PHYSICS EQUATIONS – 2nd SEMESTER

TANGENTIAL VELOCITY	Tangential velocity = $\frac{2 \cdot \text{pi} \cdot \text{radius} \cdot (\#\text{revs})}{\text{time}}$	$v_t = \frac{2\pi r(\#\text{revs})}{t}$
CENTRIPETAL ACCELERATION	$a_c = \frac{\text{velocity}^2}{\text{radius}}$	$a_c = \frac{v^2}{r}$
CENTRIPETAL FORCE	(a) centripetal force = mass · centripetal acceleration (b) centripetal force = $\frac{\text{mass} \cdot \text{velocity}^2}{\text{radius}}$	(a) $F_c = ma_c$ (b) $F_c = \frac{mv_t^2}{r}$
TORQUE	Torque = Perpendicular Force · Lever Arm Distance Balanced Torque = $\text{Force}_1 \cdot \text{distance}_1 = \text{Force}_2 \cdot \text{distance}_2$	$T = F \cdot d$ $F_1 \cdot d_1 = F_2 \cdot d_2$
ROTATIONAL INERTIA	Hoop and Pendulum Solid Cylinder Solid Sphere Stick about End Stick about CG	$I = mr^2$ $I = 1/2\ mr^2$ $I = 2/5\ mr^2$ $I = 1/3\ mr^2$ $I = 1/12\ mr^2$
ANGULAR MOMENTUM	Angular Momentum = mass · tangential velocity · radius	$L = m \cdot v_t \cdot r$
UNIVERSAL GRAVITATION	Force of Gravity = $\frac{\text{Gravity constant} \cdot \text{mass}_1 \cdot \text{mass}_2}{\text{distance}^2}$ $G = 6.67 \times 10^{-11}\ \text{N-m}^2/\text{kg}^2$ $r_{earth} = 6.38 \times 10^6\ \text{m}$ $m_{earth} = 5.98 \times 10^{24}\ \text{kg}$	$F_g = \frac{Gm_1m_2}{d^2}$
ACCELERATION OF GRAVITY	Acceleration of Gravity = $\frac{\text{Gravity constant} \cdot \text{mass}}{\text{radius}^2}$	$a_g = \frac{G\ m}{r^2}$
TANGENTIAL VELOCITY	Tangential Velocity = Square root of $\frac{\text{Gravity constant} \cdot \text{mass}}{\text{radius}}$ mass – orbit center. radius - orbit	$V_t = \sqrt{\frac{G\ m}{r}}$
COULOMB'S LAW	Electrical Force = $\frac{\text{constant} \cdot \text{charge}_1 \cdot \text{charge}_2}{\text{distance}^2}$ $k = 9.0 \times 10^9\ \text{N-m}^2/\text{C}^2$	$F_e = \frac{kq_1q_2}{d^2}$
POTENTIAL DIFFERENCE	Potential Difference = Potential Energy ÷ charge Electron Charge = -1.6×10^{-19} C Proton Charge = 1.6×10^{-19} C Mass = 9.11×10^{-31} kg Mass = 1.67×10^{-27} kg	$V = PE/q$
ELECRIC CURRENT	Electric Current = charge ÷ time	$I = q/t$

OHM'S LAW	Electric Current = Voltage ÷ Resistance	$I = V/R$
ELECTRIC POWER	Electric Power = Current · Voltage	$P = IV$
ELECTRICAL ENERGY	Electric Energy = Power · time	$E = Pt$
ELECTRICAL COST	Cost = Energy · rate per kilowatt-hour	$\$ = E \cdot \text{rate}$
SERIES CIRCUITS	Resistance $_{total}$ = Resistance$_1$ + Resistance$_2$ …. Voltage $_{total}$ = Volts$_1$ + Volts$_2$ + Volts$_3$ ….	$R_T = R_1 + R_2 + R_3$ …. $V_T = V_1 + V_2 + V_3$ …. (I constant)
PARALLEL CIRCUITS	1/ Resistance $_{total}$ = 1/Resistance$_1$ + 1/Resistance$_2$ …. Current total = Current$_1$ + Current$_2$ + Current$_3$ ….	$\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2}$ $I_T = I_1 + I_2 + I_3$ (V constant)
MAGNETIC FORCE	Magnetic Force = charge · velocity · magnetic field Magnetic Force = current · length · magnetic field	$F_B = q \cdot v \cdot B$ $F_B = I \cdot L \cdot B$
FREQUENCY & PERIOD	frequency = 1 ÷ Period Period = 1 ÷ frequency	$f = 1/T$ $T = 1/f$
PER. OF A PENDULUM	Period = 2 · pie · square root of length ÷ gravity	$T_p = 2\pi\sqrt{L/g}$
VELOCITY OF A WAVE	Velocity = frequency · wavelength	$v = f\lambda$
SPEED OF SOUND IN AIR	V_{air} = 331 m/s + (0.6 m/s) · Temperature in Celsius	$V_{air} = 331 \text{ m/s} + (0.6 \text{ m/s})T_c$
ENERGY OF LIGHT	Photon Energy = Planck's Constant · frequency Photon Energy = $\frac{\text{Planck's Constant} \cdot \text{speed of light}}{\text{Wavelength}}$ $h = 6.63 \times 10^{-34}$ J-S	$E = h \cdot f$ $E = \frac{h \cdot c}{\lambda}$
LAW OF REFLECTION	angle of incidence = angle of reflection	$\theta_i = \theta_r$
LAW OF REFRACTION	index of refraction$_1$ · sine angle$_1$ = index of refraction$_2$ · sine angle$_2$ $n = \frac{V_{(air)}}{V_{(medium)}}$	$n_1 \sin\theta_1 = n_2 \sin\theta_2$
LENS EQUATIONS	1/ focal length = 1/object distance + 1/image distance Magnification = - image distance ÷ object distance	$\frac{1}{f} = \frac{1}{d_o} + \frac{1}{d_i}$ $M = -\frac{d_i}{d_o}$