[4860] - 54
M.E. (Civil) (Structures)
THEORY OF PLASTICITY
(2008 Pattern) (Open Elective)

Time : 4 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1) Answer any two questions from each section.

2) Answers to the two sections should be written in separate answer books.

3) Neat diagrams must be drawn wherever necessary.

4) All questions carry equal marks.

5) Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.

6) Assume suitable data, if necessary.

SECTION - I

Q1) a) Derive the equations of equilibrium of 3D elasticity problem and show that shear stresses are complimentary. **[10]**

b) Explain constitutive relations for plane stress, plane strain and axisymmetric problems. **[10]**

c) Derive the stress compatibility conditions for 2D plane stress problem. **[5]**

Q2) a) Explain in brief Tresca's and Von-Mises-Hencky's yield criteria. **[10]**

b) Describe geometrical representation of the yield surface in the principle stress. **[10]**

c) Write short note on convexity of yield surface. **[5]**

Q3) a) Explain theories of plastic flow. **[10]**

b) Explain in brief Drucker's stability postulates. **[10]**

c) Explain factors affecting plastic deformations of the metal. **[5]**

SECTION - II

Q4) a) Explain in brief Prager's and Zieglerl's kinematic hardening model. **[10]**

b) Explain initial and subsequent yield surface in tension. **[10]**

c) What is Mises flow rule for isotropic hardening? **[5]**

Q5) a) Derive the equations of radial (σ_r) and transverse (σ_θ) stresses for the section of wide plate subjected moments at the ends. **[15]**

b) State and explain uniqueness theorems. **[10]**

Q6) a) Explain convergence criteria for displacement function in finite element analysis. **[5]**

b) What are the advantages of isoparametric elements over conventional elements. **[10]**

c) Explain finite element models for plasticity problems. **[10]**

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