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Question Paper Code : X 86198

M.E./M.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2020
First/Third Semester
Structural Engineering
ST 5103 – THEORY OF ELASTICITY AND PLASTICITY
(Regulations 2017)

Time : Three Hours

Maximum : 100 Marks

Answer ALL questions

PART – A

(10×2=20 Marks)

1. Define homogenous and isotropic materials.
2. What are the elastic constants ?
3. State the condition under which a problem can be solved as 2D problem.
4. Can plane strain problem can be solved as plane stress problem. State reason.
5. Define thin and hollow walled circular shafts.
6. How do you conduct warping function ?
7. What is the basic principle of virtual work ?
8. State Rayleigh Ritz method.
9. What are the physical assumptions in plastic yielding ?
10. State the plastic stress strain relationship.

PART – B

(5×13=65 Marks)

11. a) Derive the equilibrium and compatibility equations under Elastic Stress-Strain relationship by the understanding of Hook's law.

(OR)

- b) Explain about the Reduction of Elastic constants under stress strain relationship for Homogeneous and Isotropic materials.

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12. a) State plain stress and plain strain. Derive the equations of the plain stress and plain strain two Dimensional Problems with illustrations.

(OR)

- b) Derive the equations of Stress Concentrations in stressed plate with circular hole and elliptical hole.

13. a) Discuss the design approaches and analysis on open web section subjected to torsion.

(OR)

- b) Write short notes on the following :

i) Membrane Analogy

(7)

ii) Analogy by Prandit's Approach.

(6)

14. a) Explain and Compare any two methods of analysis of beams on elastic foundation with suitable illustrations.

(OR)

- b) State and prove the energy theorems and also explain the applications of theorem to beams and columns.

15. a) Briefly explain about plastic bending of beams with a typical idealized stress-strain diagram and also explain plastic bending of unsymmetrical sections.

(OR)

- b) Explain the various Failure Theories adopted in elastic-plastic analysis with necessary sketches.

PART – C

(1×15=15 Marks)

16. a) Discuss the state of stress at a point. Explain the following basic equations in Cartesian and polar coordinates

i) Equations of equilibrium and

(8)

ii) Strain displacement relations.

(7)

(OR)

- b) Explain the salient theory in Identification of soil medium in beams on elastic foundation by using Winkler's Elastic model.
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