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# INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

B.Tech I Semester End Examinations (Supplementary) - February, 2018

Regulation: IARE – R16

ENGINEERING PHYSICS

Common for (CSE | IT | ECE | EEE)

Time: 3 Hours

Max Marks: 70

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Answer ONE Question from each Unit

All Questions Carry Equal Marks

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

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## UNIT – I

- (a) What are ferromagnetic materials? Discuss the hysteresis loop with B-H curve. [7M]

(b) Sulphur is elemental solid dielectric whose dielectric constant is 3.4. Assuming a cubic lattice for its structure, calculate the electronic polarizability of sulphur. Given that sulphur density is  $2.07 \times 10^3 \text{ kg/m}^3$  and atomic weight is 32.07. [7M]
- (a) What is Magnetic dipole moment? Discuss the classification of magnetic materials. [7M]

(b) An elemental solid dielectric material has polarizability  $7 \times 10^{-40} \text{ F} \cdot \text{m}^2$ . Assuming the internal field to be Lorentz field. Calculate the dielectric constant for the material if the material has  $3 \times 10^{28} \text{ atoms/m}^3$ . [7M]

## UNIT – II

- (a) Explain the construction and working of ruby laser with neat diagram. [7M]

(b) Discuss the conditions for laser action and draw block diagram of laser system. [7M]
- (a) Give the construction and working of He-Ne laser. [7M]

(b) Calculate the energy difference in eV between the two energy levels of Neon atoms of He-Ne laser if the transition between these levels results in emission of light of wavelength = 632.8nm [7M]

## UNIT – III

- (a) Explain briefly bottom-up fabrication of nanomaterial by sol-gel method. [7M]

(b) Explain quantum confinement with respect to principle of nanotechnology. [7M]
- (a) Explain chemical vapour deposition to synthesize nanomaterials. [7M]

(b) Explain the characterization of nanomaterial by XRD. [7M]

#### UNIT – IV

7. (a) What are the properties of matter waves? Obtain the expression of wave function for a particle in one dimensional potential well of infinite height. [7M]  
(b) Calculate the velocity and kinetic energy of an electron of wavelength  $1.66 \times 10^{-10} \text{m}$ . [7M]
8. (a) Describe Davisson and Germer experiment to verify matter waves. [7M]  
(b) Give the physical significance of wave function. [7M]

#### UNIT – V

9. (a) Derive an expression for the carrier concentration in p -type semiconductor, [7M]  
(b) The energy gap of Ga As is 1.42 eV. The effective masses of electrons and holes are:  $0.067 m_0$  and  $0.48 m_0$  respectively. Calculate the concentration of electrons at 300 K. [7M]
10. (a) Explain Hall effect and mention its uses. [7M]  
(b) Derive an expression for number of electrons per unit volume in the conduction band of n type semiconductor. [7M]

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