India2n Maritime University

(A Central University, Govt of India)

End Semester Examinations – December 2024

Programme Name: B Tech (Marine Engineering)

Semester: VII

Subject Code: UG11T4705

Subject Name: Marine Materials

Date: 24.12.2024	Max Marks: 70
Duration: 03 Hrs	Pass Marks: 35

General Instructions

(i) All Sections (A, B & C) are to be attempted.
(ii) Options, if any, are specified in respective section.

Section A

Ten MCQs/Fill in the Blanks of 01 Mark each – Choose the correct answer as applicable.

1.Crank and Camshaft are made up of ---------- materials
A. Bronze B. Copper C. Medium carbon steel D. Iron

2. Which type of defect occurs when an entire row of atoms is misaligned in a crystal structure?
   A) Point defect
   B) Line defect
   C) Surface defect
   D) Volume defect

3. Which property of polymers makes them highly suitable for electrical insulation applications?
   A) High thermal conductivity
   B) Low density
   C) Low electrical conductivity
   D) High tensile strength

4. Which type of fabric is commonly used in composites for its high tensile strength and impact resistance, often found in marine applications?
   A) Chopped Stranded Mat (CSM)
   B) Woven Roving (WR)
   C) Polyester fabric
   D) Nylon fabric

5. What does the eutectic point in a phase diagram represent?
   A) A point where a single phase exists.
   B) The point at which two solids coexist.
   C) The temperature at which liquid transforms into two solid phases.
   D) The temperature where complete melting occurs.

6. What is the TTT diagram used for?
   A) It shows the relationship between time, temperature, and toughness.
   B) It explains the heat treatment cycle for alloys.
   C) It represents isothermal transformations in steel.
   D) It defines the rate of cooling in non-ferrous metals.

7. What is the main purpose of annealing?
   A) To increase hardness.
   B) To relieve internal stresses.
   C) To increase grain size.
   D) To enhance surface hardness.

8. Which of the following processes involves heating the metal in a carbon-rich environment?
   A) Cyaniding
   B) Carburizing
   C) Nitriding
   D) Flame Hardening

9. Which of the following materials is most commonly used in the construction of a ship's hull due to its excellent strength-to-weight ratio and corrosion resistance?
   A) Aluminium
   B) Stainless steel
   C) Carbon fiber
   D) Mild steel

10. When selecting materials for steam turbine blades in marine applications, which factor is most critical to ensure efficient performance and longevity?
   A) Low cost and availability
   B) High thermal conductivity and ductility
   C) High creep resistance and fatigue strength at elevated temperatures
   D) High electrical resistance and low density

Section B

Five Questions of 02 Marks each

11.Differentiate between crystalline and amorphous solids with suitable examples.

12. What is the difference between thermoplastics and thermosetting plastics?
13. State Gibb's Phase rule.
14. Why is surface hardening performed on engine components?
15. What is PTFE? Give any two applications of PTFE?

Section C

Seven Questions of 10 Marks each of which any 05 questions to be answered.

16. Write a note on crystal defects. Explain line defects in detail with suitable diagrams of edge and screw dislocations. (10 Marks)
17. Discuss the classification of polymers based on their origin and structure. Explain the different types of polymerization processes (addition and condensation). (10 Marks)
18. Draw and explain the Iron-Carbon equilibrium phase diagram, highlighting eutectic, eutectoid, and peritectic reactions. (10 Marks)
19. Discuss the different surface hardening methods (carburizing, nitriding, flame hardening) used in marine engineering applications, highlighting their advantages and disadvantages. (10 Marks)
20. What types of materials are used in Propeller, rudder, and in Diesel engine components? (10 Marks)
21. What are plastics? Explain the various moulding techniques of plastics with suitable examples. (10 Marks)
22. What is Case Hardening? Discuss the importance of this process in shipbuilding and marine engineering components. (10 Marks)