

2112E005

**DIPLOMA OF VOCATION**  
**Mechanical Manufacturing**  
**Subject: Materials and Metallurgy**  
**Subject Code: ME-504**  
**Semester: Fifth**  
**December 2021**  
**Theory (External): 35 Marks**  
**Time: 03 Hours**

**Instructions to the Students**

1. This Question paper consists of two Sections. All sections are compulsory.
2. Section A comprises 10 questions of objective type in nature. All questions are compulsory. Each question carries 1 mark.
3. Section B comprises 8 essay-type questions out of which students need to do any 5. Each question carries 5 marks.
4. Read the questions carefully and write the answers in the answer sheets provided.
5. Do not write anything on the question paper.
6. Wherever necessary, the diagram drawn should be neat and properly labelled

Roll Number									

**SECTION -A (SHORT/OBJECTIVE TYPE QUESTIONS)**  
(10x1=10 Marks)

- A. What is the difference between metals and non-metals?
- B. Define toughness.
- C. Define fracture.
- D. Define atomic packing factor.
- E. What is degree of freedom?
- F. State Gibbs phase rule.
- G. What are the various allotropic form of iron?
- H. What are various types of stainless steels?
- I. Define hardenability of a steel.
- J. What is the difference between annealing and normalizing?

**SECTION -B (ESSAY TYPE QUESTIONS)**  
(5x5=25 Marks)

1. Classify various types of engineering materials.
2. Define unit cell. Differentiate between HCP and FCC structure with the help of a diagram.

3. Draw binary isomorphous phase diagram of any two-component system (say A and B) and show salient points on it.
4. Discuss the effect of various alloying elements on the mechanical properties of the material.
5. Explain how pearlite will obtain. Mention it of TTT diagram also.
6. Explain various types of surface hardening processes.
7. Discuss various types of aluminium alloys. Also list their applications.
8. With the help of an example discuss how stress strain curve will be plotted? Also mark the important points on stress strain curve.

==END OF PAPER==