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A-LEVEL

National examination marking guide
of COMPUTER SCIENCE from 2012
to 2023

[MARKING GUIDE OF PAST NATIONAL EXAMINATION OF COMPUTER SCIENCE A-LEVEL; FROM 2012 TO 2023]

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Computer Science

016

19 Nov.2012 8.30 am - 11.30 am

REPUBLIC OF RWANDA



RWANDA EDUCATION BOARD (REB)

ADVANCED LEVEL NATIONAL EXAMINATIONS 2012

SUBJECT: COMPUTER SCIENCE

COMBINATIONS : MATHS-COMPUTER SCIENCE-ECONOMICS: MCE

MATHS-PHYSICS-COMPUTER SCIENCE: MPC

DURATION : 3 HOURS

INSTRUCTIONS :

This paper consists of **three** sections: **A, B and C.**

Section A: Attempt **all** questions.

(55 marks)

Section B: Attempt **three** questions.

(30 marks)

Section C: Attempt **any one** question.

(15 marks)

SECTION A: Attempt all questions (55 marks)

1. What is a computer program? **(3 marks)**
2. What is computer programming? **(3 marks)**
3. a. Explain the term *stored procedure*. **(3 marks)**
b. Briefly explain the advantages of using stored procedures. **(6 marks)**
4. What will be the output of the following code? **(5 marks)**

```
#include<stdio.h>
#define max 10+2
int main()
{
    int i;
    i=max*max;
    printf("%d",i);
    return 0;
}
```

5. In the table below give and explain with examples the 6 Arithmetic Operators of Visual Basic? **(12 marks)**

Each Operator 1 mark, Meaning in words 0.5 marks,

Example (Arithmetic expression) 0.5 mark.

Operator	Meaning in words	Example (Arithmetic expression)

6. a) What is Visual Basic? **(2 marks)**
- b) How is VB program made up? **(3 marks)**
7. What are the responsibilities of a DBA (Database Administrator)? **(4 marks)**
8. Why does a DBMS interleave the actions of different transactions instead of executing transactions one after the other? **(4 marks)**
9. Explain the following terms briefly: **(10 marks)**

a) attribute,	b) entity,	c) relationship,
d) relationship set,	e) one-to-many relationship,	f) many-to-many relationship,
g) participation constraint,		h) weak entity set,
i) aggregation,		k) role indicator.

SECTION B: Attempt any three questions from this section (30 marks)

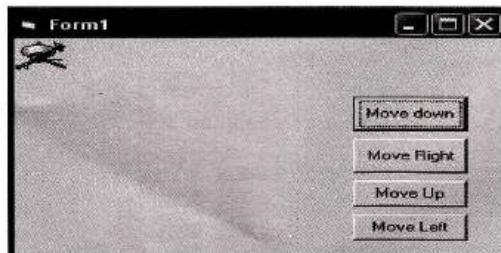
10. GCD of two numbers is a largest positive numbers which can divide both numbers without any remainder. For example GCD of two numbers 4 and 8 is 2 since 2 is the largest positive number which can divide 4 as well as 8 without a remainder. Write a C program for finding gcd (greatest common divisor) of two given numbers. **(10 marks)**

11. Answer the questions below concerning the following fragment of code in C++.

```
int n;
{
    cout << "Enter an integer: ";
    cin >> n;
    if (n < 10)
    {
        cout << "less than 10" << endl;
    else if (n > 9)
        cout << "greater than 9" << endl;
    else
        cout << "not interesting" << endl;
    }
}
```

- a. What will be the output of the fragment above if the user enters the integer value 0? **(2.5 marks)**
- b. What will be the output of the fragment above if the user enters the integer value 15? **(2.5 marks)**
- c. What will be the output of the fragment above if the user enters the integer value 7? **(2.5 marks)**
- d. What values for n will cause the output of the fragment above to be "not interesting"? **(2.5 marks)**

12. Below is a program that can move an object up, down, left, and right every time you click on a relevant command button. The code is such that Image1.Top = Image1.Top + 100 which makes the distance increase or decrease every time a user clicks on the command button. For example, if the initial position of image1 is 1000 twip from the top, after one click, the distance from the top will be 1100, and the next distance will be 1200 and so on. Write the program for all the four buttons that allows you to move the image in four directions by clicking any of the four buttons. **(10 marks)**



13. Explain how the following steps are performed in JDBC:

- a. Connect to a data source. **(4 marks)**
- b. Start, commit, and abort transactions. **(4 marks)**
- c. Call a stored procedure. **(2 marks)**

14. Consider the following relations:

Student (snum: integer, sname: string, major: string, level: string, age: integer)

Class (name: string, meets at: string, room: string, fid: integer)

Enrolled (snum: integer, cname: string)

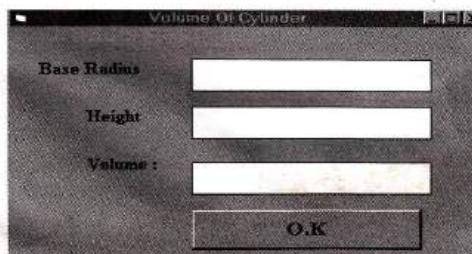
Faculty (fid: integer, fname: string, deptid: integer)

The meaning of these relations is straightforward; for example, Enrolled has one record per student-class pair such that the student is enrolled in the class. Write the following queries in SQL. No duplicates should be printed in any of the answers.

- a) Find the names of all Juniors (level = JR) who are enrolled in a class taught by 1Teacher. **(4 marks)**
- b) Find the age of the oldest student who is either a History major or enrolled in a course taught by one Teacher. **(6 marks)**

SECTION C : Attempt any of one question from this section (15 marks)

15. Write a c program for ATM transaction while currencies are 1000,500 and 100. **(15 marks)**
16. An airplane has a registration number, type and location (City Airport base of the airplane). Each airplane type is described by its name (Boeing 747, Airbus A340 ...), its weight, its capacity and range. A company technician has a name, number (matriculate), address (city of residence), phone number, salary and is an expert on one or several types of airplane during a given period (beginning date and end date). A driver is described by the same attributes as a technician. In addition it must pass an annual medical examination. Each plane must also pass a number of testing work. Each test has a number that identifies a name and a minimum value (a threshold to be reached). We want to keep the date and status of each test. Each flight is commanded by a single pilot on one plane A flight departure city (Departure_City) and city of arrival (Arrival_City), time of departure (Departure-hour) and time of arrival (arrival_hour). Make a conceptual data model (entities relationship and associations model). Do not forget the cardinalities and underline the keys. **(15 marks)**
17. Knowing that the formula to compute the volume of a cylinder is $v=\pi r^2 h$ where v = volume; $\pi= 22/7$; r = radius and h = height. Write a required code to make a program that calculates the volume of a cylinder using the VB interface as designed bellow: **(15 marks)**



When you run the program, you should be able to see the interface as shown in. If you enter a value each in the radius box and the height box, then click OK; the value of the Volume will be displayed in the volume box.

NB: Using the function Str\$. The declaration step is not required.

CORRECTION OF NATIONAL EXAM 2012

SECTION A: Attempt all questions (55 marks)

1. What is a computer program?

A **computer program** is an organized instructions that, when executed causes the computer to behave predetermined manner.

2. What is computer programming?

Programming means designing or creating a set of instructions to ask the computer to carry out certain jobs which normally are very much faster than human beings can do.

A. Explain the term stored procedure

Stored procedures are programs that run on the database server and can be called with a single SQL statement.

B. Briefly explain the advantages of using stored procedures

They are useful in situation where the processing should be done on the server rather than the client side

Also, since the procedures are centralized to the server, code writing and maintenance is simplified, because the client programs do not have to duplicate the application logic

Stored procedures can also be used to reduce network communication; the results of stored procedure can be analyzed and kept on the database server.

3. What will be the output of the following code?

```
#include<stdio.h>
#define max 10+2
int main()
{
    int i;
    i=max * max;
    printf("%d",i);
    return 0;
}
```

Output is: 32

Explanation:

```
int main ()
{
    int I;
    i=10+2*10+2;
    printf("%d",i);
    return 0;
}
now i=10+2*10+2
i=10+20+2
```

4. In the table bellow give and explain with examples the 6 Arithmetic operators of Visual BASIC

Operator	Mathematical function	Example
$^$	Exponential	$2^4=16$
*	Multiplication	$4*3=12$
/	Division	$12/4=3$
Mod	Modulus(return the remainder from an integer division)	15 Mod 4=3
\	Integer division(Discards decimal places)	$19\backslash 4=3$
+ or &	String concatenation	“Visual”&”Basic”=Visual Basic”

5. A. What is Visual BASIC?

Visual BASIC is a high level programming language evolved from the earlier DOS version called BASIC. BASIC means Beginners' All-purpose Symbolic Instruction Code

B. How is Visual BASIC program made up?

A Visual BASIC program is made up of many subprograms, each has its own program codes, and each can be executed independently and at the same time each can be linked together in one or another.

6. What are the responsibilities of DBA (Database Administrator)?

- Designing the logical and physical schemas, as well as widely-used portions of the external schema.
- Security and authorization
- Data availability and recovery from failures.
- Database tuning: The DBA is responsible for evolving the database, in particular the conceptual and physical schemas, to ensure adequate performance as user requirements change.

7. Why does a DBMS interleave the action of different transactions instead of executing transactions one after another?

A DBMS is typically shared among many users. Transactions from these users can be interleaved to improve the execution time of users' queries. By interleaving queries, users do not have to wait for other user's transactions to complete fully before their own transaction begins. Without interleaving, if user A begins a transaction that will take 10 seconds to complete, and user B wants to begin a transaction, user B would have to wait an additional 10 seconds for user A's transaction to complete before the database would process user B's request.

8. Explain the following terms briefly

- a. **Attribute:** A property or description of an entity.
- b. **Entity:** An object in the real world that is distinguishable from other objects such as the green dragon toy
- c. **Relationship:** An association among two or more entities.
- d. **Relationship set:** a collection of similar *relationships*
- e. **One-to-many relationship:** A key constraint that indicates that one entity can be associated with many of another.
- f. **Many-to-many relationship:** A key constraint that indicates that many of one entity can be associated with many of another.
- g. **Participation constraint:** A participation constraint determines whether relationship must involve certain entities
- h. **Weak entity set:** An entity that cannot be identified uniquely without considering some primary key attributes of another identifying owner entity.
- i. **Aggregation:** Is a feature of the entity relationship model that allows a relationship set to participate in another relationship set. This is indicated on an ER diagram by drawing a dashed box around the aggregation.
- j. **Role indicator:** If an entity set plays more than one role, role indicators describe the different purpose in the relationship.

SECTION A: Attempt any three questions from this section (30 marks)

- 9. GCD of two numbers is a largest positive numbers which can divide both numbers without any remainder. For example GCD of two numbers 4 and 8 is 2 since 2 is the largest positive number which can dived 4 as well as 8 without a remainder. Write a c program for finding gcd (greatest common divisor) of two given numbers.**

```
#include <stdio.h>
#include <stdlib.h>

int main(int argc, char *argv[])
{
    int num1, num2, i, GCD;
    printf("Enter two integers: ");
    scanf("%d %d", &num1, &num2);
    for(i=1; i<=num1 || i<=num2; ++i)
    {
        if(num1%i==0 && num2%i==0)
            GCD=i;
    }
    printf("G.C.D of %d and %d is %d", num1, num2, GCD);

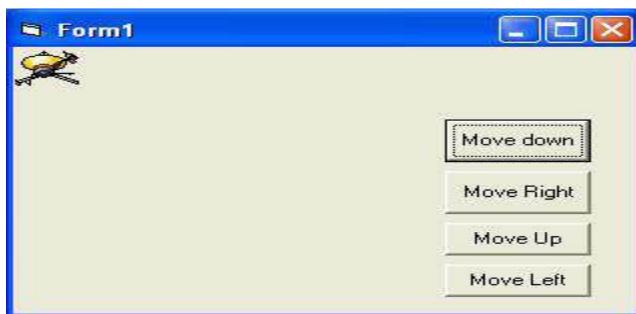
    system("PAUSE");
    return 0;
}
```

- 10. Answer the questions bellow concerning the following fragment of code in C++**

```
int n;
{
    cout<<"Enter an integer:";
    cin>>n;
    if(n<10)
    {
        cout<<"Less than 10"<<endl;
    else if(n>9)
    {
        cout<<"Greater than 9"<<endl;
    else
        cout<<"Not interesting"<<endl;
    }
}
```

- a. What will the output of the fragment above if the user enters the integer value 0?**
Less than 10
- b. What will the output of the fragment above if the user enters the integer value 15?**
Greater than 9

- c. What will the output of the fragment above if the user enters the integer value7?
Less than 10
- d. What value for n will cause the output of the fragment above to be “Not interesting”?
No value
11. Below is a program that can move an object up, down, left, and right every time you click on a relevant command button. The code is such as that Image1.Top = Image1.Top + 100 which make the distance increase or decrease every time a user clicks on the command button. For example, if the initial position of image1 is 1000 twip from the top, after one click, the distance from the top will be 1100, and the next distance be 1200 and so on. Write the program for all the four buttons that allows you to move the image in four directions by clicking any of the four buttons.



```
Private Sub Command1_Click()
Image1.Top = Image1.Top + 100
End Sub
Private Sub Command2_Click()
Image1.Top = Image1.Top - 100
End Sub
Private Sub Command3_Click()
Image1.Left = Image1.Left + 100
End Sub
Private Sub Command4_Click()
Image1.Left = Image1.Left - 100
End Sub
```

12. Explain how the following steps are performed in JDBC:

a. Connect to data source

Connecting to database source in JDBC involves the creation object. Parameters for the connection are specified using a JDBC URL that contains things like the network address of the database server and the user name and password for connecting

b. Start, Commit, and abort transactions

Each connection can specify how to handle transactions. If the out commit flag is set, each SQL statement is treated as separate transaction. If the flag is turned off, there is a commit (function) call that will actually commit the transaction.

c. Call a stored procedure:

Stored procedure are called from JDBC using the

13. Consider the following relations:

Student (snum: integer, sname: string, major: string, level: string, age: integer)

Class (name string, meets at: string, room: string, fid: integer)

Enrolled (snum: integer, cname: string)

Faculty (fid: integer, fname: string, deptid: integer)

The meaning of these relations is straightforward; for example, Enrolled has one record per student-class pair such that the student is enrolled in the class. Write the following queries in SQL. No duplicates should be printed in any of the answers.

- Find the names of all juniors (level = JR) who are enrolled in a class taught by 1 teacher.
- Find the age of the oldest student who is either a History major or enrolled in a course taught by one Teacher.

a. SELECT DISTINCT S.Sname FROM Student S, Class C, Enrolled E, Faculty F WHERE S.snum = E.snum AND E.cname = C.name AND C.fid = F.fid AND F.fname = 'I.Teach' AND S.level = 'JR'

b. SELECT MAX(S.age) FROM Student S WHERE (S.major = 'History') OR S.snum IN (SELECT E.snum FROM Class C, Enrolled E, Faculty F WHERE E.cname = C.name AND C.fid = F.fid AND F.fname = 'I.Teach')

SECTION C: Attempt any of one question from this section (15 marks)

14. Write a C program for ATM transaction while currencies are 1000, 500 and 100.

```
#include <stdio.h>
#include <stdlib.h>
int totalThousand =1000;
int totalFiveFundred =1000;
int totalOneHundred =1000;

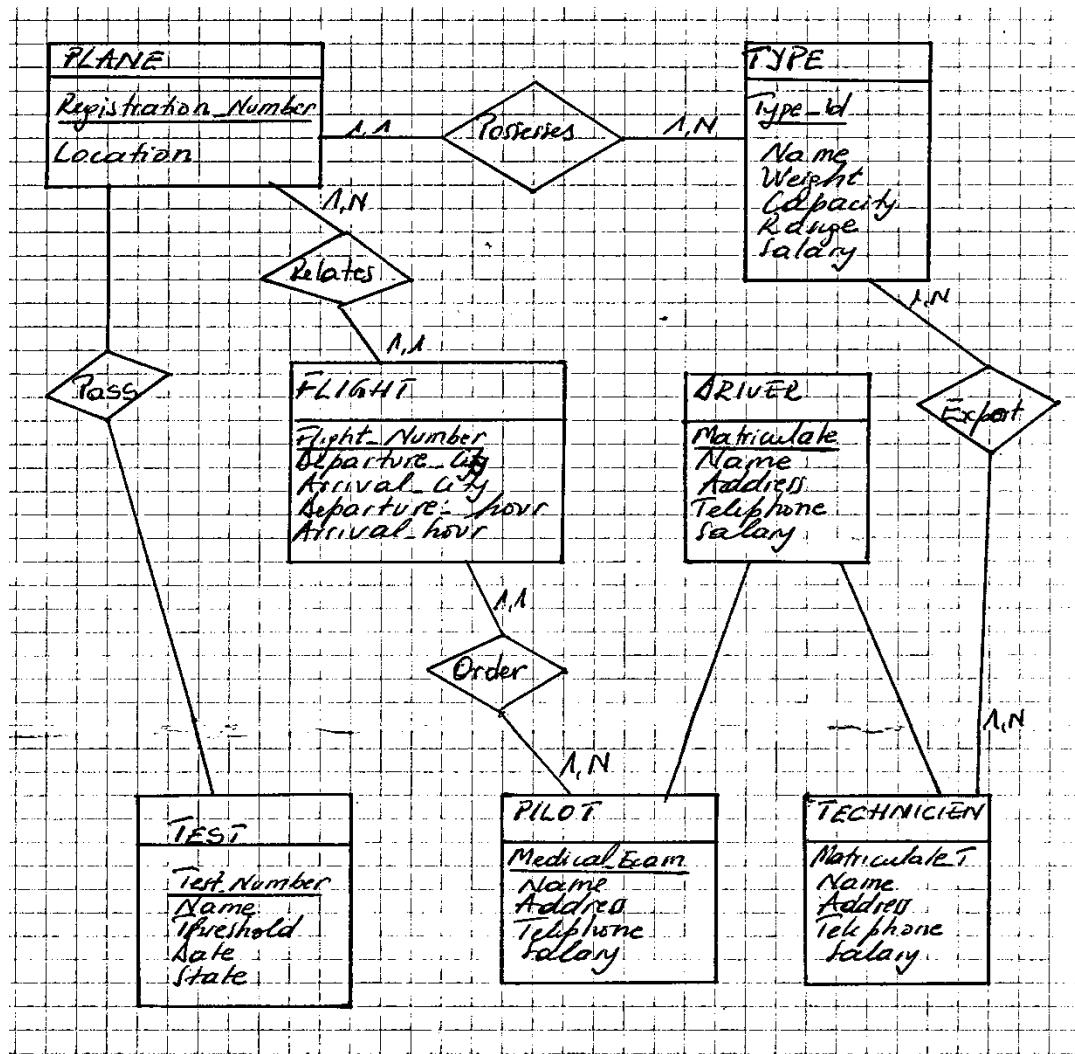
int main(){

    unsigned long withdrawAmount;
    unsigned long totalMoney;
    int thousand=0,fiveHundred=0,oneHundred=0;
    printf("Enter the amount in multiple of 100: ");
    scanf("%lu",&withdrawAmount);
    if(withdrawAmount % 100 != 0){
        printf("Invalid amount;");
        return 0;
    }
```

totalMoney = totalThousand * 1000 + totalFiveFundred* 500 + totalOneHundred*100;

```
if(withdrawAmount > totalMoney){  
    printf("Sorry,Insufficient money");  
    return 0;  
}  
  
thousand = withdrawAmount / 1000;  
if(thousand > totalThousand)  
    thousand = totalThousand;  
withdrawAmount = withdrawAmount - thousand * 1000;  
  
if (withdrawAmount > 0){  
    fiveHundred = withdrawAmount / 500;  
    if(fiveHundred > totalFiveFundred)  
        fiveHundred = totalFiveFundred;  
    withdrawAmount = withdrawAmount - fiveHundred * 500;  
}  
  
if (withdrawAmount > 0)  
    oneHundred = withdrawAmount / 100;  
  
printf("Total 1000 note: %d\n",thousand);  
printf("Total 500 note: %d\n",fiveHundred);  
printf("Total 100 note: %d\n",oneHundred);  
system("PAUSE");  
return 0;  
}
```

- 15.** An airplane has a registration number, type and location (City airport base of the airplane). Each airplane type is described by its name (Boeing 747, Airbus A340...), its weight, its capacity and range. A company technician has name, number (matriculate), address (city of residence), phone number, salary and is an expert on one or several types of airplane during a given period (beginning date and end date). A driver is described by the same attributes as technician. In additional it must pass an annual medical examination. Each plane must also pass a number of testing work. Each test has number that identifies a name and a minimum value (a threshold to be reached). We want to keep the date and status of each test. Each flight is commanded by a sing pilot on one plane A flight departure city (Departure_City) and city of arrival (Arrival_City), time of departure (Departure_Hour) and time of arrival (arrival_hour). Make a conceptual data model (entities relationship and associations model). Do not forget the cardinalities and underline the keys.



16. Knowing that the formula to compute the volume of cylinder is $v=\pi r^2 h$ where v = volume; $\pi=22/7$; r =radius and h =height. Write a required code to make program that calculates the volume of cylinder using the VB interface as designed bellow:

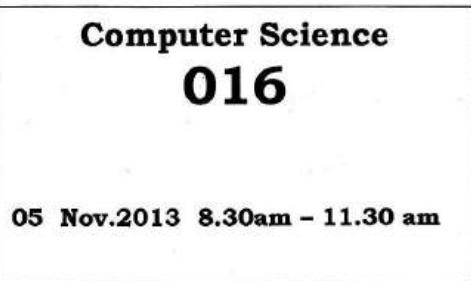


When you run the program, you should be able to see the interface as shown in. If you enter a value each in radius box and the height box, then click OK; the value of volume will be displayed in the volume box.

NB: Using the function Str\$. The declaration step is not required.

```
Private Sub Command1_Click()
```

```
Dim r, h, v As Double
Const pi As Double = 22 / 7
r = Str$(Text1.Text)
h = Str$(Text2.Text)
v = pi * (r ^ 2) * h
Text3.Text = Str$(v)
End Sub
```



REPUBLIC OF RWANDA



RWANDA EDUCATION BOARD

ADVANCED LEVEL NATIONAL EXAMINATIONS 2013

SUBJECT: COMPUTER SCIENCE

**COMBINATIONS : MATHS-COMPUTER SCIENCE-ECONOMICS: MCE
MATHS-PHYSICS-COMPUTER SCIENCE: MPC**

DURATION : 3 HOURS

INSTRUCTIONS :

1. Do not open this paper until you are told to do so.
2. This paper consists of **three** sections: **A**, **B** and **C**.

Section A: This section is compulsory. **(55 marks)**

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

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

3. Use only blue pen.

Section A: Attempt all questions (55 marks)

1. Define a flowchart. (2marks)
2. What makes up a Visual Application (Project)? (7marks)
3. What are the three ways for a variable to be declared? (3marks)
4. What are the three ways to connect to a database in Visual Basic? (3Marks)
5. Define Object Oriented Programming. (3marks)
6. Distinguish 'while' and 'do - while' statements. (8marks)
7. List the different types of parameter passing techniques. (3marks)
8. Define class. (2marks)
9. Where will you classify a member function? (4marks)
10. What is the use of a destructor? (3marks)
11. What is the difference between structure and a class? (3marks)
12. Define virtual function. (6marks)
13. What is meant by pointer and null pointer? (4marks)
14. Give any two error handling functions and their purposes. (4marks)

```
#include <iostream.h>
int main()
{
    int :: solid, liquid, gas, T;
    cout << "Enter three numbers";
    cin << solid << liquid << gas;
    if (T < 0)
        cout << "Temperature is less than solid";
    if (T < 100)
        cout << "Temperature is less than liquid";
    else if (T == 100) && (T > 100)
        cout << "Temperature is greater than liquid";
    else
        cout << "Temperature is greater than solid";
}
```

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

15. Define the following:

- a) Branching Statements. (2,5marks)
- b) Looping Statements (2,5marks)
- c) **if** statement. (2,5marks)
- d) **while** statement. (2,5marks)

16. Write a pseudocode of an algorithm that will read the two sides of
a rectangle and calculate its area. (10marks)

17. Convert the binary number 1111011 to decimal number. (10marks)

18. How does a main () function in C++ differ from main () in C? (10marks)

19. What is ADO? What are its objects? (10marks)

Section C: Attempt any one question from this section (15 marks)

20. Write a C program to print fibonacci series (0 1 1 2 3 5 8 13).

21. Write an algorithm to find the sum and average of three given
numbers.

CORRECTION OF NATIONAL EXAMINATION 2013

Section A: Attempt all questions (55)

1. Define a flowchart

A **flowchart** is a graphical representation of the sequence of operation in an information system or program.

2. What makes up a visual application (Project)?

A visual application (project) is made up of:

- a. Control (Toolbox)
- b. Form
- c. Project Explorer
- d. Properties
- e. General procedure
- f. Methods
- g. Event procedures

3. What are three ways for a variable to be declared?

- a. Default
- b. Implicit**
- c. Explicit

4. What are the three ways to connect to a database in Visual BASIC?

- 1. Using data link
- 2. Using an ODBC data source
- 3. Use a connection string

5. Define object Oriented Programming

Object-oriented programming (OOP) is a implementation in which programs are organized as co-operative collection of objects, each of which represents an instance of class and whose classes are all member of a hierarchy of class united through the property called inheritance.

6. Distinguish ‘while’ and ‘do-while’ statements.

a. While

This is the top tested loop

Loop is not executed if the condition is false

b. Do while

This is the bottom tested loop

Loop is executed at least once even though the condition is false.

7. List the different types of parameter passing techniques

Pass by Value: When we pass the parameter to a function by value, the parameter value of the caller is copied to the function parameter.

Pass by Reference: When we pass the parameter to a function by reference, the reference to the actual value of the caller is copied to the function parameter. So, at the end there are two references pointing to the same value, one from the caller, and one from the function.

8. Define a class

A **class** is a way to bind data and its associated functions together. It allows the data to be hidden if necessary.

9. Where will you classify a member function?

Outside the class definition

Inside the class definition

10. What is the use of a destructor?

It is used to destroy the object that have been created by a constructor, It release the memory space for future use.

11. What is the difference between structure and class?

The only the difference between a structure and a class in C++ is that, by default, the members of class are private, while by default the member of a structure are public.

12. Define virtual function

- It is a function qualified by the **virtual** keyword. When a virtual function is called via pointer, the class of the object pointed to determine which function definition will be used.
- Virtual functions implement polymorphism, whereby objects belonging to different classes can respond to the same message in different ways.

13. What is meant by pointer and null pointer?

- Pointer=pointer is data type that holds the address of a location in memory.**
- Null Pointer=is a pointer that does not point to any data object. In C++, the null pointer can be represented by the constant 0.**

14. Give any two error handling functions and their purposes

- eof()-TRUE(nonzero)if eof encountered while reading; otherwise FALSE(zero)**
- rdstate()-returns the status state data member of the class ios**

SECTION B: ATTEMPT ANY THREE QUESTIONS FROM THIS SECTION (30 MARKS)

15. Define the following:

- Branching statements.**

Change the control flow of a program by executing one or more different branches of the code.

- Looping statements**

Statement that cause the flow of the program to repeat or loop over a more different branches of the code.

c. If statements.

A statement conditionally executes a block of code.

d. While statement.

A looping statement that will repeatedly execute a section of code until its condition

16. Write a pseudocode of an algorithm that will read the two sides of a rectangle and calculate its area

Get length of rectangle

Get width of rectangle

Calculate the area by taking length multiply width

Print area

17. Convert the binary number 1111011 to decimal number.

$$1+(2^*1)+(2^*2^*0)+(4^*2^*1)+(8^*2^*1)+(16^*2^*1)+(32^*2^*1)=123$$

Therefore, the binary number 1111011 is equal to the decimal 123.

18. How does a main () function in C++ differ from main() in C?

C is a procedure oriented language.

C++ is object-oriented language

'main()' is C returns void

in C++, 'main()' returns an integer

And if you use 'void main()', you use it in C, not in C++. In C++ you should always use 'int main()', though using 'void main()' won't result in an error, but it's not standard.

19. What is ADO? What are its objects?

ActiveX Data Objects (ADO) is an [application program interface](#) from Microsoft that lets a programmer writing Windows applications get access to a relational or non-relational [database](#) from both Microsoft and other database providers.

Microsoft ActiveX Data Objects (ADO) enable your client applications to access and manipulate data from a variety of sources through an **OLE DB provider**. Its primary benefits are ease of use, high speed, low memory overhead, and a small disk footprint.

SECTION C: ATTEMPT ANY ONE QUESTION FROM THIS SECTION (15 MARKS)

20. Write a c program to print Fibonacci series (0 1 1 2 5 8 13).

```
#include <stdio.h>
```

```
#include <stdlib.h>
```

```
int main()
{
    int first=0,second=1,third,i,n;
```

```
    printf("Enter how many elements?");
```

```
scanf("%d",&n);
printf("\n%d %d",first,second);

for(i=2;i<n;++i)
{
    third=first+second;
    printf(" %d",third);
    first=second;
    second=third;
}

system("PAUSE");
return 0;
}
```

21. Write an algorithm to find the sum and average of three given numbers

Var A, B, C, Sum As Integer

Var Average As float

Start

Read A

Read B

Read C

Sum $\leftarrow A+B+C$

Display Sum

Average $\frac{Sum}{3}$

Display Average

Stop

CORRECTION OF NATIONAL EXAMINATION 2014

Section A: Attempt all questions (55 marks)

1. Give 3 examples of an audio port that connects audio devices to the computer.

- a. Line In
- b. Microphone
- c. Line Out
- d. Gameport/MIDI

2. List the 3 motherboard form factors

AT(Advanced Technology) form factor

BTX(Balanced Technology Extended) form factor

ATX(Advanced Technology Extended) form factor

SFF Small Form Factor

ITX Types of case found on a lot of mini and micro computer

3. Tick in the cell where the device matches with the device type as shown below.

No	DEVICES	INPUT DEVICES	OUTPUT DEVICES	STORAGE DEVICES
1	Touchpads	✓		
2	Light pen		✓	
3	Scanner	✓		
4	Electronic Whiteboard		✓	
5	RAID			✓
6	Speaker(s)		✓	
7	Monitor		✓	
8	PC card			✓

4. Write an algorithm that ask the user to enter two numbers and it displays the product of those numbers if it is null, positive or negative.

Var A, B As Integer

Start

Display" Enter the value of A"

Read A

Display" Enter the value of B"

Read B

If (A<0 and B>0)

Write ("The product is negative")

Else if (A>0 and B=0)

Write ("The product is null")

Else if (A<0 and B<0)

```
Write (The product is positive)
Else if (A>0 and B>0)
Write ("The product is positive")
Else if (A=0 and B=0)
Write ("The product is null")
End if
End
```

5. What is loop?

A loop helps to repeat instruction or block of instructions. It assists in the algorithm where you want to carry out an activity for a certain number of times

6. Write an algorithm which uses do...while loop and displays numbers from 1 to 15.

```
Var A As Integer
Start
A←1;
while (A<=5)
write (A)
A←A+1
End While
End
```

7. Distinguish seek time from data rate

Data rate: The data rate is the number of bytes per second that the drive can deliver to the CPU. Rate between 5 and 40 megabytes per second are common

Seek time: The seek time is the amount of the time between when the CPU requests a file and when the first byte of the file is sent to the CPU. Time between 10 and 20 milliseconds are common

8. Study the program below and answer the questions that follow.

```
#include <stdio.h>
int g=20;
int main()
{
    int g=10;
    printf("Value of g=%d\n",g);
    return 0;
}
```

a. What is the output?
Value of g=10
b. Explain why the output.
The local variable inside a function take preference.

9. (a) What is data structure?

A data structure is a group of data elements grouped together under one name

(b) Show with examples how the data structures are declared.

```
struct structure_name
{
```

```
    data_type1 member1;  
    data_type2 member2;  
    data_type3 member3;  
};
```

Example:

```
struct product{  
int weight;  
float price;  
};  
product apple;  
Product banana, melon;  
OR  
struct product{  
int weight;  
float price;  
}apple, banana, melon;
```

10. Which of the following is not derived data type in c?

- a. Function
- b. Pointer
- c. Enumeration
- d. Array
- e. All are data type

Answer is **c. Enumeration**

Derived data type is any data type that is built from basic data types. It can be built from one or more basic data types. Examples are arrays, structures, unions, and pointers. Functions and methods that return a value of a specified type is also considered a derived data type.

11. Which of the following is an integral data type?

- a. Void
- b. Char
- c. Float
- d. Double
- e. None of these

Answer is **b. char**

12. Explain the importance of:

- a. Plug and play system

Plug and Play (PnP): is a device manager first performs a scan different hardware buses, such as Peripheral Component Interconnect (PCI)or Universal Serial Bus (USB), to detect installed devices, then searches for the appropriate drivers

Shell: is a piece of software that provides an interface for users of an operating system which provides access to the services of a kernel.

13. What is protocol?

protocol is a set of rules that governs the communications between computer on a network. In order for two computer to talk to each other, they must be speaking the same language.

14. Describe 4 disadvantages of using relations database system in table.

- Relational databases bring table together.
- Structured query language is easy to understand
- Security of data
- Sharing data
- No duplicate data

15. How is the memory in multi-process system managed?

The memory management is managed according to three schemes namely: Fixed partition memory, variable partition memory, and variable partition allocation with compaction

16. Describe the trash can icon in the Linux

The trash can icon on the desktop contains files and folders which you have deleted using the File Manager or an application run from the desktop. It is special folder in which it is still possible to move back the deleted items to another so as to “undelete” them.

17. Multiply $(1000.10)_2$ by $(10.1)_2$.

10101.010₂

18. Swapping means exchanging the values of one variable with another variable. Write a C function that swaps two numbers and display the values of those numbers before and after the swap.

```
#include <stdio.h>
#include <stdlib.h>
int main(){
    float a, b, temp;
    printf("Enter value of a: ");
    scanf("%f",&a);
    printf("Enter value of b: ");
    scanf("%f",&b);
    temp = a;
    a = b;
    b = temp;
    printf("\nAfter swapping, value of a = %.2f\n", a);
    printf("After swapping, value of b = %.2f", b);
    system("PAUSE");
```

```
    return 0;
}
```

19. (a)Create a table of your choice with at least 4 different attribute in SQL.

Create table student (SId numeric (5) PRIMARY KEY, Fname char (25), Lname char (25), Sex char (5));

(b)Given an “Employee” table below:

NAME	PHONE	ADDRESS	SALARY	EVALUATION
KANAMUGIRE	08564433	KACYIRU	185000	0.75
RURANGWA	51231578	NYAMATA	123000	0.90
BAHIZI	03314563	RWAMAGANA	230000	0.80
GIRANEZA	08567838	REMERA	197000	0.85

Write SQL statements for:

i. Insert the new employee into the table

Insert into Employee values (0788111111, "KIGALI", "171000", 1);

ii. Update the table to give a salary increase of 20% to those employees whose evaluation is above or equal to 0.80.

UPDATE Employee SET salary= (SALARY + 0.2) WHERE EVALUATION >=0.8;

iii. Destroying table name” Employee”.

Drop table Employee;

iv. List the names, salary and address of employees whose evaluation are less than 0.8 or greater than 0.85.

Select Name, Salary, address from Employee where Evaluation NOT BETWEEN 0.8 AND 0.85;

20. (a)Define a bit.

A *bit* (short for binary digit) is the smallest unit of data in a computer. A *bit* has a single binary value, either 0 or 1. Although computers usually provide instructions that can test and manipulate *bits*, they generally are designed to store data and execute instructions in *bit* multiples called bytes.

(b)Find the binary equivalent of (353.45)₁₀

0110000.1111001

(c)Convert (7834.523)₁₀ to octal system.

(7232.413615)₈

(d)Convert (56734.5275)₁₀ into hexadecimal.

DD9E.870A3D₁₆

(e)Represent”-18” in signed magnitude form.

We know (18)₁₀ = (10010)₂

21. Write C++ program that decrease the numbers for 10 to 0 number and when it reaches to number 4 it skips that iteration, using loop.

```
#include <iostrem.h>
#include <stdlib.h>

int main()
{
int a;
for(a=10; a>0; a--)
{
if (a==4)
continue;
cout<<a<<"";
}
system("PAUSE");
return 0;
}
```

(a)What are the uses of RDMS in database

- Retrieving of information stored in the database.
- Inserting of new information into the database
- Deleting of information from database.
- Modification of data stored in the database.
- Creating a database
- Managing of information stored in the database.
- Maintain of information stored in the database.
- Read of information stored in the database.

(b)What is projection in SQL

A projection is an instruction for selecting a set of columns in a table

Section C: Attempt only one question (15 marks)

22. What are the functions of the following codes?

- | | | | |
|-----------|-----------|--------------|-----------|
| a) ls | b) cd | c) cp | d) rm |
| e) pwd | f) cat | g) Ip config | h) ping |
| i) chkdsk | j)comp | k)erase | l)deltree |
| m) dir | n)restore | o)undelete | |

a. **ls:** lists your files

b. cd(change directory): The command *cd directory* means change the current working directory to '*directory*'

- c. **cp:** copies a file
- d. **rm:** removes a file
- e. **pwd** (print working directory):enable you to work out where you are in relation to the whole file-system
- f. **cat:** Concatenate file(can be used to join them together)
- g. **Ip config:** Display the current TCP/IP network configuration and controls the DNS resolver cache
- h. **ping:** verifies IP level connectivity to another TCP/IP computer. Ping is the primary TCP/IP Command used to troubleshoot connectivity.
- i. **chkdsk:** checks a disk and displays a status report.
- j. **comp:** performs a binary comparison of multiple files and shows the differences between them.
- k. **erase:** deletes the last thing you typed
- l. **deltree:** deletes an entire subdirectory of files.
- m. **dir:** The DIR command displays the contents of a directory.
- n. **restore:** restore files or file systems from backups made with dump
- o. **undelete:** Restores file previously deleted with del.

23. (a) Enumerate the procedures followed to create a new project in VISUAL BASICS.

The procedure for creating a new project in VB is:

- Start
- All programs
- VB6.0
- Ms VB6.0
- New
- Standard
- Open

(b)Write a VB program

If user checks the first option (Option 1), the program should display the addition of numbers entered in text1 and text2 in text3 if a user checks to button compute.

If a user checks the second option (Option 2), the program should display the multiplication of the numbers entered in the text1 and text2 in the text2 if user clicks to computer button.

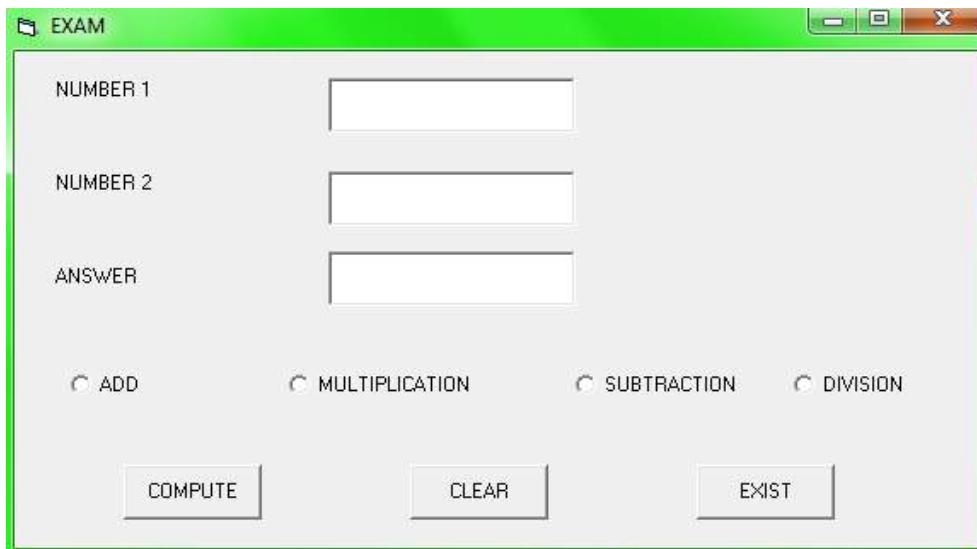
If the user checks the third option (Option 3) the program should display the subtraction of the number entered in text1 and text2 in the text3 if the user clicks to the compute button.

If the user checks the third option (Option 3) the program should display the division of the number entered in text1 and text2 in the text3 if the user clicks to the compute button.

The program should display nothing in text1, text2 and text3 if user clicks to Clear button.

Remember the program should be closed

For example: Assume that a user checked the following program



```
Private Sub Compute_Click()
Dim a, b, c As Integer
a = Val(Text1.Text)
b = Val(Text2.Text)
If Option1.Value = True Then
c = a + b
ElseIf Option2.Value = True Then
c = a * b
ElseIf Option3.Value = True Then
c = a - b
ElseIf Option4.Value = True Then
c = a / b
Text3.Text = c
End If
End Sub
```

```
Private Sub Clear_Click()
Text1.Text = ""
```

For more; visit <http://www.thinkbig.rw/online-courses/> or (www.thinkbig.rw)

```
Text2.Text = ""  
Text3.Text = ""  
End Sub
```

```
Private Sub Close_Click()  
Unload Me  
End Sub
```

S6 SC EXAMINATION MARKING GUIDE

Section A: / 45marks

- 1.** What is computer security? Explain why it is important. /3marks

Computer security is the protection of computer system and information from harm, Theft, and an authorized use.

- 2.** Which of the following are layers in the TCP/IP model? (Choose any three.) /2marks

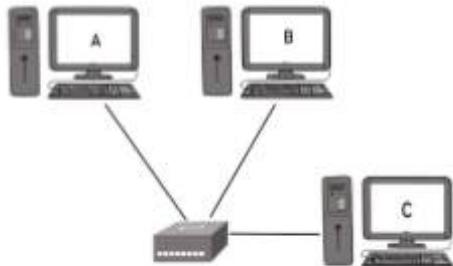
- a. Application
- b. Presentation
- c. Session
- d. Transport
- e. Internet
- f. Data Link
- g. Physical

Any three from the list except e.

- 3.** Write in full the following abbreviations /2.5marks

- a) RJ45 - **Registered Jack 45**
- b) VPN - **Virtual Private Network**
- c) SMTP - **Simple Mail Transfer Protocol**
- d) ISO - **International Standard Organization**
- e) UTP - **Unshielded Twisted Pair**

- 4.** Observe well the figure



- a)** Can the above computers (A,B and C) communicate? How and why? /2marks

Yes, through the central device

- b)** In which case the communication may not be possible? /1marks

When the central device is down (not working)

- c)** What type of network does the figure above represent? /1marks

Wired network / Guided network Bounded network

- d)** How the Computers A and B are connected? /1marks

A sends the message to the central device, and the device directs the message to B

- 5.** Write C++ program to display the following /3marks

```
1
2  2
3  3  3
4  4  4  4
5  5  5  5  5
```

```
#include<iostream.h>
#include<conio.h>
void main()
{
    int i, j;
    for(i=1;i<=5;i++)
    {
        for(j=1;j<=i;j++)
        {
            cout<<i;
        }
        cout<<"\n";
    }

    getch();
}
```

- 6.** a) What is an event in visual basics? Give two examples. /3marks

an activity that occurs so that an output is got. Click(), Load, DoubleClick(), ...

- b) Describe the use of Object Window, Property Window, Form and Form Layout as the Visual BASIC environment features. /4marks

O.W: to provide all needed controls for the project design

P.W : for all properties to be set to the project controls

Form : where the design is drawn

FL: indicate the location of the form once executed

7. Match the terms from column A to their correct meaning from column B /4.5marks

<u>Column A</u>	<u>Column B</u>
-----------------	-----------------

- | | |
|-----------------|--|
| 1. Partitions | a. Refresh, clear, organize memory cells to hold data |
| 2. CD | b. Segments of the hard drives |
| 3. Formatting | c. Optic media holding a system software |
| 4. Authenticity | d. General name given to evil software |
| 5. IRQ | e. Hotlines on the CPU that enable peripherals to signal to the CPU their particular needs |
| 6. Malware | f. Correct use of username and password |
| 7. Star | g. A client-server network topology |
| 8. Repeater | h. An amplifier of network topology |
| 9. Cross-over | i. A network cable whose some of pins on both ends are reversed |

8. Write a C++ program to calculate the sum of even numbers and odd numbers apart, in a given range of limits entered from the keyboard. /3mark

```
#include<iostream>
using namespace std;
int main ()
{
    int a,b, sumodd =0, sumeven=0;
    cout<< "Enter the limits:";
    cin>> a;
    cin>> b;
    for (int i = a+1; i < b; i++)
    {
        if (i%2 ==1)
            sumodd= sumodd + i;
        else
            sumeven = sumeven + i;
    }
    cout<<"Sum of oodd numbers:"<< sumodd << endl;
    cout<<"Sum of even numbers:"<< sumeven;
    return 0;
}
```

9. a) What is a bit? /1mark

A **bit** (short for binary digit) is the smallest unit of data in a computer. A **bit** has a single binary value, either 0 or 1. Although computers usually provide instructions that can test and manipulate **bits**, they generally are designed to store data and execute instructions in **bit** multiples called bytes.

c) Find the binary equivalent of $(353.45)_{10}$ /1mark

0110000.1111001

d) Perform $(1000011011)_2 - (111101)_2 = (\dots\dots\dots\dots\dots)_2$ /1mark

e) Perform $(101111011)_2 + (1111)_2$ /1mark

10. Assume that a database is connected to the VB form, give the method that will help the user to Add a new record, Move to next record, Move to previous record, Move to first record, Move last record and Delete record /6marks

```
Private Sub
Command1_Click()
Adodc1.Recordset.AddNew
End Sub
```

```
Private Sub
Command1_Click()
Adodc1.Recordset.MoveNext
End Sub
```

```
Private Sub Command1_Click()
Adodc1.Recordset.MovePrevious
End Sub
```

```
Private Sub
Command1_Click()
Adodc1.Recordset.MoveFirst
End Sub
```

```
Private Sub
Command1_Click()
Adodc1.Recordset.MoveLast
End Sub
```

```
Private Sub Command1_Click()
Adodc1.Recordset.Delete
End Sub
```

11. What will be the output of the block of code and explain why. /2marks

```
int i;
float f;
f = 3.14;
i = int (f);
cout<< I;
```

3. As this function is only considering the decimal part of f

12. Write an algorithm that calculate and displays the area of a rectangle when its circumference and width were entered /3marks

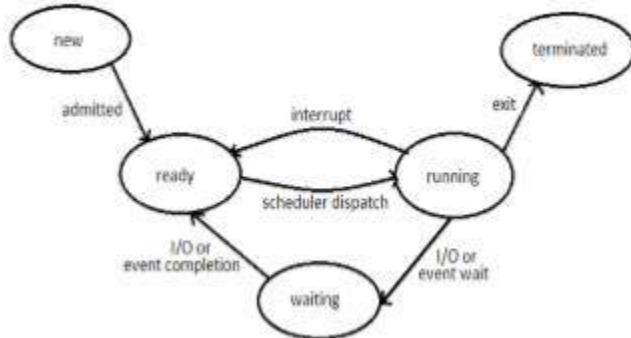
```
SET A, C, W, H As Integer
BEGIN
WRITE ("enter the rectangle circumference:")
READ(C)
WRITE ("enter the rectangle width")
READ (W)
H ← ( C / 2 ) – W
A←W * H
WRITE( A )
END
```

Section B: Attempt any three questions /15marks

- 13.** Write a C++ program using array, store and calculate the average of marks obtained by 10 students.

```
#include<iostream>
using namespace std;
int main()
{
    int sum = 0;
    float av;
    int marks [10];
    cout<< "enter ten marks:";
    for(int i = 0; i< 10; i++)
    {
        cin>> marks[i];
        sum+=marks[i];
    }
    av = sum / 10;
    cout<< "The average is:"<< av;
    return 0;
}
```

- 14.** With a well labeled diagram for the process state transitions and explains the different process states.



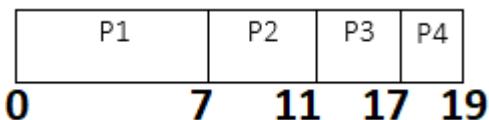
- a. New:** This is the initial state when a process is first created but it has not yet been added to the pool of executable processes.
- b. Ready:** At this state, the process is ready for execution and is waiting to be allocated to the processor. **c. Running:** At this state, the process is now executing. A running process possesses all the resources needed for its
- d. Waiting:** a process is waiting for some event to occur before it can continue execution.
- e. Terminated:** This is when a process finishes its execution.

- 15.** Consider four processes P1, P2, P3 and P4 with their arrival times, required CPU burst (in milliseconds) and priorities as shown in the following table:

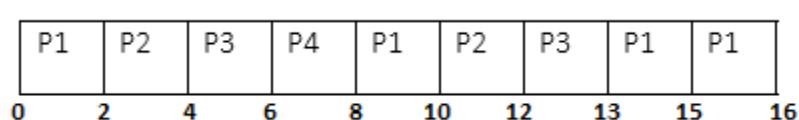
Process	P1	P2	P3	P4
Arrival time	0	1	3	4
CPU burst (ms)	7	4	3	2
Priority	4	3	1	2

- a) Using non preemptive FCFS, and RR with 2ms of quantum, construct the Gantt chart for each of the scheduling algorithm

FCFS



RR



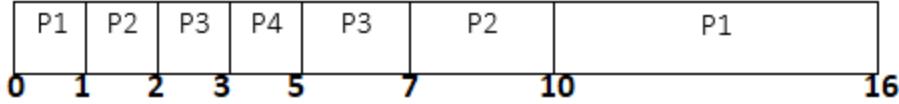
- b) Calculate the ATAT(Average Turn Around Time) for each of the scheduling algorithms

$$\text{ATAT} = (0+7+11+17+19)/4$$

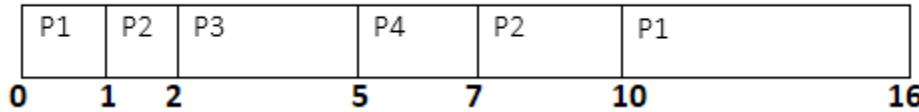
$$\text{ATAT} = (0+2+4+6+8+10+12+13+15)/4$$

- c) Using preemption SJF and Priority, draw the Gantt chart for each of the scheduling algorithms

SJF

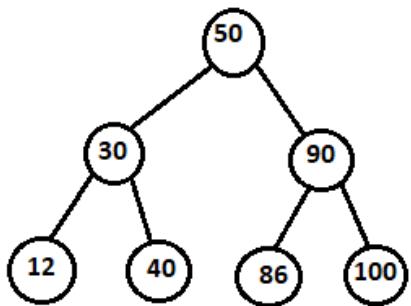


PRIORITY



- d) What is the waiting time for each of the algorithms and for each process

- 16.** Determine the order in which the elements would be accessed during Pre-Order, In Order and Post-Order traversals.



Pre-order: 50 30 12 40 90 86 100

In – order: 12 30 40 50 86 90 100

Post- order: 12 40 30 86 100 50

- 17.** Consider a user program of logical address of size 6 pages and page size is 4 bytes. The physical address contains 300 frames. The user program consists of 22 instructions a, b, c . . . u, v. Each instruction takes 1 byte. Assume at that time the free frames are 12, 8, 35, 42, 28, 41, 27, 19, 64, and 57. Find the physical address of the instructions f, k, o, t and v.

$$\mathbf{F: 4 * 8 + 1 = 33}$$

$$\mathbf{K: 4 * 35 + 2 = 142}$$

$$\mathbf{O: 4 * 42 + 2 = 170}$$

$$\mathbf{T: 4 * 28 + 3 = 118}$$

$$\mathbf{V: 4 * 41 + 1 = 165}$$

Section C: Answer one question of your choice /10marks

- 18.** Write a VB program as shown by the interface.

- If user checks the first option (Option 1), the program should display the addition of numbers entered in text1 and text2 in text3 if a user checks to button compute.
- If a user checks the second option (Option 2), the program should display the multiplication of the numbers entered in the text1 and text2 in the text2 if user clicks to computer button.
- If the user checks the third option (Option 3) the program should display the subtraction of the number entered in text1 and text2 in the text3 if the user clicks to the compute button.
- If the user checks the third option (Option 3) the program should display the division of the number entered in text1 and text2 in the text3 if the user clicks to the compute button. For this option avoid the division by zero instructing the user to enter another number in text2 instead of zero.
- If the user clicks the Compute button without choosing any of the options, the program displays “**No option chosen**”.

The program should display nothing in text1, text2 and text3 if user clicks to Clear button.

Remember the program should be closed.

Form1

NUMBER 1	<input type="text"/>		
NUMBER 2	<input type="text"/>		
ANSWER	<input type="text"/>		
<input type="radio"/> ADD	<input type="radio"/> MULTIPLICATION	<input type="radio"/> SUBSTRTUCTION	<input type="radio"/> DIVISION
<u>COMPUTE</u>	<u>CLEAN</u>	<u>EXIT</u>	

```

Private Sub Command1_Click()
Dim A, B As Integer
A = Val(Text1.Text)
B = Val(Text2.Text)
If Option1.Value = True Then
Text3.Text = A + B
ElseIf Option2.Value = True Then
Text3.Text = A * B
ElseIf Option3.Value = True Then
Text3.Text = A - B
ElseIf Option4.Value = True Then
If B = 0 Then
MsgBox "DIVISION BY ZERO! ENTER AN OTHER NUMBER.", vbCritical
Text2.SetFocus
Else
Text3.Text = A / B
End If
Else
MsgBox "NO OPERATION CHOSEN!", vbOKOnly
End If
End Sub

```

```

Private Sub Command2_Click()
Text1.Text = ""
Text2.Text = ""
Text3.Text = ""

End Sub

Private Sub Command3_Click()
End
End Sub

```

- 19.** A company, using Database approach has a well manner to manage its employees and calculate employee salaries as shown by the table below:

Employee

EmployeeID	Employeename	Place_Of_Work	Working_Days	Base_salary
005	KAREKEZI	MUHANGA	28	28,000
006	MUNEZA	BUTAMWA	15	15,000
007	SESONGA	MUHANGA	18	18,000
008	MANIRARORA	KIGALI	22	22,000
009	BUGINGO	RILINDO	25	25,000
010	GABINEZA	KIGALI	14	14,000
011	RUGIRA	MUHANGA	7	7,000

Write sql commands to create the following queries:

i)

Employee_ID	Employee_name	Place_Of_Work
005	KAREKEZI	MUHANGA

006	MUNEZA	BUTAMWA
007	SESONGA	MUHANGA
008	MANIRARORA	KIGALI
009	BUGINGO	RILINDO
010	GABINEZA	KIGALI
011	RUGIRA	MUHANGA

Select Employee_ID , Employee_name , Place_Of_Work from Employee;

ii)

EmployeeID	EmployeeName	Base_Salary
006	MUNEZA	15,000

Select Employee_ID , Employee_name , Base_Salay from Employee where Employee_ID = 006;

iii) The total amount of all employees' salaries

Select sum(Base_Salary) from Employee;

iv) All information for employees who work at MUHANGA

Select * from Employee where Place_Of_Work = 'MUHANGA';

v) The number of employees that earn more than 20,000

Select count(EmployeeID) from Employee where Base_Salary > 20000;

Good luck !

CORRECTION OF NATIONAL EXAMINATION 2016

SECTION A: Attempt all questions in this section. (55 marks)

- 1) Complete the following result of a relational operation which is a Boolean value that can only be true or false, according to its Boolean result. **(5marks)**

If $a=2$, $b=3$ $c=6$
($a == 5$)
($a*b >= c$)
($b+4 > a*c$)
($(b=2) == a$)
($c > b$)

- 2) Consider the following declaration: **(2marks)**

(i) short i=10;
(ii) static i=10;
(iii) unsigned i=10;
(iv) const i=10;

Choose the correct answer:

- a) Only (iv) is incorrect
b) Only (ii) and (iv) are incorrect
c) Only (ii),(iii) and (iv) are correct
d) Only (iii) is correct
e) All are correct declarations

- 3) What are the functions of a hard drive? **(2marks)**

- 4) What are the functions of the following? **(4marks)**

(a) Antivirus Program (b) Spyware Remover
(c) Firewall (d) NIC

- 5) What are the four main roles of operating systems? **(4marks)**

- 6) What is a control in VB? Give three of its examples. **(5marks)**

- 7) What are the differences between a form module and standard module? **(2marks)**

- 8) Write an algorithm which receives water temperature and displays the states of water as follows: **(5marks)**

Below 0 : state is Solid
Below 100 : state is Liquid
100 and above : state is Gas.

- 9) What are the 6 common services provided by operating systems? **6marks)**

- *10) What are the differences between a function call and a system call operating system? **(3marks)**

- 11) What is a block of statement? **(2marks)**

- 12) What are the outputs of the following program? **(4marks)**

```
#include <stdio.h>main()
{inti = 10;
while ( i> 0 )
```

```
{printf("Hello %d\n", i);
i = i -1;
if(i == 6 )
{
break;
}}
```

- 13) What are the outputs of the following program?

(4marks)

```
#include <iostream>
using namespace std;
int subtraction (int a, int b)
{
int r;
r=a-b;
return (r);
}
int main ()
{
int x=5, y=3, z;
z = subtraction (7,2);
cout<< "The first result is " << z << '\n';
cout<< "The second result is " << subtraction (7,2) << '\n';
cout<< "The third result is " << subtraction (x,y) << '\n';
z= 4 + subtraction (x,y);
cout<< "The fourth result is " << z << '\n';return 0 }
```

- 14) Give four examples of DBMS languages.

(4marks)

- 15) Distinguish data integrity from data security.

(3marks)

SECTION B: Attempt any three questions (30 marks)

- 16) a)What is a computer?

(2marks)

- b) Describe the four main categories of computers.

(8marks)

- 17) a)Define the following networking devices:

(5marks)

- (i) Router (ii) Gateway (iii) Bridge
- (iv) Hub (v) Repeater

- b) Complete the following table which are IP address classes and subnetmasks.

(5marks)

Class	First Octet – to	Default Subnet Mask	Number of Networks
A			
B	128 to 191		16,384
C	192 to 223		2,097,152

- 18) Write a program in C++ containing two functions that return values.
 The first Function returns the higher of two numbers entered by
 the user. The second Function returns the lowest number.
 The parameters for the two functions are entered through the
 main function. **(10marks)**
- 19) Write an algorithm and the flowchart for the problem that allows
 the user to input three numbers and display the sum, the average
 and their product.
 Flowchart: **(10marks)**

20) Write SQL commands on the basis of EMPLOYEES table given below:

EMPLOYEES						
Employee No.	Firstname	Lastname	DeptNo	Jobs	Salary (Frw)	Commission (Frw)
1	Hakizimana	Moses	10	manager	300,000	25,000
2	Harindintwari	J claudie	10	driver	100,000	5,000
3	Mukakimenyi	Vanessa	15	president	750,000	00
4	Mutimukeye	Sandrine	15	clerk	150,000	00
5	Uwambajimana	Hackimu	12	driver	120,000	00
6	Kalisa	Eric	12	analysis	350,000	10,000
7	Harimpisya	Edson	10	clerk	180,000	7,000
8	Tumwebaze	Hamisi	15	security	800'000	00
9	Mutoni	Sandrine	15	manager	280,000	15,000
10	Umuhoza	Yvonne	10	reception	110,000	1,000
11	Tumusifu	Emmanuel	12	analysis	400,000	5,000

- a) To show total salary for manager's Job and rename salary as
 managers' salary. **(2marks)**
- b) Find all Employees whose Department is the same as that of
 "Tumusifu" **(1mark)**
- c) Display Fist name, last name, Job, Commission and Increase the
 Commission of all Employees by 10%. **(2marks)**
- d) Count the available Employees in the table. **(1mark)**
- e) Show by Names and the Commission for the Employees who
 receive the commission (Frw) of 1000,5000 and 00 respectively. **(2marks)**
- f) Display all Employees that do not receive any Commissions. **(2marks)**

SECTION C: Attempt only one question (15marks)

- 21) a) Define "Concurrence in SQL". **(3marks)**
 b) List and explain 6 constraints in SQL. **(12marks)**
- 22) Write a VB program to find Fibonacci series up to a given term
 (useInputBox). **(15marks)**

CORRECTION

COMPUTER SCIENCE MARK SCHEME 2016

SECTION A: Attempt all questions from this section. (55 marks)

1. Complete the following result of a relational operation which is a Boolean value that can only be true or false, according to its Boolean result. (5 marks)

(a) $a=2, b=3, c=6$

(a) $a == 5$ // evaluates to false since a is not equal to 5.

(b) $(a * b >= c) //$ evaluates to true since $(2 * 3 >= 6)$ is true.

(c) $(4 > a * c) //$ evaluates to false since $(3 * 4 > 2 * 6)$ is false.

(d) $((b == 2) == a) //$ evaluates to true.

(e) $(c > i) //$ evaluates to false

2. Consider the following declaration: (2 marks)

(i) short i=10;
(ii) static i=10;
(iii) unsigned i=10;
(iv) const i=10;

Which correct one:

A) Only (iv) is incorrect
B) Only (ii) and (iv) are incorrect
C) Only (ii),(iii) and (iv) are correct
D) Only (iii) is correct
E) All are correct declaration

3. What are the role of hard driver (2 marks)

The hard drive magnetically stores the operating system, the programs and others data.

4. What are the role of the following (4 marks)

Antivirus Program – protects a computer against virus attacks.
Spyware Remover – protects against software that sends information about web surfing habits to an attacker. Spyware can be installed without the knowledge or consent of the user.
Firewall – a program that runs continuously to protect against unauthorized communications to and from your computer.

NIC-enables a computer to connect to a network such as a home network or the Internet using an Ethernet cable with a RJ-45 connector

5. What are the four main roles of operating system(4 marks)

- Control hardware access
- Manage files and folders
- Provide a user interface
- Manage applications

6. What is a control in VB? Give three examples (5 marks)

A control is a tool on the toolbox window that you place on a form to interact with the user and control the program flow. Examples: textbox, label, commandbutton

7. What are the difference between a form module and standard module? (2 marks)

a form module is a module file that holds one or more forms and the code

a standard module is a file that holds code not related to a form

8. Write an algorithm which receives water temperature and displays the states of water as follows.(5 marks)

Bellow 0 : states is Solid

Bellow 100 : state is Liquid

100 and above : state is Gas

Var a as integer

start

write("enter a number")

If a >= 100 Then

Write("It is a gas")

Else If a >= 0 Then

Write("it is a liquid")

Else

Write("it is a solid")

End If

End.

9. What are 6 common services provided by operating systems (6 marks)

Following are few common services provided by operating systems.

- Program execution
- I/O operations
- File System manipulation
- Communication
- Error Detection
- Resource Allocation
- Protection

1. What are the difference between a function call and system call operating system?(3 marks)
A function call refers to a program calling its own functions while a system call is used for the operating system calling its own functions

2. What is a block of statement?
A block is a group of statements which are separated by semicolons (;) like all C++ statements, but grouped together in a block enclosed in braces: { }.

2. What are the output of the following program(4 marks)

#include <stdio.h>

```
main()
{
    int i = 10;
    while (i > 0)
    {
        printf("Hello %d\n", i);
        i = i - 1;
        if (i == 6)
        {
            break;
        }
    }
}
```

Answers

Hello 10
Hello 9
Hello 8
Hello 7

13. What are the output of the following program (4 marks)

```
#include <iostream>
using namespace std;
int subtraction (int a, int b)
```

```
turn (r);  
  
int main ()  
{  
    int x=5, y=3, z;  
    z = subtraction (7,2);  
    cout << "The first result is " << z << '\n';  
    cout << "The second result is " << subtraction (7,2) << '\n';  
    cout << "The third result is " << subtraction (x,y) << '\n';  
    z= 4 + subtraction (x,y);  
    cout << "The fourth result is " << z << '\n';  
    return 0;  
}
```

Answer

The first result is 5

The second result is 5

The third result is 2

The fourth result is 6

14. Give four examples of DBMS languages (4 marks)

Four examples of DBMS languages are:

- a) data definition language (DDL),
- b) storage definition language (SDL),
- c) view definition language (VDL),
- d) data manipulation language (DML)

15. Distinguish data integrity from data security (3 marks)

Data integrity

In other words, data integrity is the assurance that data will always be correct and accessible.

Data Security

Data security refers to data being protected so that only authorized personnel can access them.

SECTION B: Attempt any three questions (30 marks)

16. What is the computer?(2 marks)

- Computer is an electronic device or a combination of electronic devices which solves problems after accepting data of the binary language 0 and 1 and supplies results to the user.

B. Describe the four main categories of computers(8 marks)

Mainframes computer

It is a computer large and very powerful. Can serve hundreds of people and do many jobs at the same time. Typical users would be banks, insurance companies, large manufacturers, governments.

Mini-Computers

It is a computer smaller and less powerful than mainframes. Can be able to handle a number of users - up to 60. Mostly used for a wide range of business applications such as accounts, payroll, stock control .

Micro Computers

A Single-user single tasking machine, meaning that only one person doing one thing is able to use it at a time. The microcomputer is also known as the personal computer.

Super computers

It is a computer very expensive, very fast and most powerful. Used in scientific research stations such as in nuclear stations and weather forecasting stations. Users of these machines are institutions such as NASA, Boeing, General Motors.

17. Define the following networking devices:(5 marks)

- a) Router
- b) Gateway
- c) Bridge
- d) Hub
- e) Repeater

Answer

- a) Router is a device which is used to route the packets on the internet.
- b) Gateway is a device which interconnects two different types of networks. Is used to convert one protocol into another

- c) Bridges is used to connect two networks, but running the same basic protocol, maybe with slight differences.
- d) Hub is a device that provides a backbone to multiple devices on the ethernet
- c) Repeater electrically amplifies the signal it receives and rebroadcasts it.

B. Complete the following table which are IP address classes and subnet masks. (5 marks)

18. Write a program in C++ containing two functions that return values. The first Function returns the higher of two numbers entered by the user. The second Function returns the lowest number.

Class	First Octet – to	Default Subnet Mask	Number of Networks	The parameters for the two functions are entered
A	1 to 127	255.0.0.0	126	
B	128 to 191	255.255.0.0	16,384	
C	192 to 223	255.255.255.0	2,097,152	

through the main function.(10 marks)

```
#include<iostream.h>
int higher(int a,int b)
{
    int maximum;
    if (a<b)
        maximum=b;
    else
        maximum=a;
    return (maximum);
}
int lowest(int a,int b)
{
    int minimum;
    if (a<b)
        minimum=a;
    else
        minimum=b;
    return (minimum);
}
main()
{
```

- iii. Display First name, last name, Job, Commission and Increase the Commission of all Employees by 10%
- SELECT Firtname, Lastname, Job, Commision +Commision*10/100 FROM EMPLOYEES;
- iv. Count the available Employees in the table
- SELECT COUNT(Job) FROM EMPLOYEES;
- v. Show by Names and the Commission for the Employee whose receive the commission of(1000,5000,00)
- SELECT Firtname, Lastname, Commision FROM EMPLOYEES WHERE Commision IN ('1000', '5000', '00');
- vi. Display all Employees that does not receive any Commissions
- SELECT * FROM EMPLOYEES WHERE Commision <='00';

SECTION C: Attempt any one question from this section

1. A. Define Concurrence in SQL (3 marks)

Concurrency is the ability of a database management system to allow multiple users to access data at the same time while maintaining the integrity and consistency of the data.

B List and explain 6 constraints in SQL (12 marks)

NOT NULL Constraint: Ensures that a column cannot have NULL value.

DEFAULT Constraint: Provides a default value for a column when none is specified.

UNIQUE Constraint: Ensures that all values in a column are different.

PRIMARY Key: Uniquely identified each rows/records in a database table.

FOREIGN Key: Uniquely identified a rows/records in any another database table.

CHECK Constraint: The CHECK constraint ensures that all values in a column satisfy certain conditions.

INDEX: Use to create and retrieve data from the database very quickly.

22. Write a VB program to find Fibonacci series up to given term (use InputBox). (15 marks)

```
Private Sub cmdClear_Click()
    Unload Me
End Sub

Private Sub cmdDisplay_Click()
    n = InputBox("Enter The Terms")
    a = 0
    b = 1
    Print "Fibonacci Series is : "
    Print a
    Print b
    For i = 1 To n - 2
        c = a + b
        a = b
        b = c
        Print c
    Next
End Sub

Private Sub cmdExit_Click()
    Unload Me
End Sub
```

```
Private Sub cmdClear_Click()
frmFibo.Cls
End Sub
Private Sub cmdDisplay_Click()
n = InputBox("Enter The Terms")
a = 0
b = 1
Print "Fibonacci Series is : "
Print a
Print b
For i = 1 To n - 2
c = a + b
a = b
b = c
Print c
Next
End Sub
```

COMPUTER SCIENCE

016

27 / 11 / 2017 08.30 AM – 11.30 AM

REB

Rwanda Education Board

ADVANCED LEVEL NATIONAL EXAMINATIONS, 2017

SUBJECT: COMPUTER SCIENCE

COMBINATIONS:

- MATHEMATICS-COMPUTER SCIENCE & ECONOMICS (MCE)**
- MATHEMATICS-PHYSICS & COMPUTER SCIENCE (MPC)**

DURATION : 3HOURS

INSTRUCTIONS:

Section A: attempt all questions. (55 marks)

Section B: attempt three questions (30marks)

Section C: attempt only one question. (15 marks)

SECTION A: Attempt all questions (55marks)

1. List 6 devices that use USB port. (6marks)

ANS: - computer, scanner, printer, camera, storage devices, keyboard, mouse, modem.....

2. What is an event in visual basics? Give two examples. (5marks)

ANS: An event is something that happens, usually but not always due to the user at the keyboard, during a program's operation.

Or

An event is an action which allows visual basic code to be executed.

Examples: click, double-click, press a key on a keyboard.

3. Differentiate a variable from variable address. (2marks)

ANS: A variable is a memory zone which is used to store data.

A variable address helps to locate a variable in the memory.

4. Write an algorithm which store 5 numbers entered by a user in array and display them to the user. (5marks)

ANS: var a(5) as array

Var I as integer

Start

For (i=0 to 4)

Do

Write("enter a number:")

Read (a(i))

ENDFOR

For (i=0 to 4)

Do

```
Write(a(i))
ENDFOR
END
```

OR

```
Variable i, A[5] as integer
START
Write("enter the numbers of arrays:")
For i←1 to 5
Read (A[i])
i←i+1
endfor
write("the elements of array are:")
for i←1 to 5
write(A[i])
i←i+1
endfor
END
```

OR

```
Var I, a[5] as integer
START
Write("enter the numbers of arrays:")
For (i=0 to 4)
Do
Read (a[i])
Write(a[i])
Endfor
END
```

5. Give the codes for movenext,moveprevious methods in VB. **(2marks)**

ANS: Private Sub Cmdmovenext-click()

```
Adodc1.recordset.movenext
Endsub
```

```
Private Sub Cmdmoveprevious-click()
Adodc1.recordset.moveprevious
Endsub
```

6. What are the meaning of the following commands? **(3marks)**

ANS: Date: to display the current date

```
LS: show listing of file in present directory
MD or MKDIR: to create directory
```

7. Describe the system call in operating system. **(3marks)**

ANS: A system call is a strategy or mechanism of calling a function which is in operating system in order to realize a specific task **or** (is a mechanism used by an application for requesting a service from the system).

8. What are the output of the following program? **(2marks)**

ANS: There is error , specify the error

Output: Previous=99, Next=101

9. a) what are the role of database management system? **(2marks)**

ANS: a role of dbms is to manage access and assure that all users have access and are used in accordance with permissions and restrictions.

OR

- Security management
- Database access
- Backup and recovery
- Multiuser access control
- Data storage management
- Data integrity
- Inconsistency avoidance
- Data coding
- database access language and application programming interfaces
- data dictionary management
- avoid redundancy in database
- create database

- b) what are the roles of intersection in SQL? **(2marks)**

ANS: the intersection operator intersect returns a result set common to both data set.

As shown in the following statement.

- c) SELECT *FROM NameoftableA **(2marks)**

INTERSECT

SELECT *FROM NameoftableB

10. what are the 3 characteristics of a printer? **(3marks)**

ANS: - Its type

- Its print speed
- Its resolution expressed in DPI or point per inch
- Its number of cartridges
- Its functionalities such as photo quality, reading of memory board, extend PC and impression of the photographs, etc
- Warm up time
- Paper feed

11. Write a program in c language to find greater number of five numbers stored in array.

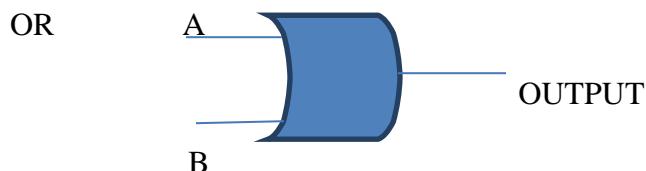
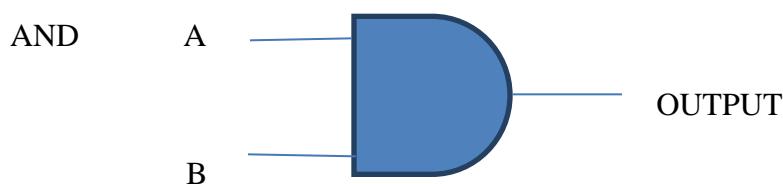
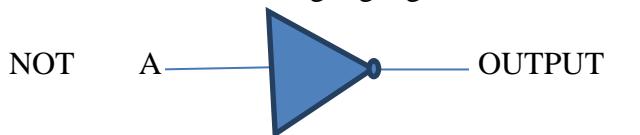
(5marks)

ANS:

```
#include<stdio.h>
Int main() {
    Int a[30],I,num,largest;
    Printf("\n enter number of elements:");
    Scanf("%d",&a[i]);
    Largest=a[0];
    For(i=0;i<num;i++){
        If(a[i]>largest){
            Largest=a[i];
        }
    }
    Printf("\n largest elements:%d",largest);
    Return(0);
}
```

12. Give an illustration of the following logic gates: NOT, AND, OR. (3marks)

ANS:



13. List five types of instructions of computer program. (5marks)

ANS: - input instructions

- Output instructions
- Processing instructions
- Declaration instructions
- Assignment instructions
- Control instructions.

14. Write in full the following abbreviations. **(5marks)**

- a. RJ45: registered jack 45
- b. VPN: virtual private network
- c. ISP: Internet service provider
- d. ISO: international standards organizations
- e. UTP: unshielded twisted pair

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

15. A. what is a table in SQL? **(2marks)**

ANS: the table is a collection of related data entries and it consists of columns and rows.

B. Name and explain the types of identifiers. **(8marks)**

ANS: i. **the simple identifier**

An identifier is known as simple if it consists of only one property.

ii. **Composite identifier**

An identifier is known as composite if it consists of two parts or more (more property).

iii. **Relative identifier or foreign key**

An entity has a relative identify on if it consists in part of a property belonging to another entity. The relative identify is a characteristic of the weak entities.

iv. **Weak entities**

An entity B is known as weak t can be only identified by an identifier of another entity A such as A and B is in association.

16. Write a C++ program to read through an array of any type. Write a C++ program to scan through this array to find a particular value. **(10marks)**

ANS:

```
#include<iostream.h>
#include<stdlib.h>
```

```
Main()
{
Int ara[10],i, n;
Cout<<" enter 6 numbers:\n";
For(i=0;i<6;i++)
Cin>>ara[i];
Cout<<please enter number to be test:\n";
cin>>n;
for(i=0;i<6;i++)
{
If(ara[i]==n)
{
cout<<"the number is found.";
exit(0);
}
Else
Cout<<"the number is not found";
Exit(0);
} }
```

17. a) what is a file system? **(3marks)**

ANS: file systems are the structures behind how your computer stores and organizes data.

Everything you install, save, edit or create on your computer comprises the trillions of bits of data a file system stores, organizes and allows access to on a daily basis for computer users.

b) list four activities that operating system does/operate for file management. **(4marks)**

ANS: - keep track of information, location, uses, status, etc. the collective facilities are often known as file system.

- Decides who gets the resources
- Allocates the resources
- De-allocates the resources
- Or
- Delete file/folder
- Create file/folder
- Copy file/folder
- Paste file/folder

c) What are the functions of a file system? **(3marks)**

ANS: the file system is responsible for organizing files and directories and keeping track of which areas of the media belong to which file and which are not being used.

- Update, manipulation of file/directories.

18. a) Write a function program in c programming language to multiply two numbers. **(7marks)**

ANS:

```
#include<stdio.h>
Int mult (int a, int b)
{
    Int c;
    C=a*b;
    Return(c);
}
Int main()
{
    Int x,y,z;
    Printf("enter the value of x and y");
    Scanf("%d%d,&x,&y);
    Z=mult(x,y);
    Printf("the product of two numbers is %d\n",z);
    Return(0);
}
```

OR

```
#include<stdio.h>
Int mult(inta,int b);
Int main()
{
    Int x,y,z;
    Printf("enter the value of x and y");
    Scanf("%d",&x);
    Scanf("%d",&y);
    Z=mult(x,y);
    Printf("the product of 2 numbers is %d\n",z);
    Return(0);
}
Int mult(ina,intb)
{
    Return(a*b);
}
```

b) the scope and life time of the variables define in C is classified depending to the storage. Give 3 storage classes of variables. **(3marks)**

ANS:

- automatic variables
- external variables
- static variables
- register variables

19. Using a switch, write an algorithm which receive a student mark and tells him his grade as follows:

- Note 16 and above: Grade A
 - Note 14-16: Grade B
 - Note 12-14: Grade C
 - Nte below 12: Grade D
- (10marks)

ANS:

Var note as integer
START
Write (“Grade menu:”)
Write (“ use numbers to make your choice”)
Write(“ Note from 16 and above, enter 1”)
Write(“note 14 to 16, enter 2”)
Write(“ Note 12 to 14, enter 3”)
Write(“ Note less than 12, enter 4”)
Write(“ enter a number to see your grade:”)
Read(Note)
Switch(Note)
Case1
Write(“ Grade A”)
Case2
Write(“ Grade B”)
Case3
Write(“ Grade C”)
caseElse
Write(“ Grade D”)
Endswitch
END
OR
Variable mark as integer
START
Write(“enter student mark”)
Read(mark)
SWITCH(mark)
Case is mark>16
Write(“ Grade A”)
Break
Case is 14 to 16
Write(“ Grade B”)
break
Case is 12 to 14
Write(“ Grade C”)

```
Break
Case is <12
Write(" Grade D")
Default:
Write("invalid mark")
Endswitch
END
OR
Variable mark as integer
START
Write("enter student mark")
Read(mark)
SWITCH(mark)
Case is >16
Write(" Grade A")
Case 14 to 16
Write(" Grade B")
Case 12 to 14
Write(" Grade C")
Case is <12
Write(" Grade D")
Default:
Write("invalid mark")
ENDSWITCH
END
```

SECTION C: attempt only one question (15marks)

20. List and explain 5 basic concepts of Object oriented programming. **(15marks)**

ANS:

1. **OBJECTS:** are basic runtime entities in an object oriented systems. They may represent a person, a place, a table of data or any item that the program must handle. Object contain data and code to manipulate the data. Or
OBJECT: is an instance of a class (element).
2. **CLASS:** class is a way to bind the data and its associated functions together. A class allows its data to be hidden from its external use.
Or
CLASS: is a collection of object which have the same data type.
3. **DATA ENCAPSULATION:** is the wrapping up of data and functions into a single unit.

4. INHERITNCE: is the process by which objects of one class acquire properties of objects of another class.

5. POLYMORPHISM: polymorphism means ability to take more than one form.

6. ABSTRACTION: abstraction refers to showing only the essential features of the application and hiding the details.
In C++, classes provide methods to the outside world to access and use the data variables but the variables are hidden from direct access.

7. Exception handling is a feature of OOP, to handle unresolved exceptions or errors produced at runtime.

21. The table below contain information of teachers, write SQL commands. **(15marks)**

N0	Name of teacher	Age	Department	Date of joining	Salary	Sex
1	Ndahimana	36	Computer	12-jan-99	150000	M
2	Kamili	59	Math	4-mar-86	250000	M
3	Neema	30	Entrepreneurship	30-jun-12	120000	F
4	Harima	29	Geography1	10-apr-10	130000	F
5	Kasiimu	43	Geography2	12-feb-88	200000	M
6	Nzabandora	32	Physics	1-feb-00	230000	M
7	Ruterana	45	Kinyarwanda	12-aug-85	240000	M
8	Shakilla	29	Maths	13-jul-12	150000	F
9	Jackline	31	Geography1	12-jan-11	120000	F
10	Jack	40	Physics	11-sep-99	200000	M
11	mutessa	28	Computer	9-nov-14	120000	M

- a) To find the teachers that did not join on the date of ("1/feb/2000","4/mar/1986","12/feb/1988"); **(2marks)**

ANS:

SELECT*FROM teachers WHERE Date of joining NOT IN ("1/feb/2000","4/mar/1986","12/feb/1988");

OR

SELECT*FROM teachers WHERE Date of joining <>#1/feb/2000# AND Date of joining<>#4/mar/1986# AND Date of joining<>#12/feb/1988#;

- b) To show all information about the teacher of maths department. **(1marks)**

ANS:

SELECT*FROM teachers WHERE Department="Maths";

- c) To list the name and age of the female teachers who are in geography1 Department. **(2marks)**

ANS:

SELECT Nameofteacher, Age FROM teachers WHERE SEX='F' AND Department="Geography1";

- d) To list the names of all teachers whose age is greater than 30 with their date of joining in ascending order? **(2marks)**

ANS:

SELECT Nameofteacher, Dateofjoining FROM Teachers WHERE Age>'30' ORDER BY dateofjoining ASC;

- e) To display Names, Age, and Salary for male teachers only. **(2marks)**

ANS:

SELECT Nameof teacher,Age,Salary FROM teachers WHERE SEX='M';

- f) Arrange the whole table in the alphabetical order to name. **(2marks)**

ANS:

SELECT*FROM teachers ORDER BY Nameofteacher ASC;

- g) Display all teachers whose the names contain the character “n”. **(2marks)**

ANS:

SELECT*FROM teachers WHERE Nameofteacher like '*n*';

- h) Remove duplicates department in the table. **(2marks)**

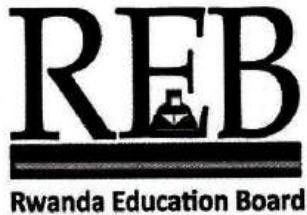
ANS:

SELECT DISTINCT Department FROM teachers;

COMPUTER SCIENCE

016

26/11/2018 8.30 AM- 11.30 AM



ADVANCED LEVEL NATIONAL EXAMINATIONS, 2018

SUBJECT: COMPUTER SCIENCE

COMBINATIONS:

- MATHS-COMPUTER SCIENCE-ECONOMICS (MCE)
- MATHS-PHYSICS-COMPUTER SCIENCE (MPC)

DURATION: 3 HOURS

INSTRUCTIONS:

1. Write your names and index number on the answer booklet as they appear on your registration form and **DO NOT** write your names and index number on additional sheets of paper 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 **THREE** questions. **(30 marks)**

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

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

SECTION A: ATTEMPT ALL QUESTIONS (55 Marks)

- 1) Give and explain the main components of an Operating System. **(3marks)**
- 2) Is it possible to Log on more than 1 user using one computer simultaneously? Explain your answer. **(3marks)**
- 3) Give 4 expansion cards available in the computer. **(4marks)**
- 4) What is int, float and char? **(3marks)**
- 5) Explain 3 Data Manipulation Language statements. **(3marks)**
- 6) (a) What is a protocol?
(b) Give 5 main functions of the protocols. **(5marks)**
- 7) Describer the friend function. **(3marks)**
- 8) Convert the following in Decimal number.
(a) (1237)₈
(b) (10101)₂ **(4marks)**
- 9) Rewrite the following if-else segment using switch-case statement. **(4marks)**

24 M
2014

```
char ch='A';
if(ch=='A')
    System.out.println("Account");
if((ch=='C') || (ch=='G'))
    System.out.println("Admin");
if(ch=='F')
    System.out.println("Advisor");
```

- 10) What is meant by case sensitive? Is Java case sensitive? **(3marks)**
- 11) List any 3 objectives of a website. **(3marks)**
- 12) Give the syntax of declaring a structure. **(3marks)**
- 13) List the basic operations carried out in a linked list. **(4marks)**
- 14) What are the four functions of an operating system? **(4marks)**
- 15) What are the hardware devices used for computer graphics? **(4marks)**

Intell

SECTION B: ATTEMPT ANY THREE QUESTIONS (30Marks)

- 16) Compare the disadvantages of fiber optic cables and
the advantages of twisted pair cables. **(10marks)**
- 17) (a) Name different ADO Objects. **(10marks)**
(b) What is the difference in passing values ByRef or ByVal
to a procedure?
(c) What is the difference between list box and combo box?
- 18) Using a class, write a program to find the largest number in
two number entered by the user. **(10marks)**
- 19) (a) Give at least five operators allowed in the WHERE Clause. **(10marks)**
(b) Complete the table below:

Notation chart	Corresponding meaning in ERD

- 20) Among 20 values given by a user, write an algorithm to display
the values which are less than their average. **(10marks)**

SECTION C: ATTEMPT ANY ONE QUESTION (15 Marks)

- 21) Consider the following Entities and Relationships. **(15marks)**
Country (con-code, name, capital)
Population (pop-code, population)
Country & Population are related with one-to-one relationship.
Constraints : Primary key and country name should not be null.

(a) Create a Relation Data Base.

(b) Write queries for the following

Give name and population of a country whose capital is 'Kigali'.

Count the number of countries whose population is > 6,000,000

Find the details of the country with the highest population.

Display country wise population details.

wlho se (capital = kigali) <count>

22) Write down html code that prints the following.

(15marks)

First Name:

Last Name:

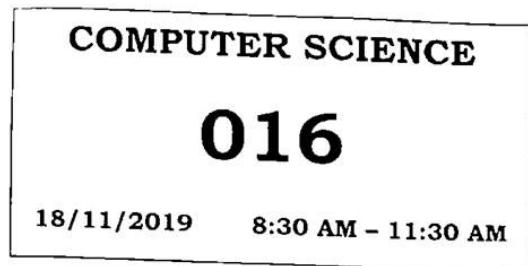
Password:

Language Used:

Kinyarwanda English French

Gender:

Male Female



ADVANCED LEVEL NATIONAL EXAMINATIONS, 2019

SUBJECT: COMPUTER SCIENCE

COMBINATIONS:

- MATHS-COMPUTER SCIENCE-ECONOMICS (MCE)
- MATHS-PHYSICS-COMPUTER SCIENCE (MPC)

DURATION: 3 HOURS

INSTRUCTIONS:

- 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 of paper 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) Give the codes for movenext, moveprevious methods in the VB. **(2 marks)**
- 2) Explain the peer to peer network. **(3 marks)**
- 3) What are the principle problems to be handled by the operating system's memory management? **(3 marks)**
- 4) What are the work (operation) performed by the following audio port?
Line In.
Microphone
Line Out
Gameport/MIDI **(4 marks)**
- 5) Rewrite the following code using switch statement: **(5 marks)**

```
If (k==1)
    Day="Monday";
Elseif (k==2)
    Day=" Tuesday";
elseif (k==3)
    Day="Wednesday";
else
    Day="-"
```

- 6) What is the main purpose of Photoshop? **(3 marks)**
- 7) Describe the four (4) roles of CPU **(4 marks)**
- 8) Why is Multimedia important in education? **(4 marks)**
- 9) Write an algorithm that asks the user to enter the number and it displays the square of that number. **(4 marks)**
- 10) Write the output of the following program and explain your answer. **(4 marks)**

```
int i;
float f = 3.14;
i = (int) f;
cout<<i;
```

- 11) a) What is a function ? **(2 marks)**
b) Write the syntax showing how the function is declared. **(4 marks)**
- 12) What is the difference between CLI vs GUI? **(3 marks)**
- 13) Describe the Characteristics of Constructors. **(4 marks)**
- 14) Describe the major components of a database management system. **(4 marks)**
- 15) What is the importance of Encapsulation? **(2 marks)**

SECTION B: ATTEMPT ONLY THREE QUESTIONS. (30 marks)

- 16) Write HTML code to print the following output: **(10 marks)**

Weekly days

Saturday

Sunday

Monday

Tuesday

Wednesday

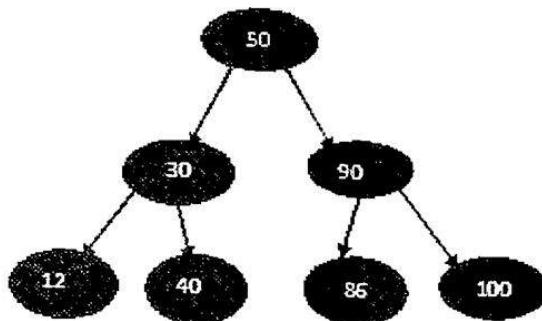
Thursday

Friday

- 17) Write a C++ Program using array to find the average marks obtained by 5 students. **(10 marks)**
- 18) Write the Java Program to swap two Numbers entered from the keyboard. **(10 marks)**
- 19) Write codes of a VB 6.0 program which displays the sum and average of numbers ranging from 0 to 10 use do...loop until **(10 marks)**

- 20) a) Determine the order in which the elements would be accessed during an in-order, pre-order and post-order traversal.

(10 marks)



- b) Determine the Path between 50 and 86.

SECTION C: ATTEMPT ONLY ONE QUESTION (15marks)

- 21) Consider the following instances of the Student, Enrolment and Course relations from the University relational model.

Student

Reg No	Name	Reg year	CounsellorNo
s01	Kaberuka	1993	4523
s02	Smith	1998	3412
s05	Smitoth	1997	4523
s07	Smiteth	1996	4538
s09	Nsabimana	1995	4523

Enrolment

Reg No	CourseCode	TutorNo
s01	c4	4523
s05	c2	3412
s05	c7	3412
s07	c4	4538
s09	c4	4523
s09	c2	4538
s09	c7	4523

Course

CourseCode	Title	Credit
c2	C++ Programming	100
c4	Databases	100
c7	Logic	50

Using the University relational model, give relational algebra queries to discover the following:

- a) Find the reg No name registered in year 1993,1995,1997 or 1998. (2 marks)
- b) Using SQL statement, display the names and Reg No of all students. (2 marks)
- c) Display the names of all students registered since 1996. (2 marks)
- d) Find the names of all students taking course 'c7'. (2 marks)
- e) Specify Students whose Reg Year are less 1996 or greater than 1997 (2 marks)
- f) Display Reg No of all students with the names of either 'Smith' or 'Smitoth' (2 marks)
- g) List the Reg No and names of Students with Reg year in the range 1995 to 1997 inclusive. (3 marks)

22) Explain the following network topologies:

Bus topology	(3 marks)
Ring topology	(3 marks)
Star topology	(3 marks)
Mesh topology	(3 marks)
Extended star topology	(3 marks)

ADVANCED LEVEL NATIONAL EXAMINATIONS 2019

SUBJECT: COMPUTER SCIENCE

MARKING SCHEME

SECTION A

1. Private sub cmdmovenext_click()
 Adodc1.recordset.movenext
 End sub
 Private sub cmdmovenext_click()
 Adodc1.recordset.moveprevious
 End sub

Or

```
Private sub command1_click ()  
Data 1. recordset. movenext  
End sub  
Private sub command1_click()  
Data 1. recordset.moveprevious  
End sub
```

2. A peer-to-peer (P2P) network is created when two or more computers are connected and share resources without going through a separate server computer.
Peer-to-peernetworks work best in environments with ten or fewer computers.
It is not require for the peer to peer network to use the dedicated server computer. Any computer on the network can function as both a network server and a user workstation.
3. To provide the memory space to enable several processes to be executed at the same time.
 - To provide a satisfactory level of performance (process execution speed) for the system users.
 - To protect each process from each other.
 - Where desired, to enable sharing of memory space between processes.
 - To make at the addressing of memory space as transparent as possible for the programmer.

4. Audio port

Line in it allows you to connect any device that has an audio output(such as a CD or MP3 player
Microphone
Line out
Gameport/MIDI

5. Int k;

```
Switch(k)
{
Case 1:
Cout<< "Monday";
Break;
Case 2:
Cout<< "Tuesday";
Break;
Case 3:
Cout<< "Wednesday";
Break;
Default:
Cout<<" ";
}
```

6. Photoshop is considered as one of the leaders in photo editing software.

allows users to manipulate, crop, resize and correct color on digital photos.

It is used for editing /processing and manipulation of pictures.

7. The **Central Processing Unit (CPU)**, also known as the processor, is the mostimportant component of the computer. It is actually regarded as the “**brain**” of thecomputer because all processing activities are carried out inside the processor.

The Arithmetic Logic Unit (ALU): performs all arithmetic and logical operations.

Control Unit: coordinates all processing activities in the CPU as well as input,storage and output operations.

Registers: special memories within the CPU for holding instructions and data.

8. Multimedia enables students to represent information using several different media

- Multimedia helps in deeper understanding
- Multimedia improve problem solving
- It helps in accessing to a vast variety of information
- Used to improve learning effectiveness
- Used for communication between learners and teachers

9. Var a, square as integer

```
Start
Write("enter a number ")
Read(a)
Square=a*a
Write("square of a number is",square)
End
```

10. Output

3
Because Type casting operator represented with brackets () converts (casts) a value from one data type to another. if f is a float, it can be casted to an integer

11.A) A function is a complete sub-program in itself that may contain input, processing and output logic.

Is a section of program(block of code) that performs a specific task
b) Creating user-defined functions require
that you declare the *function name, return type, and list of arguments.*
type fun_name(arg1,arg2,...){
statements
}

12.A graphical user interface (GUI) is an interface through which a user interacts with electronic devices such as computers, hand-held devices and other appliances.

GUI representations are manipulated by a pointing device such as a mouse, trackball, stylus, or a finger on a touch screen.
While command line interface (CLI) or command language interpreter as command line interface (CLI) enables users to type commands in a terminal or console window to interact with an operating system. Users type a command or series of commands for each task they want to perform.

13. Name of the constructor function is same as that of the class they are part of

No return type is required for the constructor function.

Constructor functions are automatically called at the time of object creation/declaration.

Constructor functions can be overloaded.

Constructor functions are always defined in the public type access specifier.

14. DBMS have several components, each performing very significant tasks in the database

management system environment. Below is a list of components within the database and its environment.

Software

This is the set of programs used to control and manage the overall database. This includes the DBMS software itself, the Operating System, the network software being used to share the data among users, and the application programs used to access data in the DBMS.

Hardware

Consists of a set of physical electronic devices such as computers, I/O devices, storage devices, etc., this provides the interface between computers and the real world systems.

Data

DBMS exists to collect, store, process and access data, the most important component. The database contains both the actual or operational data and the metadata.

Procedures

These are the instructions and rules that assist on how to use the DBMS, and in designing and running the database, using documented procedures, to guide the users that operate and manage it.

15. Encapsulation is an Object Oriented Programming concept that binds together the data and functions that manipulate the data, and that keeps both safe from outside interference and exploitation. Data encapsulation led to the important OOP concept of **data hiding**.

Encapsulation means that the internal representation of an object is generally hidden from view outside of the object's definition. Encapsulation is all about binding the datavariables and functions together in class.

SECTION B

16.<html>

```
<body>
<h1>Weekly days</h1>
<h2>Saturday</h2>
<h3>Sunday</h3>
<p>Monday</p>
<p> Tuesday</p>
<p> Wednesday</p>
<p> Thursday</p>
<p> Friday</p>
</body>
</html>
```

17.#include<iostream>

```
using namespace std;
int main(){
int marks[5] ,i,sum=0;
    float average;
cout<<"Please enter five marks:"<<endl;
for (int i = 0; i<5; i++){
cin>>marks[i];
}
for (int i = 0; i<5; i++){
sum=sum+marks[i];
}
Average=sum/5;
cout<<"averages marks obtained by 5 students is equal to "<<average;
return 0;
}
```

```
18.import java.util.Scanner;
class swapping {
public static void main(String args[]) {
    int c;
    Scanner scanner = new Scanner(System.in);
    System.out.println("Enter fist number:");
    int a = scanner.nextInt();
    System.out.println("Enter second number:");
    int b = scanner.nextInt();
    c=a;
    a=b;
    b=c;
    System.out.println("numbers after swap");
    System.out.println("the first number is: " + a);
    System.out.println("the second number number is: " + b);
}
}
```

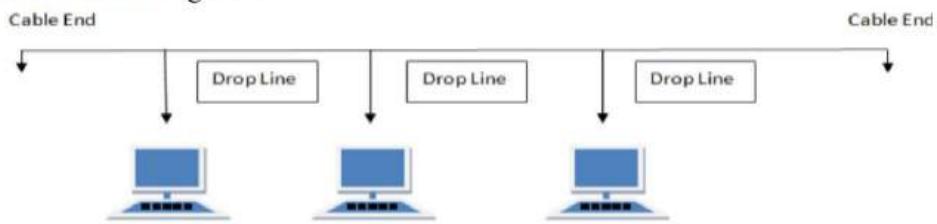
```
19.Private Sub Form_Load()
Form1.Show
Dim sum, i As Integer
Dim average as float
sum = 0
i = 0
Do
    sum = sum + i
    i = i + 1
Loop until i=10
Average=sum/10
Print average
print sum
End Sub
```

20.

21. Network Topology is the schematic description of a network arrangement, connecting various nodes through lines of connection.

BUS Topology

Bus topology is a network type in which every computer and network device is connected to a single cable.



1. It transmits data only in one direction.
2. Every device is connected to a single cable.

Advantages of Bus Topology

1. It is cost effective.
2. Cable required is least compared to other network topology.
3. Used in small networks.
4. It is easy to understand.
5. Easy to expand joining two cables together.

Disadvantages of Bus Topology

1. Cables fail then whole network fails.
2. If network traffic is heavy or nodes are more the performance of the network decreases.
3. Cable has a limited length.
4. It is slower than the ring topology.

RING Topology

It is called ring topology because it forms a ring as each computer is connected to another computer, with the last one connected to the first. Exactly two neighbors for each device



In a ring network, data travel from one device to the next until they reach their destination.

Advantages of Ring Topology

1. Transmitting network is not affected by high traffic or by adding more nodes, as only the nodes having tokens can transmit data.
2. Cheap to install and expand

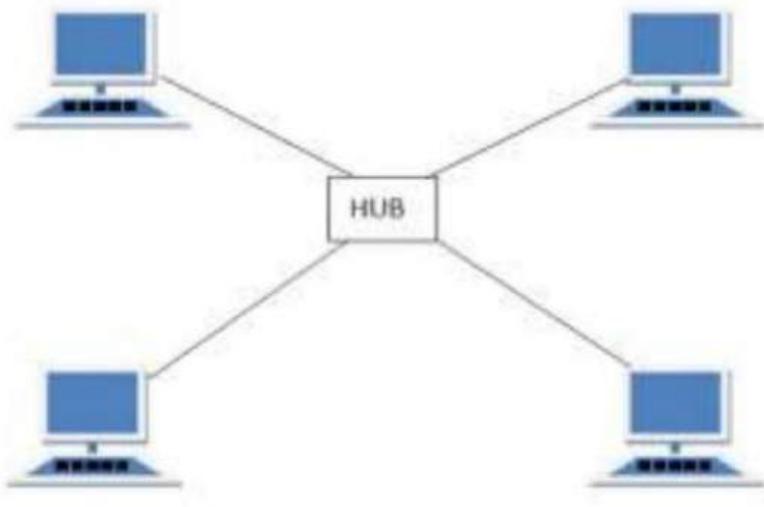
Disadvantages of Ring Topology

1. Troubleshooting is difficult in ring topology.
2. Adding or deleting the computers disturbs the network activity.
3. Failure of one computer disturbs the whole network.

STAR Topology

In this type of topology all the computers are connected to a single hub or a switch through a cable.

This hub or switch acts as the central device and all others nodes are connected to the central device.

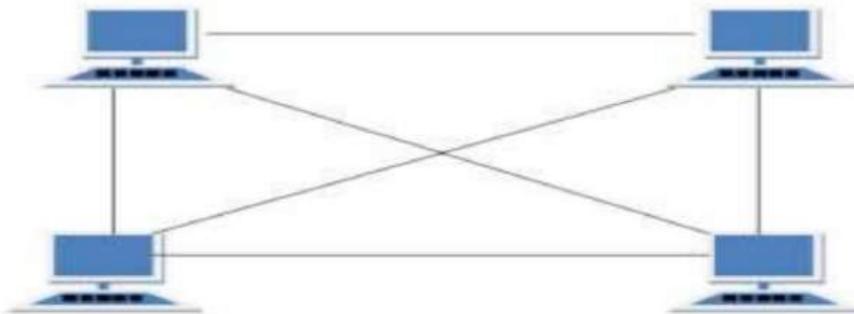


1. Every node has its own dedicated connection to the hub.
2. Hub acts as a repeater for data flow.
3. Can be used with twisted pair or coaxial cable.

Advantages of Star Topology	Disadvantages of Star Topology
<ol style="list-style-type: none">1. Fast performance with few nodes and low network traffic.2. Hub can be upgraded easily.3. Easy to troubleshoot.4. Easy to setup and modify5. Only that node is affected which has failed, rest of the nodes can work smoothly.	<ol style="list-style-type: none">1. Cost of installation is high.2. Expensive to use.3. If the hub fails then the whole network is stopped because all the nodes depend on the hub.4. Performance is based on the hub that is it depends on its capacity

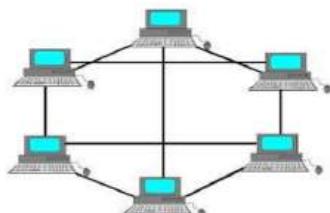
MESH Topology

It is a point-to-point connection to other nodes or devices. All the network nodes are connected to each other

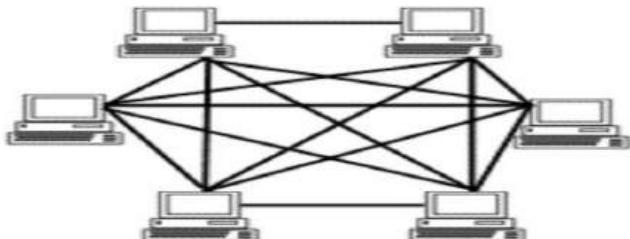


Types of Mesh Topology

1. **Partial Mesh Topology:** In this topology some of the systems are connected in the same fashion as mesh topology but some devices are only connected to two or three devices.



2. **Full Mesh Topology:** all devices are connected to each other which is very expensive but provides the best redundancy as a failure of a single does not affect the network connectivity



Features of Mesh Topology

1. Fully connected.
2. Robust.
3. Not flexible.

Advantages of Mesh Topology

1. Each connection can carry its own data load.
2. It is robust.
3. Fault is diagnosed easily.
4. Provides security and privacy.

Disadvantages of Mesh Topology

1. Installation and configuration is difficult.
2. Cabling cost is more.

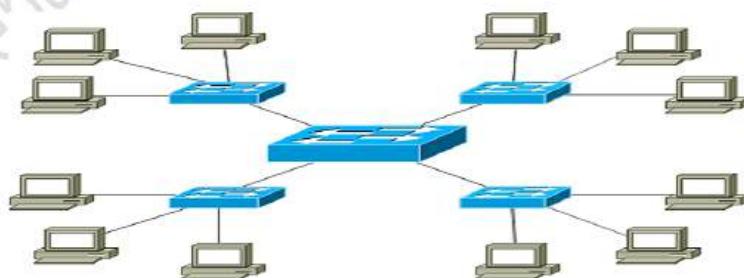
Bulk wiring is required

Extended star

Is a star network with an additional device connected to the main networking device

Star Topology is better suited for small network, Extended Star Topology is generally better for the larger ones.

Extended star network topology extends a physical star topology by one or more repeaters



COMPUTER SCIENCE

016

26/07/2021 8.30 AM- 11.30 AM



NESA NATIONAL EXAMINATION AND SCHOOL INSPECTION AUTHORITY

ADVANCED LEVEL NATIONAL EXAMINATIONS, 2020-2021

SUBJECT: COMPUTER SCIENCE

COMBINATIONS:

- MATHS-COMPUTER SCIENCE-ECONOMICS (**MCE**)
- MATHS-PHYSICS-COMPUTER SCIENCE: (**MPC**)

DURATION: 3 HOURS

INSTRUCTIONS:

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

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

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

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

SECTION A: ATTEMPT ALL QUESTIONS (55 marks)

- 1) What is the difference between a function and a sub (method) in VB? (3 marks)
- 2) Write an algorithm that asks the user to enter the max of students and if the max are between 9.5 and 10 add 1 max (5 marks)
- 3) Differentiate the Arithmetic operation from logic unit and give an example. (4 marks)
- 4) Explain the difference between a one-to-many and a many-to-many relationship. Give an example for each. (4 marks)
- 5) What is *pseudocode*? (3 marks)
- 6) What advantages does fiber optics have over other media? (3 marks)
- 7) Write the corresponding C++ expressions for the following mathematical expressions: (3 marks)
 - (i) $\sqrt{a^2+b^2}$
 - (ii) $(a+b)/(p+q)^2$
- 8) Write a VB program to display the following sequence of numbers 100,80,60,40,20,0 (5 marks)
- 9) Most PCs give a single beep on boot up to indicate they are ok hardware wise. You boot your PC and don't get a beep. What should you check first? (2 marks)
 - A. System board
 - B. Microprocessor
 - C. Ram
 - D. Power supply
 - E. Speaker

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write in
this margin

SECTION A

1. Function always return a value whereas a method
(sub) does not return a value. 1.5

OR

sub procedure is a block of statements inside sub
and end sub while function starts with function
and ends with end function 1.5

OR

Function can be called from sub, while sub can
not be called from function 1.5

13 marks

2. Var max as float / double / Real 10.5

Start 10.5

Write ("Enter the max of Students") 10.5

Read (max) 10.5

if (max >= 9.5 AND max <= 10) Then 11

 max ← max + 1 11

End if 10.5

Write (max)

End 10.5

15 marks

OR

Set max as float / double / Real 10.5

Start 10.5

Write ("Enter the max of students") 10.5

read (max) 10.5

If (max > 9.5 AND max < 10) Then 11

 Write (max + 1) 11

end if 10.5

End 10.5

15 marks

OR

Step 1: Ask the user to enter the max of student 11

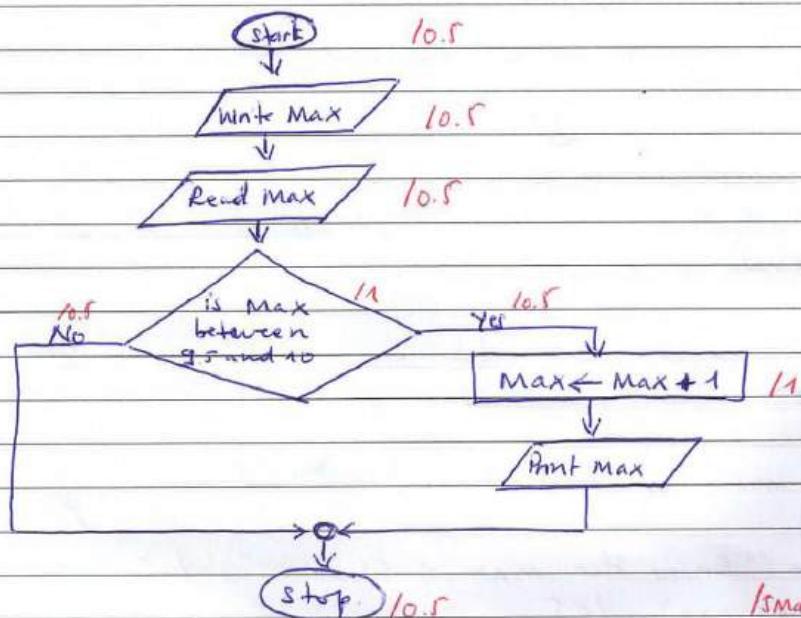
2: User enter the max 11.5

3: If the max are between 9.5 and 10 11.5

4: Add 1 max. 11

OR

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write in
this margin



15marks

3. An arithmetic operation is dealing with data in Computational manner, adding, subtracting etc

A logical operation would normally be regarded as Comparison and decision, though one school of thought would include the literally, logical operations such as NOT, OR, AND etc..

4marks

OR

An arithmetic operation returns numerical value 11

Ex: $2 + 3 = 5$ 11

Whereas logical operation returns boolean value 1

Ex:

A	B	$A + B$
0	0	0
0	1	1
1	0	1
1	1	1

14marks

14marks

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write in
this margin

4. One-to-Many means that at most one entity in set A is assigned to any number of entities in set B. For example Employee in set A has any number of phone numbers in set B. 11

Many-to-Many : means that any numbers of entities in set A assigned to any number of entities in set B. 11 For example several employees in set A may have several accounts in set B. 11 14marks

OR

One to many is the relationship between instances of an entity with more than one instance of another entity. 11

Ex:

Many to Many is the relationship between many instances of entity with more than one instance of another entity. 11

Ex: Student study many courses 11 14marks

14Marks

5. When writing a new computer program, in the planning stages a programmer may express the program's logic in pseudocode, a set of statements in English that map out the program plan just as the flowchart does. Instead of using a set of predefined graphic symbol, the pseudocode statements look something like the statements of the final program. 13marks

OR

Pseudocode is an artificial and informal language that help a programmer to develop an algorithm without using any specific programming language. 13marks

3Marks

6. Advantages does fiber optics have over other Media.

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write in
this margin

- 1 It is less susceptible to electrical interference 11
- 2 It supports higher bandwidth, meaning more data can be transmitted and received. 11
- 3 Signal degrading is also very minimal over long distances 11
can transmit data over 2000m without Repeater.
- 4 Security 11
- 5 Faster Speeds 11
- 6 It is not affected by Weather Conditions (more flexibility for the future) 11
- 7 Data can be transmitted digitally (in form of light) 11
- 8 Lower total cost of ownership 11
- 9 Light weight 11
- 10 Durability (long life) 11

13 Marks

7. i) $\sqrt{ax^2 + bx^2}$ 10.5

ii) $\frac{(a+b)}{\sqrt{p+q}} / \sqrt{(p+q)} \quad 10.5$
OR

i) $\sqrt{pow(a, 2) + pow(b, 2)} \quad 10.5$

X or $\sqrt{a^2 + b^2} \quad \text{Not Considered}$

ii) $\frac{(a+b)}{\sqrt{(p+q)^2}} \quad 10.5$

X or $\frac{(a+b)}{pow((p+q), 2)} \quad \text{Not Considered.}$

13 Marks 13 Marks

8. Private sub form_Activate () 10.5

Dim number as integer 10.5

for number = 100 to 0 step -20

print Number 11

Next Number 10.5

End sub 10.5

15 Marks

OR

Do not
write in
this margin

Private sub form - Load () } 0.5
forms.show()

Dim number as integer 10.5

number = 100 10.5

While number >= 0 11

Print number 10.5

number = number - 20 11

Wend 10.5

End Sub 10.5

15 Marks

9 E. speaker /2 Marks

12 Marks

10. The output of the program is :

Inside display 11

Inside area 11

Inside volume 11

13 Marks

11. An anti-virus program must be installed on all servers and workstations to ensure protection.

That's because individual users can access any workstation and introduce a computer virus when plugging in their removable hard drives or flash drives. 1.5 Marks

13 Marks

12. If statement can perform only true condition and there is no option for false condition 11 while if-else statement can perform both true as well as false condition 11

Example:

if (a > b) {
 cout << "a is greater than b" 11

In this code for false condition no statement is given

if (a < b) {
 cout << "a is greater than b" 11
 else

 cout << "b is greater than a"

2019 Here for both option either true or false output will come Page 5 of 16 14 Marks

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13. Three main parties of computer with suitable examples

1. Input devices are devices that send information to the computer system for processing 1

Examples: Keyboard, Mouse, Scanner etc... 1

2. Output devices are devices which convert information into human readable form 1

Examples: Monitor, printer, speaker, projector etc... 1

3. System Unit is the part of computer that houses the primary devices that perform operations and produce result for complex calculations 1

Example: Motherboard, CPU, RAM etc... 1 1

14.

```
for (int i=0; ++i<20;) 1
```

{ 1

if (i==8) 1

break; 1

System.out.println (++i); 1

} 1

14Marks

OR

int i; 1

```
for (i=0; ++i<20; i++) 1
```

{ 1

if (i==8) 1

break; 1

System.out.println (++i); 1

} 1

14Marks

14Marks

15. Three software used in Computer Graphics

- MS Paint 1

- Photoshop 1

- Microsoft Picture Manager 1

- Sketch 1

- Adobe Illustrator 1

- Affinity Designer 11
- Adobe InDesign 11
- CorelDraw Graphics 11
- Inkscape 11
- Topaz studio 11
- Adobe XD 11
- Autodesk 3ds Max 11
- GIMP 11
- Adobe Light Room 11
- photo line. 11

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13 Marks

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SECTION B

16(a) Equi-Join is the join in which two columns of different tables are compared for equality. 1.5

For example: Emp(empno, name, deptno)

Dept.(deptno, dname)

Select empno, name, dname 10.5

From Emp, Dept. 10.5

where Emp.deptno = Dept.deptno; 10.5

OR

Any other example written using SQL or simple English.

(b) A group function operates on a set of values in a table and returns a single value. 1

E.g : AVG, MAX, MIN, SUM, COUNT (Any two) 12

(c) Commit saves the changes permanently whereas Rollback undoes all the changes done till last Commit in the current session 12

(d) The difference between UNION and UNION ALL is that UNION ALL will not eliminate duplicate rows, instead it just pulls all rows from all the tables fitting your query specifics and combines them into a table. While UNION will eliminate the duplicated rows 12.

10 Mark

Q.

```
#include <iostream>
using namespace std;
```

int main() 10.5

{10.5 int i, j, k=4; 10.5

for (i=1; i<=k; i++) 1

{ for (j=i; j<=k; j++) 1

{ cout << " " ; 10.5

? for (j=1; j<=i; j++) 1

{ cout << "*" ; 1

? cout << endl; 1

2019

Page 8 of 16

```
for (j = 1; j <= i - 1; j++) //  
    cout << "*"; //  
} return 0; //  
} 10.5
```

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10marks

OR

```
#include <iostream>  
using namespace std; 10.5  
int main () 10.5  
{ 10.5  
    int i, j; 10.5  
    for (i = 4; i > 0; i--) //  
        for (j = 0; j <= 4 - i; j++) //  
            if (j >= i) //  
                cout << "*"; //  
            else  
                cout << " "; 10.5  
                cout << endl; //  
    for (j = 0; j <= 4; j++) //  
        if (j == 0) 10.5  
            cout << " "; 10.5  
        else  
            cout << "*"; 10.5  
    }  
    return 0; //  
} //
```

10marks

OR

```
#include <iostream>  
using namespace std; 10.5  
int main () 10.5  
{ 10.5  
    int i, j, k; 10.5  
    for (i = 1; i <= 5; i++) //  
        for (j = 5; j >= i; j--) //  
            cout << " "; 10.5  
    for (k = 1; k <= i; k++) //  
        cout << "*"; //  
        cout << endl; //  
    for (k = 1; k <= i - 1; k++) //  
        cout << "*"; //  
    return 0; //  
} 10.5.
```

10marks

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```

18. #include <iostream.h> 10.5
    float A, P;
    class Rectangle { 10.5
        float L, W; 10.5
        public:
            void getdata() 10.5
            { cout << "Enter the length:"; 10.5
                cin >> L; 10.5
                cout << "Enter the width:"; 10.5
                cin >> W; 10.5
            }
            void Perimeter() 10.5
            { P = (L + W) * 2; 10.5
            }
            void area() 10.5
            { A = (L * W); 10.5
            }
            void showdata() 10.5
            { cout << "The length:" << L << endl; 10.5
                cout << "The width:" << W << endl; 10.5
                cout << "The perimeter:" << P << endl; 10.5
                cout << "The area:" << A << endl; 10.5
            }
    }; 10.5
    main() 10.5
    {
        Rectangle S; 10.5
        S.getdata(); 10.5
        S.Perimeter(); 10.5
        S.area(); 10.5
        S.showdata(); 10.5
    } 10 marks

```

OR

```

#include <iostream>
using namespace std; 10.5
class Rectangle { 10.5
    float W, L; 10.5
    public:
        void getdata(float Len, float Wid) 10.5

```

Do not
write in
this margin

```

{ L = len;
  w = wid;
  float perimeter() 10.5
  {
    float p;
    p = (L+w)/2;
    return p; 10.5
  }
  float area() 10.5
  {
    return ((L * perimeter())/2); 10.5
  }
  void showdata() 10.5
  {
    cout << "The length is:" << L << endl; 10.5
    cout << "The width is:" << w << endl; 10.5
    cout << "The perimeter is:" << perimeter() << endl; 10.5
    cout << "The area is:" << area() << endl; 10.5
  }
}; 10.5
int main() 10.5
{
  float l, w;
  Rectangle rect; 10.5
  cout << "Enter the length and width"; 10.5
  cin >> l >> w; 10.5
  rect.getdata(l, w); 10.5
  rect.showdata(); 10.5
  return 0;
}

```

10marks

OR

```

import java.util.Scanner; 10.5
class Rectangle 10.5
{
  float L, P, A, WI; 10.5
  void getdata(); 10.5
  {
    Scanner obj = new Scanner(System.in); 10.5
    System.out.println("Enter length and width");
    L = obj.nextFloat(); 10.5
    WI = obj.nextFloat(); 10.5
  }
  void perimeter() 10.5
  {
    P = (L+WI)/2;
  }
  void area() 10.5
  {
    A = (L * P)/2;
  }
}

```

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void showdata() 10.5

```
{ System.out.println("Enter the length:" + L); 10.5
    System.out.println("The width:" + W); 10.5
    System.out.println("Perimeter:" + P); 10.5
    System.out.println("Area is:" + A); 10.5
}
```

public class inher

```
{ public static void main (String [] args) } 10.5
    Rectangle B = new Rectangle(); 10.5
```

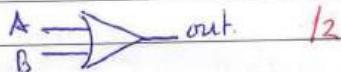
```
B.getdata(); 10.5
B.perimeter(); 10.5
B.area(); 10.5
B.showdata(); 10.5
```

? 3

10marks

10marks

19. a)



A	B	A+B
0	0	0
0	1	1
1	0	1
1	1	1

12

b) $(1001)_2 = 1 \times 2^4 + 0 \times 2^3 + 0 \times 2^2 + 1 \times 2^1 + 1 \times 2^0$
 $= 16 + 0 + 0 + 2 + 1 = 19$ 10.5

$$\begin{aligned} (.1101)_2 &= 1 \times 2^1 + 1 \times 2^2 + 0 \times 2^3 + 1 \times 2^4 \\ &= 0.5 + 0.25 + 0 + 0.625 \\ &= 0.8125. \end{aligned}$$

$(10011, .1101)_2 = 19.8125.$ 11

i) $(23)_{10} = (10111)_2$ 11

$$\begin{array}{r} 23 \\ - 22 \\ \hline 1 \end{array} \quad \begin{array}{r} 1 \\ - 1 \\ \hline 0 \end{array} \quad \begin{array}{r} 1 \\ - 1 \\ \hline 0 \end{array} \quad \begin{array}{r} 1 \\ - 1 \\ \hline 0 \end{array} \quad \begin{array}{r} 1 \\ - 1 \\ \hline 0 \end{array}$$

11

ii) $\begin{array}{r} 1111111 \\ - 101011 \\ \hline 1010100 \end{array}$ 11

10marks

10marks

SECTION C

21. Private sub Command1_Click() /0.5 Dim sv, cm as Double Dim fname as String /0.5 fname = Text1.Text /0.5 sv = Val(SV.Text) /0.5 If (sv < 500) Then /1 cm = sv * 2 /100 /0.5 Text2.Text = cm /1 Label4.Caption = fname /1 ElseIf (sv < 1000) Then /1 cm = sv * 4 /100 /0.5 Text3.Text = cm /1 Label4.Caption = fname /1 ElseIf (sv < 2000) Then /1 cm = sv * 6 /100 /0.5 Text3.Text = cm /1 Label4.Caption = fname /1 ElseIf (sv < 5000) Then /1 cm = sv * 8 /100 /0.5 Text3.Text = cm /1 Label4.Caption = fname /1 ElseIf (sv > 5000) Then /1 cm = sv * 10 /100 /0.5 Text3.Text = cm /1 Label4.Caption = fname /1 End If /0.5 End Sub /0.5 /1.5	
OR Private sub Command2_Click() /0.5 Dim sv, cm As Double Dim fname As String /0.5 fname = Text1.Text /0.5 sv = Val(SV.Text) /0.5 Select Case sv /0.5 Case sv < 500 /1 cm = sv * 2 /100 /0.5 Text3.Text = cm /0.5 Label4.Caption = fname /1 Case sv < 1000 /1 cm = sv * 4 /100 /0.5 Text3.Text = cm /0.5 Label4.Caption = fname /1 Case sv < 2000 /1 cm = sv * 6 /100 /0.5 Text3.Text = cm /0.5 Label4.Caption = fname /1 Case sv < 5000 /1 cm = sv * 8 /100 /0.5 Text3.Text = cm /0.5 Label4.Caption = fname /1 Case Else /0.5 Print "Invalid" /0.5 End Select /0.5 End Sub /0.5 /1.5	

DE1	DE2
First Name	/0.5
Sales Volume	/0.5
Commission	/0.5
	/0.5
	compute /0.5

OR

```

Private sub Command1_Click()
    if Val(text1.text) < 5000 then 10
        text2.text = Val(text1.text) * 2 / 100 11
    elseif Val(text1.text) < 10000 then 11
        text2.text = Val(text1.text) * 4 / 100 11
    elseif Val(text1.text) < 20000 then 11
        text2.text = Val(text1.text) * 6 / 100 11
    elseif Val(text1.text) < 50000 then 11
        text2.text = Val(text1.text) * 8 / 100 11
    elseif Val(text1.text) > 50000 then 11
        text2.text = Val(text1.text) * 10 / 100 11
    else
        Text2.text = "Invalid"
    End if 10
    Label3.caption = "Peter" 11
End sub. 10

```

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- 11th Marker 11th Marker
22. a) SELECT Firstname from Employee;
 OR SELECT UPPER(F firstname) as 'First Name' From Employee.
OR SELECT UCASE(F firstname) as F firstname From Employee;
- c) SELECT F firstname + ' ' + L lastname As Name From Employee;
 OR SELECT CONCAT(F firstname, ' ', L lastname) as Name From Employee;
 OR SELECT (F firstname & ' ' & L lastname) As Name From Employee;
 d) Select* From Employee where L lastname = 'Manila';
 OR PIEmployees, F firstname, L lastname, salary, gender (L lastname = 'Manila')
- e) Select* From Employee where F firstname Like 'K%';
 OR 0.5 0.5 0.5 0.5
- f) SELECT* From Employee where gender like '%re';
 OR 0.5 0.5 0.5 0.5
- g) SELECT MAX(salary) As Maximum from Employee;
 OR 0.5 0.5
- f) SELECT* From Employee where F firstname Not IN ('Umuhiza', 'Kayisingi', 'Umutoni');
OR SELECT* From Employee where F firstname <> 'Umuhiza' and F firstname <> 'Kayisingi' and F firstname <> 'Umutoni';

i) SELECT * from Employee where Salary < 500000 and
firstname ^{0.5} like 'K*' or ^{0.5}
^{0.5}

ii) SELECT * from Employee where Salary <= 550 000
and Gender = 'male' ORDER By salary Asc;
^{0.5} ^{0.5}
^{or like '*male*' 1}

N.B: The symbol (*) or (%) Consider are the same.

END

COMPUTER SCIENCE

016

01/08/2022 8:30 AM- 11:30 AM



ADVANCED LEVEL NATIONAL EXAMINATIONS, 2021-2022

SUBJECT: COMPUTER SCIENCE

COMBINATIONS:

- MATHS-COMPUTER SCIENCE-ECONOMICS (**MCE**)
- MATHS-PHYSICS-COMPUTER SCIENCE (**MPC**)

DURATION: 3 HOURS

INSTRUCTIONS:

- 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 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) List the main characteristics of a computer. **(5 marks)**
- 2) Describe the differences between keywords and identifiers, and give an example. **(5 marks)**
- 3) What are the various formatting tags in HTML? Explain each. **(6 marks)**
- 4) Determine the output of the following program **(6 marks)**

```
#include <iostream>

using namespace std;

int main()

{ int n=44;

    int& rn=n;

    cout << "n = " << n << ", rn = " << rn << endl;

    --n;

    cout << "n = " << n << ", rn = " << rn << endl;

    rn *= 2;

    cout << "n = " << n << ", rn = " << rn << endl;

}
```

- 5) Illustrate some advantages of servlets. **(4 marks)**

- 6) Using if...else if statement, write the corresponding codes of the following program codes (suppose that they are embedded in vb6.0 or vb.net) **(6 marks)**

Dim Age As Integer

Age = Text1.Text

Select Case Age

Case 5

 lblCategory.caption = "Child of Five Years Old"

Case 13 To 19

 lblCategory.caption = "Teenager"

Case 20 To 35, 50, 60 To 65

 lblCategory.caption = "Special Adult"

Case Is > 65

 lblCategory.caption = "Senior Citizen"

Case Else

 lblCategory.caption = "Everyone Else"

End Select

- 7) Outline any four devices where Java can be used. **(2 marks)**

- 8) Analyze the program below and answer the questions that follow. **(5 marks)**

```
class district {
    int num;
    String name;
    district() {
        System.out.println("Rwanda has 30 districts ");
    }
}
```

```
public class Learningactivity102 {
    public static void main(String[] args) {
        district district1 = new district();
        System.out.println(district1.name);
        System.out.println(district1.num);
    }
}
```

- a) What is the output of the above program?
 - b) Differentiate between district, district1 and district () used in above program.
- 9) Differentiate RDB from RDBMS. **(4 marks)**
- 10) Define the following terms used in computer security **(4 marks)**
 - a) Computer security
 - b) Threat
- 11) What are the advantages of protecting your wireless network with a password? **(3 marks)**
- 12) What does the term bandwidth mean? Give an example. **(3 marks)**
- 13) List four areas where computer graphics can be applied. **(2 marks)**

SECTION B: ATTEMPT THREE QUESTIONS. (30 marks)

- 14) Elaborate responsibilities and role of technician in computer repairing. **(10 marks)**
- 15) Draw a flowchart to find the largest among three different numbers entered by user. **(10 marks)**
- 16) Using array write a java program to calculate sum and average of n numbers. **(10 marks)**

7) Study the table below and answer the queries that follow. **(10 marks)**

ACCOUNT

CustomerID	AccountNumber	AccountType	DateOpened	Balance
1001	9987	Checking	10/12/1989	4000.00
1001	9980	Savings	10/12/1989	2000.00
1002	8811	Savings	01/05/1992	1000.00
1003	4422	Checking	12/01/1994	6000.00
1003	4433	Savings	12/01/1994	9000.00
1004	3322	Savings	08/22/1994	500.000
1004	1122	Checking	11/13/1988	800.000

CUSTOMER

CustomerID	Names	Address	City	State	Zip
1001	Smith	123 Lexington	Smithville	KY	91232
1002	Jones	12 Davis Ave.	Smithville	KY	91232
1003	Axen	443 Grinder Ln.	Broadville	GA	81992
1004	Builder	661 Parker Rd.	Streetville	GA	81990

- a) List all the details of customers. **(2 marks)**
- b) List all the different account types. **(2 marks)**
- c) Display all customers whose names contain the character "n". **(2 marks)**
- d) Find the total savings of all customers. **(2 marks)**
- e) What will be sql code for the following output? **(2 marks)**

CustomerID	AccountNumber	AccountType	DateOpened	Balance
1003	4422	Checking	12/01/1994	6000.00
1004	1122	Checking	11/13/1988	800.000

- 18) Write a VB program that displays the multiplication table of 4 to 6.
 (You can use vb6.0 or vb.net) **(10 marks)**

SECTION C: ATTEMPT ANY ONE QUESTION. (15 marks)

- 19) Create a class called employee that contains a name (an object of class string) and an employee number (type long). Include a member function called getdata() to get data from the user for insertion into the object, and another function called putdata() to display the data. Assume the name has no embedded blanks.

Using C++ Write a main() program to exercise this class. It should create an array of type employee, and then invite the user to input data for up to 100 employees. Finally, it should print out the data for all the employees. **(15 marks)**

- 20) Suppose that the following processes arrive for execution at the times indicated. Each process will run the listed amount of time. In answering the questions, use non-preemptive scheduling and base all decisions on the information you have at the time the decision must be made.

(15 marks)

Process	Arrival Time	Burst Time
P1	0.0	8
P2	0.4	4
P3	1.0	1

- a) What is the *average turnaround time* for these processes with the FCFS scheduling algorithm? **(5 marks)**
- b) What is the *average turnaround time* for these processes with the SJF scheduling algorithm? **(5 marks)**
- c) The SJF algorithm is supposed to improve performance, but notice that we chose to run process P1 at time 0 because we did not know that two shorter processes would arrive soon. Compute what *the average turnaround time* will be if the CPU is left idle for the first 1 unit and then SJF scheduling is used. Remember that processes P1 and P2 are waiting during this idle time, so their waiting time may increase. This algorithm could be known as future-knowledge scheduling. **(5 marks)**

-END-

MARKING GUIDES 2022

<u>SECTION A</u>	
1. List the main characteristics of a computer	Do not write in this margin
<u>Answer</u> - Speed // - Power of remembering // - Accuracy // - Compactness // - Diligence // - No IQ // - Storage capacity // - No feeling // - Versatility // - logical / It uses artificial intelligence // - Reliability // - Automation (Any 5 characteristics, one mark at each)	15
2. Describe the difference between keywords and identifiers, and give an example.	
<u>Answer</u> *Keywords are the reserved words which convey specific meaning to the C++. Keywords can not be used as an identifier // Example: switch, case, for, if etc. // <u>OR</u> *Keywords are words that have special meaning in any programming language and can only be used for an intended purpose. // *Identifiers are the user defined names given to different parts of C++ program. Identifiers are not reserved. // <u>OR</u> Identifier is a name given to a variable // Example : name, age , class_12B etc. //	15
3) What are the various formatting tags in HTML? Explain each	
<u>Answer</u> - : Makes text bold - <i> : Makes text italic	

- ``: makes text italic but with added semantics

^{importance}

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16

- `<big>`: increases the font size of the text by one unit
- `<small>`: decreases the font size of the text by one unit
- * `<sub>`: makes the text a subscript
- `<sup>`: makes the text a superscript
- ``: displays a strike out text
- ``: makes the text as important
- `<mark>`: highlights the text
- `<ins>` = displays as added text

(Any 3 tags ~~at each~~, ~~1~~ for each explanation)

4) Determine the output of the following program

```
#include <iostream>
using namespace std;
int main ()
{
    int n=44;
    int rn=n;
    cout<<"n = "<<n<<, rn = "<<rn<<endl;
    ~ n
    cout<<"m = "<<m<<, rn = "<<rn<<endl;
    rn*=2;
    cout<<"m = "<<m<<, rn = "<<rn<<endl;
}
```

Answer

$$\begin{array}{l} \cancel{n=44}, \cancel{rn=44} \\ \cancel{n=43}, \cancel{rn=43} \\ \cancel{n=86}, \cancel{rn=86} \end{array}$$

16

⑤ Illustrate some advantages of Servlets-

- Power
- Integration → (~~you can integrate it with database~~)

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- Efficiency ^
- Safety ^
- Portability ^
- Endurance ^
- Elegance ^
- Extensibility ^
- Flexibility ^

- A Servlet is convenient in modifying regular HTML
- We can write the servlet code into the JSP
- Servlets includes the feature of multithreading of java. ^
- We can make use of exception handling
- Servlets have a separate layer of business logic in the application ^
- Easy for developers to show and process the information
- Servlets provide a convenient way to modify HTML pages ^
- Servlets have a separate layer of business logic in the application ^
- All the advantages of Java - like multi-threading, exception handling, etc. are there in Servlets, ^

14

(Any 4 advantages, 1 mark at each.)

- ⑥ Using if...else if statement, write the corresponding codes of the following program codes (suppose that are embedded in VB6.0 or VB.net)

```
Dim Age As Integer
Age = Texts.Text
Select Case Age
Case 5
    lblCategory.Caption = "Child of Five Years Old"
Case 13 To 19
    lblCategory.Caption = "Teenager"
Case 20 To 35, 50 To 65
    lblCategory.Caption = "Special Adult"
```

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Case Is > 65

lblCategory. Caption = "Senior Citizen"

Case Else

lblCategory. Caption = "Everyone Else"

End Select

Answer

Vb6.0

Private Sub Commands_Click()

Dim Age As Integer

Age = TextBox1.Text

If Age = 5 Then

lblCategory. Caption = "Five Year Old"

Else If Age >= 13 And Age <= 19 Then

lblCaption

lblCategory. Caption = "Teenager"

Else If (Age >= 20 And Age <= 35) Or Age = 50 Or

(Age >= 60 And Age <= 65) Then

lblCategory. Caption = "Special Adult"

Else If Age > 65 Then

lblCategory. Caption = "Senior Citizen"

Else

lblCategory. Caption = "Everyone Else"

End If

End Sub

Vb.net

Public Class forms

Private Sub

Button1_Click(sender As Object, e As EventArgs)

Handles Button1.Click

Dim Age As Integer

Age = TextBox1.Text

If Age = 5 Then

label1.Text = "Five Year Old"

ElseIf Age >= 13 And Age <= 19 Then

Page 4 of 16

Case Is > 65

lblCategory.Caption = "Senior Citizen"

Case Else

lblCategory.Caption = "Everyone Else"

End Select

Do
write
this

Answer

Vb 6.0

Private Sub Commands_Click()

Dim Age As Integer

Age = TextBox1.Text

If Age = 5 Then

lblCategory.Caption = "Five Year Old"

Else If Age >= 13 And Age <= 19 Then

lblCaption

lblCategory.Caption = "Teenager"

Else If (Age >= 20 And Age <= 35) Or Age = 50 Or

(Age >= 60 And Age <= 65) Then

lblCategory.Caption = "Special Adult"

Else If Age > 65 Then

lblCategory.Caption = "Senior Citizen"

Else

lblCategory.Caption = "Everyone Else"

End If

End Sub

Vb.net

Public Class Forms

Private Sub

Button1_Click(sender As Object, e As EventArgs)

Handles Button1.Click

Dim Age As Integer

Age = TextBox1.Text

If Age = 5 Then

label1.Text = "Five Year Old"

ElseIf Age >= 13 And Age <= 19 Then

2020 - 2021

Page 4 of 16

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16

```

Labels.Text = "Teenager" /o'
ElseIf (Age >= 20 And Age <= 35) Or Age = 50 Or (Age >=
60 And Age <= 65) Then /n
Labels.Text = "Special Adult" /o'
ElseIf Age > 65 Then /o'
Labels.Text = "Senior Citizen" /o'
Else /o'
Labels.Text = "Everyone Else" /o'
End If /o'
End Sub

```

7) Outline any four devices where Java can be used.

Answer

- Android Mobile /o'
- Desktop /o'
- Television /o'
- Servers /o'
- Smart Card /o'
- Tablets /o'
- Robotics /o'
- Web Servers /o'
- Cell phones /o'

12

(~~10~~5 mark at each device, Any 4 devices)

8) Analyse the program below :

```
class district {
```

```
    int num;
```

```
    String name;
```

```
    district()
```

```
{
```

```
    System.out.println("Dwanda has 30 districts");}}
```

```
public class Learningactivity102 {
```

```
    public static void main(String[] args)
```

```
{district districts = new district();
```

```
    System.out.println(districts.name);}
```

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write in
this margin

System.out.println (districts.num); } }

After an

- what is the output of the above program?
- Differentiate between district, districts and district() used in above program.

Answer

- c) output :

Rwanda has 30 districts 11

Null 10

① 10

- b) i) Class district is a class 11

15

ii) districts is an object 11

iii) district() is a construct of class district 11

- g) Differentiate RDB and RDBMS.

Answer

RDB (Relational Database) : is a way of organizing data such that it appears to the user to the user⁴ to be stored in a series of interrelated tables. 12 whereas

RDBMS (Relational Database Management System) is a software of managing data stored in interrelated tables. 1 12

14

No

- 10) Define the following terms used in computer security
a) Computer Security
b) Threat

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Answer:

a) Computer Security refers to techniques developed to safeguard information and systems stored on computers. ¹²

14

b) Threat refers to anything that has the potential to cause serious harm to a computer system. ¹²
A threat is an activity / attack / situation that may happen, with the potential to cause serious damage. ¹²

11) what are the advantages of protecting your wireless network with a password?

Answer

The protection of wireless network with a password helps to prevent unauthorised access or damage such as downloading pirated movies or porn to computers using that wireless networks.

13

It also guarantees the proper utilisation of available bandwidth. ¹⁵

Q

12) what does the term bandwidth mean? Give an example.

13

Bandwidth means the data carrying capacity of the channel. It defines the speed which the channel can carry data. Bandwidth is defined in mbps. ¹²

Example

if we say that the channel bandwidth is 20mbps, it means that the channel has a data carrying capacity of 20 MB in one second. ¹¹

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OR,

Bandwidth is the amount of data that can be transmitted per unit of time. 12

13. List four areas where computer graphic can be applied.

Answer

- Computer aided design 10'
- Computer art / decoration 10'
- Entertainment 10'
- Business 10'
- Education 10'
- Training 10'
- Advertisement or
- Animation or

(0.5 at each area, any 4 areas)

12

SECTION B

14) Elaborate responsibilities and role of technician in computer repairing.

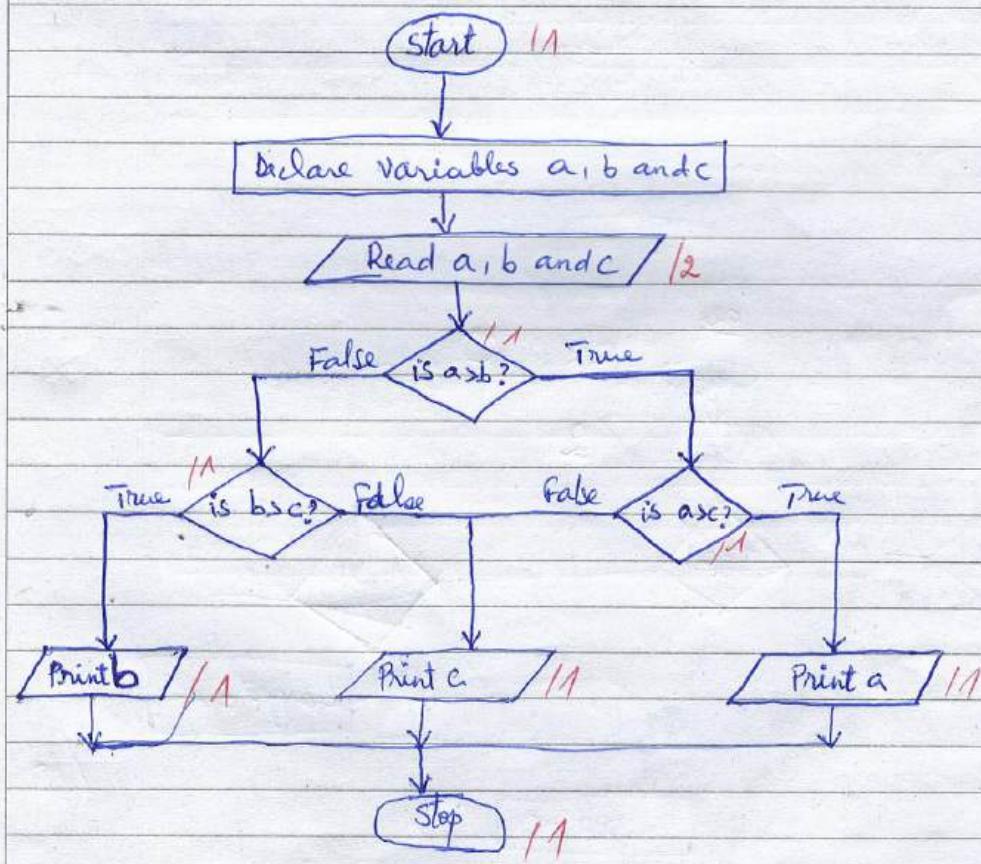
Answer

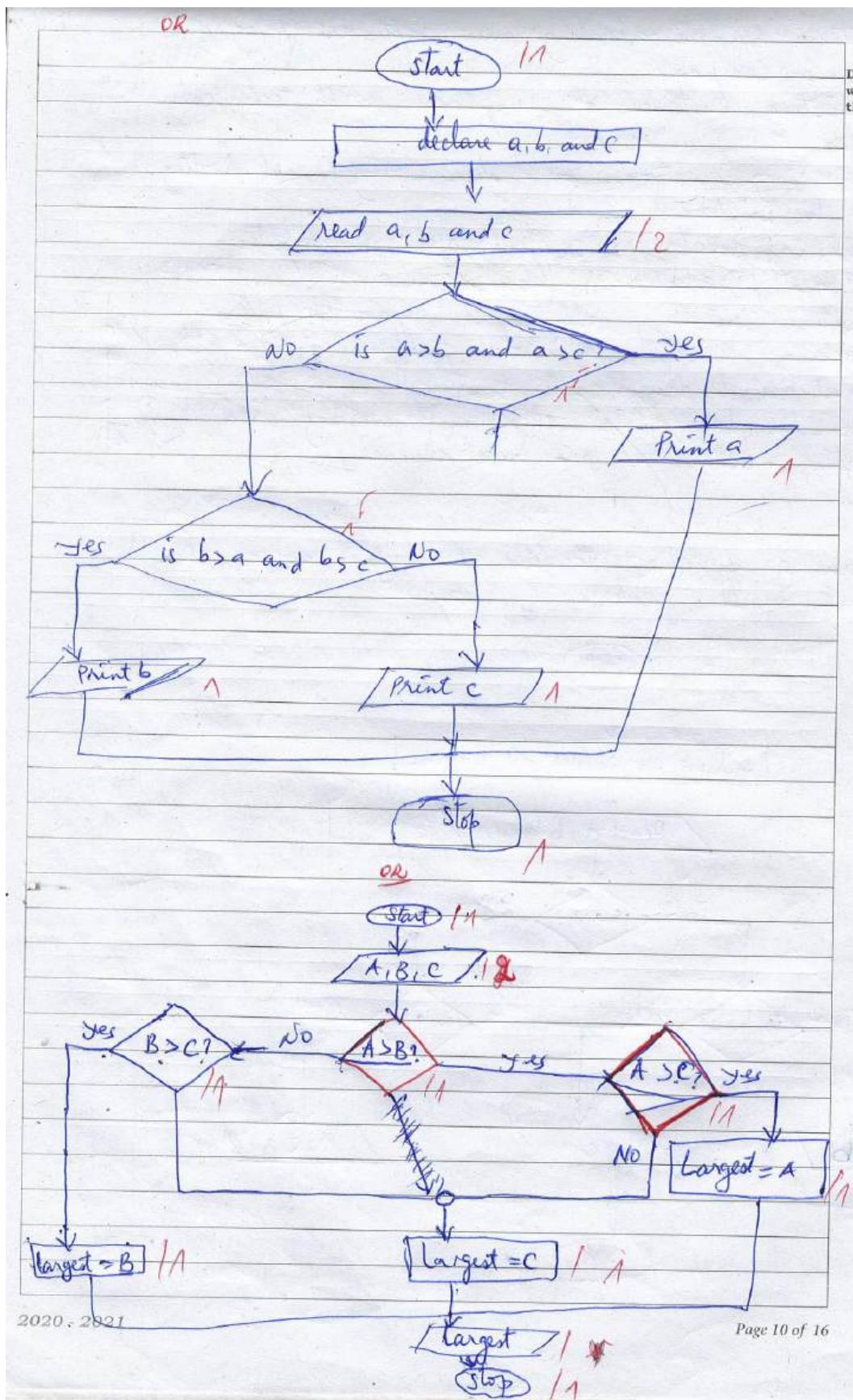
- A computer repair technician works to ensure computers function correctly.
- Preparing new computer system
- Installing software and computer programs
- Maintaining and troubleshooting existing software
- Updating and checking computer security programs
- Instructing customers on best security ~~programs~~ practices
- Analyzing computer function and repairing hardware or servers as needed

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- Testing and evaluating new software programs for a company
- Assisting customers or employees with technical issues
- Answering questions and describing troubleshooting steps to customers
- Training customers or employees on computer software programs or general use
- Visiting homes or offices to repair computers
- Working remotely to solve problems through live chat and diagnostic testing 1/10
- Responsible for general cleaning of working area
- Reporting, - data backup - data recovery

15) Draw a flowchart to find the largest among three different numbers entered by user.





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16) Using array write a java program to calculate sum and average of n numbers.

Answer

```

import java.util.Scanner; 10'
public class Sum_Average 10'
{
    public static void main (String [] args) 10'
    {
        int n, sum = 0; 10'
        float average; 10'
        Scanner s = new Scanner (System.in); 10'
        System.out.println ("Enter no of elements you
want in array :"); 10'
        n = s.nextInt(); 10' 1
        int a[] = new int [n]; 11'
        System.out.println ("Enter all the elements: ");
        for (int i = 0; i < n; i++) 11'
        {
            a[i] = s.nextInt(); 11'
            sum = sum + a[i]; 11'
        }
        System.out.println ("Sum : " + sum); 10'
        average = (float) sum / n; 10'
        System.out.println ("Average : " + average); 10'
    }
}
    
```

10

17) Study the table below and answer the queries that follow

ACCOUNT

CustomerID	AccountNumber	AccountType	DateOpened	Balance	Do not write this
1001	9987	Checking	10/12/1989	4000.00	4000.00
1001	9980	Savings	10/12/1989	2000.00	2000.00
1002	8811	Savings	01/05/1992	1000.00	1000.00
1003	4422	Checking	12/01/1994	6000.00	6000.00
1003	4433	Savings	12/01/1994	7000.00	7000.00
1004	3322	Savings	8/22/1994	500.00	500.00
1004	1122	Checking	11/13/1988	800.00	800.00

CUSTOMER

CustomerID	Name	Address	City	State	Zip
1001	Smith	123 Lexington	Smithville	KY	91232
1002	Jones	12 Davis Ave	Smithville	KY	91232
1003	Axen	443 Grinder Ln	Bradville	GA	81992
1004	Boulder	661 Pantier Rd	Streetville	GA	81990

- a) List all the details of customer
- b) List all different account types
- c) Display all customers whose names contain the character "n"
- d) Find the total savings of all customers
- e) what will be SQL code for the following output?

CustomerID	AccountNumber	AccountType	DateOpened	Balance
1003	4422	Checking	12/01/1994	6000.00
1004	1122	Checking	11/13/1988	800.00

Answer

a) Select * from

a) List all the details of customer

→ Select * from customer;
or
or
or
or

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b) List all the different account types.

\Rightarrow Select distinct AccountType from account;

c) Display all customers whose names contain the character "m".

\Rightarrow Select * from customer where name like '%m%';

\Rightarrow Select Names from customer where name like '%m%';

d) Find the total savings of all customers

\Rightarrow Select sum(balance) as Total from account where AccountType = 'Savings'

e) what will be SQL query

\Rightarrow Select * from ACCOUNT where AccountNumber <= 4422

and balance > 500.00;

OR

\Rightarrow Select * from account where AccountNumber = 4422 OR AccountNumber = 1122;

Select * from Account where Balance = 6000.00 OR Balance = 8000.00;
Alternative to (d).

\Rightarrow Select sum(balance) as total from Account, customer

where Account.customerID = customer.customerID AND
AccountType = 'Savings';

110

18) Write a VB program that displays the multiplication table of 4 to 6. (you can use VB6.0 or VB.net)

Answer

Private Sub Form_Load() 10'

Forms. Show 10'

Dim i, a As Integer 11

Print "Multiplication table of "; 4; " is here below: "

For a = 4 To 6 11

For i = 1 To 10 11

Print a; "*" ; i; "="; a * i; 12

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this margin

Next i //
Print " " / /

If (a >= 6) Then

Print " Multiplication table of " ; a + 1 ; " is here below: "

End If

Next a / /

End Sub / /

Or

private sub Form_activate () / /

Dim i, a As Integer / /

for a = 4 To 6 / /

Print " Multiplication table of " ; a ; " is: " / /

for i = 1 To 10 / /

Print a ; " * " ; i ; " = " ; a * i / /

Next i / /

Print " " / / OR Private sub form_load () / /

Next a / /

forms.show / /

End Sub / /

Dim i As Integer / /

For i = 0 To 12 / /

Print " 4 * " ; i ; " = " ; i * 4 / /

Next i / /

Print " " / /

For i = 0 To 12 / /

Print " 5 * " ; i ; " = " ; i * 5 / /

Next i / /

Print " " / /

For i = 0 To 12 / /

Print " 6 * " ; i ; " = " ; i * 6 / /

Next i / /

End Sub / /

SECTION C

Q

Answer

#include <iostream> / /

#include <string>

using namespace std; / /

class employee / /

}

private: string name; long number; public:

void getdata() / / get data from user / /

}

cout << " \n Enter name : " ; / /

cin >> name; / /

110

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this margin

```

cout << "Enter number : "; cin >> number; 105
}
void putdata() 105
{
    cout << "In Name : " << name; 105
    cout << "In Number : " << number; 105
}
};

int main() 11
{
    employee emparr[100]; 105
    int n = 0; 105
    char ch; 105
    do 105
    {
        cout << "In Enter data for employee number : " << n + 1; 105
        emparr[n].getdata(); 105
        cout << "Enter another (y/n) ? "; 105
        cin >> ch; 105
        while (ch != 'n'); 105
        for (int i = 0; i < n; i++) 105
        {
            cout << "In Employee number : " << j + 1;
            emparr[j].putdata(); 105
        }
        cout << endl;
        return 0; 105
    };
}

OR

#include <iostream> 0
#include <string> 0
using namespace std; 0
class employee 1
{
private:
    string name; 0
    long n; 0
public: 0
    void getdata() 0
    {
        cout << "Enter name : " << endl; 0
    }
}

```

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```

cin >> name; // cin >> name;
cout << "Enter number : " << endl; // cout << "The name is : " << name;
cin >> n; // cout << "The number is : " << n;
void putdata() // Emp[100];
{ cout << "The name is : " << name; // Emp[100];
cout << "The number is : " << n; // Emp[100];
}
Emp emp[100]; // Emp[100];
int main() // main()
{
    for (int i = 0; i < 100; i++) // for (int i = 0; i < 100; i++)
    {
        emp[i].getdata(); // emp[i].getdata();
        for (int i = 0; i < 100; i++) // for (int i = 0; i < 100; i++)
        {
            emp[i].putdata(); // emp[i].putdata();
        }
        return 0; // return 0;
    }
}

```

1/15

20) a) Gant chart is needed to find the finish time
 Turnaround time = finish time - arrival time.

a)

P1	P2	P3	11
0	8	12	13
Turnaround Time			
P1	8 - 0 = 8	11	
P2	12 - 0 = 12	11	
P3	13 - 1 = 12	11	
Average Turnaround time	10.33	11	

b)

P1	P3	P2	11
0	8	9	13
TAT			
P1	8 - 0 = 8	11	
P2	13 - 0 = 13	11	
P3	9 - 1 = 8	11	
A.TAT	9.33	11	

P3	P2	P1	11
0	2	6	14
TT			
P1	14 - 0 = 14	11	
P2	6 - 0 = 6	11	
P3	2 - 1 = 1	11	
ATT	6.83	11	

1/15

COMPUTER SCIENCE
016

31/07/2023 8:30 AM- 11:30 AM



ADVANCED LEVEL NATIONAL EXAMINATIONS, 2022-2023

SUBJECT: COMPUTER SCIENCE

COMBINATIONS:

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

DURATION: 3 HOURS

INSTRUCTIONS:

- 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) What are the four classifications of computers based on their size? **(4 marks)**
- 2) Differentiate between hardware and software failure. **(4 marks)**
- 3) Write pseudocode to check whether a given number is positive, negative or zero. **(6 marks)**
- 4) Explain the role of computer graphic in Education and training. **(4 marks)**
- 5) Explain disk formatting in terms of computer. **(4 marks)**
- 6) Is C++ case sensitive? What is meant by the term "case sensitive"? **(4 marks)**
- 7) Outline any two advantages and disadvantages of FDDI within a Local Area Network. **(4 marks)**
- 8) A-member function of a class can be defined inside the class or outside of class. Provide the syntax which demonstrates how to define the member function outside of class? **(5 marks)**

- 9) After studying Java, you are requested to make a proposal of Enterprise web Application for your school, explain the process to create that website and test. **(5 marks)**

- 10) What is the difference between assignment operator and equality operator? **(4 marks)**
- 11) Java is a "platform-independent language." What does this mean? **(3 marks)**

- 12) Can a class extend itself? Explain your answer. **(3 marks)**
- 13) Describe the characteristics of Secondary Memory. **(5 marks)**

SECTION B: ATTEMPT ANY THREE QUESTIONS. (30 marks)

- 14) Write C++ programs to interchange the values of two variables without using a third variable. **(10 marks)**
- 15) Compare a peer to peer network and a client server network. **(10 marks)**
- 16) Write a vb program to display the following patterns on the label control placed on the form (both vb6.0 and vb.net are allowed, use one you want) **(10 marks)**

*
**

- 17) Develop the program below using bufferedReader method. **(10 marks)**

```
package javaapplication17;
import java.util.Scanner;
public class JavaApplication17 {

    public static void main(String[] args) {
int k,ss,m,largest;
Scanner s=new Scanner(System.in);
System.out.println("Enter age of student K: ");
k=s.nextInt();
System.out.println("Enter age of student SS: ");
ss=s.nextInt();
System.out.println("Enter age of Student M: ");
m=s.nextInt();
if (k<ss && k<m)
{ System.out.println("youngest is K with : "+k +"age(s)"); }
else if (ss<k && ss<m)
{ System.out.println("youngest is SS with: "+ss +"age(s)"); }
else if (m<k && m<ss)
{ System.out.println("youngest is M with: "+m +"age(s)"); }
else
    System.out.println(" both or 2 among K, SS and M are in the same
age" );
    }
}
```

- 18) A database of an employee is identified by EmpId, FirstName, Surname, Address and Birthdate while a project is identified by its ProjectId and ProjectName. Draw a diagram representing the Entity Relationship. **(10 marks)**

SECTION C: ATTEMPT ANY ONE QUESTION. (15 marks)

- 19) (a) Create a table of your choice with at least 4 different attributes in SQL. **(15 marks)**
(b) Given an “Employee” table below:

NAME	PHONE	ADDRESS	SALARY	EVALUATION
KANAMUGIRE	08564433	KACYIRU	185000	0.75
RURANGWA	51231578	NYAMATA	123000	0.90
BAHIZI	03314563	RWAMAGANA	230000	0.80
GIRANEZA	08567838	REMERA	197000	0.85

Write SQL statements for:

- i. Insert the new employee into the table.
 - ii. Update the table to give a salary increase of 20% to those employees whose evaluation is above or equal to 0.80.
 - iii. Destroying table name “Employee.”
 - iv. List the names, salary and address of employees whose evaluation are less than 0.8 or greater than 0.85. (0.8 and 0.85 are not included)
- 20) Using a pointer, write a C++ program that will display an area and volume of a sphere ($\text{area}=4\pi r^2$, $\text{volume}=\frac{4}{3}\pi r^3$). **(15 marks)**

-END-

SECTION A: ATTEMPT ALL QUESTIONS.

1. What are four classifications of computer based on their size? (4marks)

Answer

Computer are broadly classified into 4 based on their size, namely:

- Microcomputers. /1
- Mini-computers. /1
- Mainframe computers. /1
- Supercomputers. /1

2. Differentiate between hardware from software failure. (4marks)

Answer

Hardware failure is malfunction within the electronic circuits or electromechanical components (disks, tapes) of a computer system. /2

While a software failure is the inability of a program to continue processing due to erroneous. /2

3. Write pseudocode to check whether a given number is positive, negative or zero. (6marks)

Answer

Step1: start /1

Step2: Get n value /1

Step3: if($n==0$) then print "given number is zero" else go to step 4 /1

Step4: if($n>0$) then print "given number is positive" /1

Step5: else print "given number is negative" /1

Step6: end if

Step7: stop /1

OR

Start /1

Set n as integer/float....

READ(n) /1

if ($n==0$) then /0.5

WRITE ("given number is zero") /0.5

Else if ($n>0$) then /0.5

WRITE ("given number is positive") /0.5

Else /0.5

WRITE ("given number is negative")/0.5

End if

End /1

4. Explain the role of computer graphic in Education and training. (4marks)

Answer

- ✓ Computer graphics can make better the understanding of the functioning of system.
- ✓ In physical system, biological system, population trends... models make it easier to understand. /2
- ✓ In some training systems, the population trends, etc., models with simulations help a trainee to train in virtual reality environment. /2

For example, practice session or training of ship captains, aircraft pilots, air traffic control personnel.

OR

- ✓ Computer graphics are widely used in education to help learners visualize complex concepts. /2
- ✓ It has made education more accessible and enjoyable for all students. /2
- ✓ Teacher use projector to show graphical images and video to clear the doubts that may rise in minds of students. /2
- ✓ The trainees get more explanations about concepts they are being trained in. /2

NB: Any 2 explanations, one in education and other in training has 2 marks for each.

5. Explain disk formatting in terms of computer **(4marks)**

Answer

Disk formatting is a process of preparing a data storage media such as a hard disk drive, solid state drive (SSD), or USB flash drive or memory card for first time use. /4

In some cases, the formatting operation may also create one or more new file systems. /4

disk formatting means prepare the chosen partition on the drive to be used by an operating system by deleting all data and setting up a file system. /4

6. Is c++ case sensitive? What is the meant by the term “case sensitive”? **(4marks)**

Answer

Yes, ++ is case sensitive. /2

Case sensitive means c++ treats upper and lower case characters differently. Capital letter≠small letter. /2

7. Outline any two advantages and disadvantages of FDDI within a local area network. **(4marks)**

Answer

Advantages:

- ✓ Allows the transmission of very large volumes of data over large distances. /1
- ✓ It provides high bandwidth. /1
- ✓ Secure data transmission. /1
- ✓ Not affected by electromagnetic interference. /1

Disadvantages:

- ✓ is expensive technology to set up because the network technology requires a special network card. /1
- ✓ Also require fiber-optic cabling is expensive than twisted-pair cable. /1
- ✓ Complex installation. /1
- ✓ Fragility of cables. /1
- ✓ Requires more cables. /1
- ✓ Difficult to repair. /1

NB: any 2 advantages and 2 disadvantages in consideration

8. A member function of a class can be defined inside the class or outside of class. Provide the syntax which demonstrates how to define the member function outside of class? **(5marks)**

Answer

```
Return-type /1 class-name /0.5 :: /1 function-name /0.5 (arg1,arg2.....) /0.5  
{ /0.5  
Statements;  
return variable;  
} /0.5
```

9. After study Java, you are requested to make a proposal of enterprise web application for your school, explain the process to create that website and test. **(5marks)**

Answer

Step1: to install html editor like Notepad++, Edit plus, ... /1

Step2: To install Java runtime, JDK, Netbeans, etc.. /1

Step3: To install a web server like Tomcat, GlassFish, etc. /1

Step4: To create a directory structure for the web site. /1

Step5: creating web pages using html, JSP, servlet and JDBC when necessary. /1

Step6: compile and run

10. What is the difference between assignment operator and equality operator? **(4marks)**

Answer

Assignment operator is used to assign the right-hand side value into left hand side variable. /2

Example: A=5, b=10

Equality operator is used to compare the values of both right-hand side variable and left-hand side variable and results in either true or false. /2

Example: A==B (a=5, b=5) true

A≠B (a=5, b=0) true

11. Java is a “platform-independent language.” What does this mean? **(3marks)**

Answer

Java is a platform-independent language, it means the compiled codes can be run on any java supporting platform. /3

Java compiled code (byte codes) can run on all operating systems. /3

Java is a platform independent because it is portable within all platforms that support java virtual machine (JVM). /3

12. Can a class extend itself.? explain your answer

Answer

No, A class is not a subclass of itself. /1.5

An inner class could be a subclass of some other class, but that is a separate class. /1.5

A new class can be created after the parent /super/old class. /1.5

13. Describer the characteristics of secondary memory (5marks)

- ✓ These are magnetic and optical memories. /1
- ✓ It is known as backup memory. /1
- ✓ It is nonvolatile memory. /1
- ✓ Data is permanently stored even if power is switched off. /1
- ✓ It is used for storage of data in a computer /1
- ✓ Slower than secondary memory/1

SECTION B: ATTEMP THREE QUESTIONS

14. Write c++ program to interchange the values of two variables without using a third variable

Answer

```
#include<iostream>/0.5
using namespace std;/0.5
int main ()/1
{/0.5
int a,b;/1
cout<<" \n enter fist number";
cin>>a;/0.5
cout<<" \n enter second number";
cin>>b;/0.5
a=a+b;/1
b=a-b;/1
a=a-b;/1
cout<<" \n after change the first number is:" <<a;/0.5
cout<<" \n after change the second number is:" <<b;/0.5
return 0;/1
}/0.5
```

OR

```
#include<iostream>/0.5
using namespace std;/0.5
int main ()/1
{/0.5
int a,b;/1
cout<<" \n enter fist number";
cin>>a;/0.5
cout<<" \n enter second number";
cin>>b;/0.5
a=a*b;/1
b=a/b;/1
a=a/b;/1
```

```
cout<<" \n after change the first number is:" <<a; /0.5
cout<<" \n after change the second number is:" <<b; /0.5
return 0;/1
}/0.5
```

OR

```
#include<iostream>/0.5
using namespace std; /0.5
int main ()/1
{/0.5
int a,b;/1
cout<<" \n enter fist number";
cin>>a; /0.5
cout<<" \n enter second number";
cin>>b; /0.5
a=a^b; /1
b=a^b; /1
a=a^b; /1
cout<<" \n after change the first number is:" <<a; /0.5
cout<<" \n after change the second number is:" <<b; /0.5
return 0;/1
}/0.5
```

15. Compare peer to peer network and client server network. (10marks)

Answer

Peer to peer network

- ✓ Peer to peer network is that is easier to set up./1
- ✓ In Peer-to-peer network all nodes are act as server as well as client therefore no need of dedicated server. /1
- ✓ Peer-to-peer network is less expensive. /1
- ✓ Peer-to-peer network is easier to set up and use this means that you can spend less time in the configuration and implementation of Peer-to-peer network. /1
- ✓ It is not required for Peer-to-peer network to use the dedicated server computer. Any computer in network can function as both a network server and a user workstation. /1

Client server network

- ✓ In client server network resources are controlled by a centralized network administration. /1
- ✓ The network administrator implements data backup and security measures/1
- ✓ Upgradation and scalability in client-server set-up. /1
- ✓ Security servers ca play different roles for different clients/1

Peer to peer network	Client server network
Cover small area	Cover large area
Support a smaller number of devices	Support a greater number of devices
Resources like hard disk, RAM, and software are not shared	Resources are shared among devices

Failure of one device cannot affect other devices	Failure of one device can affect the whole network
Difficult to maintain	Easy to maintain

16. Write a VB program to display the following patterns on the label control places on the form (both vb6.0 and vb.net are allowed, use one you want)

```
*  
**  
***  
****  
*****
```

Answer

Vb6.0	Vb.net
<pre>Private Sub Command1_Click () /1 Dim i As Integer, j As Integer picOut.Caption = "" For i=1 To 5 /1.5 For j=1 To i /1.5 picOut.Caption = picOut.Caption + "*" /1.5 Next j /1 picOut.Caption = picOut.Caption + vb NewLine /1.5 next i /1 End Sub /1 Note: picOut is a label name</pre>	<pre>Private Class Form1 Private Sub Button1_Click (sender As Object As EventArgs) Handles Button1.Click Dim i As Integer, j As Integer Label1.Text = "" For i=1 To 5 For j=1 To i Label1.Text += "*" Next j Label1.Text += vbNewLine next i End Sub End Class</pre>

17. Develop below program using buffered reader method

```
package javaapplication17;
import java.util.Scanner;
public class JavaApplication17
{
    public static void main (String [] args)
    {
        int k,ss,m,largest;
        Scanner s=new Scanner (System.in);
        System.out.println("Enter age of student K:");
        k=s.nextInt();
        System.out.println("Enter age of student SS:");
        ss=s.nextInt();
        System.out.println("Enter age of student M:");
        m=s.nextInt();
        if(k<ss&&k<m)
        {
            System.out.println("youngest is K with: "+k+" age(s)");
        }
        else if (ss<k&&ss<m)
        {
```

```
System.out.println("youngest is SS with: "+ss+" age(s)");
}
else if (m<k&&m<ss)
{
System.out.println("youngest is M with: "+m+" age(s)");
}
else
System.out.println("both or 2 among K, SS and M are in the same age");
}
}
```

Answer

```
package javaapplication 17;
import java.io.BufferedReader;/1
import java.io.IOException;/0.5
import java.io.InputStreamReader; /0.5
import java.util.Scanner;
public class JavaApplication 17
{/0.5
Public static void main (String [] args) throws IOException/0.5
{
int k,ss,m,largest;
InputStreamReader is = new InputStreamReader(System.in); /1
BufferedReader br=new bufferedReader(is); /1
System.out.println("Enter age of student K:");
k=Integer.parseInt(br.readLine());/0.5
System.out.println("Enter age of student SS:");
ss=Integer.parseInt(br.readLine());/0.5
System.out.println("Enter age of student M:");
m=Integer.parseInt(br.readLine());/0.5
if(k<ss&&k<m) /0.5
{
System.out.println("youngest is K with: "+k+" age(s)");
}
else if (ss<k&&ss<m) /0.5
{
System.out.println("youngest is SS with: "+ss+" age(s)");
}
else if (m<k&&m<ss) /0.5
{
System.out.println("youngest is M with: "+m+" age(s)); /0.5
}
else /0.5
System.out.println("both or 2 among K, SS and M are in the same age"); /0.5
}
}/0.5
```

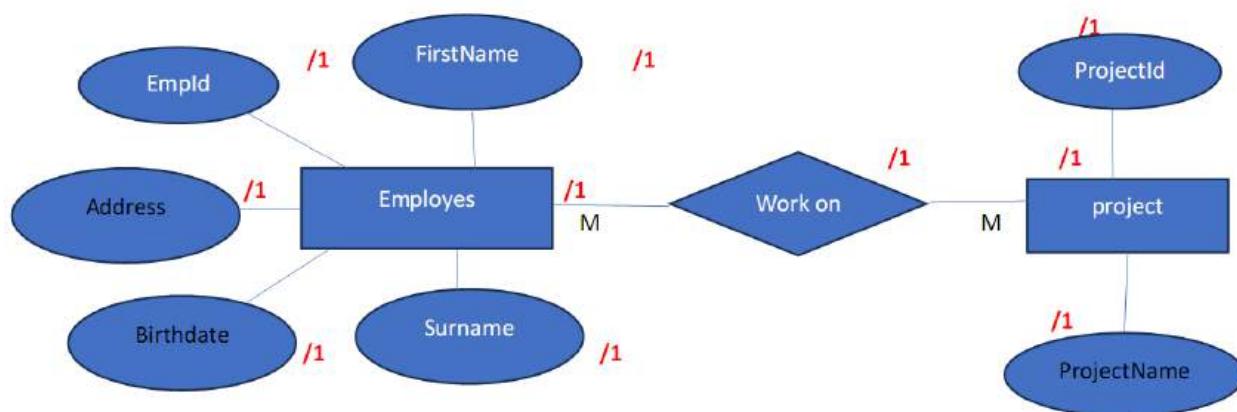
OR

```
package javaapplication 17;
import java.io.*;/2
public class JavaApplication 17/0.5
{/0.5
Public static void main (String [] args) /0.5
```

```
{
Try
{
int k,ss,m,largest;
BufferedReader br;=new bufferedReader\(newInputStreamReader\(System.in\)\); /1
System.out.println("Enter age of student K:");
k=Integer.parseInt(br.readLine());/0.5
System.out.println("Enter age of student SS:");
ss=Integer.parseInt(br.readLine());/0.5
System.out.println("Enter age of student M:");
m=Integer.parseInt(br.readLine());/0.5
if(k<ss&&k<m) /0.5
{
System.out.println("youngest is K with: "+k+" age(s)");
}
else if (ss<k&&ss<m) /0.5
{
System.out.println("youngest is SS with: "+ss+" age(s)");
}
else if (m<k&&m<ss) /0.5
{
System.out.println("youngest is M with: "+m+" age(s)");
}
else /0.5
System.out.println("both or 2 among K, SS and M are in the same age"); /0.5
}
Catch(exception e)
}
}
}/0.5
```

18. A database of an employees is identified by EmpId, FirstName,Surname,Address and Birthdate while a project is identified by its ProjectId and ProjectName. Draw the diagram representing the entity Relationship. **(10 marks)**

Answer



SECTION C: ATTEMP ANY ONE QUESTION

19.

(a)create a table of your choice with at least 4 different attributes in SQL.

(b)given an “Employee” table below:

NAME	PHONE	ADDRESS	SALARY	EVALUATION
KANAMUGIRE	08564433	KACYIRU	185000	0.75
RURANGWA	51231578	NYAMATA	123000	0.90
BAHIZI	03314563	RWAMAGANA	230000	0.80
GIRANEZA	08567838	REMERA	197000	0.85

Write SQL statements for:

- i. Insert the new employee into the table
- ii. Update the table to give salary increase for 20% to those employees whose evaluation is above or equal to 0.80`
- iii. Destroying table name “Employee”.
- iv. List the names, Salary and address of employees whose evaluation are less than 0.8 or greater than 0.85(0.8 and 0.85 are not included)

Answer

- a) `CREATE Table /0.5 student /0.5 (Sid numeric (5) PRIMARY KEY, /0.5 Fname char (25), /0.5 Lname char (25), /0.5 Sex char (5)); /0.5`
- b)
 - i. `Insert /0.5 into /0.5 Employee /0.5 value /0.5 ("John",0788111111," KIGALI","171000",1); /1`
 - ii. `UPDATE /0.5 Employee /0.5 SET /0.5 salary= SALARY*1.2 /0.5 WHERE /0.5 EVALUATION>=0.8; /0.5`

OR

`UPDATE /0.5 Employee /0.5 SET /0.5 salary= SALARY+SALARY*0.2 /0.5 WHERE /0.5 EVALUATION>=0.8; /0.5`

- iii. `DROP /1 Table / Employee; /1`
- iv. `SELECT /0.5 Name, Salary, address /0.5 from Employee /0.5 where EVALUATION /0.5 NOT BETWEEN /0.5 0.8 AND 0.85 /0.5`

OR

- v. `SELECT /0.5 Name, Salary, address /0.5 from Employee /0.5 where /0.5 EVALUATION<0.8 /0.5 OR EVALUATION >0.85 /0.5`

20. Using pointer, write c++ program that will display an area and volume of sphere ($\text{area}=4\pi r^2$).

```
#include<iostream>/0.5
using namespace std; /0.5
int main ()/1
{/0.5
double r, area, volume,*ptr; /2
```

```
double const PI=3.142;
cout<<" \n enter fist radius"; /1
cin>>r; /1
ptr=&r;/2
area=4*PI**ptr**ptr; /1.5
volume= area=(4/3)*PI**ptr**ptr**ptr; /1.5
cout<<"area=" <<area; /1
cout<<"volume=" <<volume; /1
return 0;/1
}/0.5
```

OR

```
#include<iostream>/0.5

#include<cmath>/1

#define PI=3.14;

using namespace std; /0.5
int main ()/1
{/0.5
float r, area, volume, *ptr; /2
double const PI=3.142;
cout<<" \n enter fist radius"; /1
cin>>r; /1
ptr=&r;/2
area=4*PI *pow(*ptr,2); /1
volume= (4/3)*PI*pow(*ptr,3); /1
cout<<"area=" <<area; /1
cout<<"volume=" <<volume; /1
return 0;/1
}/0.5
```

OR

```
#include<iostream.h>/1

int main ()/1
{/0.5
double r, area,y, volume, *ptr; /2
double const PI=3.142;
cout<<" \n enter fist radius"; /1
cin>>r; /1
ptr=&r;/1
y=*ptr;/1
area=4*PI*y*y; /1.5
volume= area= (4/3) *PI*y*y*y; /1.5
cout<<" area=" <<area; /1
cout<<" volume=" <<volume; /1
return 0;/1
}/0.5
```

OR

```
#include<iostream>/0.5
using namespace std;/0.5
int main ()/1
{/0.5
    Double r, area, volume,*ptr1,*ptr1; /2
    Double const PI=3.142;
    cout<<" \n enter fist radius"; /1
    *ptr1=&area;
    *ptr2=&volume;
    cin>>r; /1
    ptr=&r;/2
    area=4*PI*r*r; /1.5
    volume= area=(4/3)*PI*r*r*r; /1.5
    cout<<"area=" <<*ptr1; /1
    cout<<"volume=" <<*ptr2; /1
    return 0;/1
}/0.5
```
