OCR
Oxford Cambridge and RSA

Thursday 9 January 2020 – Afternoon

Level 1/2 Cambridge National in Systems Control in Engineering

R113/01 Electronic principles

Time allowed: 1 hour

8174104474

You must have:
- a scientific or graphical calculator

R113/01

Please write clearly in black ink. **Do not write in the barcodes.**

Centre number | | | | | | Candidate number | | | | |

First name(s) _____

Last name _____

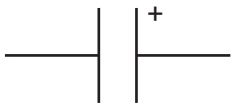
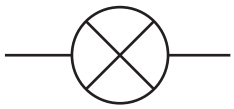
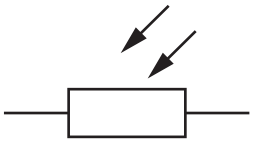
INSTRUCTIONS
- Use black ink. You can use an HB pencil, but only for graphs and diagrams.
- Write your answer to each question in the space provided. If you need extra space use the lined pages at the end of this booklet. The question numbers must be clearly shown.
- Answer **all** the questions.

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

[4]

(b) Calculate the resistance in ohms of a lamp rated at 12 volts 0.5 amperes.

.....

.....

.....

..... **[3]**

(c) Calculate the energy in kilowatt hours when a 900 watt hairdryer is used for 10 minutes.

.....

.....

.....

..... **[3]**

(d) (Circle) the **two** polarised capacitors in the list of capacitor types below.

ceramic **polyester** **electrolytic** **polystyrene** **tantalum**

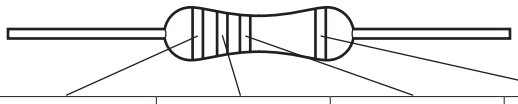
[2]

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.



Colour	Band 1	Band 2	Band 3	Band 4
Black	0	0	×1	
Brown	1	1	×10	±1%
Red	2	2	×100	±2%
Orange	3	3	×1K	
Yellow	4	4	×10K	
Green	5	5	×100K	±0.5%
Blue	6	6	×1M	±0.25%
Violet	7	7	×10M	
Grey	8	8		
White	9	9		
Gold			×0.1	±5%
Silver			×0.01	±10%

(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]**

3 A multimeter is used to test electronic circuits.

(a) Name **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.	.....

[6]

(b) 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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.....

.....

..... **[4]**

5 **(a)*** Discuss the function and applications of a Liquid Crystal Display (LCD) module.

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..... **[6]**

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

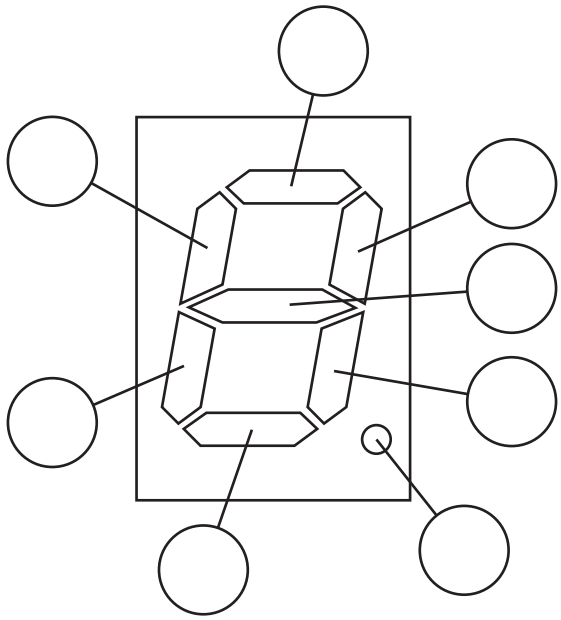

Fig. 1

Label each segment shown in Fig. 1 with the correct letters **A** to **G** and **DP**. **[4]**

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

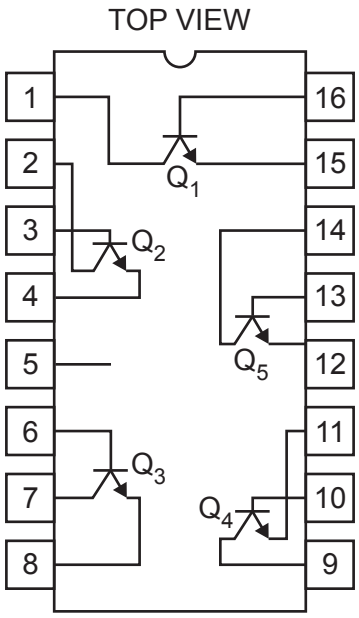

Fig. 2

(i) State the name of the component shown at positions Q_1 to 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) Draw a labelled diagram that shows the connections for a Darlington Pair.

[4]

END OF QUESTION PAPER

ADDITIONAL ANSWER SPACE

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