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

Total Number of Pages: 02 **M.Tech**
MMPC103

1st Semester Back Examination 2017-18
Mechanical Behavior of Materials
BRANCH : METALLURGICAL AND MATERIALS ENGG
Time: 3 Hours
Max Marks: 70
Q.CODE: B758
Answer Question No.1 which is compulsory and any five from the rest.
The figures in the right hand margin indicate marks.

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

a) Mention four anisotropic properties in materials
b) Define equicohesive temperature in metals
c) Differentiate between homogeneous and isotropic materials
d) Distinguish between Cross Slip & Climb
e) What is the importance of critically resolved shear stress in a crystal?
f) Draw the Burger's circuit for edge & screw dislocation?
g) Mention four anisotropic properties in materials
h) Write down the expression for Von-mises criteria
i) What is a partial dislocation?
j) What is tin cry in metals & alloys?

Q2 **a)** Explain Bauschinger effect in metals with a suitable diagram? **(5)**
b) Derive the expression for Schmid's law and mention its significance? **(5)**

Q3 **a)** Define hydrostatic and deviator component of stress with appropriate figure and equations? Clearly state, what is the important of each component(s)? **(5)**

b) Define elastic strain energy? Write down the relationship of elastic strain energy per unit volume of materials subjected to tension and pure shear? **(5)**

Q4 **a)** Write down the Hall-Petch equation and state the limitation of the equation? **(5)**
b) Name four strengthening mechanisms in metallic system and explain any one of them? **(5)**

Q5 **a)** Differentiate between kinks, jogs and bands using neat sketches. **(5)**
b) Explain the different stages in stress-strain diagram of a pure single crystal? **(5)**

Q6 **a)** (a) An element 1 cm long is extended to twice its initial length (2 cm) and then compressed to its initial length (1 cm). **(5)**
(i) Find true strains for the extension and compression and
(ii) Find engineering strains for the extension and compression.
b) A bar 10 cm long is elongated by (1) drawing it to 15 cm, and then (2) drawing it to 20 cm. **(5)**
(i) Calculate the engineering strains for the two steps and compare the sum of these with the engineering strain calculated for the overall deformation?
(ii) Repeat the calculation with true strains?

Q7 **a)** Why are twins in metals caused? Mention at least two differences between annealing twins and mechanical twins. **(5)**

b) Explain stacking faults in closed packed systems. How is stacking fault energy related to slip in metals? **(5)**

Q8 **Write short answer on any TWO:** **(5 x 2)**

a) Yield point phenomena in steels

b) Peierls Nabarro stress

c) Tresca criterion

d) Luder bands