Code No. : 16148 N/O

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS), HYDERABAD
Accredited by NAAC with A++ Grade

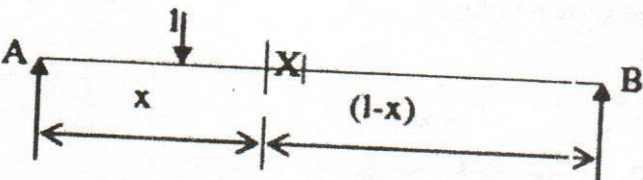**B.E. (Civil Engg.) VI-Semester Main & Backlog Examinations, May/June-2023**

Advanced 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.	A point load of 4kN moves from left to right on a simply supported beam of span 12 m. Draw influence line diagram to determine maximum bending moment at a section 5m from left hand support.	2	1	1	2
2.	Sketch the influence line diagram for shear force at any section of a simply supported beam.	2	1	1	2
3.	If a truss is having eight panels of each width and height equal to 'a', determine height of the influence line diagram for the top chord member of third panel.	2	1	2	2
4.	State the uses of influence line diagrams.	2	1	2	2
5.	What are the basic unknowns in stiffness matrix method	2	1	3	2
6.	Why the stiffness matrix method also called equilibrium method or displacement method.	2	1	3	2
7.	Distinguish between static and kinematic indeterminacy	2	1	4	2
8.	What do you mean by a restrained structure?	2	1	4	2
9.	Write the element stiffness matrix for a beam element.	2	1	5	2
10.	Define the Force Transformation Matrix	2	1	5	2

Part-B (5 × 8 = 40 Marks)

11. a)	A simply supported beam has a span of 16 m is subjected to a UDL (live load) of 8 kN/m (longer than the span) traveling from left to right. Draw the ILD for shear force and bending moment at a section 4 m from the left end. Use these diagrams to determine the maximum shear force and bending moment at this section	4	2	1	2

		4	3	1	2

b) Two point loads of 100 kN and 200 kN spaced 3 m apart cross a girder of span 12 m from left to right with the 100 kN leading. Draw the ILD for shear force and bending moment and find the values of maximum shear force and bending moment at a section 4 m from the left hand support

		8	3	2	2

12. Analyse and draw the ILD for the forces in members U_2L_2, U_3U_4, L_1L_2 and U_2L_3 of the truss shown in fig.2

Fig.2

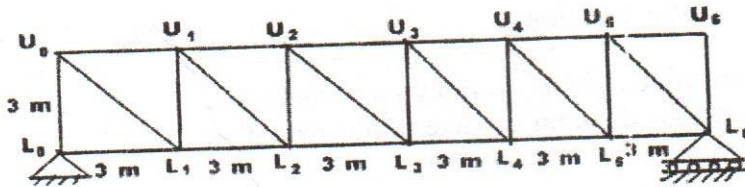|		4	3	3	2

13. a) Determine DQL matrix for the beam shown in fig.3
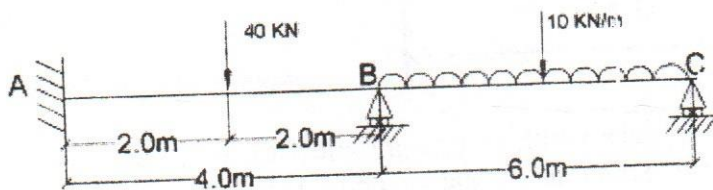
Fig.3

		4	2	3	2

b) Develop global matrix for a truss element of length 4 m. inclined at 30^0 with respect to horizontal axis

		8	3	4	2

14. Analyze the pin-jointed structure shown in Fig.4 by Stiffness matrix method. The area of each member is 1000 mm².Take E=200kN/mm²
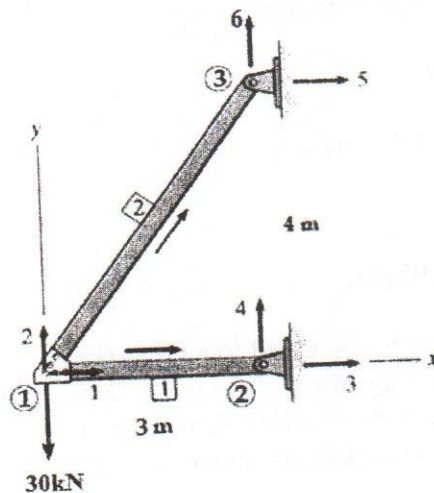
Fig.4

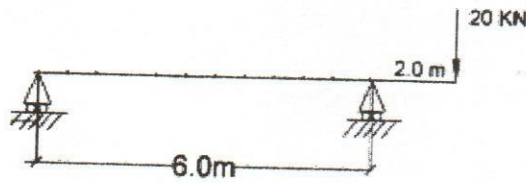|					
15.	Analyze the continuous beam shown in fig 5. Take EI=200x10^{14} KNm^2 .Use direct stiffness method.	8	3	5	2

20 KN

2.0 m

6.0m

Fig.5

16. a)	Four point loads 20 kN, 22 kN, 28 kN, and 18 kN spaced equally at a distance of 3 m roll over a simply supported girder of span 20 m from left to right with 18 kN load leading. **Calculate** the absolute maximum BM in the girder.	4	2	1	2
b)	A through type Pratt truss has 8 panels of 5m each. **Compute** the force in the top chord member of third panel due to a moving load of 16 kN/m of length more than span. Take height of the truss as 4 m.	4	3	2	2
17.	Answer any *two* of the following:				
a)	Write A$_{DL}$ matrix for the frame shoen in Fig.6	4	3	3	2

160 KN

B   C

3 m,/

50 KN

2 m,/

A

2 m   2 m
2/   2/
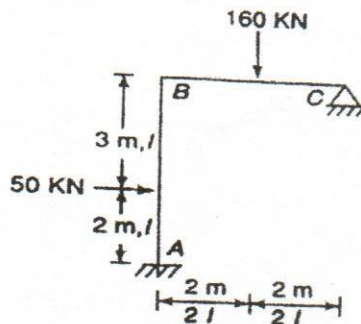
Fig.6

b)	Describe step-by-step procedure to perform analysis of a truss structure using Direct Stiffness method.	4	2	4	2
C)	Distinguish between truss element and beam frame element in direct stiffness method of analysis.	4	3	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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