

B037315(037)

**B. Tech. (Third Semester) Examination,
April-May 2021
(AICTE Scheme)**

MATERIAL SCIENCE

Time Allowed : Three hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note : Attempt all questions. Part (a) is compulsory carries 4 marks. Attempt any two from (b), (c) and (d) carries 8 marks each.

Unit-I

1. (a) Define space lattice. 4
- (b) What are the different X-Ray diffraction techniques?
Explain any two. 8

[2]

- (c) Explain the following : 8
- (i) Line defects
 - (ii) Surface defects
- (d) Explain slip and twinning and also explain the difference between them. 8

Unit-II

2. (a) Explain the difference between hardness and brittleness. 4
- (b) Write a detailed description of recovery, recrystallization and grain growth. 8
- (c) Enlist the various mechanical properties of metal. Explain any three of them briefly. 8
- (d) Explain the effect of grain size on properties of material. 8

Unit-III

3. (a) What is a grain boundary? Explain in brief. 4
- (b) Explain the metal ingot structure - dendritic and columnar grains with neat sketches. 8

[3]

- (c) Draw the equilibrium diagram for : 8
- (i) Two metals (or components) completely soluble in liquid and solid states.
 - (ii) Two metals (or components) completely insoluble in liquid state but completely insoluble in solid state.

- (d) Explain Fe-C diagram. 8

Unit-IV

4. (a) Define hardness and hardenability. 4
- (b) Draw T-T-T diagram for the decomposition of austenite in a eutectoid carbon steel. 8
- (c) Write short notes on : (any two) 8
- (i) Carburizing
 - (ii) Nitriding
 - (iii) Cyaniding
 - (iv) Flame Hardening
- (d) Write short notes on : (any two) 8
- (i) Annealing
 - (ii) Normalizing

(iii) Tempering

(iv) Hardening

Unit-V

5. (a) Write the difference between cast iron and steel. 4
- (b) Give the composition, properties and applications of any two of the following : 8
- (i) Bearing metals
 - (ii) Bronze
 - (iii) Gunmetal
- (c) Write short notes on : 8
- (i) Grey Cast Iron
 - (ii) White Cast Iron
- (d) Give the composition, properties and applications of any two of the following : 8
- (i) Aluminium Bronze
 - (ii) Phosphor Bronze
 - (iii) Babbit metal