Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S1 (R,S) Examination December 2025 (2024 Scheme)

Course Code: GBPHT121

Course Name: PHYSICS FOR ELECTRICAL SCIENCE

Max. Marks: 60 Duration: 2 hours 30 minutes

PART A

(Answer all questions. Each question carries 3 marks)

			CO	Marks
1		Explain the formation of depletion region in a p-n junction.	1	(3)
2		Explain the shift of fermi level in n type semiconductor.	1	(3)
3		Compare Zener breakdown and Avalanche breakdown	2	(3)
4		Explain the working of PIN diode	2	(3)
5		Differentiate between type I and type II superconductors.	3	(3)
6		What is meant by polarization in dielectrics? Name different types of polarization.	3	(3)
7		What is meant by population inversion? How population inversion can be achieved in a laser system?	4	(3)
8		Explain the principle of propagation of light in an optical fibre.	4	(3)

PART B

(Answer any one full question from each module, each question carries 9 marks)

Module -1

9	a)	Derive an expression for the density of electrons in conduction band.	1	(9)
10	a)	Derive an expression for fermi energy level in intrinsic semiconductor.	1	(5)
	b)	Explain V-I characteristics of a p-n junction when forward biased.	1	(4)

Module -2

11	a)	With neat labelled diagram explain the working of i) centre tap full wave rectifier and ii) full wave bridge rectifier.	2	(6)
	b)	Give any three applications of Zener diode	2	(3)

12	a)	Explain the working of solar cell and photo diode.	2	(6)
	b)	Give any six applications of LED.	2	(3)

Module -3

13	a)	What is meant by Meissner Effect?	3	(3)
	b)	Explain critical temperature and critical field for a superconductor.	3	(3)
	c)	Give any three applications of superconductors.	3	(3)
14	a)	What is meant by internal fields in liquids and solids?	3	(3)
	b)	Derive an expression for internal field for a cubic crystal.	3	(6)

Module -4

15	a)	With neat labelled diagram explain the construction and working of Ruby laser.	4	(9)
16	a)	Draw the block diagram of fibre optic communication system.	4	(3)
	b)	Give any three applications of optical fibres.	4	(3)
	c)	Calculate the maximum value of angle of incidence that a ray can make with the axis of the step index fibre, so that it gets guided through the fibre. Refractive indices for core and cladding are 1.61 and 1.5 respectively.	4	(3)

***