

## **SEM-3 Material Science & Metallurgy (2131904)**

### **Assignment to be submitted on 10-9-2019**

#### **Assignment: - 1 Introduction of MSM**

1. Define metallurgy. Explain importance of metallurgy.
2. What are the engineering requirements of materials?
3. Which are the types of metallurgy? Explain any one.
4. Explain selection criteria for material for engineering materials.
5. Differentiate micro and macro examination.
6. Explain classification of engineering material. materials and discuss mechanical properties.
7. Define the following material properties: i) Ductility ,ii) Creep and iii) Hardness
8. Differentiate between Polymers and Composite materials.
9. State the composition, properties and applications of Hindalium and Invar.

#### **Assignment: - 2 Solid Solution and Crystal geometry**

1. Justify B.C.C. is less dense than F.C.C.
2. Define atomic radius and atomic packing factor for B.C.C., F.C.C. and H.C.P.
3. What is solid solution? Explain the types of solid solution.
4. Discuss the factors affecting on solid solution.
5. What is crystallization? Explain mechanism of crystallization.
6. What is imperfection in crystal? Explain their effect on properties.
7. Explain unary and binary equilibrium phase diagram.
8. Explain Gibb's phase rule.
9. Explain lever rule and different reaction like eutectic, eutectoid.
10. Derive the expression for relationship between atomic radius and lattice parameter in Body Centered Cubic (BCC) Lattice. Find the effective number of atoms/unit cell, atomic packing factor and coordination number.
11. Molybdenum (Mo) has BCC structure and a density of  $10.2 \times 10^3 \text{ kg/m}^3$ . Calculate the lattice parameter and atomic radius. The atomic mass of Molybdenum is 95.94 gm/mol.
12. Explain the procedure for establishing crystallographic directions in a cubic lattice. Also list down the features of crystallographic directions.

#### **Assignment: - 3 Non Destructive Test**

1. Explain DPT testing.
2. What are the advantages of NDT over the destructive testing? Explain magnetic particle method.
3. Explain radiography.
4. Explain ultrasonic test with advantages and applications.
5. Explain jominey end quench test for the hardenability.
6. Describe magnetic particle testing with a neat sketch
7. What is NDT? Explain in Detail Radiography testing Method with advantages, disadvantages & applications of radiographic testing method.
8. Explain Eddy current testing method with neat sketch. Also explain limitations and applications

#### **Assignment: - 4 Powder Metallurgy**

1. What is PM? Explain basic process.
2. Explain characteristics of powder.
3. Which are the methods of manufacturing of powder? Explain automation.
4. Explain sintering process.
5. Write application of PM.
6. Write advantages and limitations of PM.
7. List down the merits and limitations of powder metallurgy
8. Explain any two mechanical process utilized for metal powder production
9. What is powder metallurgy? State applications of the powder metallurgy.