Total No. of Questions : 8]

SEAT No. :

P2043

[Total No. of Pages : 3

[4859]-1009

B.E. (Civil Engineering)

MATRIX METHODS OF STRUCTURAL ANALYSIS

(Semester - I) (2012 Pattern) (Elective - II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of logarithmic tables slide rule, mollier charts, electronic pocket calculator and steam tables is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Write computer algorithm for Gauss Elimination Method. **[6]**

b) Determined the prop reaction of the propped cantilever beam AB as shown in Figure 1 using flexibility matrix method. Take EI = constant. **[6]**

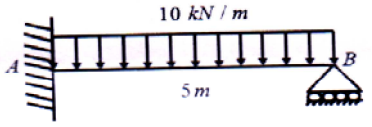


Figure 1

c) Two bars one of aluminium and other of steel are joined together and subjected to load as shown in Figure 2. Determine the displacement at common joint. Take c/s area of aluminium bar 2000 mm^2, c/s area of steel bar 400 mm^2, Young's modulus of aluminium bar 70 GPa and steel bars 200 GPa. **[8]**

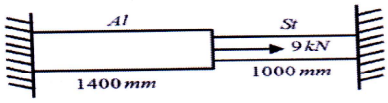


Figure 2

OR

Q2) a) Explain Gauss Jordan Method with computer flowchart. **[6]**

b) Determine the support reactions of the continuous beam ABC as shown in Figure 3 using flexibility matrix method. Take EI = constant. **[6]**

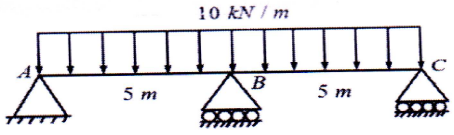


Figure 3

P.T.O.

c) Derive the transformation matrix and stiffness matrix of two noded truss member with 04 D.O.F. **[8]**

Q3) a) Explain structure approach and member approach for the analysis of framed structures. **[4]**

b) Analyze the continuous beam ABC as shown in Figure 4 using stiffness matrix method. The beam is fixed at A and C and supported by spring at B. Take EI constant. Draw BMD. **[14]**

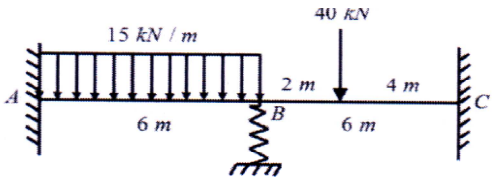


Figure 4

OR

Q4) a) Derive the stiffness matrix of two noded frame element considering axial force, shear force and bending moment. **[6]**

b) Determine the unknown joint displacements of the portal frame as shown in Figure 5 using stiffness matrix method. Take EI constant. **[12]**

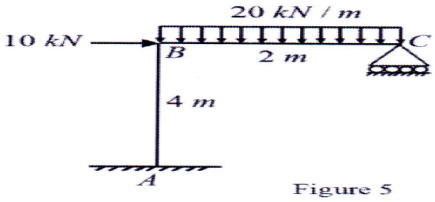


Figure 5

Q5) a) Derive the stiffness matrix of two noded grid element of with 06 D.O.F., length L, flexural rigidity EI and torsional rigidity GJ. **[8]**

b) Derive the transformation matrix of the grid element. **[8]**

OR

Q6) Analyze the grid structure ABC as shown in Figure 6 using stiffness matrix method. Take E =210 GPa, G = 84 GPa, I = 16.6×10^{-5} m^4, J=4.6×10^{-5} m^4 for all elements. **[16]**

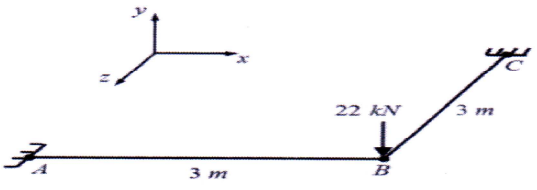


Figure 6

OR

Q7) For the truss shown in Figure7, use stiffness matrix method to determine the deflections at the loaded joint. Take E = 200 GPa and c/s area of all members 1000 mm^2. **[16]**

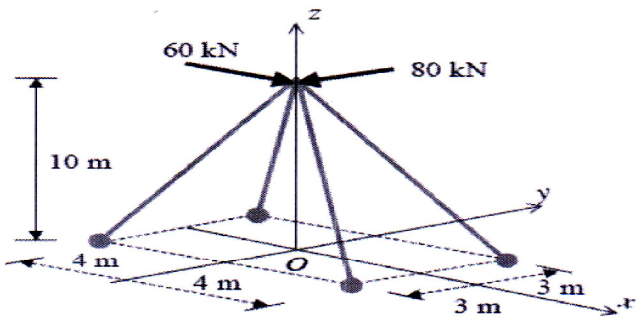
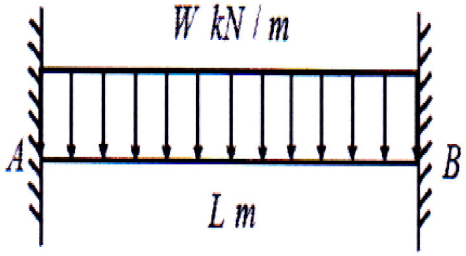


Figure 7

OR

Q8) a) A beam of span 'L' is fixed at both ends 'A' and 'B' and supports a uniformly distributed load of W kN/m over the entire span. Estimate the deflections of quarter span intervals using second order central difference formula. **[8]**



b) Estimate the lowest buckling load 'P' of a uniform pin ended column of length 'L' and flexural rigidity EI using three sub intervals. Apply finite difference method. **[8]**