

**INDIAN MARITIME UNIVERSITY**  
**(A Central University, Government of India)**

**B.TECH MARINE ENGINEERING**  
**Semester – VIII- September 2015 Examination**

**ADVANCED MATERIAL SCIENCE & SURFACE COATING ENGINEERING**  
**Subject Code: UG11E1803**

Time: 3 Hours  
Date: 30.9.2015

Max Marks: 100  
Pass Marks: 50

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**SECTION - A**

**Compulsory Questions**

(3\*10 = 30 MARKS )

1. (a) What is 'TEFLON'? Mention some of its important uses on board ship.  
(b) What are "inhibitors"? How do they protect against corrosion.  
(c) What are the differences between 'Brazing' and 'Soldering'  
(d) Explain the difference between Elastic Limit and Proportional Limit.  
(e) What is a T-T-T curve? How does it help us?  
(f) State Effects of Chromium and Nickel in Iron and Steel.  
(g) What does a S-N curve indicate?  
(h) What tests are carried out to detect any surface or subsurface defects in a material?  
(i) What do you understand by 'Hot cracking of Welds'? Give example.  
(j) What is the purpose of Radiographic Test and how is it done?

## SECTION - B

**Answer Any Five of the following :**

(5\*14 = 70 MARKS)

2.. Describe the mechanism of transformation of austenite to :-

(a) Pearlite (b) ferrite (c) Cementite (d) Martensite . Compare their structure and properties.

[10+4=14 Marks]

3. What is the primary function of a surface coating? Describe the purpose of metallic coatings, inorganic chemical coatings, and organic coatings, giving examples of each of them.

[5 + 9 14 Marks)]

4. Draw a stress-strain diagram for a low carbon steel specimen indicating the proportional limit, elastic limit, yield point, the point of maximum loading and rupture. Explain the above important data.

[14

Marks)]

5. How does thermit welding process differ from ordinary arc welding? State their application and metallurgy.

[14

Marks]

6. State the mechanism of :

(a) Fatigue failure

(b) Creep failure

[7+7=14 Marks]

7. Explain briefly the theory of tempering. Why steel is tempered and how it is done? What are the effects of tempering on the mechanical properties of steel?

[6+4+4 = 14

Marks]

8. a) Briefly discuss the various means for control and prevention of corrosion.

b) State the effects of alloys viz. Molybdenum, Chromium and Vanadium on TTT curve

[8+6=14 Marks]

9. State and discuss the materials to be selected for the manufacture of the following shipboard machinery components

(3.5 x 4= 14

Marks)

(a) Stern frame

(b) Diesel Engine Cylinder Liner

(c )LNG Tanks

(d )Turbine blades