



**GCE AS**

**B490U10-1A**



**MONDAY, 20 MAY 2024 – AFTERNOON**

**ELECTRONICS – AS component 1  
Data Booklet**

A clean copy of this booklet should be issued to candidates for their use during each AS Level Electronics examination.

Centres are asked to issue this booklet to candidates at the start of the AS Level Electronics course to enable them to become familiar with its contents and layout.

### Preferred Values for resistors

The figures shown below and their decade multiples and sub-multiples are the E24 series of preferred values.

10, 11, 12, 13, 15, 16, 18, 20, 22, 24, 27, 30, 33, 36, 39, 43, 47, 51, 56, 62, 68, 75, 82, 91.

### Standard Multipliers

Prefix	Multiplier	Prefix	Multiplier
T	$\times 10^{12}$	m	$\times 10^{-3}$
G	$\times 10^9$	$\mu$	$\times 10^{-6}$
M	$\times 10^6$	n	$\times 10^{-9}$
k	$\times 10^3$	p	$\times 10^{-12}$

### Useful equations

$$C = \frac{Q}{V}$$

$$V_{\text{rms}} = \frac{V_0}{\sqrt{2}}$$

$$\frac{1}{C} = \frac{1}{C_1} + \frac{1}{C_2}$$

$$I_{\text{rms}} = \frac{I_0}{\sqrt{2}}$$

$$C = \frac{C_1 C_2}{C_1 + C_2}$$

$$I_C = h_{\text{FE}} I_B$$

$$C = C_1 + C_2$$

$$I_D = g_M (V_{\text{GS}} - 3)$$

$$P = I_D^2 r_{\text{DSon}}$$

$$A + \bar{A}.B = A + B$$

$$A.B + A = A.(B + 1) = A$$

$$G = \frac{V_{OUT}}{V_{IN}}$$

$$G = 1 + \frac{R_F}{R_1}$$

$$G = -\frac{R_F}{R_{IN}}$$

$$V_{OUT} = -R_F \left( \frac{V_1}{R_1} + \frac{V_2}{R_2} + \dots \right)$$

$$V_{OUT} = V_S \text{ for } V_+ > V_-$$

$$V_{OUT} = -V_S \text{ for } V_+ < V_-$$

$$V_{OUT} = V_{IN}$$

$$\text{slew rate} = \frac{\Delta V_{OUT}}{\Delta t}$$

$$\text{slew rate} = 2\pi f V_P$$

$$T = RC$$

$$V_C = V_0 e^{-\frac{t}{RC}}$$

$$V_C = V_0 \left( 1 - e^{-\frac{t}{RC}} \right)$$

$$t = -RC \ln \left( 1 - \frac{V_c}{V_0} \right)$$

$$t = -RC \ln \left( \frac{V_c}{V_0} \right)$$

$$f \approx \frac{1}{RC}$$

$$f = \frac{1}{T}$$

$$T = 1.1 RC$$

$$t_H = 0.7(R_1 + R_2)C$$

$$t_L = 0.7R_2C$$

$$f = \frac{1.44}{(R_1 + 2R_2)C}$$

$$\frac{T_{ON}}{T_{OFF}} = \frac{R_1 + R_2}{R_2}$$

$$V_r = \frac{I}{f_r C}$$