Code No: 153BC **R18**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech II Year I Semester Examinations, April/May - 2023
MATERIAL SCIENCE AND METALLURGY
(Common to ME, MCT)

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)	Define unit cell.	[2]
b)	Define slip.	[3]
c)	Define alloy.	[2]
d)	What is the purpose of constructing the phase diagrams?	[3]
e)	Define heat treatment power.	[2]
f)	Define spheroidising.	[3]
g)	What do you mean by continuous cooling curves?	[2]
h)	Define carbo-nitriding.	[3]
i)	Write the chemical composition of stainless steels.	[2]
j)	What are the applications of tool steels?	[3]

PART – B

(50 Marks)

2. Explain two types of line defects in crystals with the help of neat diagrams and their importance in determining the plastic deformation of the material. [10]

OR

3. Explain the procedure to find out critically resolved shear stress in a single crystal with the help of neat sketch. [10]

4. Explain the substitutional and interstitial solid solutions with neat sketches and suitable examples. [10]

OR

5. Construct the Iron Iron-carbide phase diagram to scale and label the phases in it. [10]

6. Explain the procedure to construct Isothermal transformation diagrams for Fe-C alloys. [10]

OR

7. Explain the purpose and procedure of the following heat treatment processes.
a) Normalizing
b) Tempering. [5+5]

8. Explain the vacuum and plasma hardening processes with neat sketches. [10]

OR

9. Explain the carburizing and nitriding processes with suitable chemical reactions that occur in these processes. [10]

10. List out the properties and applications of important aluminium and titanium alloys.[10]

OR

11. Explain the microstructure, properties and applications of malleable and gray cast irons. [10]

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