Name: Enrolment No:	MANIPAL UNIVERSITY JAIPUR

Odd Semester Mid Term Examination, December 2024
Faculty of Engineering
Department of Physics
B. Tech. All Programme

Course Code: PHY1001	Course: Engineering Physics	Semester: I
Time: 1.5 hrs.		Max. Marks: 30

Instructions: All questions are compulsory.
Missing data, if any, may be assumed suitably.
Calculator is allowed.

SECTION A

S. No.		Marks	CO
Q 1	Which of the following is a condition for sustained interference? A. Sources should be independent B. Sources must be coherent C. Sources must have equal intensity D. Both A and B	2	CO1
Q 2	Which law explains the shift in the peak wavelength of black body radiation with temperature? A. Stefan's Law B. Wien's Displacement Law C. Rayleigh-Jeans Law D. Planck's Law	2	CO2
Q 3	The Davisson-Germer experiment confirmed the: A. Wave nature of electrons B. Particle nature of electrons C. Quantum theory of light D. Principle of superposition	2	CO2

SECTION B

Q 4	A cavity radiator has its maximum spectral radiancy at a wavelength of 25.0 μm, which lies in the infrared region of the em-spectrum. The temperature of the body is then increased such that the total radiant intensity I(T) becomes 16 times. (a) What is the new temperature of the cavity radiator? (b) At what wavelength will the spectral radiancy now have its maximum value?	4	CO2
Q 5	Explain the phenomenon of diffraction of light and distinguish between Fraunhofer and Fresnel diffractions, with proper schematic diagram.	4	CO1
Q 6	X-rays of wavelength $\lambda_0 = 0.20$ nm are scattered from a block of material. The scattered X-rays are observed at an angle of 45° to the incident beam direction. Calculate the wavelength of scattered X-rays and kinetic energy of scattered electrons.	4	CO2
Q 7	State and prove Brewster's law with a proper schematic diagram, depicting the polarization of the rays involved.	4	CO1

SECTION-C

Q 8	Define interference of light, and hence explain the coherent sources. Derive the expression for fringe width for the interference fringes obtained from Young's double slits experiment (YDSE). Support the derivation with a proper schematic diagram.	8	CO1

Useful Physical constants: Planck's Constant (h) = 6.62607015×10^{-34} J·sec,
Stefan Boltzmann Constant (σ) = 5.67×10^{-8} W/(m^2·K^4)
Speed of light (c) = 3×10^8 m/s, Mass of electron (m_e) = 9.1×10^{-31} kg