

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 to 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

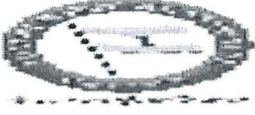
The first part of the document discusses the importance of maintaining accurate records of all transactions. It emphasizes that every entry should be supported by a valid receipt or invoice. This ensures transparency and allows for easy auditing of the accounts.

In the second section, the author details the various methods used to collect and analyze data. This includes both primary and secondary research techniques. The primary research involved direct observation and interviews with key stakeholders, while secondary research focused on reviewing existing literature and industry reports.

The third part of the document presents the findings of the study. It highlights several key trends and insights that emerged from the data analysis. These findings are then used to inform the recommendations provided in the final section. The author suggests several strategies to address the identified challenges and opportunities.

Finally, the document concludes with a summary of the overall objectives and the significance of the research. It reiterates the value of the data collected and the insights gained, and expresses confidence in the proposed recommendations.





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UG11T3501 - 13.06.2023 - FN - reg.

1 message

ESE IMU HQ <imuese@imu.ac.in>
Bcc: shishirs@tmi.tolani.edu

Tue, Jun 13, 2023 at 10:37 AM

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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