

Total No. of Questions : 12]

SEAT No. :

P1052

[Total No. of Pages : 3

[4659]-9

B.E. (Civil Engineering)

a-MATRIX METHODS OF STRUCTURAL ANALYSIS

(2008 Pattern) (Elective-II) (Semester-I)

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) a) Explain need of Computer Algorithm & Programming aspects. **[6]**

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

$$2.5X_1 - X_2 + 2X_3 = 2.5$$

$$-6X_1 + 3X_2 + 3X_3 = 3$$

$$12X_1 + 3X_2 = 18$$

OR

Q2) a) Write a note on Gauss Elimination Method. **[6]**

b) Solve following equations by Gauss Seidel Method **[10]**

$$2.5X_1 - X_2 + 2X_3 = 2.5$$

$$-6X_1 + 3X_2 + 3X_3 = 3$$

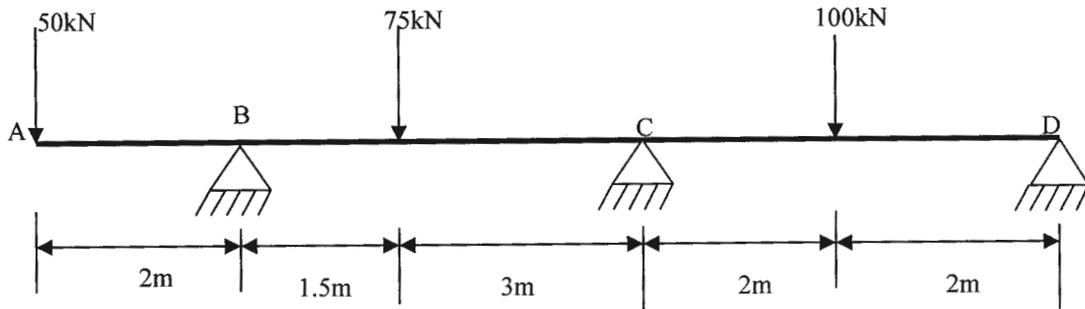
$$12X_1 + 3X_2 = 18$$

Q3) A two span continuous beam ABC is fixed at A and C & simply supported at B. AB = BC = 5m. It carries concentrated load of 100 kN at centre of AB and uniformly distributed load of 30 kN/m over BC. EI is uniform & it is 12,000 kN/m². Find redundants using flexibility method. **[18]**

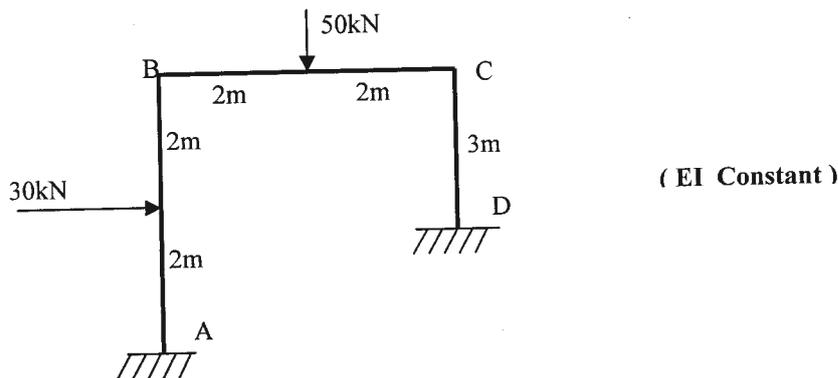
OR

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Q4) Analyze the beam shown below by flexibility method (EI is constant). [18]



Q5) Analyse the portal frame using flexibility method. [16]



OR

Q6) Analyse above portal frame by stiffness method. [16]

SECTION-II

Q7) Explain: [18]

- a) Member approach and structure approach.
- b) Force Method of structural analysis.
- c) Local and global stiffness matrix.

OR

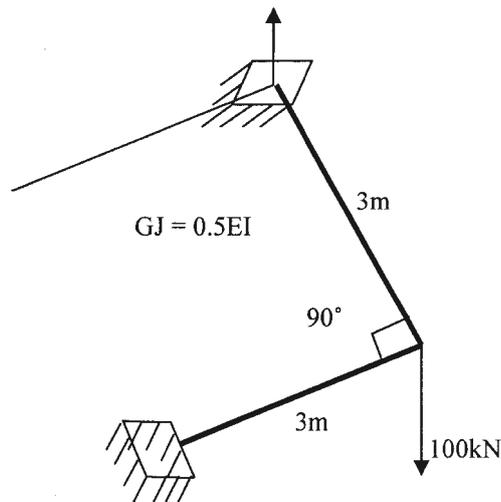
Q8) a) Show that stiffness matrix of a member of a structure, in structure co-ordinate system is obtained by transformation.

$[S_m] = [R]^T [S_m] [R]$; where, $[S_m]$ is member stiffness matrix in member co-ordinate and $[R]$ is rotation matrix of the member. [10]

b) Explain properties and special characteristics of stiffness matrix of a structure. [8]

Q9) a) Using proper DOFs, write clearly stiffness matrix equation for a member of orthogonal grid structure. Explain various terms involved in matrix equation. [8]

- b) Using structure approach, develop only stiffness matrix of grid structure shown in figure 5. $GJ = 0.4 EI$. & Uniform for all members. [8]



OR

- Q10)** Analyse & draw bending moment diagram for grid structure shown in Q. 9b. Use stiffness matrix method. [16]

- Q11)** Explain input data, input file and results in output file in case of software solution of plane truss problem. Take a suitable example of truss & write details as per the format of software you have used. [16]

OR

- Q12)** A single bay two storied frame is to be analyzed by computer programme of stiffness matrix method. [16]

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

