Reg. No. : | | | | | | | | | | | |

M 0886

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2011

SIXTH SEMESTER

CIVIL ENGINEERING

CE1351 DESIGN OF REINFORCED CONCRETE AND MASONRY STRUCTURES

(REGULATION 2008)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is Counter fort?

2. How will you avoid overturning of retaining walls?

3. What is the minimum percentage of steel in walls of a water tank?

4. What is staging?

5. Define column drop.

6. State the necessity of concrete walls.

7. State assumptions made in the yield line theory of analysis.

8. Define virtual work.

9. What is effective height?

10. What is permissible stress in masonry walls?

PART B — (5 × 16 = 80 marks)

11. Design the base of the cantilever retaining wall to retain 5 m of horizontal backfill.

Density of soil is 15.5 kN / m^3

Safe Bearing Capacity of soil = 155 kN / m^2

Angle of internal friction of soil = 28°

The coefficient of friction between base slab and concrete = 0.58.

Use M20 Concrete and Fe415 steel. Check also the stability. Key design is not necessary.

Or

12. Design the base slab and back counterfort for the following data.

Earth to be retained = 9.0 m

Density of soil is 16 kN / m^3

Safe Bearing Capacity of soil = 165 kN / m^2

Angle of internal friction of soil = 30°

The coefficient of friction between base slab and concrete = 0.6.

Use M20 Concrete and Fe415 steel. Spacing between counterforts 3.6m.

13. Design an underground water tank 4 m × 6 m × 3.2 m with a freeboard of 0.2 m. The weight of subsoil is 16 kN / m^3. Angle of internal friction of soil = 33°. The soil is dry for full depth of the tank. Safe Bearing Capacity of soil = 230 kN / m^2.

Or

14. Design dome and side walls for a circular water tank to a capacity of 4 lakh litres. The tank is at a height of 20m above ground level. Use M30 Concrete and Fe415 steel.

15. Design a dog legged staircase for a room of 3.6m wide. The height between floors is 3.0m. Use M20 Concrete and Fe415 steel.

Or

16. Explain the principle of design of mat foundation.

17. Find the Ultimate load for orthotropically rectangular slab fixed on all edges carrying uniformly distributed load throughout the slab.

Or

18. Find the Ultimate load for isotropic slabs of the following profiles fixed on all edges carrying uniformly distributed load throughout the slab.

(a) Square slab and (b) Circular slab

19. A masonry wall is subjected to an axial load of 160 kN. The height of the wall is 3.6m. Design the wall.

Or

20. A masonry wall is subjected to an axial load of 100 kN and bending moment of 20 kNm. The height of the wall is 4m. Design the wall.

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B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2011

SIXTH SEMESTER

CIVIL ENGINEERING

CE1354 DESIGN OF STEEL STRUCTURES

(REGULATION 2007)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. State the properties of steel.

2. Write any two comparisons of bolted and welded connection.

3. Why tension member is most economical?

4. What is a lug angle?

5. Define radius of gyration.

6. State the factors influencing the compressive strength of practical columns.

7. What is flexural buckling and flexural torsional buckling?

8. When are beams usually used?

9. Define a steel roof truss.

10. Enlist the major loads on roof trusses.

PART B — (5 × 16 = 80 marks)

11. (a) State the properties and uses of Structural steel. (6)

(b) State the general principles of limit state design. (4)

(c) List out the advantages and disadvantages of welds. (6)

Or

12. (a) Design the welded connection to connect two plates of width 180 mm each and thickness 8 mm for 100 percent efficiency. (8)

(b) Design a Triple bolted lap joint for a plate of 16 mm thickness to carry its full load. (8)

13. (a) A single angle 100 × 100 × 8 mm is connected to a gusset plate at the ends with 20 mm diameter bolts to transfer tension and the connection length is 150 mm. Determine the tensile strength of the angle. (12)

(b) Write a short note on block shear failure. (4)

Or

14. Design a splice to connect a 300 × 20 mm plate with a 300 × 10 mm plate. The design load is 500 kN. Use 20 mm block bolts, fabricated in the shop. (16)

15. (a) List out the design procedure of column design as per IS 800 : 2007. (12)

(b) State how the boundary condition of column is idealized. (4)

Or

16. Design a laced column 10 m long to carry a factored axial load of 1400 kN. The column is restrained in position but not in direction at both ends. (16)

17. (a) Determine the design bending strength and design shear strength of laterally supported beams ISMB 300. (12)

(b) State as to how does the beam failure occur? (4)

Or

18. Calculate the bending strength and the shear strength of laterally supported plate girder. (16)

Depth of girder = 800 mm

Thickness of web = 10 mm

Breadth of flange = 200 mm

Thickness of flange = 12 mm.

Given F_y = 250 MPa and F_u = 410 MPa.

19. Design an I section purlin for an Industrial building to support a galvanized corrugated iron sheet roof, given : (16)

Spacing of the trusses = 5.0 m

Spacing of Purlins = 1.5 m

Inclination of main rafter to horizontal = 30°

Weight of galvanized sheets taking into account laps and connecting bolts = 130 N / m^2

Imposed snow load = 1.5 kN / m^2

Wind load = 1.0 kN/m^2, suction.

Or

20. Design a simply supported Gantry girder to carry a overhead travelling crane, given : (16)

Span of gantry girder = 6.5 m

Span of crane girder = 16 m

Crane capacity = 250 kN

Self weight of crane girder excluding trolley = 280 kN

Self weight of trolley = 50 kN

Minimum hook approach = 1.0 m

Distance between wheels = 3.5 m

Self weight of rails = 0.3 kN/m.

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B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2011

SIXTH SEMESTER

CIVIL ENGINEERING

CE1354 DESIGN OF STEEL STRUCTURES

(REGULATION 2008)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Mention the advantages of HSFG bolts.

2. Write the five series of rolled steel I-sections manufactured in India.

3. Distinguish between a strut and a tie member

4. What is meant by block shear failure in a tension member

5. What is the necessity for providing intermediate transverse stiffener?

6. Differentiate between the web crippling and web buckling?

7. Write the interaction formula for the beams subjected to biaxial bending.

8. What is meant by beam column?

9. What are the loads considered in the design of a gantry girder?

10. Write the expression for design wind speed and design wind pressure at any site.

PART B — (5 × 16 = 80 marks)

11. Find the maximum force which can he transferred through the double covered butt joint show in Fig 1. Find the efficiency of the joint also. Given M20 bolts of grade 4.6 and Fe410 steel plates are used.

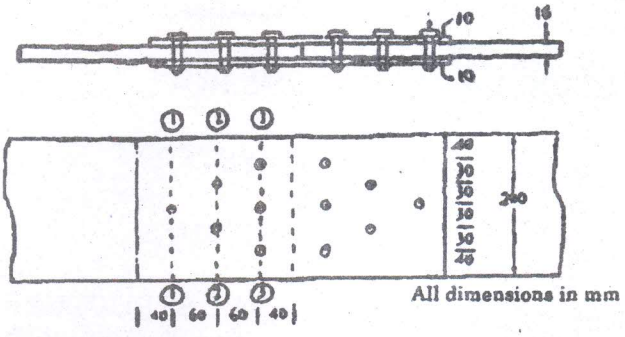

Fig. 1

Or

12. A bracket is bolted to the flange of a column as shown in Fig.2, using 8 mm thick bracket plate. Using M20 bolts of grade 4.6 design the connection.

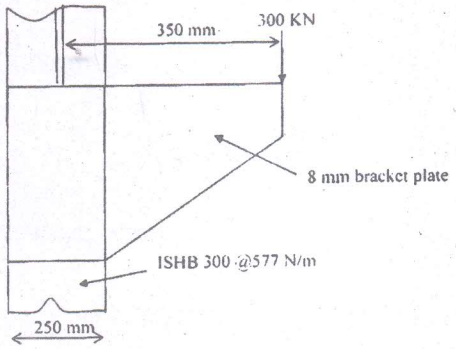

Fig. 2

13. A single unequal angle 75 × 75 × 6 is connected to a 8-mm thick gusset plate at the ends with four 20-mm diameter bolts to transfer tension as shown in Fig.3. Determine the design tensile strength of the angle. Assume that the yield and the ultimate stress of steel used are 250 MPa and 410 MPa respectively.

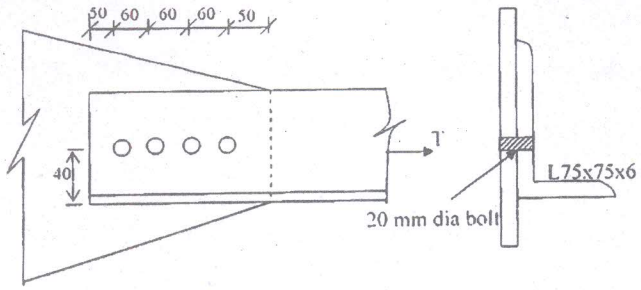

Fig. 3

Or

M 0980

14. Determine the tensile strength of a roof truss diagonal 100 × 75 × 6 mm connected to the gusset plate by 4-mm weld as shown in Fig.4

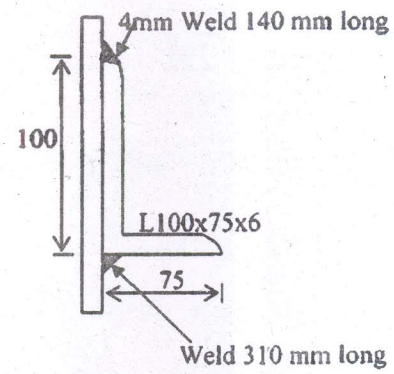

Fig. 4

15. Determine the design axial load on the column section ISMB 350. The height of the column is 6.0 m. It is effectively restrained at mid height by a bracing member in the y-y direction but is free to move in the z-z direction and both the ends of the column are pinned. Also assume = 250 N/mm² and f_u = 410 N/mm² and E = 2 × 10^5 N/mm².

Or

16. Design a laced column with two channels back to back of length 10 m to carry an axial factored load of 1400 kN. The column may be assumed to have restrained in position but not in direction at both ends.

17. Design a simply supported beam of 7 m span carrying a reinforced concrete floor capable of providing lateral restraint to the top compression flange. The total udl made up of 100 kN dead load including self weight plus 150 kN imposed load. In addition, the beam carries a point load at mid span made up of 50 kN dead load and 50 kN imposed load (assuming a stiff bearing length of 75 mm).

Or

18. Design a welded plate girder of span 30 m to carry a superimposed load of 35 kN/m. Avoid use of bearing and intermediate stiffeners, Use Fe415 steel.

19. Determine the design loads on the purlins of an industrial building near Visakhapatnam, given

Class of building: general with life of 50 years.

Terrain : Category 2.

Maximum dimension : 40 m

Width of building : 15 m.

Height at eve level : 8 m

Topography : θ less than 3°,

Permeability : medium

Span of truss : 1.5 m

Pitch : 1/5

Sheeting : A.C sheets

Spacing of purlins : 1.35 m

Spacing of trusses : 4 m.

Or

20. Suggest the structural model of the roof truss and determine the design loads on the truss for an industrial building located at Guwahati with a span of 20 m and a length of 50 m. The roofing is galvanized iron sheeting. Basic wind speed is 50 m/s and the terrain is an open industrial area. Building is class B building with a dear height of 8 m at the eaves.

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M 0950

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2011

SIXTH SEMESTER

CIVIL ENGINEERING

CE1353 IRRIGATION ENGINEERING

(REGULATION 2008)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is consumptive use of water?

2. Define crop period and base period.

3. Distinguish between canal irrigation and tank irrigation.

4. Differentiate between lift and flow irrigation.

5. List out different types of dams.

6. Define a spillway.

7. How are canal alignment classified?

8. What are the objectives of River Training works?

9. List out the methods of minimizing canal water losses.

10. What is meant by optimum utilization of irrigation water?

PART B — (5 × 16 = 80 marks)

11. (a) Explain with neat sketches the techniques used in water distribution on farms. (14)

(b) Explain the factors affecting duty. (2)

Or

12. (a) A stream of 150 litres per second was delivered from a canal and 120 litres per second were delivered to the field. An area of 1.8 hectares was irrigated in 10 hours. The effective depth of root zone was 1.8 m. The run of loss in the field was 420 cum. The depth of water penetration varied linearly from 1.8 m at the head end of the field to 1.2 m at the tail end. Available moisture holding capacity of the soil is 20 cm per meter depth of soil. It is required to determine all the efficiencies. Irrigation was started at a moisture extraction level of 50% of the available moisture. (12)

(b) Derive a relationship between duty and delta. (4)

13. Describe the merits and demerits of sprinkler irrigation.

Or

14. (a) Explain in detail the merits and demerits of Drip irrigation. (8)

(b) Enlist the systems involved in Drip irrigation. (8)

15. Explain the factors governing the selection of a particular type of Dam.

Or

16. Explain with neat sketches the types of weirs.

17. Explain with neat sketches the types of cross – drainage works.

Or

18. Explain any four types of canal fall with neat sketches.

19. Explain participatory irrigation management.

Or

20. Discuss the needs for optimization of water use.

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M 0346

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2011

SIXTH SEMESTER

CIVIL ENGINEERING

CE1352 STRUCTURAL ANALYSIS — II

(REGULATION 2007)

Time : Three hours | Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is a primary structure?

2. What is meant by flexibility?

3. Define degree of freedom.

4. [redacted]

5. What is mean by Element aspect ratio?

6. Define shape factor.

7. State Lower bound theorem.

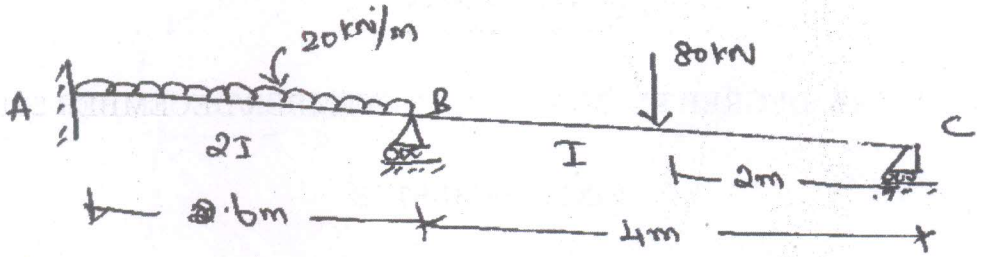
8. What is plastic modulus?

9. Define Tension co-efficient of a truss member.

10. What is the role of stiffening girder?

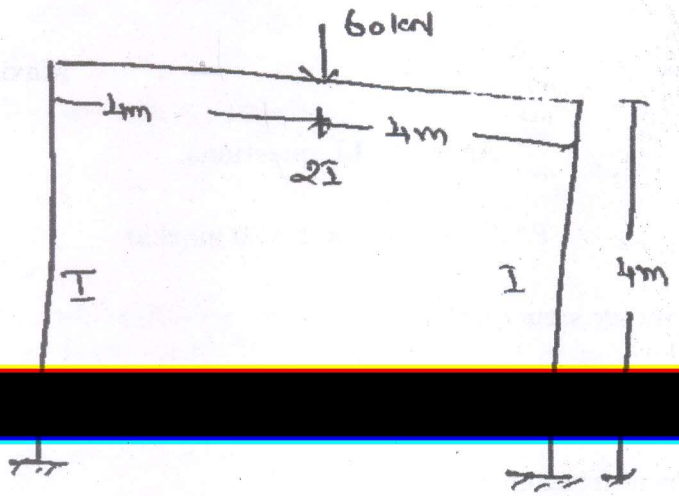
PART B — (5 × 16 = 80 marks)

11. Analyse the continuous beam shown in fig. by flexibility matrix method.

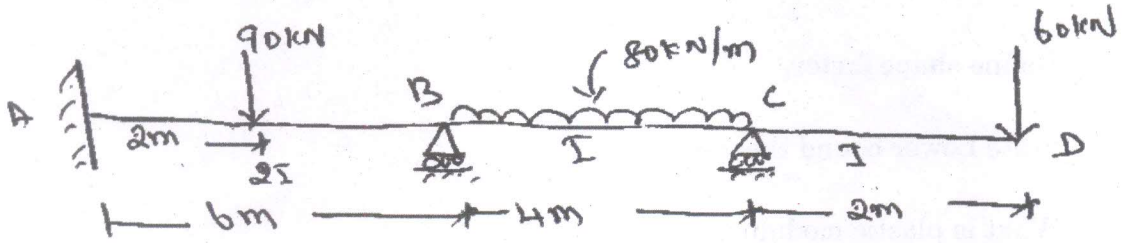


Or

12. Analyse the rigid frame shown in fig. by flexibility matrix method.

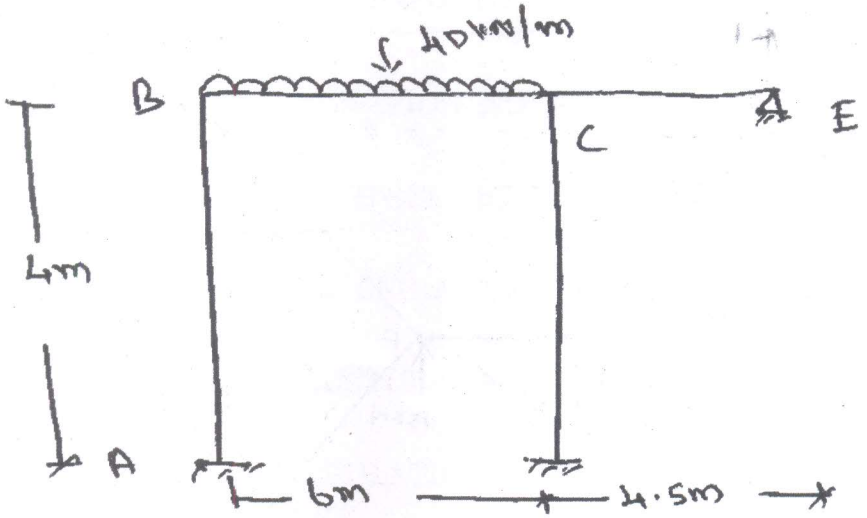


13. Analyse the beam shown in fig. by stiffness matrix method.



Or

14. Using stiffness matrix method analyse the frame shown in fig. Take EI constant throughout.

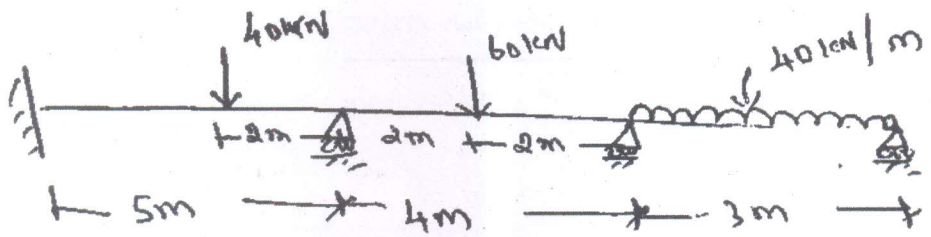


15. List and briefly explain the general steps of the finite element analysis.

Or

16. Explain Discretization and Classification of co-ordinates.

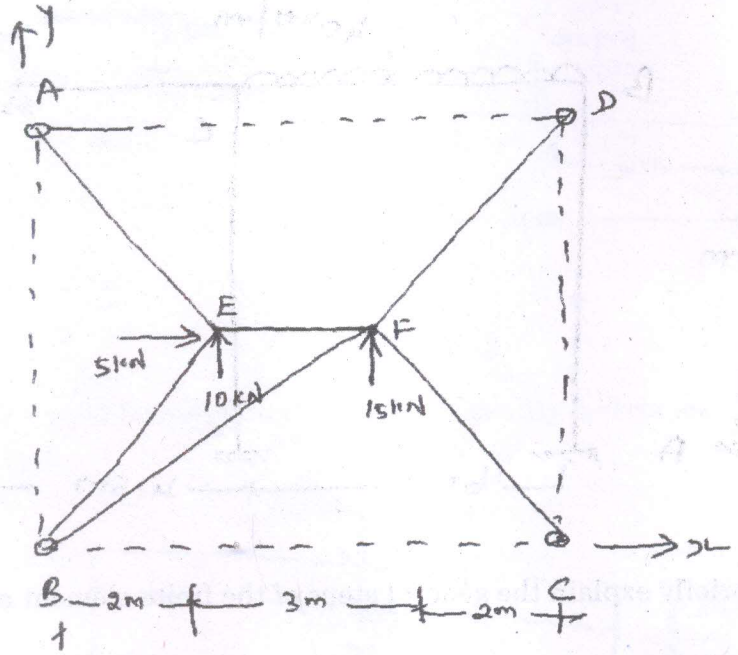
17. Determine the plastic moment capacity M_p required for continuous beam



Or

18. Derive the shape factor for rectangular and circular section.

19. A space frame shown in fig. is supported at A, B, C and D in a horizontal plane, through ball joints. The member EF is horizontal, and is at a height of 3 m above the base. The load at the joints E and F, shown in the fig. act in a horizontal plane. Find the forces in all the members of the frame.



Or

20. The three hinged stiffening girder of suspension bridge of 120 m span subjected to two point load 250 kN each 30 m and 50 m respectively from the left hand hinge. Determine B.M. and S.F. in the girder at section at 40 m from each end. Also determine the maximum tension in the cable which has a central dip of 10 m.

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M 0949

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2011

SIXTH SEMESTER

CIVIL ENGINEERING

CE1352 STRUCTURAL ANALYSIS — II

(REGULATION 2008)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define force method.

2. Write the force displacement matrix equations in general form for a portal frame having both the ends fixed.

3. Write the axial stiffness expression for a rectangular section of length L.

4. Write the stiffness coefficient for the rigid jointed portal frame subjected to lateral displacement at the beam level at any one joint The span and height of the frame is L.

5. List any four commercially available finite element analysis softwares.

6. Mention the types of Finite Elements used in finite element analysis.

7. Define the upper bound theorem.

8. Mention the different type of mechanisms formed for a plane portal frame.

9. Consider a curved beam in plan and state the number of reactive components induced when it is cut at any location.

10. Define the term tension coefficient of a member of a frame.

PART B — (5 × 16 = 80 marks)

11. Analyze the continuous beam as shown in figure 1 by the force method. (16)

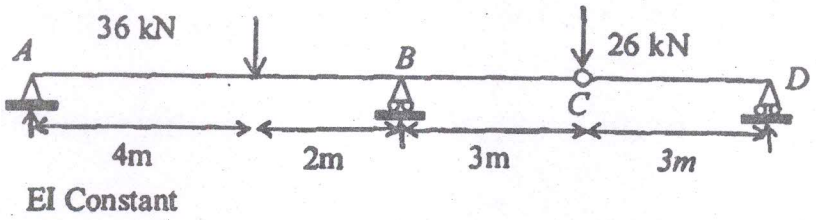

Fig. 1

Or

12. Analyze the indeterminate pin-jointed frame as shown in figure 2. by the force method. (16)

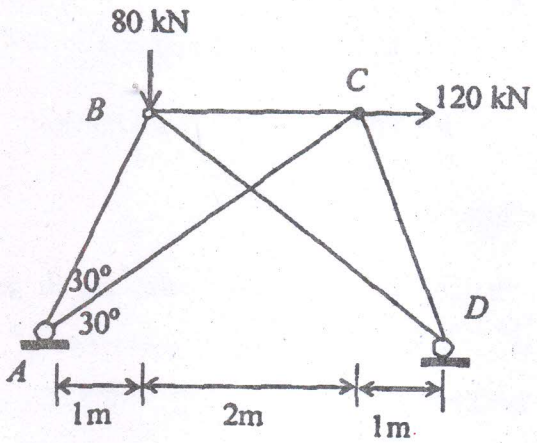

Fig. 2

13. Formulate the member stiffness matrix for the space frame member as shown in figure 3. (16)

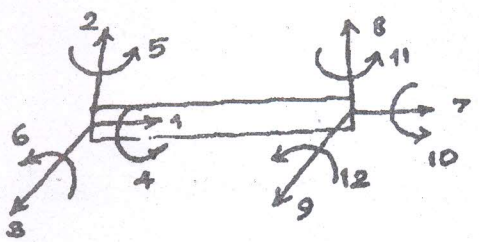

Fig. 3

Or

14. Generate the stiffness matrix for the rigid jointed frame with respect to the coordinates shown in figure 4. (16)

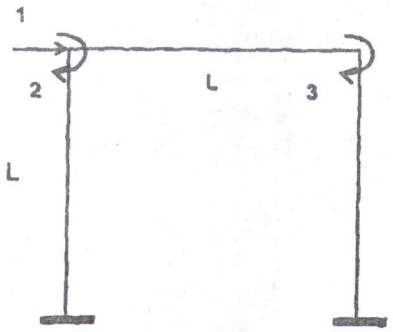

Fig. 4

15. General algorithm to analyse the basic one dimensional and two-dimensional structural system with flow Chart. (16)

Or

16. The beam shown in figure 5 is clamped at the two ends and acted upon by the force P and moment M in the mid-span. Determine the deflection and rotation at the center node and the reaction forces and moments at the two ends. (16)

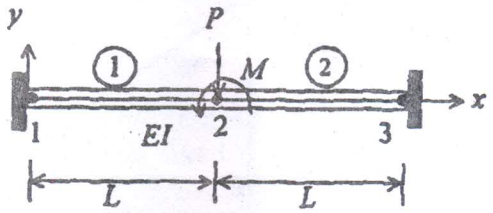

Fig. 5

17. A propped cantilever carries an UDL of W over span L. Determine the ultimate collapse load W_U if the plastic moment capacity of the beam is M_P. (16)

Or

18. Calculate the required value of M_P for the frame shown in figure 6. (16)

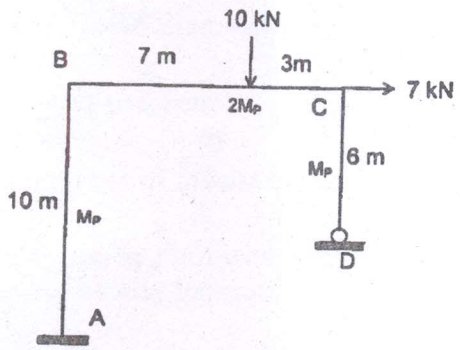

Fig. 6

19. A curved beam in the form of a quadrant of a circle of radius R and having a uniform cross section is in a horizontal plane. It is fixed at A and free at B as shown in figure 7. It carries a vertical concentrated load W at the free end B. Compute and draw the shear force, bending moment and twisting moment diagrams. Also determine the vertical deflection at the free end B. (16)

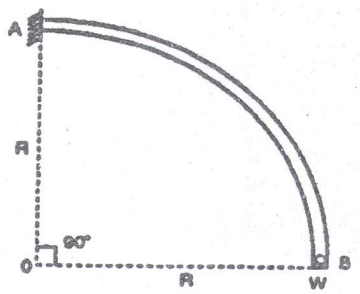

Fig. 7

Or

20. Using the method of tension coefficients analyse the plane frame as shown in figure 8. (16)

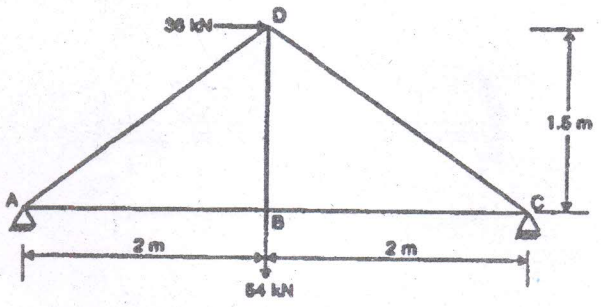

Fig. 8