Name: Student University Roll No.: 22	Printed Pages: 02

School of Engineering

Second Sessional Examination, Odd Semester (AS: 2023-24)

B. Tech: CSE (1A,1B,1C,1D,1E,1F,1G,1H,1I,1J)

[Year: First] **[Semester: I]**

Course Title: Engineering Physics **Course Code: NBS 4102**	**Max Marks: 60** **Time: 3*hrs***

Instructions if any: Read the question Carefully.

	SECTION 'A' **Q.N.1. Attempt all parts of the following:**	**Course Objective**	**Marks**
a)	Two independent sources could not produce interference, why?	CO1	1
b)	Define specific rotation.	CO1	1
c)	What are eigen function and Eigen values?	CO2	1
d)	What are the characteristics of a wave function?	CO2	1
e)	What is equation of continuity?	CO3	1
f)	What is the basic principle of optical fiber?	CO3	1
g)	What do you mean by proper length?	CO4	1
h)	Show that rest mass of photon is zero.	CO4	1
	SECTION 'B' **Q.N.2. Attempt any two parts of the following:**	**Course Objective**	**Marks**
a)	A thin film of soap solution is illuminated by white light at an angle of incidence, $i = \sin^{-1}(4/5)$. In reflected light, two dark consecutive overlapping fringes are observed corresponding to wavelength 6.1×10^{-7} m and 6.0×10^{-7} m. The refractive index for soap solution is 4/3. Calculate the thickness of the film.	CO1	6
b)	An electron has a speed of 4×10^{5} m/s within the accuracy of 0.01%. Calculate the uncertainty in position of electron.	CO2	6
c)	Assuming that all energy radiating from a 1000 Watt lamp is radiating uniformly, calculate the average value of intensities of electric and magnetic field of radiation at a distance of 2 m from the lamp.	CO2	6
d)	The mass of a moving electron is 11 times its rest mass. Find its kinetic energy and momentum.	CO3	6

6.077×10^{-23}

SECTION 'C'		Course Objective	Marks
Q.N.3. Attempt any two parts of the following:			
a)	Describe the formation Newton's ring in reflected monochromatic light. Prove that the diameters of dark rings are proportional to the square root of natural numbers.	CO1	5
b)	Describe the Rayleigh's criterion for resolution. Deduce an expression for resolving power of grating.	CO1	5
c)	Describe construction and working of Nicol prism. How will you use it as polarizer and analyzer?	CO1	5
Q.N.4. Attempt any two parts of the following:			
a)	Derive time dependent Schrodinger wave equation.	CO2	5
b)	Describe Bragg's spectrometer and explain how it is used to study the structure of a crystal by an example.	CO2	5
c)	What are group velocity and phase velocity? Show that $v_p \times v_g = c^2$	CO2	5
Q.N.5. Attempt any two parts of the following:			
a)	Define the acceptance angle and numerical aperture? Derive the expression for them.	CO3	5
b)	Prove that the velocity of plane electromagnetic wave in vacuum is given by $c = 1/(\mu_0 \varepsilon_0)^{1/2}$	CO3	5
c)	What is Poynting vector? Derive the Poynting theorem and explain its significance.	CO3	5
Q.N.6. Attempt any two parts of the following:			
a)	Establish Einstein's mass energy relation.	CO4	5
b)	Derive an expression for time dilation using Lorentz transformation equations. Show that time dilation is a real effect.	CO4	5
c)	Describe Michelson Morley experiment. Give the significance of negative results.	CO4	5

Table 1: Mapping between COs and questions

COs	Questions Numbers	Total Marks
CO1	1a,1b, 2a, 3a,3b,3c	23
CO2	1c,1d,2b,4a,4b,4c	23
CO3	1e,1f,2c,5a,5b,5c	23
CO4	1g,1h,2d,6a,6b,6c	23