

Code: 19ME3303

II B.Tech - I Semester – Regular Examinations – MARCH 2021

**MATERIAL SCIENCE AND ENGINEERING
(MECHANICAL ENGINEERING)**

Duration: 3 hours

Max. Marks: 70

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- Note: 1. This question paper contains two Parts A and B.
2. Part-A contains 5 short answer questions. Each Question carries 2 Marks.
3. Part-B contains 5 essay questions with an internal choice from each unit. Each question carries 12 marks.
4. All parts of Question paper must be answered in one place
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PART – A

1. a) Define coordination number.
b) What is the use of lever arm rule?
c) What is the purpose of heat treatment?
d) What is the effect of chromium on properties of high speed steel?
e) What is the purpose of fiber in the composite material?

PART – B

UNIT – I

2. Describe the various imperfections in crystal and their effects on properties. 12 M

OR

3. a) Write the classification of engineering materials. 3 M
b) Mention the various mechanical properties of materials and explain them briefly. 9 M

UNIT – II

4. Explain about Iron – Iron carbon equilibrium diagram and explain about all critical points. 12 M

OR

5. a) Describe the importance of the Hume Rothery rules in the development of alloys. 6 M
- b) Explain about Substitutional and Interstitial solid solutions. 6 M

UNIT-III

6. What is surface hardening? Explain about various surface hardening methods with neat sketches. 12 M

OR

7. a) What are the differences between normalizing and annealing? 6 M
- b) Explain about normalizing process. 6 M

UNIT – IV

8. Discuss the various types of cast irons with regard to their composition, microstructure and appearance of fracture. 12 M

OR

9. a) Describe the following i) Austenitic stainless steels, 6 M
ii) Die steels
- b) Differentiate between Grey cast iron and Spheroidal Graphite cast iron. 6 M

UNIT – V

10. What are the uses of pure copper? Name some application of copper alloys and describe why the alloy is used for the particular application. 12 M

OR

11. a) Explain why the two phase titanium alloys are stronger than the single phase alpha alloys. 6 M

b) Write the merits and demerits of composite materials over conventional materials. 6 M