

Total No. of Questions—12]

[Total No. of Printed Pages—4+2

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S.E. (Production) (First Semester) EXAMINATION, 2010

(Common to Prod./SW)

MATERIAL SCIENCE

(2008 COURSE)

Time : Four Hours

Maximum Marks : 100

N.B. :— (i) Attempt Q. No. 1 or 2, Q. No. 3 or 4, Q. No. 5 or 6 from Section I and Q. No. 7 or 8, Q. No. 9 or 10, Q. No. 11 or 12 from Section II

(ii) Answers to the two Sections should be written in separate answer-books.

(iii) Neat diagrams must be drawn wherever necessary.

(iv) Figures to the right indicate full marks.

(v) Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.

(vi) Assume suitable data, if necessary.

SECTION I

1. (a) What is cast iron ? What are different types of C.I. ? Explain with one application each. [6]

P.T.O.

- (b) What is work Hardening ? Explain its effect on Mechanical Properties of metal with proper graph. [6]
- (c) Draw the following planes on cubic : [6]
- (i) (1 1 1)
- (ii) (2 2 2)
- (iii) (1 1 0).

Or

2. (a) Explain classification of steels based on % carbon and give typical use of each of them with mech. properties. [6]
- (b) Explain Edge and Screw dislocation. [6]
- (c) Define : [2]
- (i) Unit cell
- (ii) Co-ordination no.
- (d) Explain point imperfections in detail. [4]
3. (a) Differentiate between Izod and Charpy. [16]
- (b) Explain Radiography.
- (c) What is fatigue ? What factors improve fatigue strength ?
- (d) Show self-explanatory diagram :
- (i) Stress-strain diagram for MS
- (ii) S-N. diagram for steel.

Or

4. (a) Draw self explanatory diagram for Erichsen cupping and cone test and explain. [16]
- (b) Differentiate between Vickers and Brinell Hardness Tester.
- (c) Write a short note on ultrasonic testing.
- (d) Explain and give reason.
- (i) Magnetic particle test is used to detect defects in plastic component.
- (ii) Hardness of rubber blade is checked on Brinell hardness tester.

5. (a) Write Hume Rothery Rule for solid-solution formation. [16]
- (b) Draw and explain cooling curve for pure metal.
- (c) Draw a typical equilibrium diagram for 2 metals, which have 100% solubility in each other in liquid as well as solid state.
- (d) Explain :
- (i) Eutectic transformation
- (ii) Eutectoid transformation.

Or

6. (a) Write a short note on use of eutectic alloys. [4]
- (b) Define Gibbs phase rule and show its application on cooling curve for eutectic alloys. [4]

- (c) Plot an equilibrium dia on given data and show slow cooling of alloy having 15% B from its liquidus temp. till the room temp.

Melting point of A : 961°C

Melting point of B : 1083°C

Eutectic temp. : 780°C

Eutectic composition : 28.1% of B

Max. solubility of B in A i.e. in a is 8.8% at Eutectic temp.
and A in B is 7.9% at Eutectic temp. [8]

SECTION II

7. (a) Explain strengthening by martensitic transformation. [16]
(b) Explain principle, operation of resistance pyrometer.
(c) Draw disappearing filament pyrometer.
(d) How composite materials are useful for strengthening ? Explain.

Or

8. Write short notes on : [16]
(a) Total radiation pyrometer
(b) Solid-solution hardening
(c) Precipitation hardening
(d) Thermocouple.

9. (a) What is corrosion ? How is corrosion prevented in material selection processes ? Explain. [8]
- (b) Explain electrodeposition in detail. [6]
- (c) How is humidity responsible in increasing corrosion rate ? [2]

Or

10. (a) Explain ion implantation. [4]
- (b) How is design of component responsible to change corrosion of metal ? Explain with example. [6]
- (c) What is Anodic coating ? [2]
- (d) Explain PVD process. [4]

11. (a) Explain mechanical processes for powder manufacturing. [6]
- (b) What are different advantages of Powder Metallurgy ? [6]
- (c) Define the following : [6]
- (i) Apparent Density
- (ii) Tap Density
- (iii) Compressibility.

Or

12. (a) Write short notes on : [12]

(i) Diamond impregnated tool

(ii) Electrical contact material

(iii) Carbide tool.

(b) What are physical methods of powder manufacturing. [4]

(c) Is it possible to manufacture a component having wt. of 10 kg by powder metallurgy ? Explain. [2]

