***Kenya Certificate of Secondary Education.***

**FORM 3**

**OPENER EXAMINATION TERM 3, 2022**

**SEPTEMBER 2022 451/1**

**COMPUTER STUDIES MARKING SCHEME**

**SECTION A (40 MARKS)**

1. **Explain how each of the following would affect the suitability of a room for use** as a computer room.

(a) Burglar proofed door- *enhances the security system as it prevents* (1mk)

* *Unauthorized users from entering*

(b) Availability of taps and sinks in the room

* *Could be detrimental since water can cause damage to computer equipment*  (1mk)
1. Distinguish between special purpose keys and editing keys on a keyboard. (with an example) (3mrks)
* *Special purpose keys are used in combination with other keys to give certain commands to a computer e.g Ctrl+Esc used to display the start menu. While Editing keys are used to delete or insert characters in a document. E.g insert key*
1. Two features of Von Neumann architecture are the use of registers and the use of buses.

Give the names of any **two** registers and **two** buses. (2 marks)

**Registers**

**Any two from:**

* *PC (Program Counter)*
* *MAR (Memory Address Register)*
* *MDR (Memory Data Register)*
* *CIR or IR ((Current) Instruction Register)*
* *ACC (Accumulator)*

**Buses**

**Any two from:**

* *control*
* *data*
* *address*
1. Nicolae needs to send 30 photos to a friend and he chooses to send all 30 together as a single email attachment. Each photo is 1.8 MB in size, but the maximum possible attachment size is only 20 MB. State how Nicolae can solve this problem. (2mrks)

*Any one from:*

* *send as JPEG files*
* *carry out a file compression first*
1. What is portability and Authenticity in relation to software specification? (2mrks)
* *Portability refers to whether a program can be copied or installed in more than one computer. While*
* *Authenticity refers to genuineness, validity and or legitimacy of software*
1. Describe each of the following data processing methods (3mks)

(i) Batch processing

* *Transactions are collected and the processed at a pre- specified time. Once processing begins no amendments can be made.*

(ii) Distributed processing

* *Data processing where computations and data storage are spread out geographically among the computers on a network*

Multiprogramming- Running of two or more programs simultaneously

1. (a) Distinguish between firmware and device drivers as used in computers. (2mrks)
* ***Firmware****is a software program permanently etched into a hardware device such as a keyboards, hard drive, BIOS, or video cards.*
* ***Device******drivers****are operating system-specific and hardware-dependent. A device driver acts as a translator between the hardware device and the programs or operating systems that use it.*
* ***Firmware****is a software that controls a system, and firmware's functionality ranges from performing basic tasks like minimal I/O controls to full-fledged software system running with simple or no OS, with scheduler, memory management, etc.*
* *A****driver****on the other hand, is usually part of the operating system that performs specific task of controlling a hardware component like display or usb controller, etc., and gives a interface to use the hardware by Operating system and applications.*

 (b) Distinguish between customized and custom made software. (2 marks)

* *Customized software is general-purpose software which has been modified to better meet the needs of an individual or organisation, for example, using macros. While Custom-written (tailor-made) software is software written to meet the specific needs of a specific company or organisation; it is therefore expensive and highly specialized.*
1. What is the difference between system files and application files? Give examples. (3 marks)
* *System files contain information that is critical for the operation of the computer e.g. win.com while application files hold programs and are executable Winword.exe.*
1. Differentiate between the terms **upgradability** and **compatibility** in relation to hardware specification. (2 marks)
* ***Upgradability****is a term that describes adding new****hardware*** *in a computer that improves its performance. while*
* *A***hardware compatibility***refers to the ability of given hardware that is***compatible***with (work with) a particular operating system or device management software.*
1. State two differences between Disk Operating System (DOS) and WINDOWS operating system. (2 marks)
* *DOS is command driven while Windows is GUI driven*
* *DOS is difficult to learn and use while Windows is easier to learn and use.*
1. Publishing firms prefer using DTP instead of Word processors. Giveany TWO reasons for this. (2 marks)
* *A DTP software gives the user more tools and control of the page layout, text manipulation and graphic design than a word processor.*
* *A DTP program gives you more control over the graphics in a publication. You can:*
* *Has a wide range of Fonts & print sizes that can be merged with useful symbols, such as arrows and stars.*
* *Has Columns of various widths, in which the text is fitted automatically using sensible hyphenation. The columns can also be reorganization automatically.*
1. Banks have replaced each credit card with a smart card, which contains a microchip, in order to give greater protection against fraud. State **three** items of data that are stored on the microchip in a smart card. (3 marks)

*Any three from:*

* *biometric data e.g. retina scan, fingerprints*
* *PIN code/ID code*
* *bank details e.g. account number, sort code*
* *holders card limit*
* *record of transactions made within this limit*
1. Explain how one can manage his/her disks using windows. (3mrks)
* *Formatting disks*
* *Scanning a storage devices for problem*
* *Using disk defragmenter- contents to rearrange*
* *Compressing the storage media*
* *Backing up data*
* *Partitioning a disk*
1. Define the following terms as used in data representation. (4mrks)
* *Amplitude: - the maximum value a wave can attain*
* *Frequency: - the number of cycles made by a wave in one second*
* *Nibble: - half a byte (4 bits)*
* *Byte: - a group of 8 bits*
1. Failure of information systems is a major concern in the security of data in computing systems. State **two** causes of such failure. (2mrks)
	* *Hardware failure due to improper use.*
	* *Unstable power supply as a result of brownout or blackout and vandalism.* o *Network breakdown*
	* *Natural disaster*
	* *Program failure/crash*

**SECTION B (60 MARKS)**

***Answer Question 16 (compulsory) and any other THREE questions from this section.***

1. a) Give three types of errors that may be detected during program testing (3mrks)
* *Syntax errors*
* *Logical errors*
* *Runtime errors*

b) State any three activities that occur in a program compilation process. (3mrks)

* *Program code converted into machine language (translation of source program to object code)*
* *Program is debugged (checked for syntax errors)*
* *Executable format of file is created Testing of the program*

c) A program is needed for calculating the average age of students in a class. Write a pseudocode that will read the age of the students and calculate the average age. The program should terminate if the value of 999 is entered for age and output the number of times the statements within the loop were executed. (9 marks)

|  |  |
| --- | --- |
|  |  |

|  |  |
| --- | --- |
| *START* | *½* |
| *SUM = 0* | *½* |
| *COUNT = 0* | *½* |
|  *PRINT “ENTER AGE”* |
|  *READ AGE* | *½*  |
| *WHILE AGE<>999 DO* | *1* |
|  *SUM = SUM + AGE* | *1* |
|  *COUNT = COUNT + 1* | *1* |
|  *PRINT “ENTER AGE”* |
|  *READ AGE* |  |
| *ENDWHILE* |  |
|  *AVERAGE = SUM / COUNT* | *1* |
|  *PRINT COUNT* | *1* |
|  *PRINT AVERAGE* | *½*  |
| *STOP* | *½* |
| *LOGIC* | *1* |
| ***TOTAL*** | ***9*** |

1. (a) Subtract 01112 from 10012 (2mrks)

 00102

(b) Using two’s compliment, subtract 7 from 17 and give the answer in

decimal notation (4mks)

 17= 100012

7 = 001112

 -7 in two’s compliment is 111001

 ∴010001

 111001

 + (1)001010

 (c) Convert (3mks)

 (i) 91B16 to octal

|  |  |  |
| --- | --- | --- |
| 9 | 1 | B |
| 1001 | 0001 | 1011 |

|  |  |  |  |
| --- | --- | --- | --- |
| 100 | 100 | 011 | 011 |
| 4 | 4 | 3 | 3 |

 91B16 = 44338

 (ii) 3768 to hexadecimal (3mks)

|  |  |  |
| --- | --- | --- |
| 3 | 7 | 6 |
| 011 | 111 | 110 |

|  |  |  |
| --- | --- | --- |
| 0000 | 1111 | 1110 |
| 0 | F | E |

 3768 = FE16

(iii) 9.62510 to binary (3mks)

9= 1001

0625 x 2 = 1.25 WRITE 1

0.25 x 2 =0.5 WRITE 0

0.5 x 2 = 1.0 WRITE 1

9.62510 = 1001.1012

18. i) (a) Give four reasons why a firm may decide to computerize its operation (4mks)

* + High quality products/ services
	+ Better decision- making
	+ Cut down on costs/ labor
	+ Compete effectively
	+ Timely computations of tasks
	+ Enjoy benefits of global markets
	+ Sharing information
	+ Reduce redundancy

(b) An individual has a right to demand guarantee to privacy of personal information stored on a computer. Give three such types of information (3mks)

* Bank accounts records
* Income tax records
* Medical records
* Legal records
* Bio- data
* Property records

ii) A passenger logs onto an airline website and types in the reference number for their flight. Once the passenger accesses their account they can choose their seat and also print out a boarding pass which contains a unique barcode. This barcode is scanned at the airport check-in desk.

* 1. Name **one** input and **one** output device found at the check-in desk and give a reason for your choice. (2mrks)
* *Barcode reader*
* *Printer*
	1. The training department of an international airline has introduced computer based training (CBT) to teach foreign languages to its cabin crew. Give four advantages of using CBT. (4mrks)
* *user can work at their own speed*
* *user can learn in their own time/when/where they want*
* *user can re-run sections of training package whenever they wish*
* *user can pause the training at any point*
* *user gets immediate feedback/analysis (on their performance)*
* *there is no need to have teachers or classrooms*
* *less expensive for the airline/ training department*

iii) State any four ways the computers can be used in a hospital. (2mrks)

* *Process the payroll*
* *Staff training through virtual reality*
* *Stock control of drugs in the pharmacy etc.*
* storing patient records

19. a) A student set up a spreadsheet to compare share prices in six companies over five years.



(i) What formula is in cell G5 to find the mean share price for KLN? (2mrks)

* *= AVERAGE (B5:F5) or = AVERAGE (B5, C5, D5, E5, F5) or = SUM (B5:F5)/5*
* *or = (B5+C5+D5+E5+F5)/5*

(ii) What formula is in cell H5 to find the highest share price for KLN? (2mrks)

* *= MAX (B5:F5) or = MAX (B5, C5, D5, E5, F5)*

(iii) If the data in cell E4 was changed to 425, which cells would be automatically updated? (2mrks)

* *G4, (H4)*

**(iv)** State the cells that are needed to create a line graph to show the share prices for years 2006 to 2008. (2 marks)

* *A3:A8, B3:E8, or A3:E8*

(v) The student wants to extend the spreadsheet to include share prices for 2010. Describe how the student would do this. (2mrks)

* *add column between F and G/insert column before G/insert column after F*
* *change the formula(s) to allow 2010 data to be added*

b) Describe the following terms with reference to security of data:

(i) Log files (1mk)

* *A file that lists actions that have occurred. For example, web servers maintain log files listings every request made to the server. With log file analysis tools, it’s possible to get a good idea of where visitors are coming from, how often they return and how they navigate through a site.*

*(*ii) Firewalls. (1mk)

* *A* ***firewall*** *is an* information technology *(IT)* security *device which is configured to* *permit, deny or* proxy data *connections set and configured by the organization's* security policy. *Firewalls can either be* hardware *and/or* software *based.*
* ***A firewalls basic task is to control traffic between compeer networks with different zones of trust. Typical examples are the* Internet *which is a zone with no trust and an* internal network** *which is (and should be) a zone with high trust The* *ultimate goal is to provide controlled interfaces between zones of differing trust* levels *through the enforcement of a security policy and connectivity model based on the* least privilege *principle and* separation of duties

 (c) List three functions of antivirus software. (3mks)

* *Identify a virus/Warn*
* *Heal/Clean a virus*
* *Prevent/Protect infection*
* *Quarantine infected files*

 20. (a) A students' database comprises of students1 details table and fees received table as shown below:

**Students' details table Fees Received table**

Surname Admission Number

Middle Name Amount

Admission Number Date

First Name Receipt Number

Course

b) State the primary key field for each table. (2mks)

* ***Student table-*** *Admission Number*
* *Fees Received table* - *Receipt Number*

ii) State the field, which should serve as the linking field for the two tables. (2mrks)

* Admission number

*(Note: Make Admission Number a foreign key in the fees table)*

iii) Name three types of relationships that can be applied in database design. (3mrks)

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

c) Bunam Water Company sends out field officers to take consumer meter readings. The data collected by the officers is then keyed into the computer. The system then generates utility bills which are printed and sent to the consumers.

i) State two transcription errors that are likely to occur during meter reading or input. (2mrks)

* *Transposition*
* *Misreading*

ii) State three ways such errors can be avoided (3mrks)

* *Design user interfaces that minimize chances of invalid data entry.*
* *Using error detection and correction software when transmitting data.*
* *Using devices that capture data directly from the source. E.g. digital cameras, optical character readers*

d) Mention at least two trends in the technological revolution of computers. (3mrks)

* *Continual decrease in computer size*
* *Improved speed and power of processing*
* *Decrease in computer physical size and its related facilities cost*