



**B.Tech II Semester Supplementary Examinations, January 2024**  
**Applied Physics**  
(Common to CSE, CSE(AI&ML) & CSE(DS))

**Maximum Marks: 60**

**Date: 29.01.2024 Duration: 3 hours**

- Note:**
1. This question paper contains two parts A and B.
  2. Part A is compulsory which carries 10 marks. Answer all questions in Part A.
  3. Part B consists of 5 Units. Answer any one full question from each unit.
  4. Each question carries 10 marks and may have a, b, c, d as sub questions.

**Part-A**

All the following questions carry equal marks (10x1M=10 Marks)			CO	Bloom Tx
1	a	What is Schrodinger wave equation?	CO1	L1
	b	Define de Broglie wave length.	CO1	L1
	c	Mention two significant properties of semi-conductors.	CO2	L1
	d	How are solids classified based on band theory of solids.	CO2	L1
	e	What is meant by donor energy level?	CO3	L1
	f	Write down the expression for carrier concentration for a P-Type semi-conductor.	CO3	L1
	g	Give examples for Optoelectronic devices.	CO4	L1
	h	What are Pyro electric materials	CO4	L1
	i	Define Numerical aperture and acceptance angle.	CO5	L1
	j	In quantum computing, what is the basic unit of information	CO5	L1

**Part-B**

Answer All the following questions. (5X10M=50Marks)				
2	a) Derive Schrodinger time independent equation. (5m) b) Determine the wavelength associated with an electron having an energy of 100eV. (5m)		CO1	L3 L3
	OR			
3	a) Explain the physical significance of the wave function? (5m) b) Calculate the De-Broglie wavelength of an electron which is accelerated by a potential of 100V. $h=6.6 \times 10^{-34}$ Js, $m=9.1 \times 10^{-31}$ Kg. (5m)		CO1	L2 L3
4	a) Discuss classical free electron theory. (5m) b) Explain the concept of effective mass of electron. (5m)		CO2	L2 L2
	OR			
5	a) Explain the formation of energy bands in solids. (5m) b) Explain the concept of E-K with the help of diagram. (5m)		CO2	L2 L2

6	a) Derive carrier concentration of electrons in intrinsic semiconductors. (5m) b) With necessary theory and with neat diagram explain the working of a PN Junction diode. (5m)	CO3	L3 L2
	OR		
7	a) State Hall –Effect and derive an expression for Hall-coefficient. (6m) b) Compare intrinsic and extrinsic semiconductors with examples. (4m)	CO3	L1 L3
8	Explain with a neat sketch the working and V-I characteristics of solar cell. (10m)	CO4	L2
	OR		
9	a) Explain in detail the working of LED with a neat labelled diagram. (6m) b) Compare Ferro electric, Piezoelectric and Pyro Electric materials. (4m)	CO4	L2 L3
10	a) With neat labelled diagram explain the working of optical fiber communication system. (6m) b) Distinguish between Step index and Graded index optical fibers. (4m)	CO5	L1 L2
	OR		
11	a) Define Bloch sphere and represent Bloch vectors on X,Y,Z axis. (6m) b) Explain the representation of quantum mechanical state using Dirac notation. (4m)	CO5	L1 L2