Useful Formulae in Advanced Level Physics

Useful Formulae in Advanced Level Physics					
A1.	$a = \frac{v^2}{r} = \omega^2 r$	centripetal acceleration	C17.	$B = \frac{\mu_0 NI}{l}$	magnetic field inside long solenoid
A2.	$a = -\omega^2 x$	simple harmonic motion	C18.	$F = \frac{\mu_0 I_1 I_2}{2\pi r}$	force per unit length between long parallel straight current carrying conductors
A3.	$L = I\omega$	angular momentum of a rigid body	C19.	$T = BANI \sin \phi$	torque on a rectangular current carrying coil in a uniform magnetic field
A4.	$T = \frac{dL}{dt}$	torque on a rotating body	C20.	$E = BAN\omega \sin \omega t$	simple generator e.m.f.
A5.	$E=\frac{1}{2}I\omega^2$	energy stored in a rotating body	C21.	$\frac{V_s}{V_p} \approx \frac{N_s}{N_p}$	ratio of secondary voltage to primary voltage in a transformer
B1.	$\upsilon = \sqrt{\frac{T}{m}}$	velocity of transverse wave motion in a stretched string	C22.	E = -LdI / dt	e.m.f. induced in an inductor
B2.	$v = \sqrt{\frac{E}{\rho}}$	velocity of longitudinal wave motion in a solid	C23.	$E = \frac{1}{2}LI^2$	energy stored in an inductor
B3.	$n = \tan \theta_p$	refractive index and polarising angle	C24.	$X_L = \omega L$	reactance of an inductor
B4.	$d = \frac{\lambda D}{a}$	fringe width in double-slit interference	C25.	$X_C = \frac{1}{\omega C}$	reactance of a capacitor
B5.	$d\sin\theta=n\lambda$	diffraction grating equation	C26.	$P = IV \cos \theta$	power in an a.c. circuit
B6.	$f' = f(\frac{\upsilon - u_0}{\upsilon - u_s})$	Doppler frequency	C27.	$\Delta V_{out} / \Delta V_{in} = -\beta \frac{R_L}{R_B}$	voltage gain of transistor amplifier in the common emitter configuration
B7.	$10 \log_{10}(\frac{I_2}{I_1})$	definition of the decibel	C28.	$V_0 = A_0 (V_+ - V)$	output voltage of op amp (open-loop)
Ci.	$F = \frac{Gm_1m_2}{r^2}$	Newton's law of gravitation	C29.	$A = -\frac{R_f}{R_i}$	gain of inverting amplifier
C2.	$V = -\frac{GM}{r}$	gravitational potential	C30.	$A = 1 + \frac{R_f}{R_i}$	gain of non-inverting amplifier
C3.	$r^3/T^2 = \text{constant}$	Kepler's third law	D1.	pV = nRT = NkT	equation of state for an ideal gas
C4.	$E = \frac{Q}{4\pi\varepsilon_0 r^2}$	electric field due to a point charge	D2.	$pV = \frac{1}{3} Nmc^{2}$	kinetic theory equation
	$V = \frac{Q}{4\pi\varepsilon_0 r}$	electric potential due to a point charge		$E_k = \frac{3RT}{2N_A} = \frac{3}{2}kT$	molecular kinetic energy
C6.	$E = \frac{V}{d}$	electric field between parallel plates (numerically)	D4.	$E = \frac{F}{A} / \frac{x}{L}$	macroscopic definition of Young modulus
C7.	$C = \frac{Q}{V} = \frac{\varepsilon_0 A}{d}$	capacitance of a parallel-plate capacitor	D5.	$E = \frac{1}{2}Fx$	energy stored in stretching
C8.	$Q = Q_0 e^{-t/RC}$	decay of charge with time when a capacitor discharges	D6.	$F = -\frac{dU}{dr}$	relationship between force and potential energy
	$Q = Q_0 \left(1 - e^{-t/RC}\right)$	rise of charge with time when charging a capacitor	_	E = k/r	microscopic interpretation of Young modulus
C10.	$E = \frac{1}{2}CV^2$	energy stored in a capacitor	D8.	$P + \frac{1}{2}\rho v^2 + \rho g h$	Bernoulli's equation
C11.	I = nAvQ	general current flow equation		$ = \text{constant} $ $ \Delta Q = \Delta U + \Delta W $	first law of thermodynamics
C12.	$R = \frac{\rho l}{4}$	resistance and resistivity	D10.	$E_n = -\frac{13.6}{r^2} \text{ eV}$	energy level equation for hydrogen atom
	$F = BQ \upsilon \sin \theta$			$N = N_0 e^{-kt}$	law of radioactive decay
C14.	$F = BII \sin \theta$	force on a moving conductor in a magnetic field	D12.	$t_{\frac{1}{2}} = \frac{\ln 2}{k}$	half-life and decay constant
C15.	$V = \frac{BI}{nQt}$	Hall voltage	D13.	$\frac{1}{2}m\upsilon_m^2 = h\nu - \Phi$	Einstein's photoelectric equation
C16.	$B = \frac{\mu_0 I}{2\pi r}$	magnetic field due to a long straight wire	D14.	$E = mc^2$	mass-energy relationship