Student ID:_____ Name: _____

PHYS 2130 Sp2015 FINAL EXAM

IMPORTANT INFORMATION that you may need:

Speed of light in empty space (c)	3.0×10^{8} m/s
Planck's constant (h)	6.626×10^{-34} J-sec
$\hbar = h/2\pi$	
Coulomb's constant (k)	8.99×10^{9} N-m^2/C^2
Charge of an electron (e)	1.6×10^{-19} C
Ground state energy of electron in Hydrogen	-13.6eV
Mass of electron (kg)	9.11×10^{-31} kg
Mass of proton or Mass of neutron (kg)	1.67×10^{-27} kg

hc = 1240 eV-nm

ke^2 = 1.440 eV-nm

1 electron – Volt = 1.602×10^{-19} Joules

1 nm = 1×10^{-9} m

Representative wavelengths: Red (680 nm); Orange (610 nm); Yellow (580 nm); Green (540 nm); Blue (470 nm); Violet (410 nm)

Work functions of common metals: Sodium=2.28eV; Cadmium=4.07eV; Aluminum=4.08eV; Copper=4.7eV; Lead= 4.14eV; Silver= 4.73eV; Carbon= 4.81eV; Nickel= 5.01eV;

Atomic configurations: neutral Hydrogen (H): 1 proton, 1 electron;
neutral Helium (He): 2 protons, 2 neutrons, 2 electrons

1D Schrodinger Equation:

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

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

COLOR

Honor Code Pledge

"On my honor as a University of Colorado at Boulder student I have neither given nor received unauthorized assistance on this work."

Name_____

Signature _____

Student ID:_____ Name: _____

IMPORTANT INFORMATION that you may need:

Speed of light in empty space (c) $3.0 \times 10^{8}\ m/s$

Planck's constant (h) $6.626 \times 10^{-34}\ J \cdot s$

$$\hbar = \frac{h}{2\pi} \qquad 1.055 \times 10^{-34}\ J \cdot s$$

Charge of an electron (-e) $-1.6 \times 10^{-19} C$

Mass of an electron (m_e) $9.11 \times 10^{-31} kg$

Ground state energy of electron in Hydrogen $-13.6\ eV$

Mass of proton (m_p) $1.67 \times 10^{-27} kg$

$hc = 1240\ eV \cdot nm$ $\quad ke^2 = 1.440\ eV \cdot nm$ $\quad 1\ eV = 1.602 \times 10^{-19}\ J$

Representative wavelengths: Red (680 nm); Orange (610 nm); Yellow (580 nm); Green (540 nm); Blue (470 nm); Violet (410 nm)

$1\ ns = 1 \times 10^{-9} s$ $\quad 1\ nm = 1 \times 10^{-9} m$ $\quad 1\ \mu m = 1 \times 10^{-6} m$ $\quad 1\ mm = 1 \times 10^{-3} m$

1-D Time-Dependent Schrödinger Equation

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

deBroglie Relation:

$$\lambda = \frac{h}{p}$$

Energy of a photon:

$E = hf$