

Hi-Tech Institute of Engineering & Technology	
DEPARTMENT OF APPLIED SCIENCE	
1ST MODEL PAPER, ODD SEMESTER-2023-24,	
Semester: 1st	Course/Branch: B.Tech
Subject Code: BAS101	Subject Name: Engineering Physics
Faculty Name: Dr. Kushal Kumar	
Time: 3: 00 Hours	Total Marks: 70

Note: Attempt all Sections. If you require any missing data, then choose suitably.

SECTION A

1. Attempt all questions in brief. 2X7=14

Q No.	Question	Marks	CO
a.	What is physical significance of wave function?	2	1
b.	What Poynting vector?	2	2
c.	What do you mean by coherent source of light?	2	3
d.	What do you mean by missing order?	2	3
e.	What is the difference between stimulated emission and spontaneous emission?	2	4
f.	What is isotopic effect?	2	5
g.	Describe different type nano-material.	2	5

SECTION B

2. Attempt any three of the following: 7X3= 21

Q No.	Question	Marks	CO
a.	An electron is bound in 1 dimensional box of size 2.5×10^{-10} m. Calculate two lowest permitted energy values.	7	1
b.	If the earth receives $2 \text{ cal min}^{-1} \text{ cm}^{-2}$ solar energy, what are the amplitudes of electric and magnetic field of radiation?	7	2
c.	White light is incident on a soap film at an angle $\sin^{-1} 4/5$ and the reflected light is observed with a spectroscope. It is found that two consecutive dark bands corresponds to wavelengths 6.1×10^{-5} cm and 6.0×10^{-5} cm respectively. If the refractive index of the film be $4/3$, calculate the thickness.	7	3
d.	Derive an expression for numerical aperture and acceptance angle. An optical fiber of length 150 m has input power of $10 \mu\text{W}$ and output power of $9 \mu\text{W}$. compute loss in dB/Km.	7	4
e.	Describe Type I and Type II superconductors. Why are Type I super conductors poor current carrying conductors. The critical field for niobium is 1×10^5 A/m at 8K and 2×10^5 A/m at 0 K. calculate the transition temperature of the element.	7	5

SECTION C

3. Attempt any one part of the following: 7X1= 7

Q No.	Question	Marks	CO
a.	Derive expression for general relation between V_p and V_g and show that $V_p = V_g$ for non dispersive medium.	7	1
b.	Derive time independent and time dependent Schrodinger equation.	7	1

4. Attempt any *one* part of the following: 7X1= 7

Q No.	Question	Marks	CO
a.	Explain the concept of Maxwell's displacement current and show how it leads to the modification of ampere's law.	7	2
b.	Deduce pointing theorem for the flow of energy in an electromagnetic field and explain the physical significance of various terms involved in the equation.	7	2

5. Attempt any *one* part of the following: 7X1= 7

Q No.	Question	Marks	CO
a.	Discuss the formation of interference fringes due to a wedge shaped thin film seen by normally reflected sodium light and obtain the expression for fringe width.	7	3
b.	Discuss the phenomenon of Fraunhofer diffraction at a single slit and show that the relative intensity of the successive maximum are nearly $1 : (4/9\pi^2) : (4/25\pi^2) : 4/49\pi^2$ and so on.	7	3

6. Attempt any *one* part of the following: 7X1= 7

Q No.	Question	Marks	CO
a.	Draw a neat diagram of Helium- neon Laser and describe its method of working. What are the characteristics of a Laser beam? Discuss its important applications.	7	4
b.	What do you mean by single mode and multi-mode fibers?	7	4

7. Attempt any *one* part of the following: 7X1= 7

Q No.	Question	Marks	CO
a.	What is superconductivity? What is the significance of critical temperature and critical magnetic field for superconductors	7	5
b.	Describe different type nano-material. Explain the formation of Bucky ball, their properties and applications.	7	5