**JOINT EXAMINATION**

**KENYA CERTIFICATE OF SECONDARY EDUCATION (KCSE)**

**451/1 - COMPUTER STUDIES - PAPER 1**

**(THEORY) – FORM FOUR**

**JUNE 2022**

MARKING SCHEME

## Section A (40 marks)

|  |  |  |  |
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| 1 |  | Why must food and beverages be kept out of the computer lab?  | ***[2 marks]*** |
| *Food droplets may attract rodents which may computer components more so cables while beverage may spill on metallic part therefore causing rust*  |
| 2 |  | State two key technological developments that occurred during the third generation of computers  | ***[2 marks]*** |
| 1. *Development of integrated circuits that combined several transistors*

*ii) Development of magnetic storage devices* |
| 3 |  | 1. What are toggle keys in relation to keyboards?
 | ***[1 marks]*** |
| *These are keyboard keys that can perform two different functions or any key that is used to turn a function on or off, or to switch between two functions. Examples are the caps lock key, number lock key and scroll lock key.*1. What type of keyboard would you prefer for the following and why? ***[4 marks]***

i) Visually impaired users: *Braille keyboards because they have touch overlays that are raised keys that can be felt by the fingers*ii) Busy restaurant: *Concept keyboards are used when fast input is needed and are ideally suited to selecting from a limited range of choices.* |
| 4 |  | State two differences between buffers and registers ***[4 marks]*** |  |
| *i) Buffers hold more than one piece of data while registers hold only one piece of data at a time**ii) Buffers are found in I/O devices and CPU while registers are only found in the CPU* |
| 5 |  | As a computer expert, you were approached by certain organization to help them secure some computers they require. You were keen at certain considerations based on the knowledge you have in computing. What would the following considerations imply? | ***[3 marks]*** |
| i) Software Authenticity: *It is the genuineness, validity and legitimacy of the software i.e. obtained from authorized source*ii) Multi-media capability *Ability of the computer to work with text, audio and visual*iii) Software portability *The ease of software to be installed or copied in multiple computers* |
| 6 |  | During class discussion, a Form One student was asked to present his findings on what Operating Systems perform in a computer. Explain four key points he will address. | ***[4 marks]*** |
| *i) Job scheduling – allocating processor time to various tasks following certain criteria**ii) Interrupt handling – dealing with breaks from the normal sequencing of operations when processing a task**iii) Error handling – recognizing any error that may occur and suggesting possible remedies* *iv) Memory management – organizing how memory locations shall be utilized by data and programs* |
| 7 | a | Differentiate between formula and function as used with spreadsheets. | ***[2 marks]*** |
| *Formula – user designed mathematical expression that create relationship with the referenced cells while a function in an inbuilt mathematical expression/formula that can be utilized by the user* |
| 8 | a | When working with database, one required to create relationship among the table structures. What is relationship in database? | ***[2 marks]*** |
| *It is an association between tables that are created using join statements to retrieve data or is a situation that exists between two relational database tables when one table has a foreign key that references the primary key of the other table* |
|  | b | State **three** purpose of establishing relationship among tables. | ***[3 marks]*** |
| * *It establishes a connection between a pair of tables that are logically related to each other.*
* *It helps to refine table structures and minimize redundant data.*
* *It enables retrieval of data from multiple tables easy*
 |
| 9 |  | Most spreadsheets usually accept certain type of data to be entered into the worksheets. Outline four types of these data. | ***[2 marks]*** |
| * *Values*
* *Labels*
* *Formulae*
* *Functions*
 |
| 10 | a | Outline four benefits of using word processors over manual typewriters* *Efficiency.*
* *Documents can easily be sent electronically.*
* *It is easier to make changes to your documents.*
* *Spell checking/Gramma checking.*
* *Insert images and art in documents*
* *Documents can be saved for future reference electronically*
 | ***[2 marks]*** |
|  | b | Differentiate between the following |  |
|  |  | 1. Merging and splitting cells in word processor table
 | ***[2 marks]*** |
| *Merging – combining more than one cell, row or column while splitting cell is the sub-division of a cell into more cells, rows or columns* |
|  |  | 1. Data source and main document in mail merge ***[2 marks]***
 |  |
| *Data source – list of recipients of the personalized documents while main document is the document that contain the universal information shall be received by all recipients*  |
| 11 |  | Why are system analysts referred to as change agents in an organization? | ***[1 marks]*** |
| *They initiate a change from one system to another within an organization*  |
| 12 |  | Why would one defragment his storage media? | ***[1 marks]*** |
| *So as to group data that are related to each other in one particular location to enable fast access of such data and information* |
| 13 |  | What is the meaning of the phrase ‘syntax error’ as used with computer programming? | ***[1 marks]*** |
| *These are errors that are committed when the program code does not conform to the rules of a particular programming language* |
| 14 |  | Why are repeaters necessary when setting up a large network? | ***[1 marks]*** |
| *They receive weak signal from one segment, clean, boast and then retransmit to the next segment* |
| 15 |  | State one major reason why organizations are opting for telecommuting . | ***[1 marks]*** |
| * *It saves on the office space* *and allows workers to work at their convenient times*
* *It also reduces the office conflicts that may be encountered by staff*
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| Section B (60 marks)Answer question 16 and any other three questions |
| 16 | a | State **two** distinct differences between compilers and interpreters. | ***[2 marks]*** |
| * *Compilers translate the entire source code at once before execution while interpreters translate source code one statement at a time*
* *Compiled codes can be saved and run when required while interpreters translate the code each time the program is to run*
* *Compiled codes require more memory while interpreted codes require less memory*
 |
|  | b | 1. Outline three demerits of using low level programming languages
 |  |
|  |  | * *They are machine dependent and therefore not portable*
* *Require well trained personnel to develop and maintain them*
* *Are difficult and cumbersome to learn and use*
* *Debugging is difficult*
 | ***[3 marks]*** |
|  |  | (ii) Differentiate between monolithic and modular programs  | ***[2 marks]*** |
| *A monolithic program that is self-contained and independent from other computing applications while modular program is a program that is divided into a set of loosely coupled functional units (named modules) that can be integrated into a larger program* |
|  | c | Study the following statements and answer the questions that follow | ***[7 marks]*** |
| ***Start****Initialize x to 3 and y to 4**Count = 1**While Count <=10**Increment x by 1**Multiply y by 2 and subtract ½* *Add x to y to attain z**Increase the value of Count by 2**Endwhile**Print the values for x, y and z****Stop*** i) What does the above statements represents? ***[1 mark]****Pseudocode*ii) What is the value for y and z ***[1 mark]*** *y = 112.5 and z = 120.5*ii) Implement the above statements using a program flowchart ***[6 marks]***Start X = 3Y = 4Count = 1Count <= 10?X = x + 1Y = (Y + 2) – ½ Z = X + YCount = Count + 2Print X, Y and ZStop  |

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| 17 | a | Outline three ways +4 denary can be represented in a computer | ***[3 marks]*** |
| *i) Prefixing an extra bit – (0)100**ii) Ones complement – 011**iii) Twos complement - 100* |
|  | b | Use one’s compliment to represent -610 in 8-bits formation. | ***[2 marks]*** |
| *610 = 1102**8-bit notation = 00000110**Ones complement = 11111001* |
|  | c | Briefly explain how data are represented on a floppy disk | ***[2 marks]*** |
| *By rearranging the magnetic dipoles within the domains. Dipoles facing one direction would be interpreted as 1s and those in opposite directions as 0s* |
|  | d | Differentiate between wavelength and frequency of a signal | ***[2 marks]*** |
| *Wavelength is the distance between two successive peaks of a signal while frequency is the number of complete oscillations/cycles made within one second by a signal* |
|  | e | Describe each of the following computer terminologies as used in data representation | ***[4 marks]*** |
| 1. Word

*A combination of two or more bytes*1. Bit

*Binary digits that is either 1 or 0*1. Byte

*Combination of 8 consecutive bits that forms a character*1. Nibble

*It is a half a byte or 4 consecutive bits* |
|  | f | Convert 9.62510 to binary | ***[2 marks]*** |
|  |  |

|  |  |
| --- | --- |
| *Integral part* | *Fractional part* |
| *2* | *9* | *0.625 x 2 = 1.25* |
| *2* | *4 rem 1* | *0.250 x 2 = 0.50* |
| *2* | *2 rem 0* | *0.500 x 2 = 1.00* |
|  *2* | *1 rem 0* |  |
| *2* | *O rem 1* |  |
| *= 1001* | *= 0.101* |

 *The answer is 1001.1012* |  |
| 18 | i | A school intends to network its computers in the computer laboratory. Outline three benefits that this would bring to the lab users | ***[3 marks]*** |
| * *Allows scarce resources to be shared among the users*
* *Facilitate remote communication*
* *Allows distributed processing*
 |
|  | ii | 1. What is signal attenuation?
 | ***[1 mark]*** |
| *It is a situation whereby the signal losses it strength and magnitude as it moves along the transmission media* |
|  |  | 1. State **three** advantages unbounded media
 | ***[3 marks]*** |
| * *Can span large geographical area*
* *It is easier to expand the network coverage*
* *One doesn’t need to maintain the line of sight*
 |
|  | iii | Network servers run a special type of operating system. State four key functions that this kind of operating system perform | ***[4 marks]*** |
| * *Produce logs*
* *Allows scarce resources to be accessed by various users/applications*
 |
|  | iv | International Organization for Standardization, ISO developed Open System Interconnection, OSI reference model to help in developing network protocols. State the first four layers of this model. | ***[4 marks]*** |
| * *Physical layer*
* *Data link layer*
* *Network layer*
* *Transport layer*
 |
| 19 |  | Otieno was tasked with entering marks for a certain exam that was done by an entire class.  |  |
|  | a | State two types of errors he is likely to encounter during this exercise * *Transposition*
* *Misreading*
 | ***[2 marks]*** |
|  | b | How can the above identified errors be avoided? | ***[1 mark]*** |
| * *Using devices that capture directly from the source*
* *Designing user interfaces that minimizes chances of wrong entries*
 |
|  | c | Other than the errors identified above, list two other errors that can be encountered during data processing | ***[1 mark]*** |
| * *Truncation*
* *Rounding*
* *Overflow*
 |
|  | d | 1. A certain research institution had his staff collect data from the field. The collected data are then surrendered to the central location where they are processed as a unit over a period of term. What processing mode is being used?

 *Batch processing*1. State one merit of this mode. ***[1 mark]***
* *Cheaper to produce a whole batch of a product than a single item at a time.*
* *Machinery can be utilized more efficiently, therefore saving money for the business.*
* *Reduces the risk of concentrating on one product and allows for flexibility.*
* *It is not labour intensive*
 | ***[1 mark]*** |
|  | e | Describe data integrity. | ***[1 mark]*** |
| *It is the completeness and validity of data entered in a computer for processing* |
|  | f | There are so many ways that can be used to reduce threat to data integrity. Mention any two | ***[2 mark]*** |
| * *Using direct capture devices*
* *Backing data on separate location/external storage devices*
* *Controlling access to data by putting security measures*
* *Using error detection and correction software when transmitting data*
* *Designing user interfaces that minimize chances of entry of invalid data*
 |
|  | g | Give the best file organization employed by Magnetic tapes and SD Cards.*SD Card – Random/Direct**Magnetic tapes - Serial* | ***[2 mark]*** |
|  | h | 1. The school’s LAN is done using UTP cable. List **two** advantages of using this type of cable.
* *Cheaper because of mass production*
* *Installation equipment used are usually cheap*
* *Easier to set up a network as they readily available*
1. List **two** advantages of using fibre optic cable in networking ***[2 marks]***
* *Fast and support high bandwidths*
* *Smaller and lighter*
* *Suffer low attenuation hence suitable for use as backbone*
* *Immune to electromagnetic interference and eavesdropping*
* *Can be used in highly flammable systems*
 | ***[2 mark]*** |
|  | i | Data flows in the school’s LAN in a duplex manner. List **two** other modes of data transmission in a network* *Simplex*
* *Half duplex*
 | ***[1 mark]*** |

|  |  |  |  |
| --- | --- | --- | --- |
| 20 | a | 1. Outline **three** threats to data stored in a computer
 | ***[3 mark]*** |
| * *Virus*
* *Unauthorized access*
* *Sabotage*
 |
|  |  | 1. Database design can take several forms depending on the user’s needs. Explain two models that one can use
* *Network*
* *Hierarchical*
* *Relational*
 | ***[2 marks]*** |
|  | b | The following is a spreadsheet relating to a retailer.If the Tax Rate is applicable to all items listed, write a formula that can be entered in cell E2 and can be copied along the column to get the tax for other items*=D2 \* $B$7* | ***[2 marks]*** |
|  | c | 1. Study the passage below

**Raila Amolo Odinga** (born 7 January 1945) is a Kenyan politician who served as the [Prime Minister of Kenya](https://en.wikipedia.org/wiki/Prime_Minister_of_Kenya) from 2008 to 2013.He is assumed as the [Leader of Opposition](https://en.wikipedia.org/wiki/Leader_of_the_Opposition) in Kenya since 2013 as the [New Constitution of Kenya](https://www.klrc.go.ke/index.php/constitution-of-kenya/124-chapter-eight-the-legislature/part-3-offices-of-parliament/276-108-party-leaders) does not prescribe for such a position. He was the Member of Parliament (MP) for [Langata](https://en.wikipedia.org/wiki/Langata_Constituency%22%20%5Co%20%22Langata%20Constituency) from 1992 to 2007. Raila Odinga served in the [Cabinet of Kenya](https://en.wikipedia.org/wiki/Cabinet_of_Kenya) as Minister for Energy from 2001 to 2002, and as the Minister for Roads, Public Works and Housing from 2003 to 2005. Odinga was appointed [High Representative for Infrastructure Development](https://en.wikipedia.org/wiki/African_Union_High_Representative_for_Infrastructure_Development) at the [African Union Commission](https://en.wikipedia.org/wiki/African_Union_Commission) in 2018.Outline four formatting styles that have been applied to the passage* *Indentation*
* *Bold facing*
* *Double strikethrough*
* *Underline*
 | ***[2 marks]*** |
|  | d | List **three** career opportunities in the field of ICT. | ***[3 marks]*** |
| * *Database administrators*
* *Network managers*
* *Computer technicians*
* *Trainers*
* *System analysts*
 |
|  | e | Outline **three** services offered on the internet. | ***[3 marks]*** |
| * *E-mails*
* *E-commerce*
* *E-learning*
* *Chats*
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