Name:
Student University Roll No.:

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School of Engineering
Second Sessional Examination, Even Semester (AS: 2022-23)
B. Tech: CSE, CCML, CS-AI, IOTBC
[Year: First]

Course Title: Physics II (Set B) [Semester: II]
Course Code: BAS 3202

Max Marks: 60
Time: 3hrs

Instructions if any: Read the question Carefully.

	SECTION 'A'		
Q.N.1. Attempt all parts of the following:		**Course Objective**	**Marks**
a)	Show that super conductors are perfectly diamagnetic.	CO1	1
b)	What is wave function? Give its physical significance.	CO1	1
c)	What do you mean by packing factor?	CO2	1
d)	Define space lattice.	CO2	1
e)	What do you mean by skin depth?	CO2	1
f)	What are Matter waves?	CO1	1
g)	What do you mean by critical magnetic field?	CO3	1
h)	What do you mean by XRD, SEM and AFM?	CO3	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 a velocity equal to $1/20^{th}$ of the velocity of light.	CO1	6
b)	The lattice constant for a unit cell of aluminum is 4.049 Å. Calculate the spacing of (2 2 0) plane.	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 critical field for Niobium is 1×10^4 A/m at 8K and 2×10^5 A/m at 0K. Calculate the transition temperature of Niobium.	CO3	6
	SECTION 'C'	**Course Objective**	**Marks**
Q.N.3. Attempt any two parts of the following:			
a)	Derive time independent Schrodinger wave equation.	CO1	5
b)	Apply Heisenberg uncertainty principle this to prove	CO1	5

	the non-existence of electron and existence of neutron and proton inside nucleus.		
c)	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)	A particle is in motion along a line between x = 0 and x = a with zero potential energy. At points for which x < 0 and x > a, the potential energy is infinite. Solving Schrodinger's equation obtains energy Eigen values and normalized wave function for the particle.	CO1	5
b)	Describe the crystal structure of NaCl.	CO2	5
c)	What is Poynting vector? Derive the Poynting theorem and explain its significance.	CO2	5
Q.N.5. Attempt any two parts of the following:			
a)	What are Miller indices? Show that the distance between the successive planes of miller indices (hkl) is given by $d_{hkl} = [\, h^2/a^2 + k^2/b^2 + l^2/c^2 \,]^{-1/2}$	CO2	5
b)	Prove that the velocity of plane electromagnetic wave in vacuum is given by $c = 1/(\mu_0 \varepsilon_0)^{1/2}$.	CO2	5
c)	What are type I and type II superconductors? Distinguish between them.	CO3	5
Q.N.6. Attempt any two parts of the following:			
a)	How the carbon nanotubes are produced? Discuss the properties and applications of carbon nanotubes.	CO3	5
b)	Discuss BCS theory of superconductivity. Explain the formation of Cooper pairs.	CO3	5
c)	Derive Maxwell's equations in differential form.	CO2	5

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

COs	Questions Numbers	Total Marks
CO1	1a,1b,1f,2a,3a,3b,4a	24
CO2	1c,1d,1e,2b,2c,3c,4b,4c,5A,5b,6c	45
CO3	1g,1h,2d,5c,6a,6b	23