Hall Ticket No | | | | | | | | | | |

Question Paper Code: AHS006

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

B.Tech I/II Semester Supplementary Examinations - July, 2017

Regulation: IA-R16

ENGINEERING PHYSICS

[Common for : I Semester (CSE, IT, ECE and EEE)]

Time: 3 Hours **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

1. (a) Define the terms dipole moment and polarization. Discuss the different polarizations mechanisms in dielectrics. **[8M]**

   (b) If a NaCl crystal is subjected to an electric field of 1000 V/m and the resulting polarization is $4.3 \times 10^{-8}\, C/m^2$, calculate the dielectric constant of NaCl. **[6M]**

2. (a) What is internal field? Derive an equation for internal field in case of one dimensional array of atoms in dielectric solids. **[8M]**

   (b) A silicon material is subjected to a magnetic field of strength 1000 A/m. If the magnetic susceptibility of silicon is -0.3x10^{-5}, calculate its magnetization. Also evaluate the magnetic flux density of the field inside the material. **[6M]**

UNIT – II

3. (a) Obtain an expression for energy density of radiation under equilibrium condition in terms of Einstein coefficients. **[8M]**

   (b) Explain the three major engineering applications of laser. **[6M]**

4. (a) Explain the construction of He-Ne laser with neat diagram.Discuss its working in detail with energy level diagram. **[8M]**

   (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 λ= 632.8 nm **[6M]**

UNIT – III

5. (a) What are nanomaterials? Explain their electrical and magnetic properties. **[7M]**

   (b) Explain briefly quantum confinement nature of nano materials. **[7M]**

6. (a) Explain qualitatively why nanomaterials are significantly different from bulk materials of the same chemical composition. **[7M]**

   (b) Explain briefly chemical vapour deposition method of fabrication of nano materials with neat sketch. **[7M]**

UNIT – IV

7. (a) What are the properties of wave functions? Obtain the expression energy Eigen values an energy functions for a practice in one dimensional potential well of infinite height. **[7M]**

   (b) What are matter waves? Derive the expression for de-Broglie wavelength. **[7M]**

8. (a) Describe Davisson and Germer experiment to verify matter waves. **[7M]**

   (b) An electron is bond in one dimensional potential well of width 0.12 nm. Find the energy values in the ground state and also the first two excited state in eV. **[7M]**

UNIT – V

9. (a) Define Fermi level in case of semiconductors and mention its position in intrinsic and extrinsic semiconductors at 0 K. **[7M]**

   (b) The effective density of states for electrons and holes in silicon at 300 K are: $2.8 \times 10^{19} cm^{-3}$ and $1.04 \times 10^{19} cm^{-3}$ respectively. The energy gap is 1.1 eV. Calculate the intrinsic carrier concentration at 450 K. **[7M]**

10. (a) State and explain Hall effect and derive the expression for Hall coefficient. **[8M]**

    (b) A silicon plate of thickness 1mm, breadth 10mm and length 100mm is placed in a magnetic field of $0.5\, wb/m^2$ acting perpendicular to its thickness. If 10^{-2} A current flows along its length, calculate Hall voltage developed if Hall coefficient is $3.66 \times 10^{-4} m^3$/coulomb. **[6M]**

– ○ ○ ◯ ○ ○ –