Index Number:_____ SEC09/1.23m

L-Università ta' Malta

MATRICULATION AND SECONDARY EDUCATION CERTIFICATE EXAMINATIONS BOARD

SECONDARY EDUCATION CERTIFICATE LEVEL
2023 MAIN SESSION

SUBJECT:	**Computing**
PAPER NUMBER:	I
DATE:	28th April 2023
TIME:	9:00 a.m. to 11:05 a.m.

Directions to Candidates

Write your index number were indicated at the top of the page.
Answer **ALL** questions in the spaces provided. You are not allowed to use extra sheets other than those provided in this booklet.
Good English and orderly presentation are important.
The use of flowchart templates is permitted. The use of calculators is **not** permitted.
This paper carries 85 marks of the examination.

Question Number	1	2	3	4	5	6	7	8	9	10	**FOR MARKERS' USE**
For Markers' use only **MARKS**	Total number of Marks or Grade obtained by candidate										

1. A company has decided to implement a new system that will be separate from the main network and will only be used by the billing and invoicing department. The system will have its own Central Processing Unit (CPU), Random Access Memory (RAM), Read Only Memory (ROM), and storage devices. Tick the correct answer for the questions that follow.

a. What is the function of the CPU?

- ☐ To manage input/output operations
- ☐ To perform arithmetic and logical operations
- ☐ To store data
- ☐ To control the flow of data within the system (1)

b. What type of memory is used to store data that is temporarily needed by the CPU?

- ☐ Hard Disk Drive (HDD)
- ☐ Compact Disk (CD)
- ☐ RAM
- ☐ ROM (1)

c. What is the purpose of ROM in a dedicated system?

- ☐ To store the Operating System (OS) and other permanent data
- ☐ To store temporary data for the computer's processor
- ☐ To store backup data
- ☐ To store data for external devices (1)

d. What is the difference between RAM and ROM?

- ☐ RAM is volatile and ROM is non-volatile
- ☐ RAM is used more than ROM
- ☐ RAM is more expensive than ROM
- ☐ RAM is faster and ROM is slower (1)

e. Which of the following is a portable storage device that can store large amounts of data?

- ☐ HDD
- ☐ CD
- ☐ Floppy Disk Drive (FDD)
- ☐ USB Flash Drive (1)

f. Identify the reason why two separate systems were implemented, one for the billing and invoicing department and another one for the main network.

- ☐ To decrease RAM usage from the main network
- ☐ To separate sensitive financial data from the main network
- ☐ To reduce the cost of the main network
- ☐ To decrease ROM usage from the main network (1)

(Total: 6 marks)

2. A digital circuit has two inputs A and B, and three outputs X, Y and Z. The truth table below shows the inputs and outputs.

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

a. Identify the logic gate at output X.

_____(1)

b. Identify the logic gate at output Y.

_____(1)

c. Identify the logic gate at output Z.

_____(1)

d. Draw the logic circuit that represents the above truth table.

(4)

(Total: 7 marks)

3. An e-commerce company has recently invested in multimedia notebook computers for its customer service team to assist customers with online research and purchases.

a. Identify **ONE** advantage and **ONE** disadvantage of using the Internet as a primary source to search for information.

_____

_____(2)

This question continues on next page.

b. Explain **ONE** benefit and **ONE** limitation of using a wireless connection for customer service representatives to access company databases and resources.

_____

_____(2)

c. Identify and explain the use of **ONE** assistive technology feature, either in the form of a peripheral device or software, that can be implemented to improve accessibility for customers with special needs.

_____

_____

_____(2)

d. When purchasing online, payment must be completed through an online platform and the user will be required to input personal information which needs to be encrypted.

i. What is data encryption?

_____

_____(1)

ii. Why is data encryption required in this scenario?

_____

_____(1)

e. Identify **TWO** other services, besides online shopping, which can be used over the Internet.

_____

_____(2)

(Total: 10 marks)

4. A small start-up company is considering implementing a teleworking policy for its employees. The company specialises in developing software for the healthcare industry and stores sensitive patient data in its database.

a. Is an antivirus used to protect unauthorised access to the database? Explain.

_____

_____(2)

b. Identify **ONE** way how this database can be recovered if it becomes corrupted.

_____(1)

c. Which law prevents personal data from being shared without the owner's permission?

_____(1)

d. State **TWO** principles of the law mentioned in part (c).

_____

_____(2)

e. Identify **TWO** peripherals required for teleworking.

_____(2)

(Total: 8 marks)

5. A bedroom alarm clock uses the 24-hour clock. Both the hour and the minute are represented digitally by two 8-bit registers A and B respectively.

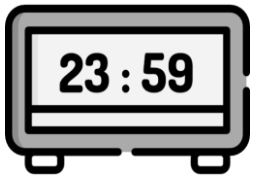


Image taken from www.flaticon.com

Register A (Hours)

Register B (Minutes)

a. What time is represented if register A holds the bit pattern 00010001_2 and register B holds 00110111_2?

_____

_____

_____ (2)

b. If the time shows 06:45, what binary bit patterns would registers A and B hold?

_____

_____

_____(2)

c. Represent your answer in part (b) in hexadecimal form.

_____

_____

_____(2)

d. Can a 5-bit register be used instead of an 8-bit register to represent the hour? Explain.

_____

_____(2)

(Total: 8 marks)

6. A company that produces and sells agricultural machinery has developed a small dedicated system that monitors the temperature, humidity, and soil moisture levels in greenhouses.

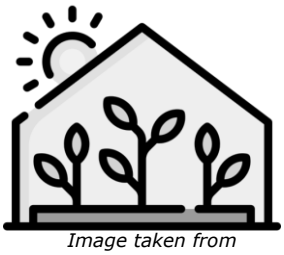


Image taken from www.flaticon.com

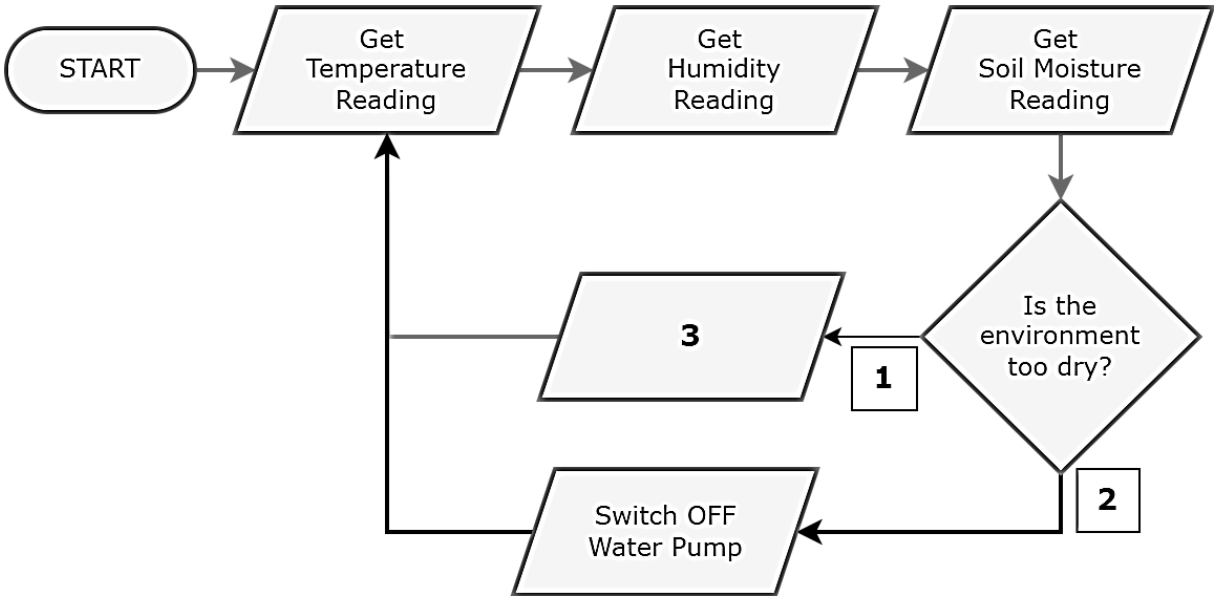
a. What is a dedicated system?

_____

_____

_____(1)

b. The system controls the automation of the watering system according to the levels of temperature, humidity, and soil moisture. The system works as per the following algorithm.



i. What is an algorithm?

_____

_____(1)

ii. Complete the missing parts in the above flowchart.

1: _____(1)

2: _____(1)

3 : _____ (1)

iii. Fill in the blanks using some of the terms available below.

Hexadecimal	Temperature	Digital	Information
Sensors	Analogue	Encrypted	Programmed

The system has three types of _____ - one for measuring _____, one for measuring air humidity, and one for measuring soil moisture. These sensors receive _____ signals and convert them into _____ data. Based on this data, the system is _____ to output _____ in terms of switching the water pump on or off. (6)

iv. Explain the difference between data and information in the given scenario.

_____

_____(1)

v. Does the loop in the flowchart terminate? Explain.

_____

_____(2)

(Total: 14 marks)

7. A database administrator for a small retail store has been assigned the task of designing a new database for storing and retrieving information on inventory and sales efficiently.

To implement the database system, besides other tables and fields, the following database structure is used.

- **Products table**: This table stores information on all the products and contains the following fields: "product_id", "product_name", "category", "price", "quantity_in_stock".

- **Customers table**: This table stores information on all the customers and contains the following fields: "customer_id", "name", "surname", "email", "has_loyalty_card".

- **Orders table**: This table stores information on all the orders placed by the customers and contains the following fields:"order_id", "customer_id", "product_id", "quantity", "total_price".

This question continues on next page.

a. Suggest a primary key for the table Products and the table Customers.

_____(2)

b. Identify the relationship between table Customers and table Orders.

_____(1)

c. Which field establishes the relationship between table Customers and table Orders?

_____(1)

d. Data can be accessed in serial or direct mode. Which data access mode is required to:

i. search for the details of a particular product: _____ (1)

ii. print a list of **all** customers: _____ (1)

e. Mention **ONE** field which is best set as a 'Yes/No' data type.

_____(1)

f. The "customer_id" field must contain data in the form of eight digits followed by a letter. For example, 01234567L. Suggest **ONE** data validation method required for this field.

_____(1)

(Total: 8 marks)

8. TourApp, a mobile software app, was designed to provide tourists with information about their holiday destination, including activities, transportation, weather, and more. When used, TourApp displays various options based on the tourist's current location.

a. Give **TWO** advantages of running TourApp on a smartphone rather than a desktop PC.

_____

_____(2)

b. TourApp uses a Graphical User Interface (GUI). What is a user interface?

_____

_____(1)

c. TourApp allows users to upload photos and write reviews. During the uploading process, the resolution of the photographs is reduced to make the file size smaller.

i. Are the uploaded photos stored as raster or vector images? Explain.

_____

_____(2)

ii. What is the reason for the decrease in photo file size when reducing its resolution?

_____

_____(1)

iii. In what ways does your answer in part c (ii) improve the functionality of TourApp?

_____

_____(1)

d. Indicate whether the components listed below are input, output, or both input and output, and provide **ONE** application for each in the scenario described above.

Components	**Input**	**Output**	**Application**
i. GPS Sensor:	☐	☐	
			(2)
ii. Touch Screen:	☐	☐	
			(2)

(Total: 11 marks)

9. A multinational corporation is setting up a new branch office in a different country. The branch office needs to establish its IT infrastructure from scratch and thus needs the services of various IT roles. Name the IT role that fits the below descriptions.

a. Develops and implements custom software solutions to support its business operations.

_____(1)

This question continues on next page.

b. Manages the products inventory by accurately entering and updating information in the company's database.

_____(1)

c. Installs and maintains computer equipment, including servers and workstations.

_____(1)

d. Provides training to employees on how to use the e-commerce platform and other IT systems.

_____(1)

e. Designs and develops computer systems and networks, as well as their hardware and software components.

_____(1)

(Total: 5 marks)

10. A software developer at EduApps company have been tasked to create a basic attendance tracking system for a school. The system must enable teachers to mark student attendance for every day of the week, either as present or absent. The following Java code snippet showcases a portion of the code required for the system.

```
public class AttendanceTracker {
  public static void main(String[] args) {
    String[] daysOfWeek = {"Mon", "Tue", "Wed", "Thur", "Fri"};
    int[] studentAttendance = new int[5];
    for (int i=0; i<5; i++) {
        System.out.print("Enter 1 for present or
                          0 for absent for " + daysOfWeek[i]);
        studentAttendance[i] = Keyboard.readInt();
    }
  }
}
```

a. What is the purpose of the `studentAttendance` array?

_____

_____(1)

b. What is the data type of the `studentAttendance` array?

_____(1)

c. What is the maximum number of days that can be recorded by this code?

_____(1)

d. What is the purpose of the following line of code?

```
studentAttendance[i] = Keyboard.readInt();
```

_____(1)

e. What is printed by the following line of code? Tick the correct answer.

```
System.out.print("Enter 1 for present or
                  0 for absent for " + daysOfWeek[i]);
```

- ☐ The names of the students and their attendance status.
- ☐ The attendance status of students and the days of the week.
- ☐ A prompt to input the attendance status of students for the days of the week.
- ☐ The total number of present students for each day of the week. (1)

f. Is data validation implemented in the code above? Explain.

_____

_____(2)

g. What is the function of the `main(String[] args)` method?

_____(1)

(Total: 8 marks)

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Index Number:_____ SEC09/2A.23m

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MATRICULATION AND SECONDARY EDUCATION CERTIFICATE EXAMINATIONS BOARD

SECONDARY EDUCATION CERTIFICATE LEVEL
2023 MAIN SESSION

SUBJECT:	**Computing**
PAPER NUMBER:	IIA
DATE:	2nd May 2023
TIME:	9:00 a.m. to 11:05 a.m.

Directions to Candidates

Write your index number were indicated at the top of the page.
Answer **ALL** questions in the spaces provided. You are not allowed to use extra sheets other than those provided in this booklet.
Good English and orderly presentation are important.
The use of flowchart templates is permitted. The use of calculators is **not** permitted.
This paper carries 85 marks of the examination.

Question Number	1	2	3	4	5	**FOR MARKERS' USE**
For Markers' use only **MARKS**	Total number of Marks or Grade obtained by candidate					

1. A fire alarm which is equipped with an MCS-51 single-chip microcontroller is to be installed in a factory. The device will trigger an alarm if the smoke detector (S) senses a smoke, or the glass break detector (G) senses a window breakage. During the day (D), it should sound an internal alarm (X) inside the building, and at night it should sound an outside siren (Y).

Image taken from freepik.com

a. Considering the below inputs and outputs, draw the truth table for this system.

- Smoke Detector (S): smoke = 1, no smoke = 0
- Glass Break Detector (G): window broken = 1, not broken = 0
- Day (D): day = 1, night = 0
- Inside Alarm (X): On = 1, Off = 0
- Outside Siren (Y): On = 1, Off = 0

(5)

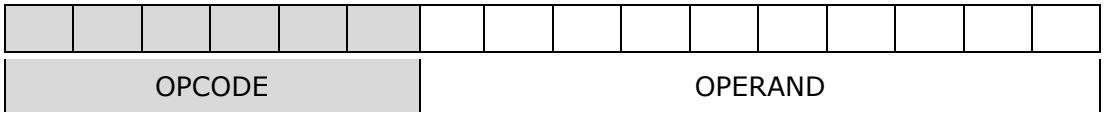
b. Develop the Boolean expression for the outside siren (Y), considering that the Boolean expression for the internal alarm is X = (S + G) . D

_____(1)

c. Draw the logic circuit for the outside siren (Y) according to your answer in part (b).

(4)

d. The MCS-51 single-chip microcontroller has a 16-bit instruction set and uses two's complement registers. The instruction format uses 6 bits for the opcode and 10 bits for the operand.



i. Define 'instruction set'.

_____(1)

ii. How many instructions can the MSC-51 microcontroller process?

_____(1)

iii. How many memory locations can the MSC-51 microcontroller access?

_____(1)

iv. What is the binary representation of the largest address that can be used if direct addressing mode is utilised?

_____(1)

v. Convert your answer in part d (iv) above in decimal format.

_____

_____(1)

(Total: 15 marks)

2. PrintPro 3D Ltd, a company specialising in 3D printing services uses CAD/CAM software and a computer-based batch processing system for managing the production of their products. The design details are entered into the system, and the production process begins. The batch processing system runs every few hours to update the progress of the production.

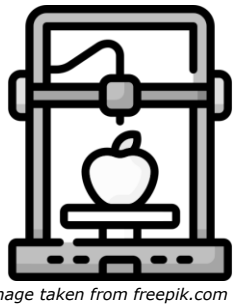


Image taken from freepik.com

a. How is CAD/CAM software related to 3D printing?

_____

_____

_____ (2)

This question continues on next page.

b. Mention **ONE** other application where CAD/CAM could be used.

_____

_____ (1)

c. Explain the term batch processing.

_____

_____ (1)

d. Give **ONE** advantage and **ONE** disadvantage of batch processing to PrintPro 3D Ltd.

_____

_____

_____(2)

e. The company decides to upgrade to a time-sharing OS.

i. Define OS.

_____

_____(1)

ii. Explain time-sharing.

_____

_____(1)

iii. How does CPU utilisation differ between batch processing and time-sharing OS?

_____

_____(1)

iv. Name and briefly describe another type of OS.

_____

_____(2)

v. List **THREE** functions of an OS.

_____

_____(3)

(Total: 14 marks)

3. Village Mart Ltd, a retail company, will be expanding from a supermarket to a shopping village. As a result, the company must revise its computerised inventory management system to accommodate for the increased demands.

Image taken from freepik.com

a. Who is responsible to evaluate the current IT system and provides recommendations to ensure efficient and effective operations?

_____(1)

b. List **THREE** methods that could be used to analyse the current system.

_____

_____(3)

c. Considering that the shopping village will include the previously established supermarket, why is a phased changeover method implemented?

_____

_____(1)

d. One piece of data which will need to be handled by the system is the price of a product. The below Java code snippet is used as a validation check for the price of the product entered by the stock controller.

```
public class PriceChecker {
   public static void main(String[] args) {
      double productPrice;
      System.out.print("Enter the price: ");
      productPrice = Keyboard.readDouble();
      if (priceIsValid(productPrice) == true) {
         storePriceInDB(productPrice);
      } else {
         System.out.println("The price is not valid.");
      }
   }
   //more code here
}
```

i. Why is the variable `productPrice` declared of type double?

_____(1)

This question continues on next page.

ii. Mention **TWO** validation checks (conditions) which are probably included in the method `priceIsValid()`.

_____(2)

iii. The method `priceIsValid()` is written as

```
boolean priceIsValid(double price)
```

What data type does the method return and what data type does the method accept as argument?

Return data type: _____ (1)

Parameter data type: _____ (1)

iv. Name **ONE** other method used in the above code snippet and briefly explain its function.

_____

_____(2)

v. Which class is used to read the price entered by the user?

_____(1)

vi. The Java code snippet below implements a loop that repeatedly prompts the stock controller to enter the price of a product until a valid price is entered.

```
public class PriceChecker {
   public static void main(String[] args) {
       double productPrice;
       while (priceIsValid(productPrice) == false){
          System.out.print("Enter the price: ");
          double productPrice = Keyboard.readDouble();
          if (priceIsValid(productPrice) == true) {
             storePriceInDB(productPrice);
          } else {
             System.out.println("The price is not valid.");
          }
       }
   }
}
```

The code testers conducted an analysis and determined that the while loop instruction is causing an error. Why is this so?

_____

_____(1)

vii. Fill in the missing code in the JAVA code snippet below to fix the error.

```
public class PriceChecker {
   public static void main(String[] args) {
       double productPrice;

       _________________
           System.out.print("Enter the price: ");
           double productPrice = Keyboard.readDouble();
           if (priceIsValid(productPrice) == true) {
              storePriceInDB(productPrice);
           } else {
              System.out.println("The price is not valid.");
           }

       ____________________________________________________
   }
}
```

(2)

(Total: 16 marks)

4. The National Museum of Archaeology has set up various digital kiosk information centres for visitors to access information about the exhibits. Visitors can easily navigate through the options available on the touch screen menu and get a detailed understanding of the exhibits through high-definition videos with accompanying audio. The video files are stored on a central networked storage device which can be accessed from all the digital kiosks.

Image taken from freepik.com

a. State which secondary storage device is suitable to store the high-definition video files. State the reason for your answer.

_____

_____(2)

This question continues on next page.

b. The storage device needs to be formatted before it can be used. Formatting can be done for two reasons, one of them is to create the disk filing system.

i. Is formatting, a system or an application type of software?

_____(1)

ii. Define 'disk filing system'.

_____

_____(1)

iii. Mention another function of formatting.

_____

_____(1)

c. What type of network is used to connect all the digital kiosks inside the museum together? Give a reason for your choice.

_____

_____(1)

d. The digital kiosks are equipped with 10-bit colour depth touchscreens. What is the difference between an 8-bit and a 10-bit colour depth touchscreen, and how does this affect the quality of displayed images?

_____

_____(2)

e. To enter the museum, visitors must purchase a ticket from the front desk, where they will be assisted by a secretary using a tablet device that is connected to a printer. The printer is utilised to print the ticket, which contains a unique 12-digit code. The ticket is scanned at the museum entrance gate to gain admission, and the ticket can only be used once.

i. Which type of printer, Dot Matrix or Laser, is more appropriate for printing entry tickets? Explain.

_____

_____(2)

ii. Name **ONE** other type of printer and give a brief description where it could be utilised.

_____

_____(2)

iii. What is the purpose of I/O buffering in relation to printing?

_____

_____(1)

f. When scanning the ticket, the scanner reads the code and performs two validation checks. It checks for a valid code check sum, and that it is the first time being used. If the ticket code is valid, the gate opens, otherwise a warning message is displayed.

i. How is OCR software related to this?

_____

_____(1)

ii. Draw a flowchart showing the processes that happen when a ticket is scanned at the entrance gate.

(7)

(Total: 21 marks)

5. 'SmartHome Co.', a manufacturing company has developed a line of devices for home automation which include smart lights, locks, security cameras, and more. The company also developed a smartphone software app for users to connect and control these devices from their phones.

Image taken from flaticon.com

a. SmartHome Co. program their smart devices using Assembly language. Why is Assembly language used?

_____

_____(1)

b. SmartHome Co. developed their smartphone software app using Java programming language. How is Java different than Assembly language?

_____

_____(1)

c. To develop smartphone software apps, developers use an Integrated Development Environment (IDE). Mention **ONE** IDE and briefly explain the use of IDEs in software development.

_____

_____(2)

d. *Source code*, *executable code*, and *language translators* play important roles in the development of a smartphone software app. Define the terms in italics.

_____

_____

_____

_____(3)

e. Which language translator is required for the smart devices to run the built-in software?

_____(1)

f. When a user downloads a smartphone software app from an app store, they are downloading the executable code, not the source code. Which language translator was used to create the executable code? Explain.

_____

_____(2)

g. Name another language translator which is not mentioned in part (e) and part (f) above.

_____(1)

h. The following is a program written in assembly language.

```
        LDA #00011001       ; Load 00011001 into Accumulator.
        NOT                 ; Logical NOT the content of Accumulator.
        ADD #00000001       ; Add 00000001 to the value in Accumulator.
        JZE Error           ; Jump to label error if the content of accumulator is 0.
        STA num             ; Store the value in Accumulator into memory location "num".
        JMP exit            ; Jump to label exit.
error:  LDA "Invalid Entry" ; Load the String "Invalid Entry" into Accumulator.
        STA num             ; Store the value in Accumulator into memory location "num".
exit:   HLT                 ; End of program.
```

i. What is the name of the variable used in the above assembly code?

_____(1)

ii. Identify **ONE** assembly instruction that uses immediate addressing.

_____(1)

iii. Explain why this program will never jump to label error.

_____

_____(1)

iv. Identify **ONE** assembly instruction that does **not** make use of the Arithmetic and Logic Unit (ALU) during the fetch and execute cycle. Explain.

_____

_____(2)

v. Provide **ONE** instance when this program gives a runtime error. Explain.

_____

_____(1)

vi. What is the value of num at the end of this program?

_____

_____(1)

i. What is the function of the assembly code above?

_____

_____

_____(1)

(Total: 19 marks)

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Index Number:_____ SEC09/2B.23m

L-Università ta' Malta

MATRICULATION AND SECONDARY EDUCATION CERTIFICATE EXAMINATIONS BOARD

SECONDARY EDUCATION CERTIFICATE LEVEL
2023 MAIN SESSION

SUBJECT:	**Computing**
PAPER NUMBER:	IIB
DATE:	2nd May 2023
TIME:	9:00 a.m. to 11:05 a.m.

Directions to Candidates

Write your index number were indicated at the top of the page.
Answer **ALL** questions in the spaces provided. You are not allowed to use extra sheets other than those provided in this booklet.
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Question Number	1	2	3	4	5	**FOR MARKERS' USE**
For Markers' use only **MARKS**	Total number of Marks or Grade obtained by candidate					

1. A fire alarm which is equipped with an MCS-51 single-chip microcontroller is to be installed in a factory. The device will trigger an alarm (A) if the alarm system (AS) is switched on and either the smoke detector (S) senses a smoke or the glass break detector (G) senses a window breakage.

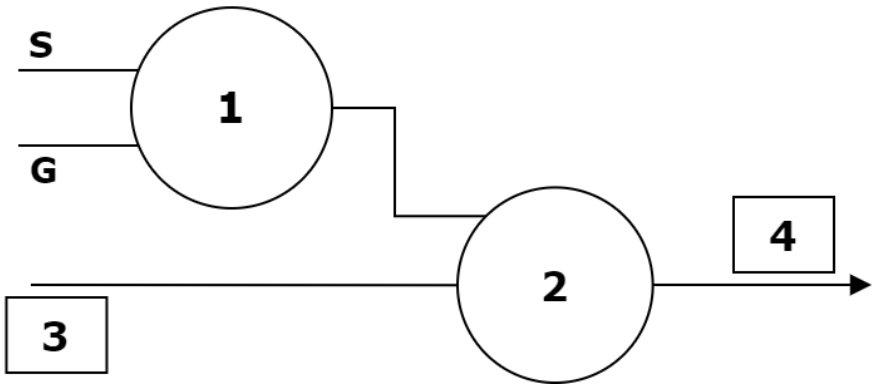
Image taken from freepik.com

a. Considering the below inputs and outputs, complete the truth table shown below that represents this system.

- Smoke Detector (S): smoke = 1, no smoke = 0
- Glass Break Detector (G): window broken = 1, not broken = 0
- Alarm System (AS): switched on = 1, switched off = 0
- Alarm Siren (A): On = 1, Off = 0 (4)

S	G	AS	A
0	0	0	0
0	0	1	
0		0	
1	0	1	1
	1		
1	1		

b. Complete the following logic circuit for this fire alarm system.



1: _____ (1)

2: _____ (1)

3: _____ (1)

4: _____ (1)

c. The MCS-51 single-chip microcontroller has the following specifications:

- 40Mhz CPU
- 8-bit data bus
- 16-bit address bus
- 256 bytes volatile memory
- 64 KB of non-volatile memory.

i. The word length refers to the bits of data that the CPU can process at one time. What is the word length of the MCS-51 microcontroller in bytes?

_____(2)

ii. What is the clock speed of the MCS-51 microcontroller?

_____(1)

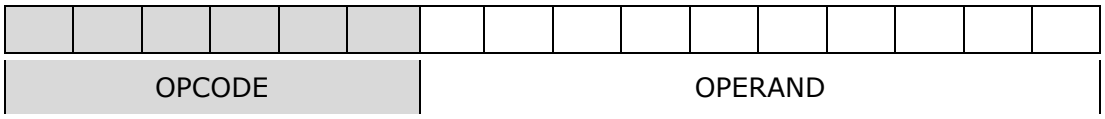
iii. What is the capacity of the RAM?

_____(1)

iv. What is the capacity of the ROM?

_____(1)

d. The MSC-51 microcontroller has a 16-bit instruction set and uses 6 bits for the opcode and 10 bits for the operand.



i. Define 'instruction set'.

_____

_____(1)

ii. How many bits are reserved for data or memory locations?

_____(1)

iii. How many bits are reserved for the instructions?

_____(1)

(Total: 16 marks)

2. PrintPro 3D Ltd, a company specialising in 3D printing services uses CAD/CAM software on specialised laptops that run on MS Windows Operating System (OS), and several 3D printers that run on Linux OS.

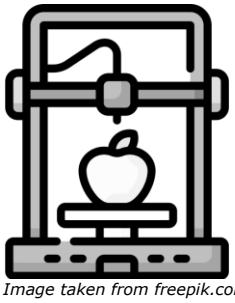


Image taken from freepik.com

a. What does the term CAD/CAM stand for?

_____

_____ (1)

b. How is CAD/CAM useful in 3D printing?

_____

_____ (1)

c. Mention **ONE** other application where CAD/CAM could be used.

_____ (1)

d. Briefly describe the purpose of an OS.

_____

_____ (1)

e. Tick the OS function which ensures that each program gets enough RAM to run properly.

☐ File management	☐ CPU management
☐ Memory management	☐ Communication management
☐ Clipboard management	☐ Input & Output Management (1)

f. Tick the OS function which is responsible for executing instructions and allocates the processing time effectively among the different programs running on the computer.

☐ File management	☐ CPU management
☐ Memory management	☐ Communication management
☐ Clipboard management	☐ Input & Output Management (1)

g. Tick the OS function which allows users to copy and paste data between different programs.

☐ File management	☐ CPU management
☐ Memory management	☐ Communication management
☐ Clipboard management	☐ Input & Output Management (1)

h. Tick the OS function which ensures that data is sent and received efficiently and that multiple programs can access peripherals simultaneously.

- ☐ File management
- ☐ CPU management
- ☐ Memory management
- ☐ Communication management
- ☐ Clipboard management
- ☐ Input and Output Management (1)

i. The OS of the 3D Printers is stored in ROM because 3D printers do not have a built-in storage device. Is the OS of the laptop stored in ROM? Explain.

_____

_____ (2)

j. One challenge faced by PrintPro 3D Ltd is ensuring that data is secure even in the event of a hardware failure. Hence, the company has implemented a cloud-based off-site backup system.

i. Tick the correct description of off-site backup.

- ☐ Backup stored on a storge device at the same location as the original data.
- ☐ Backup stored on a storage device at a remote location.
- ☐ Backup stored and accessed once every month.
- ☐ Backup stored on a local device and only accessible from that device. (1)

ii. Is a pen drive an ideal storage device to use for off-site backup? Justify your answer.

_____

_____(2)

iii. Mention **ONE** storage device that can be used for off-site backup.

_____(1)

(Total: 14 marks)

3. Village Mart Ltd, a retail company, will be expanding from a supermarket to a shopping village. As a result, the company must revise its computerised inventory management system to accommodate for the increased demands.

Image taken from freepik.com

a. Who is responsible to evaluate the current IT system and provide recommendations to ensure efficient and effective operations?

_____(1)

b. Identify **TWO** methods that could be used to evaluate the current system.

_____(2)

c. Considering that the shopping village will include the previously established supermarket, the changeover method requires that the process is divided into several stages, each building on the previous one, until the new system is fully implemented, and the old system is discontinued. Tick the changeover method that is required.

☐ Straight changeover method ☐ Parallel changeover method
☐ Phased changeover method ☐ Pilot test changeover method (1)

d. The following JAVA code snippet is used as a validation check for the price of a product entered by the stock controller.

```
Line 1:   do{
Line 2:      //data entered by stock controller
Line 3:      System.out.print("Enter the price: ");
Line 4:      productPrice = Keyboard.readDouble();
Line 5:
Line 5:      // validation check
Line 6:      if (productPrice > 0) {
Line 8:          System.out.println("The price is not valid.");
Line 9:      } else {
Line 10:         System.out.println("The price is not valid.");
Line 11:     }
Line 12:  } while (productPrice > 0);
```

i. What is the name of the variable that holds the price entered by the stock controller?

_____(1)

ii. What is the data type of the variable mentioned in part d (i)?

_____(1)

iii. What validation check (condition) is done in the code above?

_____(1)

iv. Can the code run considering that the above code has a logical error? Explain.

_____

_____(2)

v. Modify the line of code to fix the logical error.

_____(1)

vi. Mention **ONE** other programming error and provide an example of such error.

_____

_____(2)

vii. Which class is used to allow the stock controller to enter the product price?

_____(1)

viii. Identify the looping construct used in the code above.

_____(1)

ix. Mention **TWO** other looping constructs used in JAVA.

_____(2)

x. Mention **TWO** good programming practices used in the above code.

_____(2)

(Total: 18 marks)

4. The National Museum of Archaeology has set up various digital kiosk information centres for visitors to access information about the exhibits. Visitors can easily navigate through the options available on the touch screen menu and get a detailed understanding of the exhibits through high-definition (HD) videos with accompanying audio. The video files are stored on a central networked storage device which can be accessed from all the digital kiosks.

Image taken from freepik.com

a. State **TWO** reasons why DVDs or Blue Ray Disks are not suitable for the national museum to store the HD video files.

_____

_____(2)

b. Hard Disk Drives (HDDs) are used to store the HD video files. This storage device needs to be formatted before it can be used. Formatting can be done for two reasons, one of them is to create the disk filing system which is a structure to store and organise computer files on a storage device.

i. Mention another function of formatting.

_____(1)

ii. Is formatting a system or an application type of software?

_____(1)

This question continues on next page.

c. Mention **ONE** advantage of storing video files on a central networked storage device instead of on individual kiosks.

_____

_____(1)

d. Which OS function handles storage device formatting?

_____(1)

e. State **TWO** reasons why a Local Area Network (LAN) is used to connect all the digital kiosks inside the museum together.

_____

_____(2)

f. To enter the museum, visitors must purchase a ticket from the front desk, where they will be assisted by a secretary using a tablet device that is connected to a printer. The printer is utilised to print the ticket, which contains a unique 12-digit code. The ticket is scanned at the museum entrance gate to gain admission, and the ticket can only be used once.

   i. Which type of printer, Dot Matrix or Laser, is more appropriate for printing entry tickets? Explain.

_____

_____(2)

   ii. Name **ONE** other type of printer and give a brief description where it could be used.

_____

_____(2)

g. Identify **ONE** other output device apart from printer used in this system.

_____(1)

h. When scanning the ticket, the scanner reads the code by using an OCR software. It checks that the ticket code is within the range of codes accepted by the system, and that it was not used before. If the ticket code is valid, the gate opens, otherwise a warning message is displayed.

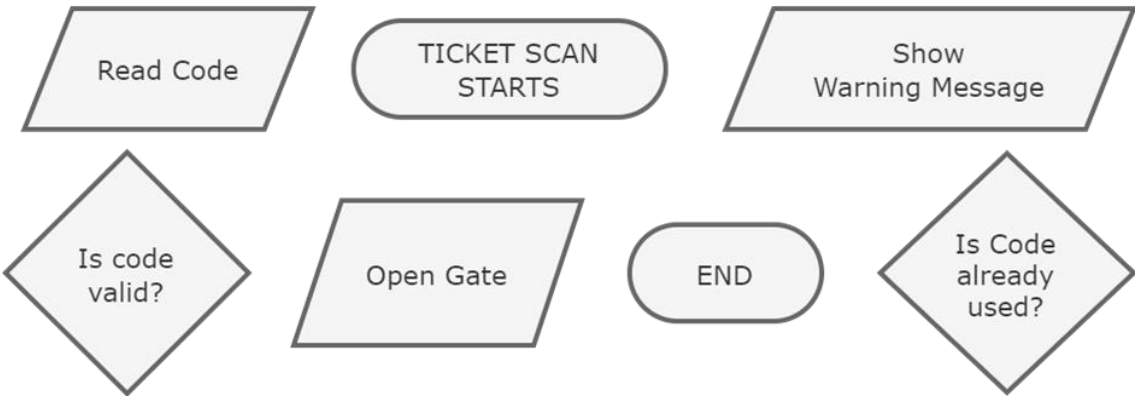
   i. What does the acronym OCR stand for?

_____(1)

   ii. What is the function of an OCR software?

_____(1)

iii. Draw a flowchart using the following symbols, showing the processes that happen when a ticket is scanned at the entrance gate.



Flowchart here

(8)

(Total: 23 marks)

5. 'SmartHome Co.', a manufacturing company has developed a line of devices for home automation which include smart lights, locks, security cameras, and more. The company also developed a smartphone software app for users to connect and control these devices from their phones.

Image taken from flaticon.com

a. SmartHome Co. program their smart devices using Assembly language. Is Assembly language a low-level or a high-level language?

_____(1)

b. SmartHome Co. developed their smartphone software app using JAVA programming language. Is JAVA a low-level or a high-level language?

_____(1)

c. Mention **TWO** differences between a low-level and a high-level language.

_____

_____(2)

d. To develop smartphone software apps, developers use an Integrated Development Environment (IDE). Mention **ONE** IDE and briefly explain the use of IDEs.

_____

_____(2)

e. *Source code*, *executable code*, and *language translators* play important roles in the development of a smartphone software app. Define the terms in italics.

_____

_____

_____

_____(3)

f. Which language translator is required for the smart devices to run the built-in software?

_____(1)

g. Explain why the executable code, and not the source code, is downloaded when a user downloads a smartphone software app from an app store.

_____

_____(1)

h. Which language translator is used to create the executable code?

_____(1)

i. Name another language translator which is not mentioned above and briefly explain how it operates.

_____

_____(2)

(Total: 14 marks)

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