

(Following Paper ID and Roll No. to be filled in your Answer Books)

PAPER ID :

Roll No.

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B.TECH.

**Theory Examination (Semester-VI) 2015-16
MATRIX ANALYSIS OF STRUCTURES**

Time : 3 Hours

Max. Marks : 100

SECTION-A

Q.1 Attempt all parts. Write answer of each part in short. (2 x 10=20)

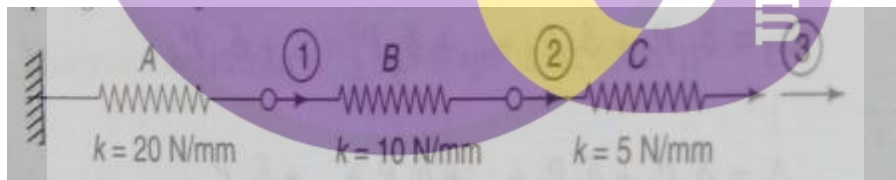
- (a) Write down the force-displacement relationship.
- (b) Explain Static and Kinematic Indeterminacy.
- (c) Define degree of freedom.
- (d) Sketch the different type of truss members.
- (e) What are the advantages of frames over the truss?
- (f) Define framed structure.
- (g) Write short notes on transfer matrix method.
- (h) What are the substructure techniques for solving very large structure?
- (i) Explain displacement method.
- (j) Explain in Rotation of axes for a space truss member.

SECTION-B

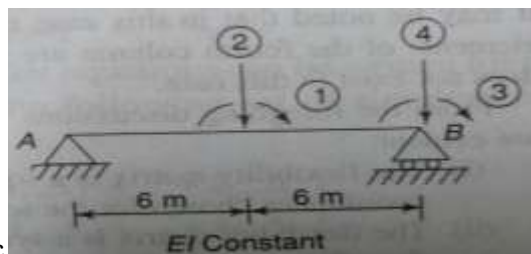
Q.2 Attempt any 5 questions from this section.

(10 x 5=50)

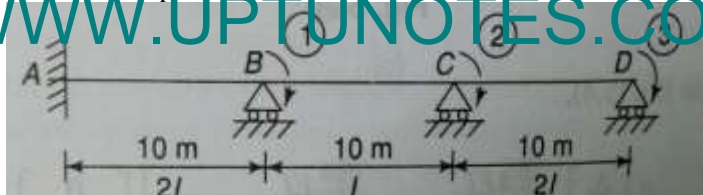
a) Three springs A, B, and C are connected in series as shown in fig. The stiffnesses of the springs are 20, 10 and 5 N/mm respectively. Develop the flexibility matrix for the system of springs with reference to coordinates 1, 2 and 3 as shown in the figure.



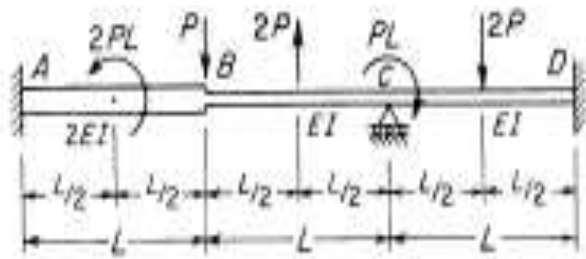
b) Develop the flexibility matrix for the simply supported beam AB with reference to the coordinates shown in fig.



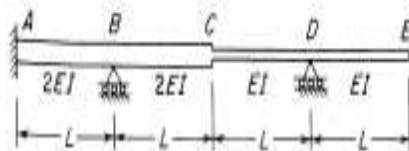
c) Calculate the flexural stiffness at point D of the three-span continuous beam ABCD shown in fig.



d) Analyze the beam shown in the figure, taking points A, B, C, and D as joints. The segment AB has a flexural rigidity of 2EI, and the portion from B to D has a constant flexural rigidity of EI.



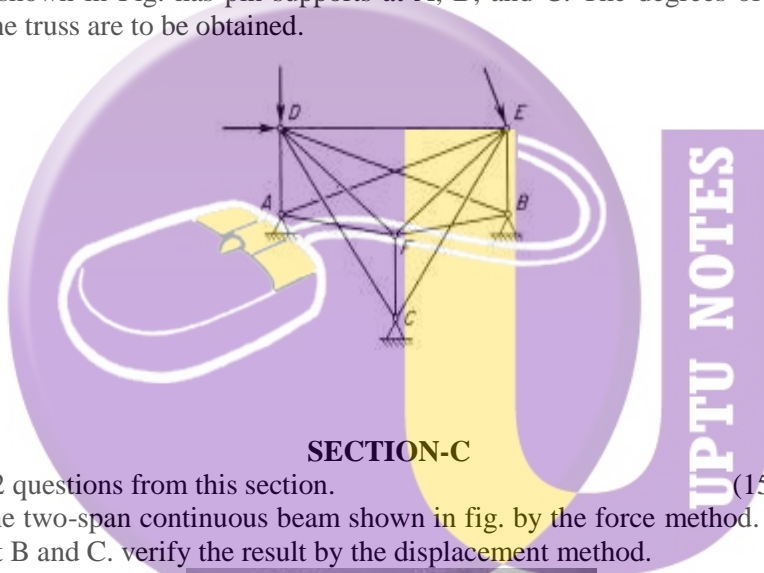
e) Obtain the joint stiffness matrix S , for the beam shown in the figure.



f) Explain the different types of framed structure with neat sketch.

g) Explain the deformation in framed structure.

h) The space truss shown in Fig. has pin supports at A, B, and C. The degrees of static and kinematic indeterminacy for the truss are to be obtained.

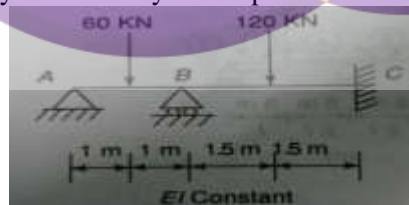


SECTION-C

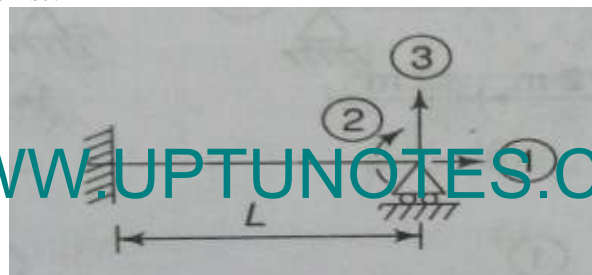
Note: Attempt any 2 questions from this section.

(15 x 2=30)

Q.3 a) Analyze the two-span continuous beam shown in fig. by the force method. Hence determine the bending moments at B and C. verify the result by the displacement method.

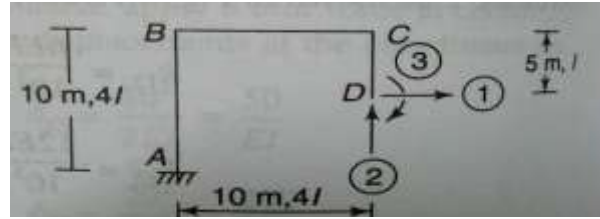


b) Develop the stiffness matrix for beam AB of uniform cross-section shown in fig. with reference to the coordinates shown in the figure. end A is hinged and end B is free. Discuss why the flexibility matrix does not exist?

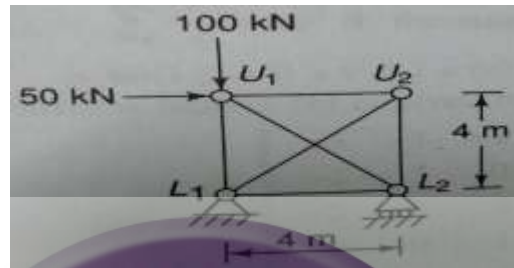


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Q.4 a) Develop the flexibility and stiffness matrices for the frame ABCD with reference to the coordinates shown in figure.



b) Analyze the pin-jointed plane frame shown in fig. The axial stiffness for each number is 40kN/mm.



Q.5 a) Figure shows a triangular frame carrying a load of 200kN at A. Determine the displacements of joints A and C. Hence calculate the forces in the members of the frame. The axial stiffness for each member is 100 kN/mm.



b) The beam AB shown in Fig. it is fixed at both ends and is subjected to a concentrated load p and a couple M at the midpoint. It is assumed that the beam has constant flexural rigidity EI.

