

Wednesday 22 June 2016 – Morning

A2 GCE COMPUTING

F453/01 Advanced Computing Theory

Candidates answer on the Question Paper.

OCR supplied materials:

None

Other materials required:

- You may use a calculator

Duration: 2 hours



Candidate forename		Candidate surname	
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Centre number						Candidate number				
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INSTRUCTIONS TO CANDIDATES

- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. HB pencil may be used for graphs and diagrams only.
- Answer **all** the questions.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).
- Do **not** write in the bar codes.

INFORMATION FOR CANDIDATES

- The number of marks is given in brackets [] at the end of each question or part question.
- The total number of marks for this paper is **120**.
- 'Quality of Written Communication' will be assessed in this paper.
- This document consists of **20** pages. Any blank pages are indicated.

1 (a) Operating systems can use many different scheduling algorithms.

(i) State **three** different scheduling algorithms.

- 1
- 2
- 3 [3]

(ii) Explain the purpose of scheduling.

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..... [3]

(b) Memory management in a computer for main memory can use either paging or segmentation.

(i) Explain what is meant by 'paging'.

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..... [2]

(ii) Explain what is meant by 'segmentation'.

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..... [2]

(iii) State **two** similarities between paging and segmentation.

- 1
- 2 [2]

2 Early computers were programmed in binary machine code. Today most programmers use high-level languages.

(a) Explain the advantage to the programmer of using a high-level language over machine code.

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..... [4]

(b) Explain why the programmer could use intermediate code for the final product.

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..... [3]

(c) Identify **four** benefits to the programmer of using library routines.

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..... [4]

3 A computer uses a Von Neumann processor.

(a) Describe the fetch-decode-execute cycle that this architecture uses.

Fetch

.....

Decode

.....

Execute

.....

[3]

(b) Von Neumann architecture uses special registers to store data.

One of these registers is the Current Instruction Register (CIR).

Name **two** other special registers.

1

2

[2]

(c) RISC and CISC are types of processor architecture.

Describe the differences between the **two** architectures.

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[4]

- (b) A programmer has 16 bits to use to store a real binary number. Describe the trade-off between accuracy and range when deciding how many bits to use for the mantissa and exponent.

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..... [4]

5 A programmer decides to use a dynamic data structure to hold items.

(a) Describe the advantages and disadvantages of using a dynamic data structure.

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..... [4]

(b) Part of the data held is as follows:

(42, 83, 27, 18, 52)

(i) Explain why a binary search would **not** be used for this data.

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..... [2]

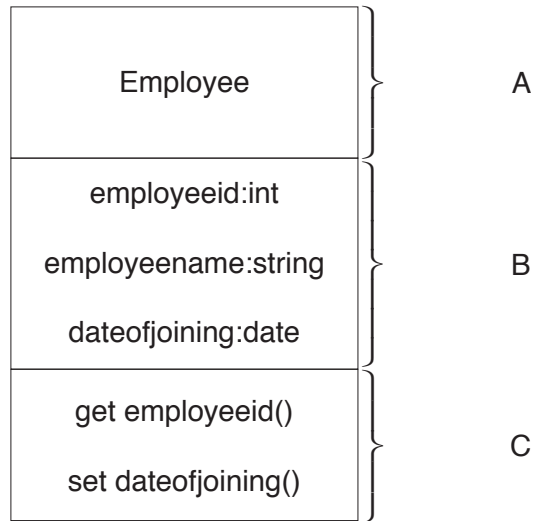
(ii) Describe the steps that a serial search would take to find the value 27.

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..... [4]

(iii) Demonstrate the steps needed for a quick sort on these values: (42, 83, 27, 18, 52).

[5]

6 A systems analyst defines part of a company’s system using Unified Modelling Language (UML).



(a) Name the three different parts of the diagram labelled A, B and C.

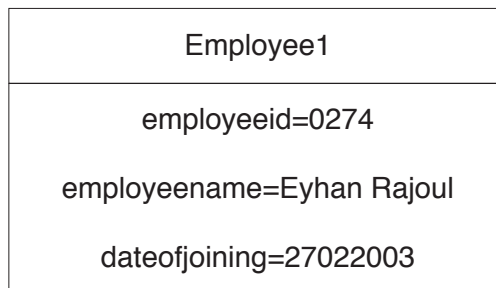
A

B

C

[3]

(b) A similar UML diagram is used to show actual data held.



State the name of this type of UML.

..... [1]

(b) Symbolic addressing is used in assembly language.

Describe symbolic addressing and why it may be used.

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..... [4]

10 A programmer needs to design a database to hold details about customers and their orders for an online company.

(a) Describe the differences between a flat file and a relational database.

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..... [4]

(b) A database contains three tables labelled Customer, Order and Item. Draw an Entity-Relationship Diagram for these where a Customer can have many Orders and an Order can have many Items.

[3]

(c) Part of the database was designed in SQL.

Describe what will be displayed for the following code:

```
SELECT (Title, First_Name, Surname, Phone_No) FROM Cust_File  
WHERE Age > 21 ORDER by Surname
```

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..... [4]

(d) The table named Cust_File has these fields: (Cust_ID, Title, First_Name, Surname, Email_Address, Age, Phone_No, Address1, Address2, County, Postcode).

A promotion targeting 15–18 year olds is planned.

(i) State the most appropriate field that should be used as a secondary key for this promotion.

..... [1]

(ii) Explain the term 'secondary' key.

.....
..... [2]

(iii) An example of SQL is given as follows:

```
SELECT (Title, First_Name, Surname, Phone_No) FROM Cust_File  
WHERE Age > 21 ORDER by Surname
```

Rewrite this code to select the target audience.

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..... [3]

END OF QUESTION PAPER

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