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Roll No. .....

AU/IP/ME–402(GS)

B. E. (Fourth Semester) EXAMINATION, June, 2012

(Grading System)

(Common for AU, IP & ME Engg. Branch)

MATERIAL SCIENCE AND METALLURGY

Time : Three Hours

Maximum Marks : 70

Minimum Pass Marks : 22 (D Grade)

Note : Attempt any *five* questions. All questions carry equal marks. Different parts of the same question should be attempted in continuation.

1. (a) Explain the origin of metallic bonding. How does it differ from ionic bonding ? Explain with suitable examples.

   (b) Draw the planes and directions of FCC structures (3 2 1), (1 0 2), (2 0 1) and (1 1 1).

2. (a) Explain the differences between hot and cold working of metals. Also explain the effect of cold working on mechanical properties of metals.

   (b) Differentiate clearly between the following :

   (i) Point defect and line defect

   (ii) Edge and screw dislocation

3. (a) Distinguish between the terms 'recovering' and "recrystallization" involved in the process of heating

P. T. O.

cold worked metals. Also compare ductile and brittle failure in metals and alloys.

(b) Differentiate between "slip and twinning".

4. (a) Give explanation of Hume-Rothery's rule.

(b) What are phase diagrams ? What utility do they have ? Draw the phase diagram you would expect for a binary isomorphous system.

5. (a) Name the different methods of heat treatment. Explain the processes of austempering and martempering.

(b) Define the term hardenability. What factors affect hardenability ?

6. (a) What is Creep ? Draw a typical creep curve and explain the different stages of creep.

(b) What is Bronze ? Name various types of Bronze and explain any *three* of them in details.

7. (a) Explain the advantages and disadvantages of using power metallurgy.

(b) Write about GRP resins giving its properties and uses.

8. Write short notes on any *two* of the following :

(a) Iron-carbon equilibrium diagram

(b) T. T. T. diagram

(c) Gibbs' phase rule

(d) Thermoplastics and thermosetting plastics