Roll No. [redacted]

SHAMBHUNATH INSTITUTE OF ENGINEERING AND TECHNOLOGY, PRAYAGRAJ

Subject Code: BAS: 101 **Subject: Engineering Physics**

Course: B.Tech. SEMESTER: I

FIRST SESSIONAL EXAMINATION, ODD SEMESTER, (2024-2025)

Branch: For All Branches (Section A & B)

Time –1hr 30 min **Maximum Marks – 30**

1. Attempt any *FIVE* questions.

Q N	QUESTION	Marks	CO	BL
a.	What is the importance of quantum theory?	2	CO1	L2
b.	Distinguish between matter waves and e.m. radiations.	2	CO1	L2
c.	Explain properties and significance of wave function.	2	CO1	L2
d.	Derive the relation between group velocity and phase velocity.	2	CO1	L3
e.	Explain the de-Broglie hypothesis.	2	CO1	L2
f.	Write down the Planck's expression (formula) for spectral energy density in Black Body radiation.	2	CO1	L1

2. Attempt any *ONE* of the following.

Q N	QUESTION	Marks	CO	BL
a.	Derive an expression for the Compton shift. Explain why Compton shift is Not observed in visible light.	5	CO1	L3
b.	Derive Schrödinger time dependent and time independent wave equation.	5	CO1	L3
c.	A particle is moving in one dimensional box described by $V=0$ for $0 \leq x \leq L$ $V = \infty$ for $x < 0$ and $x > L$ Write and solve its Schrödinger's wave equation and obtain Eigen value and Eigen function. Prove that Energy of the matter particle is in quantized form.	5	CO1	L3

3. Attempt any *FIVE* questions.

Q N	QUESTION	Marks	CO	BL
a.	What is continuity equation?	2	CO2	L1
b.	Distinguish between conduction current and displacement current.	2	CO2	L2
c.	State Gauss Divergence Theorem.	2	CO2	L1
d.	State Ampere circuital law.	2	CO2	L1
e.	Define Skin depth for good conductors and good dielectrics.	2	CO2	L1
f.	State Gauss law for Electrostatics.	2	CO2	L1

4. Attempt any *ONE* of the following.

Q N	QUESTION	Marks	CO	BL
a.	Derive Maxwell's equations and also write their Physical significance.	5	CO2	L3
b.	If the earth receives 2 **cal $min^{-1}cm^{-2}$** solar energy, what are the amplitudes of electric and magnetic fields of radiation?	5	CO2	L3
c.	What is Poynting vector? Derive the Poynting Theorem and explain the Physical meaning of each term.	5	CO2	L2

Bloom's Taxonomy Level (BL):-

Remember (L1), Understanding (L2), Apply (L3), Analyze (L4), Evaluating (L5), Creating (L6)