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Roll No. :

337353(37)

B. E. (Third Semester) Examination, Nov.-Dec. 2021

(New Scheme)

(Mech. Engg. Branch)

MATERIAL SCIENCE & METALLURGY

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

Note : Attempt all questions. Part (a) of each question is compulsory. Attempt any two parts from the rest of three parts (b), (c) and (d) in each question.

Unit-I

1. (a) Define atomic packing factor. 2
- (b) Discuss effect of grain size on properties of metals. 7

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- (c) Discuss mechanism of solidification of metals. 7
- (d) Explain Homogeneous and Heterogeneous nucleation in short. 7

Unit-II

2. (a) What is Elastic Deformation? 2
- (b) Define Stiffness, Yield strength, Resilience and Ductility. 7
- (c) Compare Edge and Screw dislocation. 7
- (d) Define Interstitial defect, Frankel defect & Schottky defect. 7

Unit-III

3. (a) What is Gibb's phase rule? 2
- (b) Explain the allotropy of iron alongwith a neat sketch indicating the different phases for pure iron at various temperatures. 7
- (c) Draw equilibrium diagram when two metals completely soluble in the liquid and solid state and

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find the percentage amount, of solid and liquid phase portion of the diagram by Lever Rule. 7

- (d) Draw and explain Iron-Carbon equilibrium diagram. 7

Unit-IV

4. (a) Define "Annealing". 2
- (b) Explain T-T-T curve in brief. 7
- (c) What are the purposes of Heat treatment & explain Normalizing? 7
- (d) Explain the process of Carbo-Nitriding and Sphero- idising process. 7

Unit-V

5. (a) Enumerate the various ores which yield ferrous metals. 2
- (b) Give the composition properties and uses of any of the two : 7
- (i) White Cast Iron
- (ii) High Carbon Steel
- (iii) Nodular Cast Iron

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(c) Give the composition, properties and uses of any of the two : 7

(i) Naval Brass

(ii) Gun metal

(iii) Sintered Carbide

(d) What is the contribution of light metals and their alloys for solving the problems related to corrosion? Give examples. 7