Name:
Student University Roll No.: | Printed Pages: 01

School of Engineering
Second Sessional Examination, Even Semester (AS: 2023-24)
B. Tech: CSE-AI 1A-1F, CCML-1A, CS-1K, CS-1L, IOTBC1
[Year: First] **[Semester: II]**
Course Title: Engineering Physics | **Max Marks: 60**
Course Code: NBS 4202 | **Time: 3hrs**

Instructions if any: Read the question Carefully.

	SECTION 'A' **Q.N.1. Attempt all parts of the following:**	Course Objective	Marks
a)	Define frame of reference.	CO4	1
b)	What are the properties of a wave function?	CO2	1
c)	What is specific rotation?	CO1	1
d)	Define coherent sources.	CO1	1
e)	What is equation of continuity?	CO3	1
f)	What are matter waves?	CO2	1
g)	What is time dilation?	CO4	1
h)	What is displacement current?	CO3	1
	SECTION 'B' **Q.N.2. Attempt any two parts of the following:**	Course Objective	Marks
a)	The mass of a moving electron is 11 times its rest mass. Find its kinetic energy and momentum.	CO4	6
b)	Calculate the specific rotation if plane of polarization is turned through 26.4°, traversing 20 cm length of 20% sugar solution.	CO1	6
c)	Calculate the lowest energy of an electron in one dimension in an infinitely deep potential box of width 1Å.	CO2	6
d)	Find the critical angle, acceptance angle and numerical aperture of a fibre with refractive indices of core and cladding as 1.50 and 1.45, respectively.	CO3	6
	SECTION 'C' **Q.N.3. Attempt any two parts of the following:**	Course Objective	Marks
a)	Describe Michelson-Morley experiment? Explain the significance of negative results.	CO4	5
b)	Show that the diameter of bright rings is proportional to the square root of odd natural numbers.	CO1	5
e)	Describe Bragg's spectrometer and explain how it is used to study the structure of a crystal by an example.	CO2	5
	Q.N.4. Attempt any two parts of the following:		
a)	Define wave function. Derive time independent Schrodinger wave equation.	CO2	5
b)	Derive mass-energy relation.	CO4	5
c)	What is Poynting vector? Derive the Poynting theorem and explain its significance.	CO3	5
	Q.N.5. Attempt any two parts of the following:		
a)	What is phase and group velocity? Derive a relation between them in dispersive medium.	CO2	5
b)	Derive EM wave equation in free space and show that electromagnetic wave travels with the velocity of light.	CO3	5
c)	Explain the phenomenon of double refraction in a calcite crystal.	CO1	5
	Q.N.6. Attempt any two parts of the following:		
a)	Discuss the classification of optical fibres.	CO3	5
b)	Describe Rayleigh's criterion of resolution. Derive the expression of resolving power of grating.	CO1	5
c)	Derive Lorentz transformation equation. Use it to derive the expression for length contraction.	CO4	5

Table 1: Mapping between COs and questions
(Number of COs may vary from course to course)

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