

SULIMO JOINT EXAMINATION

Kenya Certificate of Secondary Education

MARKING SCHEME

451/1

COMPUTER STUDIES

Paper I

JULY 2025 – 2 $\frac{1}{2}$ hours

Name Index Number

Candidate's Signature Date

Instructions to Candidates

- Write your name and index number in the spaces provided above.
- Sign and write the date of examination in the spaces provided above.
- This paper consists of **two** sections: **Section I** and **Section II**.
- Answer **all** the questions in **Section I**
- Answer Question 16 then any other three from section B.
- Show all the steps in your calculation, giving your answers at each stage in the spaces provided below each question.**
- Non-programmable** silent electronic calculators and KNEC mathematical tables may be used, except where stated otherwise.
- This paper consists of 14 printed pages.**
- Candidates should check the questions paper to ascertain that all the pages are printed as indicated and that no questions are missing.**
- Candidates should answer the questions in English.**

For Examiner's Use Only

Section I

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

16	17	18	19	20

SECTION A: (40 MARKS)

Answer **ALL** questions in the spaces provided

1. Define the term Datum? Give an example. (2 marks)

- it is singular for data, unprocessed raw facts e.g numbers, letters, symbols

1 mark for definition 1 mark for example

2. Give **three** reasons why an IT manager would reject a request by a database administrator to replace his desktop with a laptop? (3 marks)

- Laptops support fewer peripheral devices*
- Laptops being portable can easily be stolen*
- Laptops have smaller capacity for permanent data storage*
- Laptops have no expansion slots for upgrading software or hardware.*

3. a) Define the term normalization? (2marks)

- it is the process of dividing information into independent tables to avoid redundancy and allow flexibility in manipulating the database

b) Mention two objectives of normalization (2 marks)

- remove data redundancy/repetition*
- ensure data integrity*
- organise related data items into tables*

4. Speech or voice input is rapidly developing means of input to a computer.

List two advantages and two disadvantages of speech input technology.

(4 marks)

Advantages of speech input technology.

- Can be used when hands are busy*
- Can be used by people without hands*
- It requires few peripherals*

Disadvantages of speech input technology.

- Limited vocabulary*
- Background noise*
- Recognition maybe slow*

5. Give two ways in which irrelevance can corrupt the integrity of data.

(2 marks)

- Data will not meet the requirements of the processing cycle*
- Data will be inappropriate to the user.*

6. Give two purposes of an Information System.

(2 marks)

- Generating reports that can be used to support decision making process.*
- Enable sharing of information.*
- Support information processing by enhancing tasks such as data processing, collection and dissemination.*

7. Other than cost and compatibility, state two factors to consider when selecting an input device for an organization (2 marks)

- *User needs*
- *Type of data to be entered*

8. State the importance of the cache memory to the computer (1mark)

- *It improves the speed and general performance of the computer*

9. List any four properties an OS adds to a computer file . (2 marks)

- *File Name* - *File extension*
- *File Size* - *File location*
- *Date Modified/created*

10. a) One type of component within the CPU is an address bus. Identify two other types of bus and state what each is responsible for transmitting in the CPU. (2 marks)

Bus 1: Data Bus (1 mark)

- *Responsible for transmitting data between components (e.g., CPU, memory, I/O devices).*
(1 mark for description)

Bus 2: Control Bus (1 mark) - *Responsible for transmitting control signals and timing information between components (e.g., read/write signals, clock signals).*

(1 mark for description)

11. a) State any two disadvantages of printing documents using thermal printers (2marks)

- *Its printing paper and ink are expensive*
- *Its print out is affected by direct sunlight*
- *Its print out fades over time*

12. Falyaz has created a diary using word processing software. The diary entry for 17th May 2020 is shown.

17th May 2020

First day of the holidays today and the family went to stay in a hotel near Cherai Beach in Kerala. This was a lovely place to spend the holidays with a long stretch of beach to play on. It is called the *Princess of the Arabian Sea*. We also visited a number of the lagoons in the area and met a lot of people. The weather was lovely, and the sun shone throughout most of the day.



Write down four formatting features of the word processing software used to make this diary entry.

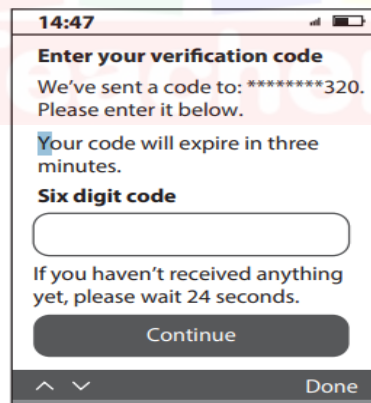
(4 marks)

- *Bold on date*
- *Superscript on the date*
- *Left aligned on date*
- *Fully justified*
- *Text/word wrap*
- *Highlighted text*
- *Italics*

13. Geography students have access to course materials on their college website. A web browser is used to access these materials. Describe three features of a web browser which would be suitable for this application. (3 marks)

- *Links to associated resources possible within text (hyperlinks) Hot spots – in pictures/ maps*
- *Forward/back buttons – allows review of resources favorites – maintains links to resources between sessions history – previous searches*
- *Refresh – updates pages*
- *Filters – takes out unwanted information*

14. Motiso, an accountant, has a bank account with Light International Bank. After logging into his account, the bank sends a onetime passcode (OTP) through his personal mobile phone as shown in the figure below.



a) Name the method of data security described above

(1 mark)

- *Two-Factor Authentication (2FA) / Multi-Factor Authentication (MFA)*
- *Allow OTP (One-Time Password) based authentication.*

b) State two benefits of the method of data security identified above

(2 marks)

- *Increased security*
- *even if password is compromised, the second factor is needed.*
- *Reduced risk of unauthorized access*
- *Provides an extra layer of protection*
- *Harder for hackers to gain access*

(Award 1 mark for any two distinct benefits)

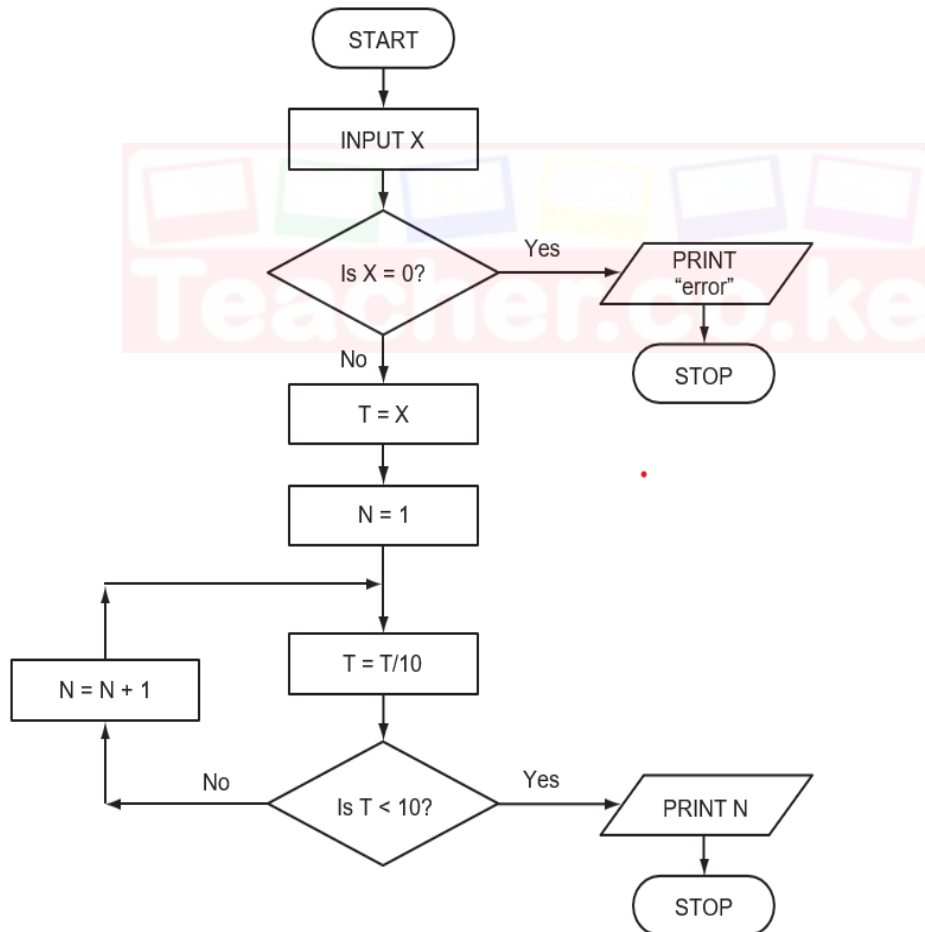
15. The following statements relate to careers in ICT. Complete the table below by naming each of the following job descriptions with the most appropriate ICT career title: (2 marks)

Description	ICT career title
a) Designs and maintains websites for organizations.	<i>Web Developer / Web Designer</i>
b) Protects computer systems and networks from security breaches.	<i>Cybersecurity Analyst</i>
c) Analyzes business problems and designs technology solutions.	<i>Systems Analyst</i>
d) Writes and tests code to develop software applications.	<i>Programmer / Software Developer</i>

SECTION B (60 marks)

Answer Question 16 and any other three questions from this section

16. Study the flowchart below and answer the following questions



a) Identify the errors in the flowchart above.

(2 marks)

1. *INPUT X* statement is put on a wrong shape
2. *The flowchart is having two stop instead of one.*

b) Suggest solutions for the errors identified above

(2 marks)

1. Use parallelogram shape to represent input X
2. Extend flowline from Print "error" to one stop below Print N

c) What output would you expect if the following data was input into the flowchart?

(3marks)

i. **X = -150**

```
* START
* INPUT X (X = -150)
* Is X = 0? (No, -150 != 0)
* T = X (T = -150)
* N = 1 * Loop:
* T = T/10 (T = -150 / 10 = -15)
* Is T < 10? (Yes, -15 < 10 is true)
* PRINT N (Prints 1)
* STOP
```

Output: 1

ii. **X = 540**

```
* START
* INPUT X (X = 540)
* Is X = 0? (No, 540 != 0)
* T = X (T = 540)
* N = 1
* Loop 1:
* T = T/10 (T = 540 / 10 = 54)
* Is T < 10? (No, 54 is not < 10)
* N = N + 1 (N = 1 + 1 = 2)
* Loop 2:
* T = T/10 (T = 54 / 10 = 5.4)
* Is T < 10? (Yes, 5.4 < 10 is true)
* PRINT N (Prints 2)
* STOP
```

Output: 2

iii. **X = 0**

```
* START
* INPUT X (X = 0)
* Is X = 0? (Yes)
* PRINT "error"
* STOP
```

Output: error

d) Write the pseudocode for the corrected version of flowchart above. (8marks)

```

START
  INPUT X
  IF X = 0 THEN
    PRINT "error"
  ELSE
    SET T = X
    SET N = 1
    REPEAT
      SET T = T / 10
      IF T < 10 THEN
        PRINT N
      ELSE
        SET N = N + 1
      ENDIF
    UNTIL FALSE
  ENDIF
STOP
  
```

17. a) The emergence of Gen-Z popular 'maandamano' has led to many organizations in major cities in Kenya to embrace teleworking approach

i) Differentiate between the term teleworking and teleconferencing (2 marks)

- *Teleworking is where an employee can work away from the office i.e. home and is linked to the office through network connections while*
- *Teleconferencing is having a non-physical meeting using internet connection like zoom, , google meet*

ii) State two benefits that the organization gained by using this approach. (2marks)

- *Reduces travel expenses*
- *Reduces stress due to commuting inconveniences e.g. traffic jams*
- *Reduces risk of contracting communicable diseases, e.g. COVID-19*

b). State three ways of transforming a picture embedded in a Desktop Publishing programme in order to fit in a designated space on a document. (3marks)

- *Rotation*
- *Flipping*
- *Cropping*
- *Stretching*

c). You are given the following Spreadsheet file showing **sales data** for a hair salon's clients. Use this data to answer the questions below

	A	B	C	D	E
1	Client_Name	Gender	Date_Birth	Hair_Style	AmountPaid
2	Ann Mwende	F	2024-03-15	Bob Cut	450
3	Brian Okoth	M	2023-11-22	Fade	3050
4	Carla Kamau	F	2025-01-10	Layered Cut	5500
5	Daudi Ahmed	M	2025-06-05	Pompadour	4000

i). State the difference between the following two expressions: (2 marks)

=IF (C1>10," Yes", "No")
 =IF (AND(C1>10, C3>10)," Yes", "No"))

Difference 1.

*=IF (C1>10," Yes", "No") – it test a single cell C1 to be greater than 10
 =IF (AND(C1>10, C3>10)," Yes", "No")): This formula checks two specific conditions (C1 > 10 AND C3 > 10) and returns "Yes" only if both conditions are true.*

Difference 2.

*=IF (C1>10," Yes", "No") – is a single logical function "IF"
 =IF (AND(C1>10, C3>10)," Yes", "No")) is a combined logical function "IF" and "AND"*

ii). Write a function to count the number of "F" in the Gender column. (2 marks)

=COUNTIF(B2:B5,"F")

iii). Write an appropriate expression to determine the age of the client as at today (2 marks)

=DATEDIF(C2, TODAY(),"Y") (1 mark)

- o *Allow =YEAR(TODAY())-YEAR(C2) (simpler, but less accurate for exact age)*
- o *Allow =INT((TODAY()-C2)/365)*

- iv). In a new column named gift value, an expression is entered that calculates the 10% of the amount paid. Write this expression. *=\$E\$2*0.10* (2 marks)

18. A multinational organisation has offered to donate computers to your school.

The Board of Governors has requested you to advise on the operating system to be used by providing answers to the following questions.

a) What is an operating system? (1 mark)

- *Refers to a system software that acts as an interface between the live ware (user) and the computer.*

b) State two classifications of operating system giving one example of each.

(4 marks)

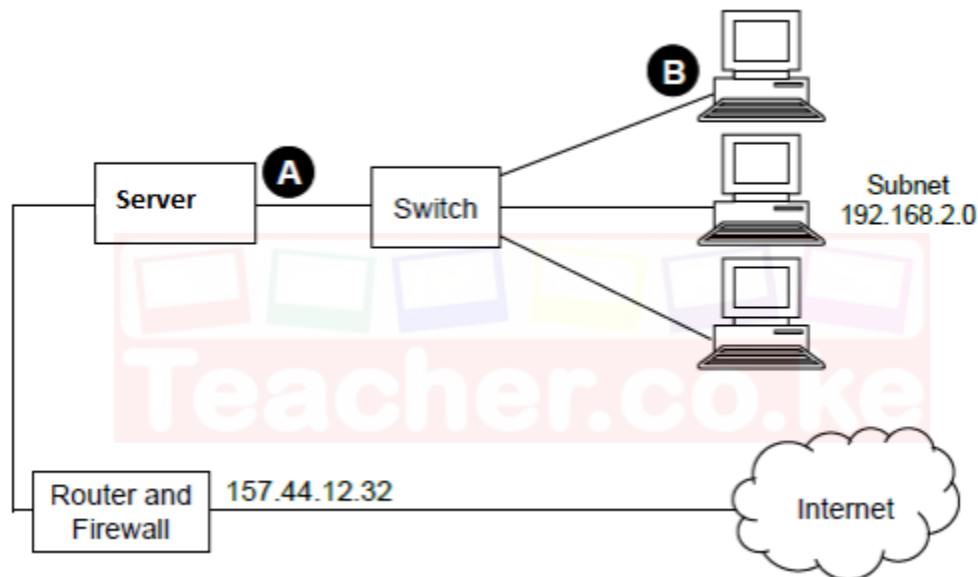
- According to **User Interface**: e.g. Command line, Menu Driven, GUI
- According to **Number of User**: e.g. Single / Multi-user
- According to **Number of Task**: e.g. Single / Multi-tasking

c) List any three functions of Network Operating system

(3 marks)

- Making sharing of resources possible.
- Transmitting data around network.
- Respond to requests from application programs running on the networks.
- Enables nodes on the network to communicate with each other more efficiently.
- Implementing network security features.
- Supporting services.

d) Study the following diagram



i). Name the physical topology used in the above shown network

(1 mark)

- Star topology

ii). State two functions of the device named server

(2 marks)

- **Resource Sharing**: Servers can facilitate the sharing of network resources such as printers, databases, and internet access among connected devices.
- **Centralized Storage**: A server can store and manage files, applications, and data, making them accessible to multiple client computers on the network.
- **Host Applications/Services**: Servers can run various applications and services (e.g., email servers, web servers, database servers) that are critical for the organization's operations.
- **Authentication and Authorization**: Servers can manage user accounts, authenticate users, and control their access rights to network resources, enhancing security.

- iii). Clearly explain what would happen if the device named switch fails (2 marks)
- If the switch fails, the **three computers (endpoints)** connected to it will **lose connectivity** to each other, to the server, and to the internet (via the router and firewall).
 - Essentially, all network communication for those specific computers will cease because the switch is the central connecting device for that segment of the network.

iv). What is the importance of the subnet mask address shown on the diagram above? (2marks)

- The subnet mask (implied by "Subnet 192.168.2.0" which typically refers to a network address in combination with a subnet mask) is crucial for **identifying the network portion and the host portion of an IP address**. It allows devices on the network to determine:
 - a. **Whether a destination IP address is on the same local network (subnet) or a different network**. This helps in efficient routing of data, as traffic destined for the same subnet does not need to go through a router.
 - b. **The size of the network (how many host IP addresses are available within that subnet)**.

19. a) State three standard coding schemes used in computing (3marks)

- Binary Coded Decimal (BCD)
- American Standard Code of Information Interchange (ASCII)
- Extended Binary Coded Decimal Interchange Code (EBCDIC)
- Unicode

b) The hexadecimal error code AC8 means 'insufficient memory'. Convert the hexadecimal error codes AC8 to denary values. (2 marks)

The hexadecimal number is textAC8_{16} . Where:

- Text A represents 10
- Text C represents 12

$$\begin{aligned} \text{So, the conversion is: } \text{textAC8}_{16} &= (10 * 16^2) + (12 * 16^1) + (8 * 16^0) \\ &= (10 * 256) + (12 * 16) + (8 * 1) \\ &= 2560 + 192 + 8 = 2760 \end{aligned}$$

Therefore, $\text{textAC8}_{16} = 2760_{10}$.

c). Use eight-bit ones complement to perform the following and leave the answer in decimal notation (4 marks)

$$100001_2 - 111010_2$$

$$\Rightarrow 00100001 - 00111010$$

11000101 \rightarrow ones complement

00100001 +

11100110 \rightarrow no overflow, re-complement to ones complement and attach negative sign bit (1)

$$\underline{(1)00011001_2 \rightarrow -25_{10}}$$

d). Arrange the following numbers in order from smallest to largest

(3mrks)

110011₂, 1FH, 67₈ and 45₁₀

110011₂, 1FH, 67₈ and 45₁₀

Convert to the same number system decimal

110011 = 51

1FH = 31

67 = 55

45

1FH, 45₁₀, 110011₂, 67₈

e). Convert $\frac{12}{32}$ base 10 to binary number system

(3mrks)

12/32 * 2 = 0.3/4

$\frac{3}{4} * 2 = 1.1/2$

$\frac{1}{2} * 2 = 1.0 \rightarrow 0.011_2$

OR

$\frac{12}{32} = 0.375$

<i>0.375x2</i>	<i>=0.75</i>
<i>0.75x2</i>	<i>=1.5</i>
<i>0.5x2</i>	<i>=1.0</i>

0.011₂

20. The tables below were extracted from jobu's enterprise database. Use them to answer the questions that follows

CUSTOMER TABLE				
CUSTOMER ID	ID NUMBER	NAME	ADDRESS	TOWN

ORDER TABLE					
ORDER ID	CUSTOMER ID	ORDER DATE	PARTICULARS	QUANTITY	UNIT COST

(a). Identify the most appropriate primary keys in both tables

(1mark)

CUSTOMER TABLE – CUSTOMER ID

ORDER TABLE – ORDER ID

(b). Identify a candidate key in any of the tables

(1mark)

- CUSTOMER ID – ID NUMBER

- (c). Describe the relationship formed between the two tables (2marks)
- *A one to many relationship whereby one record in the customer table relates to many records in the order table.*

- (d) Feasibility studies play a key role in determining whether a system project should proceed. Give four reasons why conducting a feasibility study is important in system development. (2 marks)

- *It saves time and money by determining if a project is viable before significant resources are committed, this prevents investment in project that are likely to fail.*
- *It help in reducing risk by identifying potential problems, obstacles and risks early in the project lifecycle, allowing for mitigation strategies to be developed*
- *It aids is decision-making through providing essential information to stakeholders, enabling them to make informed decisions about whether to proceed with, modify, or abandon a project.*
- *It improves on project success rate by ensuring the project is well-conceived and has a high probability of achieving its objectives, it increases the overall success rate of system development initiatives.*

- (e) Describe any three types of feasibility study. (2marks)

1. **Operational Feasibility:** Examines how well the proposed system will solve the current problems and how it will fit into the existing organizational structure and workflow. It assesses user acceptance, training needs, and the impact on daily operations.
2. **Technical Feasibility:** Assesses whether the proposed system can be developed and implemented using existing or acquire-able technology. It considers hardware, software, and network requirements, as well as the technical expertise available.
3. **Economic Feasibility:** Evaluates the financial viability of the project. It involves a cost-benefit analysis to determine if the potential benefits (e.g., increased revenue, reduced costs, improved efficiency) outweigh the estimated costs of developing and operating the system.

- (f) The V-shaped model is one of the linear system development strategies. Describe the main characteristic of the *V-shaped model* in system development. (2 marks)

- *its emphasis on **early testing and verification/validation activities that correspond directly to each development phase.***
- *V-model illustrates how testing phases (e.g., unit testing, integration testing, system testing, acceptance testing) are planned and executed in parallel with the corresponding development phases (e.g., requirements gathering, design, coding).*
- *"V" shape highlights the strong relationship between each development phase on the left side of the "V" and its corresponding testing phase on the right side.*

- (g) A company uses robots in its factory to manufacture large pieces of furniture. One characteristic of a robot is that it is programmable. State two other characteristics of a robot. (2 marks)

- *Autonomous / Can operate independently*
- *Can sense its environment (using sensors)*
- *Can move/manipulate objects (using actuators)*
- *Perform repetitive tasks accurately*
- *Operate in hazardous environments*

(Award 1 mark for any two distinct characteristics)

(h) Give three advantages to company employees of using robots to manufacture large pieces of furniture. (3 marks)

- *Improved safety*
- *robots handle dangerous/heavy tasks, reducing injuries.*
- *Reduced strenuous/repetitive work*
- *employees can focus on less physical tasks.*
- *Opportunity for upskilling*
- *employees learn to program/maintain robots.*
- *Higher quality products*
- *consistent output from robots.*
- *Increased efficiency/productivity*
- *- less overtime for employees.*

(Award 1 mark for any two distinct advantages from the employees' perspective)

