

INDIAN MARITIME UNIVERSITY
(A Central University, Govt. of India)
DEPARTMENT OF MARINE ENGINEERING
TERM END EXAMINATION – December 2015

Sub Code: UG11T2501/UG11T1501

Time: 0300 Hrs

Sub Name: **Material Science**

Max Marks-100

Semester: 5th

Pass Marks-50

Part-A (3x10=30 Marks)

Compulsory Questions

- 1) (a) State Pauli's exclusion law of principle?
- (b) Define co-ordination number. Mention the co-ordination number of FCC, HCP & BCC structure
- (c) Why "Grey cast iron" is preferred over "White cast iron".
- (d) Name different types of Destructive Tests to determine the suitability of a metal?
What is the significance of B.H.N.?
- (e) State Gibbs phase rule.
- (f) What are "Liquidus line" and "Solidus Line"?
- (g) What are the main purposes of Heat Treatment of a material?
- (h) What are 'Stress Concentration' and 'Material Fatigue'?
- (i) Briefly describe the reason behind rusting in iron structure in presence of water-drop / moisture?
- (j) Explain with reasons for selection of materials for engine seating?

Part-B (5x14 = 70Marks)

Answer any five of the followings.

- 2) (a) Derive the atomic radius for B.C.C & F.C.C crystal lattice (7)
(b) Explain the ionic, covalent, and metallic bonding with suitable example. (7)
3. What are the differences between Izod and Charpy Impact test? Describe fluorescent die penetration test procedure for crack detection. (8 + 6)
Or,
a. Draw a neat diagram of 'Impact Test' and explain in brief.
b. Find out the energy to rupture the test piece, assume require data.
c. What are the standard sizes of the specimen to be used for Impact testing? (10 + 2 + 2)
4. Draw a neat diagram of iron carbide equilibrium diagram and explain it briefly. (14)
- 5.(a) What is meant by annealing? Explain the various types of annealing with suitable examples (14)
OR
(b) Explain the following i) Carburising ii) Nitriding iii) Cyaniding (14)

6.a. Explain briefly fatigue testing with a neat sketch.

b. What is S-N curve?

(10 + 4)

7.a. What is meant by corrosion ?

b. How does "Sacrificial Anode" prevent corrosion? Give an example.

c. Explain the term anodizing and phosphating?

(3 + 5 + 6)

8) Write a brief note on Refractories, mentioning it's different types & properties. What is dimensional stability of refractory material?

(14)