

Thursday 9 January 2020 – Afternoon

Level 1/2 Cambridge National in Systems Control in Engineering

R113/01 Electronic principles

Time allowed: 1 hour

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You must have: • a scientific or graphical calculator	

Please write clearly in black ink. Do not write in the barcodes.							
Centre number					Candidate number		
First name(s)							
Last name							

INSTRUCTIONS

- Use black ink. You can use an HB pencil, but only for graphs and diagrams.
- Write your answer to each question in the space provided. If you need extra space use the lined pages at the end of this booklet. The question numbers must be clearly shown.
- · Answer all the questions.

INFORMATION

- The total mark for this paper is **60**.
- The marks for each question are shown in brackets [].
- Quality of written communication will be assessed in questions marked with an asterisk (*).
- This document has 8 pages.

ADVICE

· Read each question carefully before you start your answer.

Answer all the questions.

1 (a) Complete the table by naming the component for each electronic symbol shown. Part of each answer has been given for you.

Symbol	Component
	polarised
	lamp
	to switch
	resistor

ceramic	polyester	electrolytic	polystyrene	tantalum	
Circle the two	polarised capaci	tors in the list of ca	apacitor types below.		
				[3]
Calculate the	energy in kilowatt	hours when a 900	watt hairdryer is use	d for 10 minutes.	
				[3]
Calculate the r	esistance in ohm	s of a lamp rated a	at 12 volts 0.5 ampere	es.	
	Circle the two	Circle the two polarised capaci	Circle the two polarised capacitors in the list of ca	Circle the two polarised capacitors in the list of capacitor types below.	

[4]

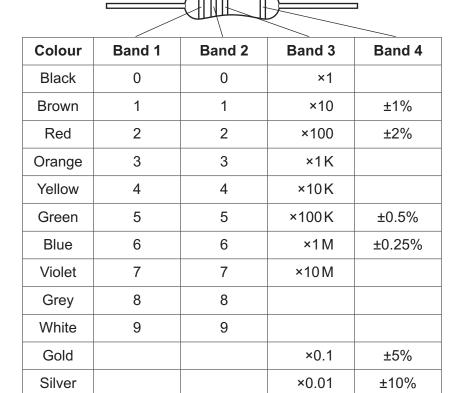
2 (a) Complete the table by identifying which components are **input** devices and which are **output** devices.

The first one has been done for you.

Component	Type of Device
Solenoid	Output
Relay	
Microphone	
Phototransistor	
Pressure switch	
Light Emitting Diode	
Touch screen	

[6]

(b) The diagram below shows a resistor and a colour code chart.



(i)	State the value of a resistor colour coded Brown, Grey, Red and Gold.	
		[3]
(ii)	State why resistors of different power ratings are available.	
		[1]

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A m	nultim	neter is used to test electronic circuits.	
(a)	Nar	me four other pieces of equipment that are used to test electronic circuits.	
	1		
	2		
	3		
	4		[4
(b)	(i)	Describe four stages in using a multimeter to test for continuity in a fuse.	
			[4]
	(ii)	Give two other specific uses for a multimeter.	
		1	
		2	
			[2

4 (a) Complete the table below by naming **three** benefits and **three** drawbacks of using surface mount components in commercial circuit construction.

The first one has been done for you.

Statement	Benefit or Drawback
The components of SMT are smaller.	Benefit
Fewer holes need to be drilled onto the circuit board.	
Large, high-power or high-voltage parts are unsuitable for surface mount construction.	
Manual prototype or component level repair is more difficult.	
Skilled operators are needed with expensive tools as the parts are much smaller.	
Components can be placed on either side of the circuit boards.	
Better mechanical performance under shake and vibration conditions.	

[o]
Visual Inspection is one method used within quality assurance in commercial printed circuit board (PCB) production. Describe the visual checks that the manufacturer can carry out.
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5	(a)*	Discuss the function and applications of a Liquid Crystal Display (LCD) module.
		[6]

(b) A typical seven segment LCD module is shown in Fig. 1.

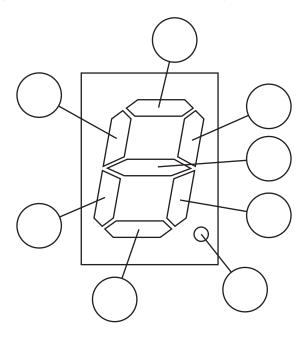


Fig. 1

Label each segment shown in Fig. 1 with the correct letters ${\bf A}$ to ${\bf G}$ and ${\bf DP}$.

6 (a) Fig. 2 shows a linear integrated circuit (IC).

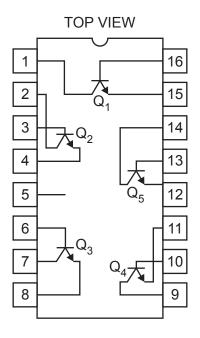


Fig. 2

	(i)	State the name of the component shown at positions \mathbf{Q}_1 to \mathbf{Q}_5 in Fig. 2.	
		[2]	
	(ii)	State the name that is given to the group of components arranged as shown in Fig. 2.	
		[2]	
(b)	Dra	w a labelled diagram that shows the connections for a Darlington Pair.	

ADDITIONAL ANSWER SPACE

If additiona must be cle	Il space is required, you should use the following lined page(s). early shown in the margin(s).	The question number(s)



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