SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
Siddharth Nagar, Narayanavanam Road – 517583

QUESTION BANK (DESCRIPTIVE)

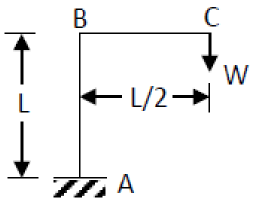
Subject with Code : Structural Analysis-I(16CE117) **Course & Branch**: B.Tech – CE

Year & Semester: III-B.Tech & I-Semester **Regulation:** R16

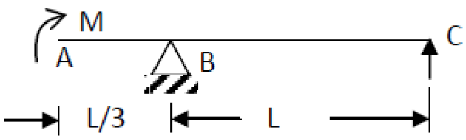
UNIT-I

ENERGY METHODS & INDETERMINATE STRUCTURAL ANALYSIS

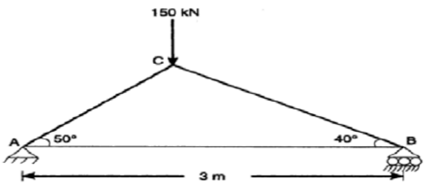
1. A vertical load W is applied to the rigid cantilever frame shown in figure below. Assuming EI to be constant throughout the frame determine the horizontal and vertical displacements of the point C. Neglect axial deformation. **10M**



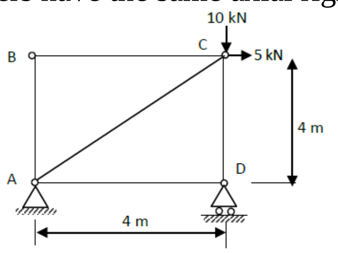
2. Calculate the central deflection and slope at ends of a simply supported beam carrying a U.D.L. **w** per unit length over the whole span. \ **10M**
3. Using Castigliano's theorem, determine the deflection and rotation of the overhanging end A of the beam loaded as shown in figure below. **10M**



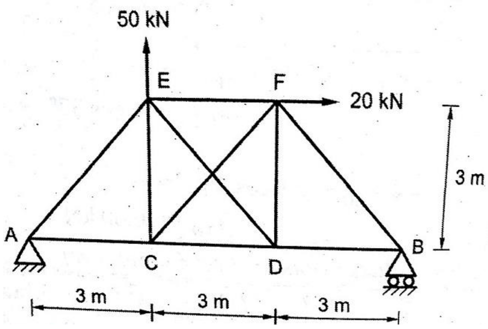
4. Determine the horizontal and vertical deflection components of joint C of the truss shown in figure below by energy method. Take E = 200 GPa and cross sectional area of each member is 1500 x 10^{-6} m^2. **10M**



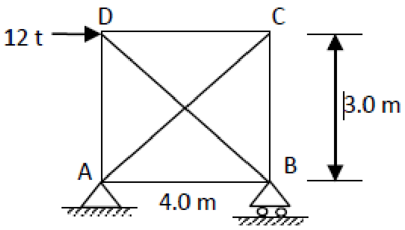
5. Find horizontal and vertical deflection of joint C of truss ABCD loaded as shown in figure below. Assume that, all members have the same axial rigidity. **10M**



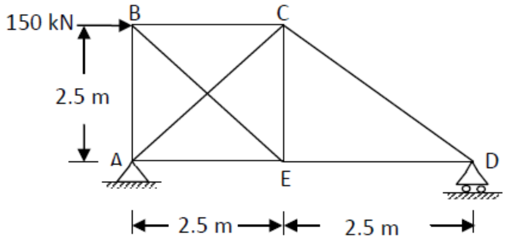
6. Analyze the truss shown in figure below. Assume that the cross sectional area of all members are same. **10M**



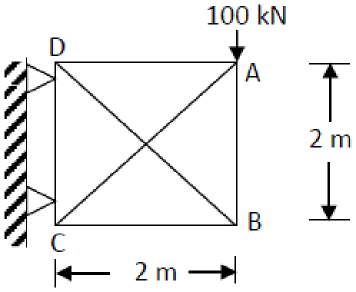
7. A pin jointed framed structure is loaded as shown in figure below. Calculate the forces in all members. Take area for horizontal members as 20 cm2, vertical members as 30 cm2, inclined members as 50 cm2 and E = 2000 t/cm2. **10M**



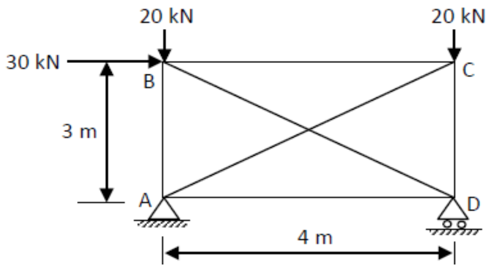
8. Determine the forces in the members AC and BE of a pin-jointed truss shown in figure below. Assume cross-sectional area of each member to be 15 x 10-4 m2. **10M**



9. Find the forces in all the members for a statically indeterminate frame shown in figure below. The cross-sectional area and E are the same for all the members. **10M**



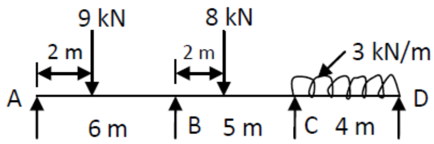
10. Determine the stresses in all the members of the frame shown in figure below, in which the cross sectional area of vertical members are 30 cm^2 each and those of all other members are 22 cm^2. Take E = 200 GPa. **10M**



UNIT-II

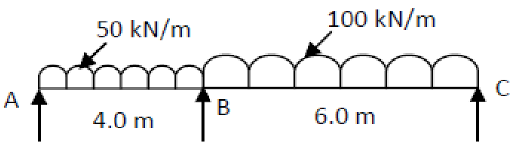
ANALYSIS OF FIXED BEAMS & CONTINUOUS BEAMS

1. A fixed beam of length 6 m carries two point loads of 30 kN each at a distance of 2 m from both ends. Determine the fixed end moments and draw BMD. **10M**
2. A Fixed beam of span 6 m is subjected a UDL of 5 kN/m on the left half of the span and a point load of 15 kN at the middle of the right half of the span. Draw the SFD and BMD **10M**
3. Calculate the fixed end moments and the reactions at the supports for a fixed beam AB of length 6 m. The beam carries point loads of 160 KN and 120 KN at a distance of 2 m and 4 m from the left end A. Draw SFD & BMD. **10M**
4. (a) Derive an expression to find BM and SF of fixed beam carrying an eccentric load. **6M**
   (b) A load of 3 kN is placed at the centre of fixed beam of length 4m. If E = 2 × 106 N/cm2 and I = 20000 cm4, determine the end moments and BM at centre as simply supported beam and deflection under load. **4M**
5. Determine the fixed end moments for the fixed beam with applied clockwise moment 'M' of distance 'a' from left end. The total length of beam is 'L'. Sketch the bending moment and shear force diagram. **10M**
6. A continuous beam ABC of constant moment of Inertia carries a load of 10 kN in mid span AB and a central clockwise moment of 30 kN-min span BC. Span AB = 10 m and span BC = 15 m. Find the support moments and plot the shear froce and bending moment diagram. **10M**
7. Analyze the continuous beam ABCD shown in the figure below using theorem of three moments. Draw SFD and BMD. **10M**

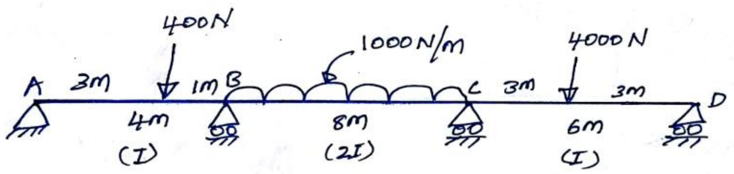


8. A continuous beam ABC of uniform section with span AB and BC as 4 m each, is fixed at A and simply supported at B and C. The beam is carrying a uniformly distributed load of 6 kN/m run throughout its length. Find the support moments and the reactions using theorem of three moments. Also draw SFD and BMD. **10M**

9. Analyze the beam and draw BMD and SFD **10M**



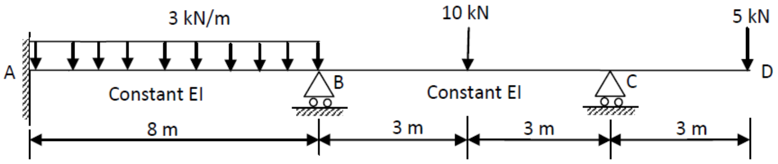
10. A continuous beam ABCD 18 m long is loaded as shown in figure below. During loading support 'B' sinks by 10 mm Find support moments and plot shear force and bending moment diagrams for the beam.Take E= 20 kN/mm^2 , I = 8 X 10^6 mm^4 **10M**



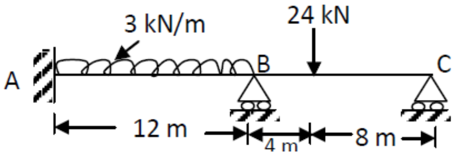
UNIT-III

SLOPE DEFLECTION METHOD

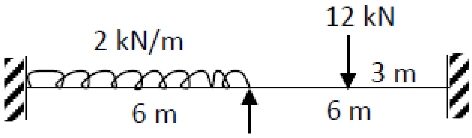
1. Analyze the continuous beam shown in figure below, using slope deflection method. Draw shear force and bending moment diagram for the continuous beam. **10M**



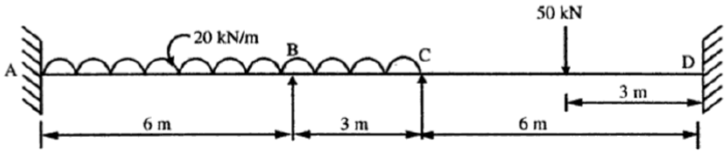
2. Analyze the continuous beam shown in figure below using slope deflection method. The support B sinks by 0.03 m. Values of E and I are 200 GPa and 0.2 x 10^{-3} m^4 respectively uniform throughout. Draw SF and BM diagrams. **10M**



3. Analyze the continuous beam shown in figure below using slope deflection method. Draw shear force and bending moment diagrams. **10M**

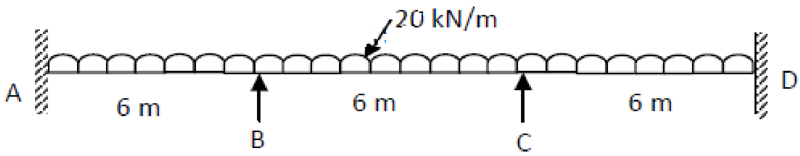


4. Analyze the continuous beam as shown in figure below by slope deflection method. Support B sinks by 10 mm. Take E = 200 GPa and I = 16 x 107 mm4. Draw the bending moment diagram.

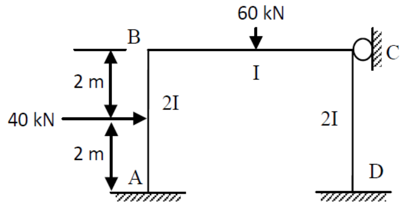


10M

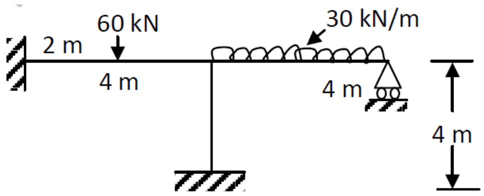
5. Analyze the continuous beam shown in figure below by slope deflection method and sketch SFD and BMD. EI is constant. **10M**



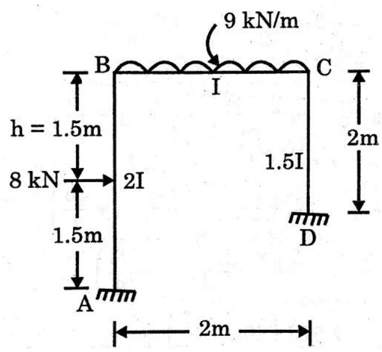
6. Analyze the portal frame shown in figure below, by slope deflection method. The relative moment of inertia value for each member is indicated in the figure below. Sketch the bending moment diagram **10M**



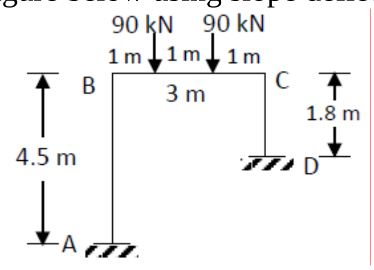
7. Analyze the frame shown in figure by slope deflection method. Draw BMD flexural rigidity is same for all members **10M**



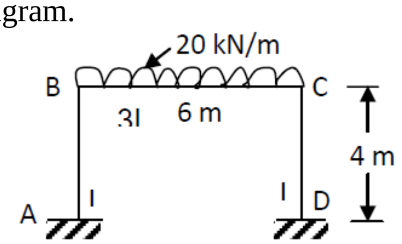
8. Analyze the frame shown in figure using slope deflection method and draw the bending moment diagram. **10M**



9. Analyze the portal frame shown in figure below using slope deflection method. **10M**



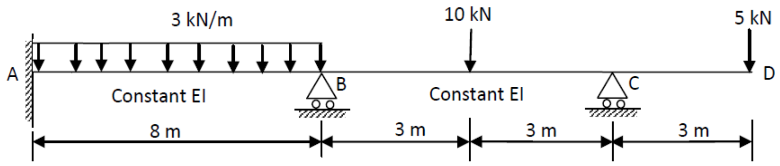
10. Analyze the portal frame shown in the figure below using slope deflection method. Draw also the bending moment diagram. **10M**



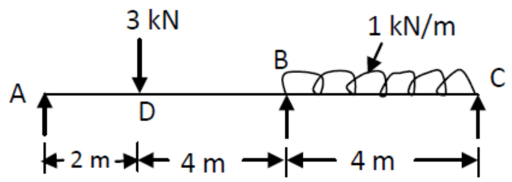
UNIT – IV

MOMENT DISTRIBUTION METHOD

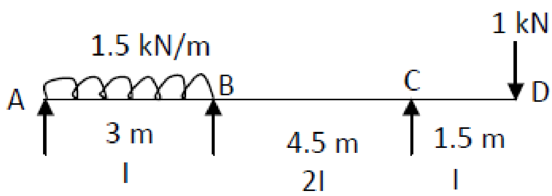
1. Analyze the continuous beam shown in figure below, using moment distribution method. Draw shear force and bending moment diagram for the continuous beam. **10M**



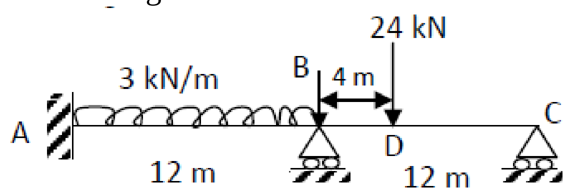
2. Analyze the continuous beam shown in figure below using moment distribution method. Draw the SF and BM diagrams. **10M**



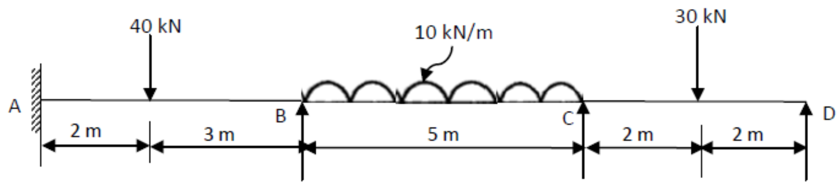
3. Analyze the continuous beam shown in figure below using moment distribution method. Draw B.M and S.F diagrams. **10M**



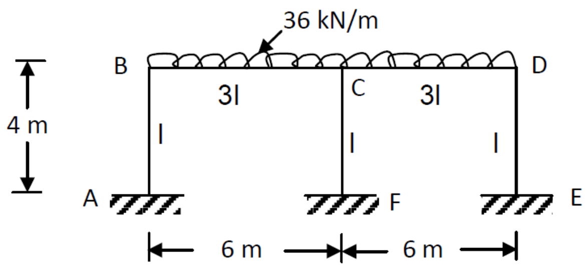
4. Analyze the continuous beam shown in figure below by using moment distribution method. The support B sinks 30 mm, values of E and I are 200 GPa and 0.2×10^9 m^4 respectively uniform throughout. Draw S.F and B.M diagrams. **10M**



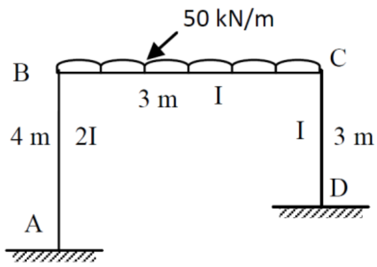
5. Analyze the continuous beam as shown in figure below by moment distribution method. Draw the bending moment diagram **10M**



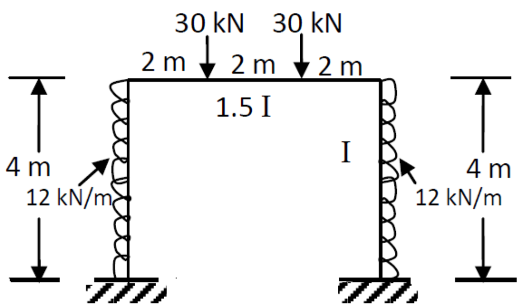
6. Analyze the rigid jointed frame shown in figure by moment distribution method and draw BMD **10M**



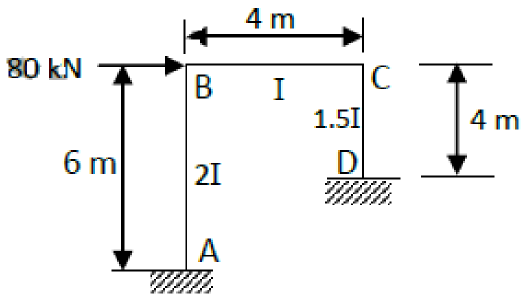
7. Analyze the portal frame shown in figure below by moment distribution method. The relative moment of inertia value for each member is indicated in the figure below. Sketch the bending moment diagram. **10M**



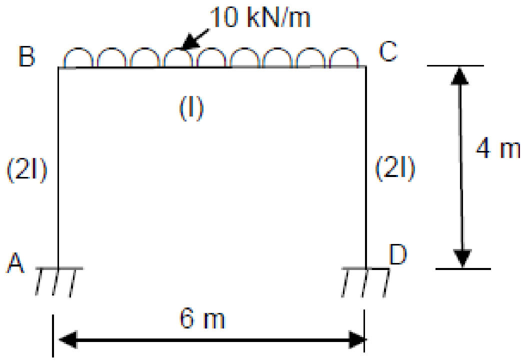
8. Analyze the portal frame shown in figure using moment distribution method **10M**



9. Analyze the portal frame shown in figure using moment distribution method **10M**



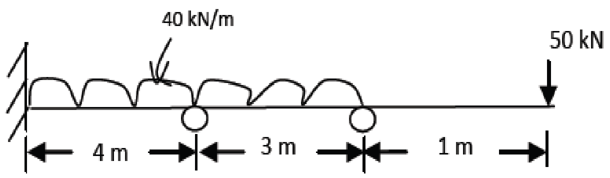
10. Analyze the portal frame shown in figure using moment distribution method **10M**



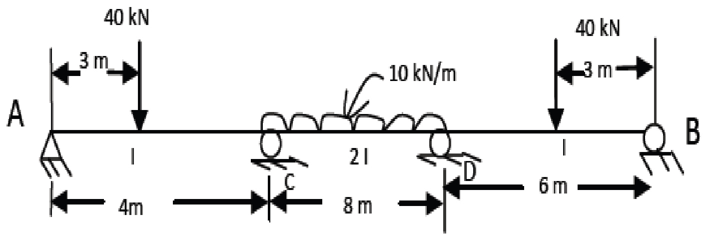
UNIT – V

KANI'S METHOD

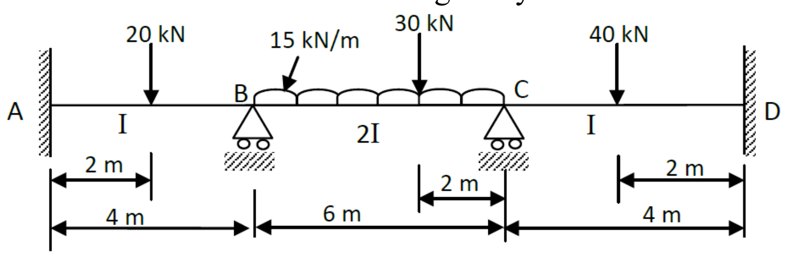
1. Determine the moments at supports if support B yield by 10 mm under the given loading for the beam as show in figure below by Kani's method, E=2.05x10^5 N/mm^2 , I=30x10 mm^4. **10M**



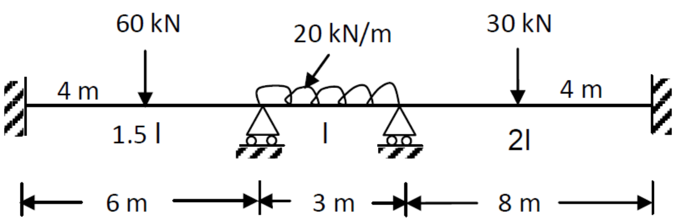
2. Determine the end moments of the continuous beam as shown in figure below by Kani's method. E is constant. **10M**



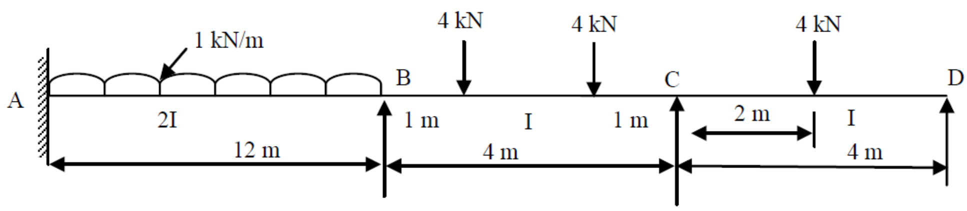
3. Analyze the continuous beam shown in the figure by Kani's method **10M**



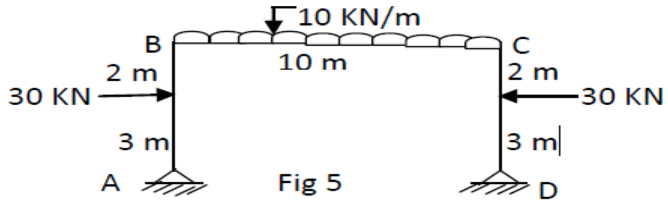
4. Analyze the continuous beam shown in the figure by Kani's method **10M**



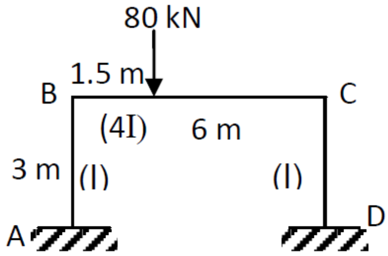
5. Analyze the continuous beam shown in the figure by Kani's method **10M**



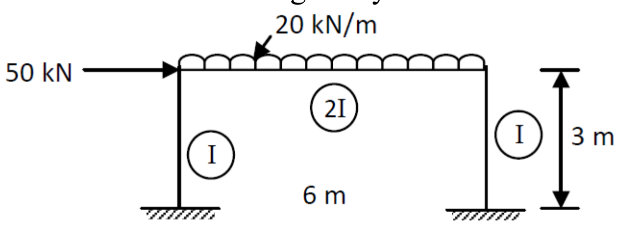
6. Analyze the structure shown in figure using Kani's method and draw BMD. **10M**



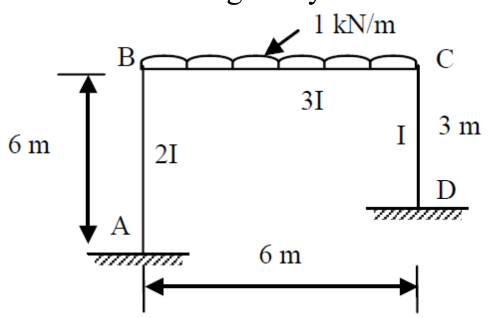
7. Analyze the frame shown in figure using Kani's method **10M**



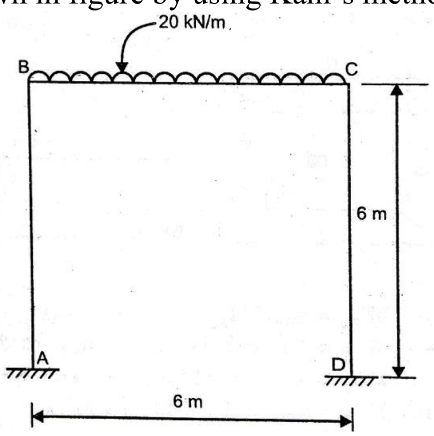
8. Analyze the portal frames shown in figure by Kani's method **10M**



9. Analyze the portal frames shown in figure by Kani's method **10M**



10. Analyze the portal frame shown in figure by using Kani's method **10M**



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QUESTION BANK (OBJECTIVE)

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Year & Semester: III-B.Tech & I-Semester **Regulation:** R16

UNIT-I

ENERGY METHODS & INDETERMINATE STRUCTURAL ANALYSIS

1. Compatibility conditions are primarily governed by [ ]
   A) Strain B) stress C) temperature D) force
2. Number of compatibility condition needed analysis of statically determinate structure are
   A) 0 B) 2 C) 3 D) 6 [ ]
3. Minimum number of equilibrium equations required for a plane frames analysis of structure is
   A) 2 B) 3 C) 5 D)6 [ ]
4. Minimum number of equilibrium equations required for a space frames analysis of structure is
   A) 3 B) 6 C)8 D)9 [ ]
5. The number of independent equations to be satisfied for static equilibrium of a plane structure is [ ]
   A) 3 B) 9 C) 1 D) 6
6. If there are m unknown member forces, r unknown reaction components and j number of joints, then the degree of static indeterminacy of a pin-jointed plane frame is given by [ ]
   A) m + r + 2j B) m - r + 2j C) m + r - 2j D) m + r - 3j
7. Number of unknown internal forces in each member of a rigid jointed plane frame is [ ]
   A) 3 B) 2 C) 3 D) 6
8. Degree of static indeterminacy of a rigid-jointed plane frame having 15 members, 3 reaction components and 14 joints is [ ]
   A) 2 B) 3 C) 6 D) 10
9. Degree of kinematic indeterminacy of a pin-jointed plane frame is given by [ ]
   A) 2j + r B) j - 2r C) 3j – r D) 2j - r
10. Independent displacement components at each joint of a rigid-jointed plane frame are [ ]
    A) Three linear movements B) Two linear movements and one rotation
    C) One linear movement and two rotations D) Three rotations
11. If in a pin-jointed plane frame (m + r) > 2j, then the frame is [ ]
    A) Stable and statically determinate B) stable and statically indeterminate
    C) Unstable D) none of the above
12. where m is number of members, r is reaction components and j is number of joints
    A pin-jointed plane frame is unstable if [ ]
    A) (m + r)>2j B) m + r = 2j C) (m + r)<2j D) none of the above
13. where m is number of members, r is reaction components and j is number of joints
    A rigid-jointed plane frame is stable and statically determinate if [ ]
    A) (m + r) = 2j B) (m + r) = 3j C) (3m + r) = 3j D) (m + 3r) = 3j

14. where m is number of members, r is reaction components and j is number of joints
The number of independent equations to be satisfied for static equilibrium in a space structure is [ ]
A) 6 B) 4 C) 3 D) 2
15. For a fixed support, the numbers of reactions are [ ]
A) 1 B) 2 C) 3 D) 4
16. For a roller support, the numbers of reactions are [ ]
A) 1 B) 2 C) 3 D) 4
17. For a pinned support, the numbers of reactions are [ ]
A) 1 B) 2 C) 3 D) 4
18. External redundancy can be calculated by [ ]
A) E=R-r B) E=R+r C) E=r-R D) E= r+R
19. For a beam, if fundamental equations of statics are not sufficient to determine all the reactive forces at the supports, the structure is said to be [ ]
A) Determinate B) Statically determinate C) Statically indeterminate D) none
20. For a beam, if fundamental equations of statics are sufficient to determine all the reactive forces at the supports, the structure is said to be [ ]
A) Determinate B) Statically determinate C) Statically indeterminate D) none
21. If the beam is supported so that there are only three unknown reactive elements at the supports. These can be determined by using [ ]
A) $\sum H = 0$ B) $\sum V = 0 \sum H = 0$ C) $\sum H = 0 \sum V = 0 \sum M = 0$ D) none
22. For a beam having fixed ends, the unknown element of the reactions is [ ]
A) Horizontal components at either end B) vertical components at either end
C) Horizontal component at one end and vertical component at other end
D) Horizontal component and vertical component at both ends.
23. The deformation of a spring produced by a unit load is called [ ]
A) Stiffness B) flexibility
C) Influence coefficient D) unit strain
24. End A of beam AB is hinged and end B is on roller. The degree of kinematic indeterminacy is
A) 3 B)2 C)1 D) zero
25. The number of equilibrium conditions required to find the displacement components of at joints of the structure are known as [ ]
A) The degree of kinematic indeterminacy or degree of freedom
B) The degree of static indeterminacy or degree of redundancy
C) Both A and B
D)None of the above
26. The number of equilibrium conditions required to find the displacement components of at joints of the structure are known as [ ]
A) The degree of kinematic indeterminacy or degree of freedom
B) The degree of static indeterminacy or degree of redundancy
C) Both A and B
D) None of the above
27. A beam having fixed and free ends then it is called [ ]
A) Fixed B) Continuous C) Cantilever D) Simply Supported
28. A beam having pinned and roller ends then it is called [ ]
A) Fixed B) Continuous C) Cantilever D) Simply Supported

29. The maximum strain energy stored in a material at elastic limit per unit volume is [ ]
    A) Resilience B) Proof resilience C) Modules of resilience D) Modulus of rigidity
30. The maximum strain energy stored in a material is [ ]
    A) Resilience B) Proof resilience C) Modules of resilience D) Modulus of rigidity
31. External indeterminacy of the beam can be calculated by [ ]
    A)R-r B)R+r C)m-(2j-r) D)m-(3j-r)
32. External indeterminacy of the frame can be calculated by [ ]
    A)R-r B)R+r C)m-(2j-r) D)m-(3j-r)
33. The member is subjected to axial force then that structure is [ ]
    A) Pin jointed structure B)Rigid structure C)Surface structure D)None
34. The member is subjected to axial, shear forces and bending moment then that structure is
    A) Pin jointed structure B)Rigid structure C)Surface structure D)None[ ]
35. Internal indeterminacy of the frame can be calculated by [ ]
    A)R-r B)Zero C)m-(2j-r) D)3C
36. Internal indeterminacy of the truss can be calculated by [ ]
    A)R-r B)Zero C)m-(2j-r) D)3C
37. Pin joint [ ]
    A) Axil force B) Shear force C) Bending moment D) None
38. Rigid joint [ ]
    A) Axil force B) Shear force C) Bending moment D) All the above
39. Slope equation [ ]
    A) EI $\frac{d^2y}{dx^2}$ B) I $\frac{d^2y}{dx^2}$ C) EI$\frac{dy}{dx}$ D) EIY
40. Deflection equation [ ]
    A) EI $\frac{d^2y}{dx^2}$ B) I $\frac{d^2y}{dx^2}$ C) EI$\frac{dy}{dx}$ D) EIY

UNIT-II

ANALYSIS OF FIXED BEAMS & CONTINUOUS BEAMS

1. Rotation at the fixed end [ ]
   A) L/2 B) L/4 C) Zero D) none
2. Net moment at the support [ ]
   A) Zero B) double C) half D) none
3. Bending Moment is________ to shear force [ ]
   A) Directly proportional B) Indirectly proportional
   C) Equal D) all the above
4. Degree of freedom for fixed end condition beam [ ]
   A) Zero B) 1 C) 2 D) 3
5. A fixed beam is subjected to UDL over its entire span. The joints of contra-flexure will occur on either side of the center at a distance of _________ from the center. [ ]
   A) l/√3 B) l/3 C) l/2√3 D) l/4√3
6. A beam is a structural member predominantly subjected to [ ]
   A) Transverse loads B) axial forces C) twisting moment D) none of the above
7. The moment distribution method is best suited for [ ]
   A) Indeterminate pin jointed truss B) Rigid frames
   C) Space frames D) Trussed beam
8. In slope deflection method, the unknown rotations at various joints are determined by considering [ ]
   A) The equilibrium of the joint B) The rigidity of the joint
   C) The equilibrium of the structure D) None
9. While using three moments equation, a fixed end of a continuous beam is replaced by an Additional span of [ ]
   A) Zero length B) Infinite length C) Zero moment of inertia D) None of the above
10. Maximum deflection of a [ ]
    A) Cantilever beam carrying a concentrated load W at its free end is WL3/3EI
    B) Simply supported beam carrying a concentrated load W at mid-span is WL3/48EI
    C) Cantilever beam, carrying a uniformly distributed load over span is WL3/8EI
    D) All the above
11. The shear force on a simply supported beam is proportional to [`]
    A) Displacement of the neutral axis B) Sum of the forces
    C) Sum of the transverse forces D) Algebraic sum of the transverse forces of the section
12. In a loaded beam, the point of contra-flexure occurs at a section where [ ]
    A) Bending moment is minimum B) Bending moment is zero or changes sign
    C) Bending moment is maximum D) Shearing force is maximum
13. The shape of the bending moment diagram over the length of a beam, carrying a uniformly increasing load, is always [ ]
    A) Linear B) Parabolic C) Cubical D) Circular
14. The shape of the bending moment diagram over the length of a beam, carrying a uniformly distributed load is always [ ]
    A) Linear B)Parabolic C) Cubical D) Circular

15. Shear force for a cantilever carrying a uniformly distributed load over its length, is
    A) Triangle B) Rectangle C)Parabola D) Cubic parabola [ ]
16. For a beam having fixed ends, the unknown element of the reactions, is [ ]
    A) Horizontal components at either end B) Vertical components at either end
    C) Horizontal component at one end and vertical component at the other
    D) Horizontal and vertical components at both the ends
17. If the shear force along a section of a beam is zero, the bending moment at the section is
    A) Zero B) Maximum C) Minimum D) Average of maximum-minimum [ ]
18. The moment diagram for a cantilever carrying a concentrated load at its free end, will be
    A) Triangle B)Rectangle C)Parabola D) Cubic parabola [ ]
19. The bending moment is maximum on a section where shearing force [ ]
    A) Is maximum B) Is minimum C) Is equal D) Changes sign
20. For a simply supported beam with a central load, the bending moment is [ ]
    A) Least at the centre B) Least at the supports
    C) Maximum at the supports D) Maximum at the centre
21. In a continuous bending moment curve the point where it changes sign, is called
    A) Point of inflexion B) Point of contra flexure [ ]
    C) Point of virtual hinge D) All the above
22. The max deflection of a simply supported beam of length L with a central load W, is
    A)$WL^2/48EI$ B)$W^2L/24EI$ C)WL3/48EI D)$WL^2/8EI$ [ ]
23. A simply supported beam carries two equal concentrated loads W at distances L/3 from either support. The maximum bending moment [ ]
    A) WL/3 B)WL/4 C)5WL/4 D)3WL/12
24. A cantilever of length is subjected to a bending moment at its free end. If EI is the flexural rigidity of the section, the deflection of the free end, is [ ]
    A)ML/EI B)ML/2EI C)$ML^2/2EI$ D)$ML^2/3EI$
25. In a fixed beam, at the fixed ends [ ]
    A) Slope is zero and deflection is maximum
    B) Slope is maximum and deflection is zero
    C)Both Slope and deflection are maximum
    D) Slope and deflection are zero
26. A beam fixed at both ends carries a UDL of 20KN/m over the entire span of 6 m. The bending moment at the centre of the beam is [ ]
    A) 10KN-m B) 30KN-m C) 60KN-m D) 90KN-m
27. A beam ABC is simply supported at B and C and AB being the overhanging portion with UDL the maximum number of contra-flexure points in the beam will be equal to
    A) 0 B)1 C) 2 D)3 [ ]
28. The rate of change of bending moment represents [ ]
    A) Shear force B) Horizontal Force C) Bending moment D) none
29. The units of bending moment are [ ]
    A) KN-m B) KN-m^2 C) KN/m D) KN/m^2
30. A fixed beam AB 6 m long carries a vertical load 90 KN at 2m from A. The fixed end moments at A and B are [ ]
    A) 40 KN-m, 80 KN-m B) 40 KN-m,120 KN-m
    C) 80 KN-m,40 KN-m D) 120 KN-m,80 KN-m

31. In a fixed beam is subjected to UDL throughout the span, the point of contra flexure will occur at [ ]
A) L/2 B) At two fixed supports C) 0.21 L from each of the supports
D) 0.667 L from each of the supports
32. The point of contra flexure in a fixed beam carrying UDL will occur at a distance------ from the ends [ ]
A) L/√3 B) L/√2 C) L/3√2 D)L/2√3
33. A beam having more than two supports then it is called [ ]
A) Fixed B) Continuous C) Cantilever D) Simply Supported
34. Fixed beam is more [ ]
A) Stable B) Stronger C) Stiffer D) All
35. At the point of contra flexure the moment is [ ]
A) Maximum B) Minimum C) Zero D) Negative
36. At the maximum deflection the slope is [ ]
A) Maximum B) Minimum C) Zero D) Negative
37. A simply supported beam of span L carries a uniformly distributed load W. The maximum bending moment M is [ ]
A)$\frac{WL}{2}$ B)$\frac{WL}{4}$ C) $\frac{WL}{8}$ D)$\frac{WL}{12}$
38. A simply supported beam of span L carries a concentrated load W at its mid span. The maximum bending moment M is [ ]
A)$\frac{WL}{2}$ B)$\frac{WL}{4}$ C) $\frac{WL}{8}$ D)$\frac{WL}{12}$
39. For a simply supported beam with a central load, the bending moment is [ ]
A) Least at the center. B) Least at the supports. C) Maximum at the supports. D) Maximum at the center
40. The deflection of any rectangular beam simply supported is [ ]
A)Directly proportional to its weight B)Inversely proportional to its width
C) Inversely proportional to the cube of its depth D)All the above

UNIT-III

SLOPE DEFLECTION METHOD

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
2. In the slope deflection equations, the deformations are considered to be caused by [ ]
   i. Bending moment
   ii. Shear force
   iii. Axial force

   The correct answer is
   A) Only (i) B) (i) and (ii) C) (ii) and (iii) D) (i), (ii) and (iii)
3. The fixed end moment for continuous beam subjected to UDL [ ]
   A) $\frac{wl^2}{12}$ B) $\frac{wl^3}{12}$ C) $\frac{Wl}{8}$ D) $\frac{wab^2}{l^2}$
4. The fixed end moment for continuous beam subjected to central point load [ ]
   A) $\frac{wl^2}{12}$ B) $\frac{wl^3}{12}$ C) $\frac{Wl}{8}$ D) $\frac{wab^2}{l^2}$
5. The fixed end moment for continuous beam subjected to eccentrically point load
   A) $\frac{wl^2}{12}$ B) $\frac{wl^3}{12}$ C) $\frac{Wl}{8}$ D) $\frac{wab^2}{l^2}$ [ ]
6. Slope deflection equation M_{AB} = [ ]
   A) $F_{AB}+\frac{2EI}{l}(2\theta_A+\theta_B)$ B) $F_{AB}-\frac{2EI}{l}(2\theta_A+\theta_B)$
   C) $F_{BA}+\frac{2EI}{l}(2\theta_B+\theta_A)$ D) $F_{BA}+\frac{2EI}{l}(2\theta_A+\theta_B)$
7. A continuous beam AB subjected to UDL of 20 kN/m then fixed end moment F_{AB} is
   A) 40 kN-m B) 120 kN-m C) 60 kN-m D) 180 kN-m [ ]
8. A continuous beam AB subjected to central point load of 60 kN then fixed end moment F_{AB} is [ ]
   A) 40 kN-m B) 45 kN-m C) 60 kN-m D) 80 kN-m
9. Frames may sway due to [ ]
   A) Horizontal force & unsymmetry B) horizontal force only
   C) unsymmetry of columns D) all the above
10. A beam subjected to UDL then bending moment diagram is in ________ shape
    A) Triangle B) rectangle C) parabola D) cubic [ ]
11. A beam subjected to point then bending moment diagram is in ________ shape
    A) Triangle B) rectangle C) parabola D) cubic [ ]
12. A beam subjected to UVL then bending moment diagram is in ________ shape
    A) Triangle B) rectangle C) parabola D) cubic [ ]
13. The develop method for slope deflection method is [ ]
    A) Flexibility method B) Kani's method
    C) Stiffness matrix method D) moment distribution method

14. In the displacement method of structural analysis, the basic unknowns are [ ]

A) Displacements B) force

C) Displacements and forces D) none of the above

15. In the slope deflection equations, the deformations are considered to be caused by

i) B.M. ii) S.F.iii) axial force

The correct answer is: [ ]

A) Only I B)i and ii C) ii and iii D)all three

16. Bending moment at any section in a conjugate beam gives in the actual beam

A)Slope B) curvature C) deflection D) B.M. [ ]

17. The statically indeterminate structures can be solved by [ ]

A) Using equations of statics alone B) Equations of compatibility alone

C) Ignoring all deformations and assuming the structure is rigid

D)Using the equations of statics and necessary number of equations of compatibility

18. A beam is completely analysed, [ ]

A) Support reactions are determined B)Shear and moment diagrams are found

C) The moment of inertia is uniform throughout the length

D) All of the above

19. A bending moment may be defined as [ ]

A) Arithmetic sum of the moments of all the forces on either side of section

B) Arithmetic sum of the forces on either side of section

C) Algebraic sum of the moments of all the forces on either side of section

D) None of these

20. At either end of a plane frame, maximum number of possible transverse shear forces, are

A) One B) two C) three D) four [ ]

21. At either end of a plane frame, maximum numbers of possible bending moments are

A) One B) two C) three D) zero [ ]

22. If one end of a prismatic beam AB with fixed ends is given a transverse displacement Δ without any rotation, then the transverse reactions at A or B due to displacement is [ ]

A) $6EI\Delta/l^2$ B) $6EI\Delta/l^3$ C) $12EI\Delta/l^2$ D) $12EI\Delta/l^3$

23. In slope deflection method, the unknown rotations at various joints are determined by considering [ ]

A) The equilibrium of the joint

B) The rigidity of the joint

C) The equilibrium of the structure

D) None

24. A Continuous beam ABC, supports A and C are fixed and support B simply supported carries an udl of 3KN/m over AB span. Span AB=6m, BC=4m.Fixed end moment at A

A) -9kNm B) 9.5kNm C) -8.5 kNm D) 8kNm [ ]

25. A Continuous beam ABC, supports A and C are fixed and support B hinged carries an udl of 3 KN/m over BC span. Span AB=6m, BC=4m Fixed end moment at B [ ]

A) -9kNm B) 9kNm C) -4 kNm D) 4 kNm

26. A rigid frame is a structure composed of members which are connected by [ ]
A) Rigid joints B) simple bearing C) a single rivet D) none of the above
27. Consider the following statements [ ]
Sinking of an intermediate support of a continuous beam
1) Reduces the negative moment at a support
2) Increases the negative moment at a support
3) Reduces the positive moment at a support
4) Increases the positive moment at the centre of span
Of these statements, which are correct
A) 1 and 4 B) 1 and 3 C) 2 and 3 D) 2 and 4
28. For the application of moment area method, for finding deflection at a section in a beam
A) The position of at least one tangent to the elastic curve, should be known [ ]
B) The M/EI diagram must be a triangle
C) The beam must be of uniform moment of inertia
D) The B.M. diagram if known is sufficient
29. Fixed end moment from A to B for beam AB carries eccentric load is [ ]
A) $W a^2 b/l^2$ B) $W a b^2/ l^2$ C) W a b/l D)none
30. In portion AB, the free moment diagram is a symmetric triangle with maximum ordinate as [ ]
A) $WL^2/12$ B)WL/8 C) WL/4 D)WL/3
31. In portion BC, the free moment diagram is a symmetric parabola with maximum ordinate as [ ]
A) $WL^2/8$ B)WL/8 C) WL/4 D)WL/3
32. Due to lateral sway causes additional moments in the column, which may be called
A) Rotation contribution B) Displacement contribution [ ]
C) Torsional Contribution D) None
33. While using slope deflection method, in which direction is moment taken as positive?[ ]
A) Clockwise B) Anti-clockwise C) Depends upon case D) Depends upon loading
34. If support B settles by 1mm downward, what is direction of rotation at point A? [ ]
A) +ve B) –ve C) Can't say D) Depends upon loading at point A
35. If support B settles by 1mm downward, what is direction of rotation at point B? [ ]
A) +ve B) –ve C) Can't say D) Depends upon loading at point A
36. How many sde (slope deflection equations) are possible if 4 supports are there? [ ]
A) 0 B) 3 C) 4 D) 6
37. What will be one of the extra condition, which we will get if we conserve moment near joint B?
A) $M_{BA} + M_{CA} = 0$ B) $M_{BA} + M_{CB} = 0$ C) $M_{BA} + M_{BC} = 0$ D) $M_{AB} + M_{BC} = 0$[ ]
38. What is the Degree of freedom of this beam? [ ]
A) 1 B) 2 C) 3 D) 4
39. What will be MBA in this case? [ ]
A) EI θA/L B) 2EI θA/L C) 3EI θA/L D) 4EI θA/L
40. What will be MAB in this case? [ ]
A) EI θA/L B) 2EI θA/L C) 3EI θA/L D) 4EI θA/L

UNIT – IV

MOMENT DISTRIBUTION METHOD

1. In moment distribution method, the sum of distribution factors of all the members meeting at any joint is always [ ]
   A) Zero B) less than 1 C) 1 D) greater than 1
2. The carryover factor in a prismatic member whose far end is fixed is [ ]
   A) 0 B) ½ C) ¾ D) 1
3. Carry over factor = [ ]
   A) $\frac{M}{\theta_A}$ B) $\frac{\theta_A}{M}$ C) $\frac{M'}{M}$ D) $\frac{M}{M^I}$
4. Stiffness K= [ ]
   A) $\frac{M}{\theta_A}$ B) $\frac{\theta_A}{M}$ C) $\frac{M'}{M}$ D) $\frac{M}{M^I}$
5. Distribution factor = [ ]
   A) $\frac{\sum K}{M}$ B) $\frac{\sum K}{K}$ C) $\frac{M}{\sum K}$ D) $\frac{K}{\sum K}$
6. If the far end is fixed then stiffness K= [ ]
   A) $\frac{4EI}{L}$ B) $\frac{3EI}{L}$ C) $\frac{2EI}{L}$ D) $\frac{EI}{L}$
7. Which of the following methods of structural analysis is a displacement method [ ]
   A) Moment distribution method B) column analogy method
   C) Three moment equation D) none of the above
8. In the displacement method of structural analysis, the basic unknowns are [ ]
   A) Displacements B) force
   C) Displacements and forces D) none of the above
9. The moment distribution method is best suited for (**Observers-2013**) [ ]
   A) Indeterminate pin jointed truss B) Rigid frames
   C) Space frames D) Trussed beam
10. Bending moment at any section in a conjugate beam gives in the actual beam: [ ]
    A) Slope B) curvature C) deflection D) B.M.
11. The statically indeterminate structures can be solved by: [ ]
    A) Using equations of statics alone B) Equations of compatibility alone
    C) Ignoring all deformations and assuming the structure is rigid
    D) Using the equations of statics and necessary number of equations of compatibility
12. The simultaneous equations of slope deflection method can be solved by iteration in: [ ]
    A) Moment distribution method B) Consistent deformation method
    C) Conjugate beam method D)Williot mohr method
13. The carryover factor in a prismatic member whose far end is hinged is (**AEE-2008)** [ ]
    A) 0 B) 1/2 C) 3/4 D) 1
14. The moment required to rotate the near end of a prismatic beam through a unit angle without translation, the far end being simply supported, is given by(**AEE-1996, 2004,2006,TSPSC-GENCO-15**
    A)3EI/L B) 4EI/L C)2EI/L D)EI/L [ ]

Where EI is flexural rigidity and L is the span of the beam.

15. The moment required to rotate the near end of a prismatic beam through a unit angle without translation, the far end being fixed, is given by (**TSPSC-AEE-15,AEE-1987)** [ ]

A)EI/L B) 2EI/L C) 3EI/L D)4EI/L

Where EI is flexural rigidity and L is the span of the beam.

16. If M is the external moment which rotates the near end of a prismatic beam without translation (the far end being fixed), then the moment induced at the far end is **(AEE-2006)** [ ]

A) M/2 in the same direction as M B) M/2 in the opposite direction as M

C) M in opposite direction D) 0

17. If one end of a prismatic beam AB with fixed ends is given a transverse displacement Δ without any rotation, then the transverse reactions at A or B due to displacement is: (**AEE-2012)** [ ]

B) $6EI\Delta/l^2$ B) $6EI\Delta/l^3$ C) $12EI\Delta/l^2$ D) $12EI\Delta/l^3$

18. Moment-distribution method was suggested by [ ]

A) Hardy Cross B) G.A. Maney C) Gasper Kani D) None of these

19. A simply supported beam of span L carries a uniformly distributed load W. The maximum bending moment M is [ ]

A) $\frac{WL}{2}$ B) $\frac{WL}{4}$ C) $\frac{WL}{8}$ D) $\frac{WL}{12}$

20. A simply supported beam of span L carries a concentrated load W at its mid span. The maximum bending moment M is [ ]

A) $\frac{WL}{2}$ B) $\frac{WL}{4}$ C) $\frac{WL}{8}$ D) $\frac{WL}{12}$

21. A simply supported beam carries two equal concentrated loads W at distances L/3 from either support. The maximum bending moment M is [ ]

A) $\frac{WL}{3}$ B) $\frac{WL}{4}$ C) $\frac{5WL}{8}$ D) $\frac{3WL}{12}$

22. For a simply supported beam with a central load, the bending moment is [ ]

A) Least at the centre B) Least at the supports C) maximum at the supports

D) Maximum at the centre

23. Rotation at the fixed end [ ]

A) L/2 B) L/4 C) Zero D) none

24. A portal frame having single bay, single storey configuration can be analysed by using

A) Slope deflection method B) Kani's method [ ]

C) Moment distribution method D) All of the above

25. The ratio of stiffness of a member when far end is hinged to that of the member when far end is fixed is [ ]

A) 1 B) 2 C) 3/4 D) 4/3

26. For a simply supported beam with a central load, the bending moment is [ ]

A) Least at the centre B) Least at the supports C) maximum at the supports

D) Maximum at the centre

27. The simultaneous equations of slope deflection method can be solved by iteration in [ ]

A) Moment distribution method B) Consistent deformation method

D) Conjugate beam method D)Williot mohr method

28. A beam is a structural member predominantly subjected to [ ]

A) Transverse loads B) axial forces C) twisting moment D) none of the above

29. The moment distribution method is best suited for [ ]

A) Indeterminate pin jointed truss B) Rigid frames

C) Space frames D) Trussed beam

30. A two span continuous beam ABC, fixed at 'A' and 'C' have equal span of 0.5 each EI is same for both spans. The distribution factors for member BA is [ ]

A) ½ B) ¼ C) 1/3 D) 2/3

31. If K_i is the stiffness of i^{th} member at a joint the distribution factor for the member is[ ]

A) $K_i / \sum K_i$ B) $\sum K_i$ C) K_i D) $(\sum K_i - K_i)$

32. A fixed beam is subjected to a moment M at the mid span sections; the fixed end moments are

A) M B)M/2 C) M/4 D) M/3 [ ]

33. If one end of a fixed beam of span 'l' and flexural rigidity EI sinks by δ, the beam is subjected to [ ]

A) Sagging moment($6EI\,\delta/l^2$) B) hogging moment($6EI\,\delta/l^2$)

C) Sagging moment at the lower support and hogging moment at the other support of magnitude ($6EI\,\delta/l^2$)

D) Hogging moment at the lower support and sagging moment at the other support of magnitude ($6EI\,\delta/l^2$)

34. Hardy cross method of analysis is based on [ ]

A) Slope displacement method B) Moment area method

C) Conjugate beam method D) Virtual work method

35. For prismatic members, the stiffness factor is computed as [ ]

A) EI B) EI/L C)1/EI D) L/EI

36. The moment distribution method in structural analysis can be treated as [ ]

A) Force method B) Displacement method C) Flexibility method D) Numerical method

37. When a moment is applied at one end of a member allowing rotation of that end and fixing the far end and if same moment develops at far end also, this is called as [ ]

A) Balancing moment B) carryover moment C) Distribution moment D) Rotation Factor

38. Relative stiffness when far end is fixed [ ]

A) I/L B)2I/L C) 3I/L 3I/4L

39. Relative stiffness when far end is hinged [ ]

A) I/L B)2I/L C) 3I/L D)3I/4L

40. The deformation of a spring produced by a unit load is called [ ]

A) Stiffness B) Flexibility C) Influence Coefficient D) Unit strain

UNIT – V

KANI'S METHOD

1. The following methods are used for structural analysis: [ ]
   i) Macaulay method
   ii) Column analogy method
   iii) Kani's method
   iv) Method of sections
   Those used for indeterminate structural analysis would include:

   A) i and ii B) i and iii C) ii and iii D) ii, iii and iv
2. The distribution factor of a member at a joint is: [ ]
   A) The ratio of the moment borne by the member to the total moment applied at the joint
   B) The ratio of the area of the member to the sum of the areas of several members
   C) The ratio of the moment induced at the far end to the moment applied at the near end
   D) None of the above
3. Kani's 'Rotation Contribution' method is advantageous over Moment distribution method since [ ]
   A) Kani's method is iterative
   B) Any arithmetic error that creeps in will automatically get corrected
   C) It involves actual solution of simultaneous equations
   D) None of the above
4. Sway calculations and non-sway calculations are carried out in a single operation in [ ]
   A) Kani's method B) Moment distribution method
   C) Unit load method D) none
5. If the preliminary dimensions of the sections are changed relatively, the analysis can be modified fast in [ ]
   A) Moment distribution method B) Kani's method
   C) Double integration method D) Consistent deformation method
6. When an end of continuous beam is fixed, in Kani's method, the rotation contribution will be:
   A) 0 B) EI/l C) $2EI/l$ D) EI [ ]
7. In Kani's method an overhand can be conveniently dealt with be regarding it as a member with ____________ length. [ ]
   A) Infinite B) zero C) unit D) none
8. In Kani's method, the displacement contribution of a member with a sway of δ is: [ ]

   A) EI δ B) $6EI\delta/l^2$ C) $4EI\delta/l$ D) $3EI/l$
9. Kani's Method was introduced by: [ ]
   A) Gasper Kani B) G.A. Maney C) Hardy Cross D) None
10. Rotation factor is defined as: [ ]
    A) 0.5DF B) 0.25DF C) -0.5 DF D) -0.25DF
11. A Continuous beam ABC, supports A and C are fixed and support B simply supported carries an udl of 3

    kNm^{-1} over AB span. Span AB=6m, BC=4m.Fixed end moment at A [ ]
    A) -9kNm B) 9.5kNm C) -8.5 kNm D) 8kNm

12. A Continuous beam ABC, supports A and C are fixed and support B hinged carries an udl of 3 kNm^{-1} over BC span. Span AB=6m, BC=4m Fixed end moment at B [ ]
    A) -9kNm B) 9kNm C) -4 kNm D) 4 kNm

13. The distribution factor of a member at a joint is: [ ]

    A) The ration of the moment borne by the member to the total moment applied at the joint
    C) The ration of the area of the member to the sum of the areas of several members
    D) The ratio of the moment induced at the far end to the moment applied at the near end
    E) None of the above

14. A beam is completely analysed, when [ ]
    A) Support reactions are determined
    B) Shear and moment diagrams are found
    C) The moment of inertia is uniform throughout the length
    D) All of the above

15. A rigid frame is a structure composed of members which are connected by [ ]

    A) Rigid joints B) simple bearing C) a single rivet D) none of the above

16. Consider the following statements [ ]
    Sinking of an intermediate support of a continuous beam
    i. Reduces the negative moment at a support
    ii. Increases the negative moment at a support
    iii. Reduces the positive moment at a support
    iv. Increases the positive moment at the centre of span
    Of these statements, which are correct
    A) 1 and 4 B) 1 and 3 C) 2 and 3 D) 2 and 4

17. For the application of moment area method, for finding deflection at a section in a beam [ ]
    A) The position of at least one tangent to the elastic curve, should be known
    B) The M/EI diagram must be a triangle
    C) The beam must be of uniform moment of inertia
    D) The B.M. diagram if known is sufficient

18. Which of the following is not the displacement method [ ]
    A) Equilibrium method B) Moment Distribution method
    C) Column analogy method D) Kani's method

19. Which of the following methods of structural analysis is a Force method [ ]
    A) Slope deflection method B)Moment Distribution method
    C) Column analogy method D)Kani's method

20. The force required for a spring produced by unit displacement is called' [ ]
    A) Flexibility B) stiffness C) torsional D) none

21. In the displacement method of structural analysis the basic unknowns are [ ]
    A) Displacement B) force C) displacement & Force D) none of the above

22. The analysis of multistoried frames are done by [ ]
    A) slope deflection method B)moment distribution method
    C) Kani's method D)None

23. Rotation factor for fixed ended beam is calculated by kani's method is [ ]
    A) $-0.5\ K/\sum K$ B)$-0.4\ K/\sum K$ C)$-0.3\ K/\sum K$ D)None

24. Fixed end moment from A to B for beam AB carries eccentric load is [ ]
    A) $W a^2 b/l^2$ B) $W a b^2/ l^2$ C)$W a b/l$ D)none

25. Final moments calculated by which formula [ ]
   A) FEM+2 NEC +FEC B) FEM+NEC+2FEC C) FEM+2NEC D)None
26. Displacement factor for fixed ended beam is calculated by kani's method is [ ]
   A) -1.5 k/∑k B) -1.4 k/∑k C) -1.3 k/∑k D)none
27. In portion AB, the free moment diagram is a symmetric triangle with maximum ordinate as [ ]
   A) $WL^2/12$ B)WL/8 C) WL/4 D)WL/3
28. In portion BC, the free moment diagram is a symmetric parabola with maximum ordinate as [ ]
   A) $WL^2/8$ B)WL/8 C) WL/4 D)WL/3
29. In a rigid jointed frame, the rotating members meeting at the joint will be [ ]
   A) Equal
   B) Proportional to the length of the member
   C) Proportional to the stiffness
   D) Proportional to the respective moment of inertia
30. Displacement factors for column if there is say in the frame. [ ]
   A) -3/4(K/∑K) B) -3/5(K/∑K) C) -3/2(K/∑K) D) -2/3(K/∑K)
31. Storey moment is [ ]
   A) $S_r h_r/3$ B) S_r/h_r C) $3h_r/S_r$ D) None
32. To start with, unknown values of all rotation contribution and displacement contribution are taken equal to [ ]
   A) 1 B) -1 C) Zero D) None
33. Due to lateral sway causes additional moments in the column, which may be called [ ]
   A)Rotation contribution B) Displacement contribution
   C) Torsional Contribution D) None
34. Rotation at the fixed end [ ]
   A) L/2 B) L/4 C) Zero D) none
35. Net moment at the support [ ]
   A) Zero B) double C) half D) none
36. Bending Moment is ________ to shear force [ ]
   A) directly proportional B) indirectly proportional
   C) equal D) all the above
37. Stiffness of beam if far end is hinged [ ]
   A) 4EI/L B) 3EI/L C) 2EI/L DEI/L
38. Degree of freedom for fixed end condition beam [ ]
   A) Zero B) 1 C) 2 D) 3
39. A fixed beam is subjected to UDL over its entire span. The joints of contraflexure will occur on either side of the center at a distance of _________ from the center. [ ]
   A) $l/\sqrt{3}$ B) $l/3$ C) $l/2\sqrt{3}$ D) $l/4\sqrt{3}$
40. A beam is a structural member predominantly subjected to [ ]
   A) Transverse loads B) axial forces C) twisting moment D) none of the above

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