

Exam.Code:0942  
Sub. Code: 7062

1058  
B.E. (Mechanical Engineering)  
Sixth Semester  
MEC-605: Materials and Heat Treatment

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Section.

x-x-x

- Q1. (a) What do you understand by 'Miller Indices'? 2\*5=10  
(b) Explain the importance of Manganese as alloying element in steel.  
(c) In general, HCP metals are hard and brittle while FCC metals are soft and ductile. Why?  
(d) Why solubility of carbon is more in austenite than in ferrite?  
(e) What is GIBBS phase rule?

Section A

- Q2. (a) Discuss various volume imperfections in a crystal. 5  
(b) Calculate A.P.F. for BCC and FCC crystal structure. 5  
Q3. (a) Differentiate between homogeneous and heterogeneous nucleation. 5  
(b) Write the various stages of growth of a crystal. 5  
Q4. (a) Classify engineering materials. Explain any two of them. 5  
(b) State the effect of adding following elements to steel : Ni, Cr, V, Si, W. 5

Section B

- Q5. (a) What is critical cooling rate (CCR)? With neat sketch explain time temperature transformation (TTT) diagram and give its applications. 5  
(b) Draw a neat and labeled Iron-Iron Carbide diagram and explain eutectic and eutectoid reaction in it. 5  
Q6. (a) Distinguish between austempering and martempering. 5  
(b) Compare normalizing and hardening processes. 5  
Q7. (a) Explain the following methods: Carbonitriding, Cyaniding. 5  
(b) Explain flame hardening and induction hardening with neat sketches. 5

x-x-x