Printed Pages: 03   **Sub Code: NCE012**

Paper Id: | 1 | 0 | 0 | 6 | 1 | 2 | **Roll No.** | | | | | | | | | | |

B TECH
(SEM VI) THEORY EXAMINATION 2017-18
MATRIX ANALYSIS OF STRUCTRES

Time: 3 Hours   *Total Marks: 100*

Note: Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1.   **Attempt *all* questions in brief.**   **2 x 10 = 20**

   a.   Distinguish between the element and global stiffness matrices.
   b.   What is rank deficiency of a matrix?
   c.   The flexibility method is also known as force method, compatibility method. Give reasons.
   d.   Write different approaches to matrix method?
   e.   What do you mean by encastre beam?
   f.   What are the objectives of analysis of structures?
   g.   Write the necessity of shear walls.
   h.   Define the terms initial and thermal stresses.
   i.   Define stiffness coefficients.
   j.   Write the relationship between flexibility and stiffness matrices.

SECTION B

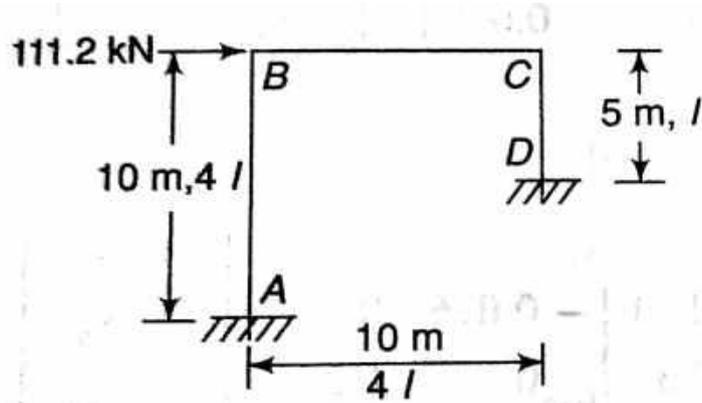2.   **Attempt any *three* of the following:**   **10 x 3 = 30**

   a.   Analyse the continuous beam shown in figure by Flexibility matrix method. If the downward settlement of supports B and C are 10 mm and 5 mm respectively. Take EI = 184 x 10^{11} N-mm^2.
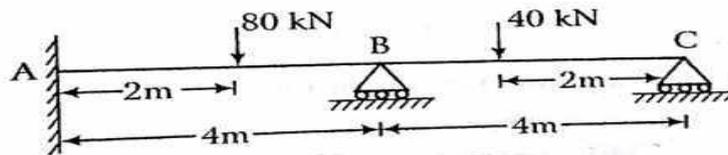
   b.   Discuss one method to determine stresses in a pin jointed frame due to lack of fit of member.
   c.   Generate the stiffness matrix for the structure with co-ordinates as shown in figure.
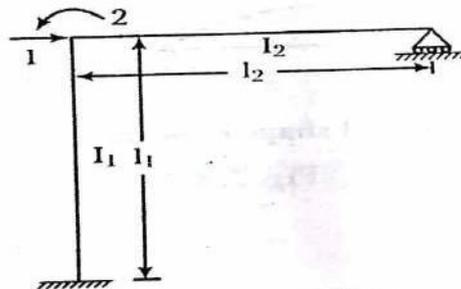

   d.   What do you mean by boundary condition in case of flexibility matrix as well as stiffness matrix method?
   e.   Analyse the portal frame shown in figure by displacement method. The flexibilities of support D for horizontal and vertical displacements in KN-m units are 10/EI and 20/EI respectively.

SECTION C

3. **Attempt any *one* part of the following:**   **10 x 1 = 10**

(a) What is the basic difference between stiffness and flexibility matrix method to analyze any structure? How will you analyze a beam by these two methods? Explain in brief.

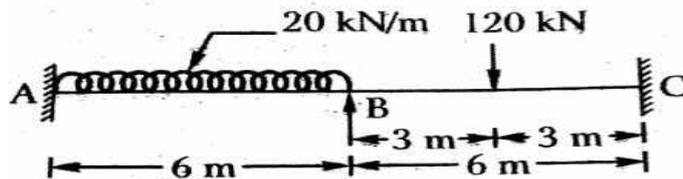(b) Develop the flexibility matrix for the beam shown in figure:
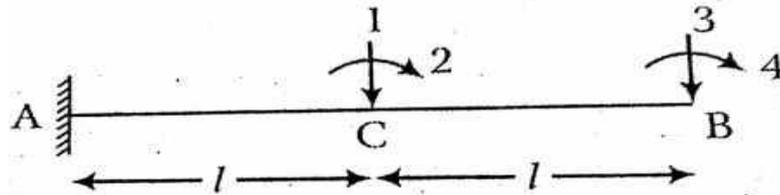
4. **Attempt any *one* part of the following:**   **10 x 1 = 10**

(a) Analyse the pin jointed plane truss shown in figure by flexibility matrix method. The members in parenthesis are cross-section area of the members in mm^2
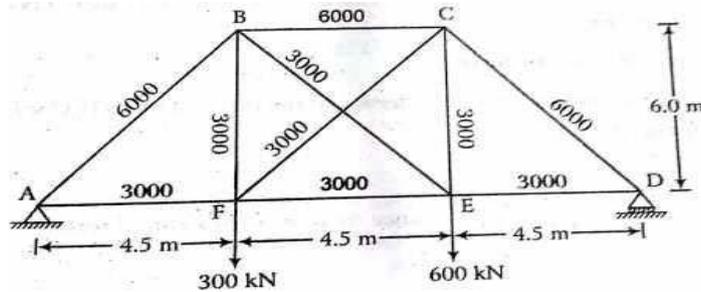
(b) Analyse the continuous beam shown in figure below by stiffness matrix method.

5. **Attempt any *one* part of the following:**   **10 x 1 = 10**

(a) Explain the properties and special characteristics of stiffness matrix of a structure. Also state the importance of bandwidth in stiffness analysis by computer and measures to keep it minimum.

(b) Using the direct stiffness matrix approach determine stiffness matrix for a beam element considering the axial deformation is negligible.

**6.**   **Attempt any *one* part of the following:**   **10 x 1 = 10**

    (a)   Write the step by step procedure for the analysis of a portal frame using direct element method.

    (b)   Show that stiffness matrix of a member of a structure, in structure coordinate system is obtained by transformation;
$[S_m] = [R]T [S_m] [R]$
Where; $[S_m]$ is member stiffness matrix in member coordinate and $[R]$ is the rotation matrix of the member.

7.   **Attempt any *one* part of the following:**   **10 x 1 = 10**

    (a)   Analyse the frame shown in figure by using flexibility matrix method.
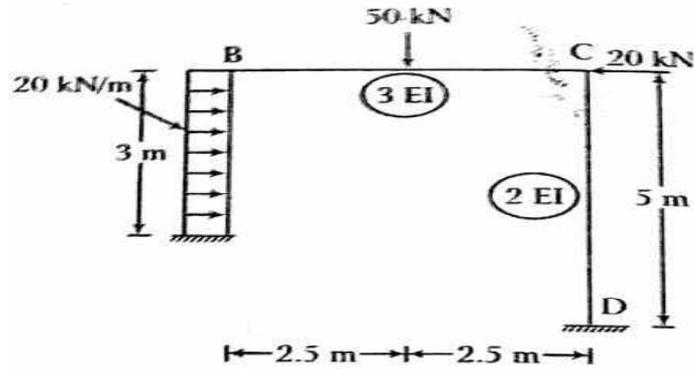
    (b)   Explain the concept of stiffness method of Structural Analysis employed to a rigid frame subjected to temperature change.