JUNIOR LYCEUM ANNUAL EXAMINATIONS 2006

Educational Assessment Unit – Education Division

FORM 4 (Option)   **COMPUTER STUDIES**   **TIME: 1 hr 30 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 (a) Data files are updated frequently for various reasons. Mention the **three** functions that may occur during updating.

1ˢᵗ function: _____

2ⁿᵈ function: _____

3ʳᵈ function: _____

[1]

(b) Explain with a diagram or in writing, how update occurs: use the terms *master file*, *transaction file*, *sorting*, *updating* and *error report* in your explanation.

Space for diagram or explanation.

[4]

2 (a) As a systems analyst you are asked to study a system. The 7 stages that must be followed are listed below. Number the stages so that they are followed in the correct order. *The 1ˢᵗ number is given as a help.*

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

[3]

(b) One of the stages in systems analysis is **Programming and Documentation**.
  i.   Mention one **type** of documentation.
  ii. For the mentioned type of **documentation** give one reason to show why it is needed.

i. Type: _____

ii. Reason: _____

_____

[2]

3 (a) When a program is written it must be tested using test-data to check that it works as intended. What do you understand by **test data**?

Test data: _____

_____

[1]

(b) Study carefully the section of code given below:

```
Begin
 s := 0;  m := 0;
 For k := 1 to 10 do
  Begin
   Write('Enter number: ');
   Readln(n);
   s := s + n;
   If n > m  then m := n;
  End;
```

i. Explain what this section of code is doing.

Explanation:

[2]

ii. Give **two** suitable test data you would use to check the code.

Test Data 1:

Test Data 2:

[2]

4 Below you are given the steps of the Fetch Execute Cycle in random order. Give numbers so that the steps will be in order. *The last step is numbered.*

	Store a copy of the instruction in the Instruction Register.
6	Return to Step 2.
	Fetch the instruction pointed by the Program Counter.
	Execute the instruction.
	Set value of Program Counter to the address of 1st instruction.
	Increment the Program Counter by 1.

[5]

5 (a) **Robotics** is widely used in industry. A motor, under the control of a computer, controls the movement of the robot. In order to operate the motor, a device is required to change the digital signals to voltages.

    i.   What is this **device** called?

    ii.   Give a **disadvantage** of using robots in industry.

Device:

Disadvantage:

[2]

(b) **Process Control** is when the output from a situation is used again by the computer for the next operation. Give an everyday example where process control is used.

Example:

[1]

(c) With the widespread use of the Internet, **e-commerce** is becoming even more effective. Give an **advantage** and a **disadvantage** of e-commerce.

Advantage:

Disadvantage:

[2]

6 (a) i. What do we mean by the term **wordlength**?
ii. In what way does the wordlength affect the performance of a computer?

Wordlength:

Performance:

[2]

(b) A machine code instruction is made of two parts the **opcode** and the **operand**. What is the difference between the two?

Opcode:

Operand:

[2]

(c) When a new CPU is being designed it will be instructed to *obey* a number of commands (instructions). What is this group of commands called?

Answer:

[1]

7 (a) It is illegal to copy most software. However, some other software is either **freeware** or **shareware**. What do the terms freeware and shareware mean?

Freeware:

Shareware:

[2]

(b) Software can be either bought **off-the-shelf** or it can be **tailor-made** for your own needs. Give an **advantage** and a **disadvantage** of buying off-the-shelf software.

Advantage:

Disadvantage:

[2]

(c) **Fourth Generation Languages** (4GLs) make use of modules to make a program operational. Give **one** advantage of a 4GL.

Advantage:

[1]

8 (a) **Check digits** are used to validate the authenticity of a number. The following algorithm is used to create a new check digit for a 5-digit code. An example for the code '2 3 4 6 4' is also being provided:

Algorithm	**Example**
1. Multiply each number by 2	: 2 3 4 6 4 becomes 4 6 8 12 4
2. Split any two digit numbers	: 4 6 8 12 4 becomes 4 6 8 1 2 4
3. Add all the numbers	: 4+6+8+1+2+4 = 25
4. Divide the answer by 10	: 2 remainder 5
5. The remainder is the check digit	: 5 is the check digit, so the code becomes **5** 2 3 4 6 4

You are given the two codes '**8** 1 2 7 3 5' and '**4** 2 4 4 1 9'. The first digit (in bold) is the check digit generated by the above algorithm. One of the codes has a correct check digit while the check digit for the other is incorrect.
Write down the correct and the incorrect codes. For the incorrect code find the appropriate check digit.

Correct code: _____

Incorrect code: _____

Check digit: _____

[3]

(b) When entering data in a computer a clerk can type errors – **omission**, **transposition** and **substitution** are three common errors. An omission error is shown below. Give an example of a transposition and a substitution error.

	Correct Data	**Data with error**
Omission	COMPUTER	COMPUTR
Transposition		
Substitution		

[2]

9 (a) On his way to work a man has to pass by **two** different sets of traffic lights. On a particular day he got up late and to arrive on time for work both lights must be green. Assume binary 1 is green and on time:
  i.   What type of logic gate will represent the arrival of the man on time?
  ii. Draw the truth table for this gate.

Logic Gate: _____

Space for truth table:

[2]

(b) Draw the logic circuit for the Boolean Expression:
$$X = ((NOT\ A)\ AND\ B)\ AND\ ((NOT\ B)\ OR\ A)$$

Space for Logic Circuit:

[3]

10 The binary numbers for the decimal numbers 200 and 60 are 11001000 and 111100 respectively

(a) **Add** the two binary: 11001000 + 111100.
Space for working:

Answer: _____

[2]

(b) If the result of part (a) above is to be stored in an 8-bit register, what do we call such a situation?

Answer: _____

[1]

(c) Using **two's complement** subtract 111100 from 11001000:
Space for working:

Answer: _____

[2]

11 (a) While running a program a programmer may encounter 3 different types of errors; one of them is **runtime error**. Explain briefly how a runtime error occurs.

Runtime error: _____

_____

[1]

(b) It is desirable to draw a flowchart for the solution to a problem. Draw the general flowchart to describe how the operation **If…Then…Else** (in Pascal) is executed.

Space for flowchart

[1]

(c) Write a program in Pascal, which asks the user to input **two** integer numbers; the two numbers are then divided. The output on the screen should show the integer part of the answer together with the remainder. An example of what is expected is given below.
E.g. If 11 and 3 are the two numbers, the output should show:
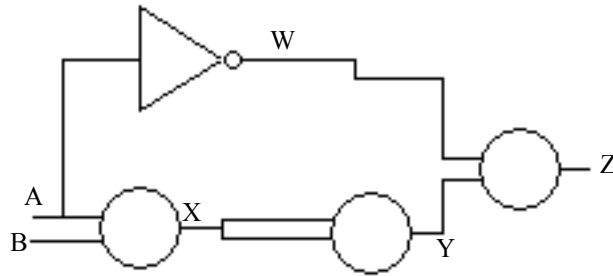$$11/3 = 3 \text{ remainder } 2$$
Space for program

[3]

Section B – Answer any TWO questions

12 (a) Why do programmers design the problem before writing the source code? [2]
(b) What is a flowchart? [1]
(c) Draw a flowchart which shows the algorithm for printing any multiplication (times) table. The algorithm should ask the user to enter a number and for the given number the table from 1 to 12 of the given number is shown on the screen.
If for example the user inputs the number 5, the output on the screen should read:
1 * 5 = 5
…
12 * 5 = 60 [6]
(d) For the flowchart done in part (c) above, write the Pascal program (**use in-line documentation where necessary**). [6]

13 (a) Why are binary numbers used in computers? [1]

(b) Convert the following numbers:
      i.   the **decimal number** 224 to **Hexadecimal** [1]
      ii.   the **binary number** 10111100 to **Decimal** [1]
      iii.   the **binary number** 11000011 to **Hexadecimal** [1]

(c) You are given the following three hexadecimal numbers: 1GG, 2H6, BAA. **One** of them is incorrect. State **which** one is incorrect and **why**. [2]

(d) Below is a partly drawn logic circuit and its incomplete truth table.

A	B	W	X	Y	Z
1	0				
0	1		1		
1	1				0
0	0			0	

By examining both the circuit and truth table:
      i.   Copy and complete the circuit by replacing the three circles with the appropriate logic gates (AND or OR). [3]
      ii.   Copy and complete the truth table to match the circuit. [3]

(e) Using **two** logic gates, design a circuit for a microwave oven with the following conditions. The oven **starts** (logic 1) if the **S**witch is ON (logic 1) and the **D**oor is closed (logic 1). Also, it starts if it has **F**ood in it (logic 1). Use S, D and F for the inputs switch, door and food respectively. [3]

14 (a)
      i.   What do DBMS stand for? [1]
      ii. How does a key field differ from a normal field? [1]
      iii. What are queries? [1]
      iv. What is the difference between a simple query and a compound query? [1]
      v. A database has been created to store information on DVDs. The table below shows part of the file specifications. Give another **three** important fields, together with their type and size/format.

                                                  [3]

Field Name	Type	Size/Format
Name of DVD	Text	50
Date of Release	Date/Time	Short Date

(b)
      i.   What is a network? [1]
      ii.   Give **two** advantages and **two** disadvantages of a networked system over a stand-alone computer. [4]
      iii.   Distinguish between LAN and WAN. [1]
      iv.   What is the ISP (internet service provider)? [1]
      v.   What is a 'search engine'? [1]