Please check that this question paper contains 8 questions and 2 printed pages within first ten minutes.

EVENING

[Total No. of Questions: 08] [Total No. of Pages: 02]

14 JAN 2023

Uni. Roll No. .....

Program: M.Tech. (Batch 2019 onward)
Name of Subject: Finite Element Method in Structural Engineering
Subject Code: MST-102
Paper ID: 16126

Time Allowed: 03 Hours **Max. Marks: 100**

NOTE:
1) Attempt all questions
2) Any missing data may be assumed appropriately

Part-A (4 @ 5 = Marks)

Q1. Finite Element Method is a numerical techniquc-commcnt.

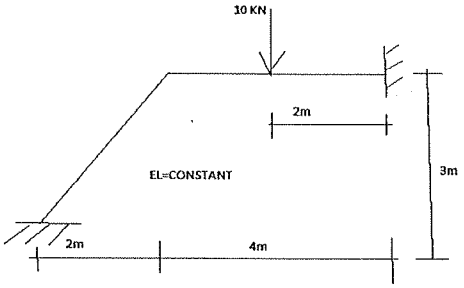
Q2. What is the discretization of the continuum? Discuss with the help of an example.

Q3. Derive the equilibrium equation for a finite element and thus a continuum using virtual work approach.

Q4. What are the numerical integration techniques used in the finite element method.

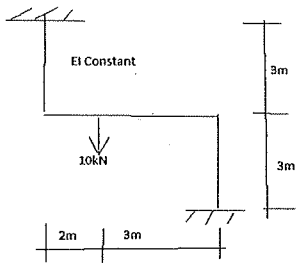
Part-B (4 @ 20 = 80 Marks)

Q5. Analyze the structure shown in by element stiffness technique.



Or

Analyze the structure shown by element stiffness technique



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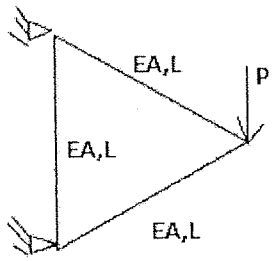
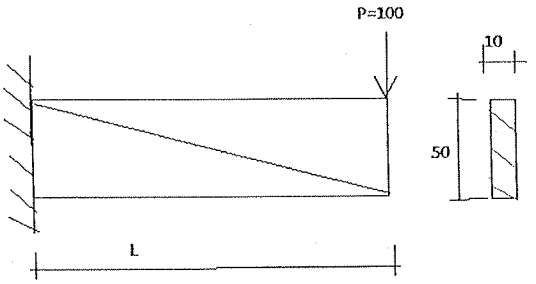
Q6. Using finite element method analyze the truss and validate your results.



Or

Calculate the stiffness of the quadrilateral from two triangles and analyse. E=106, v=0.3, L=100



Q7. Using two point Gauss Quaderature calculate:

$$\int_{-1}^{2} (r^3 + 3)dr$$

Or

Draw the flow chart for the program to calculate shape functions for various types of elements (1-D, 2-D, 3-D, lagrengian serendipity)

Q8. (a) Discuss in detail the procedures used in linear static finite element program.
(b) Discuss various types of solvers used in the finite element analyses.

Or

Describe the principle of Virtual Work and Vibrational Principle. Discuss its application in the finite element formulations.

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