OCR
RECOGNISING ACHIEVEMENT

GENERAL CERTIFICATE OF SECONDARY EDUCATION

DESIGN AND TECHNOLOGY

Electronic Products

Paper 4 (Higher Tier)

H

1953/04

MONDAY 9 JUNE 2008

Afternoon

Time: 1 hour 15 minutes

Candidates answer on the question paper
Additional materials: No additional materials are required

Candidate Forename		Candidate Surname	

Centre Number		Candidate Number	

INSTRUCTIONS TO CANDIDATES

- Write your name in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use blue or black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Answer **all** the questions.
- Do **not** write in the bar codes.
- Write your answer to each question in the space provided.
- All necessary formulae are provided within the questions. No extra formulae sheet is required.

INFORMATION FOR CANDIDATES

- The number of marks for each question is given in brackets [ ] at the end of each question or part question.
- The total number of marks for this paper is **50**.
- The marks allocated and the spaces provided for your answers are a good indication of the length of answers required.
- Marks will be awarded for the use of correct conventions.
- Dimensions are in mm unless stated otherwise.
- Show all working for calculations.
- This examination paper contains a product analysis question based on the theme of **Mobile Phones**.

FOR EXAMINER'S USE	
1	
2	
3	
4	
5	
TOTAL	

This document consists of **12** printed pages.

[Turn over

1 **(a)** Electronic products rely extensively on the use of plastics for their manufacture.

   (i) Give **one** property of a thermoplastic.

   ....

   ....[1]

   (ii) Give **one** property of a thermoset plastic.

   ....

   ....[1]

   Fig. 1 shows symbols found on plastic packaging products as an aid to recycling.

   HDPE **PS** **V**
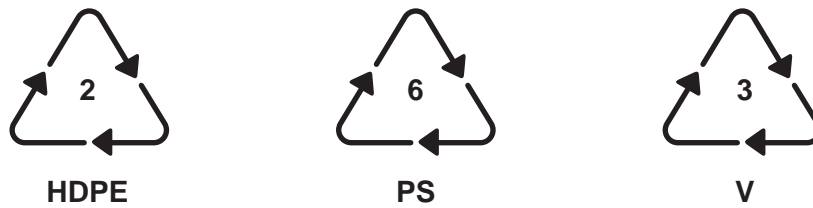
   Fig. 1

   (iii) State the reason for the letters under each symbol.

   ....[1]

   (iv) State **two** environmental benefits of recycling plastic.

   1 ....[1]

   2 ....[1]

(b) (i) Complete the table in Fig. 2 using the list of plastics and production processes shown.

Plastics	**Production processes**
Acrylic	Extrusion moulding
PVC (polyvinyl chloride)	Vacuum forming
Phenol formaldehyde	Injection moulding
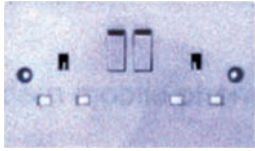
Product	**Suitable plastic**	**Production process**
13 A mains socket		*Compression moulding*
Multimeter case	*HIPS* (high impact polystyrene)	
Insulation sleeving		

Fig. 2

[4]

(ii) State **one** reason that makes all the products shown in Fig. 2 unsuitable for batch production.

....

....

....[1]

[Total: 10]

[Turn over

2   Product Evaluation Question.

Mobile phones first appeared in the 1980's and are now widely used.

(a) (i) Modern mobile phones provide a variety of communication methods.

State **two** methods of communication, other than voice, available with mobile phones.

1 ....[1]

2 ....[1]

(ii) When carried in a bag or pocket mobile phones could be activated by accident.

Give **two** ways in which mobile phone design has overcome this.

1 ....[1]

2 ....[1]

(b) (i) Early analogue mobile phones had a number of security weaknesses.

State **two** security weaknesses of early analogue mobile phones.

1 ....[1]

2 ....[1]

(ii) The available radio spectrum became inadequate to meet the needs of increasing numbers of analogue mobile phone users in the 1980's. This led to the introduction of the GSM system we use today.

State the main change introduced with GSM to accommodate greater numbers of mobile phone users.

....[1]

(iii) Geostationary satellite phones are used in remote areas.

Describe **one** problem experienced by geostationary satellite phone users.

....

....[1]

(c) (i) State **one** possible health risk associated with mobile phones.

....[1]

(ii) Describe **one** negative social impact of mobile phones.

....

....[1]

[Total: 10]

[Turn over

3 **(a)** Fig. 3 shows a SR bistable circuit.
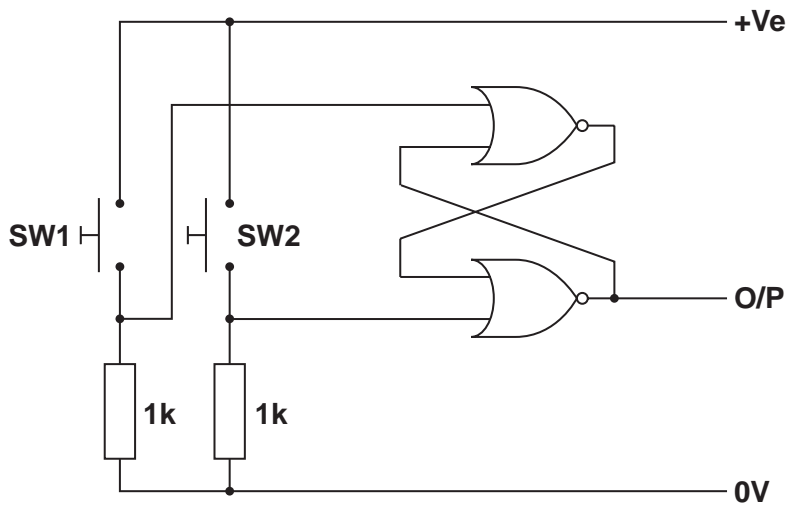
Fig. 3

    (i) State the name of the logic gate used in Fig. 3.

       ....[1]

   (ii) Explain what is meant by the term bistable circuit.

       ....

       ....

       ....[2]

  (iii) State the logic level at the output (**O/P**) when:

       1.   the circuit is first turned on;   ....[1]

       2.   switch **SW1** is pressed and held down;   ....[1]

       3.   switch **SW1** is released.   ....[1]

(b) Fig. 4 shows a PCB layout for the bistable circuit and the pin connections for the logic IC used.
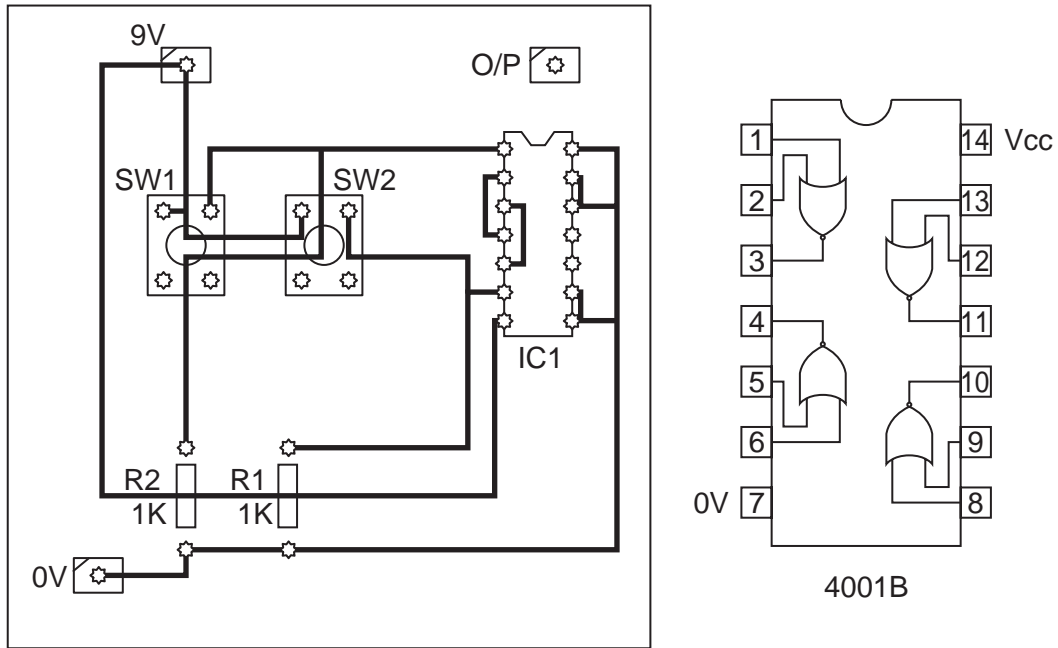

Fig. 4

(i) Complete Fig. 4 by drawing the **missing** track to connect the O/P. [1]

(ii) Describe the **routing** mistake in the PCB layout.

....

....[1]

(iii) Give **two** ways of improving the PCB layout shown in Fig. 4.

1 ....

....[1]

2 ....

....[1]

[Total: 10]

[Turn over

4 **(a)** Fig. 5 shows a 555 circuit operating two LEDs which continue to flash alternately. A graph showing the voltage changes at point **A** is also shown.
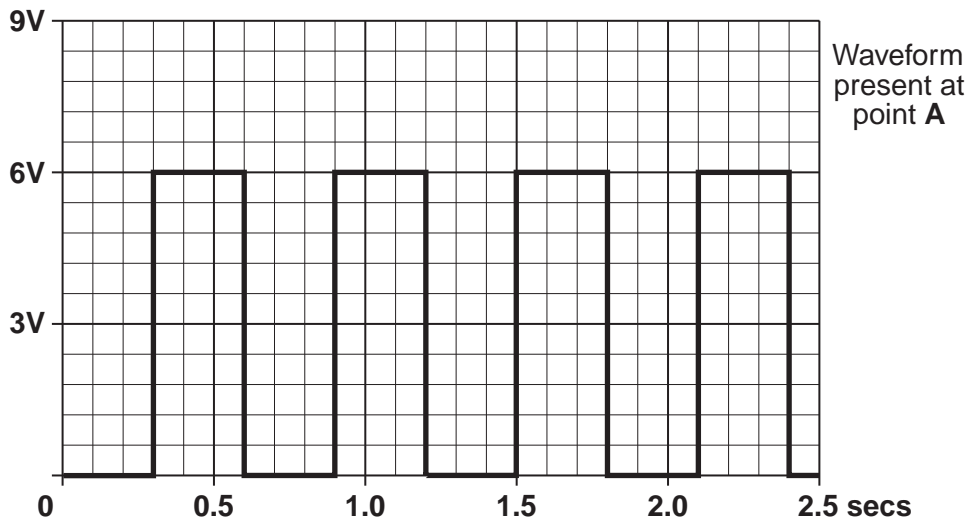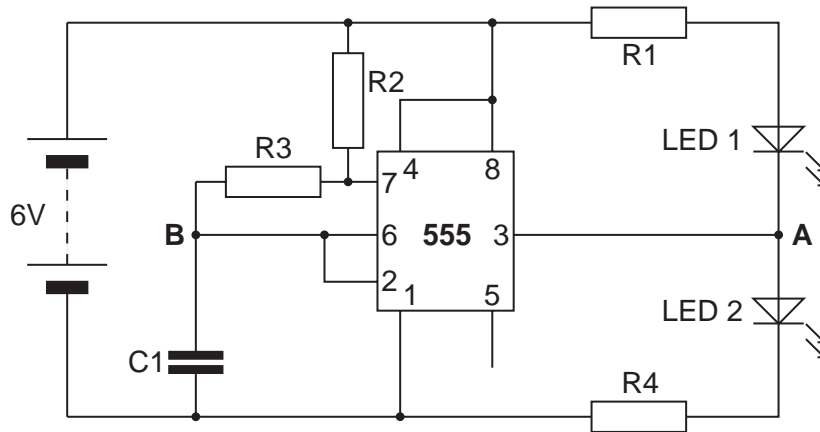

Fig. 5

    (i) State the type of timer circuit shown in Fig. 5.

    ....[1]

   (ii) State the type of the waveform shown in Fig. 5.

    ....[1]

  (iii) State the time period for the waveform shown in Fig. 5.

    ....[1]

(iv) Calculate the frequency of the waveform shown in Fig. 5 using the formula
f = T / time period.

....

....[2]

(v) Fig. 6a shows the waveform present at point **A**. Complete the graph in Fig. 6b by drawing
the waveform present at point **B** of the circuit during operation.

Waveform
present at point **A**

Fig. 6a

Waveform
present at point **B**
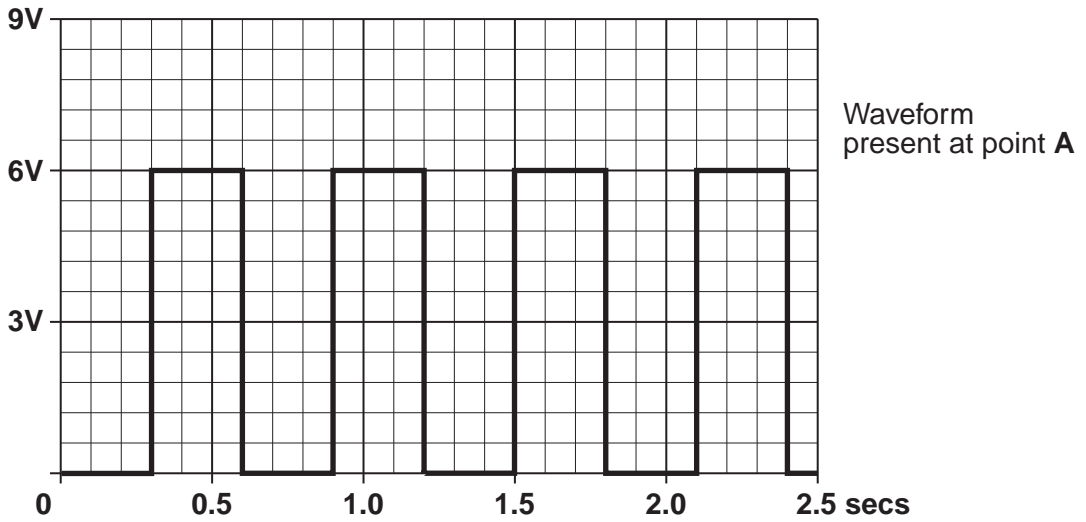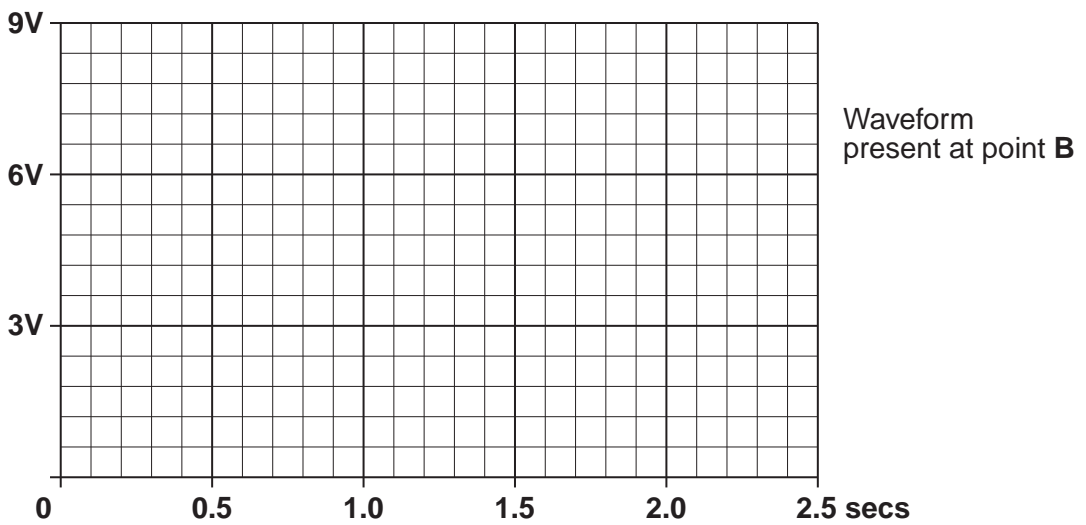
Fig. 6b

[3]

(b) Explain what would happen if resistor **R2** was reduced in value to less than 10 ohms.

....

....

....[2]
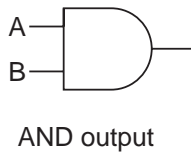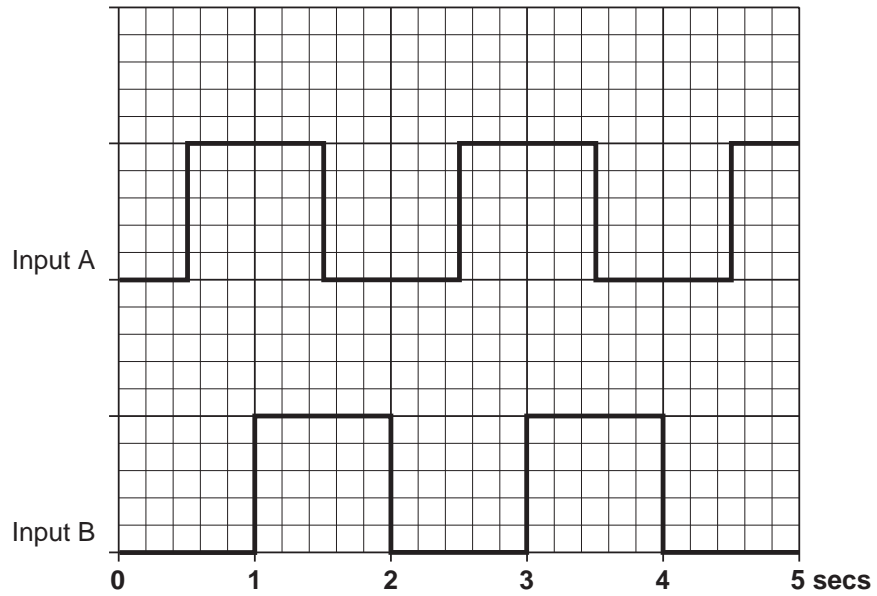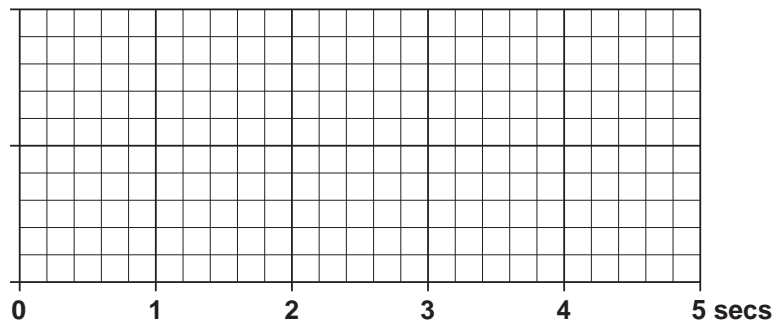
[Total: 10]

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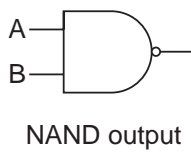**5**   Fig. 7 shows 2 clock inputs which are applied in turn to **three** types of logic gate.

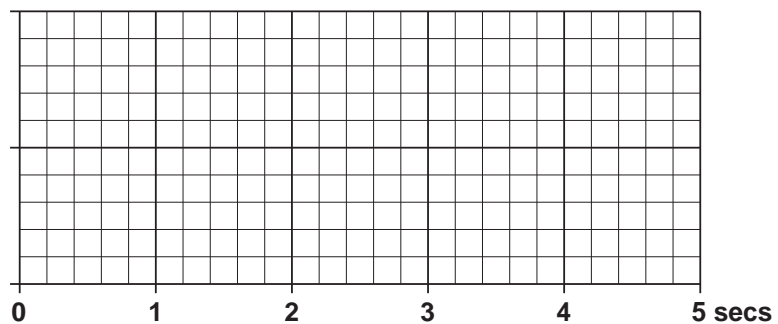   **(a)** Complete the graphs to show the output produced for each of the **three** logic gates.

Input A

Input B

0   1   2   3   4   5 secs

A ─┐
   │ AND ─
B ─┘

AND output

0   1   2   3   4   5 secs   [1]

A ─┐
   │ NAND ○─
B ─┘

NAND output

0   1   2   3   4   5 secs   [1]

A ─┐
   │ NOR ○─
B ─┘

NOR output

0   1   2   3   4   5 secs   [1]

Fig. 7

(b) On Fig. 8 draw the symbol for an XOR (Exclusive OR) logic gate and complete the truth table.

A ———

———X

B ———

Input A	Input B	Output X
0	0	
0	1	
1	0	
1	1	

XOR symbol   **XOR** truth table

Fig. 8

[2]

(c) (i) Programs for PIC microcontrollers are usually developed and tested using computer simulation.

Give **one** reason why computer simulation may not be a satisfactory method for testing PIC programs.

....

....[1]

(ii) Programs for PIC microcontrollers are often written using high level programming language tools such as BASIC or flowcharts. These languages convert the high level program to the low level machine code necessary to operate the PIC.

Give **one** reason why programming is carried out using high level programming languages in preference to low level programming languages.

....

....[1]

[Turn over

Fig. 9 shows a diagrammatic representation of a PIC microcontroller.
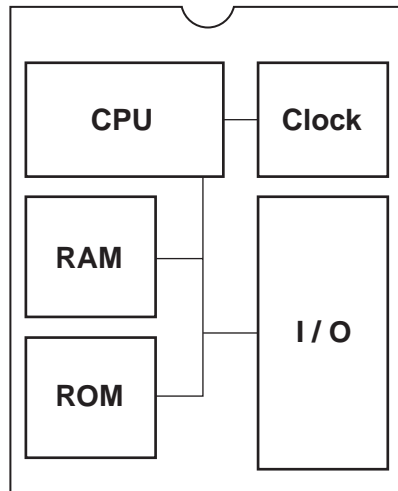
Fig. 9

(iii) State the area of the PIC shown in Fig. 9 that stores the program.

....[1]

(iv) State the area of memory in the PIC shown in Fig. 9 that will lose data when power is turned off.

....[1]

(v) State the advantage that PICs using 'flash' technology have over other PIC types.

....

....[1]

[Total: 10]