**CEKENA**

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

**FORM 4**

**MARKING SCHEME**

**SECTION A (40 MARKS)**

**ANSWER ALL QUESTIONS IN THIS SECTION**

1. In a computer class a teacher taught on removable storage media. State three precautions of preventing data loss in such media that the teacher may have mentioned. (3 mrks)
2. ***The storage media should not be exposed to excessive heat***
3. ***Not to forcefully remove the media from the drive or USB port.***
4. ***Do not bend or fold the media.***
5. ***Avoid dropping the media***
6. What is the function of an antistatic wrist member. (1 mrk)

* ***These are gloves worn on the hands to prevent static cherge on ones hands from reaching silicon chips on the motherboard.***

1. Classify the following softwares according to purpose. (3 mrks)

|  |  |  |
| --- | --- | --- |
|  | software | Classification |
| 1. | Need for Speed Game | ***Application*** |
| 2. | BIOS | ***System software*** |
| 3. | Google Chrome Browser | ***Application*** |

1. Differentiate between Sequential file organization and indexed-sequential file organization. (2 mrks)

* ***Sequential – Records are stored and accessed in a sequential order from beginning to the end of the file.***
* ***Indexed- An index is used to enable the computer to identify individual records on a storage media.***

1. List any four threats to a computer system. (4 mrks)

* ***Computer viruses***
* ***Power fluctuations***
* ***Poor Handling of storage media***
* ***Unauthorized access***
* ***Theft***
* ***Sabotage***

1. Distinguish between relative and absolute cell references as used in spreadsheet. (2 mrks)

* ***Relative cell reference – Cell address used in a formula that adjusts itself to reflect its position in the worksheet.***
* ***Absolute cell reference- a cell address that keeps on referring to a special cell regardless of its position in the worksheet***

1. List three characteristics of a soft computer system. (3 mrks)
2. ***Boundaries keep on changing***
3. ***Hard to exactly measure performance***
4. ***Goals and objectives usually conflict.***
5. Briefly describe two transcription errors. (2 mrks)
6. ***Misread- errors emanating from incorrect reading of the source document by the user entering wrong values.***
7. ***Transposition errors – Is as a result of misplacement of characters.***
8. a) List two advantages of secondary storage devices which make them indispensable part of a computer. (2 mrks)

* ***High storage capacity***
* ***Non-volatile***
* ***Cheaper than primary storage***
* ***Portable***

b) Give two reasons why magnetic tape is not a popular secondary storage device. (2 mrks)

- ***Its bulky***

***- Low storage capacity***

***- Its contents can only be accessed sequentially hence slow.***

1. Define the following as used in word processing. (2 mrks)

i) ***Word wrap. – a feature that automatically moves the cursor or text to the next line when the end of the line is reached.***

***ii) Drop Cap – A character or a group of characters at the beginning of the paragraph that spreads in more than one line.***

1. Orphan: A paragraph-opening line that appears by itself at the bottom of a page or column, thus separated from the rest of the text.
2. Widow: A paragraph-ending line that falls at the beginning of the following page or column, thus separated from the rest of the text.
3. Name the two common types of system units and differentiate them. (2 marks)
4. *Tower*
5. *Desktop*

***Desktop*** *-the monitor is placed on top of the system unit. The* ***tower*** *type the monitor rests on the table*

1. Without proper marketing, a business cannot survive in a competitive environment hence computers are being used in a number of ways to enhance marketing. List any three ways of ensuring this is effected. (3 marks)
2. *Electronic Commerce or e-business*
3. *Electronic presentation*
4. *Advertising*
5. Control unit is an essential component of the CPU. Describe the functions of the control unit. (2 marks)
6. *The control unit is responsible for coordinating all the activities of the C.P.U*
7. *To coordinate these activities, the control unit uses a system clock that sends command signals*
8. Speech recognition devices are used to capture natural sound and convert the input into digital form. State two problems related to speech recognition devices. (2 marks)

* ***Recognition rate is slow*** *– the number of words in English and the number of words which can be said at a given point (known as branching factor) mean that response rates are still relatively slow.*
* ***Limited vocabularies*** *– most systems are still limited to words in isolation; connected speech is much harder to get right than segmented speech. A computer may not respond to a voice command that has speech related problems like accents, Inflations and varying tones.*
* ***Speaker variability****–The speed, pitch, range, rhythm. Intonation, loudness and pronunciation of an individual can vary (especially if they a have a cold).*
* ***Homophones*** *– Some words e.g. see and sea, sound the same.*
* ***Problems of speech context*** *– A computer cannot understand different contexts and meanings of speech because it is ‘literal minded’.*
* ***Background noise*** *–Can upset voice input without a shielded mouthpiece on the microphone.*

1. (a) Differentiate between pasteboard and master page as used in DTP (2 marks)

* ***Pasteboard****: The background that lies behind your document. It is a convenient space to put things if you need to move text or images between pages. You can also place items on the****pasteboard****until you decide where to position them on the page. Any text or images that you place on the****pasteboard****won't be printed.*
* ***Master page:*** *A page used in designing the general layout that will be replicated in all other pages in* the publication.

1. Differentiate between graphic-based and layout based desktop publishing software. (2 marks)
2. *Graphic based- They are specifically developed to edit and format graphic objects such as pictures and vector drawings.*
3. *Layout based- Are specifically developed to create different page layout designs for text and pictures.*

**SECTION B (60 MARKS)**

**ANSWER QUESTION 16 AND ANY OTHER THREE QUESTIONS IN THIS SECTION**

1. (a) Define the following terms as used in programming (2 marks)

**(i) Source code**

* *The program instructions entered in the program editor window that is not yet translated into machine readable form (binary language).*

***(ii) Object code***

* *The program or source code that is already translated into machine readable form (binary language).It is produced by the assembly process (the production of a source code to machine form/binary).*

(b) Differentiate between Assembler and Interpreter as used in programming. (2 marks)

***Assembler(s)*** *– it is a program or language processor that translates assembly language into machine language that the computer can understand and execute.*

***Interpreters*** *– It is a translator program that translates source program one instruction at a time, completely translating and executing each instruction before it goes onto the next. Interpreters seldom produce object code but temporarily produce intermediate code which is not stored in main memory.*

(c) Identify the type of programming language used in the codes below; (1 mark)

(i) **1101 1101 1011 1011**

**1110 0001 1100 0111**

**0010 1110 1011 0011**

*Machine Language*

………...……………………………………………………………………………..………………………

(ii) **LDA A, 20**

**ADD A, 10**

**STO B, A**

**NOP** *Assembly Language*

………...……………………………………………………………………………..………………………

(d) On the Nairobi-Nakuru highway, the Kenya Police have put speed cameras at a certain point to read the time a vehicle passes a point (A) on the road and then reads the time it passes a second point (B) on the same road. (Points A and B are 200 meters apart). The speed of the vehicle is calculated using:

* ***Speed = (Km/ hr)***
* *The maximum allowed speed is 100 kilometers per hour.*
* *500 vehicles were monitored using these cameras over a 1-hour period.*

1. Write a pseudo code, which: (5 marks)

* Inputs the start time and the end time for the 500 vehicles that were monitored
* Calculates the speed for each vehicle using the formula above.
* Outputs the speed for each vehicle and a message if the speed exceeded 100 km/hour.

>=100km/hr “High Speed”

<100km/hr “Normal Speed”

Start

starttime=0

Endtime=0

Speed=0

For Vehicles=1 To 500 Do

Input Start Time

Input Stop Time

Speed =100/(End Time-Start Time)

Print Speed

If Speed >100 Then

Print Over Speeding

Else

Print Normal Speed

ENDIF

NEXT VEHICLE

ENDFOR

STOP

1. Draw a flow chart for the above pseudo code. (5 marks)

starttime=0

Endtime=0

Speed=0

Vehicle=1

Start time

Stop time

Speed =100/(End Time-Start Time)

PRINT SPEED

IS SPEED >100?

NO

YES

NORMAL SPEED

NORMAL SPEED

IS VEHICLE>500?

NO

YES

1. a) Describe two health issues related to working with computers and give a remedy for each. (4 mrks)
2. ***RSI – Use ergonomic keyboards.***
3. ***Eye problems and headache. - Use LCD or antiglare screens on CRTs***
4. ***Backache - Use standard furniture.***

b) Robots are introduced into a factory which makes car engines. Describe three ways this could affect the workers. (6 mrks)

- ***Job replacement***

***- Job creation***

***- Job displacement***

c) List two duties performed by the following personnel

i) *Database administrator (2 mrks)*

***1. Designing and developing database applications***

***2. Setting up security measures needed to control access to data and information.***

***3. Keeping databases up to date by adding new records, modifying or deleting unnecessary records.***

ii) Computer trainer (2 mrks)

1. ***Training people on how to use the computer and application programs***
2. ***Developing training reference materials***
3. ***Guide learners on how to acquire knowledge***
4. ***Preparing learners for ICT exams***
5. *Web administrator*

* **Coding websites – the most popular languages include HTML and JavaScript**
* **Collaborating with development teams to program websites**
* **Setting up tools to monitor website traffic**
* **Analyzing website traffic to inform design decisions**
* **Addressing usability issues**

1. a) Differentiate between a database and DBMS. (1 mrk)

***Database – A collection of organized data.***

***DBMS – Programs that help the user to enter , store, edit , retrieve and print databases.***

b) List four advantages of using electronic database systems. (2 mrks)

i) ***Has unlimited storage capacity.***

***ii) Has forms that provide a user friendly way of entering records***

1. ***The output is presentable.***
2. ***Editing records is easy.***
3. ***Has inbuilt queries that can help the user extract records that meets the conditions he specifies.***

c) In database system, data integrity ensures the correctness and completeness of the data in the database. Differentiate the following types of integrity constraints.

i) ***Validity integrity (1 mrk)***

***Ensures that the data entered is correct***

1. ***Entity integrity (1 mrk)***

***Ensures there is no duplicate records within the table and that the field that identifies the record is unique.***

1. ***Referential integrity ( 1mrk)***

***Is database concept that ensures relationships between tables remain consistent.***

***d) Briefly describe any three database models. (3 mrks)***

***i) Network model – entities form network of objects***

***ii) Flat file model – keeps one set of data***

1. ***Relational model – uses tables /relations***
2. ***Hierarchical model- data items arranged in tree form***

e) (i) Differentiate between error handling and interrupt handling as used in operating systems.

(2 marks)

**Error handling .**

* *The OS has many ways of reporting to the user of any errors that occur during program execution. It does this by monitoring the status of the computer system & performing error checks on both hardware and software.*
* *When the user makes an error, the OS through the Kernel determines the cause of the error, and prints diagnostic messages on the screen suggesting appropriate routines of how the error can be corrected.*
* *In case of a fatal error that cannot be corrected, the program will be suspended permanently. E.g., the user program will prematurely terminate when it encounters an illegal operation, such as, dividing a no. by 0 or if it attempts to read a data file that had not been opened.*

***Interrupt handling***

* *An* ***Interrupt*** *is a break from the normal sequential processing of instructions in a program.*

*Each hardware device communicates to the processor using a special number called the Interrupt Request number (IRQ). Therefore, when an interrupt occurs, control is passed to the Kernel, which determines the cause of the interrupt. The processor stops executing the current program to wait for the corrective response of the user. Control is returned to the program that was interrupted once corrective action has been taken.*

(ii) State **three** reasons why most network technicians prefer using command line operating systems to configure networking equipment. (3 marks)

* *A****CLI****can be a lot faster and efficient than any other type of****interface****.*
* *It is secure since the expert only knows the commands.*
* *A****CLI****requires less memory to use in comparison to other****interfaces****.*
* *A****CLI****doesn't require high graphics, hence a low-resolution monitor can be used.*
* *A CLI does not require Windows to run*

1. (a) Define the following terms as used in networking. (3marks)
2. Network

* *A collection 2 or more computers connected together using transmission media (e.g., telephone cables, or Satellites) for the purpose of communication and sharing of resources.*

1. Intranet

* *Internal corporate network that uses the infrastructure of the Internet and the World Wide Web.*

1. Browser

* *A browser (short for web browser) is a computer program/software that accesses webpages and displays them on the computer screen. It is the basic software that is needed to find, retrieve, view and send information over the internet.*

(b) The World Health Organization is global entity that deals with health issues around the world. It has computer networks linking its regional and continental offices using internet. State **two** importance of the internet to such organization. (2 marks)

* ***Communication*** *with other organizations, with your members, with your staff, with your supporters and donors through e-mails, messenger, web pages, mail lists, web site message boards. The Internet greatly offers rapid communication on a global scale. It even delivers an integrated multimedia entertainment that any other mass medium cannot offer.*
* ***Publishing*** *your message to the world using online books, journals, press releases, workshops, conferences, lectures. Websites with conference proceedings, PDF (Portable Document Format) files of your publications, blogs, newsfeeds e.t.c. support publishing.*
* ***Customer support*** *- the people you are helping through your organization. It can help them when you aren't there: email, messenger, web pages, mail lists, and web site message boards. With video-conferencing, podcasting and other great web tools, you can even have workshops and classes online.*
* ***Research*** *on news, issues, papers and literature relevant to your cause. Use of search engines to find materials world-wide, mail lists e.t.c.*
* ***Leisure activities – e.g.*** *online games, videos or music.*
* *A place to do* ***business and many other commercial activities****. E.g. e-bay, amazon.com, e.t.c.*

(c) Mr. Zuma, the Principal of a school wishes his school to have an internet connection in a bid to improve its service delivery. Mention **four** internet connectivity requirements that must be present to enable the connection. (2 marks)

* ***Transmission/Telecommunication/Network media***
* ***Data Terminal Equipments - A TCP/IP enabled computer with a web browser.***
* ***An account with an Internet Service Provider (ISP).***
* ***Networking equipment such as a modem, router or switch to connect the computer transmission media.***

(c) Explain the following as used in e-mail:

* ***Inbox****: Stores incoming mails (1 mark)*
* ***Drafts****: Stores a saved copy of e-mails (usually composed but unsent) for later use. (1 mark)*

(e) (i) Failure of information systems is a major concern in the security of data in computing systems. State **two** causes of such failure. (2 marks)

* + *Hardware failure due to improper use.*
  + *Unstable power supply as a result of brownout or blackout and vandalism.*
  + *Network breakdown*
  + *Natural disaster*
  + *Program failure/crash*

(ii) Explain the following computer crimes.

* Fraud (1 mark)
* ***Fraud*** *is the use of computers to conceal information or cheat other people with the intention of gaining money or information.*
* **Industrial espionage (1 mark)**
* *Involves spying on a competitor to get or steal information that can be used to finish the competitor or for commercial gain. The main aim of espionage is to get ideas on how to counter by developing similar approach or sabotage.*

(f) Excluding passwords, state **two** other security control measures used to guard against unauthorized access to computers in a network. (2 marks)

1. *Audit trails*
2. *Firewalls*
3. *Proxy servers*
4. *Log files/security monitors*
5. *Encryption*
6. *User access levels/Multilevel access*
7. *Biometric security*
8. (a) Convert the 1010.0112  to decimal equivalent. ( 3 marks)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 23 | 22 | 21 | 20 |  | 2-1 | 2-2 | 2-3 |
| 1 | 0 | 1 | 0 | . | 0 | 1 | 1 |
| 8 | 0 | 2 | 0 |  | 0.5 | 0.25 | 0.125 |

**8+0+2+0 0+0.25+0.125 Ans = 10.37510**

(b) Perform the following number system conversions. (3 marks)

(i) 342.258 to binary.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 3 | 4 | 2 | . | 2 | 5 |  |
| 011 | 100 | 010 |  | 010 | 101 |  |
| 011 100 010 | | | . | 010 | 101 |  |

**Ans = 11100010.0101012**

(ii) 50310 to hexadecimal (3 marks)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Divide | Result | INT | DEC PART \*16 | Hex |
| Ignore decimal parts | 503/16 | 31.4375 | 31 | 0.4375 X16 =7 | 7=7 |
| 31/7 | 1.9375 | 1 | 0.9375 X 16 =15 | 15=F |
| 1/16 | 0.0625 | 0 | 0.0625 X 16 =1 | 1=1 |

**Ans = 1F7**

(c) **(i)** Compute the binary arithmetic given below: (3 marks)

10111 + 10001 + 101

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Carry digit ˃** | ***1*** | ***1*** | ***1*** | ***1*** | ***1*** |  |
|  | 1 | 0 | 1 | 1 | 1 | 1 |
| + |  | 1 | 0 | 0 | 0 | 1 |
|  | **1 0** | **0** | **0** | **0** | **0** | 0 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Carry digit ˃** |  | ***1*** | ***1*** | ***1*** | ***1*** | 1 | 1,1 |
|  | **1** | **0** | **0** | **0** | **0** | **0** | **0** |
| - |  |  |  |  | 1 | 0 | 1 |
|  |  | 1 | 1 | 1 | 0 | 1 | 1 |

**Ans = 111011**

**(ii)** Using 8-bit notation, perform the **twos** complementof 2510 -1510 , leaving your answer in binary. (4 marks)

25 = 00011001

15 = 00001111

Ones complement/Bitwise NOT **15** = **11110000**

Twos complement **15** (11110000 + 1) = **11110001**

**Add the binary of 25 to the twos complement of 15 i.e. 00011001 + 11110001**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Carry digit ˃** | ***1*** | ***1*** | *1* |  |  |  | *1* |  |
|  | **0** | **0** | **0** | **1** | **1** | **0** | **0** | **1** |
|  | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 |
|  | **(1)0** | 0 | 0 | 0 | 1 | 0 | 1 | 0 |

Ignore overflow bit. **Ans = 00001010**

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