THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATIONS COUNCIL OF TANZANIA

ADVANCED CERTIFICATE OF SECONDARY EDUCATION EXAMINATION

136/1 **COMPUTER SCIENCE 1**

(For Both School and Private Candidates)

Time : 3 Hours **ANSWERS** **Year : 2019**

Instructions

1. This paper consists of sections A and B with a total of **thirteen (13)** questions.
2. Answer **all** questions in section A and **two (2)** questions from section B.
3. Section **A** carries **sixty (60)** marks and section **B** carries **forty (40)** marks.
4. Communication devices and any unauthorised materials are **not** allowed in the examination room.
5. Write your **Examination Number** on every page of your answer booklet(s).

1. (a) Mention six phases of system development life cycle.

The first phase is the planning phase where the project objectives, scope, and feasibility are defined. It sets the foundation for the whole process.

The second phase is the system analysis phase which involves gathering requirements and understanding the needs of users and stakeholders.

The third phase is the system design phase where detailed specifications of the system architecture, database, and interface are created.

The fourth phase is the implementation or coding phase where programmers write the actual code to develop the system based on the design.

The fifth phase is the testing phase where the system is checked for errors, bugs, and functionality issues to ensure it meets the requirements.

The sixth phase is the maintenance phase where the system is updated, corrected, and enhanced after deployment to keep it functional and relevant.

(b) Explain the importance of a feasibility study in system development.

A feasibility study is important because it helps determine whether the project is technically possible, financially viable, and operationally practical before resources are invested.

It prevents wastage of time and money by identifying risks and challenges early in the process.

It provides management with reliable data for decision making, ensuring that only beneficial projects are pursued.

It also assists in predicting project outcomes and the likelihood of success, making planning more realistic.

2. Describe three limitations of computer networking.

One limitation is security risks since networks can be vulnerable to hacking, unauthorized access, and malware attacks.

Another limitation is high installation and maintenance costs because networking infrastructure such as routers, cables, and servers require investment and skilled management.

Networks may also suffer from performance issues like congestion, slow data transfer, and system downtime if many users access it simultaneously.

3. (a) What is an entity relationship (E-R) diagram?

An E-R diagram is a visual representation of entities in a database and the relationships between them. It helps in designing the logical structure of a database.

(b) Differentiate a primary key from a foreign key.

A primary key is a unique identifier for records in a table, for example StudentID in a student table.

A foreign key is a field in one table that refers to the primary key in another table to create a relationship, for example CourseID in a student-course table referencing CourseID in the course table.

(c) Explain three tools used to automate database in MS Access.

One tool is macros, which allow automation of repetitive tasks by executing a series of commands automatically.

Another tool is queries, which help to retrieve, update, or manipulate data according to specified criteria.

The third tool is forms, which allow user-friendly data entry and interaction with the database without directly handling tables.

4. (a) Outline four procedures for generating a table of contents in a word document.

First, apply heading styles to the text in the document such as Heading 1, Heading 2, or Heading 3.

Second, place the cursor at the position in the document where the table of contents should appear.

Third, go to the References tab and select the Table of Contents option.

Fourth, choose a preferred format and the table of contents will be automatically generated from the headings.

(b) Distinguish buffer memory from cache memory.

Buffer memory is temporary storage used to handle data when there is a speed mismatch between devices, for example between a CPU and a printer.

Cache memory is high-speed memory located close to the CPU that stores frequently used instructions and data to speed up processing.

(c) Describe one function of the two microcomputer application softwares in health information processing and management.

Spreadsheet software is used in health management to calculate medical statistics, analyze patient data, and prepare reports.

Database software is used to store, retrieve, and update patient medical records securely and efficiently.

5. Read the following algorithm steps and answer the questions that follow:

(a) Draw a flow chart to represent the algorithm above.

The flowchart starts with "Start", then a loop runs to input marks of 10 candidates, storing them in an array while adding to the sum. After the loop, the sum is divided by the number of candidates to calculate the average, then the results (sum and average) are displayed, and the program ends with "Stop".

(b) Write C++ statements for step 2 and 3.

```
int marks[10];
int sum = 0;
for(int i = 0; i < 10; i++) {
cin >> marks[i];
sum = sum + marks[i];
}
float average = sum / 10.0;
```

6. (a) Use circuit diagram to explain how half adder operates.

A half adder is a digital circuit that adds two binary inputs A and B. It has two outputs: Sum and Carry. The Sum is generated by an XOR gate, while the Carry is generated by an AND gate. For example, if A = 1 and B = 1, the Sum = 0 and Carry = 1.

(b) Show that $(A + B)(A + C) = A + BC$

Expand: $(A + B)(A + C) = A(A + C) + B(A + C)$
$= A + AC + AB + BC$
$= A + AB + AC + BC$
$= A(1 + B + C) + BC$
$= A(1) + BC$
$= A + BC$

Hence proved.

7. (a) Explain local variables and static variables as used in Visual Basic program.

Local variables are variables declared within a procedure or block and can only be accessed within that block during execution. They are destroyed once the procedure ends.

Static variables are variables declared with the Static keyword and maintain their values between multiple calls of the procedure. They persist throughout the program execution.

(b) Write an example of an event procedure for a Command Button that counts and displays the number of clicks made.

```
Private Sub Command1_Click()
Static count As Integer
count = count + 1
Print "Number of clicks = "; count
End Sub
```

(c) Show how an empty Visual Basic form can be opened giving four steps.

First, open Visual Basic and start a new project.

Second, choose Standard EXE from the project types.

Third, a default form (Form1) is created automatically and appears on the screen.

Fourth, the form can then be saved and used for designing or coding as required.

8. (a) Describe three health problems experienced by people who work with computers.

One problem is eyestrain caused by staring at screens for long periods, leading to blurred vision and headaches.

Another problem is repetitive strain injury (RSI) from continuous use of keyboard and mouse which affects wrists and fingers.

A third problem is back and neck pain due to poor posture while sitting at the computer for long hours.

(b) Explain three ways of reducing the health risks when using ICT equipment.

One way is using ergonomic chairs and desks to promote correct posture and reduce strain.

Another way is taking regular breaks to rest the eyes and stretch the body.

The third way is adjusting screen brightness and position to minimize glare and reduce eye discomfort.

9. (a) Explain what is meant by the term data backup.

Data backup refers to the process of creating a copy of data files and storing them in another location so they can be restored in case of data loss or damage.

(b) Mention six steps of troubleshooting process.

The first step is identifying the problem.

The second step is establishing a probable cause.

The third step is testing the cause to confirm it.

The fourth step is developing a solution plan.

The fifth step is implementing the solution.

The sixth step is verifying system functionality and documenting the process.

(c) Differentiate open ended questions from closed ended questions as applied in troubleshooting.

Open ended questions allow detailed responses and explanations from the user, for example “What exactly happened before the system failed?”

Closed ended questions require short, specific answers such as “Is the computer plugged in?” which help narrow down the issue quickly.

10. Read the following codes and answer the questions that follow:

(a) How many elements are included in the array “a”?

The number of elements in an array depends on how it is declared. If the code declares for example int a[10];, then the array has 10 elements. Generally, the size in the square brackets determines the number of elements.

(b) What type of sorting algorithm is implemented on the codes above?

From the structure of typical exam codes, the algorithm is usually bubble sort or selection sort. Bubble sort repeatedly compares adjacent elements and swaps them until the array is sorted, while selection sort finds the smallest element and swaps it into position. If the code uses nested loops with swaps of adjacent elements, then it is bubble sort.

(c) In which order will the array “a” be sorted?

The order depends on the comparison operator. If the code uses ">" it will sort in ascending order. If it uses "<" it will sort in descending order.

(d) Which variable will be used as temporary in the codes above? Give a reason.

A temporary variable, often named temp, is used to hold the value of an element during swapping. It prevents data loss when values are exchanged between two array positions.

(e) Write the codes to display the sorted array “a”.

```
for(int i = 0; i < size; i++) {

  cout << a[i] << " ";

}
```

11. Websites can facilitate communication between manufacturers and consumers. Analyze five advantages and three limitations of a website to manufacturers.

One advantage is that websites provide global visibility, allowing manufacturers to reach customers worldwide at any time.

Another advantage is reduced marketing costs since websites offer cheaper advertising compared to traditional media.

Websites also allow manufacturers to provide detailed product information, specifications, and demonstrations to customers.

They improve communication and customer feedback through contact forms, chats, and online surveys.

Websites also support e-commerce where manufacturers can sell directly to consumers, increasing profit margins.

One limitation is high maintenance costs, since keeping a website updated and secure requires skilled staff and resources.

Another limitation is cybersecurity risks such as hacking or data breaches, which can damage reputation and customer trust.

A third limitation is internet dependency, as customers must have access to the internet to use the website.

12. Describe four basic types of physical network topologies with the aid of a diagram, and explain two advantages and two disadvantages of each type.

The first topology is bus topology where all devices share a single communication line. Its advantages are low installation cost and ease of adding new devices. Its disadvantages are that a single cable failure disrupts the entire network and performance decreases with more devices.

The second topology is star topology where each device connects to a central hub or switch. Its advantages are easy fault isolation and reliable performance. Its disadvantages are dependency on the central hub and higher cabling costs.

The third topology is ring topology where devices are connected in a closed loop. Its advantages are predictable data transfer and equal access for all devices. Its disadvantages are network disruption if one device fails and difficulty in reconfiguration.

The fourth topology is mesh topology where each device is connected to every other device. Its advantages are high reliability and multiple data paths. Its disadvantages are very high cost and complex installation.

13. Describe measures to be taken against unauthorized access and loss of data in a computer. Give four points for each.

Measures against unauthorized access include using strong passwords that combine letters, numbers, and symbols. They also include installing firewalls to monitor and block malicious network traffic. Another measure is applying user authentication methods like biometrics or smart cards. Finally, setting user access rights ensures that only authorized individuals access sensitive information.

Measures against loss of data include performing regular data backups to external drives or cloud storage. Another measure is using uninterruptible power supply (UPS) to prevent sudden power failures that cause data loss. Installing reliable antivirus software helps prevent data corruption by malware. Lastly, implementing redundancy such as RAID systems ensures data is preserved even if a storage device fails.