# JUNIOR LYCEUM ANNUAL EXAMINATIONS 2006

Educational Assessment Unit – Education Division

**FORM 5 (Option)** **COMPUTER STUDIES** **TIME: 1 h 45 min**

**Name:** _____ **Class:** _____

***Directions to Candidates**:*

*Answer **ALL** questions in **Section A** on this paper.*
*Answer any **TWO** questions from **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 | 14 | Paper Total | Course Work | Final Mark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Max | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 15 | 15 | 15 | 85% | 15% | 100% |
| Mark | | | | | | | | | | | | | | | | | |

## Section A - Answer all Questions

**1** The table below lists some **Input** and **Output** devices. Tick (✓) whether each device is an input or output device and provide a suitable application for each. An example has been given to help you answer this question.

| Device | Input | Output | Application |
|---|---|---|---|
| Keyboard | ✓ | | Word Processing. |
| Laser Printer | | | |
| Mouse | | | |
| Bar-code Reader | | | |
| Joystick | | | |
| Plotter | | | |

[5]

**2** (a) Two common types of secondary storage media are **magnetic** and **optical**. Tick (✓) whether the following media are **magnetic** or **optical** and for each medium give a typical storage capacity.

| Secondary Storage | Magnetic | Optical | Capacity |
|---|---|---|---|
| Hard Disk | | | |
| Floppy Disk | | | |
| Compact Disk | | | |

[3]

(b) Secondary storage media allow **direct** (random) and/or **sequential** (serial) methods of accessing data. Distinguish between the two methods.

**Direct:** _____

_____

**Sequential:** _____

_____

[2]

**3** (a) Say what the following **abbreviations** stand for:

**CAM:** _____

**CAL:** _____

**EFT:** _____

[3]

(b) Mention a typical situation where **CAL** and **EFT** may be used.

**CAL:** _____

**EFT :** _____

[2]

**4** (a) Most software is covered by copyright laws and therefore it is illegal to copy it (software piracy). Describe **three** security measures which software houses use to protect their software.

**1st Security:** _____

_____

**2nd Security:** _____

_____

**3rd Security:** _____

_____

[3]

(b) To protect data against loss or unauthorized access, different procedures (methods) are used, for example passwords. Describe **two** OTHER methods which can be used to protect important data.

**1st Method:** _____

_____

**2nd Method:** _____

_____

[2]

**5** (a) The following are three computer applications:
***Bank transactions***; ***preparing telephone invoices***; ***training airline pilots***.
Match the computer applications with the systems listed below:

i. simulation: _____

ii. real-time system: _____

iii. batch processing: _____

[3]

(b) Distinguish between **real-time** and **multiprogramming** operating systems.

**Real-time:** _____

_____

**Multiprogramming:** _____

_____

[2]

**6** (a) Computers are linked together to form network systems. Give **one** advantage and **one** disadvantage of a network system.

**Advantage:** _____

_____

**Disadvantage:** _____

_____

[2]

(b) Different types of communication links can be used to connect computers together – the telephone cable is an example. Mention **two** other types of communication links.

**1st type:** _____

**2nd type:** _____

[2]

(c) What do you understand by the **bandwidth** of a network system?

**Bandwidth:** _____

_____

_____

[1]

**7** (a) Computer systems may either be **general-purpose** or **dedicated**. What is the difference between them?

**General-purpose:** _____

_____

**Dedicated:** _____

_____

[2]

(b) Give **two** examples of dedicated computer systems.

**1st example:** _____

**2nd example:** _____

[2]

(c) What do you understand by **process control**?

**Process Control:** _____

_____

[1]

**8** (a) Programmers often make errors while writing computer programs. Which are the **three** common types of programming errors?

**1st error:** _____

**2nd error:** _____

**3rd error:** _____

[1]

(b) The incorrect program below should accept an inputted temperature in degrees Celsius (C), should convert it to degrees Fahrenheit (F) and output the result on the screen.

```
Program cen_to_fer;

 Var
  F, C : Real;

 Begin
  Write('Enter the temperature in Centigrade: ');
  Readln(C);
  (9*C/5) + 32 := F;
  Readln;
 End.
```

Write down the two errors in the program and show how each error may be corrected so that the program runs as intended.

**1st error:** _____

**Error corrected:** _____

**2nd error:** _____

**Error corrected:** _____

[4]

**9** (a) Convert the decimal numbers **147** and **17** into binary.

*Space for working:*

**147 =** _____

**17 =** _____

[2]

(b) Using two's complement, show how the subtraction **147 - 17** is performed.

*Space for working:*

**Answer:** _____

[2]

(c) Can **+ 130** be represented in two's complement using an 8-bit register? Explain why.

**Answer:** _____

_____

_____

[1]

**10** The weather person on a local television station must decide to tell the viewers if it is a nice day or not. It is a nice day if the temperature lies between **T1** and **T2** and the humidity is between **H1** and **H2**, as given below.

***T1*** < 32ºC
***T2*** > 16ºC
***H1*** < 90%
***H2*** > 50%

Therefore, it will be a nice day only if all four statements above are true. Otherwise, if at least one statement is false then it will not be a nice day.
To answer the following questions use **N** to represent a nice day.

(a) Draw the logic circuit using appropriate symbols having **T1**, **T2**, **H1** and **H2** as inputs and **N** as output.

*Space for circuit*

[4]

(b) Write down the Boolean expression for the logic circuit, in question 10 (a), in terms of **T1**, **T2**, **H1**, **H2** and **N**.

**Answer:** _____

[1]

**11** The **Fetch-Execute Cycle** is the repetitive task of the CPU while executing a program. Using the terms: **Program Counter**, **Instruction Register**, **ALU** and **Main Memory**, describe the steps of the Fetch-Execute Cycle.

_____

_____

_____

_____

_____

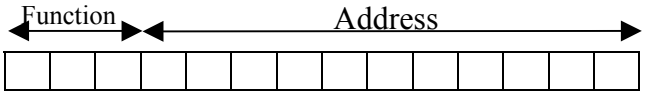
_____

_____

[5]

**Section B – Answer any TWO questions**

**12** (a) A program instruction for a simple computer is designed with a word length of 14 bits. The diagram below shows that 3 bits are used for the Function code and the remaining 11 bits for the Address.




i. How many different functions can be coded with this computer? [1]
ii. How many different memory locations can be directly addressed? [1]

(b) Describe briefly **three** differences between high level languages and low level languages. [3]

(c) Compilers and interpreters are both language translators. Explain the main difference between them. [1]

(d) i. What is the input to a compiler called? [1]
ii. What is the output from a compiler called? [1]

(e) Draw a flowchart for a validation program which asks the user to input 30 marks. For each mark entered the computer should output **'*Mark Accepted*'** if the mark is between 0 and 100, otherwise it should output '***Mark Rejected***'. [7]

**13** (a) Draw a block diagram of the hardware of a computer system. The diagram should include: **ALU**, **Control Unit**, **Accumulator, Program Counter**, **RAM**, **ROM**, an **Input Device**, an **Output Device** and a **Secondary Storage device**. In your diagram show the **flow of information**. [6]

(b) Briefly explain the functions of the **ALU**, **Control Unit** and **Memory Unit**. [3]

(c) Name and describe the function of a register found in the ALU and another one found in the Control Unit. [4]

(d) Give **two** reasons why secondary storage devices are required in a computer system. [2]

**14** (a) **Dry Running** and **Program Tracing** are two methods used to test whether a program works correctly or not. Explain the terms Dry Running and Program Tracing. [4]

(b) Write a program in Pascal which accepts **20 examination marks** and stores them in an **array**. The marks can be **real** numbers (with any decimal place). Use the marks read to output on the screen the marks in the form of a **bar chart** with asterisks (*) together with the **mark given to one decimal place**. Use the ROUND function to round down the marks to the nearest integer to display an integral number of asterisks.
The output should be displayed as in the example below:

***** 5.3
********* 9.7

Use in-line documentation (comments) where you think it is necessary to explain your source code. [11]