8 USEFUL CONSTANTS, UNITS AND SYMBOLS

8.1 Useful constants

Boltzmann Constant (k) = 1.380658×10^{-23} J.K^{-1}

Free Space Electric Constant $\varepsilon o = 8.854188 \times 10^{-12}$ F/m

Free Space Magnetic Constant $\mu o = 4 \pi \times 10^{-7}$ H/m

Free Space Impedance = $Z_o = (\varepsilon_o/\mu_o)1/2 = 120 \pi = 377\ \Omega$

$\pi = 3.141593$

e = 2.718282

c = 2.9979925 x 108 m/s (speed of light/electro-magnetic waves)

Resistivity (ρ) of Copper (annealed) = 1.7241×10^{-6} cm

Resistivity (ρ) of Copper (hard drawn) = 1.7758×10^{-6} cm

Resistivity (ρ) of Aluminium = 2.828×10^{-6} cm

Temperature Coefficient (a) of Resistance of Copper (annealed) at 20 °C = 0.00393

Temperature Coefficient (a) of Resistance of Copper (hard drawn) at 20 °C = 0.00382

Temperature Coefficient (a) of Aluminium at 20 °C = 0.0039

Temperature Coefficient (a) of Cable Attenuation = 0.002dB/dB/°C (approx)

Notes:
To find the resistance (R) of a conductor use:
$R = \rho L/A$ where ρ = Resistivity in $\Omega \cdot$cm
L = Length in cm
A = Cross sectional area in cm^2

To find the resistance (R) of a conductor at other temperatures use:
$R = R_{20} (1+a_{20} (T-20))$

where:

a_{20}	=	Temperature coefficient at 20 °C (Celsius)
R_{20}	=	The resistance at 20 °C (Celsius)
R	=	The resistance at temperature T (Celsius)

8.2 Units and symbols

Table 22 - Units and symbols

Quantity	Name	Symbol
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric Current	ampere	A
Thermodynamic temp	kelvin	K
Power	watt	W
Electric potential	volt	V
Force	newton	N
Electric resistance	ohm	W
Frequency	hertz	Hz
Logarithmic unit for:- power ratio - voltage ratio on the same impedance	Decibel (bel x 10)10 log10(P1/P2)20 log10 (U1/U2)	dB
Inductance	henry	H
Capacitance	farad	F
Binary digit – see note below	Bit	bit
Group of data bits	Byte	B

Note: the flux of bits in each second is measured in bit/s, or in alternative as bps

8.3 51 prefixes (case sensitive) - for use with the quantities in 8.2 above

Table 23 – SI prefixes

Factor	Prefix	Symbol	Factor	Prefix	Symbol
10^{24}	yotta	Y	10^{-1}	deci	d
10^{21}	zetta	Z	10^{-2}	centi	c
10^{18}	exa	E	10^{-3}	milli	m
10^{15}	peta	P	10^{-6}	micro	µ
10_{12}	tera	T	10^{-9}	nano	n
10^{9}	giga	G	10^{-12}	pico	p
10^{6}	mega	M	10^{-15}	femto	f
10^{3}	kilo	k	10^{-18}	atto	a
10^{2}	hecto	h	10^{-21}	zepto	z
10^{1}	deca	da	10^{-24}	yocto	y