PHY415115 - PHYSICS
EXTERNAL EXAM INFORMATION SHEET

Prefixes

T - *tera*	10^{12}
G - *giga*	10^{9}
M - *mega*	10^{6}
k - *kilo*	10^{3}
c - *centi*	10^{-2}
m - *milli*	10^{-3}
μ - *micro*	10^{-6}
n - *nano*	10^{-9}
p - *pico*	10^{-12}
f - *femto*	10^{-15}

Trigonometry Identities

$$\sin\theta = \frac{opposite}{hypotenuse} \qquad \cos\theta = \frac{adjacent}{hypotenuse}$$

$$\tan\theta = \frac{opposite}{adjacent}$$

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C},\ a^2 = b^2 + c^2 - 2bc\cos A$$

Motion in a Straight Line, Momentum, Force, Centripetal Force

$$v = u + at$$

$$s = ut + \frac{1}{2}at^2$$

$$2as = v^2 - u^2$$

$$p = mv$$

$$F_{net} = \frac{\Delta mv}{\Delta t} = ma$$

$$F_c = \frac{mv^2}{r} = \frac{4\pi^2 mr}{T^2}$$

$$a_c = \frac{v^2}{r} = \frac{4\pi^2 r}{T^2}$$

Work, Energy and Power

$$W = \Delta Energy = Fs\cos\theta$$

$$E_p = mgh \qquad E_K = \frac{1}{2}mv^2$$

$$P = \frac{W}{t}$$

Gravity, Kepler's Law

$$G = 6.67\times10^{-11}\ N\,m^2\,kg^{-2},\quad g = 9.81\,m\,s^{-2}$$

$$F_g = mg,\quad F_g = \frac{Gm_1m_2}{r^2}$$

$$g \overset{def}{=} \frac{F_g}{m},\quad g = \frac{GM}{r^2}$$

$$T^2 = \frac{4\pi^2 r^3}{GM}$$

Electrostatics

$$k_E = 9.00\times10^{9}\ N\,m^2\,C^{-2},\ e = 1.60\times10^{-19}\ C$$

$$m_e = 9.11\times10^{-31}kg,\ m_p = 1.67\times10^{-27}kg$$

$$E \overset{def}{=} \frac{F_E}{q},\quad E = \frac{k_E q}{r^2},\quad E = \frac{V}{d}$$

$$F_E = \frac{k_E q_1 q_2}{r^2}$$

$$V = \frac{\Delta E_p}{q}$$

Magnetism

$$k_B = 2\times10^{-7}\ N\,A^{-2}$$

$$F_B = IlB\sin\theta$$

$$F_B = qvB\sin\theta$$

$$B = \frac{k_B I}{r}$$

$$F_B = \frac{k_B I_1 I_2 l}{r}$$

$$r = \frac{mv\sin\theta}{qB}$$

$$v = \frac{E}{B}$$

Induction

$$emf = vlB\sin\theta$$

$$V = IR$$

$$P = VI$$

OFFICE OF TASMANIAN ASSESSMENT, STANDARDS & CERTIFICATION

Oscillations, Waves

$c = 3.00 \times 10^{8}\ m\,s^{-1}$

$speed\ of\ sound\ in\ air\ at\ 20^{\circ}C = 344\ m\,s^{-1}$

$$f = \frac{1}{T}$$

$$v = \lambda f$$

$$\theta_i = \theta_r$$

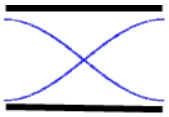
$$\frac{\sin\theta_i}{\sin\theta_r} = \frac{v_i}{v_r} = n$$

$$n_i \sin\theta_i = n_r \sin\theta_r$$

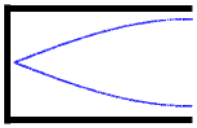
$$w = \frac{\lambda x}{d}$$

$$v = \sqrt{\frac{T}{\mu}}$$

$\lambda = 21$



$\lambda = 21$



$\lambda = 41$

Quantum

$h = 6.63 \times 10^{-34}\ J\,s = 4.14 \times 10^{-15}\ eV\,s$

$e = 1.60 \times 10^{-19} C$

$\lambda_p T = 2.90 \times 10^{-3}\ m\,K$

$E = hf$

$E_K(max) = eV = hf - W$

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

Nuclear

$m_e = 9.11 \times 10^{-31}\ kg = 0.000549\ u$

$m_p = 1.67 \times 10^{-27}\ kg = 1.007276\ u$

$m_n = 1.67 \times 10^{-27}\ kg = 1.008665\ u$

$mass\ to\ energy\ conversion\ \ 931\ MeV = 1\ u$

$N_A = 6.02 \times 10^{23}\ mol^{-1}$

$E = mc^2$

$$-\frac{dN}{dt} = \lambda N = A$$

$$\lambda = \frac{0.693}{T_{\frac{1}{2}}}$$

$$\frac{N}{N_o} = e^{-\lambda t} = \frac{A}{A_o} = \frac{Count\ Rate}{Orig\ Count\ Rate}$$

$$N = \frac{mN_A}{M} \qquad m\ in\ grams$$

EM spectrum