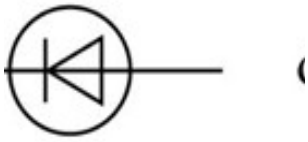
CIRCUIT DEVICES AND RESISTANCE MARK SCHEMES 1

QUESTION 1

QUESTION	ANSWER	EXTRA INFORMATION	MARKS
a)i)	light dependent resistor / LDR	accept ldr	1
a)ii)	25 (kilohms)	accept 24 - 26 inclusive accept 25 000 Ω	1
a)iii)	5 (V) or their (a)(ii) correctly converted to ohms × 0.0002 correctly calculated	allow 1 mark for converting 25kΩ / their (a)(ii) to ohms or allow 1 mark for correct substitution ie 0.0002 × 25(000) or 0.0002 × their (a)(ii) allow an incorrect conversion from kilohms providing this is clearly shown	**2**
b)i)	linear scale	using all of the available axis must cover the range 4 - 6 v or their (a)(iii) − 6 v and lie within the range 0 – 15 inc	**1**
b)ii)	. negative gradient line passing through 20 lux and their	do not allow lines with both positive and negative gradients only scores if the first mark is awarded only scores if line does not go above 6 volts	**1** **1**

c)i)	37.5 (kΩ) or their (a)(ii) + 50 % (a)(ii) correctly calculated		**1**
c)ii)	light intensity value would be unreliable / not accurate due to variation in resistance value	accept because resistance varies by ± 50 % accept tolerance of resistor is too great do not accept results are not accurate	1 1
Total marks			10

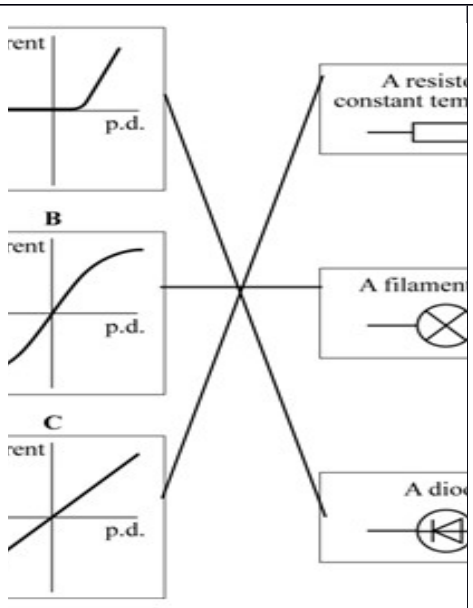
QUESTION 2

QUESTION	ANSWER	EXTRA INFORMATION	MARKS
a)	diode	accept LED	1
b)	all symbols correct  voltmeter in parallel with component added in series	must include at least voltmeter and diode allow ecf from part (a) if the component is not identified as a diode allow symbol without the line through triangle ignore polarity of diode any additional components must not affect the ability to measure V and I for the diode / their (a)	1 1

c)i)	0.05	accept 50 mA accept between 0.048 and 0.050 inclusive	1
c)ii)	16	0.8 correctly calculated their (c)(i) gains both marks allow 1 mark for correct transformation and substitution ie 0.8 or 0.8 0.05 their (c)(i) allow 17 if using 0.048	2
Total marks			6

QUESTION 3

QUESTION	ANSWER	EXTRA INFFORMATION	MARKS

a)	 three lines drawn correctly	allow 1 mark for 1 correct line if more than one line goes from a graph, both are incorrect	2
b)	J		1
Total marks			3

QUESTION 4

QUESTION	ANSWER	EXTRA INFORMATION	MARKS
a)	a light-dependent resistor		1

b)	any three from:
	resistance starts at
	
	500 (kilohms)
	  (resistance) falls rapidly as intensity increases from 0
	  (resistance) halves between 10
	and 20 lux
	(resistance) falls slightly between 20 and 50 lux
	or
	  (resistance) almost constant /
	levels out between 20 and 50 lux
	  at 50 lux, resistance = 10
		for full credit the word resistance
		must be used correctly at least once
		
		accept resistance falls
		accept brightness for intensity
		
		an answer resistance falls as
		intensity increases gains 2 marks -
		this may be combined with one of
		the bullet point marks for
			3

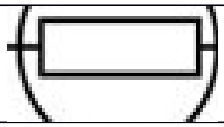
	(kilohms)	full credit	
c)i)	decrease		1
c)ii)	resistance increases	this can score without (c) (i)	1
d)	A circuit to switch on security lighting when it gets dark.		1
Total marks			7

QUESTION 5

QUESTION	ANSWER	EXTRA INFORMATION	MARKS
a)i)	to obtain a range of p.d. values	accept increase / decrease current / p.d. / voltage / resistance accept to change / control the current / p.d. / voltage / resistance to provide resistance is insufficient a variable resistor is insufficient do not accept electricity for current	1
a)ii)	temperature of the bulb increases	accept bulb gets hot(ter) accept answers correctly expressed in terms of collisions between (free) electrons and ions / atoms bulb gets brighter is insufficient	1
a)iii)	36	allow 1 mark for correct substitution, ie 12 × 3 provided no	2

	WATTS	subsequent step shown accept joules per second / J/s do not accept w	1
Total marks			5

QUESTION 6

QUESTION	ANSWER	EXTRA INFORMATION	MARKS
a)i)	correct symbol ringed 		1
a)ii)	accept any suggestion that would change light intensity, eg: • torch on or off • distance between torch and LDR • lights in room on or off • shadow over the LDR	accept power of torch do not accept watts/wattage of torch	1
b)	 resistance decreases from 600 kΩ to 200 kΩ	accept by 400 kΩ	1 1
c)i)	no numbers for light intensity or light intensity is categoric / a description/not continuous	not enough results is insufficient	1
c)ii)	YES both show that resistance increases with decreasing (light) intensity / brightness	mark is for the reason accept they both get the same results/pattern	1
d)	A circuit that automatically switches outside lights on when it gets dark.		1
Total			7

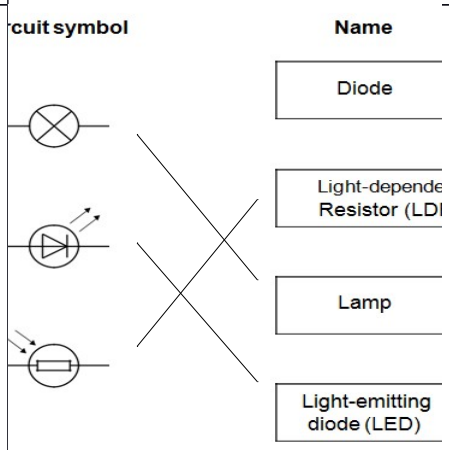
marks			

QUESTION 7

QUESTION	ANSWER	EXTRA INFORMATION	MARKS
a)i)			1
a)ii)	360	allow 1 mark for correct substitution, ie $9=0.025\times R$	2
a)iii)			1
a)iv)	An automatic circuit to switch a heating system on and off.		1
b)	so ammeter reduces / affects current as little as possible	accept so does not reduce / change the current (it is measuring) accurate reading is insufficient not change the resistance is insufficient	1
c)	gives a common understanding	accept is easier to share results accept can compare results do not need to be converted is insufficient prevent errors is	1

		insufficient	
Total marks			7

QUESTION 8

QUESTION	ANSWER	EXTRA INFFORMATION	MARKS
a)	 three lines drawn correctly	allow 1 mark for 1 correct line if more than one line goes from a graph, both are incorrect	3
Total marks			3

QUESTION 9

QUESTION	ANSWER	EXTRA INFORMATION	MARKS
a)i)	p.d. is (directly) proportional to current or gradient/slope is constant or the lines show constant resistance	accept lines are straight	1

a)ii)	C for the same p.d. the current is the smallest	reason only scores if C is chosen accept lowest gradient and the gradient = 1/R	1 1
b)i)	ohm	accept correct symbol Ω accept an answer written in Table 1 if not given in answer space	1
b)ii)	K and L only length varies	reason only scores if both K and L are chosen accept type of metal and the diameter are the same	1 1
b)iii)	measure the resistance of more wires made from different metals	accept test more (types of) metals measure the resistance of more wires is insufficient they only use two metals is insufficient	1
c)i)	voltmeter symbol correct and drawn in parallel with the wire  	accept voltmeter symbol correct and drawn in parallel with the battery	1
c)ii)	 correct symbol drawn	symbol must be rectangular	1
Total marks			9