

Code No: 111AD

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**B.Tech I Year Examinations, May - 2018****ENGINEERING PHYSICS****(Common to CE, EEE, ME, ECE, CSE, CHEM, EIE, IT, MCT, ETM, MMT, AE, AME, MIE, PTM, CEE, MSNT, AGE)****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 $3.66 \times 10^{-4} \text{ m}^3/\text{coul}$. 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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