**MOKASA EXAMINATION**

**Kenya certificate of secondary education**

**451/1 - COMPUTER STUDIES – Paper 1**

**THEORY**

 **DECEMBER 2021 – 2½hrs**

**MARKING SCHEME**

**Section A (40 Marks)**

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

1(a). As you type an entry it is displayed in the formulae bar. Entries into a worksheet can be classified into four data types. List any four of these data types. 2 Marks

* *Labels*
* *Values*
* *Formulae*
* *Functions*

(b) Differentiate between functions and formulae 2 Marks

* *Formulae are mathematical expressions that calculate or compares values entered in a cell.*
* *Functions are predefined formulae that are provided by excel to perform simple to complex calculations.*

**2.**(a) Differentiate between the following formatting elements 2 Marks

(i) Justification

(ii) Indenting

*Justification means that paragraphs are aligned evenly along the left and right margins*

*Indenting is the distance or blank spaces used to separate a paragraph with the left or right margins*

3.Define virtual reality 1 Mark

*Virtual reality refers to a condition in which a person becomes psychologically immersed into an artificial environment generated by a computer system*.

(b) List any four sensory elements in virtual reality 2 Marks

* *Head mounted display*
* *Hand gloves*
* *Body suits*
* *Virtual reality software*

4. Computer technology has evolved over time. Outline two future trends in computer and information technology 2 Marks

* *Rapid evolution in hardware software and software*
* *Artificial intelligence*
* *Expanded information superhighway*

5 Internet is an important resource. Although it has brought with it some challenges. State two measures that can prevent students from accessing pornography and dirty sites. 2 Marks

* *Using filter programs like cyber-Patrol*
* *Cybersitter*
* *Net nanny*
* *Firewall*
* *Proxy software*

*6.* Computer laboratory should be setup with safety precautions in mind. Outline four measures that can be put in place to protect the users.

 2 Marks

*All cables should be insulated*

*Cables should be laid away*

*Provide a standard furniture*

*Providing antiglare screens*

*The walls of the computer room should not be painted with overbright reflective oil paints*

*Overcrowding should not be allowed*

*Screens should face away from the window to avoid glare caused by bright background*

*Fitting the curtains*

7. Arithmetic and logic unit and the main memory use electrical pathways called buses. Describe any two of these buses. 2 Marks

* *Control buses: This is the pathway for all timing and controlling functions sent by the control unit to other parts of the system.*
* *Address bus: This is the pathway used to locate the storage positions in memory where the next instruction data to be processed is held.*
* *Data bus: Pathway where actual data to be processed is held.*

8. Distinguish between the following wireless interfaces. 2 Marks

(i) Infrared

(ii)Bluetooth

* *Infrared is a wireless interface that uses infrared to connect to infrared enabled devices*
* *Bluetooth uses short range radio broadcast to connect to any Bluetooth enabled device.*

9. Explain the term solid state giving two examples 2 Marks

*Solid state is a non- volatile storage that employs integrated circuits rather than mechanical, magnetic or optical technology. They do not have movable parts. Examples memory sticks, SD cards and flash pen drives*

10.(a) Software can be acquired using different methods, State four advantages of using standard software 2 Marks

* *They can easily be installed and run*
* *They are cheaper than inhouse developed software*
* *They are readily available for almost any task*
* *They can easily be modified to meet users’ needs*
* *Minor or no errors since they are thoroughly tested*

(b) Define the terms listed below as used in desktop publishing 3 Marks

(i) Master Page

Page used to design a common layout to be applied in other pages of the publication.

(ii) Gradient

*A gradient is a****multicolor fill in which one color gradually changes into another color.*** Gradient A function in graphic software that permits the user to fill an object or image with a smooth transition of colors. Graphic Design Visual communication using text or images to represent an idea or concept

(iii) Cropping

Hiding parts of the graphic that you do not want to be printed.

11*.* Data can ether be discrete or continuous. Distinguish the two terms.

 2 Marks

*Discrete represents data using a two state while continues data is in continuous form that varies,*

*12.*As opposed to buffers registers hold one piece of data at a time. Differentiate between storage and address registers 2 Marks

* *Address registers: holds the next piece of data waiting to be processed*
* *Storage: hold a piece of data that is on its way to and from the CPU and the main memory.*

13. List two examples of fourth generation languages and two features of fifth generation languages 2 Marks

*(a)Visual Basic, Delphi Pascal, Focus, Postscripts, SQL*

*Fifth generation language are rule based*

*(b)Designed around solving by enabling the computer to mimic human intelligence*

*Solves problems at hand*

14(a). An operating system basically consist of two main parts namely; Shell and Kernel. List any three functions of an operating system 3 Marks

* *Processor Scheduling*
* *Resource allocation*
* *Memory Management*
* *Input/Output Management*
* *Communication Control and Management*
* *Error handling*
* *Interrupt handling*

(b) Define a foreign key and list any two kinds of relationships in tables 3 Marks

A foreign key is a field in a table that matches the primary field of another table.

* *One to one relationship*
* *One to many relationship*
* *Many to many relationship*

15.Describe radio communication and list the different kinds of radio waves 3 Marks

*(a)Radio waves are omnidirectional. They start from a central point and spread outwards in all directions. As they travel onwards, their energy spreads outwards over the covered area. The waves are radiated into the atmosphere by a radio frequency antenna at constant velocity.*

*(b)Radio waves can be:*

* *High frequency*
* *Very high frequency*
* *Ultra high frequency*

**SECTION B (60 Marks)**

*Answer question* ***16*** *and any other* ***THREE*** *questions from this section in the spaces provided.*

16.Due to the diversity and advancements in writing computer programs, many programming languages have been developed and made more user friendly. Programs written in high level programming languages need to be converted into a form that the computer can understand.

1. State one advantage of using the translators listed below
2. Assembler
* Display flexibility.*By writing in assembler language, you gain direct access to the 3270 data-stream commands.*
* Interaction with other commands. *These include timed events or completion of commands under another task.*
* *It allows complex jobs to run in a simpler way.*
* *It is memory efficient, as it requires less memory.*
* *It is faster in speed, as its execution time is less.*
* *It is mainly hardware-oriented.*
* *It requires less instruction to get the result.*
* *It is convenient for critical jobs.*
1. Compiler
* *Compiled programs run quickly*
* *Compilers optimise code.*
1. Interpreter
* *Instructions are executed as soon as they are translated.*
* *Errors can be quickly spotted*

Or any other correct responce

Advantage @ 1 Mark

Total = 3 \*1 Mark

= 3 Marks

1. State any two qualities of a good flowchart
* *There should be only one entry/ starting point and one exit point of the program flowchart*
* *Use the correct symbol at each stage in the flowchart*
* *The logical flow should be clearly shown using arrows*

Or any other correct responce

Quality @ 1 Mark

Total = 2 \*1 Mark

= 2 Marks

1. Study the flow chart below and use it to answer the questions that follows;

STOP

Print “out of Cash”

YES

YES

NO

NO

1. State the output of the above program flowchart for the inputs given below (4 Marks)

Amount = 15,000, 14,000 and 23,000 respectively

|  |  |  |  |
| --- | --- | --- | --- |
| **Balance** | **Amount** | **New Balance** | **Output** |
| 34000 | 15000 | 19000 | “New Balance”, Balance |
| 19000 | 14000 | 5000 | “New Balance”, Balance |
| 5000 | 23000 | -17000 | “Out of Cash” |
|  |  |  |  |

1. State the purpose of the flowchart

*The flowchart is used to check the account balance and allow withdrawal if the balance is more than 0. Withdrawal is done only three times*

Purpose @ 2 Marks

1. Write a pseudocode for the flowchart in question (16. c) above (4 Marks)

Start

Balance=34000

For count =1 to 3 do

Input amount

Balance = Balance – Amount

If Balance>= 0 then

Print “New Balance”, Balance

Else

Print “out of cash”

End if

End for

Print “limit reached”

Stop

17.Signed binary numbers can be represented using different methods to indicate if a number is positive or negative.

1. How can -2310 be represented in; (6 Marks)
2. Signed Magnitude

*23 – 101112*

*= (1)00101112*

1. Ones complement

*1s C = 01000*

*Or*

*8 bit – 11101000*

1. Twos complement

*10111 – 01000*

*+ 1*

 *010012*

*Or*

*00010111 – 111010002*

 *+ 1*

 *111010012*

1. Convert the hexadecimal number C7D16 to its equivalent decimal number (2 Marks)

*C – 1216*

*7 – 716*

*D – 1316*

*(12\*162) + (7\*16) + 13*

*3072 + 112 + 13 = 319710*

*OR*

*C-1100*

*7-0111*

*D-1101*

*C7D16 = 1100011111012*

*(1\*211) + (1\*210) + (1\*26) + (1\*25) + (1\*24) + (1\*23) + (1\*22) + (1\*20)*

*2048 + 1024 + 64 + 32 + 16 + 8 + 4 + 1*

*= 319710*

1. Perform the binary arithmetic below; (4 Marks)
2. 1001012 + 110112 + 10112

 *1001012*

*+ 110112*

*10000002*

*+ 10112*

*10010112*

1. 1110112 – 1001112

 1110112

- 1001112

 0101002

1. Using the twos compliment and 8-bit notation subtract 27 from 12 leaving your answer in decimal notation (3 Marks)

27 – 110112 – 000110112

12 – 11002 – 000011002

1s C of 27 – 111001002

 +1

2s C of 27 – 111001012

 + 000011002

 111100012

(1\*27) + (1\*26) + (1\*25) + (1\*24) + (1\*20)

- 128 + 64 + 32 + 16 + 1

- 128 + 113

= - 1510

18.With the introduction 0f the internet services, communication has been made cheaper and faster hence reducing the world into a global village.

1. Distinguish between a hyperlink and a hypertext

*Hypertext is the non-linear representation of the data which when clicked redirects you to some other page. On the other hand, the hyperlink is the link embedded in the hypertext to which the control is transferred.*

Difference @ 2 Marks

1. Define the term login as used in internet

*login is****the procedure used to get access to an operating system or application****, by providing the correct credentials such as username and password*

Definition @ 1 Mark

1. Draw a well labelled diagram for thinnet coaxial cable (5 Marks)



1. State any two reasons why the fibre optic cable is preferred for data transmission over the other cables (2 Marks)
* *Fiber optic transmission is faster. ...*
* *Fiber optic transmission can cover greater distances. ...*
* *Fiber optic cables are impervious to electromagnetic interference (EMI) ...*
* *Save space and enhance cable management. ...*
* *Fiber optics are future-proof.*
* ***Extremely High Bandwidth****:*
* ***Low Security Risk****:*
* ***Light Weight****:*

Or any other correct responce

Reason @ 1 Mark

Total = 2 \*1 Mark

= 2 Marks

1. Protocols are set rules that govern transmission of data between two devices, state the purpose of the protocols listed below;
2. SMTP

*Simple mail transfer protocol – an internet protocol for transferring e-mails*

Purpose @ 1 Mark

1. TCP

*Transmission control protocol – this is responsible for delivery of sequenced data over the network*

Purpose @ 1 Mark

1. State the functions of the following network communication devices
2. Hub

*The only function of the hub is repeating the electrical signals received on one port, relaying those signals to all other connected ports.*

1. NIC

*A network interface card connects your computer to a local data network or the Internet. The card translates computer data into electrical signals it sends through the network;*

1. Bridge

*A*bridge*is used to connect multiple LAN segments together, forming multiple collision domains.*

Or any other correct responce

Function @ 1 Mark

Total = 3 \*1 Mark

= 3 Marks

19.Data processing helps organizations make informed decisions and rely on accurate information.

1. Differentiate between the mechanical and manual data processing methods

*In Manual systems, the transactions are recorded on the source documents, which are taken to the data processing department for processing. Human beings work on source documents mentally or with the aid of some simple manipulation tools.*

***Mechanical systems*** *are data processing systems whose activities are carried out by Keyboard devices operated by human beings. Data is keyed in by the Machine operator, manipulated by the machine, and the output is obtained in form of printed documents.*

Difference @ 2 Marks

1. State the difference between a sort file and a reference file as used in data processing

*A sort file stores data which is arranged in a particular order usually where data is to be processed sequentially While A reference file is mainly used for reference or look-up purposes for information needed for processing*

Difference @ 2 Marks

1. State any two differences between the real time processing mode and interactive processing mode

*In real-time data processing, the computer processes the incoming data as soon as it occurs updates the transaction file, and gives an immediate response that would affect the events as they happen while Interactive processing occurs if the computer & the terminal user can communicate with each other. It allows a 2-way communication between the user & the computer whereby the user respond determines the next processing step.*

Difference @ 2 Marks

1. State one advantage two disadvantages of random file organization

*Advantage*

1. *Records can be accessed sequentially or randomly.*
2. *Accessing of records can be fast, if done randomly.*
3. *Records are not duplicated.*

*Disadvantage*

1. *Accessing of records sequentially is time consuming.*
2. *Processing of records sequentially may introduce redundancy/idleness.*
3. *Required expensive storage medium.*

Or any other correct response

Advantage @ 1 Mark

Disadvantage @ 1 Mark

Total = 2 \*1 Mark

2 Marks + 1 Mark

= 3 Marks

1. Information is the most valuable asset of an organization that needs to be safe guarded. State any three measures to be considered in maintaining data integrity.
2. *Accuracy of data*
3. *Relevance of data*
4. *Timeliness of presenting the data*

Or any other correct response

Measure @ 1 Mark

Total = 3 \*1 Mark

= 3 Marks

1. As Jayden was entering data into the computer, He typed byocott instead of boycott.
2. Identify the type of error made by Jayden

*Transposition error*

Error @ 1 Mark

1. Other than using direct data entry devices, two other methods Jayden can use to avoid the error
* *Double entry of data for validation and verification*
* *Using error detection and correction software*

Or any other correct response

Method @ 1 Mark

Total = 2 \*1 Mark

= 2 Marks

20.The success of a system development project depends on the type of model used to develop.

1. Define the term prototype as used in systems development

A prototype is an early sample, model or release of a product created to test a concept or process.

Definition @ 1 Mark

1. State any two disadvantages of prototyping
* *Insufficient analysis:*
* *User confusion:*
* *Developer misunderstanding of user objectives:*
* *Excessive Development Time:*

Or any other correct responce

disadvantage @ 1 Mark

Total = 2 \*1 Mark

= 2 Marks

1. State any two characteristics of a system
* *Boundary and Environment*
* *The components of a system work towards a collective goal. (purpose)*
* *Systems do not operate in complete isolation (Inputs and output)*
* *Systems can be complex and can be made up of other smaller systems (subsystems)*
* *Systems have life cycle (system entropy)*
* *Subsystems in an information system interact by exchanging information (Process)*
* *The linkage or coupling between subsystems varies*
* *Systems are hierarchical (holistic thinking)*

Or any other correct responce

Characteristics @ 1 Mark

Total = 2 \*1 Mark

= 2 Marks

1. State the consequences of having a poorly designed system
* **Future Scalability**
* **It is not possible to post design quality.**
* **Future Ghost Problems.**
* **Future Operational Efficiency.**

Or any other correct responce

Consequences @ 1 Mark

Total = 3 \*1 Mark

= 3 Marks

1. State any three approaches used by an organization to develop a system
* *Traditional approach*
* *Structured approach*
* *Object-oriented approach*

Or any other correct responce

Approach @ 1 Mark

Total = 3 \*1 Mark

= 3 Marks

1. The operating system has the fundamental task of managing the disk with the aim of optimizing the performance of the computer
2. State the function of a formatting tool as used in disk management

*It is a utility software used to manage the process of preparing a magnetic data storage device such as a hard disk for data storage*

Function @ 1 Mark

1. State what happens during a check disk operation (2 Marks)
* *Checks for any damage on the disk surface and marks it as a bad sector*
* *Checks on the validity and integrity of the file system*
* *checks files, file indexes, and security descriptors*

Or any other correct responce

Operation @ 1 Mark

Total = 2 \*1 Mark

= 2 Marks

1. Define the term trouble shooting as used in computing (1 Mark)

*Troubleshooting is a form of problem solving, often applied to repair failed products or processes on a machine or a system. It is a logical, systematic search for the source of a problem in order to solve it, and make the product or process operational again.*

Definition @ 2 Marks