



SANSKRUTI COLLEGE OF ENGINEERING & TECHNOLOGY

(Approved by AICTE, New Delhi & Affiliated to JNTUH.)

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Subject Name:
METALLURGY AND MATERIALS SCIENCE

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Year and Sem, Department:
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UNIT 1: CRYSTAL STRUCTURES

SHORT QUESTIONS

1. Difference between space lattice and crystal structures? (2018)
2. Define UNIT CELL? (2016)
3. Define volume density, planar automatic density, and linear automatic density? (2017)
4. Define ceramic materials? (2016)
5. Define point defect, line defect, surface and volume defect? (2017)
6. Define interfacial defects? (2016)
7. Define SLIP, SLIP PLANE? (2018)
8. Find the packing efficiency in HCP lattice? (2017)
9. Define crystal structure? (2017)
10. Write properties of ceramic? (2016)

LONG QUESTIONS:-

1. What is the crystal system explain barvells lattice? (2018)
2. Define the unit cell and give the atomic packing factor of BCC HCP FCC with neat sketches? (2016)
3. Write about the crystallization of metal explains the defects of grain size?
4. Mechanical properties of steel? (2017)
5. Define the terms the ceramic give examples for different traditional ceramics? (2016)
6. Define the terms ceramic and classify the and gives some important(2018) application of ceramics? (2018)
7. Compare the physical and chemical properties of ceramics with those of metals? (2017)
8. Difference between the screw dislocations? (2016)
9. Write a short note on different types of defects? (2017)
10. Explain about SLIP, SLIP PLANE? (2018)



UNIT-2

Short Answer Questions

- 1) Define alloy and alloy system. Classify them(2016)
- 2) What is the necessity of alloying??(2018)
- 3) Distinguish between commercially pure metal and an alloy? (2018)
- 4) What are the types of solid solutions? (2017)
- 5) Explain the governing rules for the formation of substitutional solid solutions?(2016)
- 6) Compare and contrast between intermediate phases and solid solutions?(2018)
- 7) Define phases system and phase diagram?(2016)
- 8) What is the importance of phase diagram?(2018)
- 9) Define degree of freedom in terms of metallurgy?(2017)
- 10) Discuss the importance of gibb's phase rule?(2016)
- 11) Give the number of variables and the degree of freedom at the eutectic temperature of a binary phase diagram?(2018)

LONG ANSWER QUESTIONS

1. Explain the terminology of phase diagrams (2018)
2. What is the difference between phase diagrams and equilibrium diagram?
Iron-cementite diagram is a phase diagram not an equilibrium diagram. Why?
(2016)
3. Explain in detail about gibb's phase rule? (2016)
4. What are coring? Explain phase mechanism associated with it.
(or)
What is coring and how it can be minimized. (2018)
5. Draw the eutectic phase diagram. Explain microstructures of various eutectic alloys.
(or)
Draw a typical eutectic type diagram and explain its important features.
6. Explain eutectoid system and peritectoid transformation (2018)
(or)
Write a short note on transformations of solid state.
(or)
Write short notes on transformation in the solid state
7. Draw the Fe-Fe₂C diagram and label all the points, lines, temperature and reactions (2016)



8. What are the invariant reaction in iron -iron carbide equilibrium diagram?
(2017)

Unit -3 Heat treatment of steels -1

1. Define heat treatment .what are the stages involved in it ? (2016)
2. Why is heat treatment of steels done? (2018)
3. What is annealing? (2016)
4. Normalized steels are stronger than annealed steels. Explain
5. Differentiate between annealing & normalizing. (2018)
6. What are the objectives of hardening?(2017)
7. What is the effect of inadequate time of soaking of steel even at appropriate temperature of hardened steel? (2018)
8. Define hardenability? (2016)
9. Write differences between hardness and hardenability ?(2017)
10. What is the effect of cobalt addition on hardenability ? (2016)
11. what are the limitations on the use of thermal transformation diagrams?
(2016)

LONGS QUESTIONS

1. What is spheroidizing annealing and normalizing? (2018)
2. Explain about the following heat treatment operations (2016)
 - a. Solution heat treatment
 - b. Age hardening
3. Distinguish between annealing and tempering? Indicate the temperature range of the following heat treatment on Fe-Fe₃C equilibrium diagram(2018)
 - a. Annealing
 - b. Normalizing
 - c. Hardening
 - d. Tempering
4. Draw a neat sketch of the Isothermal transformation diagram for eutectoid steel and explain the constructional procedure. Label all the salient features on it . Superimpose on it a cooling curves to obtain bainitic phase? (2016)



(OR)

Describe how an I-T Diagram is ?

5. Explain in detail the different transformations (Pearlitic, Bainitic & Martensitic) of a eutectoid steel with a suitable TTT – Diagram ? (2017)
6. Explain the Importance of Austenitization temperature and Homogeneity of Austenite? (2016)
7. Compare the characteristics of Nucleation growth transformation of Austenite with that of diffusion less transformation (2017)



UNIT 4 .HEAT TREATMENT OF STEELS

SHORT QUESTIONS

1. 1. What is austempering? States its advantages over conventional quenching and tempering method? (2018)
2. Austempering is different from other hardening treatments “. Explain the statement. (2017)
3. What are the limiting of austempering? (2016)
4. Explain the important characteristics of the martensite.(2017)
5. What are the limitations of tempering? (2016)
6. Write short notes on sub-zero treatment. (2018)
7. Give the classification of surface hardening treatment.(2017)
8. Which type of surface hardening process that does not involve composition change? (2016)
9. State the differences between carburizing and nitrating ?(2017)
- 10.Mention few application of induction hardening system? (2018)

UNIT: 4: HEAT TREATMENT OF STEELS-II

1. WHAT ARE CCT CURVES? EXPLAIN CCT CURVES OF EUTECTOID STEELS? (2018)
- 1.EXPLAIN THE FOLLOWING PROCESS?
.AUSTEMPERING,2.MARTEMPERING(2017)
2. COMPARE AUSTEMPERING AND MARTEMPERING? (2016)
3. WHAT IS CASE HARDENING? EXPLAIN IN DETAIL THE CARBURIZING PROCESSES?(2017)
4. DISCUSS IN DETAIL ABOUT THE FOLLOWING?
1:CARBONITRIDING 2:CYANIDING(2018)



5. DISTINGUISH BETWEEN FLAME HARDENING AND INDUCTION HARDENING? (2016)

EXPLAIN BRIEFLY ABOUT VACCUM HARDENING? (2017)

6.

7. COMPARE DIFFERENT TYPES OF CASE HARDENING PROCESS? (2018)

1. UNIT -5 FERROUS AND NONFERROUS ALLOYS

Short Answer Questions

- 1) What are the effects of SI in steel ? (2017)
- 2) Write short note on tool and DIE Steels(2018)
- 3) Write short note on HSS?
- 4) Give two advantages of steels over the family of cast irons.
- 5) Explain the composition, Microstructure and grey cast iron? (2017)
- 6) Distinguish between white heat and black heat malleable cast iron?
- 7) Copper and AL are highly ductile compared to iron. why?
- 8) Why composition of Cartridge Brass? (2017)
- 9) Why is Muntz metal heat treatable? Describe a typical heat treatment and draw the resulting microstructure? (2018)
- 10) What is Gun metal? Indicate its composition and applications?
- 11) What are bronzes? List the uses of bronzes. (2017)
- 12) What is De-alluminification? How to overcome this problem? (2017)
- 13) Give at least two applications for alpha alloy, Alpha-Beta alloys and Beta alloys of titanium? (2018)

UNIT -5 FERROUS AND NONFERROUS ALLOYS

LONG QUESTIONS

1. Define bronze and state its properties and applications? (2018)
2. What type of alloys are included under the classifications of bronze?
3. Differentiate between the terms brass and bronze? (2017)
4. What are the classifications of aluminum alloys and state the applications of any three alloys? (2017)
5. State the properties and applications of aluminum and copper alloys? (2016)



6. Describe the composition, heat treatment methods and applications of the aluminum and its alloys? (2018)
7. Mention the important alloys of copper discuss the various types of brasses and their applications? (2017)
8. Differences between white cast iron and malleable cast iron? (2017)
9. How are cast irons classified writing the characteristics of cast irons as compared to steels? (2017)
10. State and describe various factors affecting the properties of cast iron? (2018)



UNIT-II

1. Purpose of full annealing is to refine grain size .
2. Proper annealing temperature for hypo eutectoid steel is 50 °F.
3. Air cooling is done in Normalizing.
4. Quenching process is done in Hardening.
5. Annealing is used to improve machinability of medium carbon steel.
6. Hypo eutectoid steels are heated above A₃ (upper critical temperature).
7. Hardening is always followed by another treatment known as Tempering.
8. Heating of steel in tempering is done at 150- 630° C .
9. Degree of spherodisation depends on heat treatment of temperature and holding time.
10. Machinability of high carbon steels is improved by Spherodising.
11. Wear resistance is improved by Tempering.
12. Temperature and Holding time effects the heat treatment process.