

1 INTRODUCTION TO MS&M

1. Definition of material science & metallurgy.
2. Classification of material.
3. Importance of material in engineering.
4. Selection of material and engineering requirement of material.
5. Explain material properties.
6. Describe Level of internal Structure.

2. CRYSTAL GEOMETRY & CRYSTAL IMPERFECTION

1. Define the following terminology.
 - A. Unit cell.
 - B. Crystal Structure.
 - C. Lattice structure.
 - D. Atomic packing no.
 - E. Coordination no.
2. Define the concept of allotropy, polymorphism.
3. Define the crystallization and crystallization structure.
4. Define the different crystal imperfection with detail.
5. Define the concept of vacancy.



3 METALLIC MATERIALS

1. Draw the optical microscope and label its parts.
2. Steps of specimen Preparation for micro structure observation.
3. Differentiate between Micro structure and Macro structure.
4. Short-note on micro examination.
5. Short note on etchant.

4 SOLIDIFICATION AND THEORY OF ALLOY

1. Define the concept of solidification of metal with nucleation and growth of crystals.
2. Define the effect of structure on mechanical properties.
3. Define Gibb's rule.
4. Explain hume-rothery rules.
5. Brief explanation on lever arm principle.

5 .PHASE AND PHASE EQUILLIBRIUM

1. Explain the phase equilibrium diagram in detail.
2. Explain the following reaction in brief.
 - A. Eutectic
 - B. Eutectoid
 - C. Peritectic
 - D. Peritectoid

6 ALLOTROPY OF IRON IRON-IRON EQUILLIBRIUM SYSTEM

1. Explain the Fe-C phase diagram with neat sketch and different reaction are form during the diagram justify.
2. Explain the phases form during iron- iron reaction and its effect on properties.
3. Draw the different microstructure are form in Plain carbon steel with properties and application.
4. Write a short note on wrought iron and cast iron.
5. Critical cooling curve (CCT) diagram with neat sketch.
6. Define the different four section of iron-iron phase diagram.
 - A. Eutectic
 - B. Eutectoid
 - C. Hyper eutectic
 - D. Hyper eutectoid.

7 .TTT AND HEAT TREATMENT OF STEEL

1. Draw the Time-Temperature-Transformation diagram with detail explanation.
2. Define the term heat treatment? Why we are doing heat treatment on steel, application and advantages.
3. Classification of heat treatment processes.
4. Write a short note on.
 - A. Annealing.
 - B. Normalizing.
 - C. Spherodizing.
 - D. Hardening.
 - E. Tempering.
 - F. Induction hardening.
 - G. Flame hardening of steel.

8 POWDER METALLURGY

1. What is powder metallurgy? Write the applications, advantages, dis-advantages of powder metallurgy.
2. Steps in powder metallurgy.
3. Describe the powder production process in detail.
4. Describe powder conditioning, compacting and pressing with sketch and details.
5. Explain sintering process in detail.
6. Write characterization and testing of metal powder.

9 NON- DESTRUCTIVE TESTING

1. What is NDT? With application, advantages, dis-advantages of NDT.
2. Explain following NDT method.
 - A. Liquid Penetration Testing.
 - B. Ultrasonic testing.
 - C. Magnetic Particle testing.
 - D. Eddy-current testing
 - E. Radiography Testing

10 CORROSION OF METAL AND ALLOYS

1. Define the term corrosion and mechanism of corrosion.
2. Various types of corrosion.
3. Enlist the different types of corrosion prevention technique with details.