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COMPUTER SCIENCE

016

29/07/2024   8:30 AM- 11:30 AM

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NESA | NATIONAL EXAMINATION AND SCHOOL INSPECTION AUTHORITY

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ADVANCED LEVEL NATIONAL EXAMINATIONS, 2023-2024

SUBJECT: COMPUTER SCIENCE

COMBINATIONS:

- MATHEMATICS-COMPUTER SCIENCE-ECONOMICS **(MCE)**

- MATHEMATICS-PHYSICS-COMPUTER SCIENCE **(MPC)**

DURATION: 3 HOURS

Instructions to candidates:

1) Write your names and index number on the answer booklet as written on your registration form, and **DO NOT** write your names and index number on additional answer sheets if provided.

2) Do not open this question paper until you are told to do so.

3) This paper consists of **THREE** sections: **A, B** and **C.**

   Section A: Attempt **ALL** questions**.**   **(55 marks)**

   Section B: Attempt any **THREE** questions.   **(30 marks)**

   Section C: Attempt any **ONE** question.   **(15 marks)**

4) Use only a **blue** or **black** pen.

Section A: Attempt all questions. (55 marks)

1) Which of the following statements best describes a computer virus?

(3 marks)

    a) A program that replicates itself and spreads to other computers

    b) A program that monitors user activities without their consent

    c) A program that steals sensitive information from computers

    d) A program that blocks access to certain websites

2) Match the component with its function: **(4 marks)**

Component	Function
a) Battery	1) Provides visual output.
b) Display	2) Powers the laptop.
c) Keyboard	3) Used for text and command input.
d) Trackpad	4) Enables cursor movement and control.

3) System software can further be subdivided into four sub-categories. List them. **(4 marks)**

4) What are the advantages and disadvantages of using Fiber optic cable in a LAN compared to twisted pair cable? Choose the right answer among the following: **(4 marks)**

    a) Advantages: higher bandwidth, longer distances; Disadvantages: higher cost, more difficult to install

    b) Advantages: lower cost, easier to install; Disadvantages: lower bandwidth, shorter distances

    c) Advantages: more secure, less susceptible to interference; Disadvantages: lower bandwidth, shorter distances

d) Advantages: easier to upgrade, more flexible; Disadvantages: higher latency, lower reliability

5) How does the concept of logical addressing differ from physical addressing in memory management? Choose the right answer. **(4 marks)**

   a) Logical addressing deals with data organization, while physical addressing focuses on memory hardware.

   b) Logical addressing refers to memory locations visible to the programmer, while physical addressing refers to actual memory locations.

   c) Logical addressing is used in virtual memory systems, while physical addressing is used in physical memory.

   d) Logical addressing uses hexadecimal notation, while physical addressing uses binary notation.

6) What is multimedia, and how does it differ from traditional media?
   (6 marks)

7) Explain the importance of database backups in database management and propose a backup strategy. **(5 marks)**

8) You are developing a web application that needs to retrieve data from a MySQL database. What is the correct sequence of steps to establish a JDBC connection within a servlet? **(4 marks)**
   a) Load driver, establish connection, create statement, execute query
   b) Establish connection, load driver, execute query, create statement
   c) Create statement, execute query, establish connection, load driver
   d) Load driver, create statement, execute query, establish connection

9) Analyze the use of friend functions in C++ classes. How do they violate encapsulation, and when they should be used? **(5 marks)**

10) a) What is the purpose of file handling in C++?

c) Give at least four(4) tasks you can perform in file handling. **(5 marks)**

11) Define string and give two examples of string function in C++. **(4 marks)**

12) What is the output? **(5 marks)**
```
class ArrayExample {
 public static void main(String[] args) {
  int[] age = {1, 0, 5, 0, 5};

  for (int i = 0; i < 5; ++i) {

  System.out.println("Element at index " + i +": " + age[i]);

  }  }}
```

13) In assessing the efficiency of database connectivity in a VB Windows Forms application, what should be evaluated? **(2 marks)**

a) The number of controls on the application's main form
b) The font size used for labels
c) The time taken to retrieve and display data from the database
d) The length of variable names used in the code

Section B: Attempt any three questions. (30 marks)

14) Write an algorithm of a program that reads and displays 14 elements using two-dimensional array. **(10 marks)**

15) Briefly explain the benefits of using computer networks. **(10 marks)**

16) We need the following table called "student" in our database called "school": **(10 marks)**

    id :integer

    firstname :character(20)

    secondname :character(20)

    birth : date

  a) Write queries to create student table **(3 marks)**

  b) After creating student table, you need to add new column "schoolname"

    before firstname. **(2 marks)**

  c) Create user account called school@rwanda with password "schl@123", that will be allowing for only fetching in school database. **(3 marks)**

  d) Write an SQL query to print details of the student whose firstname ends with 'h' and contains six alphabets **(2 marks)**

17) Write a Java program that uses the ArrayList class to store a list of student names and then displays the names in alphabetical order.

(10 marks)

18) By using While …Wend loop Write a VB program that computes the sum of even numbers from 0 to 50. You can use vb6.0 or vb.net **(10 marks**

Section C: Attempt any one question. (15 marks)

19) Design a form in HTML5 for user registration, including fields for name, email, password, and date of birth. The form must not allow a user to submit if there is an empty field. Validate user input for each field to ensure data integrity and security **(15 marks)**

20) List the different types of control flow statements available in C++. Briefly describe their functionality. **(15 marks)**

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