Registration No: | | | | | | | | | | |

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M.TECH
P1CIBC03

1st Semester Regular Examination 2016-17
THEORY OF ELASTICITY AND PLASTICITY
BRANCH: :CIVIL ENGINEERING(SM,SF,TP, WREM,WRE,CE,SMFE,GT,SFE)
Time: 3 Hours
Max Marks: 100
Q.CODE: Y986

Answer Question No.1 which is compulsory and any FOUR from the rest.
The figures in the right hand margin indicate marks.

Q1 Answer the following questions: **(2 x 10)**

a) State maximum principal stress theory.
b) Differentiate between anisotropic and orthotropic materials.
c) What do you mean by shape factor?
d) Define plastic flow.
e) Write the equations of equilibrium and compatibility for a two dimensional elastic body.
f) What do you mean by pure torsion?
g) Differentiate between surface force and body force. Give examples.
h) Write down four important properties of slip line field.
i) Define velocity field.
j) Draw a three dimensional body showing all components of stress.

Q2 **a)** Derive the compatibility equation in terms of stress for a three dimensional elastic body. **(12)**
b) Distinguish between plane stress problem and plane strain problem with suitable examples and figures. **(8)**

Q3 **a)** Derive the equation of equilibrium in terms of stress for a three dimensional elastic body. **(12)**
b) Derive the constitutive relationship for stress-strain for an isotropic material in three dimensions. **(8)**

Q4 **a)** What do you mean by boundary value problem? **(4)**
b) Define polar coordinates. Derive the equation of equilibrium for an elastic body in polar coordinates with diagram. **(16)**

Q5 **a)** Derive the equation for shear stress for an elliptical bar subjected to a torsional moment M. **(10)**
b) Derive the relation for normal and shear stress for circular cylinder subjected to uniform internal pressure in terms of stress function. **(10)**

Q6 **a)** Discuss the various theories of failure for a ductile material. **(15)**

b) Compare the yield criteria of Tresca and Von Mises. **(5)**

Q7 Write short notes on any four of the following; **(5 x 4)**

a) Stress function

b) Flow rule

c) Prandl Reuss stress – strain relationship.

d) Membrane analogy

e) Saint-venant principle

f) Maximum strain energy theory