

Total No. of Questions : 12]

SEAT No. :

P3658

[4959]-1009

[Total No. of Pages : 3

B.E. (Civil)

**a-MATRIX METHODS OF STRUCTURAL ANALYSIS**  
**(2012 Pattern) (Semester - I) (Elective - II)**

Time : 2½ Hours]

[Max. Marks : 70

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 indicates 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 a note on:

[6]

- a) Importance of Matrix Algebra in Matrix Methods of Structural analysis.
- b) Gauss Jordan & Gauss Seidel iteration method.

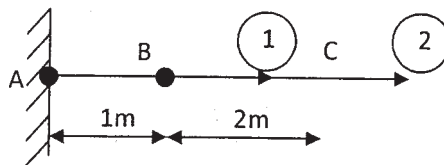
OR

Q2) Write a note on

[6]

- a) Ill conditioned matrix.
- b) Gauss Elimination Method.

Q3) Two steel bars AB and BC, each having a cross-sectional area of  $20\text{mm}^2$ , are connected in series as shown in the figure. Develop the flexibility matrix with reference to coordinates 1 and 2 shown in the figure.  $EI = 200\text{kN/mm}^2$ . [6]

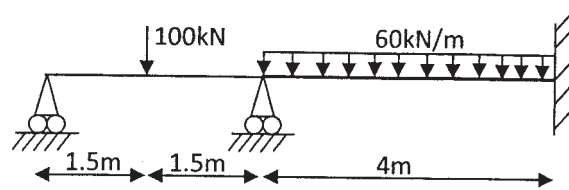


OR

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**Q4)** Develop the Flexibility matrix for the beam shown below

[6]



**Q5)** Develop the stiffness matrix with reference to coordinates 1 and 2 shown in the figure give in question 3 for the same data. [8]

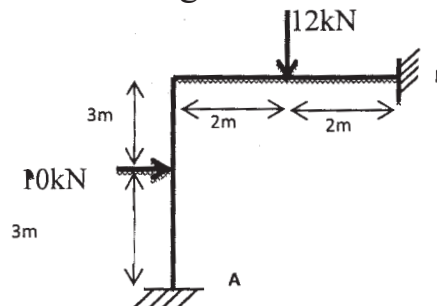
OR

**Q6)** Develop the stiffness matrix for the beam shown in the figure give in question 4 for the same data. [8]

**SECTION - II**

**Q7)** Analyze the portal frame using Stiffness Method (EI Constant)

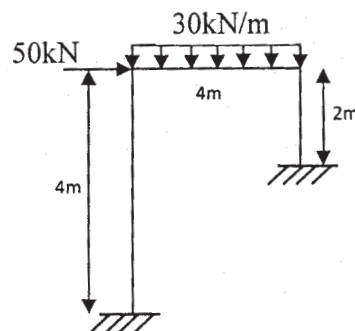
[16]



OR

**Q8)** Analyze the portal frame as shown below by force method

[16]



- Q9)** a) Differentiate between structure approach and member approach used in stiffness matrix method. Explain how support conditions are accounted in both approaches. [8]
- b) Using proper DOF's, write stiffness matrix equation for a member of orthogonal grid structure. [8]

OR

- Q10)**a) Show that stiffness matrix of a member of a structure in a structure coordinate system is obtained by transformation. [8]
- b) Explain properties and special characteristics of stiffness matrix of a structure. [8]

**Q11)** A single bay two storied frame is to be analyzed by computer programme of Stiffness matrix method [18]

- 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. [18]

**x x x**