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INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Four Year B.Tech I Semester Supplementary Examinations - July, 2018

Regulation: IARE – R16

ENGINEERING PHYSICS

Time: 3 Hours

(Common to CSE | IT | ECE | EEE)

Max Marks: 70

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the question must be answered in one place only

UNIT – I

- (a) What is polarization? Explain different types of polarizations mechanisms with suitable diagram and formula. [7M]

(b) Establish the relation between dielectric constant and its dielectric susceptibility. [7M]
- (a) Explain magnetic dipole moment, magnetization and magnetic susceptibility with suitable diagram and formula. [7M]

(b) The susceptibility of paramagnetic $FeCl_3$ is 3.7×10^{-3} at 27^0 C. What will be the value of its relative permeability at 200^0K and 500^0K . [7M]

UNIT – II

- (a) Obtain an expression for energy density of radiation under equilibrium condition in terms of Einstein's coefficients also explain with conditions leading to laser action. [7M]

(b) List the applications of laser in industry and medicine. [7M]
- (a) Explain the construction and working of a semiconductor laser with suitable diagram. [7M]

(b) Discuss in brief the characteristics of a laser beam. [7M]

UNIT – III

- (a) Discuss the variation of density of states for various quantum structures. [7M]

(b) How nonmaterial's can be prepared using chemical vapour deposition method? Analyze. [7M]
- (a) The size of the particle decides the various properties like electrical ,mechanical, magnetic of the nanomaterials? Justify. [7M]

(b) Explain TEM. How it is helpful in characterization of nonmaterials. [7M]

UNIT – IV

- (a) Explain the de Broglie hypotheses for the matter waves and illustrate the physical significance of the wave function. [7M]

(b) Describe the construction and working of the Davisson-Germer experiment(D-G) , and hence to prove the wave nature of the electron. [7M]

8. (a) Set up time independent Schrödinger wave equation for a particle and explain Eigen function and Eigen values. [7M]
- (b) Compute the de Broglie wavelength for a neutron moving with one tenth part of the velocity of light. ($m_n=1.674 \times 10^{-27}$ kg). . [7M]

UNIT – V

9. (a) Prove that the fermi level in an intrinsic semiconductor is half of its energy gap. [7M]
- (b) Explain Hall Effect. Obtain the Hall voltage in terms of Hall coefficient for a P type semiconductor. [7M]
10. (a) Derive an expression for the carrier concentration of an intrinsic semiconductor. Explain the concept of hole in semiconductors. [7M]
- (b) Explain the fermi level existence in case of p type and n type semiconductors at $T=0K$ using the energy level diagram. [7M]