Reg. No.															

Question Paper Code	13539

B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2025

Fifth Semester

Civil Engineering

20CEPC504 - STRUCTURAL ANALYSIS I

Regulations - 2020

Duration: 3 Hours | Max. Marks: 100

PART - A (MCQ) (10 × 1 = 10 Marks)

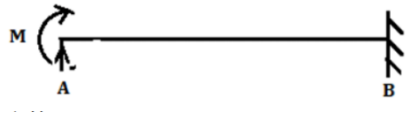
Answer ALL Questions

		Marks	K – Level	CO
1.	The number of independent equations to be satisfied for static equilibrium of a plane structure is (a) 1 (b) 2 (c) 3 (d) 6	1	K1	CO1
2.	A beam fixed at the ends and subjected to lateral loads only is statically indeterminate and the degree of indeterminacy is _____. (a) One (b) Two (c) Three (d) Four	1	K1	CO1
3.	The primary unknowns in slope deflection method is (a) Shear Force (b) Moment (c) Displacement (d) Reaction	1	K1	CO2
4.	How many rotations are possible in case of 3 dimensional frame/beam? (a) 1 (b) 2 (c) 3 (d) 4	1	K1	CO2
5.	Summation of distribution factor at the joint is (a) greater than 1 (b) less than 1 (c) equal to 1 (d) equal to 0	1	K1	CO3
6.	Stiffness of the end A if the far end B is fixed is ____ (a) EI/L (b) 2EI/L (c) 3EI/L (d) 4EI/L	1	K1	CO3
7.	When one of the supports of a beam is at a lower level as compared to the other, it will cause a moment at both ends. The magnitude of this moment introduced in slope deflection equation is (a) $-3EI\delta/L^2$ (b) $-4EI\delta/L^2$ (c) $-6EI\delta/L^2$ (d) $-2EI\delta/L^2$	1	K2	CO4
8.	Which one of the following causes sway in portal frames? (a) Unsymmetrical Loading (b) Different Column End Condition (c) Settlement of Support (d) All of the above	1	K1	CO4
9.	Flexibility matrix is always _____ (a) symmetric (b) non-symmetric (c) anti-symmetric (d) depends upon loads applied	1	K1	CO5
10.	The stiffness coefficient for beam due to axial unit force is _____ (a) AE/L (b) EI/L (c) AG/L (d) None of these	1	K1	CO6

PART - B (12 × 2 = 24 Marks)

Answer ALL Questions

		Marks	K – Level	CO
11.	Explain about principle of least work.	2	K2	CO1
12.	Find the degree of static indeterminacy of a simply supported beam carrying a point load at mid span.	2	K1	CO1
13.	What will be the value of Fixed End Moment of simply supported beam of span "L". which carries a uniformly distributed load "w/m" throughout the span?	2	K1	CO2
14.	What is the different displacement methods used in the analysis of indeterminate structures?	2	K1	CO2
15.	Find the carryover moment at end B due to moment M applied at end A for the given propped cantilever beam.	2	K1	CO3

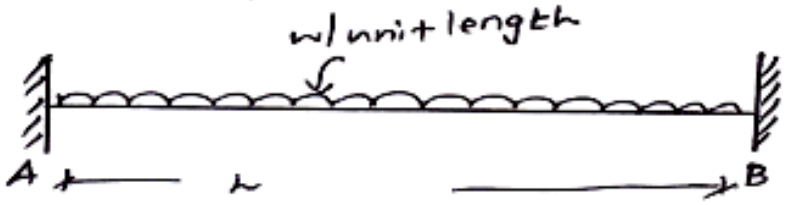


16.	Give the relative stiffness when the far end is (a) Simply supported and (b) Fixed.	2	K1	CO3
17.	Write the slope deflection equation for a beam undergoing support settlement.	2	K2	CO4
18.	What do understand by skew symmetric loading in frames?	2	K2	CO4
19.	Explain the compatibility condition used in the flexibility method.	2	K2	CO5
20.	Give the mathematical expression for the degree of static indeterminacy of rigid jointed plane frames.	2	K1	CO5
21.	What is transformation Matrix?	2	K1	CO6
22.	Write a short note on element stiffness matrix.	2	K2	CO6

PART - C (6 × 11= 66 Marks)

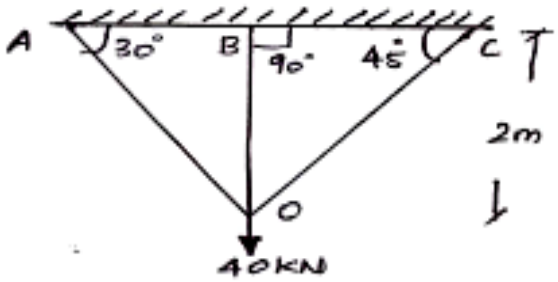
Answer ALL Questions

23.	a)	Using the consistent deformation method, find the fixed end moments developed in the fixed beam shown in figure. Draw the bending moment and shear force diagrams.	11	K3	CO1

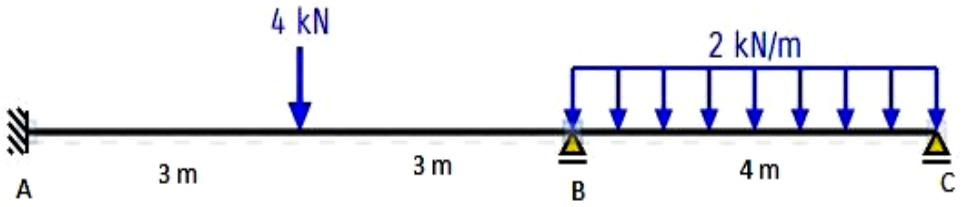


OR

	b)	Three wires AO, BO and CO support a load of 40KN as shown in figure. The cross sectional areas of all the wires are the same. Determine the forces in all the wires.	11	K3	CO1

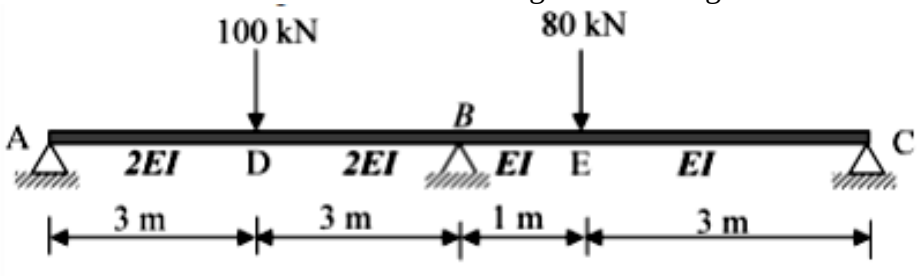


24.	a)	Determine the internal moment at each joint of the beam shown in Fig. Assume joint A is Fixed and B,C are rollers. Take EI is constant. Using slope deflection method.	11	K3	CO2



OR

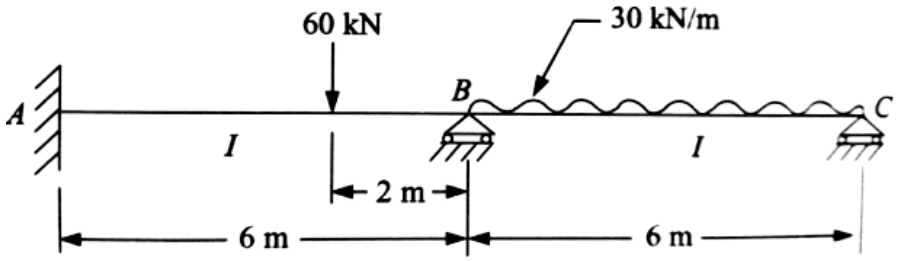
b) Analyze the continuous beam and draw Bending moment diagram. *11 K3 CO2*



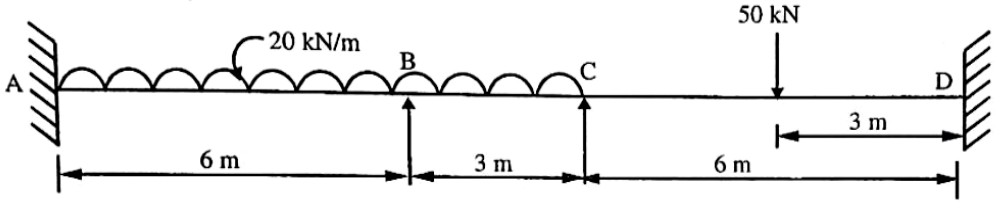
25. a) A continuous beam ABC is simply supported at A, fixed at C and continuous over support B. The span AB is 6 m and carries a concentrated load of 60 kN at its mid-span and the span BC is 8 m and carries a uniformly-distributed load of 10 kN/m. Take the flexural rigidity for portion AB as 2EI and that for portion BC as EI. Analyze the beam by moment distribution method. *11 K3 CO3*

OR

b) Analyze the continuous beam loaded as shown in Fig by moment distribution method. *11 K3 CO3*

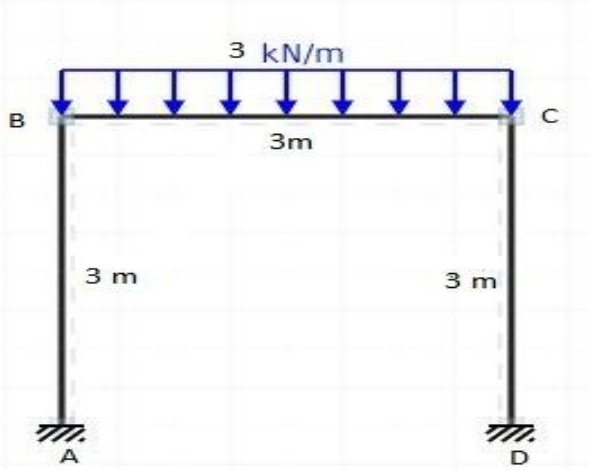


26. a) Analyse the continuous beam ABCD by slope deflection method and find the end moments. Support B sinks by 10 mm. E = 2 x 10^5 N/mm^2 and I = 16 x 10^7 mm4 by slope deflection method. *11 K3 CO4*

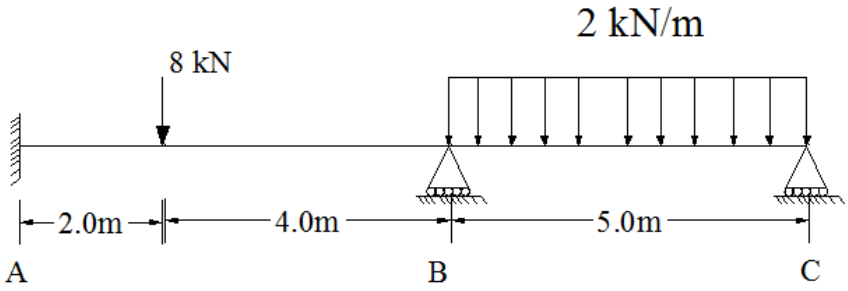


OR

b) Determine the internal moment at each joint of the frame shown in Fig. Assume joint A and D are Fixed. Take EI is constant. Using Moment distribution method. *11 K3 CO4*



27. a) Determine the Moment at A, for the following beam shown in Fig. Take EI is constant. Using Flexibility Matrix Method. *11 K3 CO5*



OR

b) Analyse the portal frame ABCD shown in figure by flexibility matrix method and sketch the bending moment diagram. *11 K3 CO5*

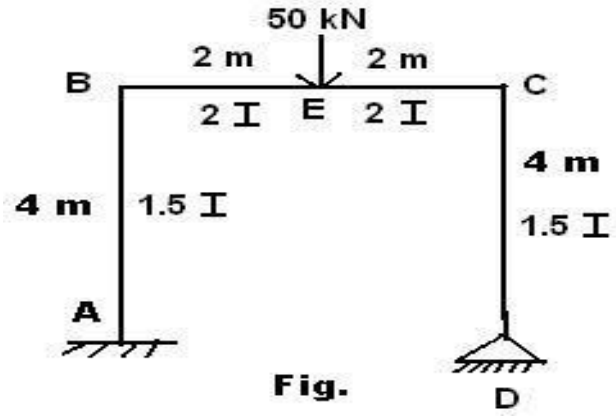
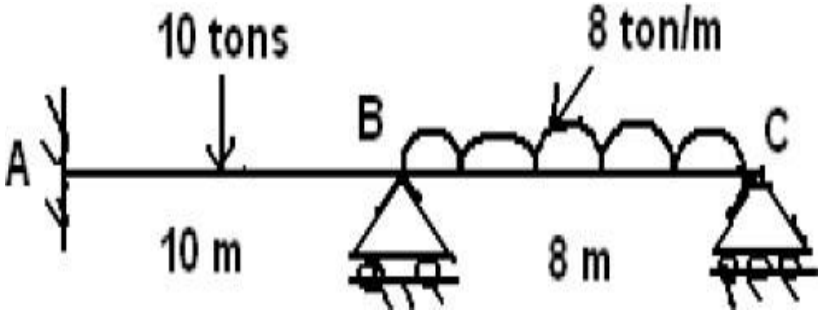


Fig.

28. a) A two span continuous beam ABC is fixed at A and simply supported over the supports B and C. AB = 10 m and BC = 8 m. Moment of inertia is constant throughout. A single central concentrated load of 10 Tons acts on AB and a uniformly distributed load of 8 Ton/m acts over BC. Analyse the beam by stiffness matrix method. *11 K3 CO6*



OR

b) Analyse the continuous beam ABC shown in figure using stiffness matrix method and also draw the shear force diagram. *11 K3 CO6*