Code No: NR321802 **NR**

III B.Tech II Semester Supplementary Examinations, April/May 2005
MECHANICAL METALLURGY
(Metallurgy & Material Technology)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) What is dislocation? Explain various dislocation movements?
   (b) Draw the figure of an edge dislocation and explain how burger′s vector is found.
   (c) Explain substitutional point Imperfectioons in crystals.
2. Sketch the geometry and comment on their shape for the following:
   (a) Rockwel diamond Indentor
   (b) Vicker′s diamond penetrator
   (c) Tensite test specimen
3. (a) Prove that phase instability occurs in a tension test when the true strain is equal to strain hardening coefficient.
   (b) Derive the expression for the true stress and true strain in terms of engineering stress and strain.
4. (a) Explain the effects of carbon content of steels, grain size and shape, crystal structure on transition temperature.
   (b) Describe with neat sketches the principles of Izod test.
5. (a) Why brittle materials are used more often in compression than in tension in structural design?
   (b) Prove that the theoretical cohesive strength of metals is $\sigma_{\max} = \left[\frac{E\gamma_s}{a_o}\right]^{1/2}$
   Where$\sigma_{\max}$ = maximum stress
   E = youngs Modulus
   γ_s = surface energy
   a_o = distance between two atoms.
6. (a) What do you mean by fatigue of metals? What factors aid fatigue failure?
   (b) Draw S-N curve for a mild steel, Al-alloy and a Nickle alloy. Discuss about their endurance limits.
7. (a) Describe an experiment with instrumentation details to conduct a creep test for short duration.

(b) Explain parametric methods of creep correlation for pridiction of long time properties.

8. What the Nondestructive tests you advise for the following. Give reasons for selection of such a process.

   (a) Aviation components.

   (b) Weldments of steel used in pressure vessals.

   (c) Forged axels.

   (d) Cold rolled bars of Titanium.

   (e) Surface cracks on tubes.

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