Roll No											

PRESIDENCY UNIVERSITY
BENGALURU

SET-A

SCHOOL OF ENGINEERING
END TERM EXAMINATION – MAY/JUNE 2024

Semester : Semester II
Course Code : MEC2016
Course Name : Material Science and Metallurgy
Program : B.Tech.

Date : Jun 18, 2024
Time : 01.00pm to 04.00pm
Max Marks : 100
Weightage : 50%

Instructions:
(i) Read all questions carefully and answer accordingly.
(ii) Question paper consists of 3 parts.
(iii) Scientific and non-programmable calculator are permitted.
(iv) Do not write any information on the question paper other than Roll Number.

PART A

ANSWER ANY FIVE QUESTIONS **5QX2M=10**

1. Name two types of phase diagrams.

(CO1) [Knowledge]

2. Define interstitial solid solution.

(CO2) [Knowledge]

3. Name 4 elements having FCC crystal structure.

(CO1) [Knowledge]

4. Define solid solutions.

(CO2) [Knowledge]

5. What is a vacancy in crystal structures?

(CO1) [Knowledge]

6. Define the Heat Treatment Process.

(CO3) [Knowledge]

7. Name 2 line imperfections.

(CO2) [Knowledge]

PART B

ANSWER ANY FIVE QUESTIONS **5QX10M=50**

8. Explain how hypereutectoid steel transforms from liquid phase to solid phase. Draw microstructure for at least 4 different points.

(CO2) [Comprehension]

9. What is dual-phase steel? Write 5 advantages of dual-phase steel over low-carbon steel.

(CO3) [Comprehension]

10. Write a brief note on titanium and its alloy.

(CO3) [Comprehension]

11. Explain the austenite to martensite transformation (fcc to bct crystal) in terms of crystal structure.

(CO4) [Comprehension]

12. Explain what is quenching. Why it is necessary to perform tempering after quenching of steel.

(CO4) [Comprehension]

13. Explain microstructure evolution during cooling of Cu-Ni alloy.

(CO4) [Comprehension]

14. Calculate the amount of pearlite and ferrite formed on cooling the steel containing 0.5 % C. For calculation refer to the iron-carbon phase diagram.

(CO3) [Comprehension]

PART C

ANSWER ANY TWO QUESTIONS **2QX20M=40**

15. Draw a $Fe - Fe_3C$ phase diagram (Temperature vs composition). Label all the phases and markinvariant points.

(CO3) [Application]

16. Draw a Cu-Ag eutectic phase diagram. Mark all the phases. Explain how hypo eutectoid alloy will transform from liquid to solid phase using microstructure.

(CO2) [Application]

17. Explain the steps involved in constructing the Time-Temperature-Transformation curve (T-T-T) for iron and steel. Draw a TTT curve for steel.

(CO3) [Application]