Reg. No. ☐☐☐☐☐☐☐☐☐☐☐☐☐

B.E. / B.TECH. DEGREE EXAMINATIONS, MAY 2023

Sixth Semester

CE18604 – Advanced Structural Analysis

(Civil Engineering)

(Regulation 2018/2018A)

TIME: 3 HOURS   **MAX. MARKS: 100**

| COURSE OUTCOMES	STATEMENT	RBT LEVEL
CO 1	Perform plastic analysis of structures	3
CO 2	Analyse the structure using finite element method.	3
CO 3	Analyse the members subjected to moving loads using the concept of influence lines.	3
CO 4	Analyse arches for given loading	3
CO 5	Analyse the space frames and cable structures.	3

PART- A (10 x 2 = 20 Marks)

(Answer all Questions)

|		CO	RBT LEVEL
1.	Classify the different types of mechanisms.	1	1
2.	Differentiate between plastic hinge and mechanical hinge.	1	2
3.	Differentiate FEM and FEA.	2	2
4.	State various applications of FEM in different fields of engineering.	2	2
5.	What is meant by influence lines?	3	1
6.	What is meant by absolute shear force diagram?	3	2
7.	Define a linear arch.	4	1
8.	Discuss the degree of static indeterminacy of a three hinged parabolic arch.	4	2
9.	Write the application of space trusses.	5	2
10.	Write the temperature effect on cable.	5	2

PART- B (5 x 14 = 70 Marks)

		Marks	CO	RBT LEVEL
11. (a)	Determine the collapse load of the beam load as shown in figure.	(14)	1	3
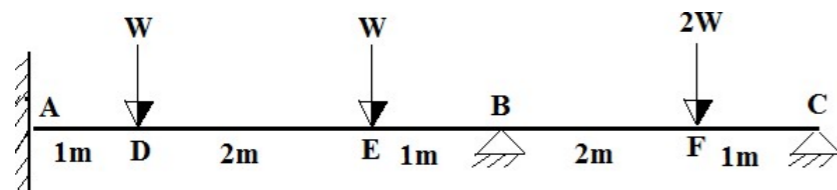
(OR)

(b)	Find the collapse load for the portal frame as shown in figure.	(14)	1	3
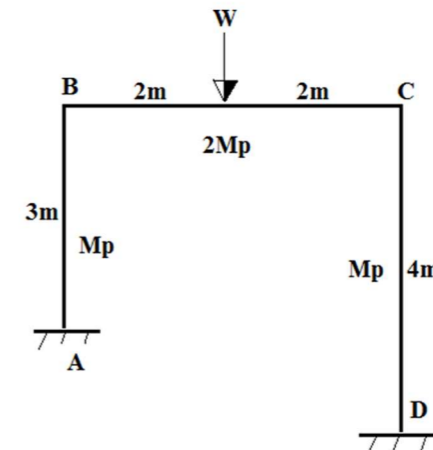
| 12. (a) | Discuss the basic steps involved in FEM and explain in detail with example. | (14) | 2 | 3 |

(OR)

| (b) | Derive the strain displacement matrix, stiffness matrix and nodal load vectors for a 2-noded beam element. | (14) | 2 | 3 |

| 13. (a) | Two wheel loads of 12 kN and 6 kN at a fixed distance apart of 2 m, cross a beam of 12 m span, Draw the influence line for bending moment and shear force for a point 5 m from the left support, and also determine the maximum bending moment and shear force at that point. | (14) | 3 | 3 |

(OR)

| (b) | In the simply supported girder of span 16 m, carries a uniformly distributed load of 4 kN/m, 5 m long crosses a girder. Determine the maximum shear forces and bending moment diagram. Calculate values at 5 m and 10 m from the left hand support. | (14) | 3 | 3 |

| 14. (a) | A three hinged parabolic arch has supports at different levels having span 20 m and carries a uniformly distributed load of 30 kN/m over the left half of the span. The left support is 5m below the crown and the right support is 4m below the crown. Draw the Bending moment diagram. Also analyze and find the normal thrust and radial shear at a section 4 m from the left support. | (14) | 4 | 3 |

(OR)

| (b) | Evaluate the horizontal thrust in a two hinged parabolic arch of span 10 m and rise 5 m carrying an uniformly distributed load of 24 kN/m over the | (14) | 4 | 3 |

left half span, assuming secant variation of its sectional moment of area.

Also calculate the Bending Moment at the crown and draw the BMD.

15. (a)	Using the method of tension coefficients, Analyse the space truss shown in the figure and find the forces in the members of the truss.	(14)	5	3
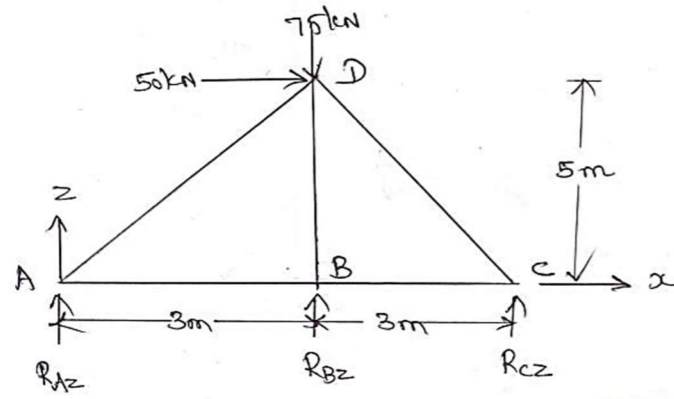
(OR)

(b)	A suspension cable, having supports at the same level, has a span of 45 m and the maximum dip is 4 m. The cable is loaded with the uniformly distributed load of 15 kN/m run over the whole span and two point loads 35 kN each at middle third points. Find the maximum tension in the cable. Also calculate the length of cable required.	(14)	5	3

PART- C (1 x 10 = 10 Marks)
(Q.No.16 is compulsory)

		Marks	CO	RBT LEVEL
16.	A continuous beam ABC of uniform section is simply supported at A, B and C. the span AB and BC are 6m and 4m respectively. the span AB carries a udl of 8kN/m and the span BC carries a central concentrated load of 12kN. Determine the support reactions and draw the Bending moment diagram.	(10)	1	5

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