



B.E DEGREE EXAMINATIONS: MAY 2018

(Regulation 2015)

Sixth Semester

CIVIL ENGINEERING

U15CET601: Structural Analysis II

COURSE OUTCOMES

- CO1:** Analyze structures using matrix flexibility method
CO2: Analyze structures using stiffness method
CO3: Perform plastic analysis for indeterminate beams and frames
CO4: Implement basic concepts of finite element analysis
CO5: Analyze space truss using tension coefficient method
CO6: Analyze beams curved in plan and cable suspension bridges

Time: Three Hours

Maximum Marks: 100

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. Matching type item with multiple choice code

CO6 [K₂]

List I	List II
A. The shape of a cable suspended between two supports is defined by	i. A catenary
B. The cable uniformly loaded along the horizontal span takes the shape of	ii. A little load
C. The cable uniformly loaded along its length assumes the shape of	iii. A parabola
D. The girder in a suspension bridge transmits to its supports	iv. Applied loads

- | | A | B | C | D |
|----|----|-----|----|-----|
| a) | i | ii | iv | iii |
| b) | i | iii | iv | ii |
| c) | iv | iii | i | ii |
| d) | iv | ii | i | iii |

2. What will be the primary unknown in the stiffness method of analysis?

CO2 [K₂]

- | | |
|-----------|-----------------|
| a) Force | b) Displacement |
| c) Moment | d) Rotation |

3. Arrange the following steps sequentially

CO4 [K₂]

- 1) Applying Boundary Condition
- 2) Solution of unknown displacement
- 3) Selection of displacement function
- 4) Assemble the element equation

PART B (10 x 2 = 20 Marks)
(Answer not more than 40 words)

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| 11. Compare flexibility method and stiffness method. | CO1 [K ₂] |
| 12. Determine the degree of static and kinematic indeterminacy of the beam in Fig.2. | CO1 [K ₃] |

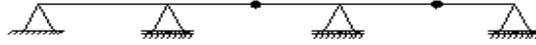


Fig.2

- | | |
|---|-----------------------|
| 13. Differentiate determinate and indeterminate structures. | CO2 [K ₂] |
| 14. What is the relation between the flexibility matrix and stiffness matrix? | CO2 [K ₂] |
| 15. State lower bound theory. | CO3 [K ₁] |
| 16. Differentiate plane truss and space truss. | CO5 [K ₂] |
| 17. List out the advantages of FEM. | CO4 [K ₂] |
| 18. What is meant by discretization? | CO4 [K ₂] |
| 19. What are the main functions of stiffening girders in suspension bridges? | CO6 [K ₂] |
| 20. List the applications of beams curved in plan. | CO6 [K ₂] |

PART C (5 x 14 = 70 Marks)

Q.No. 21 is Compulsory

- | | |
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| 21. Analyze the portal frame ABCD shown in Fig.3 by stiffness method and also draw the bending moment diagram. | CO2 [K ₄] |
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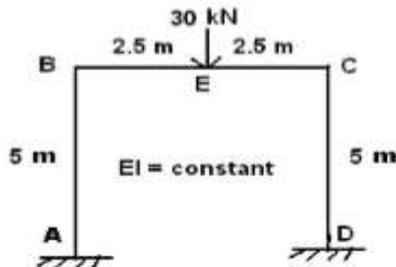


Fig.3

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|---|-----------------------|
| 22. A three hinged stiffening girder of a suspension bridge of 100 m span subjected to two point loads 10 kN each placed at 20 m and 40 m respectively from the left hand hinge. Determine the bending moment and shear force in the girder at section 30 m from each end. Also determine the maximum tension in the cable which has a central dip of 10 m. | CO6 [K ₃] |
| 23. Analyze the continuous beam ABC shown in Fig.4 by flexibility matrix method and sketch the bending moment diagram. | CO1 [K ₄] |

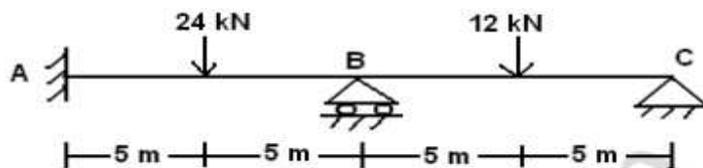


Fig.4

24. Find the fully plastic moment required for the frame shown in Fig.5, if all the members have same value of M_p .

CO3 [K₃]

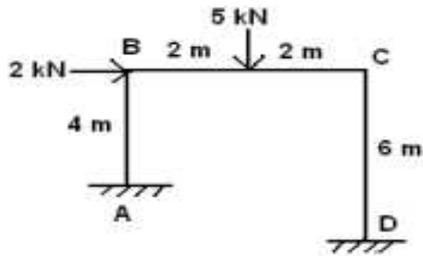


Fig.5

25. Determine the shape factor of a T-section beam of flange dimension 100 x 12 mm and web dimension 138 x 12 mm thick.

CO3 [K₃]

26. The space truss shown in the Fig.6 has roller and socket support at joint A, B, C and D
 i) Determine the member force for all members at joint F and G
 ii) Determine the reaction at support C

CO5 [K₃]

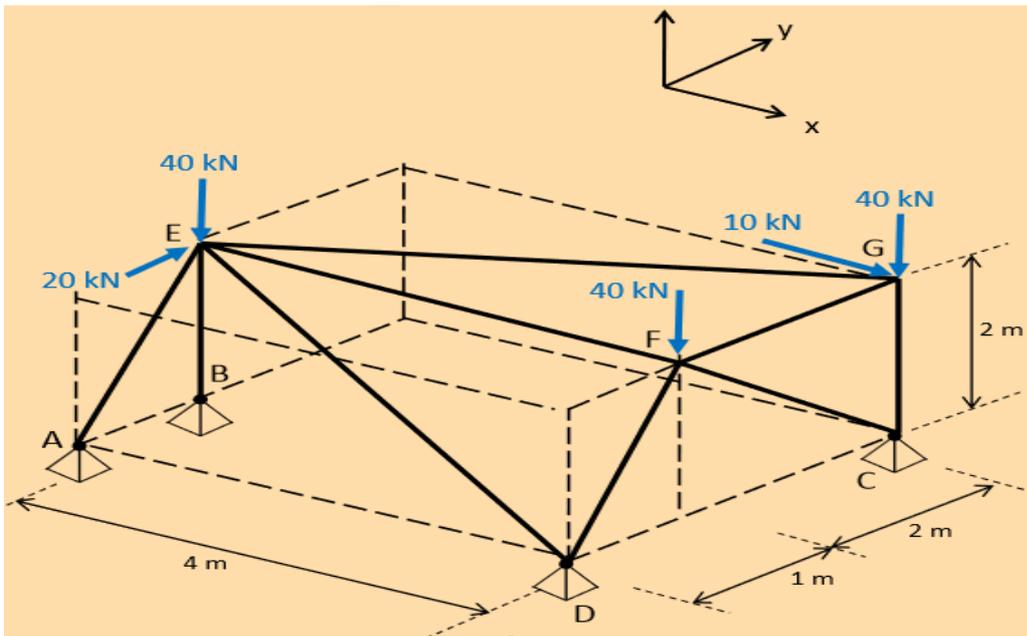


Fig.6

27. Explain the steps involved in Finite Element Analysis in detail.

CO5 [K₂]
