

**Indian Maritime University**  
(A Central University, Govt. Of India)  
**B. Tech(Marine Engineering)**

Semester V

December - 2022 End Semester Examination

**Material Science**  
**(UG11T3501)**

**Time: 3 Hours**

**Max Marks: 70**

**Date: 13.12.2022**

**Pass Marks: 35**

*Part A – Q.No.1;10 MCQs (10 X 01 Mark)*

- (i) Which one is the organic polymers
- a) Aluminium,
  - b) SiC
  - c) PTFE
  - d) Wood
- (ii) The correct order of coordination number in BCC, FCC and HCP unit cells is
- a) 12, 8, 6
  - b) 8, 12, 12
  - c) 6, 8, 12
  - d) 12, 8, 24
- (iii) The atomic bond in NaCl is
- a) Ionic Bond
  - b) Metallic Bond
  - c) Covalent Bond
  - d) Vander Waals
- (iv) During cooling, the complete transformation of austenite takes place from liquid state at
- a) 723°C just above
  - b) 723°C just below
  - c) 723°C
  - d) none of these
- (v) The carbon content present in Medium Carbon Steel
- a) 0.3 to 0.55%.
  - b) 0.08 to 0.3%.
  - c) 0.6 to 1.5%.
  - d) 2 to 4%.
- (vi) "Which one of the following is not equilibrium heat treatment
- a) Austenitising
  - b) Annealing
  - c) Normalizing
  - d) Precipitation
- (vii) The local corrosion attack resulting from the formation of small anodes on a metal surface is known as
- a) Fretting corrosion
  - b) Stress corrosion
  - c) Pitting corrosion
  - d) Erosion corrosion

(viii) Which of the following impurity in cast iron makes it hard and brittle?

- a) Sulphur
- b) Silicon
- c) Manganese
- d) copper

(ix) What is the composition of gunmetal

- a) Cu:88%,Pb:10%,Zn:2%
- b) Cu:88%,Sn:10%,Zn:2%
- c) Cu:88%,Zn:10%,Sn:2%
- d) Cu:88%,Al:10%,Zn:2%

(x) Which graph shows the fatigue properties?

- a) SN graph
- b) creep graph
- c) Stress strain graph
- d) Binary graph

*Part B – Q.No.2; 5 Short Questions (05 X 02 Marks)*

- (i) What is Hume-Rothery rule?
- (ii) Write down the factors affecting on fatigue failure.
- (iii) What is Concentration polarization?
- (iv) State the purposes of normalizing process.
- (v) Named three different type crystal defects.

*Part C – 7 Long Questions-Answer Any 5 (05 X 10 Marks)*

- 3. Distinguished between Covalent and metallic bond. Write a short note on pitting corrosion and intergranular corrosion. What is the effect of stress and temperature on a creep curve? 4+3+3
- 4. Calculate the atomic packing factor for FCC and BCC crystal structure. State crystal imperfection. 8+2
- 5. Explain the following terms: (a) Annealing (b) Normalising (c) Martempering 4+3+3
- 6. Draw and discuss CCT diagram for Fe-C system. Draw binary equilibrium diagram for an alloy system exhibiting no solid solubility. 6+4
- 7. Write down a short note on different stainless steel. What is PTFE? Write down the advantages of using PTFE filled compounds. 5+5
- 8. Draw and discuss Iron carbon diagram 5+5
- 9. Which factor Effects on corrosion? How to prevent corrosion? 5+5