Indian Maritime University

(A Central Unive1rsity, Govt of India)

Sep/Oct'25 SE

Programme Name: B TECH (ME)

Semester: VII

Subject Code: UG11T4705

Subject Name: Marine Materials

Date: 29.10.2025	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. Which crystal structure is known for having the highest packing efficiency due to its closely packed arrangement?
   A) Body-Centered Cubic (BCC)
   B) Simple Cubic (SC)
   C) Face-Centered Cubic (FCC)
   D) Hexagonal Close-Packed (HCP)
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. AB AB ----- type close packing pattern represents
a. FCC b. CCP c. HCP d. BCC

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. Relative amount of phases in a region can be used in
a. Phase rule b. Lever rule c. Either a or b d. None

8. Which of the following is not a natural Polymer
a. RNA b. Cellulose c. Rayon d. Starch

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. Crank and Camshaft are made up of ---------- materials
a. Bronze b. Copper c. Medium carbon steel d. Iron

Section B

Five Questions of 02 Marks each

11. Differentiate between crystalline and amorphous solids with suitable examples.
12. What is the term co –ordination number?
13. State Gibb's Phase rule?
14. What is the purpose of doing heat treatment?
15. What type of material is typically used for boiler tubes in marine applications to handle high temperatures and pressures?

Section C

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

16. Find out the atomic packing factor of SC, BCC, FCC, & HCP Crystals
17. Discuss the classification of polymers based on their origin and structure. Explain the different types of polymerization processes (addition and condensation).
18. Draw and explain the Iron-Carbon equilibrium phase diagram, highlighting eutectic, eutectoid, and peritectic reactions.
19. Explain the following
    a. Cooling Curves of Solid Solution, Pure Metal, and Multi phase alloy
    b. A & B Metals Mutually liquid solubility but partially solid solubility
20. What are plastics? Explain the various moulding techniques of plastics with suitable examples.
21. Explain the following a. Carburizing b. Cyaniding
    d. Nitriding d. Flame hardening
22. What types of materials are used in Propeller, rudder, and in Diesel engine components?