RUGBY SCHOOL

Sixth Form Entrance Examination

COMPUTER SCIENCE SPECIMEN PAPER

MARK SCHEME

Section A - Hardware and Software

1. Describe the difference between **primary** and **secondary** storage in a computer. Provide one example for each. **[4]**

    Primary is **volatile** eg RAM/Cache

    Secondary is **non-volatile**, e.g. HDD/SSD/Optical

    1 mark for discussing persistence/volatility or another applicable difference for each, 1 mark for a suitable example of each

2. Give three examples of the roles of an operating system. **[3]**

    Management of resources, Management of peripheral devices, Management of memory, Provision of a user interface or equivalent.

    1 mark for each example, up to a max. of 3 marks

3. (a) Match the following type of media to their corresponding average capacity. **[3]**

    - BluRay Disk   • 512 GB - 6 TB

    - Hard Disk   • 4.7 GB - 8.5 GB

    - DVD   • 25 GB - 50 GB

    - Solid State Drive   • 4GB - 2 TB

    - CD-ROM   • 700 MB

    BluRay Disk -> 25 GB - 50 GB
    Hard Disk -> 512 GB - 6 TB
    DVD -> 4.7 GB - 8.5 GB
    Solid State Drive -> 4GB - 2 TB
    CD-ROM -> 700 MB

    3 marks for all correct, 2 marks for 3 correct, 1 mark for 2 correct

    (b) State what the abbreviation **ROM** stands for in "CD-ROM". **[1]**

    Read only memory

    1 mark

    (c) Arrange the following storage types from slowest to fastest access speed: magnetic, optical and solid state. **[2]**

    Optical -> Magnetic -> Solid State

    1 mark per each correct comparison

    (d) Explain why you would expect a BluRay disk to have a higher access speed than a CD-ROM. **[2]**

    A BluRay needs to hold more data as the quality of the media stored on a BluRay disk is generally higher. This data is to be accessed in the same time frame as the data on a CD-ROM so the access speed needs to be faster.

    2 marks for any reasonable description

4. Extra information stored with an image is called *metadata*. Give two examples of image metadata. **[2]**
    e.g. resolution, colour depth, date, etc

    1 mark for each correct example of image metadata

5. (a) Define what a CPU is in a computer. **[1]**

- Central Processing Unit
- The CPU is the primary component of a computer that processes instructions.

1 mark per bullet point (or equivalent description) to a max of 1 mark.

(b) Briefly explain the steps involved in the Fetch-Decode-Execute cycle. **[4]**

- Instructions (or data) are fetched from memory
- The instruction is decoded by the Control Unit
- ....and executed
- These steps are repeated.

1 mark per bullet point

6. Ryan brags that he uses his new headphones to only listen to "FLAC, because it is a lossless file format".
Explain what Ryan means by *lossless file format*. **[3]**

The data file has been compressed…
This reduces the size of the file
There is no loss of audible information as the file can be decrypted to replicate the original.

1 mark per bullet point (or equivalent description) to a max of 3 marks.

Turn over for next section

Section B - Programming

7. Given that *a* = 7 and *b* = 6, state what appears on the screen when each of the following snippets of code is executed.

    (a)   **if** *a* > 7 **or** *b* = 1 **then**

           print("Yellow"**)**

      else

           print("Blue"**)**

      end if

[1]

    Blue

    1 mark

    (b)   **if** *NOT*(*a* > *b*) **or** (*b* ≤ 7) **then**

           print("Red"**)**

      else if *NOT*(*a* > *b*) **or** (*b* ≥ 7) **then**

           print("Blue"**)**

      else

           print("Green"**)**

      end if

[1]

    Red

    1 mark

8. The following pseudocode is intended to find and display the largest number in an array of ten positive integers.

```
1: max = numbers[0]
2: for n = 0 to 9 do
3:     if max > numbers[n] then
4:         max = numbers[n]
5:     end if
6: end for
7: print(max)
```

The pseudocode contains an error and does not work as intended. State the line of code that contains the error and suggest a correction. **[2]**

  Line 3: if max<number[n] then

 1 mark correct line number and 1 mark for the correct code

9. Describe and explain two advantages of writing code using sub-routines.

[4]

  Reusable code
  ....reduces development time
  Simplifies testing
  ......can be tested in isolation from the rest of the program
  Easier to maintain
  ......smaller sections can be readily understood by other programmers

  1 mark for each description to a max of 2 marks and 1 mark for an appropriate explanation to a max of 2 marks

10. An estate agent keeps details of all the properties they have available for rent.

PropertyID	Type	MonthlyRent	Beds	Furnished	DistanceToStation
1	Apartment	£800.00	2	Y	0.3
2	Semi	£475.00	2	N	1.5
3	Apartment	£1150.00	3	N	0.5
4	House	£1500.00	4	Y	0.2
5	Apartment	£900.00	2	Y	0.3
6	Apartment	£1250.00	3	Y	0.2
7	Semi	£550.00	3	Y	2.4
8	House	£600.00	3	N	0.6

List the Property IDs of the properties that will be found by the following SQL queries. **[4]**

(a) SELECT *
FROM tblRental
WHERE MonthlyRent <= 550.00 OR Furnished = 'Y'

1	Apartment	£800.00	2	Y	0.3
2	Semi	£475.00	2	N	1.5
4	House	£1500.00	4	Y	0.2
5	Apartment	£900.00	2	Y	0.3
6	Apartment	£1250.00	3	Y	0.2
7	Semi	£550.00	3	Y	2.4

(b) SELECT *
FROM tblRental
WHERE Type = "Apartment" AND DistanceToStation < 0.3

6	Apartment	£1250.00	3	Y	0.2

4 marks for a & b answered correctly, 1 mark per question if correct records identified but not all the fields provided.

11. Jimmy produces the following algorithm.

1: *limit* = **input(**"Please enter an upper limit"**)**
2: *x* = 0
3: **while** *x* < *limit* **do**
4:     **print(***x***)**
5:     *x* = *x* + 2
6: **end while**

(a) Write down the outputs for the algorithm for an input of 9. **[2]**

0, 2, 4, 6 ,8

1 mark for 0, 2, 4 and 1 mark for 6, 8 (if other answers provided in addition, 1 mark max)

(b) Jimmy intended this algorithm to print the first 9 non-negative even numbers in this case. Explain what this algorithm does instead. **[2]**

- Prints even numbers
- Prints numbers from 0 up to 9

1 mark for each bullet

(c) Suggest how line 4 and line 5 can be changed to make the algorithm work as intended without changing any other part of it. **[3]**

Line 4: print(2x)
Line 5: x=x+1

3 marks for both bullet points, 1 mark for just one

12. Write pseudocode that will perform the following:

Ask a user to enter a number.

If the number is between 0 and 10, output the word **blue**.

If the number is between 10 and 20, output the word **red**.

If the number is between 20 and 30, output the word **green**.

If it is not in the accepted ranges above, output a message to say that this is not a correct colour option. **[6]**

Num=input("Enter a number:")
If num>=0 AND num<10 then
    print("blue")
Else if num>=10 AND num<20 then
    print("red")
Else if num>=10 AND num<20 then
    print("green")
Else
    print("not correct")
End if

2 marks for correct usage of inputs and outputs
1 mark for conditions to print correct colours (max 3 marks)
1 mark for outputting a message if outside accepted ranges

Turn over for next section

Section C - Implications of Computer Use

13. Artificial Intelligence is increasingly used in everyday life of people, but also at more technical levels to provide advice on medical, financial and other matters.

    (a) Provide an example of how AI is used in everyday life, or at a technical level.   **[1]**

    1 mark for any reasonable response

    (b) Discuss the potential ethical and cultural issues associated with the application you have stated. Marks will be awarded for clarity of argument and knowledge of relevant information.   **[4]**

    1 mark for SPAG
    3 marks for relevant responses across ethical and cultural issues; max 2 marks if only one of the two issues are discussed

End of paper