Code No: 121AD

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech I Year Examinations, May - 2018
ENGINEERING PHYSICS
(Common to CE, EEE, ME, ECE, CSE, EIE, IT, MCT, ETM, MMT, AE, AME, MIE, PTM, CEE, MSNT)

Time: 3 hours   Max Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART-A

(25 Marks)

1.a) Define Coordination number and Packing factor.   [2]
  b) Sketch the (100), (110) and (111) planes in a simple Cubic structure.   [3]
  c) Define Fermi Energy.   [2]
  d) State the Bloch theorem.   [3]
  e) Define the Dielectric constant of a material.   [2]
  f) Explain the nature of superconductor in the magnetic field.   [3]
  g) What is diffraction grating?   [2]
  h) An optical fiber having refractive indices of 1.6 and 1.59 for core and cladding respectively is placed in water of refractive index 1.33. Find the Numerical Aperture of the fiber.   [3]
  i) Write is the significance of Surface to Volume ratio in nanomaterials.   [2]
  j) A hall with volume 6000 m^3 has reverberation time 1.2 sec. Find the total absorption in the hall.   [3]

PART-B

(50 Marks)

2.a) Distinguish between Ionic, Covalent and Metallic bonds in solids.
  b) Obtain the expression for the inter planar spacing of the orthogonal crystal system.
                                                                                         [5+5]
OR
3.a) Describe the crystal structure of diamond.
  b) State the Bragg's law of X-ray diffraction. Discuss the Laue method of X-ray diffraction for the determination of crystal structure.   [4+6]

4.a) What are Matter waves? How they are different from electromagnetic waves.
  b) Formulate Schroedinger's Time Independent wave equations for a particle in one dimensional infinite square well potential and obtain the expression for its energy values.
                                                                                         [3+7]
OR

5.a) Distinguish between Maxwell – Boltzmann, Bose Einstein and Fermi – Dirac distributions.
  b) Draw E-K curves for an electron in periodic potential and explain how it leads to formation of energy bands in solids. [6+4]

6.a) What is density of polarization? Obtain a relation between polarization density and electric displacement vector.
  b) Define electronic polarization. Derive an expression for electronic polarizability. [3+7]

OR

7.a) Distinguish between dia, para, ferro, antiferro and ferri magnetic materials.
  b) Write two applications of ferrimagnetic materials.
  c) What are type I and type II super conductors. [5+2+3]

8.a) Explain the phenomenon of interference in reflected light from a thin film. Obtain the condition for maxima and minima.
  b) How this phenomenon is used to reduce the heating effect of sun light from the roof of a building. [8+2]

OR

9.a) Write down the characteristics of Laser light.
  b) Describe the construction and working of He-Ne laser with suitable diagrams. [2+8]

10.a) What are direct and indirect band gap semiconductors?
   b) State and explain the Hall-effect and derive the expression for Hall coefficient.
   c) The Hall coefficient of specimen is 3.66×10^{-4} m^3/coul. Find the number of charge carriers present per unit volume of the specimen. [3+5+2]

OR

11.a) Derive an expression for the concentration of electrons in an intrinsic semiconductor.
   b) Describe the Sol-Gel method of preparation of Nanomaterials. [5+5]

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