GCE A LEVEL – NEW

wjec cbac

A500U20-1

S17-A500U20-1

eduqas
Part of WJEC

COMPUTER SCIENCE – A level component 2
Computer Architecture, Data, Communication and Applications

THURSDAY, 22 JUNE 2017 – MORNING

2 hours 45 minutes

A500U201 01

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1.	10	
2.	6	
3.	7	
4.	6	
5.	8	
6.	13	
7.	7	
8.	10	
9.	9	
10.	6	
11.	8	
12.	10	
Total	**100**	

ADDITIONAL MATERIALS

A WJEC pink 16-page answer booklet.

INSTRUCTIONS TO CANDIDATES

Answer **all** questions.

Write your answers in the separate answer booklet provided.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets at the end of each question or part-question; you are advised to divide your time accordingly.

The total number of marks available is 100.

You are reminded of the need for good English and orderly, clear presentation in your answers.

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Answer **all** *questions.*

1. The following describes a database table:

   Order (<u>orderNo</u>, customerNo, orderDate, handlingCost)

   (a) Write an SQL command that will create this table using appropriate data types and sizes. [4]

   (b) The Order table is subsequently populated with the following data:

orderNo	customerNo	orderDate	handlingCost
812	23	01/05/2016	22.50
916	27	03/07/2016	33.10
743	44	01/03/2016	112.99
677	12	07/12/2015	50.00
722	27	05/11/2015	41.00

   A Customer table has already been created in the database and contains the following data:

customerNo	customerName	customerCity	customerPostcode	customerPhone
27	P. Rice	Liverpool	L24 1YD	01519071665
44	J. Samuel	Birmingham	B26 3QJ	01217678585
18	J. Radford	Exeter	EX5 2BD	01392602821
23	F. McLintock	Southampton	SO18 2NL	02380620021
12	C. George	Southend	SS2 6YF	01702538500

   (i) Write an SQL command to output the names and phone numbers of all the customers in ascending order of customerPostcode. [2]

   (ii) Write an SQL command to output the names and phone numbers of customers with an orderDate before 01/03/2016. [2]

   (iii) Write an SQL command to output all the orders in descending order of handlingCost for customerNo 27. [2]

2. A certain computer has an 8 bit accumulator with the following data stored in memory.

- Memory location 1A holds the character "*"
- Memory location 1B holds the number 5_{10}
- Memory location 1C holds the number 1_{10}
- Memory location 1D holds a new line character
- Memory locations 20 to 2F are available as variable storage.

The computer's assembly language instruction set contains the following commands:

Assembly Language Command	Description
LDA X	Load the accumulator with the contents of memory location X
JGT LABEL	Jump to LABEL if the contents of the accumulator are greater than zero
ADD X	Add the contents of memory location X to the accumulator
STA X	Copy the contents of the accumulator to memory location X
JGE LABEL	Jump to LABEL if the contents of the accumulator are greater than or equal to zero
OUT X	Output the content of register X
DEC X	Decrement the accumulator by the contents of memory location X
CLR	Clear the contents of the accumulator

Using only the assembly language commands shown above, write a program to produce the pattern shown below. [6]

```
*****
*****
*****
*****
*****
```

3. *(a)* Draw a diagram to identify the hardware and communication elements of a Von Neumann computer system and how they are connected. [3]

(b) Describe the characteristics and use of cache memory used by the central processing unit. [4]

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Turn over.

4

4. Discuss the advantages and disadvantages of a voice input interface on a hand held device.

[6]

5. *(a)* Describe the importance and use of the TCP/IP and FTP protocols. [4]

(b) Describe the process of handshaking between two devices. [4]

6. *(a)* Convert the hexadecimal numbers 9_{16} and C_{16} into two 8 bit binary numbers. Using binary addition, calculate the binary number that would result from adding them. [3]

You must show all of your working.

(b) Convert the hexadecimal numbers -7_{16} and B_{16} into two 8 bit binary numbers, using two's complementation. Using binary addition, calculate the binary number that would result from adding them. [4]

You must show all of your working.

(c) In a certain computer system, real numbers are stored in floating point form using 16 bits as shown below.

Mantissa	Exponent
12 bits in two's complement form. The binary point in the mantissa is immediately after the left bit.	4 bits in two's complement form

Clearly showing your working, convert 45.75_{10} into this format. [3]

(d) In a different computer system, real numbers are stored in floating point form, an 8 bit signed mantissa and a 4 bit signed exponent.

Clearly showing your working, calculate the decimal value of $0.1001011\ 0101_2$ [3]

7. *(a)* Explain what is meant by database normalisation. [4]

(b) A school's pupils have lessons in various subjects with each pupil studying more than one subject. A subject can be taught in different rooms and by different teachers.

Draw an Entity Relationship Diagram to represent this scenario. [3]

8. *(a)* Explain how file fragmentation can occur on a secondary storage device and describe what occurs during defragmentation. [4]

(b) Describe the terms master file and transaction file and give an example of how these files are used. [6]

9. *(a)* Describe what is meant by an indexed sequential file and give the main advantage of using an indexed sequential file compared with a standard sequential file. [3]

(b) Describe direct (random) access files in terms of hashing algorithms, overflow areas and the need for files to be re-organised on occasions. [6]

10. Compare symmetric and asymmetric cryptography. [6]

11. A certain computer system would:
- **Round:** 0.10110000_2 to 0.11_2 (to 2 bits after the binary point)
- **Truncate:** 0.10110000_2 to 0.10_2 (to 2 bits after the binary point)

(a) Convert the original, rounded and truncated values to denary. [3]

(b) Calculate the absolute and relative error values for each approach. State which approach is the most accurate. [5]

12. Powerful computer systems are used in forecasting the weather.

Explain why such systems are needed and any drawbacks of these systems. Your answer should also discuss how data is captured and processed. [10]

END OF PAPER

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