DATA FOR THE PHYSICAL SCIENCES PAPER I (PHYSICS)

TABLE 1   PHYSICAL CONSTANTS

NAME	SYMBOL	VALUE
Approximate magnitude of acceleration due to gravity	g	10 m s^{-2}
Speed of light in a vacuum	c	$3{,}0 \times 10^8 \text{ m·s}^{-1}$
Gravitational Constant	G	$6{,}7 \times 10^{-11} \text{ N m}^2 \text{ kg}^{-2}$
Magnitude of charge on electron	e^-	$1{,}6 \times 10^{-19} \text{ C}$
Mass of an electron	m_{e-}	$9.1 \times 10^{-31} \text{ kg}$
Permittivity of free space	ε_o	$8{,}9 \times 10^{-12} \text{ F m}^{-1}$

TABLE 2   FORMULAE FOR MECHANICS

MOTION

$v_f = v_i + a\Delta t$	$\Delta x = \left(\dfrac{v_i + v_f}{2} \right)\Delta t$
$v_f{}^2 = v_i{}^2 + 2a\Delta x$	$\Delta x = v_i\Delta t + \frac{1}{2}a\Delta t^2$

FORCE

$F = \dfrac{Gm_1m_2}{r^2}$	$F = \mu_s F_N \qquad F = \mu_k F_N$
$p = mv$	$F_{net} = \dfrac{\Delta p}{\Delta t}$
$F_{net}\Delta t = m\Delta v$	$F_{net} = ma \qquad F_g = mg$
$\tau = F_\perp r$	$MA = \dfrac{F_L}{F_A}$

WORK ENERGY POWER

$W = Fs$	$E_p = mgh$
$P = \dfrac{W}{t} \qquad P = Fv$	$E_k = \frac{1}{2}mv^2$

WAVES, LIGHT AND SOUND

$v = f\lambda$	$T = \dfrac{1}{f}$
$\sin\theta_n = \dfrac{n\lambda}{w}$	$f' = \left(\dfrac{V}{V-v}\right)f \quad \text{or} \quad f' = \left(\dfrac{V}{V+v}\right)f$
$E = hf$	$\lambda = \dfrac{h}{mv}$

ELECTROSTATICS

$F = \dfrac{kQ_1Q_2}{r^2} \ (k = 9 \times 10^9 \, N\,m^2\,C^{-2})$	$V = \dfrac{W}{Q}$
$E = \dfrac{F}{Q}$	$E = \dfrac{V}{d}$
$E = \dfrac{kQ}{r^2} \qquad (k = 9 \times 10^9 \, N.m^2.C^{-2})$	$C = \dfrac{Q}{V}$
$C = \varepsilon_o \dfrac{A}{d}$	

ELECTROMAGNETISM

$\varepsilon = -N\dfrac{\Delta\Phi}{\Delta t}$	$\Phi = BA$
$\dfrac{V_s}{V_p} = \dfrac{N_s}{N_p}$	$F = qvB$

CURRENT ELECTRICITY

$Q = I\Delta t$	$R = \dfrac{V}{I}$
$R = r_1 + r_2 + r_3 + \dots$	$\dfrac{1}{R} = \dfrac{1}{r_1} + \dfrac{1}{r_2} + \dfrac{1}{r_3} + \dots$
$P = VI = I^2R = \dfrac{V^2}{R}$	$emf = I(R + r)$

ALTERNATING CURRENT

$I_{rms.} = \dfrac{I_{max}}{\sqrt{2}}$ and $V_{rms.} = \dfrac{V_{max}}{\sqrt{2}}$	$X_C = \dfrac{1}{2\pi fC}$ and $V_{rms} = I_{rms}X_C$
$X_L = 2\pi fL$ and $V_{rms} = I_{rms}X_L$	