

R18

Code No: 153BC

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech II Year I Semester Examinations, December - 2019

MATERIAL SCIENCE AND METALLURGY

(Common to ME, MCT)

Time: 3 Hours

Max. Marks: 75

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 25. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b as sub questions.

PART - A

(25 Marks)

- 1.a) What is Atomic Packing Factor? [2]
- b) How is pearlite different from Bainite? [2]
- c) What is normalizing? [2]
- d) Why quenching is not done after nitriding? [2]
- e) What are the main constituents in brass and bronze? [2]
- f) Explain Screw Dislocation? [3]
- g) What is peritectoid reaction? How is different from peritectic reaction? [3]
- h) What is the importance of Isothermal Transformation diagram? [3]
- i) What is martempering? [3]
- j) What is Age Hardening? [3]

PART - B

(50 Marks)

- 2.a) Describe about Volume defects in materials. [5+5]
  - b) Write short notes on Slip systems. [5+5]
- OR
- 3.a) What is the importance of critically resolved shear stress and derive an equation for CRSS? [5+5]
  - b) Describe about point defects. [5+5]
- 4.a) Describe about eutectoid and eutectic reactions. [5+5]
  - b) Explain the terms Ledeburite, Austenite and Ferrite with respect to their structure and properties. [5+5]
- OR
- 5.a) With a neat sketch describe iron-iron carbide diagram. [5+5]
  - b) Describe about microstructural changes that occur during cooling of 0.4% C steel from liquid state. [5+5]
- 6.a) Draw TTT diagram for hypo eutectoid steel and describe briefly. [5+5]
  - b) What is Critical Cooling Rate and what is its importance? [5+5]

OR

- 7.a) Write about different types of annealing processes. [5+5]
- b) Describe about hardening and tempering treatments for steels. [5+5]

- 8.a) What are the differences between flame and induction hardening?  
b) Describe about carbo-nitriding.

[5+5]

OR

- 9.a) Describe the importance of CCT diagram when compared to TTT diagram?  
b) Draw CCT diagram of eutectoid steel and explain.

[5+5]

- 10.a) Describe briefly about Titanium Alloys.  
b) What are spheroidal cast irons? Explain its structure and properties.

[5+5]

OR

- 11.a) What are the properties of tool steels? Give any two examples with composition.  
b) Describe about malleable cast irons.

[5+5]

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