Examrace

Formulae Physics for Competitive Exams

No.	Mechanics	
1.	Linear motion with constant acceleration	$v = u + at$ $s = ut + \frac{1}{2}at^2$ $v^2 = u^2 + 2as$ $s = \left(\frac{u+v}{2}\right) \times t$ $average\ speed = \frac{distance}{time}$
2.	*Relative motion*	$S_{bc} = S_b - S_c$ $v_{bc} = v_b - v_c$ $a_{bc} = a_b - a_c$
3.	*Momentum of a particle*	mv
4.	*Newton's experimental law (NEL)*	$v_1 - v_2 = -e(u_1 - u_2)$
5.	*Conservation of momentum*	$m_1u_1 + m_2u_2 = m_1v_1 + m_2v_2$
6.	*Impulse (change in momentum)*	$mv - mu$
7.	*Angle in radians*	$\theta = \frac{s}{r}$
8.	*Angular velocity*	$\omega = \frac{\theta}{t}$
9.	*Linear velocity and angular velocity*	$v = r\omega$

10.	*Centripetal acceleration*	$a = r\omega^2 = \frac{v^2}{r}$
11.	*Centripetal force*	$F = mr\omega^2 = \frac{mv^2}{r}$
12.	*Newton's law of gravitation*	$F = \frac{Gm_1m_2}{d^2}$
13.	*Force and acceleration*	$F = ma$
14.	*Weight and acceleration due to gravity*	$W = mg = v\rho g;$ $g = \frac{GM}{R^2}$
15.	*Period of a satellite*	$T^2 = \frac{4\pi^2R^2}{GM}$
16.	*Moment of a force*	$M = Fd$
17	*Torque of a couple*	$T = Fd$
	Centres of gravity	
1.	*Hemisphere, radius r*	$\frac{3}{8} \times r\, from\ centre$
2.	*Hemispherical shell, radius r*	$\frac{1}{2} \times r\, from\ centre$
3.	*Right circular cone*	$\frac{1}{4} \times h\, from\ the\ base$
4.	*Triangular lamina*	$\frac{1}{3} from\ base\ along\ medin = \left(\frac{x_1+x_2+x_3}{3}, \frac{y_1+y_2+y_3}{3}\right)$
5.	*Arc, radius r , angle 2θ*	$\frac{r \sin \theta}{\theta}$
6.	*Sector of disc, radius r , angle 2θ*	$\frac{2r \sin \theta}{3\theta}$
	Moment of Inertia	

1.	*Uniform rod, length 2l*	$Centre = \frac{1}{3}ml^2$ $One\ end = \frac{4}{3}ml^2$
2.	*Uniform disc, radius r*	$Centre = \frac{1}{2}mr^2$ $Diameter = \frac{1}{4}mr^2$
3.	*Uniform hoop, radius r*	$Centre = mr^2$ $Diameter = \frac{1}{2}mr^2$
4.	*Uniform solid sphere, radius r*	$Diameter = \frac{2}{5}mr^2$
5.	*Parallel axis theorem*	$I_b = I_c + m\|bc\|^2$
6.	*Perpendicular axis theorem*	$I_z = I_x + I_y$
7.	*Hooke's law*	$F = -ks$
8.	*Simple harmonic motion*	$a = -\omega^2 s$ $T = \frac{1}{f} = \frac{2\pi}{\omega}$ $s = A\sin(\omega t + \propto)$ $v^2 = \omega^2(A^2 - s^2)$
9.	*Simple pendulum*	$T = 2\pi\sqrt{\frac{l}{g}}$
10.	*Compound pendulum*	$T = 2\pi\sqrt{\frac{I}{mgh}}$
11.	*Work*	$W = Fs = \int F\,ds$
12.	*Potential (gravitational) energy*	$E_p = mgh$
13.	*Kinetic energy*	$E_k = \frac{1}{2}mv^2$

14.	*Principle of conservation of mechanical energy*	$E_p + E_k = constant$
15.	*Mass-energy equivalence*	$E = mc^2$
16.	*Power*	$P = \frac{W}{t} = Fv$
17.	*Percentage efficiency*	$\frac{power\ output \times 100}{power\ input}$
18.	*Young's modulus*	$E = \frac{\sigma}{\varepsilon}$
19.	*Stress*	$\sigma = -\frac{F}{A}$
20.	*Strain*	$\varepsilon = \frac{\Delta l}{l}$
21.	*Density*	$\rho = \frac{m}{v}$
22.	*Pressure*	$p = \frac{F}{A}$
23.	*Pressure in a fluid*	$p = \rho gh$
24.	*Thrust on an immersed plane surface*	$T = AP_{centroid}$
25.	*Boyle's law*	$pV = constant$
	Heat and temperature	
1.	*Celsius temperature*	$\frac{t}{℃} = \frac{T}{K} - 273.15$
2.	*Energy needed to change temperature*	$\Delta E = mc\,\Delta\,\theta$ $\Delta E = C\,\Delta\,\theta$
3.	*Energy needed to change state*	$\Delta E = ml$

		$\Delta E = L$
	Waves	
1.	*Velocity of a wave*	$c = f\lambda$
2.	*Doppler effect*	$f' = \frac{fc}{c \pm u}$
3.	*Fundamental frequency of a stretched string*	$f = \frac{1}{2l}\sqrt{\frac{T}{\mu}}$
4.	*Mirror and lens formula*	$\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$
5.	*Magnification*	$m = \frac{v}{u}$
6.	*Power of a lens*	$P = \frac{1}{f}$
7.	*Two lenses in contact*	$P = P_1 + P_2$
8.	*Refractive index*	$n = \frac{\sin i}{\sin r} = \frac{real\ depth}{apparent\ depth}$ $n = \frac{1}{\sin C} = \frac{c_1}{c_2}$
9.	*Diffraction grating*	$n\lambda = d \sin \theta$
	Electricity	
1.	*Coulomb's law*	$F = \frac{1}{4\pi\epsilon} \times \frac{q_1 q_2}{d^2}$
2.	*Electric field strength*	$E = \frac{F}{q}$
3.	*Potential difference*	$V = \frac{W}{q}$
4.	*Ohm's law*	$V = IR$

5.	*Resistivity*	$\rho = \frac{RA}{l}$
6.	*Resistors in series*	$R = R_1 + R_2$
7.	*Resistors in parallel*	$\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2}$
8.	*Wheatstone bridge*	$\frac{R_1}{R_2} = \frac{R_3}{R_4}$
9.	*Joule's law*	$P = RI^2$
10.	*Force on a current-carrying conductor*	$F = IlB$
11.	*Force on a charged particle*	$F = qvB$
12.	*Induced emf*	$E = -\frac{d\phi}{dt}$
13.	*Alternating voltage and current*	$V_{rms} = \frac{v_0}{\sqrt{2}}$ $I_{rms} = \frac{I_0}{\sqrt{2}}$
14.	*Capacitance*	$C = \frac{q}{V}$
15.	*Parallel-plate capacitor*	$C = \frac{A\varepsilon_0}{d}$
16.	*Energy stored in capacitor*	$W = \frac{1}{2}CV^2$
17.	*Power*	$P = VI$
18.	*Magnetic flux*	$\phi = BA$
19.	*Transformer*	$\frac{V_i}{V_0} = \frac{N_p}{N_s}$
Modern physics		

1.	*Energy of a photon*	$E = hf$
2.	*Einstein's photoelectric equation*	$hf = \phi + \frac{1}{2}mv_{max}^2$
3.	*Law of radioactive decay*	$A = \lambda N$
4.	*Half-life*	$T_{\frac{1}{2}} = \frac{\ln 2}{\lambda}$
5.	*Mass-energy equivalence*	$E = mc^2$

Physics formula

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