

Total No. of Printed Pages:2

**SUBJECT CODE NO:- H-315**  
**FACULTY OF SCIENCE AND TECHNOLOGY**  
**T.E. (MECH/PROD) (Sem-I)**  
**Metallurgy and Materials**  
**[OLD]**

**[Time: Three Hours]****[Max.Marks:80]**

Please check whether you have got the right question paper.

- N.B
1. Question 5 & 10 are compulsory.
  2. Solve THREE questions from each section.
  3. Figure to the right indicate full marks.

## Section -A

- |     |   |    |
|-----|---|----|
| Q.1 | a. Explain procedure of finding Miller Indices. Draw miller indices for plane (110) and (121).                                    | 07 |
|     | b. Discuss line defects and point defect with neat sketches.  | 08 |
| Q.2 | a. What is a grain size? Write explanatory notes ASTM grain size measuring methods.   | 07 |
|     | b. Describe the construction of the phase diagram for two metals completely soluble in liquid state and insoluble in solid state. | 08 |
| Q.3 | a. Discuss properties of austenite and ferrite present in steel.  | 07 |
|     | b. Write the eutectoid reaction in Fe – Fe <sub>3</sub> C system and find the amount of different phases at the eutectoid point.  | 08 |
| Q.4 | a. Discuss austempering and martempering heat treatment process.  | 07 |
|     | b. What is hardenability and how it is measured? Differentiate between Hardening and Tempering.                                   | 08 |
| Q.5 | Write short note on following (Any two)   | 10 |
|     | a. Gibbs Phase Rule   |    |
|     | b. Subzero Treatment  |    |
|     | c. TTT diagram  |    |

## Section – B

- |     |  |    |
|-----|--|----|
| Q.6 | a. Discuss characteristics, properties and application Low carbon steels, Medium Carbon steels and High carbon steels. | 07 |
|     | b. What do you mean by ferrite stabilizer and austenite stabilizer?  | 08 |
| Q.7 | a. Explain the effects of phosphorus, Manganese and cooling rate on the microstructure of cast iron.                   | 07 |
|     | b. Classify stainless steels? Enumerate their properties and applications.   | 08 |
| Q.8 | a. How nodular cast iron is manufactured? Give the properties and applications.  | 07 |

b. Define Brass? What are the types of brasses? Explain the properties and application of any two of them? 08

Q.9 a. Discuss characteristics, properties and application of cermet's and glass. 07  
b. Discuss different types of fibers and matrices used in fiber composite materials. 08

Q.10 Write short note on following (any two) 10  
a. Nano materials  
b. Aluminum alloy  
c. Tool steel.