



**451/1 MS  
COMPUTER STUDIES  
Paper 1  
MARKING SCHEME  
MARCH 2021**

**THE KENYA NATIONAL EXAMINATIONS COUNCIL  
KENYA CERTIFICATE OF SECONDARY EDUCATION**

**COMPUTER STUDIES**

**Paper 1**

**MARKING SCHEME  
(CONFIDENTIAL)**

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**This marking scheme consists of 14 printed pages.**

**Turn over**

**451/1 MARKING SCHEME**

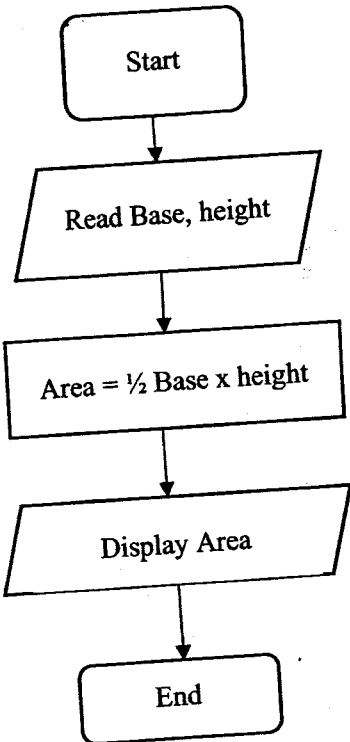
**SECTION A**

NO	ANSWER	MARKS
1.	<p><b>Computer input devices that capture data through the scanning method</b></p> <ul style="list-style-type: none"> <li>- Image Scanner</li> <li>- Optical Mark Reader (OMR)</li> <li>- Magnetic Ink Character Reader (MICR)</li> <li>- Bar Code Reader</li> <li>- Optical Character Reader (OCR)</li> </ul> <p style="text-align: right;"><b>Any 4 x ½</b></p>	<b>2</b>
2.	<p><b>Possible outcomes arising from failure to restrict the use USB flash memory in a school's computer laboratory</b></p> <ul style="list-style-type: none"> <li>- Computer hardware and peripheral devices may get damaged since flash disks may introduce viruses to the computers.</li> <li>- Students may copy software and games to play in the laboratory thereby distracting normal learning sessions.</li> <li>- Students may use it to copy software leading to infringement copy right act</li> <li>- Confidential data may be copied from the computers and disclosed to interested parties to the detriment of the school.</li> </ul> <p style="text-align: right;"><b>Any 2 x 2</b></p>	<b>4</b>
3.	<p><b>Differences between a computer power cable and a computer interface cable</b></p> <ul style="list-style-type: none"> <li>- A power cable has two or three wires whereas an interface cable has at least eight wires.</li> <li>- Power cables are used to transmit electric current from a power source (such as a socket) to a computer whereas interface cables are used to connect devices with a computer.</li> </ul> <p style="text-align: right;"><b>Any 1 x 2=(2 marks)</b></p>	<b>2</b>
4.	<p><b>Factors to consider when selecting a laptop.</b></p> <ul style="list-style-type: none"> <li>- The size of the screen, should be large enough to make the system design legible.</li> </ul>	

NO	ANSWER	MARKS
	<ul style="list-style-type: none"> <li>- Processor speed. The processor speed must support complex computation involving large volume of data in a short period.</li> <li>- It should have memory capacity capable of loading both the database application and data of the on-going process.</li> <li>- Secondary storage (HDD) should be large to contain the database program and the data.</li> </ul> <p style="text-align: right;"><b>Any 2 x 2 = (4 marks)</b></p>	<b>4</b>
5.	<p><b>Operating systems that are not capable of supporting computer networks:</b></p> <ul style="list-style-type: none"> <li>- Microsoft Disk Operating System (MS-DOS)</li> <li>- Personal Computer Disk Operating System (PC-DOS)</li> <li>- Windows Version 3.1</li> <li>- Android OS</li> <li>- Any OS for mobile devices</li> <li>- <b>Accept any valid</b></li> </ul> <p style="text-align: right;"><b>Any 2 x 1 = (2 marks)</b></p>	<b>2</b>
6.	<p><b>(a) Explanation of process scheduling</b></p> <p>This refers to the scheme through which an operating system arranges jobs as they queue for the processor.</p> <p style="text-align: right;"><b>(2 marks)</b></p> <p><b>(b) Explanation of interrupt handling</b></p> <p>This refers to the mode of handling a job that interferes with the normal process of execution especially where the job being executed has a lower priority than the incoming job.</p> <p style="text-align: right;"><b>(2 marks)</b></p>	<b>4</b>
7.	<p><b>Examples of application packages: (Accept other valid answers)</b></p> <p><b>(a) Databases</b></p> <ul style="list-style-type: none"> <li>- MS SQL</li> <li>- SQL Server</li> <li>- Microsoft Access</li> <li>- Oracle</li> </ul>	

NO	ANSWER	MARKS
	<p style="text-align: right;"><b>Any 2x½= (1 mark)</b></p> <p><b>(b) Word processors</b></p> <ul style="list-style-type: none"> <li>- Microsoft word</li> <li>- Wordstar</li> <li>- Ami pro</li> <li>- Wordperfect</li> </ul> <p style="text-align: right;"><b>Any 2 x ½=(1 mark)</b></p> <p><b>(c) Desktop publishing</b></p> <ul style="list-style-type: none"> <li>- Microsoft publisher</li> <li>- Corel Ventura</li> <li>- Page maker</li> </ul> <p style="text-align: right;"><b>Any 2 x ½= (1 mark)</b></p>	<b>3</b>
8.	<p><b>Ways of preventing underage children from accessing adult content</b></p> <ul style="list-style-type: none"> <li>- Installing of blocking/filtering and monitoring software that will control the content they can access.</li> <li>- Set rules on usage of internet and social media websites such as watching only in the company of an adult.</li> <li>- Install remote access software which allows the guidance to monitor their children activities in the internet</li> <li>- Discuss your family values with the child and be clear on what may be watched on the internet.</li> </ul> <p style="text-align: right;"><b>Any 2 x 1 = (2 marks)</b></p>	<b>2</b>
9.	<p><b>Ways of maintaining confidentiality of patients' details in a health centre</b></p> <ul style="list-style-type: none"> <li>(i) Keeping the data in encrypted form.</li> <li>(ii) Using passwords when one intends to access the information.</li> <li>(iii) Keeping audit trail</li> <li>(iv) Using policies and rules on who and when to access the details.</li> <li>(v) Avoiding writing the details on paper</li> </ul> <p style="text-align: right;"><b>Any 2 x 1 = (2 marks)</b></p>	<b>2</b>

10.	<p><b>Conversion of <math>9.25_{10}</math> to binary</b></p> $2 \overline{) 9}$ $2 \overline{) 4} \text{ Remainder } 1$ $2 \overline{) 2} \text{ Remainder } 0$ $2 \overline{) 1} \text{ Remainder } 0$ $0 \text{ Remainder } 1 \quad \checkmark$ <p><math>0.25 \times 2 = 0.5</math></p> <p><math>0.5 \times 2 = 1.0 \quad \checkmark</math></p> <p><math>9_{10} = 1001_{10}</math></p> <p><math>0.25_{10} = 0.01_2</math></p> <p><math>9.25_{10} = 1001.01_2 \quad \checkmark</math></p> <p style="text-align: right;"><b>(3 marks)</b></p>	3
11.	<p><b>Explain Distributed data processing:</b></p> <p>– A technique where data processing is divided into groups physically located at different sites but connected to a central location</p> <p style="text-align: right;"><b>(2 marks)</b></p>	2

12.	<p><b>Flowchart for computing the area of a triangle.</b></p>  <pre> graph TD     Start([Start]) --&gt; Read[/Read Base, height/]     Read --&gt; Process[Area = 1/2 Base x height]     Process --&gt; Display[/Display Area/]     Display --&gt; End([End]) </pre> <p style="text-align: right;">(3 marks)</p>	<p>✓ 1</p> <p>✓ 1</p> <p>✓ 1</p> <p>3</p>
13.	<p><b>Circumstances that may necessitate the use of a questionnaire in systems development</b></p> <ul style="list-style-type: none"> <li>- When there is need to cut costs.</li> <li>- When responses are urgently required.</li> <li>- When the audience population is large.</li> <li>- When the respondents require to be guaranteed anonymity.</li> <li>- When the respondents are scathed.</li> </ul> <p style="text-align: right;">Any 2 x 1 = (2 marks)</p>	<p>2</p>
14.	<p><b>Ways of saving costs through connecting computers to constitute a computer network</b></p> <ul style="list-style-type: none"> <li>- Less communication costs since the communication can be done across the network directly.</li> </ul>	

	<ul style="list-style-type: none"> <li>- Saving on labour since the network can be controlled from a single terminal by one person.</li> <li>- There is sharing of resources across the network thereby reducing the number of peripheral devices and services required.</li> </ul> <p style="text-align: right;"><b>Any 2x1 = (2 marks)</b></p>	<b>2</b>
<b>15.</b>	<p><b>Benefits that may be realized by using ICT to manage automobile traffic operations</b></p> <ul style="list-style-type: none"> <li>- There is accuracy of <i>time slices</i> allocated to traffic at a junction.</li> <li>- There is safety of officers handling traffic since they do not have to be on the road physically.</li> <li>- Data on traffic can be available for reference at any time.</li> <li>- Machines never get tired unlike humans so they maintain continuous control.</li> <li>- May be used to track vehicles involved in offences and crime.</li> <li>- ICT would maintain order on the roads and prevent traffic jam.</li> </ul> <p style="text-align: right;"><b>Any 3 x 1 = (3 marks)</b></p>	<b>3</b>
	<b>Section A total</b>	<b>40</b>

**SECTION B (60 Marks)**

*Question 16 compulsory and any other three*

NO	ANSWER	MARKS
16. (a)	<p><b>Ways used to identify the existence of errors in a program:</b></p> <p>(i) Desk check (dry run) – A manual technique for checking the logic of an algorithm</p> <p>(ii) Using the debugging tools that are provided in the computer</p> <p>(iii) Using test data to validate the desired input/output</p> <p align="right">Any 2 × 2 =(4 marks)</p>	4
(b)	<p>(i) The type of translator required in this model is an Assembler.</p> <p align="right">(1 mark)</p> <p>(ii) Reason for the conversion: To enable a computer to , the program during execution.</p> <p align="right">(2 marks)</p>	3
(c)	<p><b>Pseudocode</b></p> <ol style="list-style-type: none"> <li>1. Start</li> <li>2. Count = 0</li> <li>3. TotalFees = 0</li> <li>4. AmountPaid =0</li> <li>5. DiscountAmount = 0</li> <li>6. Read AmountPaid and Date</li> <li>7. If Date &lt;=opening date and AmountPaid =2000 then { {             <ol style="list-style-type: none"> <li>a) Discount = AmountPaid *0.14</li> <li>b) DiscountAmount = 2000- Discount</li> <li>c) TotalFees = Total Fees + DiscountAmount</li> <li>d) Total Discount = Total Discount + Discount}</li> </ol> <p>Else</p> <p>{</p> <ol style="list-style-type: none"> <li>e) TotalFees = Total Fees</li> <li>f) Total Discount = Total Discount</li> </ol> </li> </ol>	8

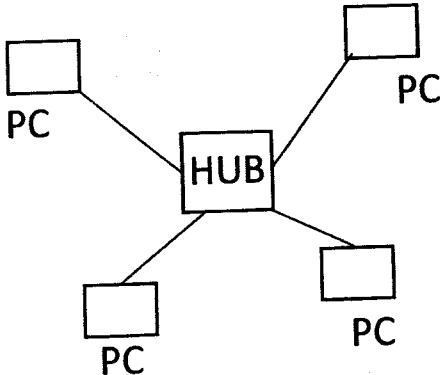


**SECTION B (60 Marks)**

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NO	ANSWER	MARKS
	<p>End if }}</p> <p>8. Count = Count + 1</p> <p>9. If Count &lt; 25 go to 3</p> <p>10. Print Total Discount, TotalFees</p> <p>11. Stop</p> <p><b>Marks distribution</b></p> <ul style="list-style-type: none"> <li>- Initialization (lines 2,3,4) @ <math>\frac{1}{2} \times 3 = 1\frac{1}{2}</math></li> <li>- Reading Amount paid &amp; Date (line 5) = <math>\frac{1}{2}</math></li> <li>- Condition (line 7) = 2</li> <li>- Computing total Discount ( = <math>\frac{1}{2}</math></li> <li>- Computing Net amount after Discount = <math>\frac{1}{2}</math></li> <li>- Computing cumulative sum after Discount = <math>\frac{1}{2}</math></li> <li>- Computing cumulative sum without discount = <math>\frac{1}{2}</math></li> <li>- Incrementing counter = <math>\frac{1}{2}</math></li> <li>- Checking until 25 to repeat (line 8) = 1</li> <li>- Printing Sum and Total Discount = <math>\frac{1}{2}</math></li> </ul> <p style="text-align: right;"><u><b>8 marks</b></u></p>	
17. (a)	<p><b>Benefits of using twisted pair cables in a local area network</b></p> <ul style="list-style-type: none"> <li>- The connectors are similar to those used in the telephone network hence it is easy to link the LAN to the telephone network.</li> <li>- The twisted pair cables are relatively easy to install since they do not require any special equipment to terminate.</li> <li>- Installation cost is cheap because the cost of the cable and associated accessories is low.</li> <li>- Guided media have relatively higher speeds of data transmission and better network utilization.</li> </ul> <p style="text-align: right;"><b>Any 3 x 2 = (6 marks)</b></p>	6

NO	ANSWER	MARKS
(b)	<p>(i) Diagram for star network topology</p>  <pre> graph TD     HUB[HUB] --- PC1[PC]     HUB --- PC2[PC]     HUB --- PC3[PC]     HUB --- PC4[PC] </pre> <p style="text-align: right;">2 marks</p> <p>(ii) Reasons that prompted for the use of star topology</p> <ul style="list-style-type: none"> <li>- The star topology is easy to set up since it requires only one cable for each computer.</li> <li>- In star topology if one computer breaks down, it doesn't affect the rest of the network.</li> <li>- It is easy to identify network faults.</li> <li>- It is easy to extend the network when need arises.</li> </ul> <p style="text-align: right;">Any 3 x 1 = (3 marks)</p> <p>(iii) Requirements needed to connect the network (LAN) to the internet.</p> <ul style="list-style-type: none"> <li>- ISP – Internet Service Provider who will provide internet services.</li> <li>- Router/Modem/Switch to be used to link the LAN to the internet.</li> <li>- Cables to link devices in the LAN to together.</li> <li>- Firewall to protect the network from intrusion.</li> </ul> <p style="text-align: right;">Any 2 x 2 = (4 marks)</p>	9

NO	ANSWER	MARKS
18. (a)	<p><b>Ways through which advancement in ICT has benefited national security</b></p> <ul style="list-style-type: none"> <li>- Keeping of records obtained from CCTV cameras aids in investigations and ascertaining evidence.</li> <li>- Surveillance cameras are used to help predict possible crime.</li> <li>- Offenders can be tracked as they escape and thereby block the escape routes.</li> <li>- Faster search of records helps in fast tracking prosecution of offenders.</li> </ul> <p style="text-align: right;"><b>Any 3 x 2= (6 marks)</b></p>	<b>6</b>
(b)	<p>Conversion of the binary number <math>1101.011_2</math> to its decimal number equivalent.</p> <p>1101.011</p> <p><math>1 \times 2^{-3} = \frac{1}{8} = 0.125</math></p> <p><math>1 \times 2^{-2} = \frac{1}{4} = 0.250</math></p> <p><math>0 \times 2^{-1} = 0 = 0.375</math></p> <p><math>1 \times 2^0 = 1</math> ✓</p> <hr style="width: 20%; margin-left: 0;"/> <p><math>0 \times 2^1 = 0</math></p> <p><math>1 \times 2^2 = 4</math></p> <p><math>1 \times 2^3 = 8</math> ✓</p> <p style="padding-left: 40px;">13</p> <p style="padding-left: 40px;"><u>=13.375<sub>10</sub></u> ✓</p> <p style="text-align: right;"><b>(3 marks)</b></p>	<b>3</b>
(c)	<p>(i) I. Formula to compute the mean of the scores</p> <p style="padding-left: 40px;">= <b>Average (C4:C38)</b> <span style="float: right;"><b>(1 mark)</b></span></p> <p>II. Number of scores exceeding 50</p> <p style="padding-left: 40px;">= <b>Count if (C4:C38&gt;50)</b> <span style="float: right;"><b>(2 marks)</b></span></p> <p>(ii) Display “pass” if the score is greater than or equal to 30 and “fail” if otherwise.</p> <p style="padding-left: 40px;">= <b>IF(C4&gt;=30, “Pass”, “Fail”)</b></p> <p style="text-align: right;"><b>(3 marks)</b></p>	<b>6</b>

NO	ANSWER	MARKS
19. (a)	<p><b>Unit of measure for:</b></p> <p>(i) Processor speed Hertz <span style="float: right;">(1 mark)</span></p> <p>(ii) Memory capacity Byte <span style="float: right;">(1 mark)</span></p> <p>(iii) Data transmission speed Bits per second (BPS) <span style="float: right;">(1 mark)</span></p>	3
(b)	<p><b>Functions of a query in a database.</b></p> <ul style="list-style-type: none"> <li>- Queries can be used to filter desired records based on some specified criteria.</li> <li>- A query may be used to perform computations based on field values within a table or on another query.</li> <li>- A query may be used to display records that are from different tables instead of displaying each from its own table.</li> <li>- A query can be used to update existing records as well as to delete unwanted records.</li> </ul> <p style="text-align: right;"><b>Any 3 x 2 = (6 marks)</b></p>	6

(c)	<p>(i) Directory tree structure for the folders created.</p> <pre> graph TD     STUDIES --&gt; ENG     STUDIES --&gt; MATHS     STUDIES --&gt; SWAHILI     ENG --&gt; LIT     ENG --&gt; LANG     SWAHILI --&gt; LUGHA     SWAHILI --&gt; FASIHI </pre> <p style="text-align: right;">@½ x 8 = (4 marks)</p> <p>(ii) Path for a file named Revision.Doc stored in the Lugha folder.  <b>D:/STUDIES/SWAHILI/LUGHA/:&gt;REVISION.DOC</b></p> <p style="text-align: right;">(2 marks)</p>	6
20. (a)	<p><b>Ways of protecting computer components from theft</b></p> <ul style="list-style-type: none"> <li>- Restricting access to the lab so that only accompanied learners access the room.</li> <li>- Use of monitoring cameras that will record all activities in the lab (CCTV).</li> <li>- Use of locks to block access to the internal components of the computer.</li> <li>- Imposing stiff penalties to any person who may be involved in theft of components.</li> <li>- Using physical security such as burglar proof doors and human security.</li> </ul> <p style="text-align: right;">Any 3x2 = (6 marks)</p>	6

(b)	<p><b>Benefits of computer knowledge to an engineer</b></p> <ul style="list-style-type: none"> <li>- Use of computer Aided Design software eases the work of an engineer during design.</li> <li>- Computers produce accurate documents than humans.</li> <li>- Computers can be used for teaching through simulation.</li> <li>- Work done during a computer may be re-used since only minor changes would be required.</li> </ul> <p style="text-align: right;"><b>Any 3 x 1 = (3 marks)</b></p>	<b>3</b>
(c)	<p><b>Challenges that a school may face by using wireless technology to link to the internet</b></p> <ul style="list-style-type: none"> <li>- The network is hard to control since any user who has the password can access the network.</li> <li>- The network lacks centralized control and therefore there could be data security issues.</li> <li>- It is not possible to control what particular categories of users can access, therefore some students may be exposed to inappropriate content.</li> <li>- Wherever there are many users accessing the internet, there is a likelihood of congestion which would slow the network.</li> </ul> <p style="text-align: right;"><b>Any 3 x 2 = (6 marks)</b></p>	<b>6</b>

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