Dr. B. C. Roy Engineering College, Durgapur
Paper: Physics-I   Paper Code: BS-PH 101
1st Semester   1st Internal Examination (SET 2)

Full Marks: 25   **Session- 2022-23**   **Time: 50 mins.**

Continuous Assessment – 3

Q. No.	Question	Marks	COs	BL
	GROUP –A (Multiple Choice Type Questions) **Choose the correct answer for <u>any five</u> of the following:**			
1. (i)	In Fraunhofer diffraction, the incident wave front is (a) Plane (b) Cylindrical (c) Spherical (d) None of these	1	CO2	R
(ii)	In Fraunhofer diffraction minima are (a) All perfectly dark (b) Never perfectly dark (c) Perfectly bright (d) None of these	1	CO2	R
(iii)	The Compton Shift depends on (a) Angle of scattering (b) Material of the target (c) Wavelength of the incident X-ray (d) None of these	1	CO4	U
(iv)	The de-Broglie wavelength of a particle with momentum p is (a) $\frac{h}{p^2}$ (b) $\frac{p^2}{h^2}$ (c) $\frac{h}{p}$ (d) $\frac{p}{h^2}$	1	CO4	R
(v)	The Compton shift is maximum when the scattering angle is (a) 45^0 (b) 90^0 (c) 180^0 (d) 60^0	1	CO4	E
(vi)	If $\hat{n}$ is the unit vector in the direction $\vec{A}$ then (a) $\hat{n} = \frac{\vec{A}}{|\vec{A}|}$ (b) $\hat{n} = \vec{A}\,|\vec{A}|$ (c) $\hat{n} = \frac{|\vec{A}|}{\vec{A}}$ (d) None of these	1	CO1	P
	GROUP – B (Short Answer Type Questions) **Answer all the questions from the following**			
2.	X-rays of wavelength 10^{-11}m are scattered by loosely bound electrons. Find the maximum wavelength present in the scattered rays and maximum kinetic energy of the recoil electron.	3 + 2	CO4	E
3.	(a) Find the relation between Phase velocity and Group velocity. (b) Write the Heisenberg's uncertainty principle and explain its physical significance.	2 + 3	CO4	P R
4.	(a) Differentiate Interference and Diffraction. (b) A light of 6000Å falls normally on a straight slit of 0.1mm width. Calculate the total angular width of the central maxima. **OR** Define the terms and find the expressions in connection with damped vibration (a) Decay Constant (b) Logarithmic decrement	3 + 2 2 + 3	CO2 CO1	R E A
5	What is Brewster's law in polarization of light? Show that sum of angle of polarization and angle of refraction is 90^0. **OR** Find $\vec{\nabla}.\vec{F}$ and $\vec{\nabla}\times\vec{F}$ where $\vec{F} = \vec{\nabla}(x^3 + y^3 + z^3 - 3xyz)$ **OR** Establish the differential equation of damped vibration and solve it.	1 + 4 1.5+ 1.5+2 2 + 3	CO2 CO1 CO1	R E E A