Q. Code: 746796

Reg. No. | | | | | | | | | | | | | |

B. E / B. TECH.DEGREE

EXAMINATIONS, MAY 2024

Sixth Semester

CE18604 – ADVANCED STRUCTURAL ANALYSIS

(CIVIL ENGINEERING)

(Regulation 2018 / 2018A)

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

COURSE OUTCOMES	STATEMENT	RBT LEVEL
CO1	Perform plastic analysis of structures.	**3**
CO2	Analyse the structure using finite element method.	**3**
CO3	Understand the concept of influence lines for structures due to moving loads.	**3**
CO4	Analyse arches for given loading.	**3**
CO5	Analyse the space frames and cable structures.	**3**

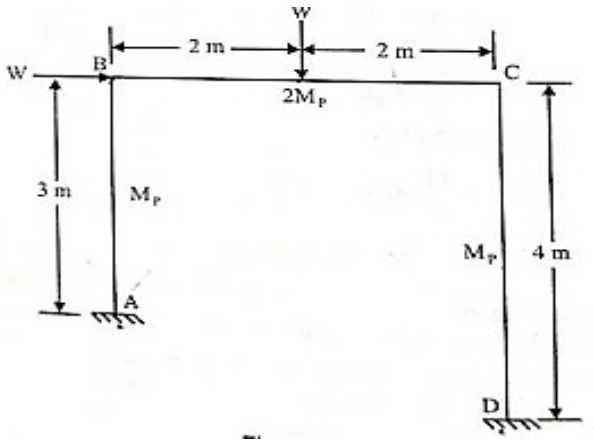
PART- A (10x2=20Marks)

(Answer all Questions)

		CO	RBT LEVEL
1.	Define shape factor. Obtain the shape factor for solid circular section of diameter D.	**1**	**2**
2.	State the difference between plastic hinge and mechanical hinge.	**1**	**2**
3.	Discuss the advantages of discretization in the Finite Element method.	**2**	**2**
4.	Define shape function.	**2**	**2**
5.	Determine the absolute Maximum bending moment of a simply supported beam of length 6 m with two rolling loads of 100 kN and 200 kN with 100 kN load is leading. The distance between the load is 3 m.	**3**	**3**
6.	State Muller Breslau principle.	**3**	**1**
7.	Enumerate the load transfer mechanism in arch.	**4**	**2**
8.	A three hinged arch has a span of 24 m and a central rise of 8 m. the body of the arch is fabricated from rolled steel sections. Find the change in central rise due to an increase in temperature of 30°C.	**4**	**2**
9.	A cable supported at the same level on either end is of 140 m horizontal span with a central dip of 14 m. It carries a load of 15 kN/m on its horizontal span. Calculate the change in the horizontal tension when the temperature rises through 28°C, coefficient of liner expansion of the cable materials, $\alpha = 4 \times 10^{-6}$/°C.	**5**	**3**
10.	What are the forces developed in beams curved in plan?	**5**	**2**

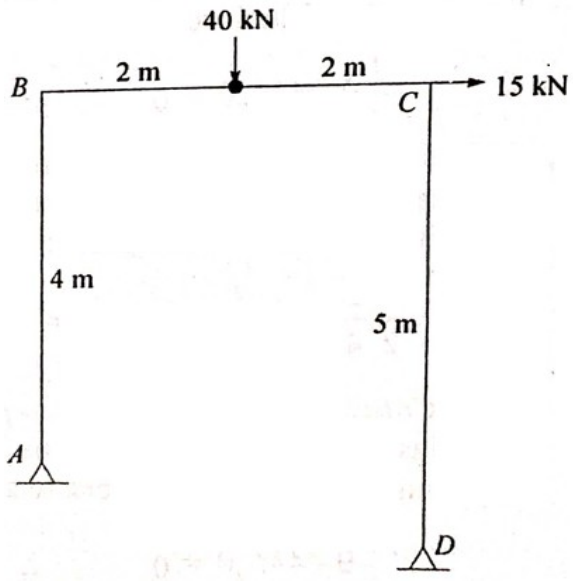
PART- B (5x 14=70Marks)

		Marks	CO	RBT LEVEL
11. (a)	Determine the collapse load for the frame shown in figure.	**(14)**	**1**	**3**



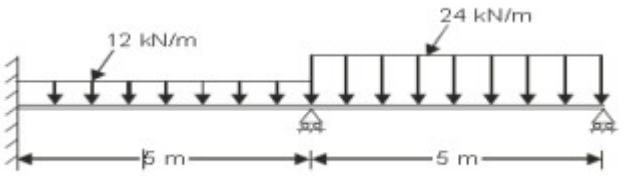
(OR)

(b)	Find the value of Mp for the frame of uniform section under the applied factored loads.	**(14)**	**1**	**3**



12. (a)	Analyze the beam by finite element method and determine the end reactions. Also determine the deflections at mid spans given.	**(14)**	**2**	**3**

Take E = 2x 10^5 N/mm^2 and I = 5x10^6 mm^4.



(OR)

(b) Construct the shape function of a four noded beam element. **(14) 2 3**

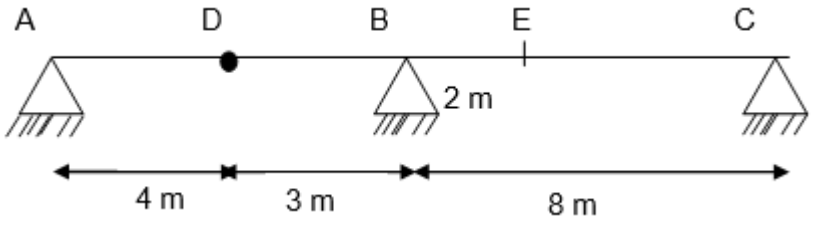
13. (a) A beam ABC is supported at A, B, C as shown in fig. **(14) 3 3**

Draw influence lines for

a) Reactions at A, B, C

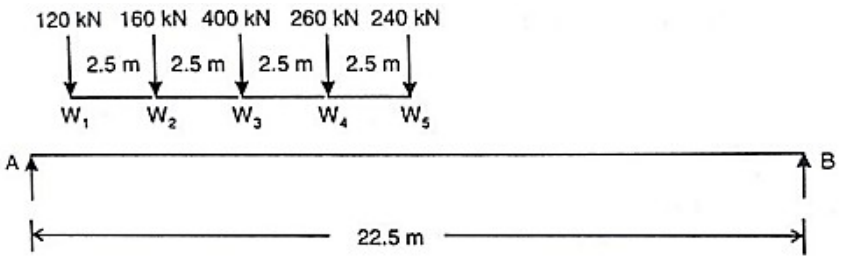
b) Shear to the right of B

c) Bending moment at E

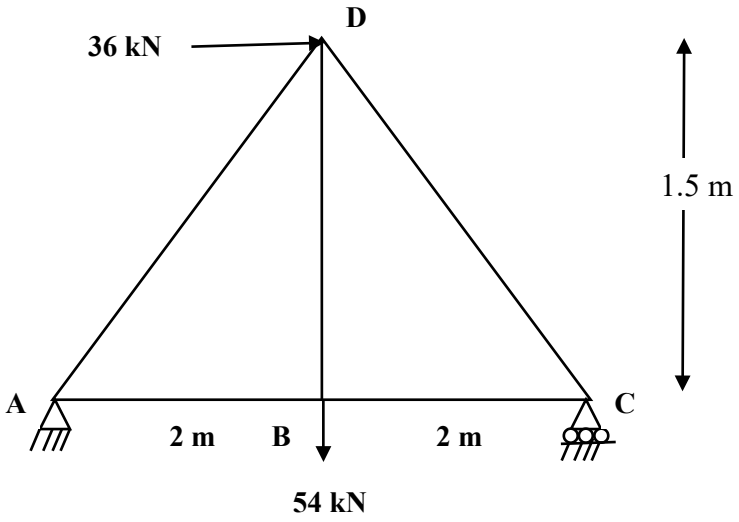


(OR)

(b) **(i)** A train of 5 wheel loads crosses a simply supported beam of span 22.5 m as shown in figure. Using influence lines, calculate the maximum positive and negative shear forces at mid span and absolute maximum bending moment anywhere in the span **(14) 3 3**



14. (a)	A three hinged parabolic arch has supports at different levels having span 20m and carries a UDL of 30kN/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 find the normal thrust and radial shear at a section 4m from the left support.	**(14)**	**4**	**3**
	(OR)			
(b)	A segmental arch has a span of 40 metres and a rise of 8 metres and is hinged at the springing. Both the hinges are at the same level. The arch supports a load of 100 kN at the crown. Find the (i) The horizontal thrust at each supports (ii) The maximum Bending for the arch.	**(14)**	**4**	**3**
15. (a)	Using the method of tension coefficients, analyse the plane russ shown in figure and find the forces in the members.	**(14)**	**5**	**3**



(OR)

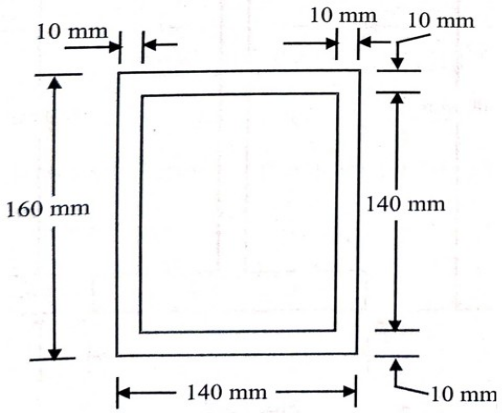
(b)	A curved beam in the form of a quadrant of a circle of radius R and having a uniform cross – section is in a horizontal plane. It is fixed at A and free at B as shown in fig. it carries a vertical concentrated load W at the free end B. compute the shear force, bending moment and twisting moment values and sketch variations of the above quantities. Also determine the vertical	**(14)**	**5**	**3**

deflection of the free end B.

PART- C (1x 10=10Marks)

(Q.No.16 is compulsory)

		Marks	CO	RBT LEVEL
16.	Calculate the shape factor for the hollow rectangular section shown in figure.	**(10)**	**1**	**3**



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