Reg. No.												

Question Paper Code	12433

B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2023

Fifth Semester

Civil Engineering

20CEPC504 - STRUCTURAL ANALYSIS I

(Regulations 2020)

Duration: 3 Hours Max. Marks: 100

PART-A (10 × 2 = 20 Marks)

Answer ALL Questions

		Marks, K-Level, CO
1.	Differentiate determinate and indeterminate structure.	*2,K2,CO1*
2.	Define strain energy.	*2,K1,CO1*
3.	State the limitations of Slope deflection method.	*2,K1,CO2*
4.	Why is slope deflection method called as displacement method?	*2,K2,CO2*
5.	Define carry over moment.	*2,K1,CO3*
6.	List any four reasons due to which sway may occur in portal frames.	*2,K1,CO3*
7.	Define a primary structure.	*2,K1,CO5*
8.	Differentiate flexibility and stiffness.	*2,K2,CO5*
9.	Explain the properties of stiffness matrix.	*2,K2,CO6*
10.	Write the stiffness matrix of a beam element simply supported at both ends.	*2,K1,CO6*

PART - B (5 × 13 = 65 Marks)

Answer ALL Questions

11.	a)	A two span continuous beam ABC simply supported at ends A and C and continuous over support B. The span AB=5m carries a uniformly distributed load of 30kN/m over span AB. The span BC=6m carries a concentrated load 40kN acting at 3m from C. EI is constant. Find the support reactions using strain energy method.	*13,K3,CO1*
		OR	
	b)	A portal frame ABCD with supports A and D are hinged at same level carries a uniformly distributed load of 35kN/m over the span BC. Span AB=CD=4m and BC=5m. A horizontal load 40kN is acting at column head B. EI is constant. Calculate the bending moment using strain energy method.	*13,K3,CO1*
12.	a)	Using slope deflection method, analyze a three span continuous beam ABCD simply supported at ends A and D and continuous over	*13,K4,CO4*

supports B and C. The support B settles by 5mm. The span AB=4m carries a concentrated load 6kN acting at 3m from A. The span BC=5m carries a uniformly distributed load of 4kN/m. The span CD=6m carries a central concentrated load 8kN. Take E=2x10^5 N/mm^{2}and I=16x10^{7}mm^4.

OR

b) A portal frame ABCD, A and D are fixed at same level. Span BC carries a uniformly distributed load of 20kN/m. EI is constant. Take Span AB=BC=CD=6m. Analyze the frame using slope deflection method and draw the bending moment diagram. *13,K4,CO2*

13. a) A beam ABC, 16m long, fixed at A and C continuous over support B, carries an uniformly distributed load of 3kN/m over the span AB and a point load of 10kN at mid span of BC. Span AB=BC=8m. Analyze the beam using moment distribution method. EI is constant. *13,K4,CO3*

OR

b) A portal frame ABCD with supports A and D are fixed at same level carries a uniformly distributed load of 80kN/m over the span BC. Span AB=BC=CD=5m. EI is constant throughout. Analyze the frame using moment distribution method. *13,K4,CO3*

14. a) A two span continuous beam ABC is fixed at A and hinged at support B and C. The span AB=10m carries a concentrated load of 240kN at centre and span BC=10m carries a central concentrated load 120kN at centre. Assuming vertical reaction at B and C as redundant and find the redundant forces using flexibility method. EI is constant. *13,K3,CO5*

OR

b) Analyse the portal frame ABCD shown in figure by flexibility matrix method and sketch the bending moment diagram. *13,K3,CO5*

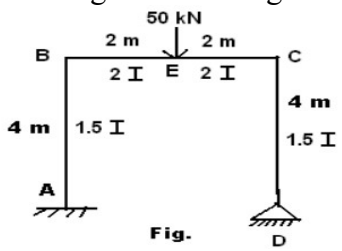
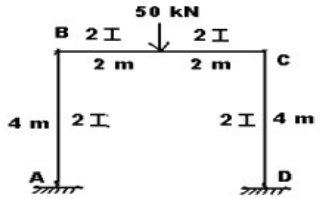


Fig.

15. a) A continuous beam ABC is fixed at A and C. The span AB=8m carries a single concentrated load of 6.4kN at 5m from support A and BC=6m carries a concentrated load of 8kN at mid span. Moment of inertia is constant throughout the beam. Compute the bending moment using stiffness matrix method. *13,K3,CO6*

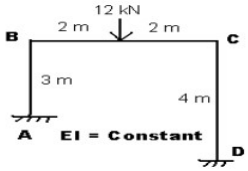
OR

b) Find the member forces of the pin jointed frame as shown in figure using stiffness matrix method. *13,K3,CO6*



PART - C (1 × 15 = 15 Marks)

16. a) Analyse the portal frame shown in figure by slope deflection method. *15,K3,CO4*



Figure

OR

b) Analyse the continuous beam ABCD shown in figure by slope deflection method. The support B sinks by 15mm. Take E = $200X10^5$ kN/m^2 and I = $120x10^{-6}m^4$ *15,K3,CO4*