

FORM 4 (Option)

COMPUTING

TIME: 1h 30min

Name: \_\_\_\_\_

Class: \_\_\_\_\_

**Directions to Candidates:**

Answer **ALL** questions in **Section A** and **Section B** on this paper;  
The use of a flow chart template is permitted;  
Calculators are **NOT** allowed;  
Good English and orderly presentation are important.

For office use only:

Question	1	2	3	4	5	6	7	8	9	10	11	12	13	Paper Total	Course Work	Final Mark
Max	5	5	5	5	5	5	5	5	5	5	5	15	15	85%	15%	100%
Mark																

## Section A – Answer all Questions

1. Give the **correct term** for each of the following:

*The first one has been done to help you.*

a.	The part of the CPU responsible for coordinating CPU components.	<b>Control Unit</b>
b.	A small device that performs a logical operation on its input/s to produce a logic output.	
c.	A group of 8 bits.	
d.	A unit of measurement for processor speed.	
e.	Physical connections that transfer data between the components inside a computer.	
f.	The complete set of instructions that a particular processor can deal with.	

2. Today many people drive ‘intelligent’ cars.

- a. GPS devices are very useful in both land and sea navigation.

i. What does **GPS** stand for? [1]

ii. Briefly **explain** how GPS navigation works. [1]

- b. Name one other **computerised device** you would associate with an intelligent car and briefly describe its use. [2]

Name	
Description	

- c. **Explain** how the device you mentioned in ‘b’ improves the driving experience. [1]

3. Computers play important roles in society through **CAD, CAM, CAL** and **simulations**.

- a. Which of the above applications would you associate with: [3]

i.	The use of videoconferencing in a school’s <i>eTwinning</i> project.	
ii.	The use of computer software to design the setup of a room.	
iii.	The use of robotic devices in car manufacture.	

- b. Flight simulators are often used in the training of pilots.

i. What is the **advantage** of using computerised simulation rather than real planes in the training of pilots? [1]

ii. Suggest a possible **limitation** of simulation-training. [1]

4. A computer system involves various types of software.
- a. Indicate whether the following are **System Software** or **Application Software**.  
*The first one has been done to help you.*

i.	Antivirus software	<i>System Software</i>
ii.	Web Browser	
iii.	Operating System	

- b. Give **two differences** between Tailor-Made and Off-The-Shelf packages. [2]

	<b>Tailor-Made Packages</b>	<b>Off-the-Shelf Packages</b>
i.		
ii.		

- c. Mention **one** thing the user needs to do during **software installation**. [1]

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5. Program documentation is an important step in the System Lifecycle.

- a. Name **two** things you would expect to find in a User Manual. [2]

- i. \_\_\_\_\_
- ii. \_\_\_\_\_

- b. Mention **two** things you would expect to find in the Program documentation. [2]

- i. \_\_\_\_\_
- ii. \_\_\_\_\_

- c. Why is program documentation necessary? [1]

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6. The System Lifecycle involves the steps in the creation and maintenance of a computerised system.

- a. What is normally the **first** step of the System Lifecycle? [1]

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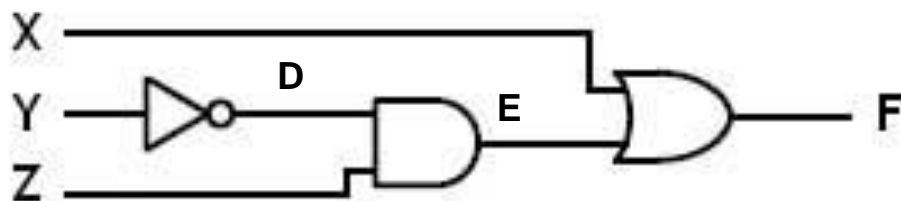
- b. Why is it important that the team designs the system plans *before* they actually create the software? [1]

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- c. A multi-branch bank is having a new system installed. [3]  
 Which of the following are **True** or **False**?

i.	If an error occurs during a parallel changeover it would be less likely to result in loss of data.	
ii.	A direct changeover would involve more data redundancy.	
iii.	The feasibility study is done after the program is written and tested.	

7. Look at the logic circuit below to answer the following.



a. Complete the **truth table** for the above logic circuit. [3]

X	Y	Z	D	E	F
0	0	0			
0	0	1			
0	1	0			
0	1	1			
1	0	0			
1	0	1			
1	1	0			
1	1	1			

b. Give the **Boolean expression** for the above logic circuit. [2]  
Working

Answer \_\_\_\_\_

8. **ASCII** is a 7-bit character encoding scheme. Meanwhile Java character primitives employ **Unicode** which is a 16-bit code.

a. How many **different characters** can a 7-bit character encoding scheme represent? [1]

b. Mention one **advantage** of Unicode over ASCII. [1]

c. Besides a character, a 7-bit binary pattern can represent an unsigned or a two's complement number. [3]

i. What is the **decimal equivalent** of the **largest unsigned number** that can be represented by a 7-bit pattern?

ii. What is the **decimal equivalent** of the **smallest two's complement number** that can be represented by a 7-bit pattern?

iii. What is the **decimal equivalent** of the **largest two's complement number** that can be represented by a 7-bit pattern?

9. Two's complementation allows us to represent negative as well as positive values.

- a. **Convert** the number 53 to 8-bit **two's complement**.

*Working*

Answer \_\_\_\_\_

- b. **Convert** the number 24 to 8-bit **two's complement**.

*Working*

Answer \_\_\_\_\_

[2]

- c. Use two's complement to **subtract** 24 from 53.

*Working*

Answer \_\_\_\_\_

[2]

10. 'If' structures allow us to implement decisions in Java.

- a. **Complete** the following code such that it outputs 'pass' if the variable *mark* is 50 or over. [2]

```
if (_____) {
    System.out.println (____);
}
```

- b. Suggest a **programming structure** that would be better suited than the 'if' structure when implementing a multi-branching choice (e.g. to implement a menu with 5 options). [1]

- c. Decisions are one of the three building blocks of algorithms. Mention **two** other algorithm constructs, besides decisions. [2]

Construct 1	
Construct 2	

11. The following Java code is being tested for errors:

```
public void findArea(){
    System.out.println ("Area:\t" + this.area + "sq cm");
    this.area = this.sideB * this.perpendicularHeight
}
```

- a. What **logic error** is there in the above code? [1]

- b. Mention **one** testing technique that could have been used to locate such an error. [1]

- c. The line below has a **syntax error**. Edit it in order to make it syntactically correct.

this.area = this.sideB \* this.perpendicularHeight

- d. Besides syntax and logical errors, there is another type of programming error.

i.	Name this type of error	[1]
ii.	Give a <b>definition</b> for this type of error	[1]

## Section B – Answer all Questions

12. A school management system is being developed using Java.

- a. The application will include a class called 'Student' that has the following **properties**:  
*name, surname, group, totalMark*.\*.

(\*totalMark will be a whole number out of a total of 1000)

- i. Answer with **True** or **False**. [2]

Individual students would be entered into the system as objects of class Student.	
A Java class can only have one method.	

- ii. Show how the following properties should be declared: [2]  
*The first one has been done for you.*

group	<i>String group;</i>
name	
totalMark	

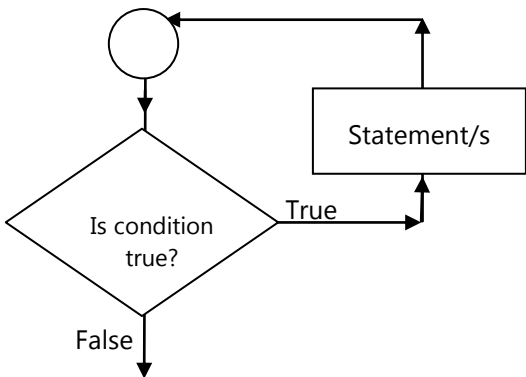
- b. Class Student will include a method called *enterStudent* that allows the user to enter student details. [6]

**Fill in the blanks** to complete the method *enterStudent* shown below:

```
public void _____{  
    System.out.print ("Enter name: ");  
    this.name = (Keyboard.readString());  
    System.out.print ("Enter surname: ");  
    this.surname = (Keyboard.readString());  
    System.out.print ("Enter group: ");  
    this.group = (Keyboard.readString());  
    int mark;  
    _____ { // starts a loop to read ten marks  
        System.out.print ("Enter mark: ");  
        mark = _____; //reads mark from the keyboard  
        _____;  
        //the line above adds the mark entered to totalExamMark of the current object  
    }  
}
```

- c. Java allows other looping constructs besides the one you mentioned in 'b'.  
**Fill in the blanks** with one of the looping constructs below:

**'while loop', 'do/while loop', 'for loop'**

i.	An unconditional looping construct.	
ii.	A conditional loop that may loop many times, once or not at all.	
iii.	A conditional loop that will execute loop contents at least once.	
iv.	A looping construct most useful when it is known beforehand how many times the program will loop.	
v.	Which looping construct does this flowchart represent? 	

13. The CPU is found at the heart of a computer system.

- a. What do the following acronyms stand for? [2]

i.	CPU	
ii.	ALU	

- b. The performance of a CPU is in part dependent on its wordlength.

- i. What is **wordlength**? [1]

- ii. Why would you expect a CPU with a 64-bit wordlength to be **more efficient** than an equivalent CPU with a 32-bit wordlength? [1]

- iii. What is the **address space** of a CPU with a 64-bit address bus? [1]

- iv. How is the size of the address space important to a computer's performance? [2]

c. The CPU makes use of a number of registers; some of them have a particular function.

i. What is a **CPU register**?

\_\_\_\_\_

ii. Explain the **function** of the following registers:

[3]

Accumulator	
Program Counter	
Instruction Register	

d. Answer **True** or **False**.

[4]

i.	CPU registers are volatile.	
ii.	Once an instruction is fetched from Main Memory it is stored in the ALU.	
iii.	A fetch instruction can only start at a signal from the System Clock.	
iv.	'Add' in a CPU instruction is known as the opcode.	