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P118-114(T1)

OCTOBER 2018 / IN - SEM (T1)
F. Y. M. TECH. (Structures) (SEMESTER -I)
COURSE NAME: Finite Element Analysis
COURSE CODE: CVPB11184
(PATTERN 2018)

Time: [1 Hour]

[Max. Marks: 20]

Instructions to candidates:

- 1) Answer Q.1 OR Q.2, Q.3 OR Q.4
- 2) Figures to the right indicate full marks.
- 3) Use of scientific calculator is allowed
- 4) Use suitable data where ever required

Q.1) Derive the equilibrium equations for a three-dimensional stress system subjected to direct stresses (σ) and shearing stresses (τ).
[10 marks]

OR

Q.2) a) Explain the terms 'Plane Stress' and 'Plane Strain' problems. Give constitutive laws for these cases. [6 marks]

b) Draw a typical three-dimensional element and indicate state of stress in their positive senses.
[4 marks]

Q.3) a) Determine stiffness matrix for beam element neglecting the axial deformation [6 marks]

b) Derive the natural coordinates for a three noded triangular elements. [4 marks]

OR

Q.4) a) Derive the shape function for a Constant Strain Triangular (CST) element in terms of natural coordinate system. [6 marks]

b) Comment on "There should be a constant term in the shape function selected."
[4 marks]