GCSE – NEW

wjec cbac

C500U10-1

S18-C500U10-1

eduqas
Part of WJEC

COMPUTER SCIENCE – Component 1
Understanding Computer Science

Wednesday 27th March 2019 - AFTERNOON

1 hour 45 minutes

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen.

Write your name, centre number and candidate number in the spaces at the top of this page.
Answer **all** questions.
Write your answers in the spaces provided in this booklet.
If you run out of space, use the continuation pages at the back of the booklet, taking care to number the question(s) correctly.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets at the end of each question or part-question.
You are reminded of the necessity for good English and orderly presentation in your answers.
The use of calculators is not permitted in this examination.

1. **Tick** (✓) the boxes below to show whether the statements about images are TRUE or FALSE.

[3]

STATEMENT	TRUE	FALSE
A 4-bit image has 16 possible colours.		
Colour depth is the number of bits used for each pixel.		
The higher the resolution, the better the quality and smaller the file size.		

2. Duncan prints a 10 x 10 inch photograph with a resolution of 60 DPI.

   a) Calculate the total number of pixels in Duncan's photograph. [2]

   b) Explain how decreasing the DPI would affect the image quality. [2]

3. Define the term character set.

[1]

4. Jessica records herself singing into a digital recording device. The bit rates and sampling frequencies of the each recording are shown below.

	Length	Bit Rate	Sampling Frequency
First recording	2 minutes	128 kbit/s	32 kHz
Second recording	2 minutes	320 kbit/s	44.1 kHz

   a) Explain which extract would have the better sound quality. [2]

   b) Give **one** drawback of using the second recording rather than the first for the final song. [1]

5. a) Tick (✓) the appropriate answer. Binary right shift is used to: [1]

   add binary numbers ☐

   subtract binary numbers ☐

   multiply binary numbers ☐

   divide binary numbers ☐

   b) Complete a 3 place binary right shift on the binary number 00101001. [1]

   c) Explain the effect that this will have on the number. [1]

   d) What problem will occur? [1]

6. A security program encrypts passwords using a hexadecimal conversion. The binary code of each letter for the password 'DOG' is shown below.

   01000100 01001111 01000111

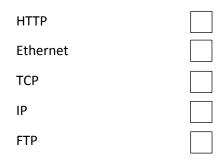   a) Convert each binary number above to a hexadecimal number to encrypt the password 'DOG' (show your working out) [6]

   b) The password 'CAT' is encrypted as 43 41 54. Convert these 3 hexadecimal numbers to denary (show your working out) [6]

   c) The password is changed to 129. Convert this number into a byte. [2]

   d) This password is very weak. Describe how to make a strong password. [2]

7. a) Add the two 8-bit binary numbers below.   [1]

1 1 0 1 0 0 0 1

+ 1 0 0 1 0 1 0 0

b) Identify and <u>explain</u> a problem that could be caused if the answer given as an 8-bit number.
                                                                                    [2]

8. Describe each of the following layers in the TCP/IP 5-layer model for data transmission:

   • Network layer

   • Data Link layer   [4]

9. Which protocol operates in the data link layer?   [1]

   HTTP   ☐

   Ethernet   ☐

   TCP   ☐

   IP   ☐

   FTP   ☐

10. Packet switching is used to direct data packets over an IP network. Describe the process that takes place when a device needs to send data from one device to another over the Internet.   [5]

11. The table below shows data for a school registration system:

Field	Example Data	Further information
Student Forename	Jessica	
Student Surname	Hawkins	
Gender	F	M or F
Age	13	Pupils are aged 11 – 18
Date	24/04/2004	
Number of absences	2	

For the following questions, you must not use the same type of validation check more than once.

a) Describe a suitable of validation check for the **Student Forename** field: [2]

Type of check:

Rule:

b) Describe a suitable of validation check for the **Age** field.   [2]

Type of check:

Rule:

c) Describe a suitable of validation check for the **Number of absences** field.   [2]

Type of check:

Rule:

12. Binary searching only works on ordered lists. Describe how you would perform a binary search to find the word "Monkey" in this list (which is sorted in alphabetical order).   [3]

Antelope   Buffalo   Cheetah   Lion   Monkey

13. A bubble sort starts by comparing the first two items in a list and then swapping them so that they are in ascending order. Complete a bubble sort for the list of numbers below (you must show the results of each step).   [4]

Step 1 | 6 2 | 8 7 9

14. The logic circuit is represented by the following logical expression:

D = (NOT A) AND (B OR C)

   a) Draw a logic gate diagram that represents this expression.   [3]

   b) Draw a truth table for the logic gate.   [6]

   c) State the value of D when A is 1, B is 0 and C is 1.   [1]

15. Explain what legislation is in place in the UK to protect people's personal data when organisations store it on computer systems. [8]

16. Explain the ethical and environment concerns that people have regarding the increased use of technology in everyday life. [6]

17. Describe the following forms of attack on cybersecurity:

(i) DoS attack   [2]

(ii) Trojans   [2]

18. Describe two ways that network managers can protect the computer systems from a cyber attack.   [4]

19. Describe the difference between a compiler and an interpreter.   [2]

20. Describe the advantages and disadvantages of using the following technologies for storage.

a) **Optical disks**   [2]

Advantage:

Disadvantage:

b) **Magnetic disks**   [2]

Advantage:

Disadvantage:

c) **Solid State Drives**   [2]

Advantage:

Disadvantage:

21. Describe one **advantage** of using lossy compression, rather than lossless compression on a sound file. [1]

22. Describe one **disadvantage** of using lossy compression, rather than lossless compression on a sound file. [1]

23. Describe CISC type processors. [2]

24. How many bytes are in 10 megabytes? [1]

25. Katie is considering buying a new PC. She has two options with different CPU specifications:

CPU in PC 1	**CPU in PC 2**
8 cores	4 cores
6MB cache	3MB cache
1.6 GHz clock speed	2.8 GHz clock speed

Compare the performance of the two CPUs in terms of:

a) Cores [2]

b) Cache [2]

c) Clock speed [2]

26. Von Neumann architecture features the 'fetch-decode-execute cycle' and the use of registers in the CPU. Explain why registers are needed in the CPU? [2]

27. Name 3 functions of an operating system. [3]

28. Computer programs sometimes contain errors.

Name three different types of error that could occur in a computer program. Give an example of each type of error.

a) Error Type 1: [2]

   Example:

b) Error Type 2: [2]

   Example:

c) Error Type 3: [2]

   Example:

END OF PAPER