**MET-305-PHYSICAL METALLURGY**

**BIFURCATION FOR UNIT TESTS**

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| **S.NO.** | **MAJOR TOPICS** | **SHORT TYPE** | **ESSAY TYPE** |
| **UNIT TEST-I** | | | |
| 1 | Structure of Metals and Alloys | 1 | 1 |
| 2 | Solidification of Metals and Alloys | 2 | 1.5 |
| 3 | Binary Thermal Equilibrium Diagrams | 2 | 2 |
| **UNIT TEST-II** | | | |
| 4 | Study of Iron-Carbon System | 2 | 1 |
| 5 | Study of important Non-Ferrous binary Systems | 1 | 1.5 |
| 6 | Microscopic and Macroscopic examination of Metals and Alloys | 2 | 1 |

**C-14**

**D.MET.E. III SEMESTER**

**SUBJECT CODE: MET-305**

**SUBJECT: PHYSICAL METALLURGY**

**UNIT TEST-1**

**PART-A 3x2=6m**

***Note:*** *Answer all the questions. Each question carries* ***two*** *marks*

1. Define space lattice and unit cell?
2. Define phase and solid solution?
3. Mention phase rule and explain the terms?

**PART-B 7x2=14m**

***Note:*** *Answer any two questions. Each question carries* ***seven*** *marks.*

1. Calculate the packing factor for BCC?
2. Explain the process of crystallization? W. r. t (a) nucleation

(b) Growth

(c) Under cooling

6. Explain the construction of equilibrium for an Isomorphous system?

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**D.MET.E III SEMETER**

**MET-305 PHYSICAL METALLURGY**

**UNIT TEST-I**

**PART-A 3x2=6M**

**Note:** Answer all the questions. Each question carries **two** marks 1. Define Lattice parameter and Co-ordination number? 2. Define dendritic structure? 3. Define Liquidus and solidus by diagram?

**PART-B 7x2=14M**

**Note:** Answer any two questions. Each question carries **seven** marks

1. Calculate the packing factor for FCC?
2. Explain Homogeneous Nucleation and Heterogeneous Nucleation?

6. Explain the construction of Equilibrium diagram of Electronic system?

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**D.MET.E. III SEMESTER**

**SUBJECT CODE: MET-305**

**SUBJECT: PHYSICAL METALLURGY**

**UNIT TEST-II**

**PART-A 3x2=6m**

***Note:*** *Answer all the questions .Each question carries two marks.*

1. Define Allotropy and Polymorphism?

2. Define Season cracking and mention with its remedies?

3. Define Macroscopic and Microscopic examination?

**PART-B 7x2=14m**

***Note:*** *Answer any* ***two*** *questions. Each question carries* ***seven*** *marks*.

4. Explain the phase diagram of iron-iron carbide system?

5. (a) List out different types of brasses?

(b) Explain properties and applications of Bebbitts?

6. Explain the principle & operation of a Metallurgical microscope with the help of a line diagram?

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**C-14**

**D.MET.E III SEMETER**

**MET-305 PHYSICAL METALLURGY**

**UNIT TEST-II**

**PART-A 3x2=6M**

**Note:** Answer all the questions. Each question carries **two** marks

1. Define Cooling curve for Pure iron?
2. List out the different types of Brasses?
3. Define Etching and give one example for etchant?

**PART-B 7x2=14M**

**Note:** Answer any two questions. Each question carries **seven** marks

1. Explain three invariant reaction in Iron-Iron Carbide equilibrium diagram?
2. Explain equilibrium diagram for Copper- Tin system?
3. Explain optical Metallurgical microscope heat line diagram?

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**D.MET.E. III SEMESTER**

**SUBJECT CODE: MET-305**

**SUBJECT: PHYSICAL METALLURGY**

**MODEL PAPER-1**

**Time: 3 hours Total marks: 80m**

**PART-A**

***Note****: 1. Answer all the questions each question carries* ***three*** *marks. 2. Answer should be brief and straight to the point and shall not exceed Five simple sentences*

1. Define space lattice and unit cell?
2. Define phase and solid solution?
3. Mention phase rule and explain the terms?
4. Define allotropy and polymorphism?
5. Define season cracking and mention its remedies?
6. Define microscopic examination and macroscopic examination?
7. Draw the cooling curves for a pure metal and alloy?
8. Mention lever rule and its applications?
9. Define cast iron and list out the types of cast irons?
10. Mention the importance of etching?

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**PART-B 5x10=50m**

**Note:** *1.Answer any* ***five*** *questions and each questions carries* ***ten*** *marks 2. Answer should be comprehensive and the criteria for valuation are the Content but not the length of the answer.*

1. Calculate the packing factor for BCC?
2. Explain the process of crystallization? W. r. t (a) nucleation

(b) Growth

(c) Under cooling

13. Explain the construction of equilibrium diagram of an isomorphous system?

14. Explain the phase diagram of iron-iron carbide system?

15. Explain (a) Different types of brasses

(b) Season cracking with its remedies

16. Explain the principle and operation of a metallurgical microscope with the help of line diagram?

17. Explain (a) Homogeneous nucleation

(b) Heterogeneous nucleation

(c) Mention the composition and applications of ‘Babbitts’

18. Explain the phase transformation during slow cooling for eutectoid, hyper and hypo eutectoid steels with the help of a neat diagram?

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**D.MET.E. III SEMESTER**

**SUBJECT CODE: MET-305**

**SUBJECT: PHYSICAL METALLURGY**

**MODEL PAPER-2**

**Time: 3 hours Total marks: 80m**

**PART-A 10x3=30m**

***Note****: 1. Answer all the questions each question carries* ***three*** *marks. 2. Answer should be brief and straight to the point and shall not exceed not* ***five*** *simple sentences*

1. Define Metallic bond?
2. Define dendrite growth?
3. Define cooling curve?
4. List out the binary systems?
5. Define eutectic reaction and give one example?
6. Mention the allotropic transformation in pure iron and curie temperature?
7. Define upper and lower critical temperature?
8. Draw the microstructures of babbits?
9. List out various parts of microscope?
10. Distinguish between optical and electron microscope?

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**PART-B 5x10=50**

**Note:** 1**.** Answer any **five** questions and each question carries ten marks

2. Answer should be comprehensive and the criteria for valuation are the content but not the length of the answer.

11. Calculate the c/a ratio and packing factor for HCP?

12. (a) Define and classify solid solutions?

(b) Define the rules governing for the formation of solid solutions?

13. Explain the equilibrium diagram of eutectic system with example?

14. Define lever rule and explain how to calculate the amount of phases at various temperatures using lever rule?

15. Explain (a) Dendrite growth and cooling

(b) Equilibrium diagram for al-si system

16. Explain the isothermal transformation in iron-iron carbide system?

(a) Peritectic reaction (b) Eutectic reaction (c) Eutectoid reaction

17. Explain copper-zinc equilibrium diagram up to 50% zinc?

18. (a) Explain the working principle of scanning and transmission electron microscope

(b) Explain various steps involved in preparation of specimen for microscopic examination?

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