Hall Ticket Number:

Code No. : 16135

VASAVI COLLEGE OF ENGINEERING *(AUTONOMOUS)*, HYDERABAD

Accredited by NAAC with A++ Grade

B.E. (Civil Engg.) VI-Semester Main & Backlog Examinations, June-2022

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.	Define absolute maximum shear force	2	1	1	1
2.	Define Influence lines.	2	1	1	1
3.	What is counter bracing in truss?	2	1	2	1
4.	What is focal length?	2	1	2	1
5.	Why flexibility method is called force method?	2	1	3	1
6.	Why stiffness method is called an equilibrium method?	2	1	3	1
7.	Define stiffness coefficient.	2	1	4	1
8.	How the initial strains are induced in stiffness method?	2	1	4	1
9.	List the advantages of stiffness method.	2	2	5	1
10.	What is an Orthogonal matrix?	2	2	5	1
	Part-B (5 × 8 = 40 Marks)				
11. a)	A UDL of intensity 12 kN/m and length more than 7 m moves across a girder of span of 7 m. Find the maximum positive and negative shear force at a section 3 m from left support as well as its absolute value. Also determine the maximum bending moment at the same section and the absolute value.	4	4	1	3
b)	A UDL of length 5 m and intensity 25 kN/m moves across a simply supported beam of span 30 m. Determine the maximum negative and positive SF and maximum BM at sections 3 m,7 m, 12 m from the left support and also the absolute maximum shear force and bending moment. Draw the maximum SFD and BMD.	4	4	1	3
12. a)	A Pratt truss consisting of 6 panels, each of 6 m length and 8 m height is simply supported and loaded over the bottom chord, as shown in Fig.1. Draw the influence lines for the force in members I, II and III. Calculate the maximum values of forces in these members, when a UDL of intensity 6 kN/m longer than span crosses the truss.	4	4	2	3

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b)	Draw the influence line for forces in the members X, Y and Z of the truss shown in Fig.2. Also find the maximum forces in these members due to UDL of intensity 1.5 kN/m , longer than the span , moving from the left support to the right support.	4	4	2	3
13. a)	Analyse the beam shown in Fig.3. by treating the fixed end moments M_A and vertical reaction R_B as redundant.	4	4	3	3
b)	Use the flexibility method to calculate the reactions at pinned support of an L bent shown in Fig.4.	4	4	3	3
14. a)	Derive the transformation matrix for an inclined bar element.	3	2	4	1
b)	For the truss shown in Fig.5, determine the displacement at node 1. Let E= 210 GPa and A= 6×10^{-4} m^2 for each element.	5	3	4	3
15. a)	Write the stiffness matrix for a frame element.	3	2	5	1
b)	Determine the displacement and rotation at node 2 for the beam shown in Fig.6. Let E =210 GPa and I= 4×10^{-4} m^4 throughout the beam length.	5	3	5	3
16. a)	Two concentrated loads of 50kNand 75 kN separated by 4 m rolls across a beam of 12 m span from left to right with 50 kN load leading the train. Draw the maximum SFD and BMD. Also calculate the maximum of the absolute maximum BM.	4	4	1	3
b)	A three hinged parabolic arch of span L has central rise h. Draw influence line diagrams for horizontal thrust, bending moment, and radial shear under unit load.	4	2	2	3
17.	Answer any ***two*** of the following:				
a)	For the three bar assemblage shown in Fig.7, determine the nodal displacements. Let E = 210 GPa and A= 30×10^{-4} m^2.	4	2	3	3
b)	For the cantilever beam of length L subjected to UDL of intensity q, solve for the free end displacements. EI is constant throughout the beam.	4	2	4	3
c)	The bar element is used to stiffen the cantilever beam element as shown in Fig.8. determine the displacements at node. Let E =210 GPa for both bar and beam elements. For the bar, let A=1×10^{-3} m^2. For the beam element A=2×10^{-3} m^2, I=5×10^{-5} m^4.	4	4	5	3

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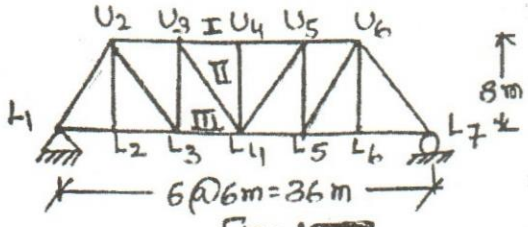


Fig. 1

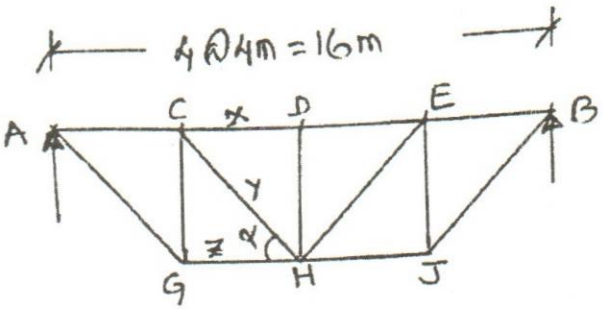


fig.2

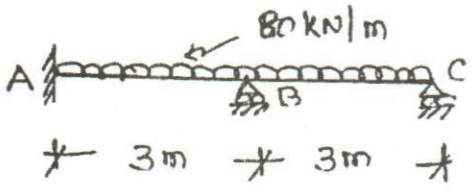


fig.3.

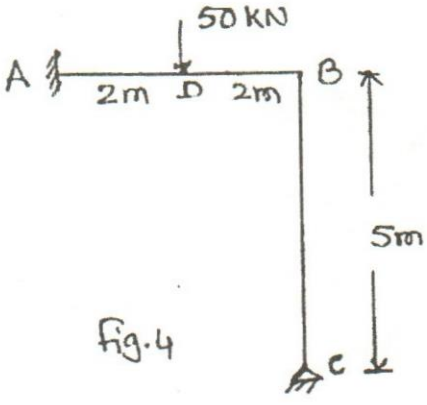


fig.4

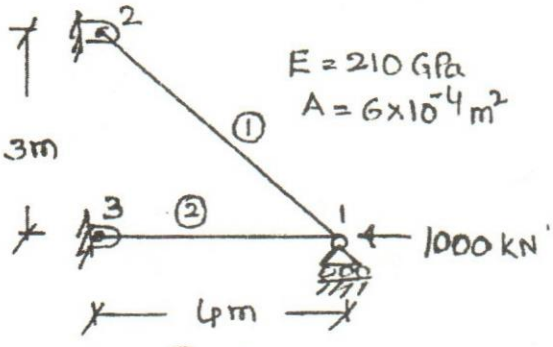
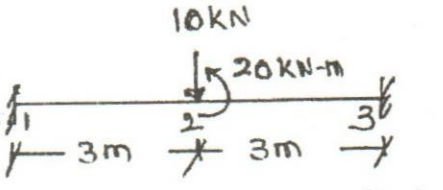


fig.5.



E = 210GPa I = 4×10⁻⁴ m⁴

fig.6.

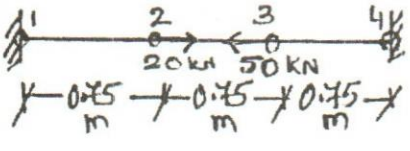


fig.7.

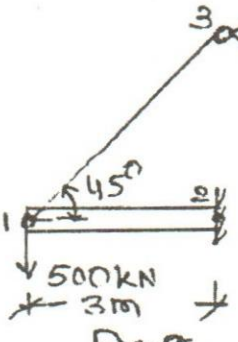


fig.8.

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

i)	Blooms Taxonomy Level – 1	20%
ii)	Blooms Taxonomy Level – 2	32.50%
iii)	Blooms Taxonomy Level – 3 & 4	47.50%

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