

III B.Tech I Semester Supplementary Examinations, April/May 2005
PRINCIPLES OF EXTRACTIVE METALLURGY
(Metallurgy & Material Technology)

Time: 3 hours

Max Marks: 70

Answer any FIVE Questions
All Questions carry equal marks

1. (a) Show that the dislocation reaction given below is both vectorially proper and energetically favourable for a BCC metal.
$$\frac{a}{2} [1 \ 1 \ 1] + \frac{a}{2} [1 \ \bar{1} \ \bar{1}] \rightarrow a [100]$$

(b) If the critical resolved shear stress for yielding in Aluminium is 240×10^3 pa, Calculate the tensile stress required to cause yielding when tensile axis is [001].
2. Explain the principle and operation involved in Rockwel hardness test. What are the major advantages and limitations of this test over other hardness tests?
3. (a) What is the significance of 'point of instability' in a tensile test.
(b) Explain what do you mean by 'Dislocation pile up'. What is the influence of the above phenomenon on the properties and behaviour of materials?
(c) Explain why Brinnell's hardness test is preferred for cast Irons.
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) Under what conditions a ductile material may fail in a brittle manner? Explain about Ductile-Brittle transition temperature.
(b) What do you mean by fracture toughness? Explain.
6. (a) What is meant by fatigue failure? Where do normally come across such failure? Explain
(b) Explain S-N curve of mild steel and a non ferrous alloy and compare their endurance limits.
7. (a) What is creep? Draw an ideal creep curve and explain the various stages with the mechanism in operation.
(b) Explain the effect of temperature and stress on creep life with the aid of graphs.
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 vessels.
 - (c) Forged axels.

- (d) Cold rolled bars of Titanium.
- (e) Surface cracks on tubes.

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