Code No: 133BG **R16**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech II Year I Semester Examinations, September/October -2023

METALLURGY AND MATERIALS SCIENCE

(Mechanical Engineering)

Time: 3 Hours **Max. Marks: 75**

Note: i) Question paper consists of Part A, Part B.

ii) Part A is compulsory, which carries 25 marks. In Part A, answer all questions.

iii) In Part B, Answer any one 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 co-ordination number? [2]

b) Distinguish between electron compounds and intermetallic compounds with examples. [3]

c) What is Lever rule? Explain. [2]

d) What is eutectic reaction? [3]

e) Why heat treatment is done for alloys? [2]

f) What is hardening? [3]

g) What is the chemical composition of cast iron? [2]

h) Distinguish between brass and bronze. [3]

i) What are crystalline ceramics? [2]

j) What are cermets? [3]

PART – B

(50 Marks)

2. Write short notes on the following:
a) Grains and grain boundaries
b)Types of solid solutions. [5+5]

OR

3.a) List out different types of Bravais lattice structures with their characteristics and examples.

b) Explain the governing rules for the formation of substitutional solid solutions. [6+4]

4.a) Explain and derive Gibb's phase rule.

b) Explain the eutectoid phase transformation reactions with examples. [5+5]

OR

5. What are the different solid state phase transformation reactions? Explain them in detail. [10]

6.a) Explain the construction of TTT diagrams of hypo eutectoid steels.

b) Explain the phase transformations obtained during cooling of eutectoid steel from austenite to room temperature under different cooling rates. [4+6]

OR

7. Draw Fe – Fe_3C diagram and explain all points, lines and areas. Explain three phase transformation reactions in the diagram. [10]

8.a) Distinguish between nodular cast iron and malleable cast iron.

b) Explain the composition, microstructure, properties and applications of nodular cast iron. [4+6]

OR

9.a) Give the classification of Cu and its alloys and write the important properties of copper and its alloys.

b) Explain the important properties and applications of titanium alloys. [5+5]

10.a) Explain the classification of composites and mention its applications.

b) Explain important properties and applications of ceramics. [5+5]

OR

11.a) What are polymers? Explain important properties and applications of polymers.

b) Explain the classification of polymers and give examples for each one of them. [6+4]

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