

Reg. No.

Question Paper Code

12127

**B.E. / B.Tech - DEGREE EXAMINATIONS, APRIL / MAY 2023**

Second Semester

**Mechanical Engineering**

(Common to Mechanical and Automation Engineering)

**20BSPH202 - PHYSICS OF MATERIALS**

(Regulations 2020)

Duration: 3 Hours

Max. Marks: 100

**PART - A (10 × 2 = 20 Marks)**

Answer ALL Questions

- |   | <i>Marks,</i><br><i>K-Level, CO</i> |
|---|-------------------------------------|
| 1. State phase rule.                                | 2,K1,CO1                            |
| 2. What is lever rule?                              | 2,K1,CO1                            |
| 3. What is eutectoid reaction?                      | 2,K1,CO2                            |
| 4. What is iron-carbon equilibrium diagram?         | 2,K1,CO2                            |
| 5. What is creep?                                   | 2,K1,CO3                            |
| 6. Difference between brittle and ductile fracture. | 2,K2,CO3                            |
| 7. What is anti-ferromagnetism?                     | 2,K1,CO4                            |
| 8. Define hysteresis.                               | 2,K1,CO4                            |
| 9. What is meissner effect?                         | 2,K1,CO5                            |
| 10. What are composite materials?                   | 2,K1,CO5                            |

**PART - B (5 × 13 = 65 Marks)**

Answer ALL Questions

11. a) Explain isomorphous (Cu – Ni) phase diagram with its microstructure. 13,K2,CO1
- OR**
- b) Explain the eutectic phase diagram with the various microstructural changes on cooling. 13,K2,CO1
12. a) Sketch the Iron carbon / Fe – Fe<sub>3</sub>C phase diagram and explain the various phases and invariant reactions in it. 13,K2,CO2
- OR**
- b) State and explain Fick's first and second law of diffusion. 13,K2,CO2
13. a) How hardness of the material determined using Brinell hardness and Vicker's micro hardness test? Explain in detail. 13,K2,CO3

**OR**

*K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create*

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- b) Explain the strengthening methods in detail. 13,K2,CO3
14. a) Explain in detail about domain theory of ferromagnetism. 13,K2,CO4
- OR**
- b) Explain the structure, properties and applications of ferrites. 13,K2,CO4
15. a) Describe the different types of polarization. 13,K2,CO5
- OR**
- b) Write note on shape memory alloys. Give its advantages and limitations. 13,K2,CO5

**PART - C (1 × 15 = 15 Marks)**

16. a) Explain in detail about applications of nanophase materials. 15,K2,CO6
- OR**
- b) List out the applications of metallic glasses. 15,K2,CO6