GIET MAIN CAMPUS AUTONOMOUS,
GUNUPUR - 765022

Registration No: | | | | | | | | | | | **M.TECH**

Total Number of Pages : 2

M.TECH 1ST SEMESTER SUPPLE EXAMINATIONS, DECEMBER 2018

APPLIED ELASTICITY AND PLASTICITY

Branch: MD, Subject Code:MMDPC1010

(Regulations 2017)

Time: 3 Hours **Max Marks : 70** **Question Code: SD18002023**

PART-A (10 X 2=20 Marks)

1. Answer the following questions.

a) Explain Lame's constants.
b) What are strain invariants?
c) What are stress tensors?
d) State the significance of yield criteria and name any two.
e) What do you mean by π-plane?
f) Mention the assumptions made in the Kirchoff's plate theory.
g) State assumptions made in Mindlin theory?
h) What is Von-Mises distortion energy theory?
i) With neat sketch show the Bauschinger effect?
j) With the help of a neat sketch, explain different zones of deformations?.

PART-B (5 X 10=50 Marks)

Answer any five questions from the following.

2.a) Prove that principal planes corresponding to a given state of stress at a point are Mutually orthogonal. [5]

b) Derive the plastic stress-strain relationship with neat diagram. [5]

3. a)Explain about Airy's stress function? [5]

b)Describe σ_{oct} and τ_{oct} in form of stress invariants ? [5]

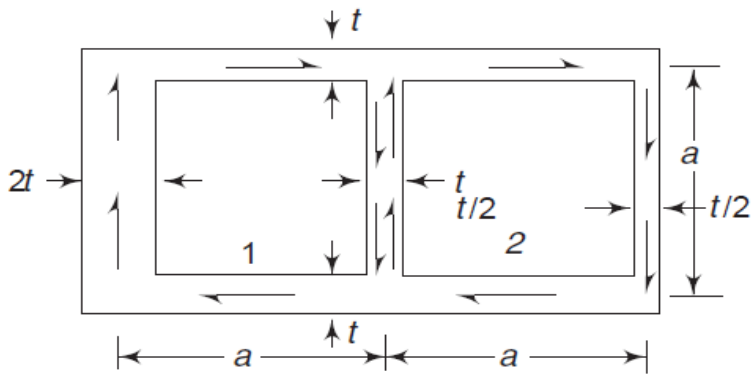
4. a)The state of stress at a point is characterized by the components [5]
Бx=12.31, Бy=8.96, Бz=4.34, Бxy=4.20, Бyz=5.27, Бzx=0.84.
Decompose the given state of stress into hydrostatic state and pure shear state.

b). Show that for a simply supported beam, length 2L, depth 2a and unit width, loaded by a concentrated load W at the centre, the stress function satisfying the loading condition is [5]
$\varnothing = (b/6)\, xy2 + cxy$ the positive direction of y being upwards, and x = 0 at midspan.

5. A steel shaft is subjected to an end thrust producing a stress of 100 MPa and the minimum shearing stress on the surface arising from torsion is 80 MPa.The yield point of the material in simple tension was found to be 300 MPa .Calculate the factor of safety of the shaft according to:(i) Maximum shear stress theory
(ii)Maximum distortion energy theory [5+5]

6. The displacement field for a body is given by
$U=[(x^2 + y^2 + 2)i+(3x + 4y^2)j+(2x^3 + 4z)k]$.
Determine the magnitude of principal strain and volumetric strain 10

7. The given fig.below shows a two-cell tubular sections whose wall thicknesses are as specified If the member is subjected to a torque T, determine the shear flows and the angle of twist of the member per unit length. [5+5]



8.Write short notes on
a) Mindlin plate theory [5]
b)Tresca's Theory [5]

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