VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS), HYDERABAD
Accredited by NAAC with A++ Grade
B.E. (Civil Engg.) V-Semester Main & Backlog Examinations, June-2022
Structural Analysis

Time: **3 hours**

Max. Marks: **60**

*Note: Answer all questions from **Part-A** and any FIVE from **Part-B***

Part-A (10 × 2 = 20 Marks)

Q. No.	Stem of the question	M	L	CO	PO
1.	Three members of relative stiffness k_1, k_2 and k_3 are meeting at a joint. List the distribution factors of respective members at this joint.	2	1	1	1
2.	Distinguish between non-sway analysis and sway analysis	2	1	1	1
3.	Write equilibrium conditions for solution of the problem shown in figure.1	2	1	2	2

Figure 1

4.	Write the slope deflection equations for the solution of the problem shown in figure 1	2	1	2	2
5.	Define rotation factor.	2	1	3	1
6.	Distinguish between moment distribution method and Kani's method.	2	1	3	1
7.	List internal forces at any section of an arch.	2	1	4	2
8.	Differentiate between three hinged and two hinged arches.	2	2	4	2
9.	State Castigliano's second theorem.	2	2	5	2
10.	What do you mean lack-of-fit?	2	2	5	2

Part-B (5 × 8 = 40 Marks)

11. a)	Find distribution factors for the frame shown in figure 2.	3	2	1	2

Figure 2

b) Perform analysis of the continuous beam shown in figure 3 using moment distribution method and draw bending moment diagram. **5 4 1 2**
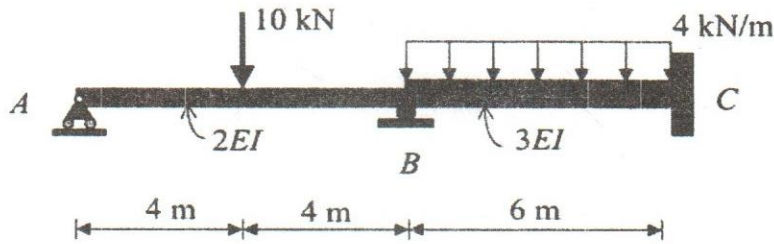

Figure 3

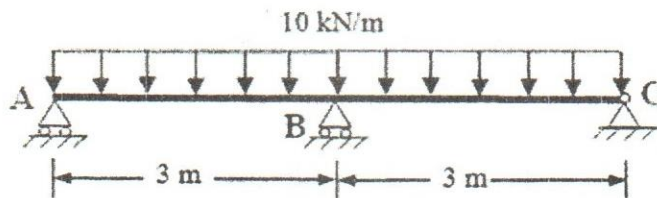12. a) Write slope deflection equations for the beam shown in Figure 4. **3 2 2 2**

Figure 4

b) Analyse the rigid jointed frame shown in Figure 5 using slope deflection method and draw BMD. Take EI constant. **5 4 2 2**
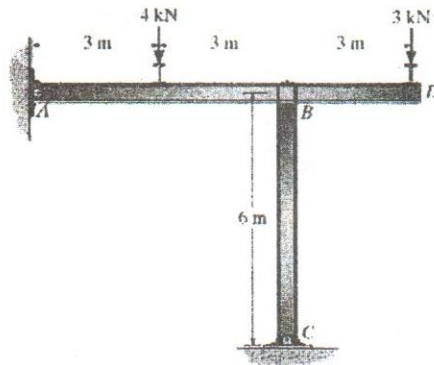

Figure 5

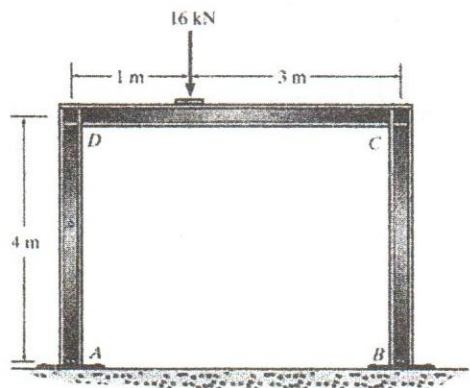13. a) Find rotation factors for the frame shown in Figure 6. **3 2 3 2**

Figure 6

		5	4	3	2
b)	Perform analysis of the frame shown in Figure 7 using Kani's method and dram BMD.	5	4	3	2

48 kN

8 kN/m
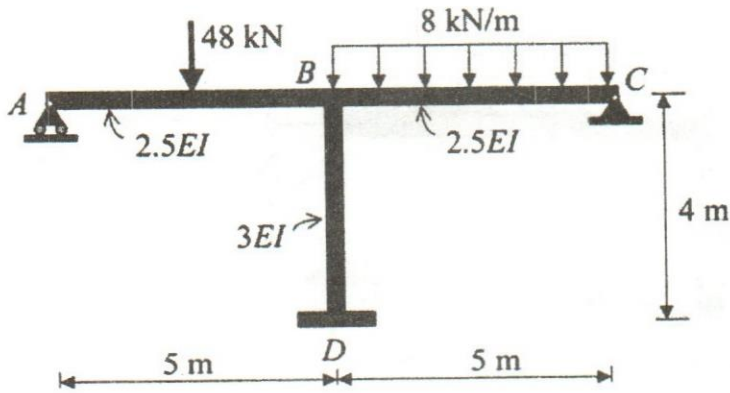
A

B

2.5EI

2.5EI

C

4 m

3EI

D

5 m

5 m

Figure 7

| 14. a)	Prove that bending moment at any section is zero in a three hinged parabolic arch subjected to UDL of w/m over it's entire span	3	2	4	2
b)	A three hinged parabolic arch is of span 40 m. and height 8 m. It is subjected to UDL of 20 kN/m on the left 15 m. length. Analyze the arch to find B.M., normal thrust, radial shear at a distance of 12 m. from the left support.	5	3	4	2
15. a)	Describe how unit load method is useful in the analysis of redundant trusses.	3	2	5	2
b)	A pin jointed truss is shown in figure 8. Determine the vertical displacement of joint E using Unit Load Method. All the members have cross-sectional area of 250 mm² and have same elastic modulus of 200 GPa.	5	3	5	2
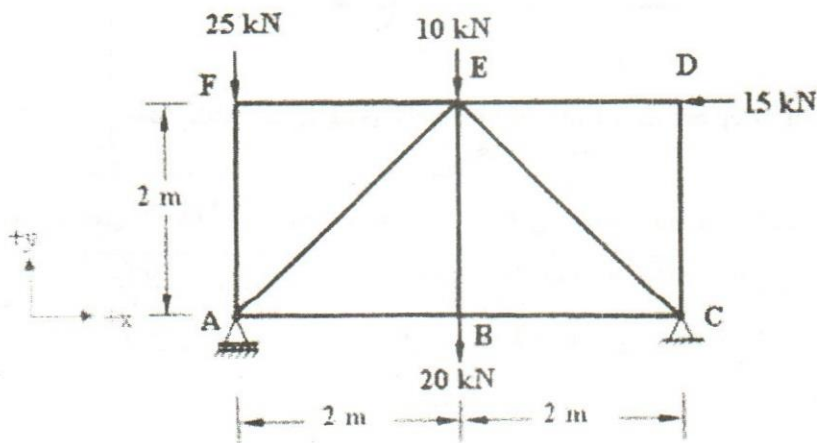
Figure 8

16. a)	State and explain Carry over theorem and distribution theorem.	4	3	1	2
b)	Describe step-by-step procedure to perform non-sway analysis of portal frames using slope deflection method.	4	3	2	2

17.	Answer any *two* of the following:				
a)	Find displacement factors for the frame shown in figure 9.	4	3	3	2

6 kN/m

B   C

2 m

3 m

D

A

4 m
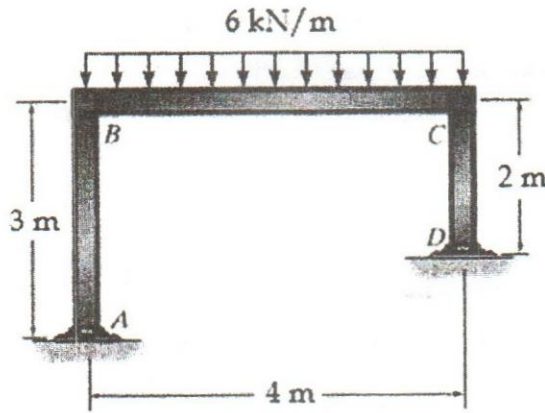
Figure 9

| b) | Use portal method to compute the horizontal shear in the columns of the frame shown in Figure 10. | 4 | 4 | 4 | 2 |

20 kN → G   H   I

5 m

30 kN → D   E   F
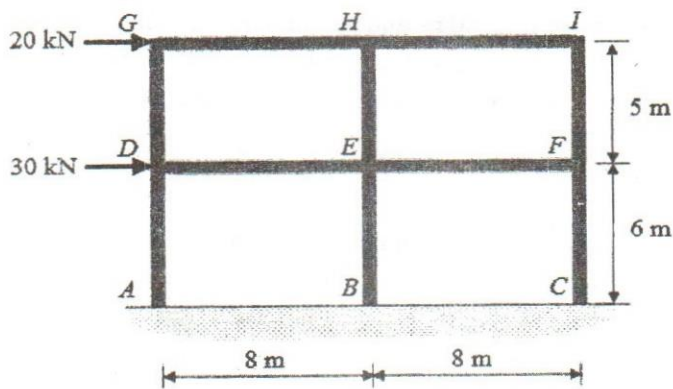
6 m

A   B   C

8 m   8 m

Figure 10

| c) | Describe the step-by-step procedure to perform analysis of a truss with lack-of-fit. | 4 | 4 | 5 | 2 |

M : Marks;   L: Bloom's Taxonomy Level;   CO; Course Outcome;   PO: Programme Outcome

i)	Blooms Taxonomy Level – 1	20%
ii)	Blooms Taxonomy Level – 2	30%
iii)	Blooms Taxonomy Level – 3 & 4	50%

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