R18

Code No: 151AE

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech I Year I Semester Examinations, January/February - 2025

APPLIED PHYSICS

(Common to ECE, EIE, CSBS, CSE(AI&ML), CSE(IOT), AI&DS, AI&ML)

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)	Define matter wave and mention any two properties of it.	[2]
b)	What is Photoelectric effect? Write Einstein photoelectric equation.	[3]
c)	What does it mean by drift of charge carriers in semiconductor?	[2]
d)	What is Hall Effect? Give any two applications of it.	[3]
e)	Define direct band gap semiconductor with suitable example.	[2]
f)	Explain radiative recombination in brief.	[3]
g)	Define population inversion and pumping.	[2]
h)	What are the conditions for total internal reflection to take place?	[3]
i)	State Ampere's law.	[2]
j)	Write a short note on piezoelectricity.	[3]

PART - B

(50 Marks)

2.a)	Explain blackbody radiation and derive an expression for Planck's law.	
b)	Describe wave-particle duality and Heisenberg uncertainty principle.	[5+5]
	OR	
3.a)	Describe Davisson and Germer experiment.	
b)	Write a detail notes on Born's interpretation of the wave function.	[5+5]
4.a)	Discuss carrier generation and recombination in semiconductors.	
b)	Explain working of Zener diode and draw its V-I characteristics.	[5+5]
	OR	
5.a)	Discuss the classification of semiconductors in detail.	
b)	What is P-N junction diode? Explain its working in forward and reverse bias.	[5+5]
6.a)	Distinguish between radiative and non-radiative recombination.	
b)	What is Solar cell? Describe its construction and working principle with neat diagram.	[5+5]
	OR	
7.a)	With neat diagram, explain construction and working of LED.	
b)	List the differences between PIN and Avalanche photo detectors.	[5+5]

8.a) Explain the terms i) Absorption ii) Spontaneous emission and iii) Stimulated emission.
b) Illustrate losses in an optical fiber in detail. [5+5]

OR

9.a) What is an acceptance angle? How it is related to numerical aperture? Explain.
b) Explain construction and working of He-Ne laser with energy level diagram. [5+5]

10.a) List out the laws of electrostatics and explain them.
b) What is ferroelectricity? Write the properties of ferroelectric materials. [5+5]

OR

11.a) Derive Clausius-Mossotti equation.
b) Explain Hysteresis of ferromagnetic materials based on ferromagnetic domains. [5+5]

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