JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.TECH I SEMESTER EXAMINATIONS, APRIL/MAY-2012
COMPUTATIONAL STRUCTURAL ANALYSIS
(AEROSPACE ENGINEERING)

**Time: 3hours**   **Max.Marks:60**

Answer any five questions
All questions carry equal marks
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1. a)   What is Galerkin Method? Solve the two noded line element problem by Galerkin Method.
   b)   Explain Modules of a multidisciplinary simulation program.

2.   Derive the shape functions for Quadratic 1D element. And also show $\sigma = E\, Bq$. where B is element strain - displacement matrix. Draw figures for shape functions.

3.   Derive the equation of nodal centrifugal forces for a flat shell element.

4.   Assemble Stiffness, displacement and Force Matrix in the equation F= KU for five node bar element with $A_1 l_1 E$, $A_2 l_2 E$, $A_3 l_3 E$, $A_4 l_4 E$. Consider node (1) fixed. At node 5 applied tensile force F_1 is applied and at node 2 Compressive force F_2 is applied.

5. a)   Explain difference between Lumped Mass and Consistent Mass.
   b)   Find out the Natural frequency of the beam shown in the figure.
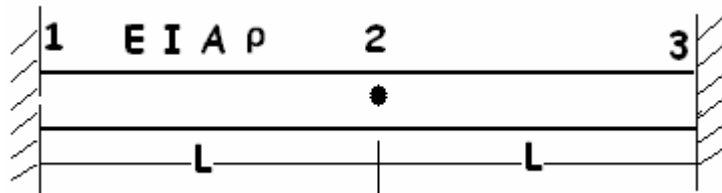
6.   Explain Material Non linearity. Use Prandtl Reuss Equation combined with the von Mises field criteria.

7.   A metallic fin with thermal conductivity $K = 360$ W/m ^{0}C, 1mm thick and 100 mm long extends from a plane wall whose temperature is 235^0C. Determine the distribution and amount of heat transferred from the fin to air at 20^0C with $h = 9$ W/ m^2 ^{0}C width of the fin is 1000 mm. Assume tip is insulated.
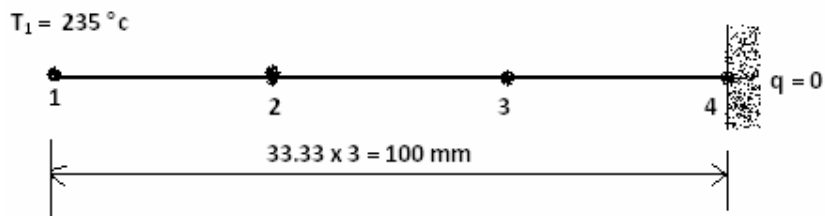
8.   Explain briefly the discretization of the Euler Equations.

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