Hall Ticket No: | | | | | | | | | | | **Question Paper Code :**

ANIL NEERUKONDA INSTITUTE OF TECHNOLOGY & SCIENCES
(AUTONOMOUS)

B. Tech II Semester Regular Examinations May - 2016

(Regulations: R15)

APPLIED PHYSICS
(For ECE, EEE & Mechanical)

Date: **Time: 3 hours** **Max Marks: 60**

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) i. How the magnetic moment arises in the magnetic materials (2M)
   ii. What are the significant features of the hysteresis curve (2M)
   b) Describe the properties and applications of Dia, Para and Ferro magnetic materials (8M)

OR

2. a) i. Explain Silsbee's rule (2M)
   ii. The critical field for Niobium is $1x10^4$ A/m at 8K and $2x10^5$ A/m at 0^oK. Calculate the transition temperature of the element. (2M)
   b) Discuss the type-I and type-II superconductors with suitable example. (8M)

UNIT-II

3. a) i. Explain the terms dielectric constant and dielectric loss (2M)
   ii. Calculate the electric displacement and polarization of a dielectric material having dielectric Constant 4 and an external applied field 10^6 V/m. (Given $\varepsilon_0 = 9x10^{-12}$ F/m) (2M)
   b) Derive the expression for electric, ionic and orientation polarizabilities. (8M)

OR

4. a) i. Derive the Classius-Mossotti relation. (2M)
   ii. A solid elemental dielectric with density of $3x10^{28}$atoms/m^3 shows an electronic polarizability of 10^{-40} F/m^2.Assuming the Lorentz field, calculate the dielectric constant of the material (2M)
   b) Explain the effect of frequency on different types of polarizabilities. (8M)

UNIT-III

5 a) i. How the nano-phase materials are differ from bulk materials? Give the reasons. (2M)

ii. Write some applications of nano- phase materials. (2M)

b) Explain the synthesis of nano-phase materials by CVD and Sol-Gel methods. (8M)

OR

6. a) i. Write the principle of X-ray florescences. (2M)

ii. What is the distance between adjacent Miller planes if the first order reflection from X-rays of wavelength $2.29A^{o}$ occurs at $27^{o}8^{1}$. (2M)

b) Explain the principle and working of Scanning Electron Microscopy. (8M)

UNIT-IV

7. a) i. Define the terms Space lattice and Bravais lattice (2M)

ii. Calculate the interplanar spacing for a (321) plane in a simple cubic lattice whose lattice constant is $4.2x10^{-8}$cm. (2M)

b) Explain the seven crystal structure systems. (8M)

OR

8. a) i. What are Miller indices? Draw the planes for which the miller indices are (112) & (221) (2M)

ii. A crystal plane intercepts the crystallographic axes of the following multiples of unit distances 3/2, 2 & 1. What are the miller indices of the plane? (2M)

b) Discuss the Simple, Body centered and Face centered cubic crystal structures (8M)

UNIT-V

9. a) i. Define the terms Fermi level and Hall Effect. (2M)

ii. The resistivity of doped silicon material is $9x10^{-3}$ Ω-m and the Hall coefficient is $3.6x10^{-4}$ m^3/C. assuming single carrier concentration, find the mobility and density of charge Carrier. (2M)

b) Derive the expression for carrier concentration in intrinsic semiconductors (8M)

OR

10. a) i. Draw the neat diagram of Volt-Ampere characteristics of P-N junction diode.

ii. What is the ratio of current for a forward bias of 0.05 V to the current for the same magnitude of Reverse bias at room temperature for Ge diode (2M)

b) Discuss the LED, LCD and Photo Diode. (8M)

***

Hall Ticket No: | | | | | | | | | | | **Question Paper Code :**

ANIL NEERUKONDA INSTITUTE OF TECHNOLOGY & SCIENCES
(AUTONOMOUS)

B. Tech II Semester Regular Examinations May - 2016

(Regulations: R15)

APPLIED PHYSICS
(For ECE, EEE & Mechanical)

Date: **Time: 3 hours** **Max Marks: 60**

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) i. Define the terms hysteresis loss and anti-ferromagnetism. (2M)
   ii. Write a short notes on Weiss domain theory (2M)
   b) Discuss the properties and applications of Ferro and ferri magnetic materials (8M)

OR

2. a) i. Explain flux quantization (2M)
   ii. A super conducting material has a critical temperature of 3.7 K in Zero magnetic field of 0.0306 T at 0^oK . Find the critical field at 2K? (2M)
   b) Differentiate between the type-I and type-II superconductors with suitable examples. (8M)

UNIT-II

3. a) i. Derive an expression for internal fields in dielectric materials (2M)
   ii. Calculate the relative permittivity of NaCl which is subjected to an external electric field of 1000 V/m and resulting polarization is $4.3x10^{-8}cm^{-2.}$ (2M)
   (Given $\varepsilon_0 = 8.85\ x10^{-12}$ F/m)
   b) Derive the expressions for electric, ionic and oriental polarizabilities. (8M)

OR

4 a) i. Write a note on ferroelectric materials (2M)
   ii. Calculate the electronic polarizability of a dielectric material with dielectric constant 4.94 and density $4x10^{28}$ atoms/m^3. (2M)
   b) Discuss the effect of frequency on different types of polarizabilities. (8M)

UNIT-III

5 a) i.Why the nanomaterials are different from bulk materials. (2M)
   ii .Write some properties of nano-phase materials (2M)
   b) Explain the synthesis of nano-phase materials by mechanical attrition method and Sol-Gel methods. (8M)

OR

6 a) i. Write the principle of X-ray fluorescence (2M)
   ii. X-rays with wavelength $1.54A^o$ are reflected from the (110) planes of the cubic crystal with unit cell $a=6A^o$ and order of reflection n=1. Calculate the Bragg's angle (2M)
   b) Explain the principle and working of Transmission Electron Microscopy. (8M)

UNIT-IV

7. a) i. Define the terms crystal lattice and Bravais lattice (2M)
   ii. The lattice constant for a unit cell of Aluminium is 4.031A^o. Calculate the interplanar space of (211) plane. (2M)
   b) Explain the seven crystal structure systems. (8M)

OR

8. a) i. Explain the importance of Miller indices with an example (2M)
   ii. In a crystal a lattice plane cuts intercepts 2a,3b and 6c along the three axes where a,b &c are Primitive vectors of the unit cell. Determine the miller indices of the plane?(2M)
   b) Describe the Simple, Body centered and Face centered cubic crystal structures (8M)

UNIT-V

9. a) i. Explain the continuity equation (2M)
   ii. An electric field of 100 V/m is applied to a sample of n-type semiconductor having a Hall coefficient - 0.0125 m^3/C. Determine the current density in the sample of the electron mobility is 0.36 m^2/V-s (2M)
   b) Derive an expression for carrier concentation in intrinsic semiconductors (8M)

OR

10. a) i. Explain the V-I characteristics of P-N junction diode (2M)
    ii. Draw the neat diagram of full rectifier (2M)
    b) Discuss the LED, LCD and Photo Diode. (8M)