GALGOTIAS UNIVERSITY

School of Basic Sciences
Bachelor of Science Honours in Physics
Mid Term Examination - Nov 2023

Duration : 90 Minutes
Max Marks : 50

Sem III - C1UD305T - Elements of Modern Physics

General Instructions
Answer to the specific question asked
Draw neat, labelled diagrams wherever necessary
Approved data hand books are allowed subject to verification by the Invigilator

1) Explain de Broglie concept of matter waves. — K2 (2)

2) Why is a red-hot object cooler than a white-hot one of the same material? — K1 (3)

3) Illustration of compton effect — K2 (4)

4) Show that for a free particle of mass m moving in one dimension, the function $\Psi(x) = A\sin Kx + B\cos Kx$ is a solution to the time-independent Schrodinger equation for any values of the constants A and B. — K2 (6)

5) Show that the wave function $\Psi(x, t) = A\cos(kx - \omega t) - iA\sin(kx - \omega t)$ does satisfy the time-dependent Schrödinger equation. — K3 (6)

6) Solve the time dependent Schrödinger Equation for a particle in a box — K3 (9)

7) Categorize the experiments for the phenomena of dual nature of light. — K4 (8)

8) Apply Wien's and Stefan's laws to analyze radiation emitted by a blackbody. — K4 (12)

OR

Photon of wavelength 2.17 pm are incident on free electrons. Find the wavelength of photon that is scattered at 35 degree from the incident direction? Do the same if the if the scattering angle is 115 degree. — K4 (12)