Total No. of Printed Pages:02

SUBJECT CODE NO:- H-528
FACULTY OF SCIENCE AND TECHNOLOGY
T.E. (MECHANICAL)
Materials And Metallurgy
(REVISED)

[Time: Three Hours] **[Max.Marks:80]**

Please check whether you have got the right question paper.

N.B
i. Each section consists of five questions.
ii. Question no.1 & 6 are compulsory.
iii. Attempt any two questions from remaining four questions.
iv. Figures to the right indicate full marks.

Section A

Q.1 Solve any five. 10

A) Explain the term "Unit Cell".
B) Define coordination number.
C) Define equilibrium phase diagram. Why it is necessary to study.
D) Explain the term Eutectoid. Write eutectoid reaction found in Fe- C diagram.
E) How to determine number of atoms per unit cell. Determine it for FCC.
F) State the objectives of heat treatment of steel.
G) Enlist seven basic crystal systems with their edge lengths & unit cell angles.

Q.2 a) What do you mean by crystal defects? Classify crystal defects. Explain point defect. 07

b) Explain crystal lattice. Draw 14 Bravais crystal structures. 08

Q.3 a) What is solid solution strengthening? Explain. 07

b) Draw a neat sketch of Iron – Carbon equilibrium diagram showing all critical temperatures on it. Explain various invariant reactions in it. 08

Q.4 a) Describe Jominy end quench test for determining the hardenability of steel. 07

b) State the purpose of Annealing heat treatment. Explain the process. How it is differ from normalizing. 08

Q.5 a) Define Atomic packing factor. Determine APF for B.C.C. 05

b) What is Gibbs phase rule? How it is applied for a cooling curve of pure iron. 05

c) What is nitriding? Explain the process of nitriding. 05

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Section B

Q.6 Solve Any Five. 10

A) What is $\propto$ - Brasses? State important brasses from this group.
B) What is chilled cast Iron?
C) What is stainless steel? Why it is called so?
D) Define composite materials. State different classes of composite materials.
E) What type of stainless steel would you prefer for the following?
   i. Wrist Watches ii. Razor blades
   iii. Utensils iv. Welded structure
F) What is Naval brass? Enlist the application of Naval brass.
G) Enlist various heat treatments used to improve service behavior of cast iron.

Q.7 a) What are different alloying elements in alloy steel? State effect of alloying elements. 07

b) Explain why gray cast iron is softer than white cast iron? Explain mechanical characteristics of gray cast iron. 08

Q.8 a) What is $\propto -\beta$ brass? Explain different important brasses from this group. How it is differ from $\propto$ - Brasses? 08

b) State the properties & application of aluminum & aluminum alloys. 07

Q.9 a) State the importance of Nano technology. Enlist different applications of Nano technology. 07

b) What is a composite material? Explain polymer based composite with example. 08

Q.10 a) What are properties of tool steel? Explain HSS tool steel. 05

b) Explain Beryllium bronze in details. 05

c) Explain properties & applications of metal matrix composite. 05

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