

Hi-Tech Institute of Engineering & Technology	
DEPARTMENT OF APPLIED SCIENCE	
2nd 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 do you mean by Phase velocity and Group velocity	2	1
b.	What is Equation of continuity?	2	2
c.	Explain why two independent light sources never be coherent?	2	3
d.	What do you mean Rayleigh criterion?	2	3
e.	What is population inversion and Explain meta stable state?	2	4
f.	What is cooper pair?	2	5
g.	What is basic principal of nano science and technology?	2	5

SECTION B

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

Q No.	Question	Marks	CO
a.	Compute the wavelength of an alpha particle accelerated by a potential difference of 200 volt.	7	1
b.	Assuming that all the energy from a 1000 watt lamp is radiated uniformly. Calculate the average values of intensities of electric and magnetic fields of radiations at the distance of 2m from the lamp.	7	2
c.	In Newton's ring experiment the diameter of 4 th and 12 th dark ring are 0.400 and 0.700 cm respectively. Deduce the diameter of 20 th dark ring.	7	3
d.	Describe Dispersion in fiber optics. Calculate the numerical aperture, acceptance angle and critical angle of the fiber from the following data $\mu_1 = 1.50$ and $\mu_2 = 1.45$.	7	4
e.	The transition temperature for lead is 7.26 K. The maximum critical field for the material is 8×10^5 A/m. Lead has to use as a superconductor subjected to a magnetic field of 4×10^4 A/m. What precaution will have to be taken?	7	5

SECTION C

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

Q No.	Question	Marks	CO
a.	Show that the group velocity of the particle is equal to the velocity of particle. Also show that $V_p V_g = C^2$.	7	1
b.	A particle is moving freely within a one dimensional box. Find expression of Eigen function and Eigen values. Show that it has discrete Eigen values.	7	1

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

Q No.	Question	Marks	CO
a.	Write the Maxwell's equations. Show that the velocity of plane electromagnetic waves in the free space is given by $1/\sqrt{\mu_0\epsilon_0}$.	7	2
b.	Deduce Maxwell's equations for free space and prove that the electromagnetic waves are transverse.	7	2

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

Q No.	Question	Marks	CO
a.	Discuss the phenomena of interference of light due to thin films of uniform thickness in reflected light and find the conditions of maxima and minima.	7	3
b.	Define limit of resolution and resolving power. Obtain an expression for resolving power of grating.	7	3

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

Q No.	Question	Marks	CO
a.	Draw a neat diagram of Ruby Laser and describe its construction and method of working. What is its draw back?	7	4
b.	What are the Einstien's coefficients? Drive Einstien relation between A &B?	7	4

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

Q No.	Question	Marks	CO
a.	Explain Meissner effect. Show that superconductor in superconducting state is a diamagnetic.	7	5
b.	Describe Grapheen. Explain the synthesis of Nano Tube, their properties and applications.	7	5