KONGUNADU COLLEGE OF ENGINEERING AND TECHNOLOGY

NAMAKKAL-TRICHY MAIN ROAD, THOTTIAM, TRICHY -621 215

DEPARTMENT OF MECHANICAL ENGINEERING

REGULATIONS - 2013

YEAR/SEM: III/VI CE6602 – STRUCTURAL ANALYSIS - II

QUESTION BANK

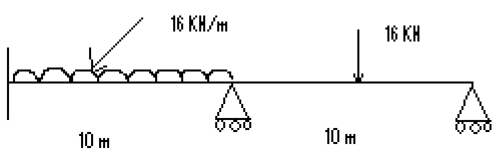
UNIT – I FLEXIBILITY METHOD

PART-A

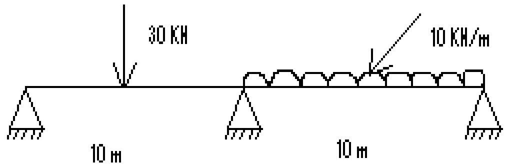
1. What is meant by indeterminate structures? (Nov / Dec 2012)
2. What are the conditions of equilibrium? (Nov / Dec 2013)
3. Differentiate between determinate and indeterminate structures.
4. Define degree of indeterminacy. (Apr/May 2011)
5. Define internal and external indeterminacies.
6. What is meant by statically indeterminate structures?
7. Write the formulae for degree of indeterminacy for: (May / June 2012)
8. Determine the degree of indeterminacy for the following 2D truss.
9. Find the indeterminacy for the beams given below. (April/May 2014)
10. Find the indeterminacy for the given rigid plane frame.
11. Find the indeterminacy of the space rigid frame.
12. Find the indeterminacy for the given space truss. (April/May 2014)
13. What are the different methods of analysis of indeterminate structures?
14. Briefly mention the two types of matrix methods of analysis of indeterminate structures.
15. Define a primary structure. (Nov / Dec 2012)
16. What is meant by Compatibity (or) Compatibity conditions. (Nov / Dec 2012)
17. What is mean by Transformation Matrix. (Nov / Dec 2012)

PART-B

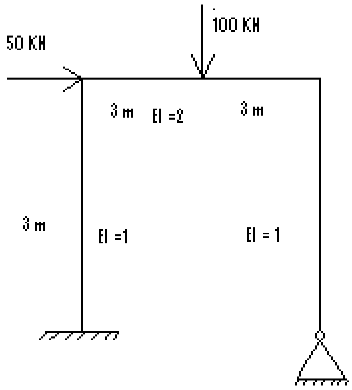
1. Explain the steps involved in force method of analysis. (April/May 2014)
2. Analyse the given continuous beam by flexibility method.



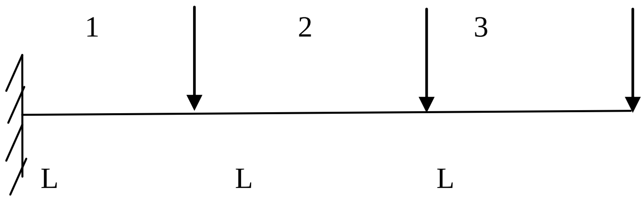
3. Analyse the given continuous beam by flexibility method (April/May 2014)



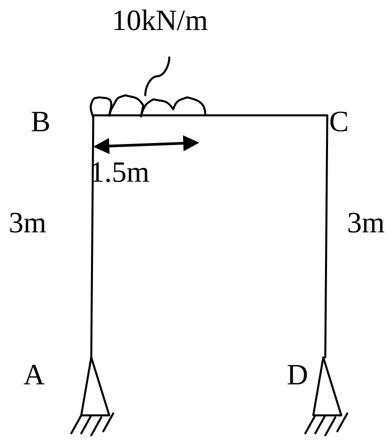
4. Analyse the given frame. (May 2010)



5. Develop the flexibility matrix for the cantilever with co-ordinates as shown in fig EI=constant (May 2010)

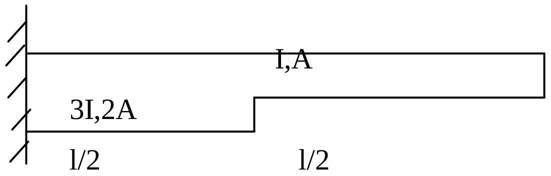


6. Analyse the frame shown in fig by flexibility method. (May 2013)

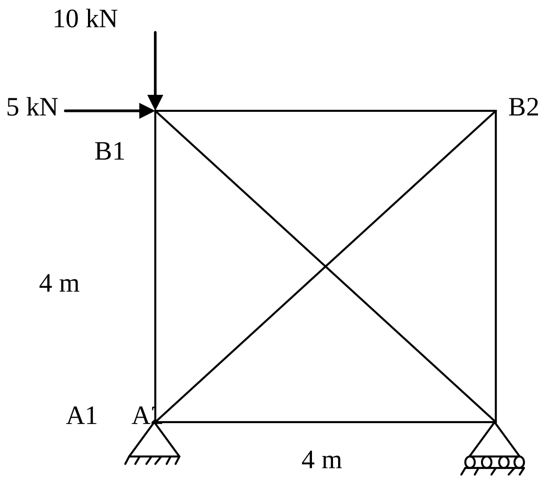


PART-C

1. Generate the flexibility matrix for the structure with co-ordinates shown in fig. (May 2010)



2. Analyze the pin-jointed plane frame shown in Figure by flexibility matrix method. The flexibility for each member. Is 0.0025 mrn/kN. (May / June 2012)



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UNIT – II STIFFNESS MATRIX METHOD

PART-A

1. What are the basic unknowns in stiffness matrix method? (May / June 2012)

2. Define stiffness coefficient k_{ij}.

3. What is the basic aim of the stiffness method?

4. What is the displacement transformation matrix? (May 2010)

5. How are the basic equations of stiffness matrix obtained?

6. What is the equilibrium condition used in the stiffness method?

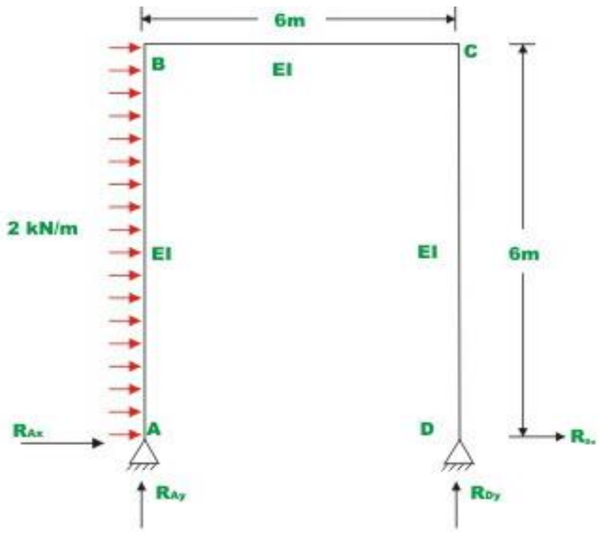
7. What is meant by generalized coordinates? (May 2010)

9. Write about the force displacement relationship.

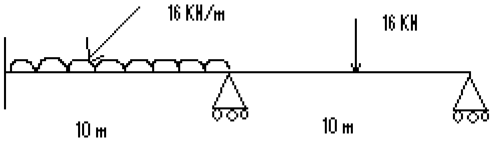
10. Write the element stiffness for a truss element. (May/June 2012)

PART-B

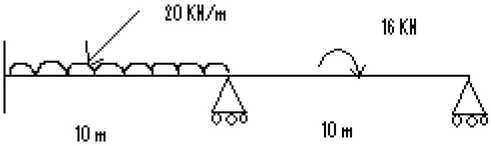
1. Analyse the given frame using matrix method.



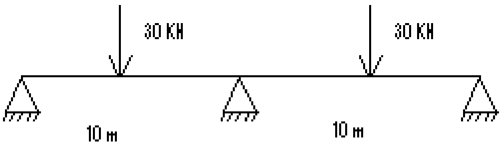
2. Analyse the continuous beam shown below by stiffness method. Draw the bending moment diagram. (May/June 2012)



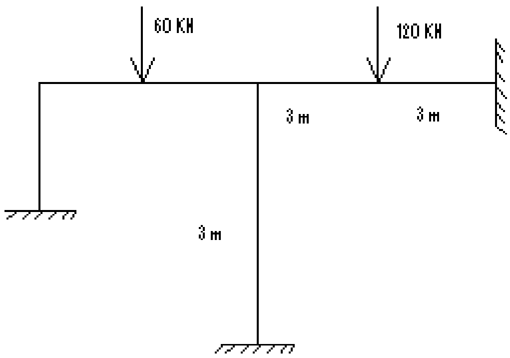
3. Analyze the beam be matrix stiffness method. (May/June 2012)



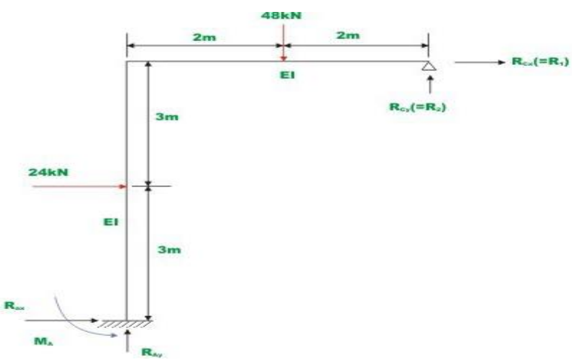
4. Analyze the beam be matrix stiffness method.



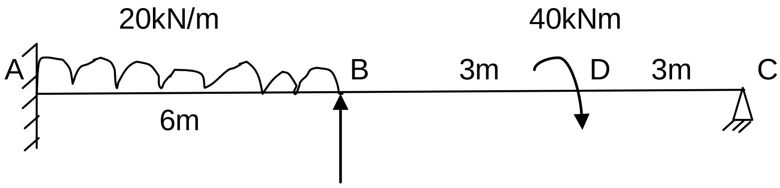
5. .Analyse the structure shown by stiffness method.



6. Analyse the structure. (May 2010)

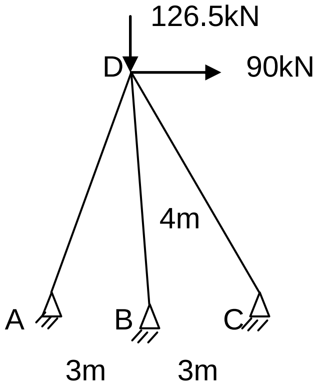


7. Analyse the continuous beam shown in fig.by stiffness method (May 2010)

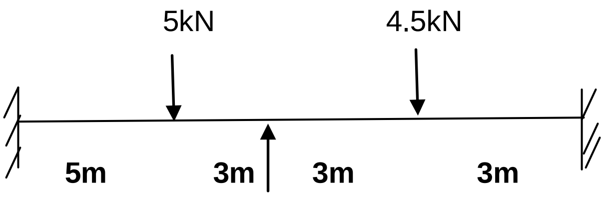


PART-C

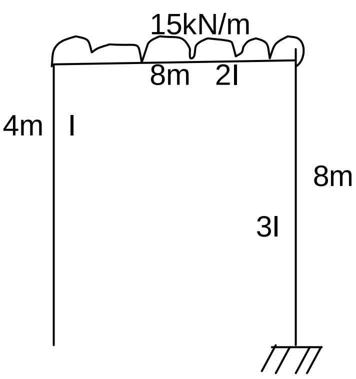
1. Analyse the pin jointed frame shown in fig by stiffness method.AE is same frame for all members. (May 2010)



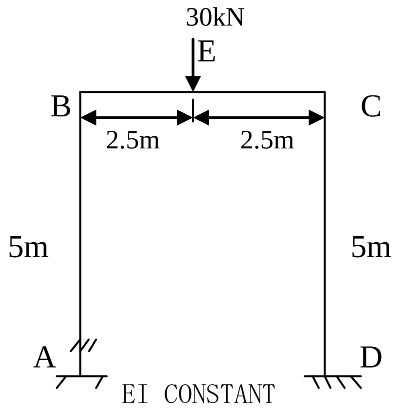
2. Analyse the continuous beam by stiffness method. (May 2010)



3. Analyse the frame shown in fig.by matrix stiffness method(May 2010)



4. Analyze the portal frame ABCD shown in Fig. by stiffness method and also draw the bending moment diagram.



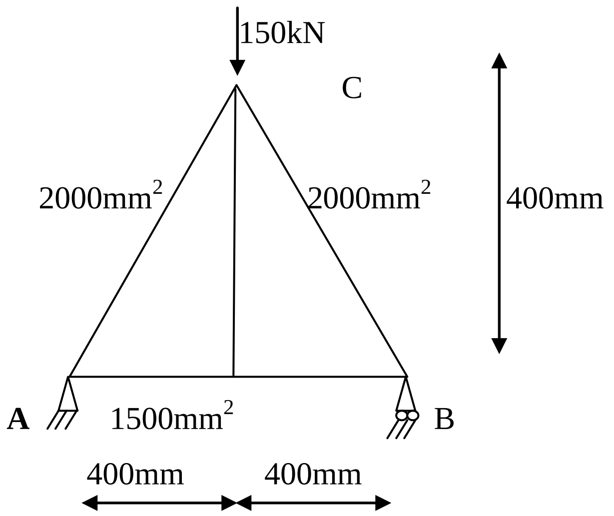
UNIT – III FINITE ELEMENT METHOD

PART-A

1. What is meant by Finite element method?
2. List out the advantages of FEM.
3. List out the disadvantages of FEM. (Nov/Dec 2011)
4. Mention the various coordinates in FEM.
5. What are the basic steps in FEM?
6. What are the factors governing the selection of finite elements
7. Define displacement function (Nov/Dec 2012)
8. Define element aspect ratio (Nov/Dec 2011)
9. What is meant by plain strain condition?
10. What are the characteristics of displacement functions?
11. What is possible location for nodes? (Nov/Dec 2012)

PART-B

1. Explain with an example the step by step procedure of solving a structural problem by finite element method. (Nov/Dec 2012)
2. What are the advantages and disadvantages of the finite element method. (Nov/Dec 2012)
3. Derive the Displacement functions of three dimensional elements using the generalized co-ordinates.
4. Derive element stiffness matrix for three bar truss shown in fig E= 200Gpa.

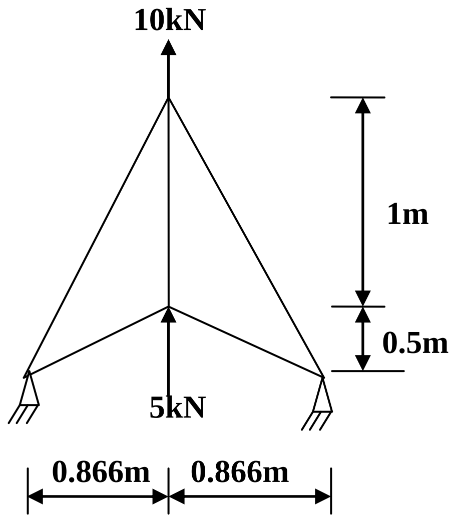


5. Write down the step by step procedure for calculation element strains and stresses for truss element by finite element method.
6. With a two dimensional triangular element model, derive for the displacement in the matrix form (May/June 2012)
7. Write a note on constant strain triangle. Explain in detail about the 4-nodded rectangular element to arrive the stiffness matrix. (Apr/May 2011)

PART-C

1. Derive the element stiffness matrix for 2D beam element using shape functions. (Apr/May 2011)
2. Explain the following (i) Constant strain triangle (ii) Linear strain triangle (Nov/Dec 2013)
3. Explain the types and applications of truss elements in finite element method. (Nov/Dec 2013)

4. For the two dimensional truss structure shown in Figure. formulate the global stiffness matrix [K]. The geometry and loading are symmetrical about centre line. Assume the area of cross section of all members is the same. Take E = 2 X 108 kN / m^2. (May/June 2012)



UNIT – IV

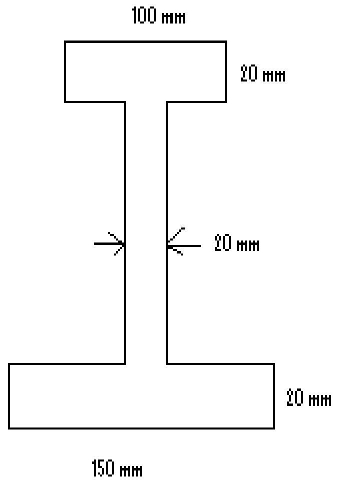
PLASTIC ANALYSIS OF STRUCTURES

PART-A

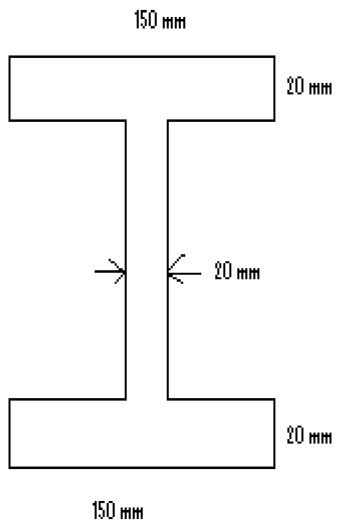
1. What is a plastic hinge?
2. What is a mechanism? (May 2010)
3. What is difference between plastic hinge and mechanical hinge?
4. Define collapse load. (April/May 2012)
5. List out the assumptions made for plastic analysis.
6. Define shape factor. (April/May 2012)
7. List out the shape factors for the following sections.
8. Mention the section having maximum shape factor.
9. Define load factor.
10. State upper bound theory.
11. State lower bound theory. (April/May 2012)
12. What are the different types of mechanisms?
13. Mention the types of frames. (May 2011)
14. What are symmetric frames and how they analyzed?
15. What are unsymmetrical frames and how are they analyzed? (May 2011)

PART-B

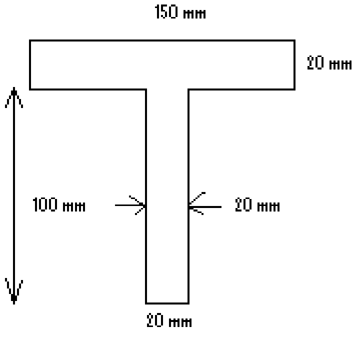
1. Find the shape factor of the given I section. (April/May 2012)



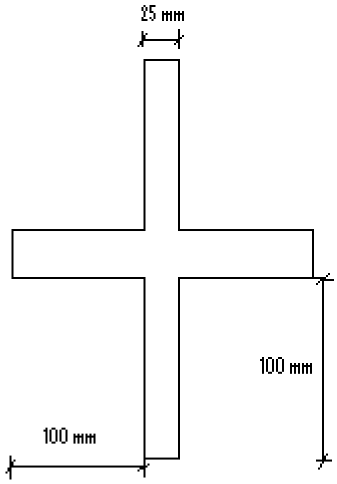
2. Find the shape factor for the given I section.



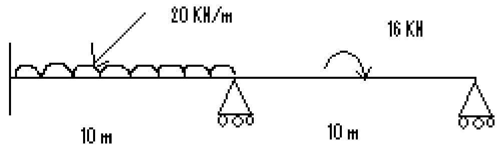
3. Find the shape factor for the given T section



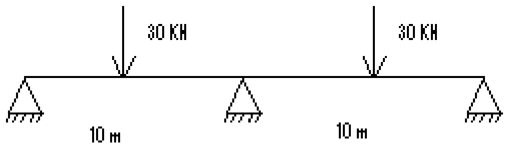
4. Find the shape factor and fully plastic moment.



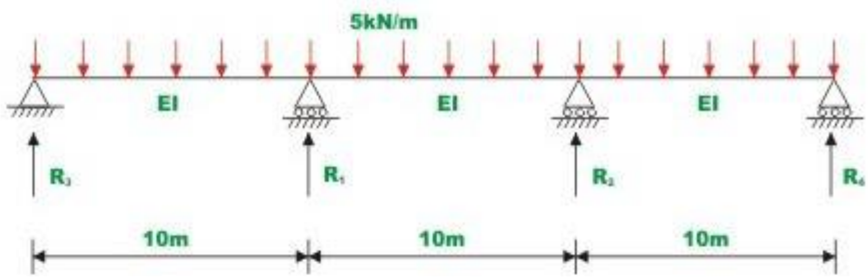
5. Determine the load factor.



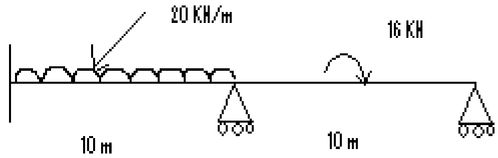
6. Determine the load factor.



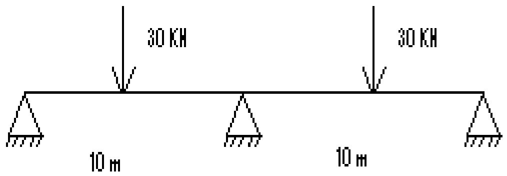
7. Determine the load factor.



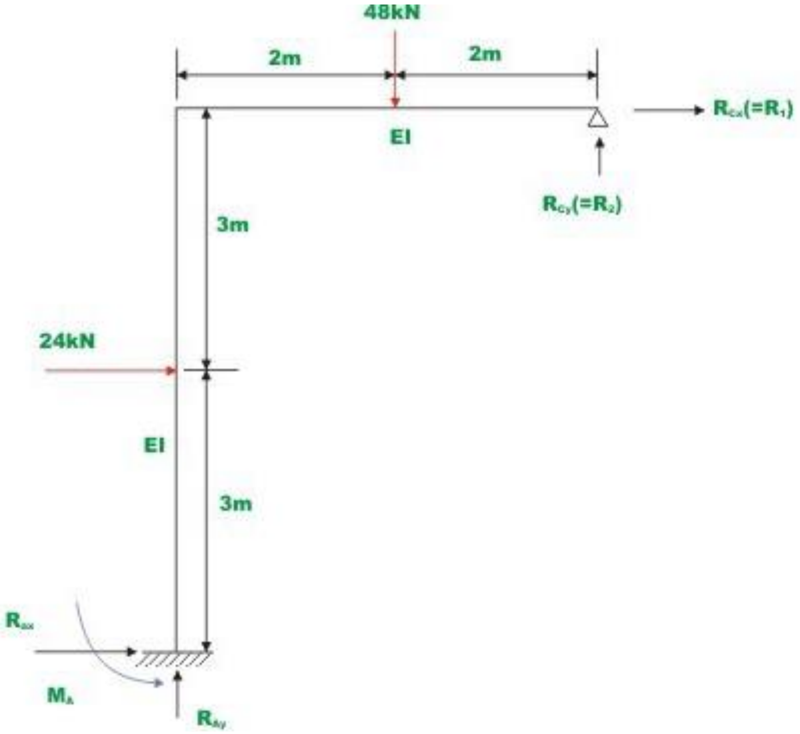
8. Determine the collapse load.



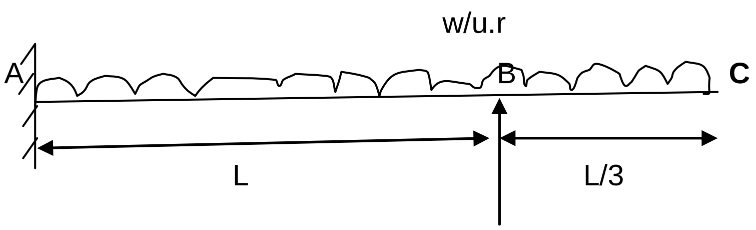
9. Determine the collapse load.



10. Analyse the frame and find the collapse load.

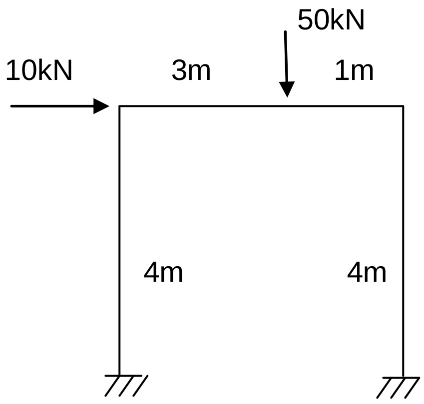


11. Determine the collapse load for the beam shown in fig.(May 2010)

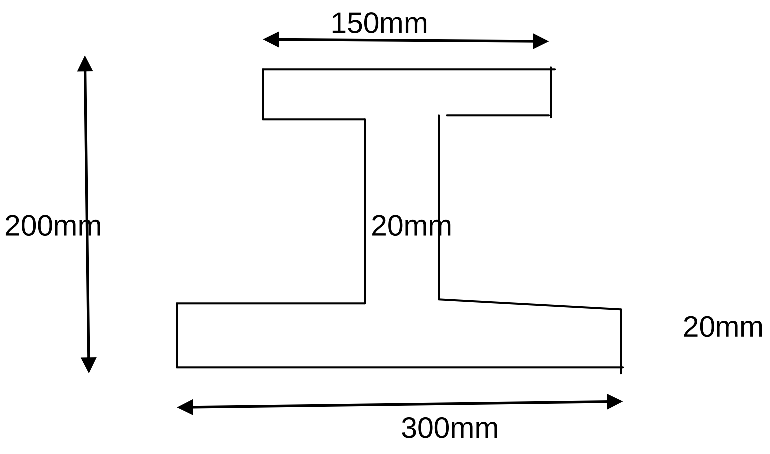


PART-C

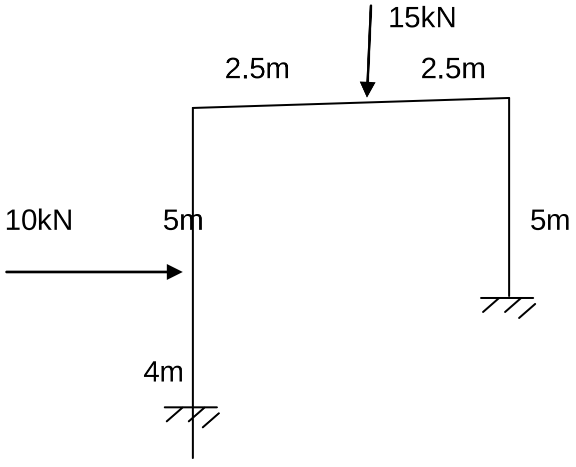
12. Given a rectangular frame of uniforn CS whose plastic moment capacity is Mp.Compute the value of Mp and sketch the BM distribution at collapse? .(May 2010)



13. Find the shape factor for I section shown in fig. (May 2010)



14. Determine the plastic moment for the given frame of uniform cross section under the applies factored loads as shown in fig.(May 2010)



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UNIT-V CABLE AND SPACE STRUCTURES

PART-A

1. What are cable structures?

2. What is the true shape of cable structures? (May 2011)

3. What is the nature of force in the cables?

4. What is a catenary?

5. Mention the different types of cable structures.

6. Briefly explain cable over a guide pulley.

7. Briefly explain cable over saddle. (April 2013)

8. What are the main functions of stiffening girders in suspension bridges? (April 2014)

9. What is the degree of indeterminacy of a suspension bridge with two hinged stiffening girder?

10. Differentiate between plane truss and space truss.

11. Define tension coefficient of a truss member. (May 2010)

12. Give some examples of beams curved in plan. (April/May 2014)

13. What are the forces developed in beams curved in plan? (April/May 2014)

14. What are the significant features of circular beams on equally spaced supports?

15. Give the expression for calculating equivalent UDL on a girder. (May 2012)

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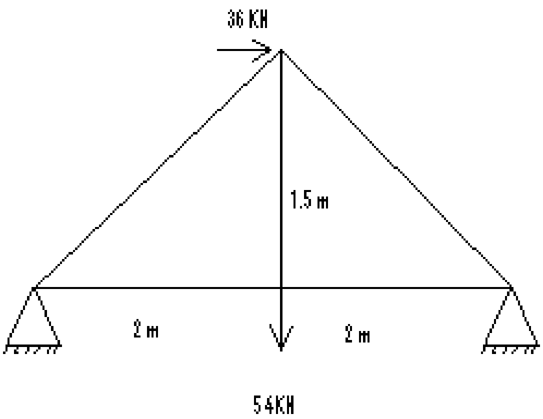
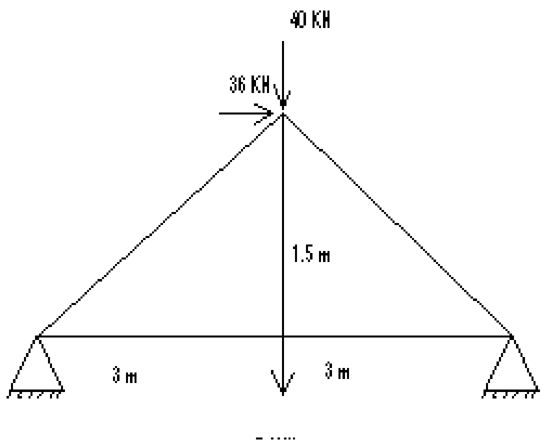
PART-B

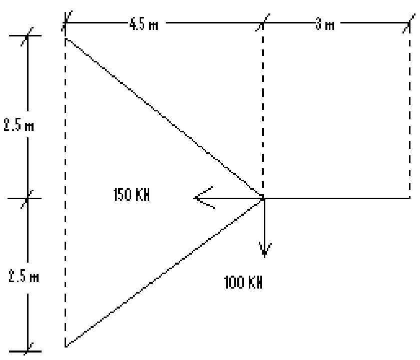
1. Using the method of tension coefficients analyse the plane truss shown in the figure and find the forces in the member. (Nov/Dec 2012)



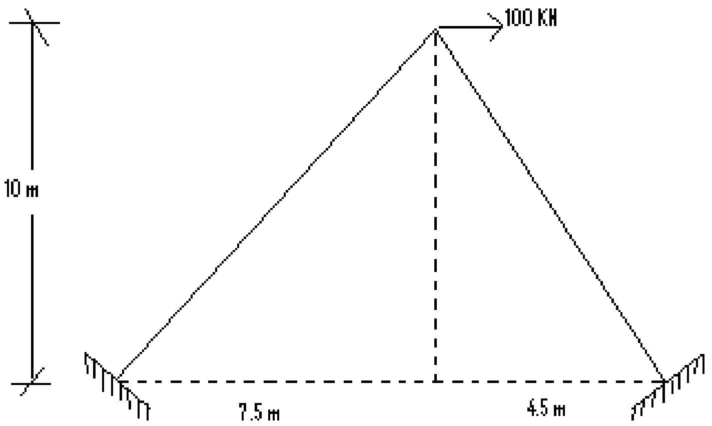
2. Using the method of tension coefficients analyze the plane truss shown in the figure and find the forces in the member.



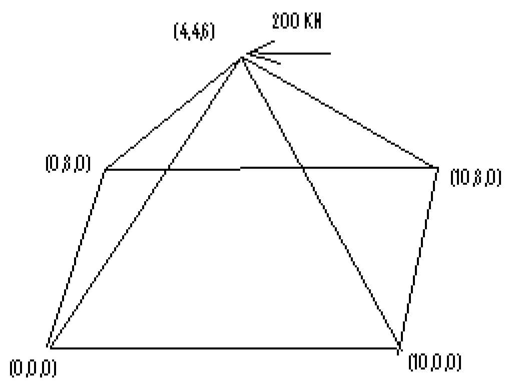
3. The given figure shows the plan of a tripod. Using the method of tension coefficients, find the forces in all the members assuming that all joints are pin-joints. (April/May 2014)



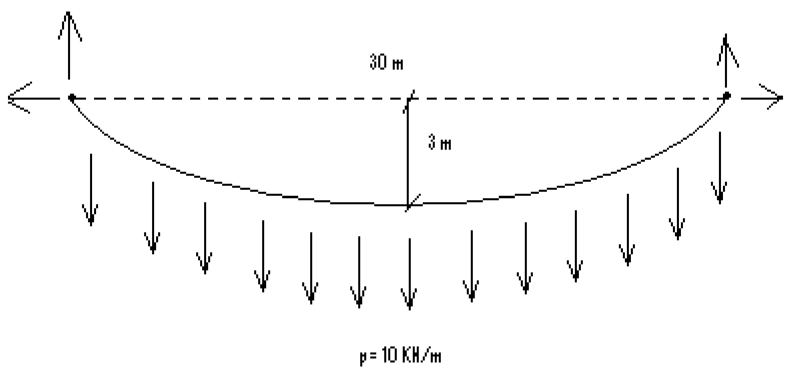
4. Using the method of tension coefficients analyze the plane truss shown in the figure and find the forces in the member.



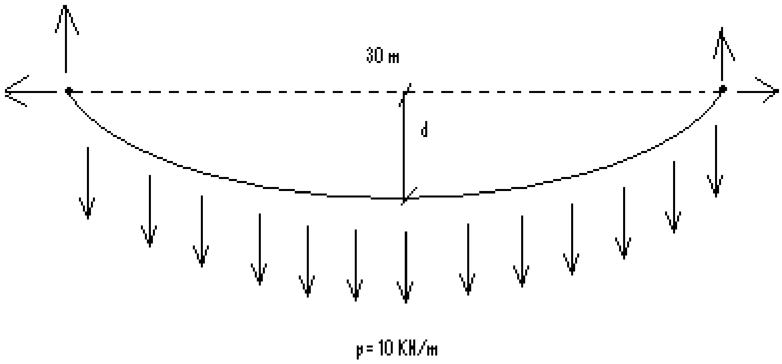
5. Using the method of tension coefficients analyze the plane truss shown in the figure and find the forces in the member.



6. A suspension cable having supports at the same level has a span of 30 m and a maximum dip of 3m. The cable is loaded with a UDL of 10 KN/m throughout its length. Find from the first principles, the maximum tension in the cable.



7. For the following cable if the maximum tension is limited to 5000 KN, calculate the minimum central dip needed.

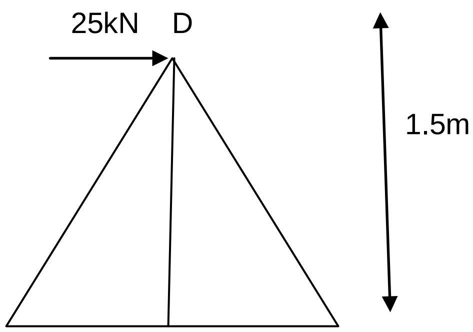


8. A suspension cable of horizontal span 210 m is supported at the same level and has a central dip of 20 m. find the increase in dip of the cable if the cable is subjected to a rise in temperature of 28oC. Take α= 12x10-6 per ^{o}C.

9. A suspension bridge is of 160 m span. The cable of the bridge has a dip of 12m. The cable is stiffened by a three hinged girder with hinges at either end and at centre. The dead load of the girder is 15 KN/m. Find the greatest positive and negative bending moments in the girder when a single concentrated load of 340 KN passes through it. Also find the maximum tension in the cable. (Nov/Dec 2012)

10. A suspension bridge is of 100 m span. The cable of the bridge has a dip of 12m. The cable is stiffened by a two hinged girder with hinges at either end. The dead load of the girder is 8 KN/m. Find the greatest positive and negative bending moments in the girder when a single concentrated load of 120 KN passes through it. Also find the maximum tension in the cable.

11. Analyse the plane truss shown in fig by using tension coefficient and find the forces in the members. (May 2010)



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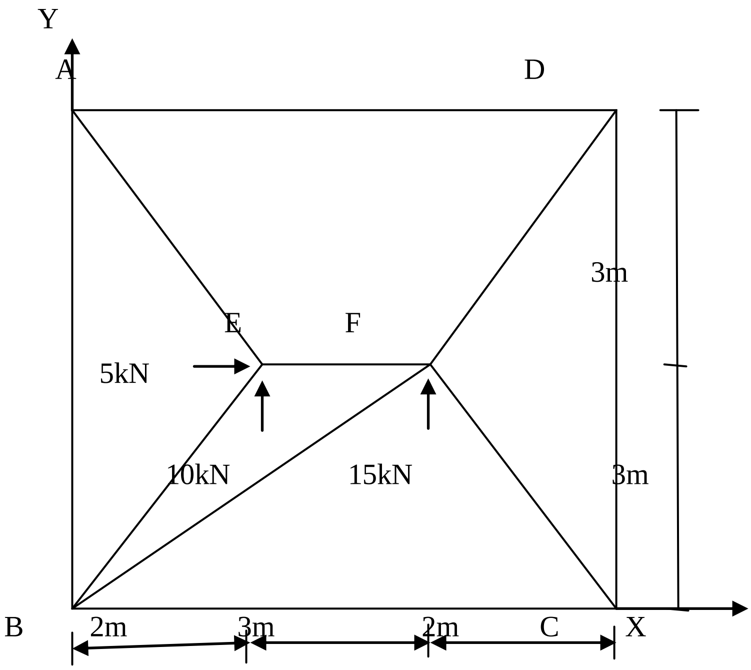
PART-C

1. A suspension bridge of 150m span has two three hinged stiffening girders supported by two cables with a central dip of 15m.If three point loads of 20kN each are placed along the center of the road way at 5, 10, 15m from the left hinge, find the shear force and bending moment in each girder at 30m fron each end.Calculate the maximum tension in the cable. (Nov/Dec 2012)

2. A space frame shown in fig is supported at A, B, C & D in a horizontal plane, through ball joints. The member EF is horizontal and is at a height of 3m above the base. The load at the joints E&F shown in fig act in a horizontal plane.Find the force in all the members of as frame. (May 2010)



3. A suspension bridge of 100m span has two three hinged stiffening girders supported by two cables with a central dip of 10m.If three point loads of 20kN each are placed along the center line of the road way at 10, 15 and 20m from left end hinge, find the shear force and bending moment in each girder at 30m from each end. Calculate the maximum tension in the cable. (May 2010)