

PHYSICS

Written examination 1

DATA SHEET

Directions to students

Detach this data sheet before commencing the examination.

This data sheet is provided for your reference.

1	velocity; acceleration	$v = \frac{\Delta x}{\Delta t}; \quad a = \frac{\Delta v}{\Delta t}$
2	equations for constant acceleration	$v = u + at$ $x = ut + \frac{1}{2}at^2$ $v^2 = u^2 + 2ax$ $x = \frac{1}{2}(v + u)t$
3	Newton's second law	$F = ma$
4	circular motion	$a = \frac{v^2}{r} = \frac{4\pi^2 r}{T^2}$
5	Hooke's law	$F = -kx$
6	elastic potential energy	$\frac{1}{2}kx^2$
7	gravitational potential energy near the surface of the Earth	mgh
8	kinetic energy	$\frac{1}{2}mv^2$
9	Newton's law of universal gravitation	$F = G \frac{M_1 M_2}{r^2}$
10	gravitational field	$g = G \frac{M}{r^2}$
11	stress	$\sigma = \frac{F}{A}$
12	strain	$\varepsilon = \frac{\Delta L}{L}$
13	Young's modulus	$E = \frac{\text{stress}}{\text{strain}}$
14	transformer action	$\frac{V_1}{V_2} = \frac{N_1}{N_2}$
15	AC voltage and current	$V_{\text{RMS}} = \frac{1}{2\sqrt{2}} V_{\text{p-p}} \quad I_{\text{RMS}} = \frac{1}{2\sqrt{2}} I_{\text{p-p}}$
16	voltage; power	$V = RI \quad P = VI$

17	resistors in series	$R_T = R_1 + R_2$
18	resistors in parallel	$\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2}$
19	capacitors	time constant : $\tau = RC$
20	Lorentz factor	$\gamma = \frac{1}{\left(1 - \frac{v^2}{c^2}\right)^{\frac{1}{2}}}$
21	time dilation	$t = t_0 \gamma$
22	length contraction	$L = L_0 / \gamma$
23	relativistic mass	$m = m_0 \gamma$
24	universal gravitational constant	$G = 6.67 \times 10^{-11} \text{ N m}^2 \text{ kg}^{-2}$
25	mass of Earth	$M_E = 5.98 \times 10^{24} \text{ kg}$
26	radius of Earth	$R_E = 6.37 \times 10^6 \text{ m}$
27	mass of the electron	$m_e = 9.1 \times 10^{-31} \text{ kg}$
28	charge on the electron	$q = -1.6 \times 10^{-19} \text{ C}$
29	speed of light	$c = 3.0 \times 10^8 \text{ m s}^{-1}$

Prefixes/Units

p = pico = 10^{-12}

n = nano = 10^{-9}

μ = micro = 10^{-6}

m = milli = 10^{-3}

k = kilo = 10^3

M = mega = 10^6

G = giga = 10^9

1 tonne = 10^3 kg

END OF DATA SHEET