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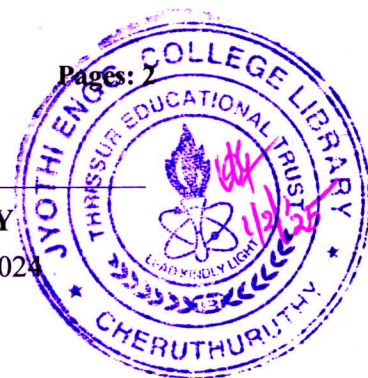
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Reg No.: _____

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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S1 (Challenge Course) Examination December 2024



Course Code: GAPHT121

Course Name: PHYSICS FOR INFORMATION SCIENCE

Max. Marks: 60

Duration: 2 hours 30 minutes

PART A*(Answer all questions. Each question carries 3 marks)*

		CO	Marks
1	Define Fermi level? Show the graphical representation of Fermi energy with Fermi function at $T=0$ and $T>0$	CO1	(3)
2	Define critical temperature and critical magnetic field? Give their relation.	CO1	(3)
3	List three properties of a well behaved wave function and give its physical significance.	CO2	(3)
4	An electron has a speed of 1.05×10^4 m/s with an accuracy of 0.02%. Calculate the uncertainty in the position of electron?	CO2	(3)
5	Differentiate intrinsic and extrinsic semiconductors.	CO3	(3)
6	Explain the current flow across a p-n junction when it is forward biased.	CO3	(3)
7	Distinguish between p-n junction diode and Zener diode.	CO4	(3)
8	What is the working principle of an LED? Give any two applications of LED.	CO4	(3)

PART B*(Answer any one full question from each module, each question carries 9 marks)***Module -1**

9	a)	Explain how the band theory of solids leads to the classification of solids into conductors, semiconductors and insulators.	CO1	(6)
	b)	Calculate the density of donor atoms to produce an n-type material with $0.2 \Omega\text{-m}$ resistivity and $0.35 \text{m}^2 \text{V}^{-1}$ electron mobility?	CO1	(3)
10	a)	Describe Meissner effect in superconductors. Distinguish between Type-I and Type-II superconductors.	CO1	(6)
	b)	Write any three applications of superconductors?	CO1	(3)

Module -2

- 11 a) Write the Schrodinger equation, state the boundary conditions of its solution and show that the energy levels are quantised for a quantum particle confined to an infinite deep potential well having finite width. CO2 (9)
- 12 a) Frame the wave function for a particle associated with a matter wave and derive the time dependent Schrodinger equation. CO2 (6)
- b) What voltage should be applied to an electron microscope to produce electrons of wavelength 0.50\AA ? CO2 (3)

Module -3

- 13 a) Derive the expression for density of electrons in conduction band of an intrinsic semiconductor. CO3 (9)
- 14 a) How is a p-n junction formed? Explain the energy band diagram of a p-n junction. CO3 (9)

Module -4

- 15 a) What is rectification? With diagrams explain full wave rectification with centre tap transformer and bridge circuits. CO4 (6)
- b) A load resistance of $1000\ \Omega$ is connected to a full wave rectifier having ideal diodes. If the applied rms voltage is 200V , calculate peak current I_m , V_m , I_{dc} and V_{dc} . CO4 (3)
- 16 a) Explain the construction, working and V-I characteristics of a solar cell. CO4 (6)
- b) Mention two - advantages, disadvantages and applications of a solar cell. CO4 (3)
