Student ID:_____ Name: _____

IMPORTANT INFORMATION that you may need:

Speed of light in empty space (c)	3.0×10^{8} m/s
Planck's constant (h)	6.63×10^{-34} J sec = 4.14×10^{-15} eV sec
(ħ)	1.05×10^{-34} J sec = 6.58×10^{-16} eV sec
Coulomb's constant (k)	8.99×10^{9} N m^2/C^2
Charge of an electron (e)	-1.6×10^{-19} C
Mass of an electron (m_e)	9.11×10^{-31} kg
Mass of a proton (m_p)	1.67×10^{-27} kg
Bohr radius (a_B)	5.29×10^{-11} m
Bohr magneton (μ_B)	9.27×10^{-24} J/T

1 electron Volt (eV) = 1.602×10^{-19} J 1 MeV = 1×10^{6} eV

1 pm = 1×10^{-12} 1 nm = 1×10^{-9} m 1 μm = 1×10^{-6} m 1 mm = 1×10^{-3} m

Double Slit Interference pattern:

Maxima: $d \sin\theta = m\lambda$ Minima: $d \sin\theta = (m+1/2)\lambda$ with m = 0, ±1, ±2, ±3, …

where d is the spacing between the slits and λ is the wavelength of the light or the de Broglie wavelength.

Representative wavelength ranges:

Infrared (750 nm – 1000 nm)	Red (620 - 750 nm)	Orange (590 - 620 nm)
Yellow (570 - 590 nm)	Green (495 - 570 nm)	Blue (450 – 495 nm)
Violet (380 - 450 nm)	Ultraviolet (380 nm – 10 nm)	

Schrödinger equation:

Time-dependent: $-\frac{\hbar^2}{2m}\frac{\partial^2\Psi(x,t)}{\partial x^2} + V(x)\Psi(x,t) = i\hbar\frac{\partial\Psi(x,t)}{\partial t}$

Time-independent: $-\frac{\hbar^2}{2m}\frac{d^2\psi(x)}{dx^2} + V(x)\psi(x) = E\psi(x)$