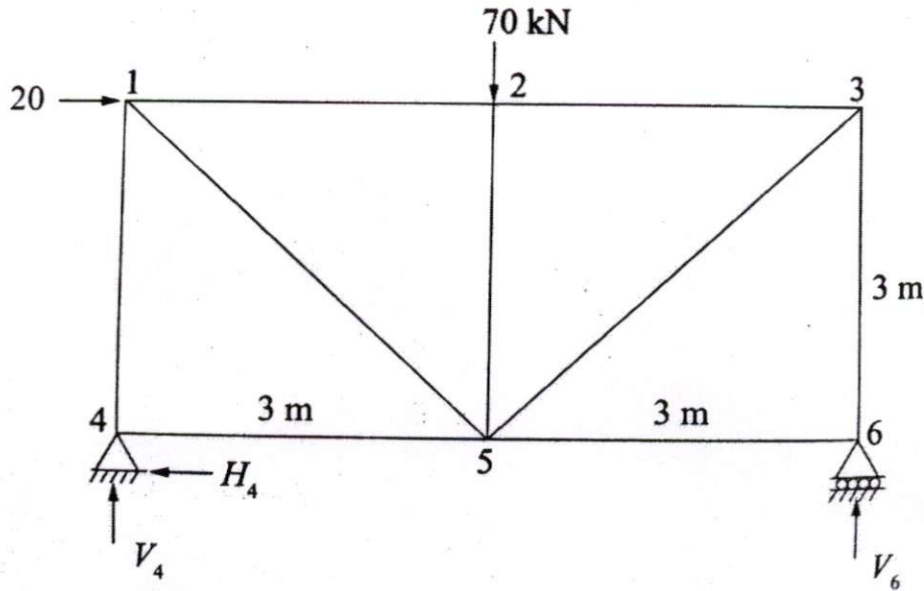


5M	CO1	BL 3,4, 5
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OR

Analyse the truss given below using method of joints.

3



10M C01

BL  
3,4,  
5

- 4 a) Derive an expression for strain energy due to bending

5M C02

BL  
3

A three-hinged symmetric parabolic arch has a horizontal span  $L$  and central rise  $h$ . It is subjected to a uniformly distributed load of  $w$  per unit length along the span. Show that the shear force and bending moment at any section normal to the profile of arch is zero. Find also the normal thrust at this section.

b)

5M C02

BL  
3

OR

A three hinged parabolic arch is shown below. It has a span of 20m and central rise of 5m. It carries a concentrated load of 100kN at a distance of 5m from the left support. Determine the maximum bending moment and plot the bending moment diagram.

5

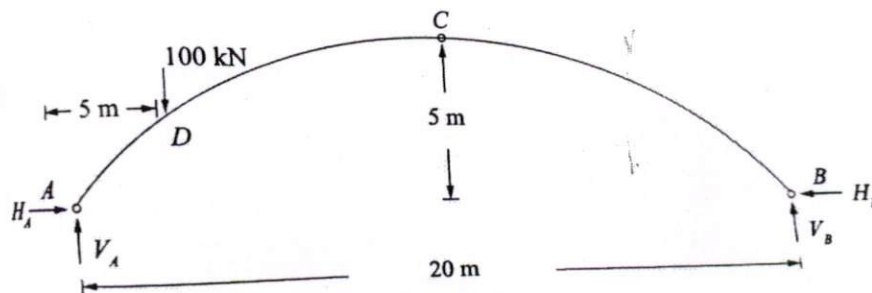


FIG. 7.35

10M C02

BL  
3,4,  
5

- 6 a) Determine the reaction at prop for propped cantilever beam carrying UDL of  $w/m$  run throughout its span using strain energy method. Take  $EI$  constant.

5M C03

BL  
3,4,  
5

- b) What are the advantages of fixed beam.

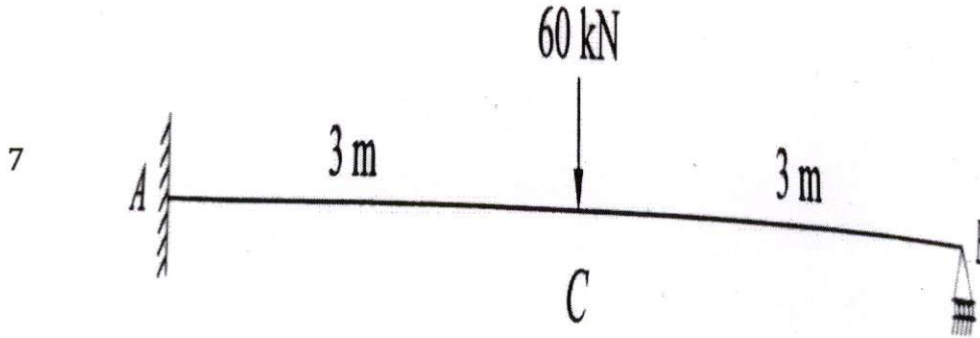
5M C03

BL



OR

Draw SFD and BMD for the propped cantilever beam loaded as shown below. Use consistent deformation method.



10M CO3 BL 3,4,5

- 8 a) What are the factors that affect bending moment in the continuous beam due to support settlement. Analyze the continuous beam ABCD using Slope Deflection Method, consists of 3 spans. Supports A & D are fixed and B & C are simply supported. Span AB is of 6m and loaded with an UDL of intensity 2 kN/m on the entire span. Span BC is of 5m and is subjected to 5kN concentrated load at 3m from Support "B". Span CD is of 5m and is subjected to a concentrated load of 8kN at mid span.
- b)

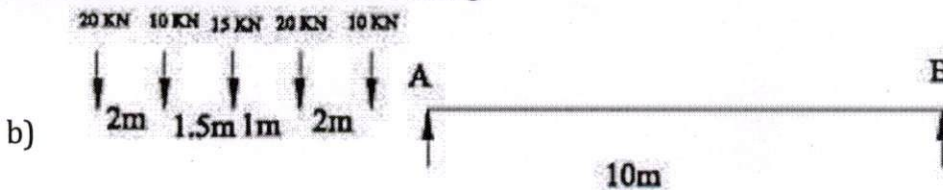
5M CO4 BL 1,2  
5M CO4 BL 3,4,5

OR

- 9 A continuous beam ABC is simply supported at A and C and continuous over support with AB= 4m & BC=5m. A uniformly distributed load of 10kN/m is acting over the beam. The moment of inertia is I throughout the span. Analyze the continuous beam and draw SFD, BMD.

10M CO4 BL 3,4,5

- 10 a) State Maxwells Betti's theorem  
A system of concentrated load, role beam left to right, s.s beam span of 10m and 10 KN load leading



5M CO5 BL 3,4

- Find 1. Absolute max +ve S.F  
2. Absolute max -ve S.F  
3. Absolute max BM

OR

- 11 A simply supported beam of 15m span is subjected to uniform dead load of 50kN/m covering the entire span and a uniform live load of 100kN/m (longer than the span). Determine the maximum value of positive as well as negative shear force at left quarter span.

10M CO5 BL 3,4,5