



Printed Pages : 3

CE – 043

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 0042

Roll No.

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B. Tech.

(SEM. VIII) EXAMINATION, 2006-07

THEORY OF ELASTICITY & PLASTICITY

Time : 3 Hours]

[Total Marks : 100

Note : Attempt all questions. All questions carry equal marks. Assume missing data, if any, suitably.

1 Attempt any **two** parts of the following : **10×2=20**

- (a) Explain about plane stress and plane strain problems. Give two examples also.
- (b) Derive the compatibility equation in terms of stress for a plane stress problem. Is this equation valid for plane strain also ?
- (c) The general displacement field in a body in certain coordinates is given as:-

$$u = 0.015 x^2y + 0.03$$

$$v = 0.005y^2 + 0.03 xz$$

$$w = 0.003 z^2 + 0.001yz + 0.005$$

Find all the strains for the point (1,0,2)

2 Attempt any **two** parts of the following : **10×2=20**

- (a) Derive the expression for circumferential stress in a curved beam with large initial armature and subjected to pure bending. State clearly the assumptions and its limitations.
- (b) A circular plate with a circular hole is simply supported around its edge and subjected to linearly varying distributed load. Derive the expressions for maximum stress.
- (c) A narrow, simply supported beam of rectangular cross-section is subjected to a uniformly distributed load. Determine the stress distribution in the beam.

3 Attempt any **one** part of the following : **20×1=20**

- (a) Determine the distribution of stress in a circular cylindrical shell having the ends supported by the diaphragms. The shell has been filled with oil of density **P** such that
 $P(Q) = 10^{-3} \rho a \cos Q$
Where a = radius
- (b) Derive the expressions for the stress resultants and displacements for the case of a cylindrical shell with a uniform pressure.

4 Attempt any **one** part of the following: **20×1=20**

- (a) Derive an expression for strain energy per unit volume for a two-dimensional linearly elastic body for plane stress or plane strain in terms of Airy's stress function.
- (b) How do you determine the stress distribution due to cracks? Explain with a suitable example.

5 Attempt any **one** part of the following : **20×1=20**

- (a) Derive an expression for strain energy per unit volume for a two dimensional linearly elastic body for plane stress or plane strain in terms of Airy's stress functions.
- (b) How do you determine the stress distribution due to cracks? Explain with a suitable example.
