# MARKING SCHEME
# THE ROYAL EXAM SERIES
Kenya Certificate of Secondary Education

## 451/1 – COMPUTER STUDIES – Paper 1

**SECTION A** (40 MARKS)

*Answer all the questions in this section in the spaces provided*

1. Abbreviations in full: (1mark)

a) *WIMP- Windows, Icons, Menus and Pointing devices.*

*b) CMOS- Complimentary metal-oxide semiconductor*

2. Characteristics of fifth generation computers. (3 marks)

i) *Have very high processing power than their predecessors.*

*ii) They are smaller than their predecessors.*

*iii) They use artificial intelligence.*

*iv) Massive connectivity to the internet*

*v) Have superior hardware and software*

**Accept comparison with other generation in relation to heat emission**

**any 3 award a mark. Max 1x3=3**

3. Functions of the enter/return key on the keyboard: (3 mark)

i*) Used to execute a preselected command*

*ii) Used to move the insertion pointer to the beginning of a new line.*

*iii) Used to create empty spaces between lines.*

**award a mark each 1x3=3**

4. Special memories found in a computer system. (2 marks)

i. *Buffer*
ii. *Cache*
iii. *Registers*
iv. *Virtual*

**Award a $^1/_2$ mark each ½ x4=2**

5. Disadvantages of magnetic tapes. (2 marks)

a*) Slow because of their linear nature of data records on the tape*

*b) Waste on storage space due to inter-record gap.*

**Award a mark each 1x2=2**

6. Advantages of USB interface cable. (3 marks)

*a) Very high speed data transmission.*
*b) High quality data transmission.*
*c) Can be used to connect many peripheral devices daisy chained to a single port.*

**Award a mark each 1x3=3**

7. Differentiate between: (4 marks)

*a) **Save** is a command that is used to save changes made to an existing document while **save as** is a command that is used to create a brand new file or change location of files.*

**Award Two marks if both explanations are correct otherwise don't award.**

*b) In Insert mode, characters appearing to the right of the insertion pointer are pushed to create room for the new ones being typed while in Type over mode, characters appearing to the right of the insertion pointer are erased one by one as they are being replaced by the new ones being typed.*

**Award Two marks if both explanations are correct otherwise don't award.**

8. The formula =A1+C2 is initially typed in cell D1. How will it appear when copied to cell F1? (2marks)

*=C1+E2*

**Deny a mark if the formula does not begin with an equal sign**

9. a) Explain two types of paper orientation (2 marks)

*a) Portrait – whereby the longer side is vertical*
*b) Landscape – the longer side is horizontal*

**Award half a mark for listing, half mark for explaining for each.**

b) Differentiate between the following keys (2 marks)

*i. Delete Key- Deletes characters from left to right at the insertion pointer*
*ii. Backspace Key – Deletes characters from right to left.*

**Award Two marks if both explanations are correct otherwise don't award.**

10. Give four differences between high and low level programming languages

*(4marks)*

- *High level languages uses words while low level languages uses mneumonic/ symbolic language*
- *High languages are friendly (easy to learn/ understand) while low level languages are difficult*
- *High level languages occupies large memory while low level languages use less memory*
- *High level languages are easy to program while low level languages are difficult to program*
- *High level languages are portable while low level languages are not*

**Award one mark for any four correct responses 1x4=4**

11. $9^1/_4$ to binary: (3marks)

| | |
|---|---|
| 2 | 9 |
| 2 | 4 R 1 |
| 2 | 2 R 0 |
| 2 | 1 R 0 |
| | 0 R 1 |

$9_{10}=1001_2$

¼=0.25
0.25X2=0.5
0.5X2=1

$0.25=0.01_2$

Therefore, $9^1/_4=1001.01_2$

**Award one mark for converting the integral part, one mark for converting the fractional part and one mark for the answer.**

12. State **three** ways of representing a negative number using binary. (3 marks)

a. *Prefixing with an extra sign bit*
b. *Using ones compliment*
c. *Using twos compliment*

**Any two award a mark each 1x2=2**

13.

Explain the meaning of following terms as used in systems development: (2 marks)

a) *Boundary: it refers to the space within which the components of a system operates.*

*b) Environment: it refers to any entity that falls outside the boundary but interacts with the system.*

**Award a mark each for every correct explanation 1x2=2**

14. Describe two types of errors that can occur during program development. (2 marks)

a. *Syntax errors- Emanate from improper use of language rules*

*b. Logical errors – errors that make the program not to produce what it is expected*

**Award half a mark for stating and half a mark for each correct describing. ½ x 4 = 2**

15. Reasons why observation is sometimes disadvantageous when used in fact finding.
(2 marks)

*a. The person being observed might alter behavior leading to wrong requirements being observed.*
*b. The need to be on-site consumes a lot of time.*
*c. The personal bias, personal view or looking at things in a particular way often creates obstacle for making valid generalization*
*d. Observation is a time taking process.*
e. *Checking the validity of observation is always difficult*.

**Award a mark each for any two relevant answers 1x2=2**

**16.** a) The difference between an interpreter and a compiler. (2marks)

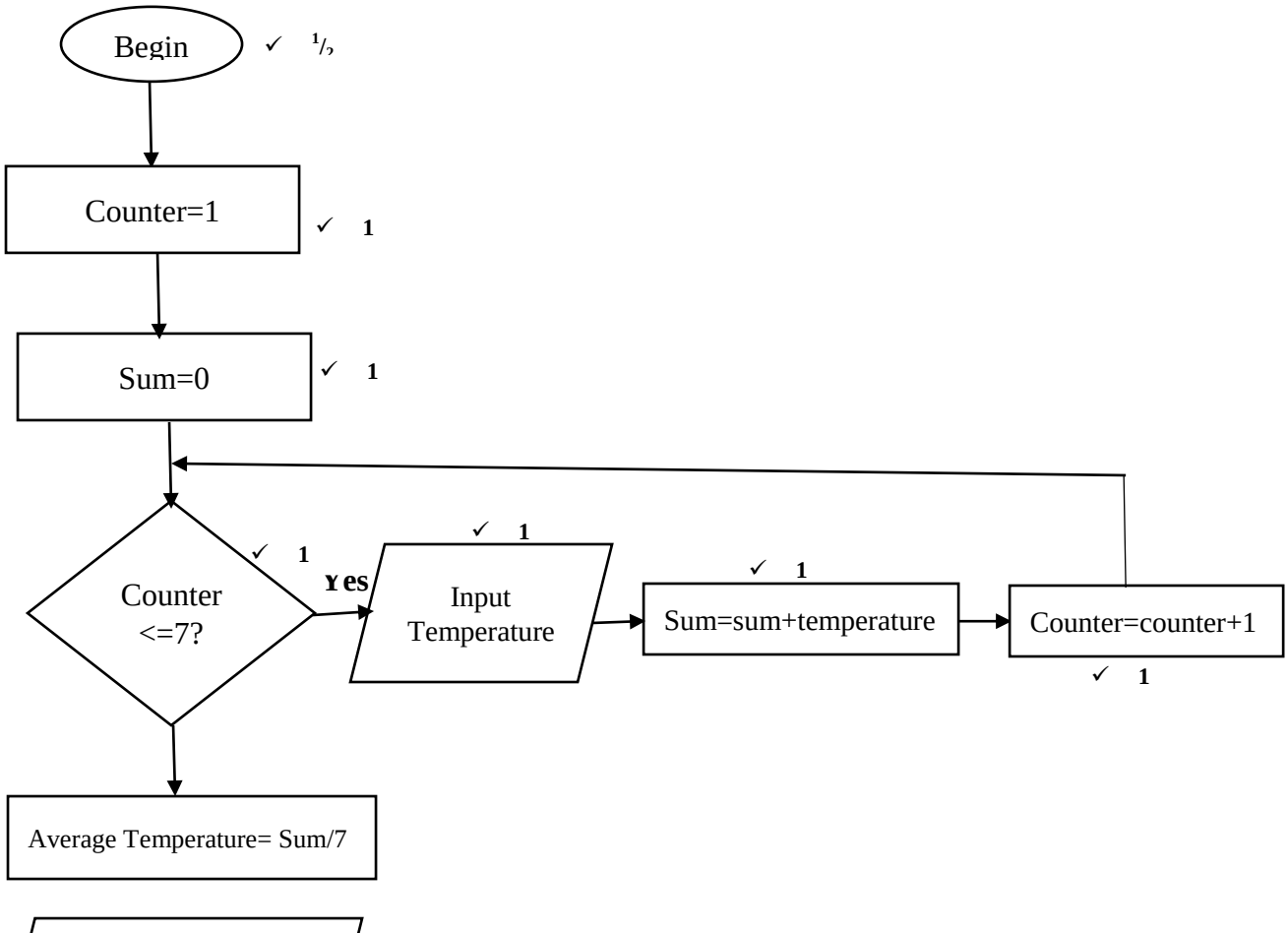
| Interpreter | Compiler |
|---|---|
| Doesn't store the object code in the computer memory | Stores the object code in the computer memory |
| Translates and executes source code to object code one line at a time | Translates the entire source code to object code |
| Slow than a compiler | Faster than interpreter |
| Interpreted object code takes less memory | Compiled program require more memory |

**Award any 2 correct differences 1x2=2**

b) Qualities of a good flowchart. (3 marks)

- ✓ *There should be only one entry and one exit point*
- ✓ *It should use neat and correct symbol at each stage.*
- ✓ *Logical flow should be clearly shown using arrows*

**c) Flowchart for the pseudocode.**



**No**

✓ **1**

↓

✓ **1**

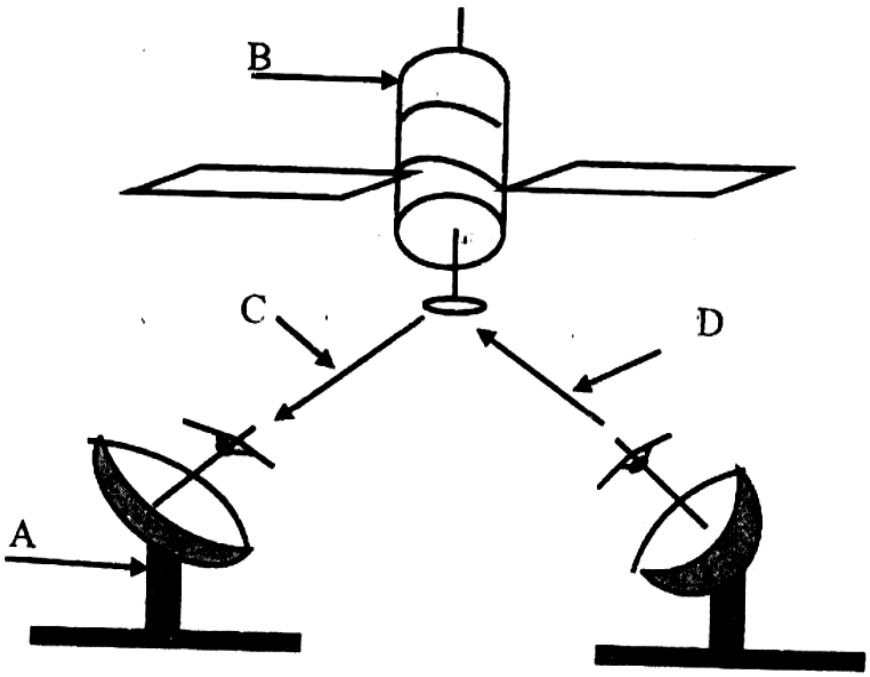
↓

✓ ½

- ✓ **Award ½mark for start and stop max 1mark**
- ✓ **Award ½ for correct text and ½ for correct symbol in every process max 8marks**
- ✓ **Award 1 mark for logical flow**

**Total 10 marks**

17. a) **a) Study the diagram below and answer the questions that follow:**




i) **Name the communication media depicted in the above diagram. (1mk)**

Satellite communication **(Award 1 mark)**

**ii) Name the parts labelled A, B, C, and D. (4 mks)**

A -Receiving earth station

B -Satellite in space

C -Down link

D -Up link

**(Award 1 mark x 4 = 4mks)**

**(b) Distinguish between bounded and unbounded transmission media, giving two examples in each. (3mks)**

- In *bounded media*, data signals are transmitted from the source to the destination through a restricted pathway, e.g., two open wire cables, twisted pair cables, Coaxial cables, fiber optic cables.
- *Unbounded media* transmits data without physical connections, e.g. microwave, satellite, radio, infrared communication.

**(Award 1 mark x 3 = 3marks)**

**(b) Differentiate between a modem and a multiplexer. (2mks)**

- A Multiplexer enables sending of multiple data signals over the same medium, either simultaneously or at different times.
- A Modern converts a digital signal to analogue form, so that it can be transmitted over analogue telephone lines.

**(Award 1 mark for each x 2 = 2mks)**

**(c) Explain the function of the following network devices: (3mks)**

i) Network interface card (NIC)

NIC creates a physical link between the computer and the transmission media.

iii) Bridge

This is a network device that selectively determines the appropriate network segment for which a message is meant to be delivered.

iv) Repeater

- A repeater receives a weak signal on the network, cleans and amplifies it for transmission over the next portion of the network. Signals become weak due to attenuation

**(Award 1 mark for each x 3 = 3mks)**

**(d) List two advantages of cell phones over fixed lines. (2mks)**

- Are cheaper than fixed lines
- Less prone to transmission errors
- Can be used even where there are no telephone lines
- Portable, i.e. can be carried around

**(Award 1 mark x 3 = 3mks)**

18. a. i) $110_2 = (1 \times 2^2) + (1 \times 2^1) + (0 \times 2^0) = 4 + 2 + 0 = 6_{10}$ **(Award 1mark)**

$0.101_2 = (1 \times 2^{-1}) + (0 \times 2^{-2} + (0 \times 2^{-3}) = 0.625$ **(Award 1 mark)**

$6^5/_8$ or $6.625_{10}$ **(Award 1 mark for the answer)**

**(Total 1 x 3 = 3marks)**

ii)

| | |
|---|---|
| 2 | 12 |
| 2 | 6 R 0 |
| 2 | 3 R0 |
| 2 | 1 R1 |
| | 0 R1 |

$12_{10} = 1100_2$

0.6875X 2=1.375
0.375X2=0.75
0.75X2=1.5
0.5X2=1

**(Award 1 mark for the integral part, 1 mark for the fractional part, 1 mark for the answer, 1 mark for the base value Total 1 x 4 = 4marks)**

Therefore, $12.6875_{10} = 1100.1011_2$

b)

| |
|---|
| 11001.0101<br>- 10.0100 |
| 10111.0001 |

**Award 1 mark for the integral part and 1 mark for the fractional part (1 x 2 = 2marks)**

c)

| | | |
|---|---|---|
| 2 | 54 | |
| 2 | 27 | R 0 |
| 2 | 13 | R1 |

| | | |
|---|---|---|
| 2 | 6 | R1 |
| 2 | 3 | R0 |
| 2 | 1 | R1 |
| | 0 | R1 |

| | | |
|---|---|---|
| 2 | 29 | |
| 2 | 14 | R1 |
| 2 | 7 | R0 |
| 2 | 3 | R1 |
| 2 | 1 | R1 |
| | 0 | R1 |

Therefore, $54_{10}=110110_2$ and $29_{10}=11101_2$

$11101_2=00011101_2$ in 8-bits
Ones complement of $00011101_2 = 11100010_2$

Twos complement of $11100010_2 = 11100010_2 + 1_2$
$=11100011_2$

$$\begin{array}{rcccccccc} & 0 & 0 & 1 & 1 & 0 & 1 & 1 & 0 \\ + & 1 & 1 & 1 & 0 & 0 & 0 & 1 & 1 \\ \hline 1 & 0 & 0 & 0 & 1 & 1 & 0 & 0 & 1 \end{array}$$

Overflow ignore

$=00011001_2$

(Award 1 mark for each conversion to binary,
1 mark for writing in 8 bits,
1 mark for converting to 1's complement
1 mark for converting to 2's complement
1 mark for the correct answer
1 mark for leaving out the overflow
(Total marks 1 x 6 = 6marks)

19. (a) types of validation checks:

- *Range checks: checks that data lies within a range of values.*
- *Presence checks: checks that data is there and has not been missed out.*
- *Length checks: checks that fields are of the right number of characters.*
- *Type checks: checks that the data is of the right type.*
- *Format checks: checks whether data is in the correct format.*

**Any 3 x 2**

(b) Methods to prevent unauthorised access:

- *Password: A secret word; a string of characters known only to a restricted group for authentication.*
- *User Access levels: A case where each group is granted different levels of BCCCSS*
- *User Access rights: An individual is granted access or denied access to*

***(Award half a mark for stating and half a mark for describing. Total ½ x 4 = 2marks)***

(c) (i) (I) Real-time

*ln a real-time processing, there is a continual input. Process and output of data instantaneously upon receipt of command.*

***(Award 1 mark)***

(11) Interactive processing

*A computer processing in which the user can modify the operation appropriately while observing results at critical steps.*

***(Award 1 mark)***

c) (ii) Application area for real-time mode

*Airline booking. Medical system, car tracking system, hotel booking system, banking system.*

**Any award 1 mark**

20. **(a) Name two responsibilities that are carried out by a: (4mks)**

**(i) Web administrator**

- Develop & test websites
- Maintains, updates & modifies information on the websites to meet new demands by the users.
- Monitors the access & use of internet connection by enforcing security measures
- Downwards information needed by an organization or institution from internet websites

**(ii) Computer trainer**

- Training people on how to use a computer & the various application programs
- Development training reference materials
- Guiding learners on how to acquire knowledge through carrying out research
- Advising the learners on the best career opportunities in the broad field of ICT
- Preparing learners for ICT examinations

**(Award 2 marks for each career. 2 x 2 = 4mks**

**(b) State two reasons why users may resist the introduction of information and communication Technology (ICT) to their place of work (2marks)**

(i) Fear of change- people are creatures of habit, hence are afraid of change

(ii) Fear of losing their jobs: By installing the computer into an organization, employees fear that they might end up losing their jobs

(iii) Fear of failure – Since the computer is very new in a given working environment, the people will be afraid that they might never get used to it.

(iv) Loss of control: The management fear that once a computer system is implemented, they might lose control of the organization.

(Award 3 marks for three correct answers 1 x 3 = 4mks)

**(c) Suggest how computers may in future be made more user-friendly for persons that are:**

a) **Blind** **(1mk)**

- Development of Braille keyboards, or engraved keyboards
- Computers can be installed with talking software, i.e., can store voice patterns of the user (Award 1 mark)

**b) Without hands** **(1mk)**

- Use of voice-activated commands.
- Computers can be installed with powerful multimedia system & speech recognition devices. (Award 1 mark)

**(d) Describe how computing has been applied to each of the following areas:**

**i) Transportation systems.** **(2mks)**

- Used by railway corporations to coordinate the movement of their goods & wagons
- Used in airline industry for air traffic control, surveillance of airspace using radar equipment
- Used in shipping control

- Used in automobile traffic control in busy towns, i.e. to simulate the timing of traffic lights.

(Award 1 mark each for 2 point = 1 x 2 =2mks)

**vi) Reservation systems. (2mks)**

- To keep record of reservation
- For online reservation (i.e. provide online remote services)
- Paperless transaction (Paying via credit cards)
- Easy to check for vacant positions

(Award 1 mark for each 2 point = 1 x 2 = 2mks)

(f) **(a) What is an expert system? ( 1mk)**

An *expert system* is computer software that mimics human expertise in a particular area of specialization. (Award 1 mark)

**(b) State two components of an expert system (2mks)**

- Inference mechanism (for making decisions)
- Knowledge base
- Explanation facility
- User interface