Printed Pages:	Sub Code: **NCE 012**
Paper Id: 100232	Roll No.

B TECH
(SEM VI) THEORY EXAMINATION 2018-19
MATRIX ANALYSIS OF STRUCTRES

Time: 3 Hours   *Total Marks: 100*

Note: Attempt all Sections. If you require any missing data, choose suitably.

SECTION A

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

   a.   What do you mean by restrained structure and how it is formed?
   b.   What do you mean by degree of freedom?
   c.   Define the term thermal stress.
   d.   What is encastre beam?
   e.   Differentiate a frame element and a truss element.
   f.   What is static condensation?
   g.   Define a flexibility & stiffness coefficient.
   h.   Distinguish between the element and global stiffness matrices.
   i.   Write the advantages of matrix methods.
   j.   The stiffness method is also known as displacement method, equilibrium method. Give reasons.

SECTION B

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

   a.   Discuss in detail the various coordinate system and transformation of coordinates used in matrix method of structural analysis
   b.   Analyse the frame shown in figure by using flexibility matrix method.
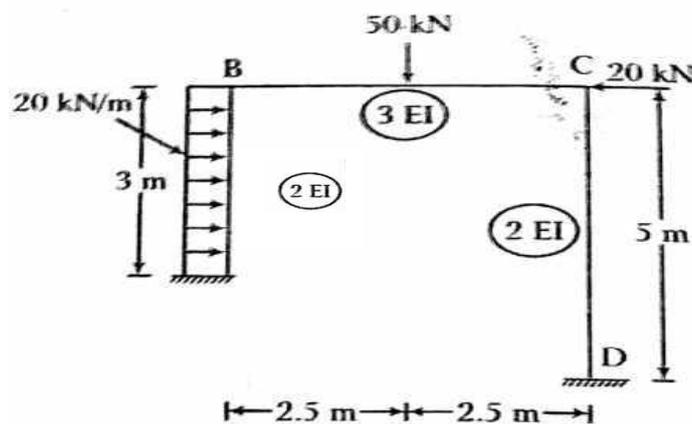
   c.   Analyse the simple truss shown in figure by stiffness matrix method.
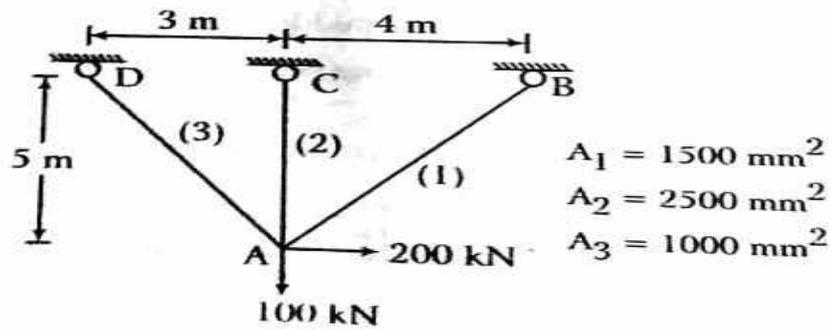
d. Discuss a method to calculate force induced in a frame due to yielding of supports.

e. Discuss why the released structure which minimizes the magnitudes of redundant generally leads to the maximum accuracy.

SECTION C

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

(a) Derive relationship between flexibility and stiffness matrices.

(b) 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.
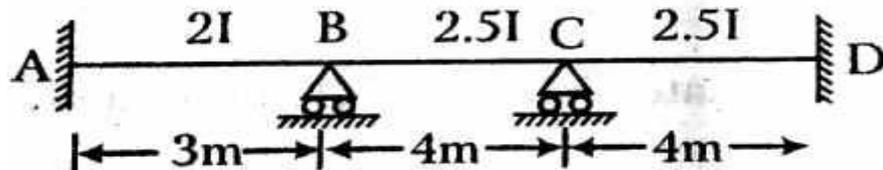
4. **Attempt any *one* part of the following:**   **10 x 1 = 10**

(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) Analyse the continuous beam shown in figure by flexibility matrix method. If the support B of the continuous beam has a downward settlement of 30 mm. take $EI = 5000$ KN-m^2.
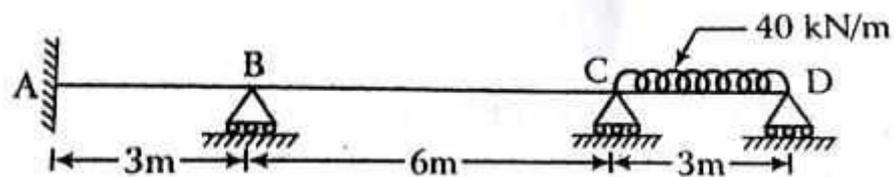
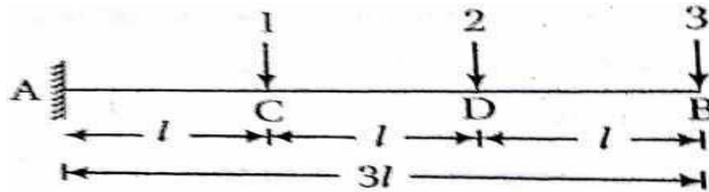**5.** **Attempt any *one* part of the following:**   **10 x 1 = 10**

(a) Analyse the continuous beam as shown in figure by stiffness matrix method. If the support B sinks by 10 mm. Take $EI= 6000$ KN-m^2.

(b) Develop the stiffness matrix for the beam shown in figure.

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

   (a)   What do you mean by boundary condition in case of flexibility matrix as well as stiffness matrix method?

   (b)   State and explain various properties of stiffness matrix used in structural analysis.

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

   (a)   Explain the concept of stiffness method of Structural Analysis employed to a rigid frame subjected to temperature change

   (b)   Analyse the portal frame shown in figure by force method. The flexibilities of support D for horizontal and vertical displacements in KN-m units are 10/EI and 20/EI respectively.