GANDHI INSTITUTE OF ENGINEERING AND TECHNOLOGY UNIVERSITY, ODISHA, GUNUPUR
(GIET UNIVERSITY)
B.Tech. (First Semester) Examinations, December – 2024
23BBSBS10003 – Engineering Physics
(Common to all Branches)

Time: 3 hrs   Maximum: 60 Marks

Answer ALL questions
(The figures in the right hand margin indicate marks)

PART – A   **(2 x 5 = 10 Marks)**

Q.1. Answer *ALL* questions

		CO #	Blooms Level
a.	Graphically show the energy variations with time for a simple harmonic oscillator. Define transverse mechanical wave with its speed equation.	CO1	K1
b.	Show that divergence of curl of a vector field is zero. Write the unit and dimension of Poynting vector.	CO2	K2
c.	Mention the properties of a reciprocal lattice. Determine the reciprocal lattice of a SC lattice.	CO3	K2
d.	Define superconductivity. Discuss the types of superconductors.	CO4	K2
e.	Calculate the de Broglie wavelength of a neutron whose kinetic energy is 0.03eV. Write Schrodinger time independent equation for a body of mass 'm' moving freely along X-axis.	CO6	K2

PART – B   **(10 x 5 = 50 Marks)**

Answer *ALL* the questions

		Marks	CO #	Blooms Level
2. a.	Set up the differential equations for a damped harmonic oscillator. Find the solution for the under damped oscillation. Graphically show the three types of damped harmonic oscillator along with their conditions of occurrence.	7	CO1	K1
b.	Three waves of amplitudes 10cm, 15 cm, 20 cm with same frequency superpose coherently and in-coherently to produce a resultant wave. Find the ratio of their resultant intensities.	3	CO1	K2
	(OR)			
c.	Define Interference. Explain Newton's Ring experiment with suitable diagram.	7	CO1	K1
d.	The diameters of 6th and 14th dark rings are 0.8cm and 1.4cm respectively. If the radius of curvature of the Plano convex lens is 90cm. then find the wavelength of the light.	3	CO1	K2
3.a.	State Stoke's theorem with its mathematical form. Mention all four Maxwell's equations in differential form and state the fundamental laws from which they are derived.	7	CO2	K1
b.	Distinguish between conduction current and displacement current.	3	CO2	K2
	(OR)			
c.	Derive the expression for electromagnetic wave equation in terms of electric and magnetic field in free space using Maxwell's equations. Show that electromagnetic wave travels with the speed of light in free space.	7	CO2	K1
d.	State and explain Poynting theorem in electromagnetism.	3	CO2	K2
4.a.	Differentiate between a crystalline and amorphous solid.	7	CO3	K1

Discuss types of crystal in 3Dimensions with their lattice parameters and structures.

b.	Discuss Miller Indices of a crystal plane. Find the Miller indices of a crystal plane having the intercepts 4a, 2b and 3c.	3	CO3	K2

(OR)

c.	Define unit cell. State and explain Bragg's law of crystal diffraction with ray diagram.	6	CO3	K1
d.	Why X-ray is used for Bragg's experiment. Find inter planar spacing for a crystal plane (2 1 2) with lattice parameters (2Å , 3Å, 2Å).	4	CO3	K2
5.a.	Differentiate among dia-, para- and ferro- magnetic materials	6	CO4	K1
b.	What is Meissner effect? What is isotopic effect in Superconductivity?	4	CO4	K2

(OR)

c.	Define a dielectric material? Differentiate among piezo-, pyro- and ferro- dielectric materials.	6	CO4	K1
d.	Discuss the working and energy level diagram of He-Ne Laser. Mention two applications of Laser.	4	CO4	K2
6.a.	Differentiate between Step index and Graded index fibers. Discuss the application of optical fibres in communication with a block diagram.	6	CO6	K1
b.	State Einstein's concepts of Photo electric effect? In a photoelectric experiment, the threshold wavelength of tungsten cathode is 2400Å. Find the work function of the metal if it is irradiated by a light of wavelength 2000Å and calculate the maximum kinetic energy of the emitted electrons.	4	CO6	K2

(OR)

c.	Define Uncertainty principle. Using it prove the Non-existence of electron in Nucleus.	6	CO6	K1
d.	State Compton effect. Find the Compton shift for X-rays of wavelength 2Å, scattered by 90°. What is the wavelength of the scattered X-rays.	4	CO6	K2

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