Code: 9A01701 **R09**

B.Tech IV Year I Semester (R09) Supplementary Examinations June 2017

FINITE ELEMENT METHODS IN CIVIL ENGINEERING

(Civil Engineering)

Time: 3 hours Max. Marks: 70

Answer any FIVE questions
All questions carry equal marks
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1 Explain the Rayleigh-Ritz methods of functional approximation.

2 Derive the following:
(a) Equilibrium equations in matrix form.
(b) Strain displacement relationship.

3 (a) Define the interpolation function and derive the shape function for a three noded-line element.
(b) Derive the stiffness matrix for one dimensional bar element.

4 Define the following:
(a) Convergence requirements.
(b) Compatibility.
(c) Geometric invariance.
(d) Natural co-ordinate systems.

5 Derive the elemental stiffness matrix for a 4-noded rectangular element of length 10 and breadth 5.

6 Derive the shape functions of a 4-noded isoparametric quadrilateral element.

7 Derive the interpolation functions of a 4-noded isoparametric axi-symmetric element.

8 (a) What is meant by static condensation and explain it in the context of finite element analysis?
(b) List the convergence requirements of displacement function to be satisfied and explain them.

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