PVP 14

Code: ME1T3, EE1T3, EC1T3, AE1T3

I B. Tech - I Semester – Regular/Supplementary Examinations
November 2017

ENGINEERING PHYSICS
(Common for AE, ME, EEE, ECE)

Duration: 3 hours Max. Marks: 70

PART – A

Answer ***all*** the questions. All questions carry equal marks

11x 2 = 22 M

1.

a) What do you mean by duality of matter?
b) What is the significance of wave function?
c) Define atomic packing factor.
d) What are Miller Indices?
e) Write a note on Fermic – Dirac distribution function.
f) Explain the terms dielectric polarization and susceptibility.
g) What is Fermi level? Draw and indicate the Fermi level in n-type & p- type semiconductors.
h) Differentiate between soft and hard magnetic materials.
i) What is meant by population inversion? How is it achieved in practice?
j) Write a note on Numerical Aperture.
k) What is the origin of the differences in the properties exhibited by nanostructures and the Bulk materials?

PART – B

Answer any ***THREE*** questions. All questions carry equal marks.
3 x 16 = 48 M

2.a) Describe the Davision & Germer experiment for the study of electron diffraction. Discuss the results obtained. 8 M

b) State Heisenberg Uncertainty principle. 4 M

c) Evaluate the energy of the lowest three levels for an electron in a square well of width $3A^{o}$. 4 M

3.a) Evaluate the atomic packing fraction of a simple cubic, body centered cubic and face centered cubic structures. 6 M

b) Derive the expression for the inter planar spacing between two parallel planes with Miller indices (h k l) for a cubic lattice. 5 M

c) Calculate the inter planar spacing for (2 3 1) plane of an FCC structure whose atomic radius is 0.175 nm. 5 M

4.a) Outline the classical free electron theory of metals. How is the conductivity of conductors related to the relaxation time? 6 M

b) Obtain the Clausius – Mosotti formula relating macroscopic dielectric constant with microscopic polarizabilities. 6 M

c) An electric field of 10^5 V/m is applied on a sample of neon at NTP. Calculate the polarisation in each atom. Given dielectric constant is 1.000134. 4 M

5.a) Deduce the expression for carrier concentration in an intrinsic semiconductor. What are donor and acceptor atoms? 6 M

b) What is hysteresis? Explain the use of a hysteresis curve. What type of magnetic material is suitable for transformer cores? 6 M

c) A magnetizing field of 1000 A/m produces a magnetic flux of $2x10^{-5}$ Weber in a bar of iron of 0.2 cm^2 cross section. Calculate permeability and susceptibility of the bar. 4 M

6.a) Explain with the help of a neat diagram the construction and working of Ruby LASER. 6 M

b) Discuss the attenuation and dispersion of signals in optical fibers. 6 M

c) The refractive index of core and cladding for a step index fiber are 1.52 and 1.41 respectively. Calculate the critical angle and the numerical aperture. 4 M