

INDIAN MARITIME UNIVERSITY
(A Central University, Government of India)
End Semester Examination Dec 2019/Jan 2020
B.Tech (Marine Engineering)
Semester -V
UG11T1501-2501- Material Science

Date: 09.12.2019
Time: 3 Hours

Max Marks: 70
Pass Marks: 35

Part – A (compulsory)

Answer the following (10x2=20 Marks)

1. State Pauli's exclusion law of principle.
2. Define atomic packing factor.
3. Explain about Substitutional and Interstitial solid solutions.
4. Give the main purpose of the heat treatment.
5. What are destructive and non-destructive test. Give any three of each.
6. State pilling bed worth rule.
7. Discuss the factors affecting creep.
8. Explain about crystal imperfections.
9. Explain about PTFE and its uses in shipping system.
10. What is the function of sacrificial anode? Give a suitable example.

Part – B

Answer any 5 out of 7 questions (5 x 10= 50 marks)

11. Show the Phase Diagram of an alloy consisting of A and B when A and B are-
 - a) Soluble in liquid state but completely insoluble in solid state. **(5 marks)**
 - b) Soluble in liquid state but partially soluble in solid state. **(5 marks)**
12. Draw and discuss the Iron-Carbon equilibrium diagram. **(10 marks)**
13. Discuss the temperature ranges for various heat treatment processes with a neat sketch. **(10 marks)**
14. a) Define the term creep. Explain the various type of creep with suitable diagram. **(5 marks)**
b) Explain the fatigue testing machine with suitable diagram. **(5 marks)**
15. What are the various means of arresting corrosion of material? Discuss each of them briefly. **(10 marks)**
16. Explain the effects of the following alloying elements in steel-
 - a) Chromium **(2 marks)**
 - b) Nickel **(2 marks)**
 - c) Manganese **(2 marks)**
 - d) Silicon **(2 marks)**
 - e) Sulphur **(2 marks)**
17. Write a brief note on refractories, its types and properties. What is dimensional stability of refractory material? **(10 marks)**
