SRM VALLIAMMAI ENGINEERING COLLEGE

SRM Nagar, Kattankulathur – 603 203

DEPARTMENT OF CIVIL ENGINEERING

QUESTION BANK

V SEMESTER

CE3561 - STRUCTURAL ANALYSIS 1

Regulation: 2023

Academic Year:2025– 2026

Prepared by

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Department of Civil Engineering

Vision

To produce competent and quality engineers by imparting knowledge, excellence and global perspectives in Civil Engineering to our students and to make them ethically strong professional engineers to build our nation.

Mission

- To produce outstanding graduates with high technical knowledge to serve the nation.
- To impart value-based education
- To provide solutions to the challenges in the field of Civil Engineering.

Program Educational Objectives (PEOs)

1. To produce graduates who can understand their ethical, environmental as well as professional responsibilities so that they appreciate the impact of the engineering solutions which have sustainability over society and the nation.
2. To develop the graduates who will exhibit strong technical ability to create & synthesize data using relevant tools and concepts, for providing sustainable solutions to civil engineering problems and projects.
3. To equip the graduates with suitable skills, making them industry ready when they leave the portals of the Institute and to become a competent distinguished Professional Civil Engineer.
4. To produce students who can exhibit attitude, professionalism, ability to communicate with team members and adapt to the latest technology by engaging themselves in life-long learning

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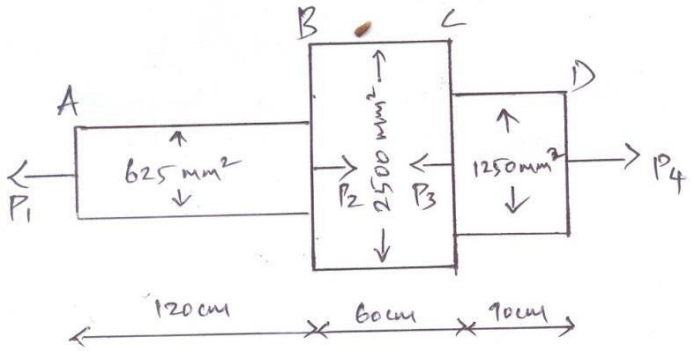
DEPARTMENT OF CIVIL ENGINEERING

QUESTION BANK

SUBJECT : STRUCTURAL ANALYSIS -1

SEM / YEAR: V/ III

UNIT I ANALYSIS OF TRUSSES			
Determinate and indeterminate trusses - analysis of determinate trusses - method of joints - method of sections - Deflections of pin-jointed plane frames - lack of fit - change in temperature method of tension coefficient - Application to space trusses.			
PART A			
Q.No.	**Questions**	**BT Level**	**Competence**
1.	Define young modulus.	BT-1	Remembering
2.	State Hooke's law.	BT-1	Understanding
3.	Recall modular ratio & Poisson's ratio.	BT-3	Applying
4.	Explain longitudinal strain and lateral strain with a neat sketch.	BT-3	Applying
5.	What do you mean by Stress?	BT-1	Remembering
6.	Discuss the relationship between Elastic Constants	BT-2	Understanding
7.	An alloy bar of 1m length has a square section throughout which tapers from one end of 10mmx10mm to another end of 20x20mm. Find the change in length due to an axial load of 30kN. Take E=120GPa.	BT-4	Analysis
8.	Discuss about thermal stresses.	BT-2	Understanding
9.	Define strain.	BT-2	Understanding
10.	Relate shear stress and shear strain.	BT-1	Creating
11.	Determine the Poisson's ratio and bulk modulus of a material for which young's modulus is $1.2 \times 10^5 N/mm^2$ and modulus of rigidity is $4.8 \times 10^4 N/mm^2$.	BT-4	Analysis
12.	A brass rod 2m long is fixed at both its ends. If the thermal stress is not to exceed $76.5N/mm^2$. Calculate the temperature through which the rod should be heated. Take the values of $\alpha = 17x10^{-6}/K$ and E =90Gpa.	BT-4	Analysis
13.	Differentiate thin cylinder & thick cylinder	BT-2	Creating
14.	What do you understand by the term wire winding of thin cylinder?	BT-1	Remembering
15.	Sketch the stress-strain diagram for TOR Steel/HYSD bars and mark the salient points.	BT-4	Analysis
16.	Define the term limit of proportionality elastic limit and yield point.	BT-1	Remembering
17.	Define the terms a) resilience b) proof resilience c) modulus of resilience	BT-1	Remembering
18.	Summarize the procedure for finding the thermal stresses in	BT-2	Evaluating

	a composite bar?		
19.	List the types of stresses developed in thin cylinders subjected to internal pressure?	BT-1	Remembering
20.	Distinguish between cylindrical shell and spherical shell.	BT-2	Evaluating
21.	What is meant by the term bulk modulus?	BT-3	Applying
22.	Distinguish between Rigid Bodies and Deformable Bodies.	BT-2	Evaluating
23.	Define shear modulus.	BT-2	Understanding
24.	Write down the formula for Maximum shear stress in thin cylinders.	BT-1	Applying
25.	Define Hoop Stress.	BT-1	Remembering
	PART B		
1.	A tensile test was conducted on a mild steel bar. The following data was obtained from the test: (i) Diameter of the steel bar = 4 cm (ii) Gauge length of the bar = 22 cm (iii) Load at elastic limit = 250 kN (iv) Extension at a load of 160 kN = 0.235 mm (v) Maximum load = 390 kN (vi) Total extension = 70 mm (vii) Diameter of rod at failure = 2.35 cm Determine the Young's modulus, the stress at elastic limit, the percentage of elongation & the percentage decrease in area.	BT-1	Remembering
2.	A member ABCD is subjected to point loads P_1, P_2, $P_3$and P_4 as shown. Find P_2 required for necessary equilibrium, if P_1 = 45kN, P_3 = 450kN and P_4=130kN. Determine the total elongation of the members. 	BT-1	Remembering
3.	Estimate the values of change in length, breadth and thickness of a steel bar 4.2m long, 35mm wide and 25mm thick. When subjected to an axial pull of 130kN in the direction of its length. Take E=200Gpa and poison's ratio = 0.3	BT-2	Understanding
4.	Three bars made of copper, zinc and aluminum are of equal length and have cross section 555, 705, and 1020 sq.mm respectively. They are rigidly connected at their ends. If this compound member is subjected to a longitudinal pull of 255kN, estimate the proportional of the load carried on each rod and the induced stresses. Take the value of E for copper = 1.3×10^5 N/mm^2, for zinc = 1×10^5 N/mm^2	BT-1	Remembering

	and for aluminum = 0.8×10^5 N/mm^2		
5.	A bar of 25mm diameter is subjected to a pull of 40kN. The measured extension on gauge length of 200mm is 0.085mm and the change in diameter is 0.003mm. Estimate the values of Poisson's ratio and the three moduli.	BT-1	Remembering
6.	i) Obtain a relation for change in length of a bar hanging freely under its own weight. (8) ii) Derive the relationship between modulus of elasticity and modulus of rigidity. (8)	BT-1	Remembering
7.	A cylindrical vessel, whose ends are closed by means of rigid flange plates, is made up of steel plates 3 mm thick. The length and internal diameter of the vessel are 55 cm and 25.5 cm respectively. Determine the longitudinal and hoop stresses in the cylindrical shell due to an internal fluid pressure of 3.5 N/mm^2. Also calculate the increase in length, diameter and volume of vessel. Take E = 2×10^5 N/mm^2 and μ=0.3.	BT-4	Analyzing
8.	**i)** Draw stress – strain diagram for mild steel, brittle material and a ductile material and indicate salient points. (10) **ii)** A circular alloy bar 2m long uniformly tapers from 30mm diameter to 20mm diameter. Calculate the elongation of the rod under the axial force of 50kN. Take E=140GPa. (6)	BT-1	Remembering
9.	**i)** A steel flat plate of thickness 10mm tapers uniformly from 60mm at one end to 40mm at the other end in a length of 600mm. If the bar is subject to a load of 60kN find the extension take E=205 Mpa. (8) **ii)** Derive the relationship between bulk modules and young's modulus. (8)	BT-1	Remembering
10.	A square steel bar 50 mm on the side and 1 m long is subject to an axial tensile force of 250 kN. Determine the decrease in the lateral dimension due to this load. Use E = 200 GPa and Poisson's ratio is 0.3	BT-2	Understanding
11.	A steel rod of 3.6cm diameter and 5m long is connected to two grips and the rod is maintained at a temperature of 105^{o}C. Determine the stress and pull exerted when the temperature falls to 40^{o}C if, the ends do not yield the ends yield by 0.13cm	BT-2	Understanding
12.	A spherical shell of 1.5 m diameter has a 1 cm thick wall. Determine the pressure that can increase its volume by 100 cm^3. Take: E= 200 GN/m^2; 1/m=0.3	BT-4	Analyzing
13.	A copper tube 30 mm bore and 3 mm thick is plugged at its ends. It is just filled with water at atmospheric pressure. If an axial compressive load of 8 kN is applied to the plugs, find by how much the water pressure will increase? The plugs are assumed to be rigid and fixed to the tube. Take: E= 100 GN/m^2; Bulk modulus= 2.2 GN/m^2; Poisson's ratio= 0.33	BT-1	Remembering
14.	A steel bar is placed between two copper bars, each having the same area and length as steel bar at 20°C. At this stage, they are rigidly	BT-3	Applying

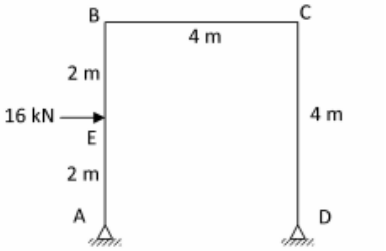
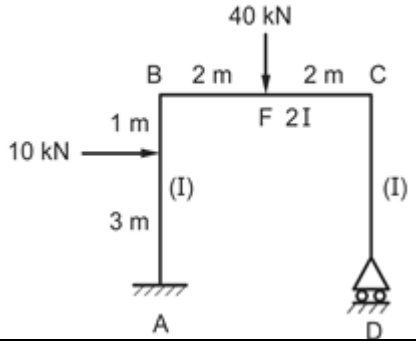
	connected at both ends. When the temperature is raised to 320°C, the length of the bars increases by 1.5 mm. Determine the original length and final stresses in the bars. Take: Es= 220 GN/m^2; Ec= 110 GN/^{m2} α_s=0.000012 per °C α_c= 0.0000175 per °C		
15.	A steel wire 2 m long and 3 mm in diameter is extended by 0.75 mm when a weight W is suspended from the wire. If the same weight is suspended from a brass wire, 2.5 m long and 2 mm in diameter, it is elongated by 4.64 mm. Determine the modulus of elasticity of brass if that of steel be 2.0 x 10^5 N/mm^2.	BT-3	Applying
16.	A steel tube of 30mm external diameter and 20mm internal diameter encloses a copper rod of 15.5mm diameter to which it is rigidly joined at each end. If, at a temperature of 10°C there is no longitudinal stress, calculate the stresses in the rod and the tube when the temperature is raised to 200°C. Take Es = 2.1x10^5 N/mm^2 and E_c = 1x10^5 N/mm^2 Co-efficient of linear expansion 11x10^{-6} per °C and 18x10^{-6} per °C	BT-3	Applying
17.	A thin spherical shell 1.5 m diameter, with its wall of 1.25 cm thickness filled with the fluid at atmospheric pressure. What intensity of pressure will be developed in it if 160 cm3 more fluid is pumped into it? Also calculate the hoop stress at that pressure and increase in diameter. Take: E= 200 GN/m^2; m=10/3	BT-3	Applying

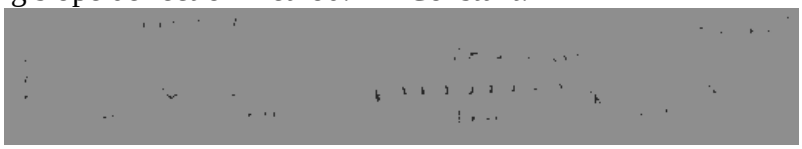
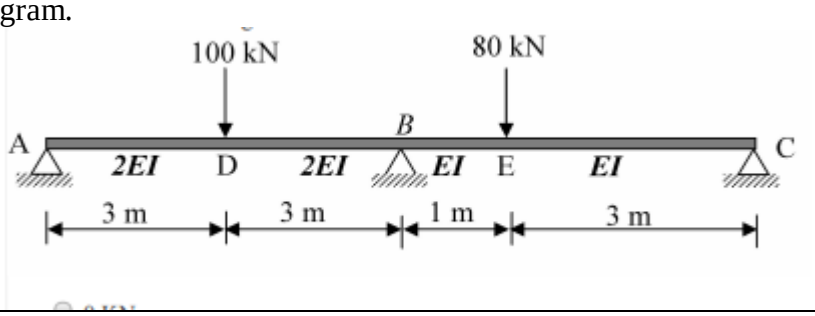
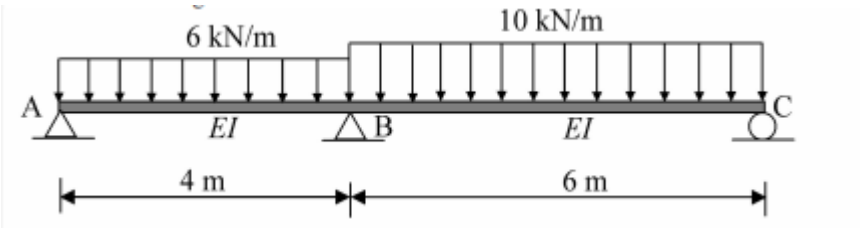
UNIT II SLOPE DEFLECTION METHOD

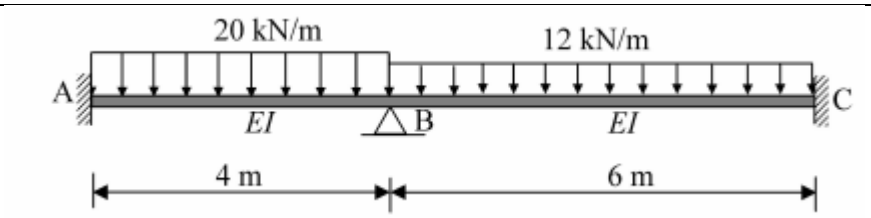
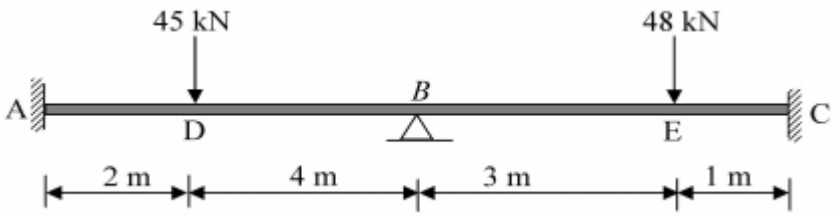
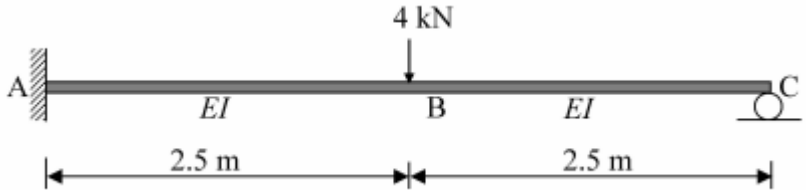
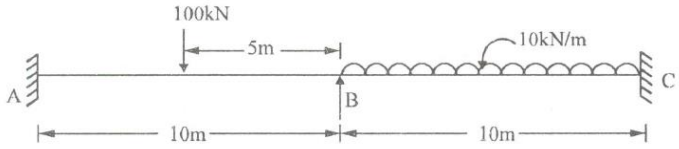
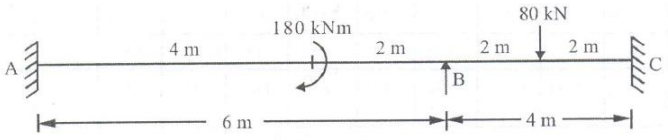
Slope deflection equations – Equilibrium conditions - Analysis of continuous beams and rigid frames – Rigid frames with inclined members - Support settlements – symmetric frames with symmetric and skew-symmetric loadings.

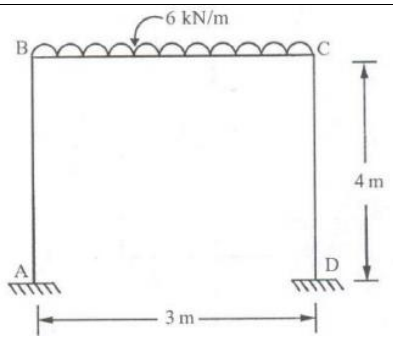
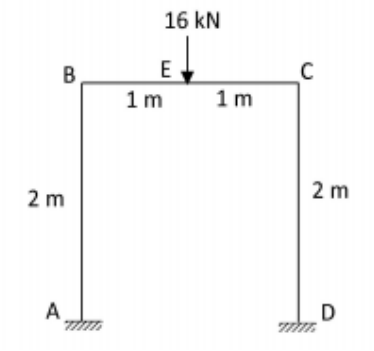
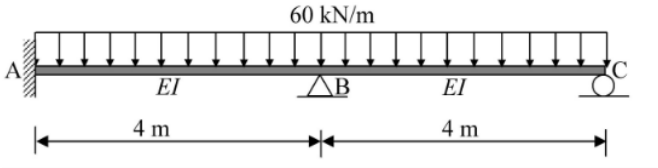
Part - A

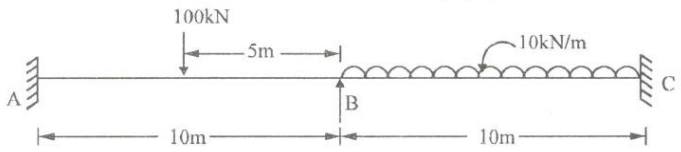
Q. No.	Questions	BT Level	Competence
1.	Who introduced Slope deflection method of analysis?	BT-1	Remembering
2.	What is the limitation of slope-deflection equations applied in structural analysis?	BT-1	Remembering
3.	What are the different support conditions?	BT-1	Remembering
4.	What are the quantities in terms of which the unknown moments are expressed in slope deflection method?	BT-1	Remembering
5.	Write the slope deflection equation for the fixed beam with right half of the span loaded with udl of intensity 'w' per meter run.	BT-1	Remembering
6.	What are the assumptions made in slope-deflection methods?	BT-1	Remembering
7.	Write down the general slope deflection equations and state what each term represents.	BT-1	Remembering
8.	What are the conditions at which side sway don't occur?	BT-1	Remembering
9.	What are the sign conventions used in slope deflection method?	BT-1	Remembering

10.	How many slope deflection equations are available for a two-span continuous beam?	BT-2	Understanding
11.	Write down the slope deflection equation for a beam AB fixed at A and B subjected to a settlement δ at B.	BT-2	Understanding
12.	Write the fixed end moment for a fixed beam with triangular loading with intensity zero at the supports.	BT-2	Understanding
13.	State the limitations of Slope deflection method.	BT-2	Understanding
14.	Why is slope deflection method called displacement method?	BT-2	Understanding
15.	Write the fixed end moment for a udl distributed for the full span.	BT-2	Understanding
16.	Write the fixed end moment for a point load located at mid span.	BT-2	Understanding
17.	Explain the use of slope deflection method.	BT-2	Understanding
18.	Mention the reasons due to which sway may occur in portal frames.	BT-3	Applying
19.	Write the shear condition for the following frame. 	BT-3	Applying
20.	Explain the principle involved in the slope deflection method of analysis.	BT-3	Applying
21.	A rectangular portal will have horizontal sway only when it is subjected to----------or----------.	BT-3	Applying
22.	Find the unknowns and equilibrium conditions of the continuous beam ABC with A, B and C are simply supported joints	BT-3	Applying
23.	Write the equation for sway correction for the portal frame shown in fig. 	BT-3	Applying
24.	How do account for sway in slope deflection method for portal frames?	BT-3	Applying
25.	A rigid frame is having a total of 10 joints including support joints. Out of slope deflection and moment distribution methods, which method would you prefer for analysis? Why?	BT-3	Applying

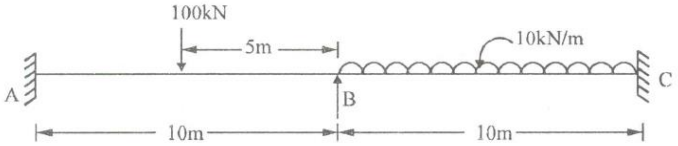
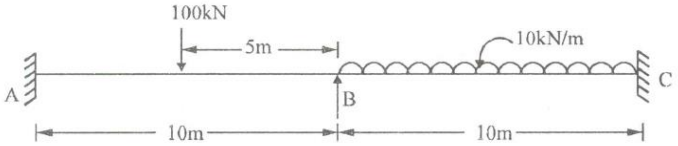
Part – B			
Q. No.	**Questions**	**BT Level**	**Competence**
1	A continuous beam ABC consists of span AB=3m and BC=4m, the ends A and C being fixed. AB and BC carry uniformly distributed loads of intensity 4kN/m and 5kN/m respectively. The beam is of uniform section throughout. What are its support moments? Draw the bending moment diagram for the beam	BT - 1	Remembering
2	Examine the given continuous beam and draw its BMD and SFD using slope deflection method. EI=Constant. 	BT-1	Remembering
3	Analyse the continuous beam ABCD shown in fig. by slope deflection method and summarize its results. Take EI=Constant. Also sketch the shear force and Bending Moment diagram. 	BT-2	Understanding
4	Analyse the continious beam and draw the bending moment diagram. 	BT-1	Remembering
5	Analyse the continious beam and draw the bending moment diagram. 	BT-1	Remembering
6	Calculate the bending moments at A, B, and C for the two-span continuous beam ABC. EI is constant.	BT-2	Understanding

			
7	Calculate the bending moments at A, and C for the two-span continuous beam ABC by slope deflection method. EI is constant. 	BT-3	Applying
8	Calculate the bending moment at B of the beam shown. The vertical settlement at support C is 10 mm. EI = 300 kN-m2 is constant throughout the section. 	BT-3	Applying
9	Calculate the bending moments at A, and C for the two-span continuous beam ABC. EI is constant. 	BT-3	Applying
10	Calculate the bending moments at A, and C for the two-span continuous beam ABC. EI is constant. 	BT-3	Applying
11	Analyse the frame by moment distribution method and draw bending moment diagram	BT-4	Analyzing

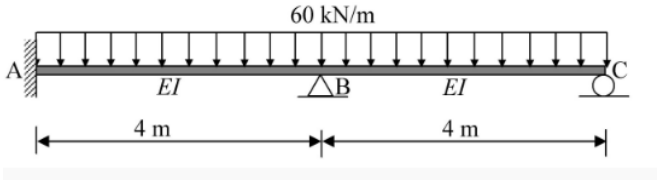
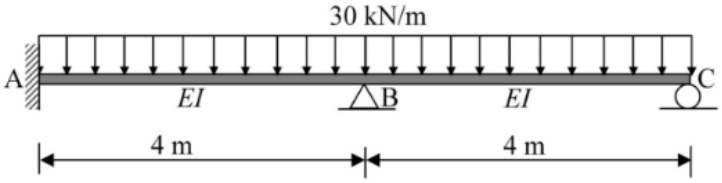
			
12	Calculate the bending moment at E for the frame shown in figure. EI is the same for all the members 	BT-3	Applying
13	A continuous beam ABC consists of span AB=4m and BC=4m, the ends A and C being fixed. AB and BC carry uniformly distributed loads of intensity 5kN/m and 2kN/m respectively. The beam is of uniform section throughout. What are its support moments? Draw the bending moment diagram for the beam	BT-4	Analyzing
14	A continuous beam ABC consists of span AB=4m and BC=4m, the ends A simply support, and C being fixed. AB and BC carry uniformly distributed loads of intensity 5kN/m and 2kN/m respectively. The beam is of uniform section throughout. What are its support moments? Draw the bending moment diagram for the beam	BT-3	Applying
15	A continuous beam ABC consists of span AB=4m and BC=4m, the ends A fixed and C simply supported. AB and BC carry uniformly distributed loads of intensity 2kN/m and 4kN/m respectively. The beam is of uniform section throughout. What are its support moments? Draw the bending moment diagram for the beam	BT-3	Applying
16	Calculate the moment at B for the two-span continuous beam ABC. EI is constant. 	BT-3	Applying

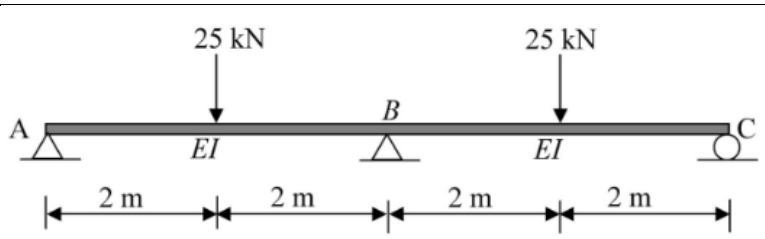
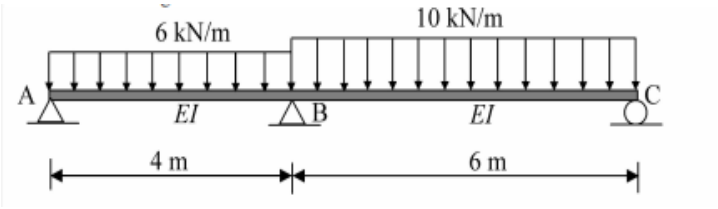
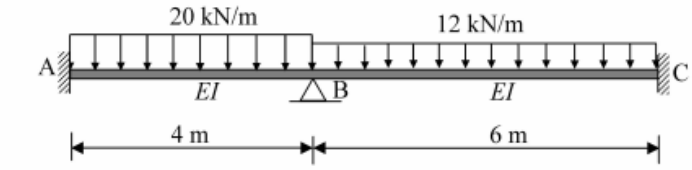
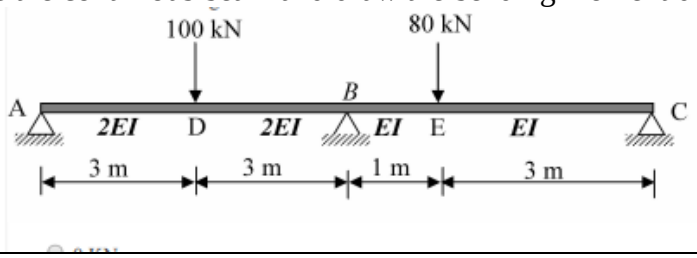
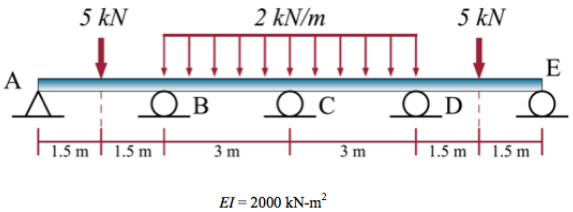
17	Calculate the moment at B for the two-span continuous beam ABC. EI is constant.  	BT-3	Applying

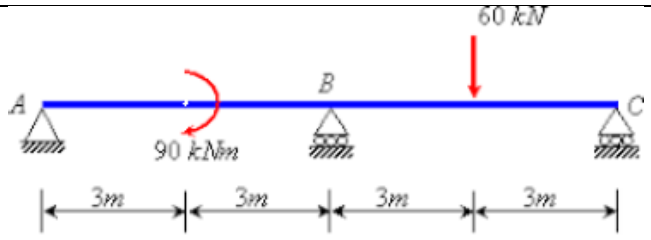
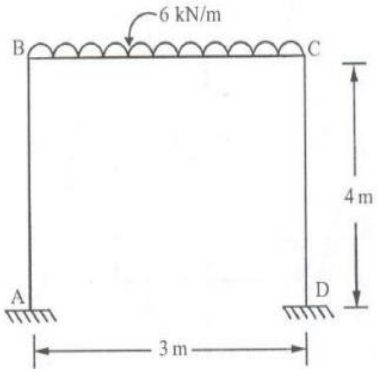
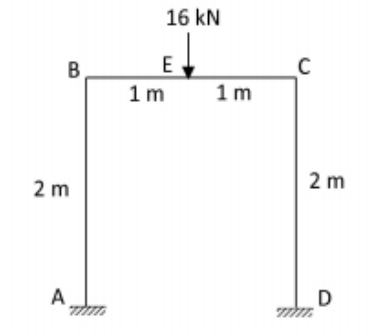
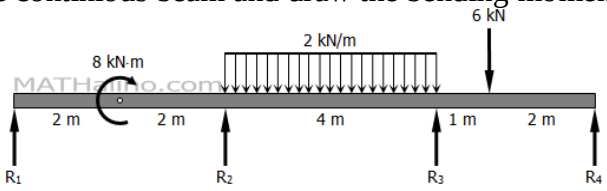
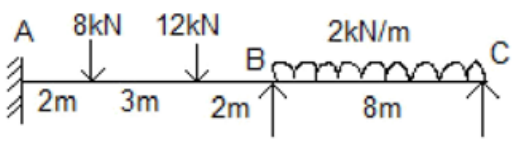
UNIT III: MOMENT DISTRIBUTION METHOD			
Stiffness - distribution and carry over factors –- Analysis of continuous Beams- Plane rigid frames with and without sway – Support settlement - symmetric frames with symmetric and skew-symmetric loadings.			
Part - A			
Q. No.	**Questions**	**BT Level**	**Competence**
1.	What is distribution factor?	BT-1	Remembering
2.	Explain about Stiffness factor	BT-1	Remembering
3.	Define sway.	BT-1	Remembering
4.	Define Stiffness	BT-1	Remembering
5.	Define: Moment distribution method (Hardy Cross method)	BT-1	Remembering
6.	What is carry over moment?	BT-1	Remembering
7.	In a member AB, if a moment of –10 KNm is applied at A, what is the moment carried over to B?	BT-1	Remembering
8.	What are symmetric and anti-symmetric quantities in structural behavior?	BT-1	Remembering
9.	What are the situations where in sway will occur in portal frames?	BT-1	Remembering
10.	What is the sum of distribution factors at a joint?	BT-1	Remembering
11.	Explain about carry over factor	BT-2	Understanding
12.	What do you understand by constant strength beam?	BT-2	Understanding
13.	A rigid frame is having a total of 10 joints including support joints. Out of slope-deflection and moment distribution methods, which method would you prefer for analysis? Why?	BT-2	Understanding
14.	Mention any three reasons due to which sway may occur in portal frames.	BT-2	Understanding
15.	What is sway correction?	BT-2	Understanding
16.	Give the relative stiffness when the far end is (a) Simply supported and (b) Fixed.	BT-2	Understanding
17.	State how the redundancy of a rigid frame is calculated	BT-2	Understanding
18.	What is the difference between absolute and relative stiffness?	BT-2	Understanding
19.	Explain Naylor simplification	BT-3	Applying
20.	Explain Flexural Rigidity of Beams.	BT-3	Applying
21.	What are the advantages of Continuous beam over simply supported	BT-3	Applying

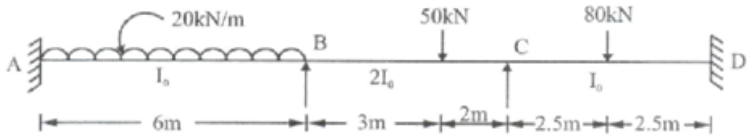
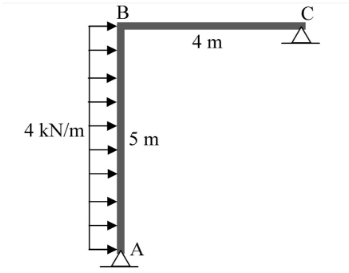
	beam?		
22.	Explain the concepts involved in the Moment distribution method (Hardy Cross method).	BT-3	Applying
23.	In member AB, if moment of -10kNm is applied at A, what is the moment carried over to B?	BT-3	Applying
24.	Write the Stiffness of the members for the joint A, B and Cof given beam? 	BT-3	Applying
25.	Write the distribution factor for the joint B of given beam? 	BT-3	Applying

PART – B

Q. No.	Questions	BT Level	Competence
1.	Calculate the moment at B for the two-span continuous beam ABC. EI is constant. 	BT-1	Remembering
2.	Calculate the mid-span moment for span AB and BC of the continuous beam ABC given below. EI is constant. 	BT-1	Remembering
3.	Calculate the moment at B for the two-span continuous beam ABC. EI is constant. (Moment distribution method)	BT-1	Remembering

			
4.	Analyse the continious beam and draw the bending moment diagram. (Moment distribution method) 	BT-3	Applying
5.	Calculate the bending moments at A, B, and C for the two-span continuous beam ABC. EI is constant. (Moment distribution method) 	BT-3	Applying
6.	Analyse the continious beam and draw the bending moment diagram. 	BT-4	Analyzing
7.	Analyse the continious beam and draw the bending moment diagram. 	BT-4	Analyzing
8.	Analyse the continious beam and draw the bending moment diagram.	BT-4	Analyzing

			
9.	Analyse the frame by moment distribution method and draw bending moment diagram 	BT-4	Analyzing
10.	Calculate the bending moment at E for the frame shown in figure. EI is the same for all the members 	BT-3	Applying
11.	Analyse the continious beam and draw the bending moment diagram. 	BT-4	Analyzing
12.	Analyse the continious beam and draw the bending moment diagram. 	BT-4	Analyzing

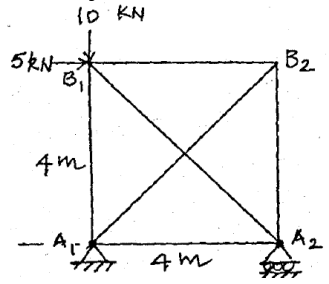
13.	Draw the bending moment diagram for the given beam by moment distribution method 	BT-4	Analyzing
14.	Calculate the bending moment for the segment given below. take EI is constant 	BT-1	Remembering
15.	A continuous beam ABC consists of span AB=4m and BC=4m, the ends A and C being fixed. AB and BC carry uniformly distributed loads of intensity 5kN/m and 2kN/m respectively. The beam is of uniform section throughout. What are its support moments? Draw the bending moment diagram for the beam	BT-3	Applying
16.	A continuous beam ABC consist of span AB=4m and BC=4m, the ends A simply support and C being fixed. AB and BC carry uniformly distributed loads of intensity 5kN/m and 2kN/m respectively. The beam is of uniform section throughout. What are its support moments? Draw the bending moment diagram for the beam	BT-3	Applying
17.	A continuous beam ABC consists of span AB=4m and BC=4m, the ends A fixed and C simply supported. AB and BC carry uniformly distributed loads of intensity 2kN/m and 4kN/m respectively. The beam is of uniform section throughout. What are its support moments? Draw the bending moment diagram for the beam	BT-3	Applying

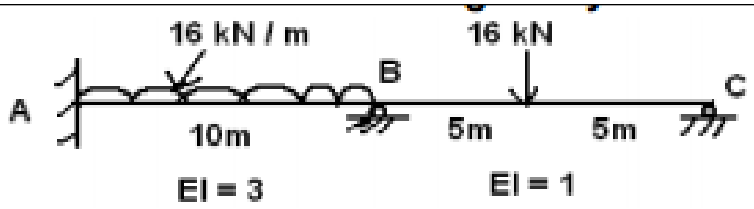
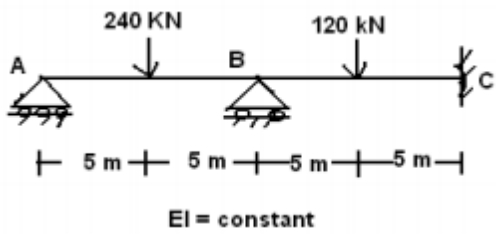
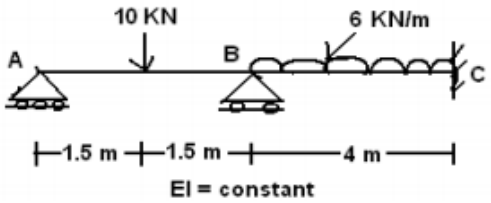
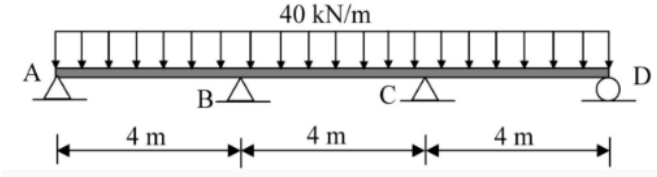
UNIT IV: FLEXIBILITY METHOD

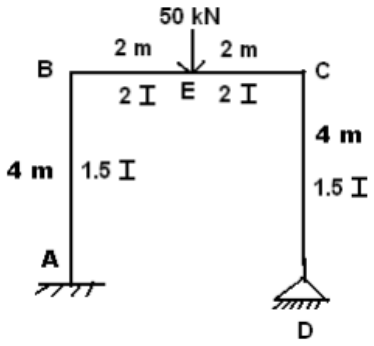
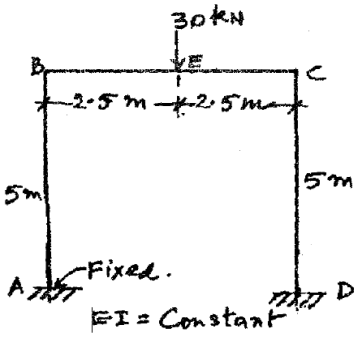
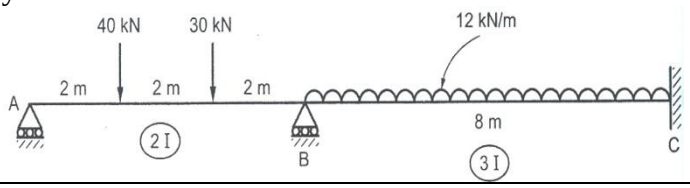
Primary structures - Compatibility conditions – Formation flexibility matrices - Analysis of indeterminate pin-jointed plane frames, continuous beams and rigid jointed plane frames by direct flexibility approach.

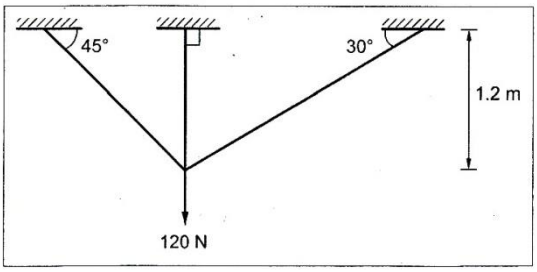
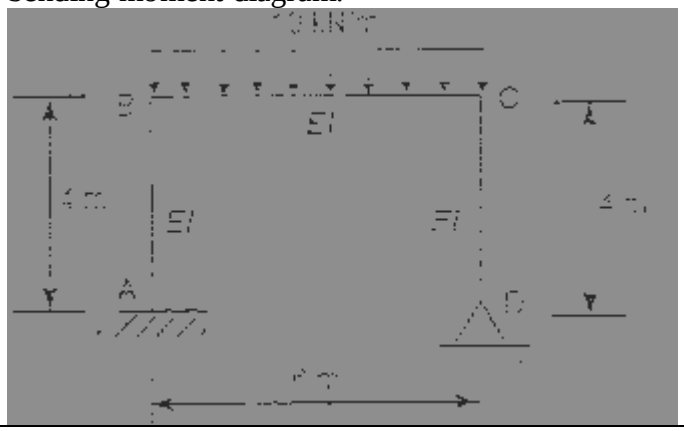
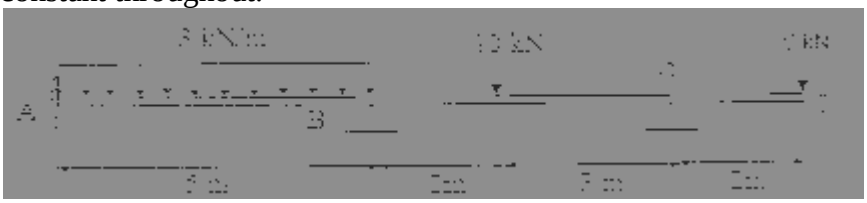
Q. No	PART-A	BT Level	Competence
1.	What are the conditions to be satisfied for determinate structures and how are indeterminate structures identified?	BT-1	Remembering
2.	Write down the equation for the degree of static indeterminacy of the pin jointed Plane frames, explain the notations used.	BT-1	Remembering
3.	Give the mathematical expression for the degree of static indeterminacy of rigid jointed plane frames.	BT-1	Remembering
4.	What are the properties which characterize if the structure response	BT-1	Remembering

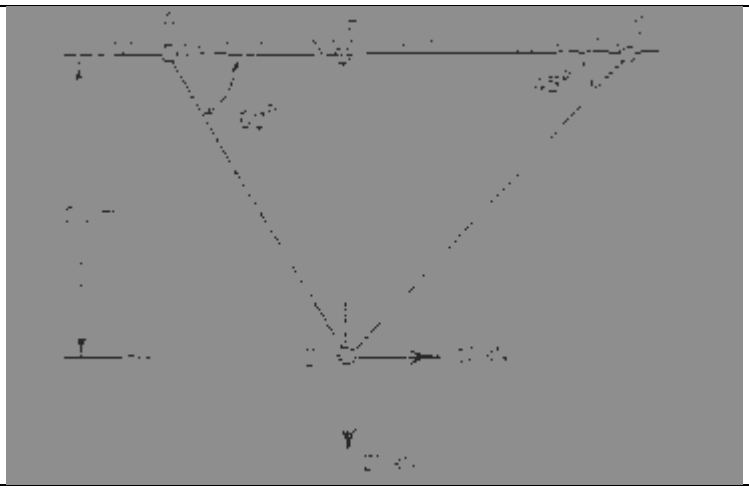
	by means of force-displacement relationship?		
5.	List the classical methods of structural analysis.	BT-1	Remembering
6.	What is meant by flexibility?	BT-1	Remembering
7.	In flexibility method unknown quantities are ----------and final equations are----------	BT-1	Remembering
8.	Write about the indeterminate structures.	BT-1	Remembering
9.	List the variables in the force method.	BT-1	Remembering
10.	Briefly mention the two types of matrix methods of analysis of indeterminate structures.	BT-1	Remembering
11.	Define a primary structure.	BT-1	Remembering
12.	What is a primary structure?	BT-2	Understanding
13.	What are equilibrium equations?	BT-2	Understanding
14.	What are the different methods of analysis of indeterminate structures?	BT-2	Understanding
15.	Differentiate Stiffness method from flexibility method.	BT-2	Understanding
16.	What are the basic requirements of structural analysis?	BT-2	Understanding
17.	Write the equation for degree of indeterminacy of 2D trusses.	BT-2	Understanding
18.	What is meant by compatibility condition?	BT-2	Understanding
19.	Write the element Flexibility matrix for a beam member and truss member.	BT-2	Understanding
20.	Define External and Internal indeterminacy.	BT-2	Understanding
21.	Explain the term flexibility coefficient.	BT-3	Applying
22.	Choose the correct answer. The flexibility method is best suited when static indeterminacy is --------the kinematic indeterminacy. (a) Less than (b) Equal to (C) Greater than.	BT-3	Applying
23.	What is meant by generalized coordinates?	BT-3	Applying
24.	Explain the compatibility condition used in the flexibility method?	BT-3	Applying
25.	What is the displacement transformation matrix?	BT-3	Applying

Q. No	PART - B	BT Level	Competence
1.	Analyse the pin-jointed plane frame shown in Fig below by flexibility matrix method. The flexibility for each member is 0.0025 mm/KN. 	BT-4	Analyzing
2.	Analyse the continuous beam ABC shown in Fig below by flexibility matrix method and draw the bending moment diagram. R_B and R_C are redundant	BT-4	Analyzing

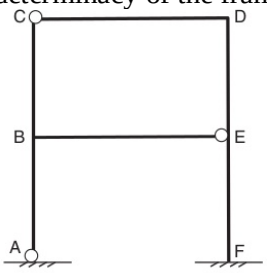
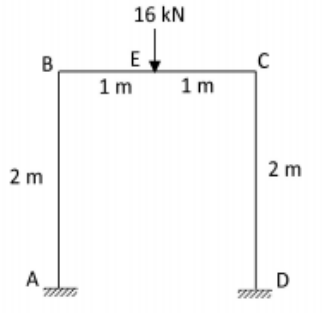
			
3.	Generate the flexibility matrix of beam ABC as shown in figure, below by flexibility matrix method and sketch the bending moment diagram 	BT-4	Analyzing
4.	A two-span continuous beam ABCD is fixed at A and hinged at support B and C. span of AB =Span of BC =9m. Arrange the flexibility influence co-efficient matrix assuming vertical reaction at B and C as redundant.	BT-4	Analyzing
5.	Calculate the deflection and moments of continuous beam shown in Fig below using force method. 	BT-4	Analyzing
6.	A cantilever is subjected to a single concentrated load P at the middle of the span. Calculate the deflection at the free end using flexibility matrix method. EI is uniform throughout.	BT-4	Analyzing
7.	Analyze the continuous beam ABCD shown in Fig below by flexibility matrix method and draw the bending moment diagram. M_B and M_C are redundant 	BT-4	Analyzing

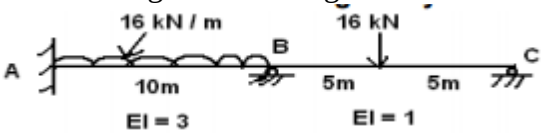
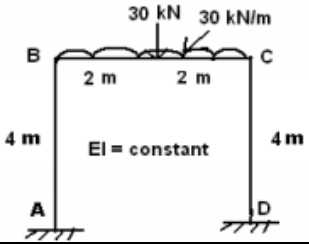
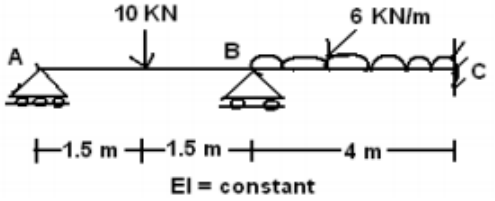
8.	A portal frame ABCD with supports A and D are fixed at same level carries a uniformly distributed load of 80kN/m on the span AB. Span AB=BC=CD=9m. EI is constant throughout. Analyze the frame by stiffness matrix method.	BT-4	Analyzing
9.	Solve the portal frame ABCD shown in Fig below by flexibility matrix method and sketch the bending moment diagram. 	BT-4	Analyzing
10.	Solve the portal frame ABCD shown in Fig below by flexibility matrix method and sketch the bending moment diagram. 	BT-4	Analyzing
11.	A portal frame ABCD with supports A and D are fixed at same level carries a concentrated load of 100kN at center of the AB. Span AB=BC=CD=10 m. EI is constant throughout. Analyze the frame by stiffness matrix method.	BT-4	Analyzing
12.	Examine the moment of the continuous beam shown in Fig below by flexibility method. 	BT-4	Analyzing

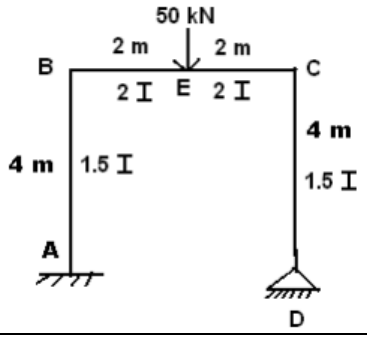
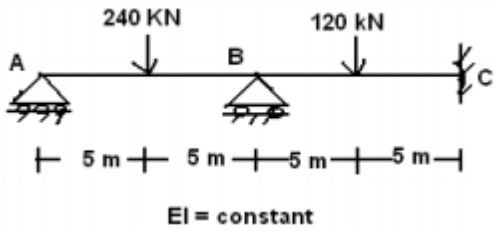
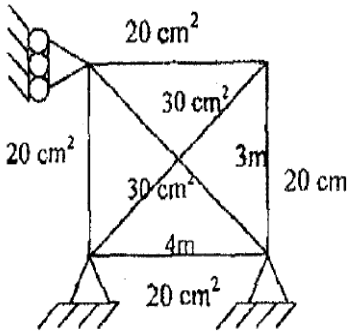
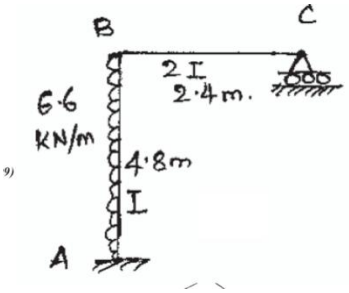
13.	Estimate the forces in all the members of the pin-jointed frames shown in Fig below by flexibility method, AE = constant. 	BT-4	Analyzing
14.	A cantilever beam is subjected to an udl of 'w'kN/m throughout the entire span. Calculate the deflection at the free end using flexibility matrix method. EI is uniform throughout.	BT-4	Analyzing
15.	Analyze the portal frame as shown in fig. by flexibility method and draw the bending moment diagram. 	BT-3	Applying
16.	Using flexibility matrix method, analyze and draw the bending moment diagram continuous beam as shown in fig, consider EI constant throughout. 	BT-3	Applying
17.	Analyze the pin jointed plane frame show in fig. by flexibility method.	BT-3	Applying

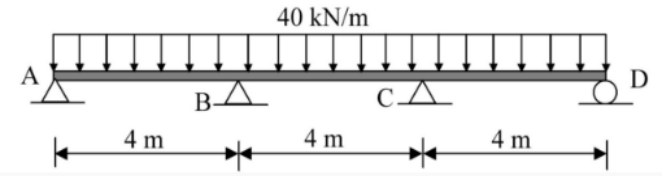
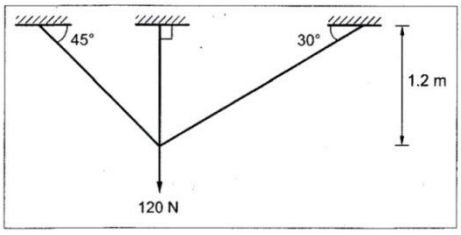
				

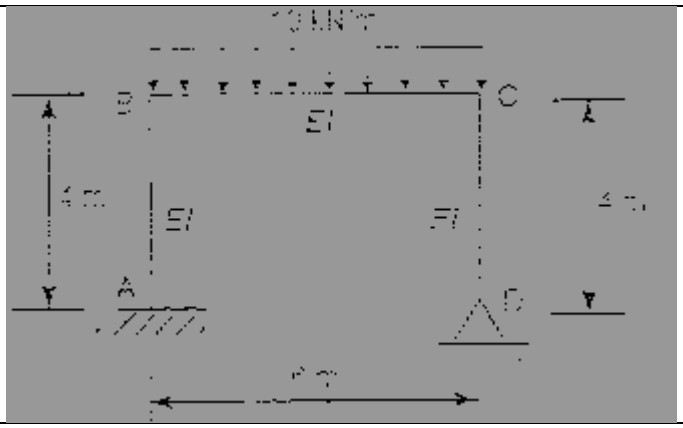
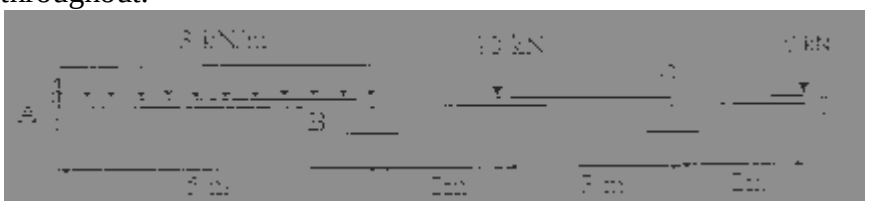
UNIT V: STIFFNESS MATRIX METHOD			
Restrained structure –Formation of stiffness matrices - equilibrium condition - Analysis of Continuous Beams, Pin-jointed plane frames and rigid frames by direct stiffness method.			
Q. No	**PART-A**	**BT Level**	**Competence**
1.	What are the basic unknowns in stiffness matrix method?	BT-1	Remembering
2.	Define degree of freedom of the structure with an example.	BT-1	Remembering
3.	Define Local and Global coordinates.	BT-1	Remembering
4.	Write down the rotation matrix for 2D beam element.	BT-1	Remembering
5.	Define Stiffness coefficient k_{ij}.	BT-1	Remembering
6.	Is it possible to develop the flexibility matrix for an unstable structure?	BT-1	Remembering
7.	What is transformation matrix?	BT-1	Remembering
8.	Explain about the properties of stiffness matrix.	BT-2	Understanding
9.	Explain the global stiffness matrices.	BT-2	Understanding
10.	Explain the steps involved in stiffness matrix method of analysis.	BT-2	Understanding
11.	Differentiate between flexibility and stiffness.	BT-2	Understanding
12.	Derive the stiffness matrix of a typical pin-jointed two-dimensional frame element.	BT-2	Understanding
13.	Write the properties of stiffness matrix.	BT-2	Understanding
14.	Write a short note on the element stiffness matrix.	BT-2	Understanding
15.	Which property of a structure determines the size of its stiffness matrix?	BT-2	Understanding
16.	What is meant by relative stiffness of a member?	BT-2	Understanding
17.	Explain the terms stiffness matrix and flexibility matrix. Show that these are inverse of each other.	BT-3	Applying
18.	Create the stiffness matrix for a 2D beam element	BT-3	Applying
19.	How are the basic equations of stiffness matrix obtained?	BT-3	Applying
20.	Explain about generalized coordinates.	BT-3	Applying
21.	What is the relationship between flexibility and stiffness matrix?	BT-3	Applying
22.	List out the types of boundary condition.	BT-3	Applying

23.	Explain the formation of load Vector	BT-3	Applying
24.	Determine the statically indeterminacy of the frame. 	BT-3	Applying
25.	Determine the statically indeterminacy of the frame. 	BT-3	Applying

Q. No	PART-B	BT Level	Competence
1.	Analyse the continuous beam ABC shown in Fig below by stiffness method and sketch the bending moment diagram. 	BT-3	Applying
2.	Analyse the portal frame ABCD shown in Fig below by stiffness method and sketch the bending moment diagram. 	BT-3	Applying
3.	Examine the continuous beam ABC shown in Fig below by stiffness method and draw the shear force diagram. 	BT-3	Applying

4.	Analyze the portal frame ABCD shown in Fig below by stiffness method and estimate the bending moment. 	BT-3	Applying
5.	Compute the final forces of continuous beam shown in Fig below using displacement method. 	BT-2	Understanding
6.	Analyse the truss shown in Fig below using a displacement method. 	BT-3	Applying
7.	Solve the portal frame shown in Fig below by matrix stiffness method and sketch the SFD and BMD. Given El is constant. 	BT-3	Applying
8.	A two-span continuous beam ABC is fixed at A and simply supported over the supports B and C. AB=6m and BC = 4m. Moment of inertia is constant throughout. A uniformly distributed load of 20kN/m acts over AB and a single concentrated load of 6 tons acts on BC.	BT-3	Applying

	Estimate BM by stiffness matrix method.		
9.	A portal frame ABCD with A and D are fixed at same level carries a uniformly distributed load of 20kN/m. EI is constant throughout. Assess the final forces by stiffness matrix method. Take Span AB=BC=CD=6m.	BT-3	Applying
10.	A continuous beam ABC is fixed at A and simply supported over the supports B and C. AB = 11m and BC = 9m. Moment of inertia is constant throughout. A single concentrated central load of 120 kN acts on AB and a uniformly distributed load of 10 kN/m acts over BC, examine the final forces by stiffness matrix method and draw BMD.	BT-3	Applying
11.	A continuous beam ABCB is simply supported over the supports A, B, C and D. AB = 10m, BC = 8m and CD=10m. Moment of inertia is constant throughout. A single concentrated central load of 12 tons acts on AB and a uniformly distributed load of 10Tons/m acts over BC, examine the final forces by stiffness matrix method and draw BMD.	BT-3	Applying
12.	Analyze the continuous beam shown in fig. by stiffness matrix method 	BT-3	Applying
13.	A portal frame ABCD with A and D are fixed at same level Span AB carries a uniformly distributed load of 20kN /meters. EI is constant throughout. Assess the final forces by stiffness matrix method. Span	BT-3	Applying
14.	Estimate the forces in all the members of the pin-jointed frames shown in Fig below by Stiffness matrix method, AE = constant. 	BT-3	Applying
15.	Analyze the portal frame as shown in fig. by stiffness method and draw the bending moment diagram.		

			
16.	Using stiffness method, analyze and draw the bending moment diagram continuous beam as shown in fig, consider EI constant throughout. 		
17.	Analyse the pin jointed plane frame show in fig. by stiffness method.