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Paper Code - P119-111 (ESE)

DECEMBER 2019/ENDSEM

F. Y. M. TECH. (STRUCTURES) (SEMESTER - I)

COURSE NAME: THEORY OF ELASTICITY

COURSE CODE: CVPB11181

(PATTERN 2018: R1)

Time: [3 Hour]

[Max. Marks: 50]

(*) Instructions to candidates:

- 1) Answer Q.1, Q.2, Q.3, Q.4 OR Q.5, Q.6 OR Q.7, Q.8 OR Q.9
- 2) Figures to the right indicate full marks.
- 3) Use of scientific calculator is allowed
- 4) Use suitable data where ever required

Q.1) a) State the strain compatibility equations in cartesian coordinate system. [3 marks]

OR

b) State the equilibrium equations in cartesian coordinate system. [3 marks]

Q.2) a) State the stress strain relations for two-dimensional plain stress problems. [3 marks]

OR

b) State the stress strain relations for two-dimensional plain strain problems [3 marks]

Q.3) a) Draw a neat sketch of stress components acting on an infinitesimally small element using polar coordinate system. [2 marks]

OR

b) Express the stress components of polar coordinate system in terms of stress function for a two-dimensional elasticity problem. [2 marks]

Q.4) a) Explain the significance of the theories of failure. [6 marks]

Q.4) b) Derive the stress components σ_r , σ_θ and $\tau_{r\theta}$ in case of circular plate subjected to uniform tensile stress of intensity σ_0 . [8 marks]

OR

Q.5) a) Determine the constants of stress function $\phi = C_1 r^2 \log r + C_2 r^2 + C_3 \log r + C_4 + C_5 r^2 + C_6 r^4 + C_7 / r^2 + C_8$ [14 marks]

Q.6) a) Derive the Moment – Curvature relations for rectangular thin plate. [6 marks]

Q.6) b) Derive the equilibrium equations for rectangular thin plate. [8 Marks]

OR

Q.7) Prove that the sum of curvatures of middle surface at any point in two perpendicular directions is independent on the chosen coordinate axes. [14 marks]

Q.8) Derive the Navier solution for an all round simply supported rectangular plate subjected to uniformly distributed load. [14 marks]

OR

Q.9) Derive the Navier solution for an all round simply supported rectangular plate subjected to sinusoidal load. [14 marks]