

337353(37)

**B. E. (Third Semester) Examination,
April-May 2021**

(New Scheme)

(Mechanical Engg. Branch)

MATERIAL SCIENCE & METALLURGY

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

Note : Attempt all questions. Part (a) from each question is compulsory. Attempt any two parts from (b), (c) and (d) of each questions. Draw neat sketches wherever necessary.

Unit-I

1. (a) What is dendritic solidification? 2
- (b) What is grain growth? What is the role of grain size in material properties? 7

[2]

- (c) Explain Dendritic solidification of pure metals. 7
- (d) How grain boundaries are formed? Explain. 7

Unit-II

- 2. (a) What is Creep? 2
- (b) Define different type of surface defects with sketches. 7
- (c) What are the differences between edge dislocation and screw dislocation? 7
- (d) Differentiate between hot working and cold working processes. 7

Unit-III

- 3. (a) What is peritectic system? 2
- (b) Draw and explain Iron-Carbon equilibrium diagram. 7
- (c) Explain the allotropy of iron along with a neat sketch indicating the different phases for pure iron at various temperatures. 7
- (d) Explain : 7
 - (i) Hume-Rothery's rule
 - (ii) Gibb's phase rule

[3]

Unit-IV

- 4. (a) What is Heat Treatment? 2
- (b) What are the various annealing processes? Explain. 7
- (c) Explain various hardening processes. 7
- (d) Draw a neat sketch of T-T-T diagram for a eutectoid steel and explain it. 7

Unit-V

- 5. (a) What is high speed steel? 2
- (b) Differentiate between grey and white cast iron (composition, properties and uses). 7
- (c) Give the compositions and uses of any **two** : 7
 - (i) Duralumin
 - (ii) γ -alloy
 - (iii) Sintered carbide
- (d) Write the classification, composition characteristics and uses of brasses. 7