

[5254]-9

B.E. (Civil)

MATRIX METHODS OF STRUCTURAL ANALYSIS

(2008 Pattern)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answers to the two sections should be written in separate books.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Your answers will be valued as a whole.*
- 5) *Use of electronic pocket calculator is allowed.*
- 6) *Assume suitable data, if necessary.*

SECTION - I**Q1)** Write note on :**[16]**

- a) Ill conditioned Matrix
- b) Gauss Elimination Method

OR

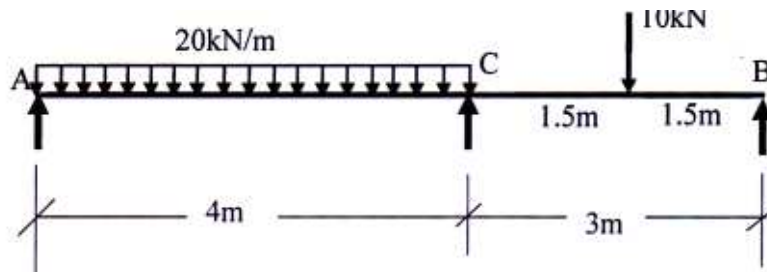
Q2) a) Solve the following equations by Gauss Elimination Method .**[10]**

$$5X_1 - 2X_2 + 4X_3 = 5$$

$$-2X_1 + X_2 + X_3 = 1$$

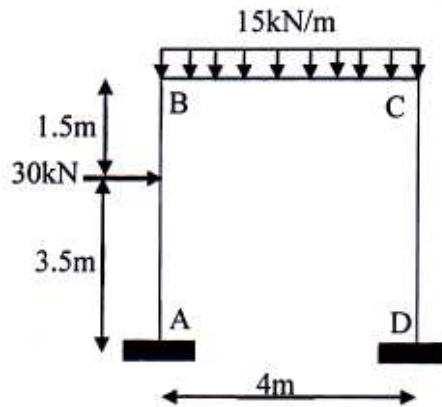
$$4X_1 + X_2 = 6$$

- b) Write a note on "Importance of Matrix Algebra in Matrix Methods of Structural analysis".

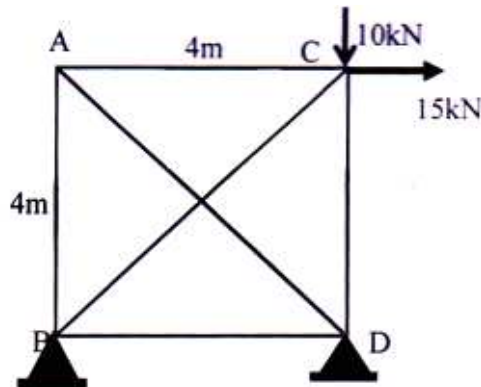
[6]**Q3)** Analyze the beam shown below by flexibility method (EI constant).**[18]****P.T.O.**

OR

Q4) Analyze the portal frame using Flexibility Method (EI Constant). [18]



Q5) Analyze the truss by Flexibility Method (EI Constant) [16]



OR

Q6) Analyze the beam shown in Ex. 3 by Stiffness Method (EI is Constant). [16]

SECTION - II

Q7) Write note on : [16]

- a) Displacement Method of structural analysis.
- b) Determinacy and Indeterminacy.

OR

- Q8)** a) Using proper DOF's, write stiffness matrix equation for a member of orthogonal grid structure. [10]
- b) Explain role of transformation matrix in structural analysis. [6]

- Q9)** a) Explain properties and special characteristics of stiffness matrix of a structure. [8]
- b) Show that stiffness matrix of a member of a structure in a structure co-ordinate system is obtained by transformation. [10]

OR

Q10) Stating clearly DOF, explain stiffness matrix for space truss member and space frame member. In which case you need transformation matrix. Explain reason. [18]

Q11) A single bay three storied frame is to be analyzed by computer programme of Stiffness matrix method [16]

- a) Prepare the flow chart for the programme and state input required for the same
- b) How will you input support conditions of the structure

OR

Q12) Explain in detail - Stiffness of a pin - joint for translation along coordinates i, j and k with example. [16]

