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

Name: ____________________________________________                Class: ________________

Directions to Candidates:

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

For office use only:

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Section A - Answer all Questions

1 (a) Differentiate between syntax and logical errors as used in programming.

Difference: ____________________________________________________________

(b) The program below allows the input of the radius of a circle and then finds and displays the area of the circle to two decimal places. However the program has two errors. Write down:

i. The instructions that contain the errors, and
ii. The corrected instructions.

Program Circle;
Constant pi = 22/7;
Var A, r : Real;
Begin
Write('Enter the radius: ');
Readln(r);
A := pi * sqr(r);
Writeln('The area of the circle is: ',);
Readln;
End.

1st Error: ____________________________________________________________
Corrected: ____________________________________________________________

2nd Error: ____________________________________________________________
Corrected: ____________________________________________________________

2 (a) i. What is Process Control?
ii. Give an example where process control is used.

Process Control: ______________________________________________________

Example: ____________________________________________________________

(b) Computers can be categorized either as dedicated or general-purpose.

i. What is a dedicated computer?
ii. Give two examples of dedicated computers.

Dedicated: ____________________________________________________________

Example 1: ____________________________________________________________
Example 2: ____________________________________________________________
3  i. Define the terms **network** and **bandwidth**.
ii. Mention one typical **application** of a WAN network.
iii. What is the purpose of a **modem** in networking?
iv. **Satellite links** and **twisted pair cable** are two communication media used in networking. Give another example of a communication medium.

**Network:**

**Bandwidth:**

**WAN application:**

**Modem:**

**Example:**

4 (a) Software publishers employ hardware and/or software techniques to protect their software against piracy.

i. What is **software piracy**?
ii. Give an example of a **hardware** and of a **software protection** technique.

**Piracy:**

**Hardware:**

**Software:**

(b) i. What is the **reason** behind the Data Protection Act?
ii. What is the role of the **Data Controller** in relation to the Data Protection Act?

**Reason:**

**Data Controller:**

5 (a) System Analysts spend time investigating the problem/s in the present system. Mention three **methods** they may use to investigate a system.

1<sup>st</sup> Method:

2<sup>nd</sup> Method:

3<sup>rd</sup> Method:
(b) The analyst/programmer has to design the solution to a problem before the source code is written. Mention two design tools that the analyst/programmer uses to solve a problem.

1st Tool:  
2nd Tool:  

6  (a) Differentiate between data verification and data validation.

Verification:  
Validation:  

(b)  
1. What is a check digit and why is it used?  
2. Mention one example where check digits are found.  
3. Briefly explain how a range check may be applied when inputting an examination mark.

Check digit:  
Example:  
Range check:  

7  A DBMS package is a powerful tool to store and manipulate data.

(a)  
1. Differentiate between a relational database and a flat database.  
2. Give a typical commercial application of a relational database.

Difference:  
Application:  

(b) The table below shows part of the students’ file in a particular school. Use the table to explain your answers to the following questions.

1. What is sorting?  
2. Give an example of a Simple Query.  
3. Give an example of a Compound Query.

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<tr>
<th>Name</th>
<th>Surname</th>
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</tbody>
</table>
Sorting: ____________________________________________

Simple Query: ______________________________________

Compound Query: ____________________________________

8 (a) Mention two registers found in the Control Unit of the CPU and explain their use.

1st Register: ________________________________________
Use: ________________________________________________

2nd Register: ________________________________________
Use: ________________________________________________

(b) What is the purpose of the accumulator in the ALU?
Accumulator: ________________________________________

9 Format, Defragmentation and Antivirus are three important utilities in computers.
   i. What is meant by formatting a hard disk?
   ii. Mention one precaution that should be taken when formatting a hard disk that was already in use? Why the need for this precaution?
   iii. What is defragmentation?
   iv. Give one function of the antivirus software.

Formatting: _________________________________________

Precaution: _________________________________________

Need: _______________________________________________

Defrag: _____________________________________________

Function: ___________________________________________
10  The **Fetch Execute Cycle** is the method used by the CPU to obey an instruction. Explain the sequence of steps involved in the fetch execute cycle.

1: __________________________________________

2: __________________________________________

3: __________________________________________

4: __________________________________________

5: __________________________________________

6: __________________________________________ [5]

11 (a) Mention one typical **item/section** found in the:
- User Documentation;
- Technical Documentation and
- Program Documentation.

User: __________________________________________

Technical: ______________________________________

Program: _______________________________________ [3]

(b) Programmers dedicate a lot of time in **testing** their programs. Mention two methods that a programmer may use to check that his/her program is working correctly.

1st Method: ______________________________________

2nd Method: _____________________________________ [2]
Section B – Answer BOTH Questions

12  (a) Consider the following Boolean Expression:

\[ X = ((A + B).C) + \overline{C} \]

For the given Boolean Expression draw:

i. The **Logic Circuit** and  \[\text{[5]}\]

ii. The **Truth Table**.  \[\text{[4]}\]

(b) Using **Twos Complement** represent the following two decimal numbers in 8 bits:

i. 110 and  \[\text{[1]}\]

ii. -75  \[\text{[2]}\]

(c) The character set of a particular computer consists of:

- The English alphabet (26 letters);
- The digits 0 to 9, and
- The four punctuation symbols: . (period), ; (semi-colon), ! (exclamation mark) and ? (question mark).

What is the **minimum number of bits** required to store this character set?  \[\text{[2]}\]

(d) What happens if the **result** of the addition of the two unsigned numbers 250 and 50 is being stored in an 8-bit register?  \[\text{[1]}\]

13  Study the following **assembly language program** and then answer the questions set on it. *A semicolon (;) introduces a comment which explains the function of that instruction.*

```
LDA #0 ; load 0 into accumulator
STA P ; store contents of accumulator into location P
LDA #4 ; load 4 into accumulator
STA K ; store contents of accumulator into location K
here: LDA P ; load contents of location P into accumulator
ADD K ; add contents of location K into accumulator
STA P ; store contents of accumulator into location P
LDA K ; load contents of location K into accumulator
DEC ; decrement contents of accumulator by 1
STA K ; store contents of accumulator into location K
JNZ here ; jump to ‘here’ if accumulator is not zero
HLT ; stop
```

i. A typical assembly language **instruction** consists of two parts. What is each **part** called?  \[\text{[2]}\]

ii. Part of the program above forms a loop. How many **instructions** form the loop?  \[\text{[1]}\]

iii. What are the values of **P**, **K** and the **Accumulator** immediately after the loop is executed for the first time?  \[\text{[3]}\]

iv. What are the values of **P** and **K** when the program finishes execution (that is, the last HLT instruction is executed)?  \[\text{[4]}\]

v. Write a **program in Pascal** which does the same task as the assembly language program above.  \[\text{[5]}\]