Seat No:_____   Enrollment No:_____

PARUL UNIVERSITY
FACULTY OF ENGINEERING & TECHNOLOGY
M.Tech. Winter 2019 – 20 Examination

Semester: 1   **Date: 16/12/2019**
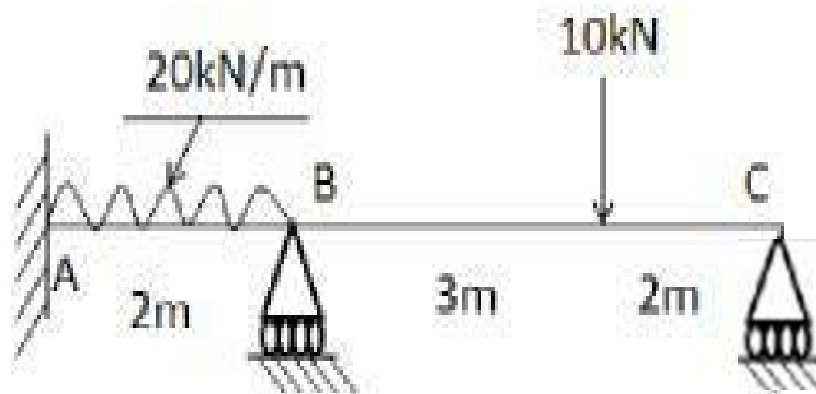**Subject Code: 203209101**   **Time: 10:30 am to 1:00 pm**
Subject Name: Advanced Structural Analysis   **Total Marks: 60**

Instructions:
1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

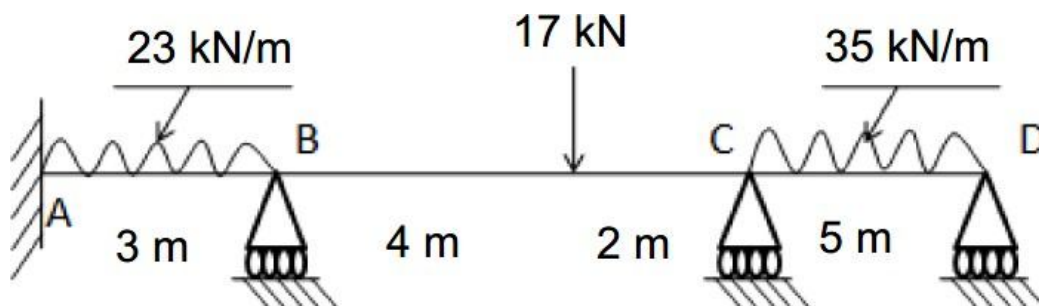**Q. 1 A) Find out K.I. for : given structure.**   **(05)**

B) Objective Type of Question   **(05)**
1. Definition of stiffness & flexibility.
2. Explain actions and displacement.
3. Write formula SM matrix for one Member in Plane Frame.
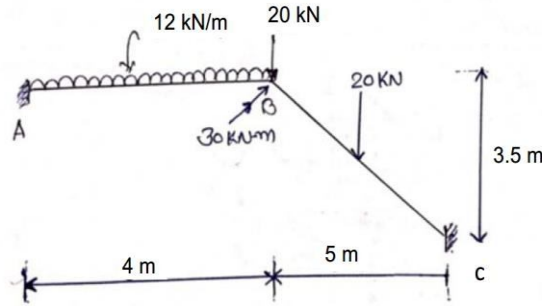4. Find out K.I. for given structure.

5. Advantages of stiffness matrix method over flexibility method.

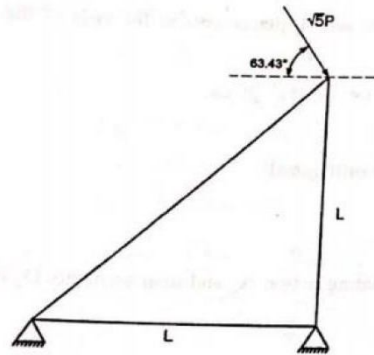**C) Write the steps to find Sj matrix of Plane Truss.**   **(05)**

Q.2 A) Calculate S_J Matrix as shown in rigid frame figure using stiffness member approach. Take, $E=2*10^8 kN/m^2$, $A=0.04m^2$, $I_z=2*10^{-3}m^4$. **(08)**
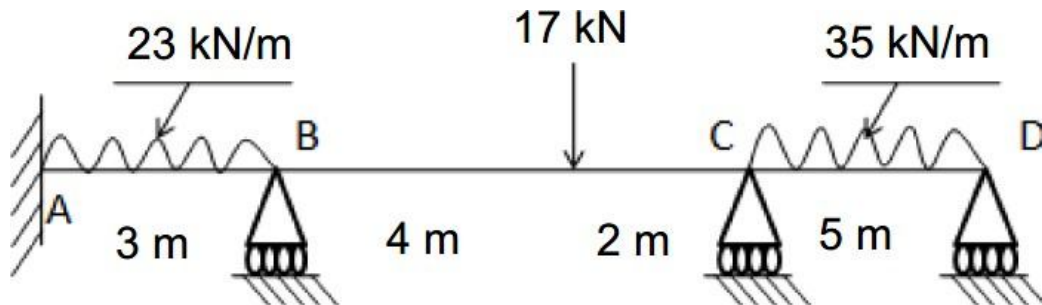

B) Obtain joint stiffness matrix of the Truss **(07)**

OR

B. Find out S.I. for given structure.

**Q.3 Answer the following questions**. (Attempt any three) (Each five mark) **(15)**
  A) Prove that any [R] direction cosine for rotation matrix is $[R]^{-1}=[R]^T$
  B) Explain the term 'Shape Functions'. Why polynomial terms are preferred for shape functions in finite element method ?
  C) Explain the one, two and three dimensional polynomial shape functions.
  D) Write short note on Galerkin's method.

Q.4 A) Calculate S_J Matrix and load vector for a beam as shown in figure using stiffness member **(07)** approach. Considering the following secondary effects
  (1) Support A rotates by 0.002 radian Anticlockwise.
  (2) Support B settle downward by 7 mm.
  (3) Member BC is subjected to temperature changes of 35^0C at top and 55^0C at bottom
  $EI=25*10^3 kN.m^2$,
  $AE=13*10^3 KN$,

$\alpha = 12*10^{-6}/{}^0C$ take d=300mm
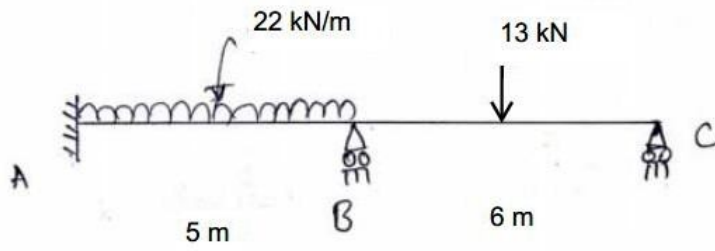
B) Find out Deformation matrix, support reactions and draw SF diagram.(same figure)　　　　**(08)**

OR

B) Find out Deformation matrix, end member actions and draw BM diagram.(same figure)