Total No. of Questions : 8]

SEAT No. :

P2957

[Total No. of Pages : 4

[5154]-509
B.E. (Civil)
MATRIX METHODS OF STRUCTURAL ANALYSIS
(2012 Course) (Semester - I) (Elective - II)

Time : 2½ Hours] *[Max. Marks : 70*

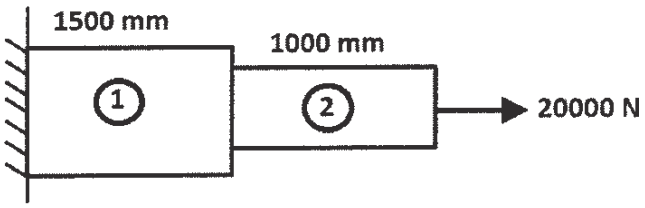
Instructions to the candidates:

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicates full marks.***
4) ***Use of electronic pocket calculator is allowed.***
5) ***Assume suitable data if necessary.***

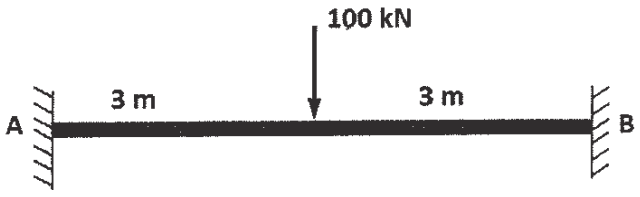
Q1) a) Solve the following system by Gauss-Elimination Method **[5]**

$$x - 2y - 6z = 12$$
$$2x + 4y + 12z = -17$$
$$x - 4y - 12z = 22$$

b) Determine maximum elongation of the bar structure as shown in figure using stiffness matrix method. The c/s area of member 1 is 1000 mm^2 whereas c/s area of member 2 is 500 mm^2. Take E = 2×10^5 MPa. **[5]**



c) Determine support reactions of beam AB as shown in figure using flexibility matrix method. Take EI constant. **[10]**



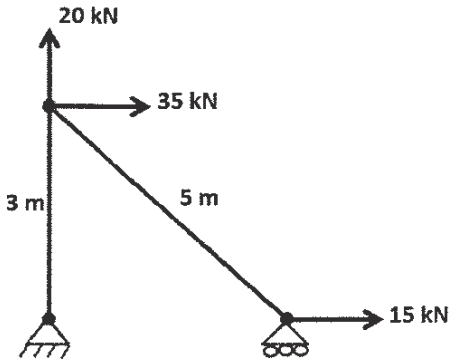
OR

P.T.O.

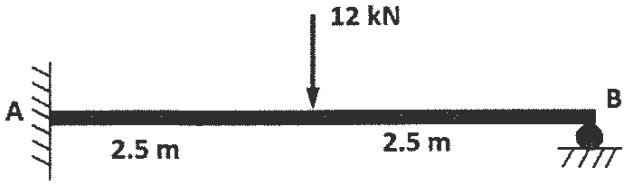
Q2) a) Solve the following system by Gauss-Jordan Method **[6]**

$$2x - 2y + z = 3$$
$$3x + y - z = 7$$
$$x - 3y + 2z = 0$$

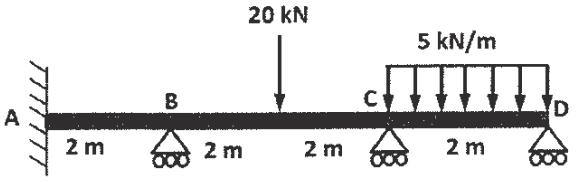
b) Determine deflections of loaded joints of the two member truss as shown in Figure using stiffness matrix method. Take c/s area of each member 1000 mm^2 and E = 200 GPa. **[8]**



c) Determine propped reaction of the beam AB as shown in figure using flexibility matrix method. Take EI constant. **[6]**

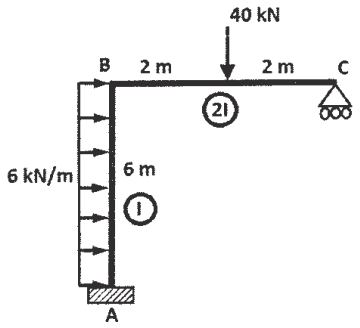


Q3) Analyze the continuous beam ABCD as shown in figure using stiffness matrix method. Take EI constant. Draw BMD. **[18]**



OR

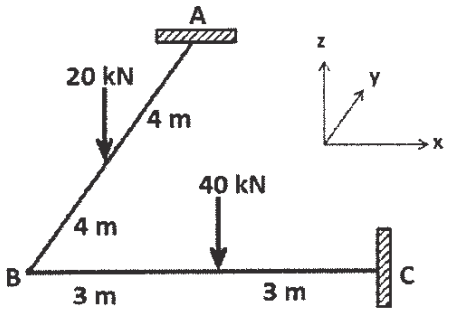
Q4) Analyze the rigid jointed portal frame as shown in figure using stiffness matrix method. Take EI = constant KN.m^2. Draw BMD. **[18]**



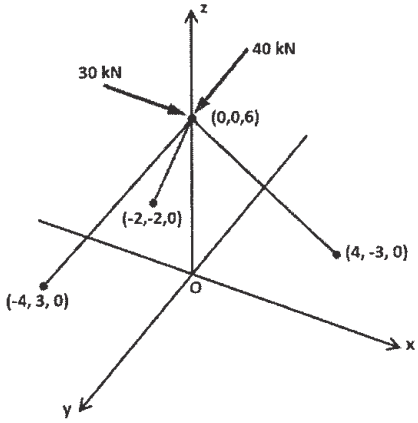
Q5) Derive the stiffness matrix and transformation matrix for grid element with 06 D.O.F. Take flexural rigidity EI and torsional rigidity GJ. **[16]**

OR

Q6) Determine unknown displacements at joint B of the orthogonal grid as shown in figure using stiffness matrix method. take EI = 1000 kN.m^2 and GJ = 500 kN.m^2. **[16]**

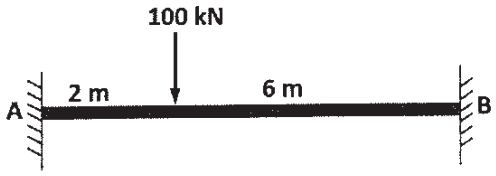


Q7) The tripod shown in figure is subjected to horizontal and vertical loads. Determine the deflections at the loaded joint using stiffness matrix method. Take E = 200 GPa and c/s area of all members 1000 mm^2. **[16]**



OR

Q8) a) A fixed beam loaded as shown in figure. Estimate the deflection under the point load using finite difference method. Use four sub intervals. Take EI constant. **[8]**



b) Estimate the critical 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]**