

Reg. No.

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B.E. / B.TECH. DEGREE EXAMINATIONS, MAY 2023

Second Semester

PH18251 – ENGINEERING MATERIALS

(Automobile Engineering)

(Regulation 2018A)

Time: Three Hours

Maximum : 100 Marks

CO1 Understand the fundamentals of molten state of Metals and alloys and their properties.

CO2 Infer the concepts of phases and properties of metals /alloys hardness and their Heat treatment.

CO3 Comprehend the fundamentals of semiconductors and electron dependent properties.

CO4 Recall the knowledge on Dielectric, Magnetic and Superconducting materials.

CO5 Inter relate the knowledge on ceramics and new Engineering materials like Nano materials and Bio materials.

Answer ALL questions

PART A - (10 X 2 = 20 Marks)

	CO	RBT
1. What is Hume Rothery rule?	1	2
2. Apply lever rule in Binary phases.	1	3
3. Why the materials are Nitrated?	2	2
4. State Fick's law of diffusion.	2	2
5. Distinguish between Intrinsic and Extrinsic Semiconductor.	3	2
6. Give few applications of Hall Effect.	3	2
7. Define polarisability. Give its unit.	4	2
8. Calculate polarisability of an atom of radius 0.158 nm.	4	3
9. Classify ceramic materials.	5	2
10. What is Pseudo Elastic Effect?	5	2

PART B - (5 X14 = 70 Marks)

11. (a) (i) Discuss Phase rule with suitable Examples. (6) 1 3
(ii) Explain binary Isomorphous system and Phases present in it. (8) 1 3

(OR)

- (b) What is Peritectic phase diagram? Draw a typical equilibrium diagram for Eutectic type of system with limited solid solubility and explain its important features. (14) 1 3
12. (a) (i) Describe Fick's law of diffusion and types of diffusion. (6) 2 3
(ii) Explain any three methods of hardening a metal. (8) 2 3
- (OR)**
- (b) Draw TTT diagram and explain the features of Iron at various temperatures, time and transformations. (14) 2 3
13. (a) Derive an expression for intrinsic carrier concentration in a semiconductor applying law of mass action. (14) 3 3
- (OR)**
- (b) (i) What is Hall Effect? With necessary theory derive an expression for Hall coefficient. (10) 3 3
(ii) With a neat diagram, Discuss the experimental determination of Hall coefficient (4) 3 3
14. (a) (i) What are the energies involved in the domain formation in ferromagnetic materials? (8) 4 3
(ii) Based on domain theory of ferromagnetism, explain Hysteresis curve. (6) 4 3
- (OR)**
- (b) Derive an expression for internal field in a dielectric material and deduce Clausius-Mosotti relation. (14) 4 3
15. (a) With a neat diagram explain production, properties and applications of Metallic Alloys. (14) 5 2
- (OR)**
- (b) What are shape memory alloys? Write down their characteristics. List out any four applications of shape memory alloys. (14) 5 2

PART C - (1 X10 = 10 Marks)

16. Discuss with an experiment how resistance varies with temperature in an intrinsic semiconductor. (10) 3 3
