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PRESIDENCY UNIVERSITY BENGALURU

SCHOOL OF ENGINEERING

MAKE UP EXAMINATION - JULY 2024

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| **Semester :III** | **Date : 09-07-24** |
| **Course Code : MEC2016** | **Time :1:30 PM -4:30PM** |
| **Course Name : Material Science and Metallurgy** | **Max Marks :100** |
| **Program : B.Tech.** | **Weightage :50%** |

**Instructions:**

1. *Read all questions carefully and answer accordingly.*
2. *Question paper consists of 3 parts.*
3. *Scientific and non-programmable calculator are permitted.*
4. *Do not write any information on the question paper other than Roll Number.*

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| **PART A** | | | |
| **ANSWER ANY 5 QUESTIONS 5Q X 2M=10M** | | | |
| 1 | Write properties of metallic bonds | (CO 1) | [Knowledge] |
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| 2 | Name common types of point imperfections. | (CO 1) | [Knowledge] |
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| 3 | Define solid solutions. | (CO 2) | [Knowledge] |
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| 4 | Name 2 line imperfections. | (CO 1) | [Knowledge] |
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| 5 | Name 4 elements having BCC crystal structure. | (CO 2) | [Knowledge] |
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| 6 | Define interstitial solid solution. | (CO 1) | [Knowledge] |
| 7 | What is a vacancy in crystal structures? | (CO 2) | [Knowledge] |
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| **PART B** | | | |
| **ANSWER ANY 5 QUESTIONS 5Q X 10M=50M** | | | |
| 8 | Explain how hypereutectoid steel transforms from liquid phase to solid phase. Draw microstructure for at least 4 points every step. | (CO 2) | [Comprehension] |
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| 9 | A 40 wt.% Sn-60 wt.% Pb alloy is at 200°C. Find   1. Phases present 2. Compositions of phases 3. The relative amount of each phase. | (CO 2) | [Comprehension] |
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| 10 | Explain microstructure evolution during cooling of Cu-Ni alloy. | (CO 3) | [Comprehension] |
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| 11 | What is a solid solution? Mention the Hume-Rothery rule applicable to substitutional solid solution. | (CO 3) | [Comprehension] |
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| 12 | Describe briefly BCC, FCC and HCP crystal systems considering the number of atoms, packing efficiency and coordination number. | (CO 2) | [Comprehension] |
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| 13 | Describe the steps involved in calculating the miller indices of planes in cubic unit cells. | (CO 2) | [Comprehension] |
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| 14 | Draw a eutectic phase diagram and mark all the phases, boundaries and invariant reactions if any. | (CO 3) | [Comprehension] |
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| **PART C** | | | |
| **ANSWER ANY 2 QUESTIONS 2Q X 20M=40M** | | | |
| 14 | Draw a Fe-FeC3 phase diagram (Temperature vs composition). Label all the phases and mark invariant points. | (CO 4) | [Application] |
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| 15 | Classify all seven crystal systems, and mention relation in a,b,c and, α, β, γ. Draw figures for each classification. | (CO 3) | [Application] |
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| 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. | (CO 4) | [Application] |
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