

Roll No



**PRESIDENCY UNIVERSITY
BENGALURU**

**SCHOOL OF ENGINEERING
END TERM EXAMINATION - JUN 2023**

Semester : Semester II - 2022

Course Code : MEC2016

Course Name : Sem II - MEC2016 - Material Science and Metallurgy

Program : MEC

Date : 21-JUN-2023

Time : 1.00PM - 4.00PM

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 ALL THE QUESTIONS

(10 X 3 = 30M)

1. Draw the unary phase diagram for pure nickel.

(CO2) [Knowledge]

2. How many types of phase diagrams are there? Name them.

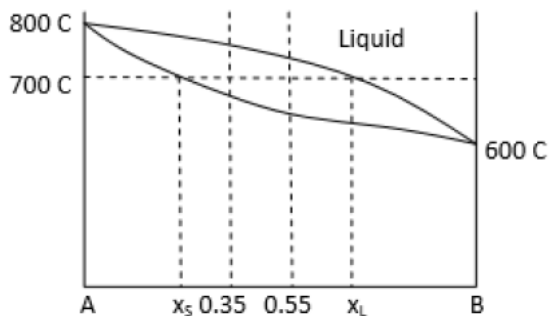
(CO1) [Comprehension]

3. Mention any three characteristics of Covalent bond.

(CO4) [Knowledge]

4.

A schematic binary phase diagram of this system is shown below:

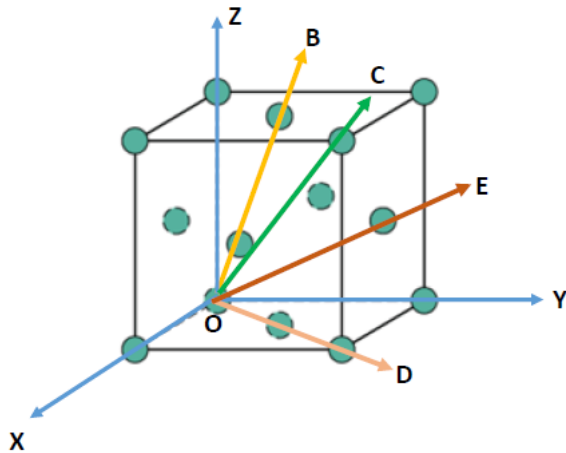


Two metals A (melting point 800C) and B (melting point 600C) form a binary isomorphous system. An alloy having 35% B has 75% solid and rest liquid whereas an alloy having 55%B has 25% solid at 700C. Estimate the composition of solidus and liquidus at the above temperature.

(CO1) [Knowledge]

5. Differentiate between binary isomorphous phase diagram and binary eutectic phase diagram. (CO2) [Knowledge]
6. Show the heating curve of pure Cu and heating curve of Cu-Ni system. (CO1) [Knowledge]

7.



Find the miller indices for the direction OD and OE as shown in the figure. (CO1) [Knowledge]

8. Mention any three properties of cementite. (CO2) [Knowledge]
9. Show the dimensional range for surface defect and volume defect. (CO3) [Knowledge]
10. What is grain boundary? Show with a neat diagram. (CO1) [Knowledge]

PART B

ANSWER ALL THE QUESTIONS

(2 X 10 = 20M)

11. Mention the full classification of various heat treatment processes. (CO3) [Comprehension]
12. Draw a binary eutectic phase diagram and show all the phases present in it. Also show the eutectic point in it. (CO2) [Comprehension]

PART C

ANSWER ALL THE QUESTIONS

(5 X 10 = 50M)

13. For the following miller indices for vectors, show its corresponding vector in a simple cubic unit cell.
 1) [1 1 1]
 2) [1 1 2]
 3) [2 1 1]
 4) [1 2 1]
 5) [2 2 2] (CO1) [Application]
14. Show all the three invariant points on the phase diagram and mention its temperature and composition also. (CO4) [Application]
15. Draw and explain the microstructure development in a Binary Eutectic phase diagram for any two cases as discussed in the subject. (CO3) [Application]
16. Explain the following heat treatment processes and show the same in phase diagram.
 a) Full Annealing
 b) Normalizing (CO1) [Application]
17. Draw a neat diagram to show the eutectoid point in a Iron-Iron Carbide phase diagram. Mention its reaction and find the percentage of each phase present at the point. (CO2) [Application]