



GCE MARKING SCHEME

SUMMER 2018

**GCE (LEGACY)
ELECTRONICS - ET2
1142/1**

INTRODUCTION

This marking scheme was used by WJEC for the 2018 examination. It was finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conference was held shortly after the paper was taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conference was to ensure that the marking scheme was interpreted and applied in the same way by all examiners.

It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conference, teachers may have different views on certain matters of detail or interpretation.

WJEC regrets that it cannot enter into any discussion or correspondence about this marking scheme.

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Question			Answers/Explanatory Notes * Indicates that ECF will be allowed from a previous part	Marks Available
1	a	(i) 1.5 k Ω (1) (ii) 2.5 k Ω (1) *		2
	b	(i) I ₁ = 3.6 mA (1) * (ii) I ₂ = 1.8 mA (1) * (iii) V ₁ = 3.6 V (1) * (iv) V ₂ = 5.4 V (1) *		4 [6]
2.	a	(i) V _{OC} = 7.2 V (1) (ii) I _{SC} = 0.5 A (1) (iii) R _O = 14.4 Ω (1) *		3
	b	(i) Correct equivalent circuit (1) * (ii) Voltage drop across R _O = 1.44 V (1) * Voltage drop across load = 7.2 - 1.44 = 5.76 V (1) [Accept any other method that makes use of equiv cct]		3 [6]
3.	a	(i) 3.5 V (1) (ii) 2 V (1) *		2
	b	Switching threshold at 6 and 11 units on time axis 2 x (1) * Inverted o/p and amplitude = 5 V (1)		3
	c	(i) Resistor connected between i/p and o/p of Schmitt (1) Capacitor connected between 0 V and Schmitt i/p (1) (ii) Suitable method (1) Correct values (1) [Any combination of R and C with a period of 2 ms e.g. R = 2 k Ω ; C = 1 μ F]		2 2 [9]
4.	a	(i) Graph 4 (1) (ii) Graph 3 (1) (iii) Graph 1 (1)		3
	b	(i) Resistor and capacitor in parallel at output (1) Input connections to bridge correct (1) Output connections to bridge correct (1) (ii) 13.6 V (1)		3 1 [7]

5.	a	(i)	Substitution with correct multipliers (1) 7.84 V (1)	2
		(ii)	NOT gate connected to output of RC network (1) Buzzer connected between 12V rail and NOT gate o/p (1)	2
	b	Substitution (1) $V_{R1} = 545 \text{ k}\Omega$ (1)	2	
	c	(i)	Voltage across R = 8.4 V (1) $R = 8.4/30 \text{ mA} = 280 \Omega$ (1)	2
		(ii)	300Ω (1) *	1
				[9]
6.	a	(i)	Appropriate labelling of axis (1) Both points plotted accurately within ± 0.5 square with graph linear between points (1)	2
		(ii)	$h_{FE} = 180 \pm 4$ *	1
	b	(i)	$3.5 \pm 0.5 \text{ V}$ (1)	2
		(ii)	$6.5 \pm 0.5 \text{ V}$ (1)	2
c		$V_{Load} = 9 - (6.5 \pm 0.5 \text{ V}) = 2.5 \text{ V} \pm 0.5 \text{ V}$ (1) * $I_C = 2.5/100 = 0.025 \text{ A}$ [25 mA] (1) * $P = 6.5 \times 0.025 = 0.1625 \text{ W}$ [162.5mW] (1) *	3	
				[8]
7.	a		$15 - 6.2 = 8.8 \text{ V}$ (1) $8.8/22 = 0.4 \text{ A} = 400 \text{ mA}$ (1) *	2
	b		$400 - 10 = 390 \text{ mA}$ (1) *	1
	c		Voltage across 22Ω resistor = $500 \text{ mA} \times 22 \Omega = 11 \text{ V}$ (1) $V_{LOAD} = 15 - 11 = 4 \text{ V}$ (1) *	2
	d		Horizontal line at 6.2V until $I = 390 \text{ mA}$ (1) * Gradual downward slope thereafter (1) Passing through (500,4) and extending to current axis (1)	3
				[8]
8.	a		Resistor and thermistor in voltage divider (1) Thermistor at bottom (1) Correct symbol for a diode in inverse parallel across solenoid (1)	3
	b		4 V (accept answers between 4 and 4.1 V)	1
	c		Rated current = $72/12 = 6 \text{ A}$ $P = 6^2 \times 0.25$ Substitution (1) * 9 W (1) *	3
				[7]
TOTAL				60