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Reg No.:_____ Name:_____

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 in to conductors, semiconductors and insulators.	CO1	(6)
	b)	Calculate the density of donor atoms to produce an n-type material with **0.2 Ω-m** resistivity and **$0.35 m^2V^{-1}$** electron mobility?	CO1	(3)
10	a)	Describe Meissner effect in superconductors. Distinguish between Type-1 and Type-11 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 **0.50Å?**	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 Ω** 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)

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