GANDHI INSTITUTE OF ENGINEERING AND TECHNOLOGY UNIVERSITY, ODISHA, GUNUPUR
(GIET UNIVERSITY)

B. Tech (Second Semester – Regular/Supplementary) Examinations, April – 2025

23BBSBS10002 - Engineering Physics

(Common for 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 three types of damped harmonic oscillator along with their conditions of occurrence.	CO1	K1
b. Why magnetic monopole does not exist?	CO2	K1
c. Write the two disadvantages and applications of Fibre Optics.	CO3	K1
d. Define Isotope effect of a superconductor.	CO4	K1
e. If mass of Harry is 78 kg and moving with velocity 10 m/s then calculate the De-Broglie wavelength of Harry.	CO5	K2

PART – B **(10 x 5 = 50 Marks)**

Answer ***ALL*** the questions	Marks	CO #	Blooms Level
2. a. What is Damped harmonic oscillator? Set up the differential equation for a damped harmonic oscillator. Find the solution for the under damped oscillation.	8	CO1	K2
b. Find the velocity of longitudinal wave in a medium of density $\rho = 9.8\times10^3$ Kg/m^3 and bulk modulus B = 12×10^{11} N/m^2	2	CO1	K2
(OR)			
c. Explain 'superposition of waves' and its types? Derive the expression of resultant amplitude for two-wave superposition.	7	CO1	K2
d. Three waves of amplitudes 5cm, 10 cm, 15 cm and same frequency superimpose coherently and in-coherently to produce a resultant wave. Find the ratio of the resultant intensities.	3	CO1	K2
3.a. (i) State Gauss divergence theorem. (ii) Evaluate Curl of the vector field, $B=(2x+y)\,i\hat{}-5\,yz\,j\hat{}+6z\,k\hat{}$ (iii) Calculate the Gradient of the scalar field, $\varphi = x^2 + y^2 + z^2$	6	CO2	K2
b. Differentiate between conduction current and displacement current.	4	CO2	K1
(OR)			
c. Derive the Maxwell electromagnetic wave equations in terms of electric field and magnetic field in free space.	7	CO2	K2
d. A point source emits light with power 250 W. Find the average value of the Poynting vector at a distance of 2m from the source. Write the unit and dimension of Poynting vector.	3	CO2	K2
4.a. Determine the reciprocal lattice of Body Centred Cubic (BCC) crystal lattice.	6	CO3	K1
b. Explain Schottky and Frenkel defect with necessary diagram.	4	CO3	K1
(OR)			

c.	What is Miller Indices? Discuss the methods to determine the Miller Indices of a crystal plane? Explain with example.	5	CO3	K2
d.	State and explain Bragg's law of crystal diffraction.	5	CO3	K1
5.a.	Discuss briefly about the Diamagnetic, Paramagnetic & Ferromagnetic materials.	6	CO4	K1
b.	Write different parts of optical fibre. In an optical fibre, the core material has refractive index 1.6 and refractive index of the cladding material is 1.3. Calculate the value of Numerical Aperture?	4	CO5	K2
	(OR)			
c.	Explain in detail about the Step index and Graded index optical fibre?	4	CO5	K1
d.	Discuss in detail the construction and working principle of He-Ne Laser with suitable energy level diagram.	6	CO4	K1
6.a.	State Einstein's concepts of Photoelectric effect. Discuss the experimental procedure in detail. In a photoelectric experiment, the threshold wavelength of tungsten cathode is 2300 Å. Calculate the work function of the metal if it is irradiated by a light of wavelength 1800 Å. Find the maximum kinetic energy of the ejected electron.	8	CO6	K2
b.	Find the De Broglie's wavelength for an electron whose kinetic energy is 0.05 eV.	2	CO6	K2
	(OR)			
c.	Explain Heisenberg Uncertainty principle? Using Heisenberg Uncertainty principle prove that electron is absent inside the nucleus.	7	CO6	K1
d.	Write the physical significance of a quantum mechanical wave function? An X-ray having wavelength 1.2 A^0 is scattered by carbon block at 60^0. Find out the Compton shift and wavelength of scattered photons.	3	CO6	K2

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