Directions to Candidates:

Answer ALL questions in Section A and Section B on this paper;
The use of 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. The CPU can carry out arithmetic on binary values in its registers.
   a. Given an 8-bit register, how would you represent:
      i. Unsigned 56
         Answer ___________________ [1]
      ii. -56 in Two’s Complement
         Answer ___________________ [2]
   b. Use 8-bit two’s complementation to subtract 56 from 88. [2]
      Answer ___________________

2. Logic circuits are designed to carry out specific functions.
   a. Use AND, NOT and OR gates to represent the logic circuit for the following truth table:
      (X is the output of the circuit) [3]
      | A | B | X |
      |---|---|---|
      | 0 | 0 | 0 |
      | 0 | 1 | 1 |
      | 1 | 0 | 1 |
      | 1 | 1 | 0 |

      Space for Logic Circuit

   b. Give the Boolean expression for the above circuit. [2]
3. The diagram below shows various system components.
   a. **Label** the following system components: [3]

   ![Diagram](image)

   **ALU, CU, Main Memory**

   b. What is a CPU register? [1]

   c. Explain the role of the **accumulator** register. [1]

4. There are various steps in the system lifecycle.
   a. State **two** things that are normally done during the system design stage of the system lifecycle. [2]
      i. ___________________________________________________________
      ii. _________________________________________________________

   b. What is **system changeover**? [1]

   c. Give **one** advantage of the following changeover methods: [2]
      i. Parallel changeover
         _________________________________________________________
      ii. Direct changeover
         _________________________________________________________
5. System testing is an important step in the system lifecycle.
   a. What is a syntax error?  

   b. Give the term for:
      i. Checking a program by working through a section of it manually.
      ii. An error in a program.

   c. Look carefully at the following section of code:
      ```java
      average = num1 + num2/total;
      System.out.println('The average is ' + average);
      ```
      i. Identify a logic error in this code.
      ii. In what circumstances can the above code give a runtime error?

6. There are various character coding systems.
   a. How many different characters can be represented by a 7-bit character coding system?

   b. If in a character coding system ‘A’ is represented by binary 65, give the binary equivalent of ‘F’.

   c. An 8-bit register holds the binary pattern 01000001.
      i. What will be the value stored in the register after an Arithmetic Shift Left?
      ii. Therefore what does an Arithmetic Shift Left do to a number?

7. a. Identify the difference between system and application software.

<table>
<thead>
<tr>
<th>System Software</th>
<th>Application Software</th>
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   b. Give two differences between tailor-made and off-the-shelf packages.

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<tr>
<th>Tailor made packages</th>
<th>Off-the-shelf packages</th>
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   c. What application software would you use to keep track of business sales?
8. **Java is an Object Oriented Language.**
   a. Answer **True** or **False**. [3]
      
      | i.   | An object is an instance of a class. |
      | ii.  | A class is a blueprint for an object. |
      | iii. | A programmer should not declare more than one instance of a given class. |
   
   b. Write a line in Java to declare and create an instance called ‘personA’ of a class called ‘Person’. [2]

9. **This question is about Software Documentation.**
   a. Name **two** things you expect to find in program documentation. [2]
      
      i. ___________________________________________________________
      
      ii. ___________________________________________________________
   
   b. Give **two** reasons why such program documentation is important. [2]
      
      i. ___________________________________________________________
      
      ii. ___________________________________________________________
   
   c. What is a user manual? [1]

10. **CPU evolution has been a long struggle to improve its efficiency.**
    a. Name and **briefly describe** the relevance of 3 factors that determine CPU speed. [3]
       
       | Factor | Description |
       |--------|-------------|
       |        |             |
       |        |             |
       |        |             |
    
    b. What is address space? [1]
    
    c. What is the address space of a 16-bit address bus? [1]
11. Registers are limited to storing a certain range of values.
   a. What is the range of two’s complement numbers that can be stored in an 8-bit register? [2]
      Answer __________________
   b. Use 8-bit binary to add 34 and 244. [2]
      Answer __________________
   c. If the result of your calculation in (b) was to be stored in an 8-bit register, what type of error would it generate? [1]
      ________________________________

Section B

12. Computers have various applications in society.
   a. What do the following abbreviations stand for? [2]
      i. CAD ____________________________________________________________
      ii. CAM __________________________________________________________
   b. Give an example of where a CAD CAM system can be used and briefly explain your answer. [2]
      
      | Where CAD CAM can be used | Explanation |
      |---------------------------|-------------|
      |                           |             |

A Virtual Learning Environment (VLE) (like Fronter) can be a useful CAL tool. A VLE offers online facilities that allow teachers to share resources with students. They also allow students to submit their work online and receive teacher feedback, results and school reports. The system can be accessed by students, parents, teachers and members of the administration who have a login name and password.

Suggest two ways in which a VLE can be key in helping students improve their performance.
   i. _________________________________________________________________
   ii. _______________________________________________________________
d. Name one use of computers in the following fields: [6]
   i. Medical diagnosis
   ii. Office Automation
   iii. Business
   iv. Aviation
   v. Ecology
   vi. School Administration


e. What is EFTPOS? [1]

   

f. Explain one way EFTPOS is advantageous: [2]

   i. To the shop
   ii. To the customer

13. Below is an incomplete Java class called Student:

   public class Student {
       String name;
       String surname;
       int totalExamMark;
       __________________________; //array to hold 10 marks

       public void findHighest(){
           int h = __________;
           int i; //counter
           for (______________________){
               if (______________________){
                   h = markList[i];
               }
           }
           System.out.println("The highest mark is: " + h);
       }
   }

   a. Write a line to declare the array called markList to hold a total of 10 whole marks. [2]

      ______________________________
b. Complete the method `findHighest` such that it outputs the highest mark in the array `markList`.

```java
public void findHighest(){
    int h = ______;
    int i;

    for (______________________){
        if (__________________){
            h = markList[i];
        }
    }
    System.out.println("The highest mark is: " + h);
}
```

c. Write a method called `findAverage()` that finds and outputs the average of the marks in `markList`.

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

| i. The for loop is a predetermined loop |
| ii. The while loop is executed at least once |
| iii. The do...while loop is a predetermined loop |

e. The following variable types are all used for whole numbers: `int, short, byte, long`

| i. Which of these variable types has the smallest range? |
| ii. Why is it important not to use larger variable types than necessary when writing a program? |