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2005 JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY

III B.TECH I SEMESTER SUPPLEMENTARY EXAMINATIONS
FINITE ELEMENT ANALYSIS
(MECHATRONICS)

NOVEMBER 2005

TIME – 3 HOUR
MARK – 80

Answer any FIVE Questions
All Questions carry equal marks

1. A steel rod is attached to rigid walls at each end and is subjected to a distributed load as shown in 1, determine displacement U(r) assuming displacement field as U(r)= a0+a1r+ a2r2. Plot U versus X and ∥ versus X. [16]

2. (a) Discuss various steps involved in operation of finite element analysis software with an example.

(b) Discuss role of post processor in FEM software package. [9+7]

3. Distinguish displacement approach, variational approach and galeskin approach in FEM analysis. Illustrate with one example. [16]

4. Evaluate shape funcitons N1, N2, N3 at the interior point p for trianglar element shown below 2. [16]

5. A composite wall consists of three elements as shown in 3 with temperatures marked having convection transfer and h = 30w/ m2. determine temperature distribution. [16]

6. (a) Discuss significance of beam elements in FEM analysis.

(b) Discuss procedure involved in semi automatic mesh generation. How does it differ form automatic mesh generation. [7+9]

7. (a) Distinguish consistent and lumped mass matrices used in dynamic equations of motion used in FEM.

(b) What are higher order elements, how does they affect FEM analysis? Illustrate with an example. How do they affect solution complexity. [7+9]

8. Write short notes on any TWO:

(a) Incompressible flow problems in F.E.M.

(b) Eight node quadrilateral

(c) Eigen value problems. [5+5+6]