Name: Student University Roll No.:	Printed Pages: 1

School of Engineering

First Sessional Examination, Even Semester (AS: 2022-23)

B. Tech: CSE, CSE-CCML1, CSE-IOTBC1, CSE-AI

Year: 1 Semester: 2

Course Title: Physics II (Set A) Course Code: BAS 3202	M.M.: 30 Time: 1 *hr*

Instructions if any: Read the question Carefully.

	SECTION 'A' **Q.N.1. Attempt all parts of the following:**	**Course Objective**	**Marks**
a)	What do you mean by a wave packet?	CO2	1
b)	What do you mean by wave function? Give its significance.	CO2	1
c)	Give the physical significance of Heisenberg's uncertainty principle.	CO1	1
d)	What is the difference between an electromagnetic wave and matter wave?	CO1	1
e)	Can a photon and electron of the same momentum have the same wavelength?	CO1	1
	SECTION 'B' **Q.N.2. Attempt any two parts of the following:**	**Course Objective**	**Marks**
a)	Calculate the de-Broglie wavelength associated with a proton moving with velocity $(1/20)^{th}$ of the velocity of light.	CO1	7.5
b)	An electron has speed of 600 m/s with an accuracy of 0.005%. Calculate the uncertainty with which we can locate the position of the electron.	CO1	7.5
c)	A particle is moving in one dimensional potential box (of infinite height) of width 25 Å. Calculate the probability of finding the particle within an interval of 5 Å at the Centre of the box when it is in its state of least energy.	CO2	7.5
d)	What will be the kinetic energy of an electron if its de-Broglie wavelength equals the wavelength of sodium light?	CO1	7.5

SECTION 'C' Q.N.3. Attempt any one part of the following		Course Objective	Marks
a)	Derive time dependent and time independent Schrodinger wave equation.	CO2	10
b)	A particle of rest mass m_o has kinetic energy K. Show that its de-Broglie wavelength is given by $\lambda = \frac{hc}{\sqrt{K(K+2m_0c^2)}}$. What will happen if $K<<m_oc^2$	CO1	10
c)	Distinguish between group velocity and phase velocity and deduce a relation between them. What happens if the phase velocity is independent of frequency?	CO1	10

Table 1: Mapping between COs and questions

(Number of COs may vary from course to course)

COs	Questions Numbers	Total Marks
CO1	1c,1d,1e,2a,2b,2d,3b,3c	45.5
CO2	1a,1b,2c,3a	19.5