Indian Maritime University

(A Central University, Govt of India)

End Semester Examinations – June 2023

Programme Name: B Tech (ME)

Semester: Fifth

Subject Code: UG11T3501

Subject Name: Material Science

Date: 13.06.2023	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.

QP setters to specify the following as applicable:-

(iii) Tables (Steam/Log/Nautical Almanac etc) that can be used.
(iv) Chart Work Booklets to be used.
(v) Any other tables/charts to be used.

Section A

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

1. Eutectoid reaction occurs at-
A. 114 °C
B. 600 °C
C. 727 °C
D. 1493 °C

2. Machines tool guide-ways are usually hardness by-
A. Mar-tempering
B. Flame hardening
C. vacuum hardening
D. induction hardening

3. Which one of the following features improve the fatigue strength of a metallic material-
A. Increasing the temperature
B. Scratching the surface
C. Over stressing
D. Under stressing

4. Gibbs phase rule is given by-
A. F = C + P
B. F = C – P + 2
C. F = C + P – 2
D. F = C – P – 2

5.The Interstitial solid solution of carbon in γ(gamma) iron is called
a) Cementite b) Ferrite c) Austenite d) Pearlite

6.The failure that happens due to cyclic loading is called a) Static failure b) Shear failure c) Creep failure d) fatigue failure

7.After welding of stainless steel which form of corrosion it is likely suffer in the HAZ (Heat Affected Zone)
a) Intergranular corrosion b) Crevice corrosion c) Fretting corrosion d) Galvanic corrosion

8.Coarse grain structure is desirable for the improvement of which of the following properties
a) fatigue b) toughness c) Creep d) Strength

9.What is Teflon
A. Laminated phenolic material
B. Thermoplastic fluorocarbon polymer
C. Thermosetting fluorocarbon polymer
D. The inorganic compound of fluorine and carbon

10. Cleavage fracture is a type of-
A. Brittle fracture
B. Ductile fracture
C. Elastic fracture
D. Viscoelastic fracture

Section B

Five Questions of 02 Marks each
11. Define Crystallography
12. How bainite is formed?
13.Differentiate between Brittle fracture and Ductile fracture
14. What is meant by "heat treatment"?
15.Explain how zinc coating provides protection to steel after galvanizing.

Section C

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

16. Classify all types of Metallic Crystal imperfections. Explain in detail about each crystal defect in metals. (10 marks)

17. With a neat sketch describe the Iron – Iron Carbide equilibrium phase diagram according to scale and show different phases on it. (10 marks)

18. a) Explain the purpose of surface hardening given to the critical components of engine (3marks)

b) Highlight the major differences between nitriding and carburising (3 marks)

c) Why tempering is mandatory after hardening by quenching of steel components? (4 marks)

19. Draw the typical S-N curves for an aluminium alloy and steel. Define the following terms i) Endurance limit ii) Fatigue strength iii) Fatigue life

20. Explain the following (4+3+3)

(i) Galvanic/Bimetallic Corrosion

(ii) Pitting Corrosion

(iii) Crevice Corrosion

21.Explain the effect of grain boundaries on the properties of alloys, also

Determine the grain size (10 mark)

22. Write short note on any two of the following: (3+4+3)

1. Ceramics 2. Stellite alloy 3. Paint

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UG11T3501 - 13.06.2023 - FN - reg.

1 message

ESE IMU HQ <imuese@imu.ac.in> Tue, Jun 13, 2023 at 10:37 AM
Bcc: shishirs@tmi.tolani.edu

Sir,

1. Refer to Question Number 22 of UG11T3501 for 13.06.2023 - FN Session.

2. In this regard, the following is clarified:

For *- Write short note on* ***any two*** *of the following*

Read ***- Write short notes on the following***

3. Please pass the instructions to the students accordingly.

Thanks & Regards,

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