

**SOUTH WEST REGIONAL MOCK EXAMINATION
GENERAL EDUCATION**

THE TEACHERS' RESOURCE UNIT (TRU)

IN COLLABORATION WITH

THE REGIONAL INSPECTORATES OF PEDAGOGY AND

THE SUBJECT TEACHERS' ASSOCIATIONS (SWATICT)

Tuesday 25th March 2025 (Afternoon) ORDINARY LEVEL

Subject Title	COMPUTER SCIENCE
Paper No.	2
Subject Code No.	0595

Two hours

Answer any FIVE questions.

All questions carry 20 marks each. For your guidance, the approximate mark for each part of a question is indicated in brackets.

You are reminded of the necessity for good English and orderly presentation in your answers.

In calculations, you are advised to show all the steps in your working, giving your answer at each stage.

Calculators are NOT allowed.

1.

- (a) A library uses the System Development Life Cycle (SDLC) to design and implement a new digital system. During the Analysis Phase, the team identifies the need to capture data such as member details, book information, and borrowing records. They decide to use online forms for member registration, barcode scanners for book tracking, and manual data entry for older records not available digitally. In the Design Phase, the team creates a database to store the captured data securely. During the Implementation Phase, they train staff to use the new system and ensure data is accurately transferred from the old system. Use the above scenario to answer the following questions:

- (i) Identify **THREE (03)** stages of the System Development Life Cycle (SDLC) mentioned in the scenario. (3 marks)
- (ii) Identify **TWO (02)** data capture methods mentioned in the scenario and briefly describe how they are used. (4 marks)
- (iii) Explain why the library team chose barcode scanners for book tracking instead of manual data entry. (2 marks)
- (iv) The library discovers that some older book records are incomplete or inaccurate. Suggest **TWO (02)** solutions to ensure the new system has reliable data. (2 marks)
- (v) During the Testing Phase, the team finds that the online forms are difficult for elderly members to use. Propose **ONE (01)** improvement to make the forms more user-friendly. (1 mark)
- (b) (i) Define Artificial Intelligence (AI) in your own words. (2 marks)
- (ii) List **TWO (02)** real-world applications of AI. (2 marks)
- (iii) Some people worry that AI might replace human jobs. Do you agree or disagree? Justify your answer with examples. (2 marks)
- (iv) A school wants to use AI to help students learn better. Suggest **TWO (02)** ways AI could be used in education. (2 marks)

2.

- (a) A computer system is designed with a multi-core processor that uses a memory hierarchy to improve performance. The system has registers, cache, RAM, and secondary storage (hard drive). When a user runs a program, the processor follows the machine cycle to process instructions. The CPU retrieve instructions from RAM, translates them into smaller steps, and perform the required operations using the arithmetic logic unit (ALU). The cache memory stores frequently used data to reduce the time needed to access it from the slower main memory.

Use the above scenario to answer the following questions:

- (i) Identify **FOUR (04)** memory types in the scenario and arrange them in order from fastest to slowest. (5 marks)
- (ii) List and describe the **three main steps** of the machine cycle as used in the scenario? (3 marks)
- (iii) Explain why the computer system uses cache instead of relying only on RAM. (2 marks)
- (iv) Why is a **multi-core processor** more efficient than a single-core processor? (2 marks)
- (b) Classifications of computers are sometimes done by its technological feature. State what technology was used in the following generations. (4 marks)
 - (i) 5th Generation
 - (ii) 4th Generation
 - (iii) 3rd Generation
 - (iv) 2nd Generation
- (c) (i) What is the main difference between **ASCII** and **EBCDIC**? (2 marks)
- (ii) A computer system uses **EBCDIC** to encode the letter 'A'. If the EBCDIC code for 'A' is 193, what would be the binary representation of this code? (2 marks)

3.

- (a) (i) Define the term **algorithm**. (2 marks)
 (ii) List the **THREE (03)** basic control constructs used in algorithms. (3 marks)
- (b) A programmer is designing an algorithm to calculate the total cost of items in a shopping cart. The programmer writes the following pseudocode:
1. Start
 2. Initialize **total_cost** to 0
 3. For each item in the cart:
 - 3.1 Read the item's price
 - 3.2 If the item is on sale then subtract the discount from the price
 - 3.3 Add the item's price to **total_cost**
 4. Display **total_cost**
 5. End
- Note: discount = 10% of Price**
- The programmer dry runs the algorithm with a sample cart containing three items:
- Item 1: Price = 1000frs, on sale
 Item 2: Price = 1500frs, not on sale
 Item 3: Price = 3000frs, on sale
- (i) What is the final value of **total_cost** after dry running the algorithm with the sample cart? Show the steps used in dry running the algorithm. (4 marks)
- (ii) Rewrite the pseudocode to include a 5% tax on the **total_cost** before displaying it. (4 marks)
- (iii) If the cart has 10 items, how many times will the loop in the algorithm execute? Justify your answer. (2 marks)
- (iv) What would happen if the programmer forgot to initialize **total_cost** to 0 at the start of the algorithm? (1 mark)
- (c) Name two types of translators used in programming and briefly explain their functions. (4 marks)

4.

- (a) A student is designing a simple security system for a room. The system has two sensors:
- Sensor A:** Detects motion (1 = motion detected, 0 = no motion).
Sensor B: Detects if the door is open (1 = door open, 0 = door closed).
- The security system should trigger an alarm if:
 Motion is detected **AND** the door is open, **OR**
 Motion is detected **AND** the door is closed.
- The student uses **AND** and **OR** logic gates to design the circuit and creates a **truth table** to represent all possible input combinations and the corresponding output (alarm = 1, no alarm = 0).
- (i) Using **A** to represent *motion* input and **B** to represent *door* input, write the **Boolean expression** for the security system (output alarm is represented as **X**) described in the scenario. (4 marks)
- (ii) Complete the truth table for the security system: (4 marks)

Sensor A (Motion)	Sensor B (Door)	Alarm Output(X)
0	0	
0	1	
1	0	
1	1	

- (iii) The student wants to modify the system so that the alarm only triggers if motion is detected **AND** the door is open. Rewrite the **Boolean expression** for this new condition. (2 marks)

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- (b) (i) What is a **computer network**? (2 marks)
 (ii) What is the purpose of an **IP address** in a network? (2 marks)
 (iii) Name TWO types of transmission media used in data communication systems. (2 marks)
 (c) What is **green computing**? (1 mark)
 (d) State ONE (01) environmental impact of Digital Waste (1 mark)
 (e) State TWO (02) ways of enhancing Green Computing (2 marks)

5.

- (a) A school is organizing a science fair and uses **project management techniques** to plan the event. The project involves several tasks:
Task A: Book the venue (2 days).
Task B: Invite participants (3 days, can start after Task A).
Task C: Prepare materials (4 days, can start after Task A).
Task D: Set up the venue (1 day, requires Tasks B and C to be completed).
 The project manager creates a **Gantt chart** to visualize the timeline and identifies the **critical path** to determine the minimum project duration. They also calculate slack time for non-critical tasks to manage delays.
 (i) Represent the activities above using a Gantt Chart. (4 marks)
 (ii) Identify the **critical path** for the science fair project and calculate the total project duration. (4 marks)
 (iii) If **Task C** is delayed by 1 day, how will it affect the project completion date? (2 marks)
 (iv) The project manager wants to reduce the project duration by 1 day. Suggest **one task** that can be adjusted to achieve this. Justify your answer. (2 marks)
- (b) (i) What is the base of the binary number system, and why is it used in computers? (2 marks)
 (ii) How many digits are used in the **hexadecimal** number system? (1 mark)
 (iii) Why is hexadecimal often used to represent binary data in computing? (2 marks)
 (iv) Carryout the following in binary $10000001_2 - 11111111_2$ (3 marks)

6.

- (a) A school is creating a database to manage student information using a relational database and a Database Management System (DBMS). The database has two tables:
Students: StudentID (primary key), Name, Age, and ClassID.
Classes: ClassID (primary key), ClassName, and Teacher.
 (i) How many fields are in the students table? (2 marks)
 (ii) Identify a foreign key in the student table. Justify your answer. (3 marks)
 (iii) A new student joins the school. Write an SQL command to insert the student's details into the Students table: (1 mark)
 $\text{StudentID} = 101, \text{Name} = \text{"John Doe"}, \text{Age} = 15, \text{ClassID} = 3.$
 (iv) Why is it important to use a **primary key** in a database table? (2 marks)
 (v) How does a **foreign key** help maintain relationships between tables in a relational database? (2 marks)
- (b) A student is working on a school project that involves creating and sharing different types of files. They use:
- A **text file** (report.txt)
 - A **spreadsheet** (data.xlsx)
 - A **presentation** (slides.pptx)
 - An **image file** (photo.png)
- (i) The student wants to share their project report with a teacher who only has a basic text editor. Which file format should they use, and why? (2 marks)