

Total No. of Questions—12]

[Total No. of Printed Pages—4+1

Seat No.	
-------------	--

[4857]-112

S.E. (Mech. S/W/Mechanical/Automobile) (First Semester)

EXAMINATION, 2015

METALLURGY

(2008 PATTERN)

Time : Three Hours

Maximum Marks : 100

- N.B. :—**
- (i) Answer any *three* questions from each Section.
 - (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) Assume suitable data, if necessary.

SECTION I

1. (a) Draw BCC and FCC crystal structures and show its lattice constant and lattice angle. [4]
- (b) What do you mean by crystal imperfection ? Explain it with any *two* types in detail. [5]
- (c) Why is Annealing required in highly cold worked material ? Explain in detail. [6]
- (d) What is CRSS ? Derive its formula. [3]

Or

2. (a) Explain Cold working and Hot working with *one* example each. [6]
- (b) Explain in brief plastic deformation mechanism and its effect on Mechanical properties with neat graph. [6]
- (c) Explain the difference in slip and twinning. [4]
- (d) What is Frenkel imperfection ? [2]

P.T.O.

3. (a) Write a short note on Radiography. [4]
- (b) Which property of metal is used in high temperature application ?
Define its test procedure to find out the same. [4]
- (c) Draw the self-explanatory diagram for the following : [8]
- (i) Stress strain diagram for Al
 - (ii) S-N diagram for non-ferrous material.
 - (iii) Intragranular fracture
 - (iv) Test specimen for izode impact test.

Or

4. (a) Define below terms : [4]
- (i) Strength
 - (ii) Resilience
 - (iii) Toughness
 - (iv) Malleability.
- (b) Write short notes on (any *two*) : [8]
- (i) Fatigue Test
 - (ii) Rockwell Hardness Test
 - (iii) Charpy Impact Test.
- (c) Explain Non-Destructive Test (any *one*) : [4]
- (i) Magnetic particle test flux
 - (ii) Dye penetration test.
5. (a) What are the benefits using alloy steels as tool steel over plain carbon steel ? Explain. [4]

- (b) Draw Iron-carbon diagram. Explain *all* the transformations on it. [8]
- (c) Which elements in cast iron make it different than steel. Write min *four* elements. [4]

Or

6. (a) Explain the malleabilising heat treatment. [4]
- (b) What is stainless-steel and write its classification ? For the application like surgical seizer which steel from this group will be used ? Explain your answer in detail. [6]
- (c) Give chemical composition for the following : [2]
- (i) AISI 1080
- (ii) C67.
- (d) Discuss slow cooling of AISI 1040 from its austenic temperature to room and calculate the percentage of phases at room temperature. [4]

SECTION II

7. (a) Draw self-explanatory diagram for the following (any *two*) : [6]
- (i) Martempering
- (ii) Ausforming
- (iii) TTT diagram for eutectoide steel.
- (b) Why is it difficult to convert 100% Austenite to Martensite ? Explain the reason. [4]
- (c) Write a short note on carburising and the heat treatment after carburising. [8]

Or

8. (a) Explain the difference in Annealing and normalising and draw the microstructure for both of them at room temperature after the heat treatment. [6]
- (b) Explain the hardening heat treatment ? What is Hardenability ? [4]
- (c) Write a short note on Jominey end quench test. [4]
- (d) Why is nitriding preferred over carburising where the dimensional stability is important ? Explain in detail. [4]
9. (a) Draw and explain the flow chart for manufacturing of cemented carbides ? [4]
- (b) Give typical composition and use for the following : [6]
- (i) Gun metal
- (ii) Cartridge brass
- (iii) Admiralty brass.
- (c) Explain the following (any *three*) : [6]
- (i) Apparent density
- (ii) Dezincification
- (iii) Tap density
- (iv) Effect of zinc in brass.

Or

10. (a) Which type of Brass is used in manufacturing the cap brass ? Explain in detail. [4]
- (b) What are mechanical processes for powder manufacturing ? Explain *all* of them in detail. [8]
- (c) Upto what percentage of zinc is added in brasses ? Explain, why ? [4]

11. (a) Write short notes on : [8]
- (i) Ceramic materials
 - (ii) Role of design engineer and selection of advance materials.
- (b) What is Composite material ? Explain its classification in detail. [8]

Or

12. Write short notes on : [16]
- (i) High temperature material
 - (ii) Role of composite in RCC structure
 - (iii) Cryogenic material
 - (iv) Manufacturing process of any *one* ceramic material.