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Total No. of Pages : 01

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**M.Tech (ME) (Sem.–1)**  
**FINITE ELEMENT ANALYSIS**

**Subject Code : MTME/102**

**M.Code : 74716**

**Date of Examination : 13-06-2024**

**Time : 3 Hrs.**

**Max. Marks : 100**

**INSTRUCTIONS TO CANDIDATES :**

1. Attempt any FIVE questions in all out of EIGHT.
2. Each question carries TWENTY marks.
  
1. Discuss the general procedure for finite element analysis of physical problems. What are the various considerations to be taken in the discretization process for finite element analysis?
2. Develop finite element characteristics for fluid flow using stream function in two-dimensional flow.
3. Derive the expression of shape function for heat transfer in a 2-D element.
4. Derive shape functions in natural coordinates and obtain Jacobian matrix for four-noded isoparametric quadrilateral element.
5. **Write short notes on :**
  - a) Difference between boundary value and initial value problems.
  - b) Pre and Post processing in FEA.
  - c) Weighted residual's method.
  - d) Stream functions.
6. Derive finite element heat transfer model for a 2-node linear element considering both conduction and convection.
7.
  - a) What is a global stiffness matrix? How will you assemble a global stiffness matrix for a single truss element?
  - b) Differentiate between a truss element and a flexure element. Discuss the elementary beam theory used for developing flexure elements.
8. Analyze a simply supported beam subjected to a uniformly distributed load throughout using Rayleigh Ritz method. Adopt one-parameter trigonometric function. Evaluate the maximum deflection and bending moment and compare with the exact solution.

**NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.**