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B.E. / B.TECH. DEGREE EXAMINATION, MAY 2017
SECOND SEMESTER

PH16252 – PHYSICS OF MATERIALS

(Biotechnology)

(Regulation 2016)

Q. Code: 820283

Time: Three Hours

Maximum : 100 Marks

Answer **ALL** questions

PART A - (10 X 2 = 20 Marks)

1. State Fick's diffusion law.
2. What are the uses of Phase rule?
3. Give the physical significance of wave function.
4. Fermi temperature of a metal is 24600 K. Calculate the Fermi velocity.
5. Explain the concept of hole in semiconductor.
6. Define dielectric loss.
7. What is Bohr magneton? Give its value.
8. Calculate the electronic polarizability of argon atom whose $\epsilon_r = 1.0024$ at NTP and $N = 2.7 \times 10^{25}$ atoms/m³.
9. What are biomaterials?
10. Mention few applications of Copper alloy.

PART B - (5 X 16 = 80 Marks)

11. (a) What is Phase diagram? Explain the phase diagram (16)
corresponding to binary alloy system.

(OR)

- (b) (i) Describe Bridgman method of crystal growth. Mention (8)
advantages and disadvantages.
- (ii) Explain the following heat treatment processes and its (8)
advantages.
- a. Carburizing b. Nitriding
12. (a) (i) Derive Schrodinger time independent and time dependent (12)
wave equations.
- (ii) Explain (a) Meissner effect (b) Persistent current (2+2)

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(OR)

- (b) (i) Explain type-I and type-II superconductors. (8)
(ii) With a neat sketch, derive an expression for density of states. (8)
13. (a) Obtain an expression for density of electrons in the conduction band of a n-type extrinsic semiconductor by assuming Fermi Dirac distribution function. (16)

(OR)

- (b) (i) Explain the phenomenon of Hall effect. Derive an expression for Hall coefficient in n-type semiconductor. Describe an experiment for the measurement of Hall coefficient. (14)
(ii) Find the Hall coefficient of a specimen in a Si doped with 10^{20} phosphor atoms m^{-3} . (2)
14. (a) (i) Describe the structure of ferrites. Mention its applications. (8)
(ii) Explain ferromagnetic domain theory. Explain the hysteresis on the basis of domain theory of ferromagnetism. (8)

(OR)

- (b) (i) What is meant by local field in a dielectric and how is it calculated for a cubic structure? Deduce Clausius-Mosotti relation. (12)
(ii) The magnetic field strength of copper is 10^6 ampere/metre. If the magnetic susceptibility of copper is -0.8×10^{-5} . Calculate the magnetic flux density and magnetization in copper. (4)
15. (a) (i) Explain the different ceramic materials and their properties and applications. (10)
(ii) Describe functioning of Relaxor. (6)

(OR)

- (b) (i) Write a note on (a) hydroxyapatite (b) Silicone. (10)
(ii) Describe the properties, types and uses of metallic glasses. (6)