**COMPUTER SCIENCE** **0478/12**

Paper 1 **October/November 2016**

MARK SCHEME

Maximum Mark: 75

**Published**

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**[Turn over**

https://xtremepape.rs/

**1 (a)** Any **two** from:

- direct access to computer processor / special hardware // machine dependent instructions
- uses up less memory
- can increase the speed of processing a program // executes instructions faster

[2]

**(b)**

| Statements | Interpreter (✓) | Compiler (✓) |
|---|---|---|
| Translates the source code into machine code all at once | | ✔ |
| Produces an executable file in machine code | | ✔ |
| Executes a high-level language program one instruction at a time | ✔ | |
| Once translated, the translator does not need to be present for the program to run | | ✔ |
| An executable file is produced | | ✔ |

[5]

**2** Any **four** from:

- Provides a user <u>interface</u>
- Handles interrupts / errors
- Memory management
- File management
- Manages peripherals (inputs/outputs)
- Provides security methods
- Allows multitasking
- Manages multiprogramming
- Enables batch processing
- Manages software installation / removal
- Allows creation of multiple accounts
- Levels of access

[4]

**3 (a) (i)** Any **two** from:

serial

– one bit sent at a time // bits sent sequentially
– over a <u>single</u> wire
– synchronous or asynchronous

[2]

**(ii)** Any **two** from:

parallel

– several bits / a byte sent at a time
– using many / multiple wires
– synchronous

[2]

**(b)** – serial

Any **two** from:

– serial data transmission more reliable over long distances
– less likely for the data to be skewed/out of synchronisation
– less interference as only a single wire
– it is a cheaper connection as only single wire needed // cheaper to set up
– a fast connection is not required as a printer is limited by its printing speed

[3]

**4 (a)** Intersection of Row 7 and column 4 circled [1]

**(b)** – Row (byte number) 7 has an odd number of 1s (five 1s)
– Column (bit number) 4 has an odd number of 1s (five 1s)

[2]

**5 (a)** 112 [1]

**(b)** 56 [1]

**(c)** divided by 2 // value 112 was halved // multiplied by 0.5 [1]

**(d) (i)**

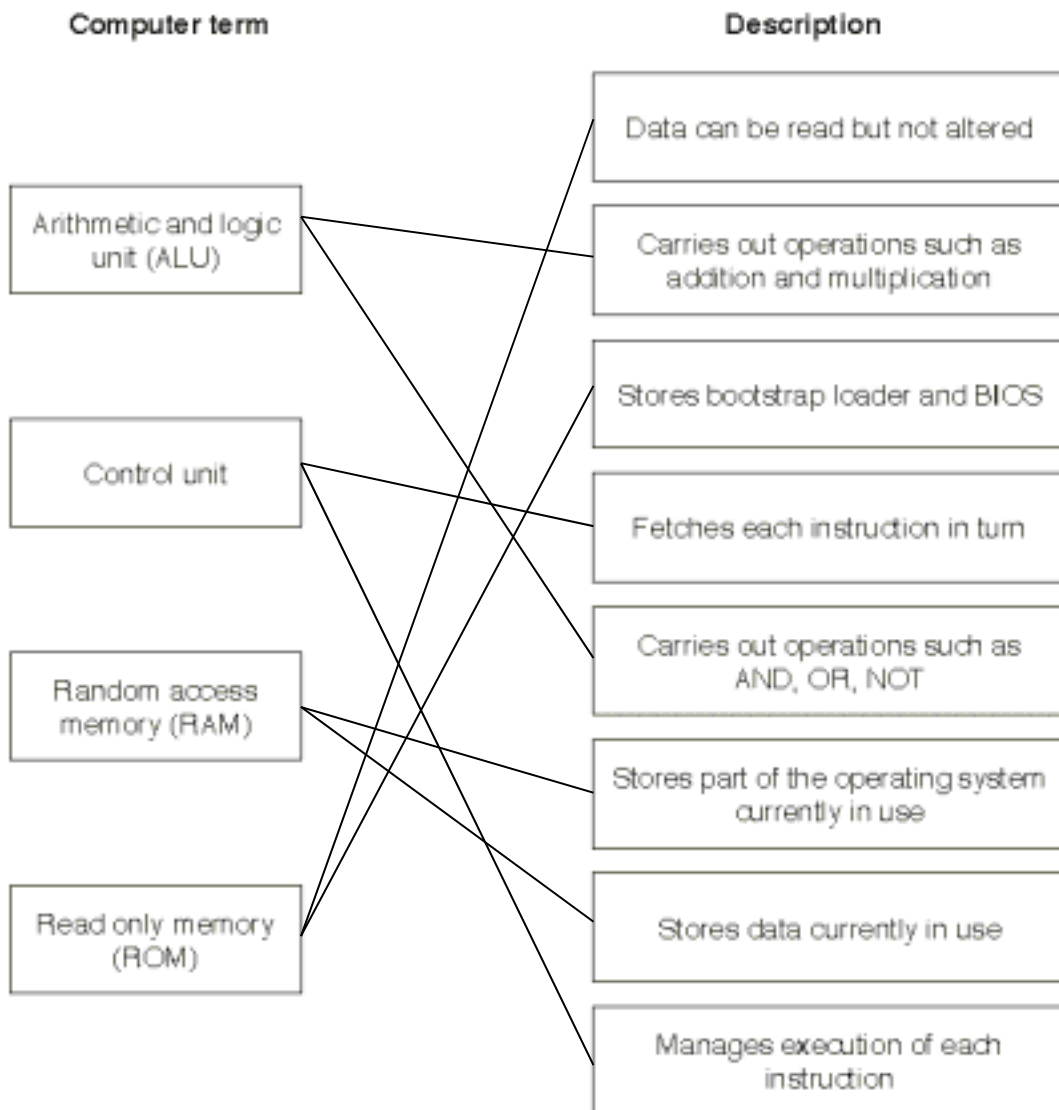| 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 |
|---|---|---|---|---|---|---|---|

[1]

**(ii)** 14 [1]

**(e)** Any **two** from:

– run out of places to the right of register / at the end of register
– right-most 1 would be lost
– number would become 3 instead of 3.5
– loss of precision

[2]

**6** 1 mark for **both** correct lines from each computer term.

**Computer term**

**Description**

Arithmetic and logic unit (ALU)

Control unit

Random access memory (RAM)

Read only memory (ROM)

Data can be read but not altered

Carries out operations such as addition and multiplication

Stores bootstrap loader and BIOS

Fetches each instruction in turn

Carries out operations such as AND, OR, NOT

Stores part of the operating system currently in use

Stores data currently in use

Manages execution of each instruction

[4]

**7 (a) (i)** 2 marks for 4 correct outputs,
1 mark for 2 correct outputs

1 mark for correct gate

| A | B | Working space | X |
|---|---|---------------|---|
| 0 | 0 | | 0 |
| 0 | 1 | | 0 |
| 1 | 0 | | 0 |
| 1 | 1 | | 1 |

**AND** gate

[3]

**(ii)** 2 marks for 4 correct outputs
1 mark for 2 correct outputs

1 mark for correct gate

| A | B | Working space | X |
|---|---|---------------|---|
| 0 | 0 | | 0 |
| 0 | 1 | | 1 |
| 1 | 0 | | 1 |
| 1 | 1 | | 1 |

**OR** gate

[3]

**(b)(i)** 1 mark per correct section.

1 mark

A

1 mark

B

1 mark

C

X

1 mark

1 mark

[4]
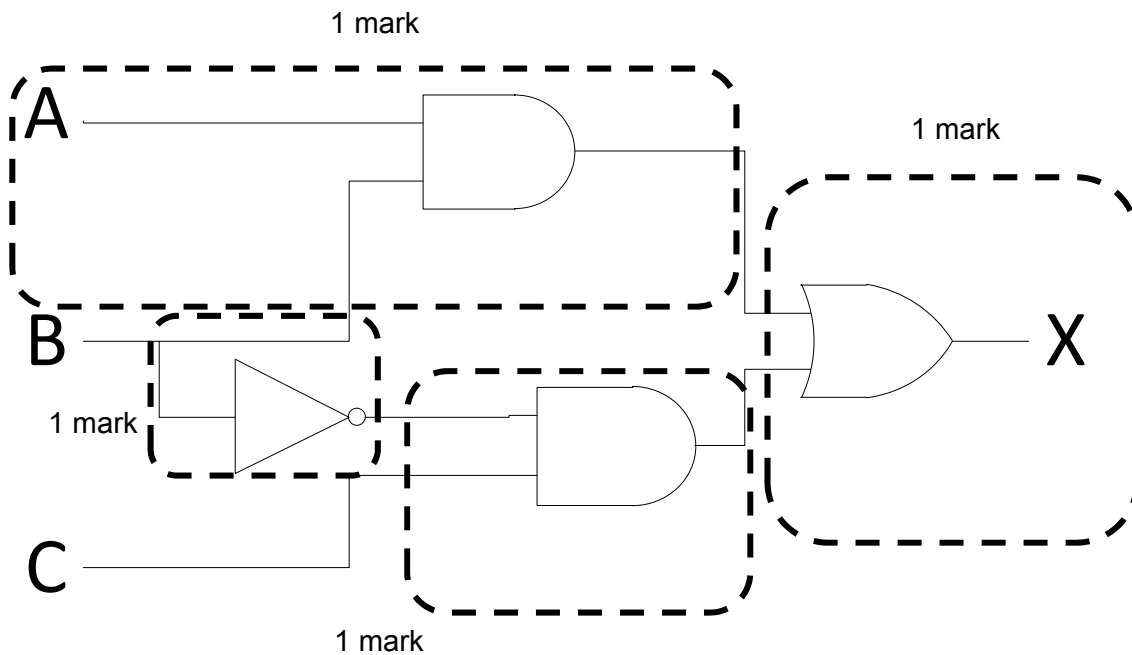
**(ii)** 4 marks for 8 correct outputs
3 marks for 6 correct outputs
2 marks for 4 correct outputs
1 mark for 2 correct outputs

| A | B | C | Working space | X |
|---|---|---|---------------|---|
| 0 | 0 | 0 |               | 0 |
| 0 | 0 | 1 |               | 1 |
| 0 | 1 | 0 |               | 0 |
| 0 | 1 | 1 |               | 0 |
| 1 | 0 | 0 |               | 0 |
| 1 | 0 | 1 |               | 1 |
| 1 | 1 | 0 |               | 1 |
| 1 | 1 | 1 |               | 1 |

[4]

**8**

| Statement | TRUE or FALSE |
|---|---|
| MIDI stores the actual music notes in a compressed format | **FALSE** |
| JPEG files are examples of lossless file compression | **FALSE** |
| MP3 files are, on average, 90% smaller than the music files stored on a CD | **TRUE** |
| MP4 files are examples of lossy file compression | **TRUE** |

[4]

**9 (a)** Any **two** from:

– a large number of requests are sent to the network/server all at once
– designed to flood a network/server with useless traffic/requests
– the network/server will come to a halt/stop trying to deal with all the traffic/requests
– prevents users from gaining access to a website/server

[2]

**(b)** 1 mark for each security threat and 1 mark for matching description

**Security threat**          **Description**

Viruses                    – software that replicates
                              – causes loss/corruption of data // computer may "crash"/run
                                      slow

Hacking/cracking        – illegal/ unauthorised access to a system/data

Phishing                – a link/attachment sends user to fake website (where personal
data may be obtained)

Pharming               – malicious code installed on user's hard drive / computer
                              – user is redirected to a fake website (where personal data may
be obtained)

Spyware/key logger    – send/relay key strokes to a third party

[4]

**10 (a)** Any **three** from:

- hyper text mark-up language
- uses both structure and presentation
- web-authoring language/software // used to create websites/webpages
- uses tags to define e.g. colour / font / graphics / layout

[3]

**(b)**

| | |
|---|---|
| File name: | ComputerSciencePapers |
| Protocol: | http(://) |
| Web server name: | www.cie.org.uk |

[3]

**11 (a)** 1 mark per nibble

0010               1010              1111

[3]

**(b)** 1 mark for identification of each sensor, max 2 for each description

Infrared/motion sensor

- Receives infrared rays/heat
- Sends data to microprocessor
- Receives microwaves
- Placed in the corner of a room, across a doorway
- Used to detect the heat of an intruder // used to detect if an infrared beam has been broken by an intruder

Pressure sensor

- Receives current if circuit created // stops receiving current if circuit is broken
- Sends data to microprocessor
- Placed on a window/door, at the entrance
- Used to detect a change in pressure

[6]

**12** Any **four** from:

- – Freeware needs owner's permission to share/copy/amend whereas free software can be shared/copied/amended without permission
- – Freeware the owner retains copyright / is subject to copyright whereas free software the owner releases copyright/ is not subject to copyright
- – Freeware is normally provided without a fee whereas free software a fee may be charged
- – Freeware is distributed without the source code whereas free software is distributed with the source code
- – Freeware can be restricted in use e.g. non-commercial whereas free software can be used without restriction

NOTE: The question asks candidates to explain the differences, so each mark needs to have a comparison.

[4]