GCE MARKING SCHEME

SUMMER 2016

ELECTRONICS ET2
1142/01

INTRODUCTION

This marking scheme was used by WJEC for the 2016 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.

GCE ELECTRONICS - ET2

MARK SCHEME - SUMMER 2016

Question			Answers/Explanatory Notes * Indicates that ECF will be allowed from a previous part	Marks Available
1	a		1.2 mA	1
	b		6 V	1
	c		20 kΩ	1
	d		0.9 mA	1
	e		6.67 kΩ	1
			correct use of Ohm's law	1
			* [allow ecf wherever applicable]	**[6]**
2.	a	(i)	3 V (1)	2
		(ii)	1.5 V (1) [allow 1 mark if answers to (i) and (ii) are reversed]	
	b		Signal goes high at 4 units on time axis (1) * Signal goes low at 12 units on time axis (1) * Amplitude = 5 V (1)	3 **[5]**
3.	a	(i)	Substitution/multipliers (1) 14 s accept 13.8 – 14s(1)	2
		(ii)	Substitution/multipliers (1) 9.32 V (1)	2
		(iii)	100 s [accept range 90 - 110 s] *	1
	b	(i)	Appropriate scales (1) Quality/accuracy of curve (1) *	2
		(ii)	22 s [accept range 20 - 24 s] *	1
				[8]
4.	a	(i)	4.6 V (1)	1
		(ii)	Graph with small ripple voltage for full wave output (1) Peaks at 4.6 V (1)	2
	b		Similar graph to a(ii) with same peak and larger ripple	1
	c	(i)	Ripple amplitude decreases (1)	2
		(ii)	100 Hz (1)	
				[6]

Question			Answers/Explanatory Notes * Indicates that ECF will be allowed from a previous part	Marks Available
5.	a	(i)	9.6 V	1
		(ii)	0.4 A [400 mA]	1
		(iii)	24 Ω *	1
	b	(i)	Equiv cct with load and correct values from part (a)	1
		(ii)	Total resistance = 60 Ω (1) *	3
			Total current = 0.16 A (1) *	
			Power in each load = 0.461 W (1) *	
			[Accept any other method that makes use of equiv cct]	
			Or Vout=5.76V $P=5.6^2/72$ =0.46W	
				[7]
6.	a	(i)	Use of LDR and resistor in voltage divider accept photo-diode no marks for thermistor (1) variable resistor (1)	3
		(ii)	LDR at bottom (1) Accept range 4.5 to 4.6 V (1)	1
	b	(i)	Voltage across R = 5.7 V (1)	2
		(ii)	$R = \frac{5.7}{40 \text{x} 10^{-3}}$ = 142.5 Ω (1)	1
			150 Ω (1)	
				[7]
7.	a	(i)	12 – 3.6 = 8.4 V (1)	2
			$\frac{8.4}{16}$ = 0.525 A = 525 mA (1) *	
		(ii)	P = 3.6 V × 525 mA (1) *	2
			= 1890 mW [1.89 W] (1)	
	b		520 mA	1
				[5]
8.	a		Switch and resistor in trigger cct (1) Switch at bottom (1)	2
	b		Relay between pin 3 and 0 V rail (1) NO contact /connections in secondary cct (1) [accept relay connected to 9 V rail with NC contact]	2
	c		T =60 s (1)	3
			Substitution into formula/multipliers (1)	
			116 kΩ (1) *	
				[7]

Question			Answers/Explanatory Notes * Indicates that ECF will be allowed from a previous part	Marks Available
9.	a		5.5 V	1
	b	(i)	Voltage across base resistor = 4.8 V (1) *	
			$I_B = \frac{4.8}{1000}$ = 4.8 mA (1) *	2
		(ii)	$h_{FE} = \frac{1.2}{4.8 \times 10^{-3}}$ = 250 *	1
	c	(i)	$V_{IN} = 250 \times \frac{15}{(250+1000)}$ (1)*	
			= 3 V (1)	2
		(ii)	V_{OUT} = 8 V accept 7.6-8V (1) *	1
		(iii)	Large voltage drop across CE junction hence power will be dissipated in transistor/transistor will overheat (1) For similar load currents MOSFETS have better power handling capability/MOSFETS have much smaller linear region (1)	2
				[9]
TOTAL				**60**