JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. Tech II Semester Examinations, February - 2017
ADVANCED FINITE ELEMENT ANALYSIS
(Machine Design)

Time: 3hrs   Max.Marks:75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART - A

5 × 5 Marks = 25

1.a) What are the characteristic of shape function?   [5]
 b) What are the types of load acting on the structure?   [5]
 c) What is CST element?   [5]
 d) Write steady state equation for one dimensional heat transfer in thin films. [5]
 e) What is Jacobian Matrix?   [5]

PART - B

5 × 10 Marks = 50

2.   Derive an expression for total potential energy of an elastic body subjected to body force, traction force and point force.   [10]

OR

3.   Derive stiffness matrix for a beam element starting from shape function.   [10]

4.   Determine the deflections for the truss structure shown in Figure.   [10]
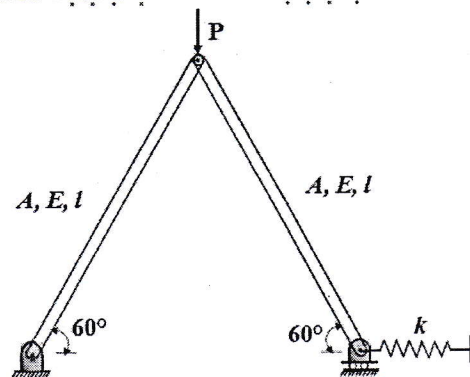
OR

5.   State and explain the three basic laws on which iso parametric concept is developed.   [10]

6.   Derive the shape functions for a CST element.   [10]

OR

7.   Derive the shape functions for a 2 – D quadrilateral element.   [10]

8. Derive the element stiffness matrices, using Galerkin approach, for heat conduction in one dimensional elements. [10]

OR

9. Explain the types of boundary conditions in heat transfer problems with example. [10]

10. Explain what would happen if the lowest eigenvalue of a system is zero and the inverse iteration technique is applied. How will you overcome the difficulty? [10]

OR

11. Find the natural frequencies of vibrations of a simple cantilever beam. [10]

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