SPECIMEN PAPER

Birkdale School

Sixth Form Scholarship Examination

Computing

Time allowed: 1 hour 30 minutes

Instructions:

Answer all questions in the spaces provided.
No marks will be awarded for using brand names of software packages or hardware.

You are **not** permitted to use a calculator

Total marks for this paper 75. The final (essay) question is graded on the quality of written expression and arguments presented.

1 **(a)** State what is meant by the terms:

Parallel data transmission .....

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Serial data transmission .....

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[2]

(b) Give **one** benefit of each type of data transmission.

Parallel data transmission

Benefit .....

.....

Serial data transmission

Benefit .....

.....

[2]

(c) Give **one** application of each type of data transmission. Each application must be different.

Parallel data transmission

Application .....

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Serial data transmission

Application .....

.....

[2]

2 **(a)** State what is meant by the term USB.

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[1]

(b) Describe **two** benefits of using USB connections between a computer and a device.

1 .....

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2 .....

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[2]

3

(a) Viruses, pharming and phishing are all examples of potential Internet security issues.

Explain what is meant by each of these **three** terms.

Virus .....

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Pharming .....

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Phishing .....

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[6]

3 (continued)

(b) An online bank requires a client to supply an 8-digit code each time they wish to access their account on the bank's website.

Rather than ask the client to use a keyboard, they are requested to use an on-screen keypad (shown on the right) to input the 8-digit code.

The position of the digits on the keypad can change each time the website is visited.

The client uses a mouse or touch screen to select each of the 8 digits.

2	**5**	**1**
6	**8**	**3**
9	**0**	**4**
	7	

(i) Explain why the bank has chosen to use this method of entering the 8 digits.

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[2]

(ii) Name and describe **another** measure that the bank could introduce to improve the security of their website.

Name .....

Description .....

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[2]

4

Explain the difference between a variable and a constant in a program.

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.....[2]

5

(a) Five statements about interpreters and compilers are shown in the table below.

Study each statement.

Tick (✓) to show whether the statement refers to an interpreter or to a compiler.

Statement	Interpreter	Compiler
creates an executable file that runs directly on the computer		
more likely to crash the computer since the machine code produced runs directly on the processor		
easier to debug since each line of code is analysed and checked before being executed		
slow speed of execution of program loops		
it is more difficult to modify the executable code, since it is in machine code format		

[5]

(b) State why a compiler or an interpreter is needed when running a high-level program on a computer.

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.....[1]

(c) Give **one** benefit of writing a program in a high-level language.

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.....[1]

(d) Give **one** benefit of writing a program in a low-level language.

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.....[1]

6

An alarm clock is controlled by a microprocessor. It uses the 24 hour clock. The hour is represented by an 8-bit register, **A**, and the number of minutes is represented by another 8-bit register, **B**.

(a) Identify what time is represented by the following two 8-bit registers.

A

128	64	32	16	8	4	2	1
0	0	0	1	0	0	1	0

:

B

128	64	32	16	8	4	2	1
0	0	1	1	0	1	0	1

Hours ..... Minutes .....

[2]

(b) An alarm has been set for 07:30. Two 8-bit registers, **C** and **D**, are used to represent the hours and minutes of the alarm time.

Show how 07:30 would be represented by these two registers:

C

Hours

:

D

Minutes

[2]

(c) Describe how the microprocessor can determine when to sound the clock alarm.

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.....[3]

6 (continued)

(d) The LCD (liquid crystal display) on the clock face is back-lit using blue LEDs (light emitting diodes). The brightness of the clock face is determined by the level of light in the room. The amount of light given out by the LEDs is controlled by a control circuit.

Describe how the sensor, microprocessor and LEDs are used to maintain the correct brightness of the clock face.

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.....[3]

(e) Modern LCD monitors and televisions use LED back-lit technology.

Give **two** advantages of using this new technology compared to the older cold cathode fluorescent lamp (CCFL) method.

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2 .....

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[2]

7

(a) Check digits are used to ensure the accuracy of input data.

A 7-digit code number has an extra digit on the right, called the check digit.

Digit position	1	2	3	4	5	6	7	8
Digit	–	–	–	–	–	–	–	–

The check digit is calculated as follows:

- each digit in the number is multiplied by its digit position
- the seven results are then added together
- this total is divided by 11
- the remainder gives the check digit (if the remainder = 10, the check digit is X)

(i) Calculate the check digit for the following code number. Show all your working.

4 2 4 1 5 0 8 …

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Check digit .....

[2]

(ii) An operator has just keyed in the following code number:

3 2 4 0 0 4 5 X

Has the operator correctly keyed in the code number?

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Give a reason for your answer.

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[3]

7 (continued)

(b) When data are transmitted from one device to another, a parity check is often carried out on each byte of data. The parity bit is often the leftmost bit in the byte.

(i) If a system uses even parity, give the parity bit for each of the following bytes:

parity bit							
	1	1	0	0	1	1	0

parity bit							
	0	0	0	0	0	0	1

[2]

(ii) A parity check can often detect corruption of a byte.

Describe a situation in which it **cannot** detect corruption of a byte.

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.....[1]

8

(a) State what is meant by encryption.

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..... [1]

(b) State what is meant by symmetric encryption.

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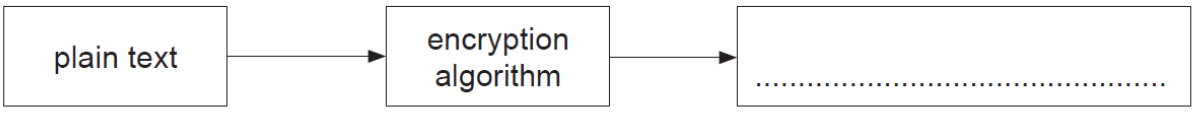
..... [1]

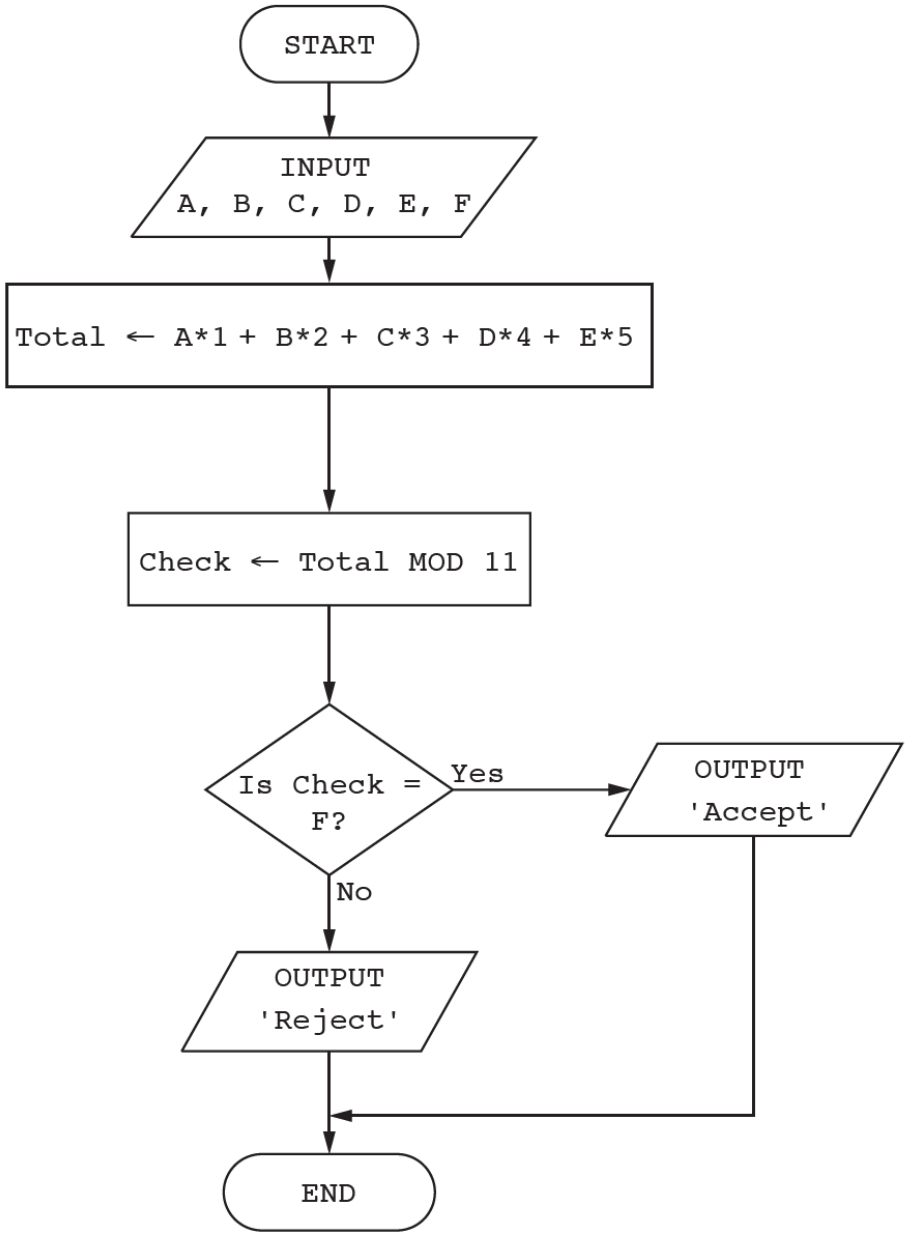
(c) Complete the diagram:



[1]

9

(a) The flowchart below inputs six single digit numbers. The predefined function `MOD` gives the value of the remainder, for example, `Y ← 10 MOD 3` gives the value `Y = 1`



9 (continued)

Complete a trace table for each of the two sets of input data.

Set 1 5, 2, 4, 3, 1, 5

Set 2 3, 2, 1, 0, 7, 3

Trace table set 1 5, 2, 4, 3, 1, 5

A	B	C	D	E	F	Total	Check	Output

Trace table set 2 3, 2, 1, 0, 7, 3

A	B	C	D	E	F	Total	Check	Output

[4]

(b) State the purpose of the flowchart in **part (a)**.

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.....[1]

(c) Identify a problem with this flowchart and explain how to correct it.

Problem .....

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Solution .....

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.....[3]

10

A fast food stall sells five types of item:

Item	drink	fries	hotdog	burger	pizza
Price	£0.50	£1.20	£1.50	£2.10	£4.00

Write an algorithm, using pseudocode or a program flowchart only, which

- inputs every item sold during the day,
- uses an item called "end" to finish the day's input,
- adds up the daily amount taken for each type of item,
- outputs the total takings (for all items added together) at the end of the day,
- outputs the type of item that had the highest takings at the end of the day.

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11

Many manufacturers of 'wearable' computer equipment are including fitness tracking sensors into their devices. These devices have tended to be used by 'early-adopters' rather than mainstream users.

Discuss the perceived benefits of using fitness trackers for users, health professionals and other interested parties such as insurance companies. Include in your discussion some of the concerns of mainstream users that are holding back more widespread adoption of this technology.

[9]

The quality of your response and written expression will be marked in this question.

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[End of Paper]