CLASS: MTECH   SEMESTER : I
BRANCH: CIVIL   SESSION : MO/2022

SUBJECT: CE502 ADVANCED STRUCTURAL ANALYSIS

TIME: 3:00 Hours   FULL MARKS: 50

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
4. Before attempting the question paper, be sure that you have got the correct question paper.
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

Q.1(a)   Determine the degree of static indeterminacy of the pin-jointed plane frame shown in Figure.   [5] (CO1)
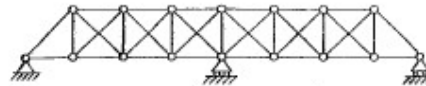
Q.1(b)   Write down the difference between force method and displacement method.   [5] (CO1)
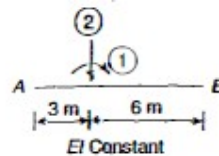
Q.2(a)   Find the inverse of A matrix?   [5] (CO2)

$$A= \begin{bmatrix} 1 & 2 & 3 \\ 0 & 1 & 4 \\ 5 & 6 & 0 \end{bmatrix}$$

Q.2(b)   Solve the following simultaneous equations.   [5] (CO2)

$$30 x_1 - 10x_2 \qquad = 2$$
$$-10x_1 + 15x_2 - 5x_3 = 3$$
$$- 5x_2 + 5x_3 = 5$$
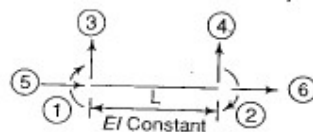
Q.3(a)   Develop the flexibility and stiffness matrices for prismatic member AB with reference to the   [6] (CO3)
         coordinates shown in Fig for the   following support conditions:

(i)   Hinged support at A and roller support at B
(ii)   Fixed supports at A and B
(iii)   Fixed support at A and roller support at B.

Q.3(b)   Establish the relation between stiffness and flexibility matrix   [4] (CO3)

Q.4(a)   Develop the stiffness matrix for the end-loaded prismatic member AB with reference to the   [5] (CO4)
         coordinates shown in Figure.

Q.4(b)   Analyze the continuous beam shown in Figure

         [5] (CO4)

Q.5(a) Determine the elements of the stiffness matrix for the portal frame with reference to the   [5] (CO5)
coordinates shown in Figure.

(a)

Q.5(b) Analyze the Portal frame shown in Figure.   [5] (CO5)

(a)   (b)

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