Code No: 111AD **R13**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech I Year Examinations, September - 2023

ENGINEERING PHYSICS

(Common to CE, EEE, ME, ECE, CSE, IT, AE, AME, MIE, PTM, AGE)

Time: 3 Hours **Max. Marks: 75**

Note: i) Question paper consists of Part A, Part B.
ii) Part A is compulsory, which carries 25 marks. In Part A, answer all questions.
iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.

PART - A

(25 Marks)

1.a) Deduce the spacing between (223) planes in a cubic crystal of lattice constant 0.15 nm. [2]

b) Find the packing factor of BCC lattice. [3]

c) Calculate the wavelength of electron moving with velocity 5×10^6 m/s. [2]

d) Compare the properties of MB and FD statistics. [3]

e) Distinguish the Type I and Type II superconductors. [2]

f) The relative permittivity of Sulphur is 4. Calculate its atomic polarizability. Given that Sulphur is in cubic form and has density of $2.08\times10^3 kg/m^3$ and atomic weight 32. [3]

g) Distinguish between the Interference and Diffraction phenomena of light. [2]

h) A thin sheet of glass (RI= 1.48) of thickness 5 micrometer introduce in a light path of an interferometer. It is causing shift of 10 fringes, find the wavelength of the light. [3]

i) Distinguish between drift and diffusion currents. [2]

j) In a solid, consider the energy level lying 0.02eV above Fermi Level. What is the probability of this level being occupied by an electron at 100K? [3]

PART - B

(50 Marks)

2.a) Describe coordination number and packing factor for a FCC.

b) Compare the Hydrogen bond and Vander-Waal's bond with proper example. [5+5]

OR

3.a) Briefly discuss the Laue method of X-ray diffraction.

b) Analyze qualitatively different types of crystal defects. [5+5]

4.a) Discuss Davisson-Germer experiment to establish the concept of matter waves.

b) Derive an expression for time independent Schrodinger's equation. [5+5]

OR

5.a) Describe qualitatively the Kronig-Penny model of solid.

b) Illustrate the concept of canonical, micro canonical and grand canonical ensembles. [5+5]

6.a) What do you mean by internal field? Derive the expression for internal field for solids.
b) Derive Clausius-Mososotti relationship for cubic solids. [5+5]

OR

7.a) Discuss the domain theory of Ferro Magnetism on the basis of Hysteresis Curve.
b) Explain the effect of magnetic field on superconductivity. [5+5]

8.a) Describe the interference in thin films and derive expressions and conditions of the interface patterns.
b) Derive the quantitively diffraction phenomena due to single slit and related the maxima, minima conditions. [5+5]

OR

9.a) Define Einstein's coefficients of radiation and find the relation between them.
b) Explain the application of optical fiber for communication system. [5+5]

10.a) Give a brief note on principle, construction and working of LED. What are its advantages and disadvantages?
b) Derive an expression of Fermi level for in intrinsic and extrinsic semiconductor. [5+5]

OR

11.a) State Sabine formula. Explain a method of calculating acoustics absorption coefficient of material.
b) Write properties of nanomaterial. Discuss the fabrication of nanomaterials using Chemical Vapour Deposition (CVD) method. [5+5]

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