

JUNIOR LYCEUM ANNUAL EXAMINATIONS 2009

Directorate for Quality and Standards in Education
Educational Assessment Unit

FORM 4 (Option)

COMPUTER STUDIES

TIME: 1h 30min

Name: _____

Class: _____

Directions to Candidates:

Answer **ALL** questions in **Section A** on this paper;
Answer **ALL** questions in **Section B** on separate foolscaps;
The use of 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 Draw the **logic circuit** and the **truth table** of the following Boolean expression:

$$X = \overline{(A.B).(A+B)}$$

Space for Logic Circuit and Truth Table

[5]

- 2 Draw a **block diagram** of a computer system. Your diagram should include the following components: **CPU, Central (main) Memory unit (MU), ALU, Program Counter (PC), Accumulator, Input Device, Secondary Storage Device, Output Device and Instruction Register (IR).**

Use arrows to show the **flow of data** between the components.

Space for diagram

[5]

- 3 (a) Application software may be **customizable**, **taylor-made** or **off-the-shelf**. Distinguish between the three types of software.

Customizable: _____

Taylor-made: _____

Off-the-shelf: _____

[3]

- (b) Mention two reasons why **4th Generation Languages** (4GLs) were developed.

Reason 1: _____

Reason 2: _____

[2]

- 4 (a) **CAD** is a technical computer application while **CAM** is an industrial computer application.

- What do the acronyms **CAD** and **CAM** stand for?
- What is the **relationship** between them?

i. **CAD:** _____

CAM: _____

ii. **Relationship:** _____

[3]

- (b) Name one **educational computer application** and provide an **advantage** of the application when compared to other (traditional) methods.

Application: _____

Advantage: _____

[2]

- 5 For the following question **$A = 121$** , **$B = 63$** and use **8-bit representation**:
Show all your workings in the space provided on the next page.

- Convert **A** and **B** into binary;
- Find **$A - B$** using two's complement;
- What **type of error** is generated if **200** is added to **A**.

Space for working:

- i. **A** = _____
- B** = _____
- ii. **A – B** = _____
- iii. **Error type:** _____

[5]

6 (a) What is the **instruction set** of a computer?

Instruction set: _____

[1]

- (b) i. Differentiate between the **data bus** and the **address bus**.
- ii. What **effect** does the width of the data bus have on the performance of a computer system?
- iii. Which **temporary store** is affected by the width of the address bus?

i. **Data bus:** _____

Address bus: _____

ii. **Width of data bus:** _____

iii. **Temporary store:** _____

[4]

7 The **Fetch Execute Cycle** is the sequence of operations involved in executing a low-level instruction. Write down the **six main steps** of the fetch execute cycle. *(The first step has been provided as help)*

1. Control unit (CU) fetches the 'opcode' from the memory location indicated by the program counter (PC).

2. _____

3. _____

- i. **Register:** _____

- ii. **Smallest:** _____
Largest: _____
- iii. **Instruction register:** _____

[5]

- 10 (a) Differentiate between **technical, user** and **program documentation**.

Technical: _____

User: _____

Program: _____

[3]

- (b) Mention two **essential features** (or sections) that one expects to find in the User's documentation.

Feature 1: _____

Feature 2: _____

[2]

- 11 (a) Briefly explain what is meant by **Systems Analysis**.

Systems Analysis: _____

[2]

- (b) The following are the **seven stages** performed by the systems analyst; however they are not in the correct order. Number each stage to show the correct sequence of tasks.

(The first stage has been numbered as help).

Design of new computerized system. _____

System maintenance. _____

Programming and documentation. _____

Control and review. _____

Present system study and analysis.

Project selection and feasibility study.

Implementation and changeover methods.

1

[3]

Section B – Answer BOTH questions

- 12 (a) The three common types of programming errors are **syntax**, **logical** or **run-time error**. For each type of error:
- Briefly explain one **method of detecting the error**; and
 - Write down one **typical example** of the error. [6]
- (b) Write a **Pascal program** which stores and processes an unknown number of examination marks (from 0 to 100) in an array. The maximum amount of marks is 30. The program should:
- Ask the user how many marks to input;
 - Enter the marks in an array;
 - Calculates and outputs the average mark to 2 decimal places;
 - Finds and outputs the maximum (highest) mark; and
 - Finds and outputs the minimum (lowest) mark. [9]
-
- 13 (a) **Transcription** errors are errors generated during the entry of data. Give the **name** and an **example** of the three types of transcription errors. *For your examples, assume that the correct data is 12345.* [6]
- (b) **Data verification** and **data validation** are two methods of checking for data integrity. Distinguish between the two methods. [4]
- (c) **Range check** is a type of data validation check.
- Explain what a **range check** is.
 - Mention a situation where a range check may be implemented. [2]
- (d) **Check digits** are typically used to validate numeric codes. For example, given the code: 123456789**5**, the check digit is **5** (the first digit from the right). The check digit was generated by following the algorithm given below:
- Add the numbers in the odd position: $1+3+5+7+9 = 25$
 - Add the numbers in the even position: $2+4+6+8 = 20$
 - Add both answers $25 + 20 = 45$
 - Divide by 10 and take the remainder $45 \div 10 = 4 \text{ remainder } 5$
 - The remainder is the check digit **5** is the check digit
- Use the same algorithm to generate the **check digit** for the code: 332145987. [2]
- (e) Provide a **typical example** of where check digits are found. [1]

