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SUBJECT: **Computing**  
 PAPER NUMBER: I  
 DATE: 14<sup>th</sup> May 2018  
 TIME: 9:00 a.m. to 11:05 a.m.

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### Directions to Candidates

Write your index number where indicated at the top of the page.

Answer **ALL** questions in the spaces provided. You are not allowed to use extra sheets other than those provided in this booklet.

Good English and orderly presentation are important.

The use of flowchart templates is permitted. The use of calculators is **not** permitted.

This paper carries 85 marks of the examination.

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Question Number	1	2	3	4	5	6	7	8	9	10	11	12	<b>FOR MARKERS' USE</b>
For Markers' use only	Total number of Marks or Grade obtained by candidate												
<b>MARKS</b>													

1. a. Given the following bit pattern **0110101111**. Determine its value:

i. in decimal;

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ (1)

ii. in hexadecimal;

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ (1)

iii. after a one shift left.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ (1)

b. Which is the largest decimal value that can be stored in a 6-bit register? Show your working.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ (2)

c. Assuming the contents of a 6-bit register are 100001, will the value resulting after a one left shift be valid? Explain your answer.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ (3)

**(Total: 8 marks)**



3. Two popular output devices are plotter and monitor.

a. Which one of these devices produces a hard copy of the output and which one produces a soft copy?

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ (2)

b. What is the difference between a raster and a vector device?

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ (2)

c. State if a plotter is a vector or a raster device.

\_\_\_\_\_

\_\_\_\_\_ (1)

**(Total: 5 marks)**

4. RAM and ROM are two types of memory.

a. State which **ONE** of them is:

- i. volatile \_\_\_\_\_
- ii. read only \_\_\_\_\_
- iii. stores currently running programs \_\_\_\_\_
- iv. stores the bootstrap loader \_\_\_\_\_ (4)

b. Besides main memory, one also finds secondary storage devices in a computer system.

i. Explain what secondary storage devices are used for.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ (1)

ii. Give **ONE** example of a secondary storage device.

\_\_\_\_\_ (1)

**(Total: 6 marks)**

5. The Data Protection Act became a law in Malta at the end of 2001 and came into effect as from April 2003.

a. Identify **TWO** important principles that are covered by this Act.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ (2)

b. Explain what software piracy is and why it is detrimental for software houses.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ (2)

c. Mention **ONE** software and **ONE** hardware procedure used to prevent piracy.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ (2)

**(Total: 6 marks)**

***Please turn the page.***

6. Assembly and Machine languages are two types of low-level languages.

a. State which **ONE** of these languages uses mnemonics.

\_\_\_\_\_ (1)

b. State which **ONE** of these languages needs to be translated. Explain.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ (2)

c. What is the translator for such a language called?

\_\_\_\_\_ (1)

d. Give **ONE** advantage of using assembly over machine code.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ (1)

**(Total: 5 marks)**

7. System analysis is the process of analysing a system in view of computerisation.

Project selection and feasibility study,  
Present system study and analysis,  
Design of new computerised system,  
Programming and documentation,  
Implementation and changeover methods,  
Control and review,  
System maintenance.

a. Whose role is it to manage the above process?

\_\_\_\_\_ (1)

b. Identify **ONE** way how to represent an algorithm when designing a program.

\_\_\_\_\_ (1)

c. Give **THREE** types of documentation produced during the fourth stage.

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(3)

d. Give reasons why a system would need maintenance.

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(2)

**(Total: 7 marks)**

8. A secretary in an office will be required to:

- prepare letters and documents to be signed by the manager;
- store data electronically in cells for simple calculations and data graphing; and
- send newsletters and notices electronically to all the employees.

a. Identify the application software required for each of the above tasks.

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(3)

b. Another major task entrusted to the secretary is to backup all the work at the end of the day. What is the meaning of the term backup?

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(2)

***This question continues on the next page.***

Serial and direct methods of access are two ways in which data can be read from a storage device.

c. If the secretary needs to look up information on one of the employees, which method would you suggest? Explain.

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(2)

d. Determine **ONE** use for another method of access **not** chosen in part (c).

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(1)

**(Total: 8 marks)**

9. A new school is required to set up a network in its computer lab. This network is necessary so that students can share resources within the classroom. It is also required so that the students on this network may communicate via their computer with students in other schools.

a. Which type of network will allow different schools (maybe even in different countries) to communicate with each other. \_\_\_\_\_ (1)

b. Identify **TWO** resources which can be shared via a network.

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(2)





11. Match the following programming terms to the correct definition.

1.	new	a.	container object that holds a fixed number of values of a single type
2.	array	b.	execute a set of statements repeatedly until a particular condition is satisfied
3.	loop	c.	gives the value on its right to the operand on its left
4.	String	d.	Java operator that creates the object
5.	assignment operator	e.	are a sequence of characters

1. \_\_\_\_\_ 2. \_\_\_\_\_ 3. \_\_\_\_\_ 4. \_\_\_\_\_ 5. \_\_\_\_\_

**(Total: 5 marks)**

12. Consider the following Java program snippet:

```
int age;
if (age >=18)
    System.out.println("You can start driving lessons");
else
    System.out.println("You cannot start driving lessons");
```

a. State the type of error which occurs if:

i. age is declared as char;

\_\_\_\_\_ (1)

ii. <= is used instead of >=.

\_\_\_\_\_ (1)

b. Which **ONE** of the errors mentioned in parts a (i) and (ii) are detected during compilation?

\_\_\_\_\_ (1)

c. What is the purpose of compilation?

\_\_\_\_\_  
 \_\_\_\_\_ (1)

d. Mention **ONE** other type of translator used for high level languages.

\_\_\_\_\_ (1)

**(Total: 5 marks)**

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MATRICULATION AND SECONDARY EDUCATION CERTIFICATE  
EXAMINATIONS BOARD

**SECONDARY EDUCATION CERTIFICATE LEVEL  
2018 MAIN SESSION**

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SUBJECT: **Computing**  
 PAPER NUMBER: IIA  
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<b>MARKS</b>						

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1. This question is about computer applications and computer systems.

In the school's music room, there are three stand-alone computers and a printer.

a. State **TWO** advantages of connecting these computers to create a local area network (LAN).

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(2)

b. What device is needed to obtain an Internet service and how does it function?

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(2)

c. Eliza uses one of the computers to record an audio file of herself playing the piano. Outline what happens when the computer converts the music into a file.

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(1)

d. Eliza has also designed some high resolution posters. The memory in her computer is almost full and she needs to transfer these posters to an external secondary storage device.

i. Define secondary storage.

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(1)

ii. Define high resolution.

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(1)

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iii. Identify the **THREE** common storage technologies Eliza can choose from.

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(3)

iv. State **FOUR** characteristics of secondary storage devices that Eliza should consider when choosing a device.

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(4)

e. Eliza’s teacher has mentioned that both the audio file and posters should be secured to prevent accidental loss. List any **THREE** measures that Eliza may use to secure her files.

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(3)

**(Total: 17 marks)**

***Please turn the page.***

2. This question is about data representation.

a. Order the following units from smallest to largest:

GB	bit	MB	byte
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\_\_\_\_\_ (1)

b. Convert the decimal number 191 into an 8 bit binary number.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ (2)

c. Convert the hexadecimal number 3E into a decimal number. You must show your working.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ (2)

d. Add together the following two 8 bit binary numbers. Express your response in an 8 bit binary form. (1)

$$\begin{array}{r} 10110011_2 + \\ \underline{10011100_2} \\ \hline \end{array}$$

e. Identify the problem that would occur if the computer had to store the result of the addition of part (d) as an 8 bit binary form.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ (2)

f. What is the largest positive number that can be represented using 8-bit Two's Complement Binary representation?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ (2)



g. What is the largest negative number that can be represented using an 8-bit Two's Complement Binary representation?

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(2)

h. Paul has claimed that hexadecimal is often used instead of binary because it uses fewer digits and so it will take up less space in a computer's memory. Justify why Paul's answer is incorrect.

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(1)

i. Paul has been given the following boolean expression  **$X = \text{Not (A or B)}$** .

i. Draw the logic circuit which represents the Boolean expression.

(2)

ii. Draw the truth table which represents the Boolean expression.

(2)

**(Total: 17 marks)**

3. This question is about computer architecture and operating systems.

Emma wants to purchase a new computer and is looking at the following computer model advert.

**Computer 1**

Processor 6 Core, 4 GHz, 64 bit

Cache size: 6 MB

Memory: 8GB DDR3 RAM

Hard Drive: 2 TB HDD

Screen Size: 19"

Display: 1920 x 1080 pixels 24bit Colour Depth

a. Computer 1 has 512 kilobytes of ROM. Describe the purpose of the ROM in a computer.

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(1)

b. Define the term colour depth.

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(1)

c. What is the resolution of the advertised computer?

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(1)

d. How many different colours can the screen of the advertised computer produce?

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(2)

Emma’s friend has found another computer advert as shown below.

**Computer 2**

Processor Single Core, 2.7 GHz, 64 bit

Cache size: 4 MB

Memory: 8GB DDR3 RAM

Hard Drive: 1 TB HDD

Screen Size: 24"

Display: 1920 x 1080 pixels 24bit Colour Depth

e. When running a Virtual Reality game, Computer 1 is likely to run faster than Computer 2. Using the information given for both computers, identify **TWO** reasons for this.

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(4)

f. File management is a function that an operating system performs. Describe how an operating system organises files in a hard disk drive.

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(2)

g. Computers may be designed to operate in different contexts. This calls for different types of Operating Systems and varying hardware configurations.

i. State **THREE** types of operating systems.

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(3)

ii. Describe **ONE** application for each type of operating system mentioned.

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(3)

**(Total: 17 marks)**

***Please turn the page.***

4. This question is about the CPU and assembly language.

a. Explain **ONE** reason why the cache size affects the performance of the CPU.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ (1)

b. Describe what is meant by 5 GHz.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ (2)

c. What do the acronyms below stand for:

i. CU: \_\_\_\_\_

ii. PC: \_\_\_\_\_

iii. IR: \_\_\_\_\_ (1½)

d. Which of the acronyms above are registers and what does the data stored in each one of these registers represent?

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ (1½)

e. List the steps of the Fetch-Execute Cycle.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ (4)

f. Consider the following section of assembly language code:

```

1      MOV   R3, #1           ; Move value #1 into Register 3
2      MOV   R4, #2           ; Move value #2 into Register 4
3      MOV   R5, #3           ; Move value #3 into Register 5
4      L1:  MUL  R3,R4,R4      ; Multiplies the contents of Register 3 with the contents of
5                               Register 4 and store the result in Register 4
6      SUB   R5, 1            ; Subtracts value 1 from the contents in register 5 and store
7                               the result in Register 5
8      JNZ   R5                ; Jump to the instruction pointed to by the label L1 if
9                               contents of Register 5 is not 0 (zero)
10     HLT                               ; Halt

```

From the above assembly language code:

i. using the instruction MOV R4, #2 as an example, state the name of each part of this instruction:

MOV        \_\_\_\_\_  
R4, #2     \_\_\_\_\_ (2)

ii. identify the line number where a label is declared.  
\_\_\_\_\_ (1)

iii. Suppose that initially 2 is stored in R3, 3 is stored in R4 and 3 in R5, write down the contents of R3, R4 and R5 as they change when this code is executed.

R3	R4	R5

(3)

iv. What is the function of the above section of assembly code?  
\_\_\_\_\_  
\_\_\_\_\_ (1)

**(Total: 17 marks)**

5. This question is about algorithmic problem solving and programming.

Today, Java is a very commonly used programming language.

a. Give **FOUR** examples of primitive data types supported in the Java Programming Language.

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(2)

For his JAVA coursework a Computing student decided to create a simple game that will test the player's luck. The snippet of code shown below is part of his source code:

```
1 public void numberGuess(){ int randomNum, userNum; int tries = 4; int score = 0;
2 // randomise a number
3 randomNum = (int)(Math.random() * 10 +1);
4 System.out.println("New Number is Randomised");
5 // start guessing number
6 do{
7     System.out.print("Guess Number: ");
8     userNum = Keyboard.readInt();
9     if (userNum != randomNum) { System.out.println("BAD LUCK");
10    System.out.println("The number was " + randomNum);
11    System.out.println("You have " + tries + " more tries"); }
12 else{
13    tries = tries - 1;
14    score = score + 1;
15    System.out.println("NUMBER GUESSED CORRECTLY");
16    System.out.println("You have " + tries + " more tries"); } } while (tries !=0);
17 //display score
18 System.out.println("FINAL SCORE: " + score); }
```

b. What is the name of the method used for the above source code?

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(1)

c. What is source code?

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(1)

d. In which line of code can we find the following coding constructs?

Construct	Line number
Output Statement	
Inline Comments	
Variable Declaration	
Input Statement	
Loop	
Assignment Statement	
Variable Initialisation	
Conditional Statement	

(4)

e. What is the function of the above snippet of source code?

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(4)

f. The student decided to improve his game by including a Main Menu with 3 options: EASY, MEDIUM and HARD. The range of numbers to be randomised changes according to the option that the player chooses.

OPTION	LEVEL	RANGE
1	EASY	1-10
2	MEDIUM	1-50
3	HARD	1-100

He created another method called mainMenu ( ) which will display a menu and the user will be able to choose an option. When the user chooses an option (1 or 2 or 3) a variable called maxRange is filled with the maximum value of the range of numbers to be randomised. For example, if the player chooses 2 (MEDIUM LEVEL) the variable maxRange is assigned value 50.

What single line of code would you change in method numberGuess( ) so it functions properly according to the difficulty level that the player chooses?

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(2)

***This question continues on the next page.***

g. Usually, it is the role of an entire team of programmers to develop advanced programs such as games. Mention **TWO** good practices that programmers should follow when coding in order to make the source code more readable and understandable for other programmers.

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(2)

The student finalised the user documentation, but noticed that he also has to develop a program documentation.

h. What is the difference between the two types of documentation?

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(1)

**(Total: 17 marks)**





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MATRICULATION AND SECONDARY EDUCATION CERTIFICATE  
EXAMINATIONS BOARD

**SECONDARY EDUCATION CERTIFICATE LEVEL  
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1. Intel has been the biggest name in computer processors (CPUs) for decades since 1991. However, in the early 2000s, Advanced Micro Devices (AMD) soon challenged Intel with the development of key technological advances. AMD's Athlon line of processors was the first to reach 1GHz clock speed, and the 'Athlon 64' line was the first processor with 64-bit processing capability.



Source: <https://en.wikipedia.org>

a. What does the acronym CPU stand for?

\_\_\_\_\_ (1)

b. How does the clock speed affect the CPU performance?

\_\_\_\_\_  
 \_\_\_\_\_ (1)

c. As shown in Figure 1 below, a CPU is made up of two main units which are the ALU and CU:

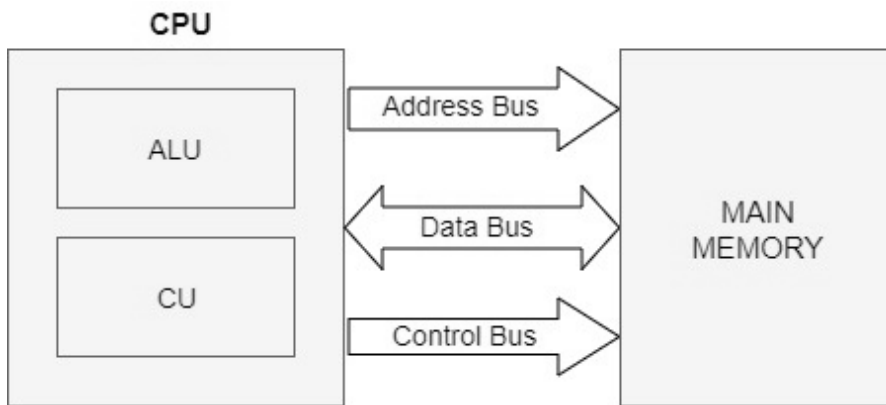


Figure 1

i. What do the acronyms ALU and CU stand for?

ALU: \_\_\_\_\_

CU: \_\_\_\_\_ (2)

ii. Which of the mentioned units in part c(i) match the description below?

Description	CPU Unit
This unit manages how data flows between RAM and CPU	
This unit processes data.	

(2)

d. As shown in Figure 1, the CPU is connected to the main memory by means of the so-called System Bus. This includes the address bus, the data bus and the control bus.

i. A 64-bit CPU is said to have a 64-bit word length. Which of the above-mentioned buses, is related to the word length?

\_\_\_\_\_ (1)

ii. State whether the following statements are True or False.

Statement	True/False
The CPU uses the control bus to locate an instruction from the main memory	
The data bus is a channel used by the CPU to get a copy of the instructions required from main memory	
The size of the address bus determines how many memory locations can be utilized by the CPU	
The address bus determines whether the CPU needs to read data from memory or write data to memory	

(4)

e. The main memory is composed of two units which are the Random-Access Memory (RAM) and the Read-Only Memory (ROM).

Briefly mention **TWO** differences between RAM and ROM.

\_\_\_\_\_  
\_\_\_\_\_ (2)

f. Which CPU processes instructions faster, a 32-bit CPU or a 64-bit CPU?

\_\_\_\_\_ (1)

g. Justify your answer in part (f).

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ (1)

***This question continues on next page.***

- h. Besides improving the CPU clock speed, both Intel and AMD introduced CPUs with multiple cores. For example, both AMD Ryzen and Intel i7 CPUs are made up of eight internal processors, hence called Octa-Core Processors.



Source: <https://goo.gl/images/eA1DGj>



Source: <https://goo.gl/images/bE2Nno>

Which of the processors shown below would be suitable in a server used to control a social networking system, such as Facebook, that can be accessed online by many users? Justify your answer.

CPU with a 3.6Ghz single core

CPU with four 1.8Ghz cores (Quad Core)

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(2)

**(Total: 17 marks)**

2. An Automated Teller Machine (ATM) is an electronic banking outlet, which allows customers to complete basic financial transactions such as cash withdrawals from and deposits to the individual's bank account. Anyone with a credit card or debit card can access most ATMs.



a. Mention **ONE** advantage of using an ATM.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ (1)

b. What does the term EFT stand for?

\_\_\_\_\_

\_\_\_\_\_ (1)

c. Mention **ONE** example of the use of EFT.

\_\_\_\_\_

\_\_\_\_\_ (1)

d. Tick (✓) the appropriate answer. An ATM is a:

- general-purpose computer system;
- dedicated computer system. (1)

e. Justify your answer in part (d).

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ (1)

f. Mention **ONE** input device and **ONE** output device found on an ATM.

INPUT: \_\_\_\_\_

OUTPUT: \_\_\_\_\_ (2)

Source: [www.knowl8dge.com](http://www.knowl8dge.com)

***This question continues on next page.***

g. An ATM is equipped with a Single-User Operating System (O/S). This type of O/S allows only one user to use the ATM at any given time. This means that more than one user can use the ATM but not at the same time.

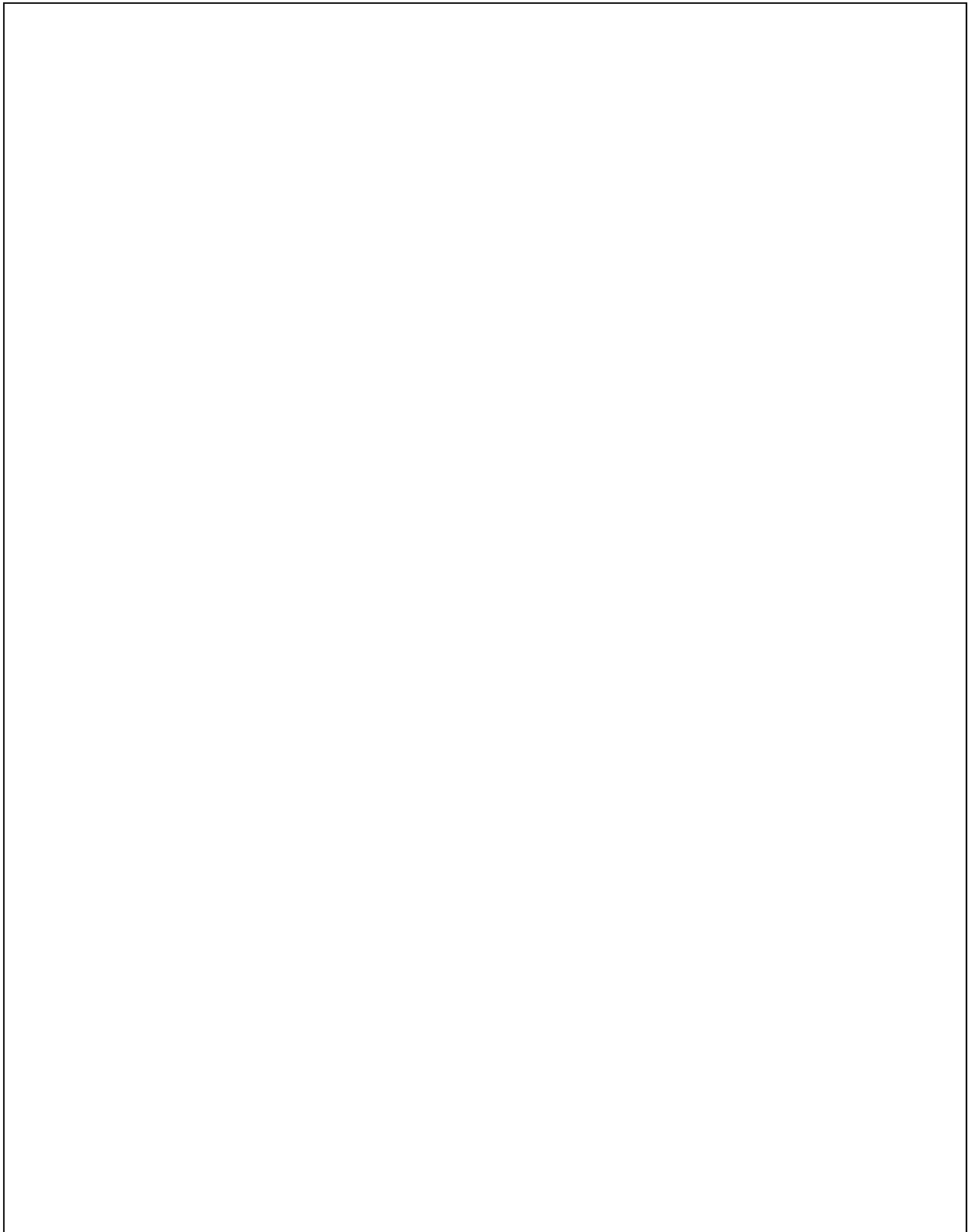
Tick (✓) the correct answer for the following statements:

- i. An O/S is a/an:
  - system software that manages all the system’s resources;
  - system software that cleans up the system from any corrupted files;
  - application software that gives the user a way to interact with the system. (1)
  
- ii. This O/S function provides a link between the user and the device:
  - File Management;
  - Input and Output Management;
  - Graphical User Interface. (1)
  
- iii. A Single-User Operating System is an operating system that is ideal for a:
  - computer used to store records of an airline reservation system;
  - smart phone;
  - computer used to store the username and password of all the members of a social network website. (1)
  
- h. For security reasons, the ATM is equipped with a login system that prevents unauthorised users to access the ATM. Every user has a 4-digit PIN number that allows the user to use the ATM.

If the user enters the PIN number incorrectly for three consecutive times the ATM will hold the user’s credit/debit card. The below pseudo code shows the algorithm used to develop this ‘LogIn’ function.

<b>Step 1:</b>	User inputs bank card.
<b>Step 2:</b>	User inputs pin number.
<b>Step 3:</b>	If PIN Number is correct, stops ‘LogIn’ function and proceeds to the ‘MainMenu’ function.
<b>Step 4:</b>	If PIN Number is not correct, check if the user has already entered the PIN number for three times.
<b>Step 5:</b>	If PIN Number has been entered incorrectly for three times, hold bank card.
<b>Step 6:</b>	If PIN number has not been entered for three times repeat from step 2.

Draw the flowchart of this algorithm in the space provided:



(7)

**(Total: 17 marks)**

***Please turn the page.***

3. Besides the use of an ATM, banks also offer the use of E-Banking that enables users to access their bank accounts and to carry out banking services online at any time.

Users who apply for this service are given an E-Banking Key as shown on the right. This key is used to generate random bank codes according to the user's account. Users must use the generated codes to access their bank accounts online.

This key is programmed in a way to enable security so that only the authorised user can access the key. Similar to an ATM, as explained in question 2, this E-Banking Key has a pin-number authentication process.



Source: <https://goo.gl/images/BMPy1L>

The following JAVA snippet is the source code developed for this authentication process:

```

Line 1:  public void authProcess() {
Line 2:      // declare properties
Line 3:      final int PIN = 8743;
Line 4:      int userPin;
Line 5:      int count = 1;
Line 6:      boolean valid = false;
Line 7:      //start authentication process
Line 8:      do{
Line 9:          System.out.println("Enter PIN");
Line 10:         userPin = Keyboard.readInt();
Line 11:         if (userPin == PIN){
Line 12:             startBanking();
Line 13:             valid == true;
Line 14:         } else {
Line 15:             System.out.println("Invalid PIN Code");
Line 16:             count ++;
Line 17:         }
Line 18:     } while (count<=3);
Line 19:     if (valid == false) {
Line 20:         stopKey();
Line 21:     }
Line 22: }

```

It was noted that the method *startBanking()* allows the user to carry out the necessary e-banking transactions, and method *stopKey()* stops the user from trying to access the e-banking key.

Analyse the source code provided and answer the following questions:

- a. What is source code?

---



---

(1)



b. What is the name of the method used for the authentication process?

\_\_\_\_\_ (1)

c. Give the name and the data type of **ONE** variable and **ONE** constant used in this code.

<b>Variable Name:</b>		<b>Data Type:</b>	
-----------------------	--	-------------------	--

<b>Constant Name:</b>		<b>Data Type:</b>	
-----------------------	--	-------------------	--

(2)

d. Mention **TWO** good practices that the programmer used, to make the above snippet of code more readable and understandable.

\_\_\_\_\_  
\_\_\_\_\_ (2)

e. Briefly explain the use of the variable named 'valid' in the code above.

\_\_\_\_\_  
\_\_\_\_\_ (1)

f. Briefly explain what happens when the user enters the correct PIN number.

\_\_\_\_\_  
\_\_\_\_\_ (1)

g. Explain what happens in line 16.

\_\_\_\_\_  
\_\_\_\_\_ (1)

h. The programmer noted that there is a syntax error in line 13.

i. What is a syntax error?

\_\_\_\_\_  
\_\_\_\_\_ (1)

ii. Rewrite the code in line 13 to fix this error.

\_\_\_\_\_  
\_\_\_\_\_ (1)

***This question continues on next page.***

i. Explain the necessity of using the do-while loop in the above code.

---

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(3)

j. The programmer noted that there is also a logical error.

After the user: 1) enters the pin correctly, 2) carries out the necessary bank transactions, and 3) logs out of the system, the user is redirected to the authentication process and prompted to enter the PIN code once again.

i. What is a logical error?

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(1)

ii. The programmer noted that the code in Line 18 is causing this logical error. Rewrite this line to fix this error.

---

(2)

**(Total: 17 marks)**

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4. The owner of a medical clinic wishes to provide the patients with a consistent experience from the clinic to the general hospital. For this reason, a systems analyst was given the task to observe how the current system works and how it can be updated and linked with the hospital's system.

a. What is a network?

---

---

(1)

b. What is a network confined to a single building called?

---

(1)

c. What type of network is suitable for this medical clinic to access the patients' records which are stored on the system used in the general hospital?

---

(1)

d. Give **TWO** benefits of linking the clinic's network to the hospital's network.

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(2)

e. Each employee at the clinic has a computer password and they are advised to change it regularly. Give **ONE** reason for this.

---

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(1)

f. Personal information about patients is transmitted via the network to and from the hospital. How is confidentiality of data protected during the transmission of data?

Tick (✓) the correct answer:

using an anti-virus software

using data-encryption technique

using a firewall

(1)

g. Briefly explain your answer in part (f).

---

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(1)

h. The Internet connection available at the clinic uses the telephone system. What device is required so that the clinic's computer system can properly connect to the Internet?

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(1)

***This question continues on next page.***

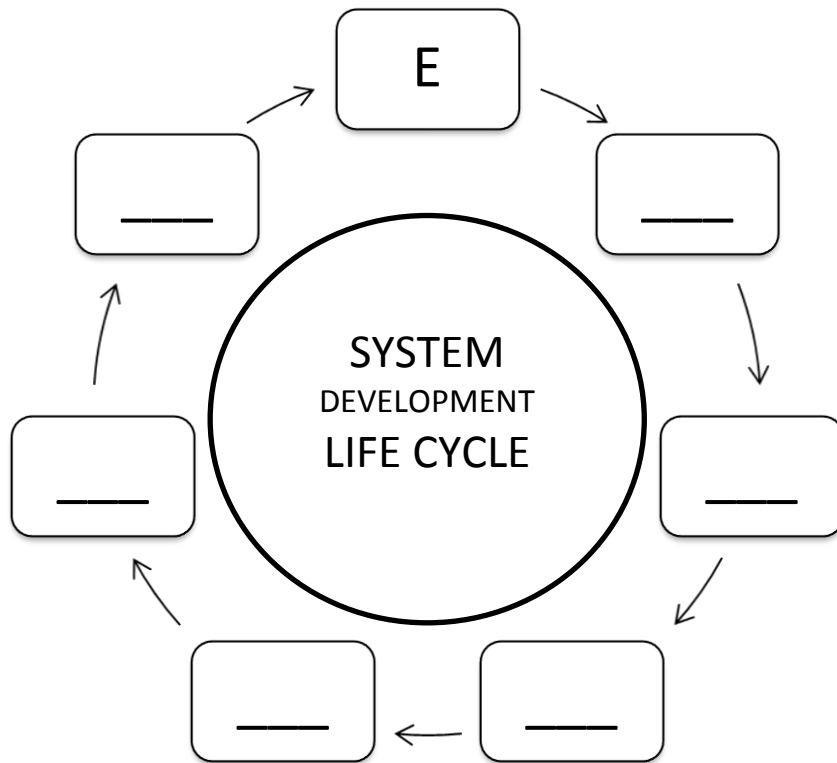
- i. The systems analyst explained to the owner of the clinic that a Software Development Life Cycle (SDLC) should be carried out. The systems analyst explained that the SDLC is the process required to investigate the problems of an existing software and the steps needed to design, program and change to a new software.

Place the below SDLC steps in the correct order in the diagram below. *The first one is done as an example.*

---

<b>A</b> Control & Review	<b>B</b> Programming, Testing & Documentation	<b>C</b> Present System Study	<b>D</b> Implementation & Change Over
<b>E</b> Problem Definition & Feasibility Study	<b>F</b> Design of the new System	<b>G</b> Maintenance	

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(6)

- j. Briefly explain the importance of the Control and Review stage.

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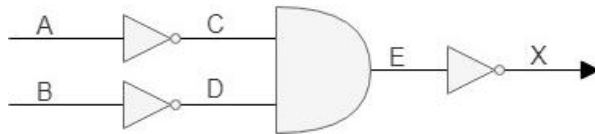
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(1)

**(Total: 16 marks)**

5. Logic gates are the elemental components of digital electronics which perform digital operations such as the logical OR, AND, and NOT. Every digital product, like computers, smart phones, calculators and digital watches contain logic gates.

a. Examine the logic circuit below and complete its truth table.



A	B	C	D	E	X
0	0				
0	1				
1	0				
1	1				

(4)

b. By observing your answer in part (a), mention and draw the symbol of one logic gate which gives the same output of the above logic circuit.

Name of Logic Gate	Symbol of Logic gate

(2)

***This question continues on next page.***

- c. An intruder alarm system monitors and detects unauthorised entry to private properties. The objective is to alert the property owner about any detected intrusions.

Generally, an intruder alarm is activated, and the alarm sounder goes on (A=1) if the alarm's:

- hub is switched on (H=1);
- pin code is not inserted (C=0); and
- PiR Sensor detects something (S=1).

- i. Complete the truth table below:

Alarm Hub (H)	Pin Code (C)	PiR Sensor (S)	Alarm Sounder (A)

(4)

- ii. Hence, continue its logic circuit provided below:



(4)

- d. When the Alarm malfunctions, error codes are displayed on the screen located on the alarm hub. Two of these errors are Err\_A2 and Err\_3F, where A2 and 3F are hexadecimal values ( $A2_{16}$  and  $3F_{16}$ ).

The technical section on the alarm user-manual indicates that the error with a decimal value of 162 ( $162_{10}$ ) indicates a faulty PIR Sensor.

- i. Which of the following mentioned hexadecimal error codes indicates a faulty PIR sensor? Show your working.

Show your working here...

Answer: \_\_\_\_\_

(2)

- ii. The other hexadecimal error code indicates a faulty Alarm Sounder. What would be the error value indicated on the alarm user-manual (in decimal value)? Show your working.

Show your working here...

Answer: \_\_\_\_\_

(2)

**(Total: 18 marks)**

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