

Series ONS**SET-4**Code No. **91**Roll No.

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Candidates must write the Code on the title page of the answer-book.

- Please check that this question paper contains **24** printed pages.
- Code number given on the right hand side of the question paper should be written on the title page of the answer-book by the candidate.
- Please check that this question paper contains **7** questions.
- **Please write down the Serial Number of the question before attempting it.**
- 15 minute time has been allotted to read this question paper. The question paper will be distributed at 10.15 a.m. From 10.15 a.m. to 10.30 a.m., the students will read the question paper only and will not write any answer on the answer-book during this period.

COMPUTER SCIENCE

*Time allowed : 3 hours**Maximum Marks : 70*

General Instructions :

- (i) *Programming Language in SECTION A : C++.*
- (ii) *Programming Language in SECTION B : Python.*
- (iii) *Answer either SECTION A or B, and SECTION C is compulsory.*
- (iv) *It is compulsory to mention on the page 1 in answer book whether you are attempting SECTION A or SECTION B.*
- (v) *All questions are **compulsory** within each section.*

SECTION - A

[Only for candidates, who opted for C++]

1. (a) Out of the following, find those identifiers, which cannot be used for naming Variables, Constants or Functions in a C++ program : 2

**Total*Tax, double, Case, My Name,
NeW, switch, Column31, _Amount**

- (b) Ronica Jose has started learning C++ and has typed the following program. When she compiled the following code written by her, she discovered that she needs to include some header files to successfully compile and execute it. Write the names of those header files, which are required to be included in the code. 1

```
void main()
{
    double X,Times,Result;
    cin>>X>>Times;
    Result=pow(X,Times);
    cout<<Result<<endl;
}
```

- (c) Rewrite the following C++ code after removing any/all syntactical errors with each correction underlined. 2

Note : Assume all required header files are already being included in the program.

```
#define Formula(a,b) = 2*a+b
void main()
{
    float X=3.2;Y=4.1;
    Z=Formula(X,Y);
    cout<< 'Result=' <<Z<<endl;
}
```

- (d) Find and write the output of the following C++ program code : 2

Note: Assume all required header files are already included in the program.

```
typedef char TEXT[80];

void JumbleUp(TEXT T)
{
    int L=strlen(T);
    for (int C=0;C<L-1;C+=2)
    {
        char CT=T[C];
        T[C]=T[C+1];
        T[C+1]=CT;
    }
    for (C=1;C<L;C+=2)
        if (T[C]>='M' && T[C]<='U')
            T[C]='@';
}

void main()
{
    TEXT Str="HARMONIOUS";
    JumbleUp(Str);
    cout<<Str<<endl;
}
```

- (e) Find and write the output of the following C++ program code : 3

Note : Assume all required header files are already being included in the program.

```
class Share
{
    long int Code;
    float Rate;
    int DD;
public:
    Share () {Code=1000;Rate=100;DD=1;}
    void GetCode(long int C, float R)
    {
        Code=C;
        Rate=R;
    }
    void Update(int Change,int D)
    {
        Rate+=Change;
        DD=D;
    }
    void Status()
    {
        cout<<"Date:"<<DD<<endl;
        cout<<Code<<"# "<<Rate<<endl;
    }
};

void main()
{
    Share S,T,U;
    S.GetCode(1324,350);
```

```
T.GetCode(1435,250);
S.Update(50,28);
U.Update(-25,26);
S.Status();
T.Status();
U.Status();
}
```

- (f) Look at the following C++ code and find the possible output(s) from the options (i) to (iv) following it. Also, write the maximum and the minimum values that can be assigned to the variable PICKER. 2

Note : Assume all the required header files are already being included in the code.

The function random(n) generates an integer between 0 and n-1.

```
void main()
{
    randomize();
    int PICKER;
    PICKER=1+random(3);
    char COLOR[][5]={"BLUE","PINK","GREEN","RED"};
    for(int I=0;I<=PICKER; I++)
    {
        for(int J=0; J<=I;J++)
            cout<<COLOR[J];
        cout<<endl;
    }
}
```

(i)	(ii)	(iii)	(iv)
PINK	BLUE	GREEN	BLUE
PINKGREEN	BLUEPINK	GREENRED	BLUEPINK
PINKGREENRED	BLUEPINKGREEN BLUEPINKGREENRED		BLUEPINKGREEN

2. (a) Write any four important characteristics of Object Oriented Programming? Give example of any one of the characteristics using C++. 2
- (b) Observe the following C++ code and answer the questions (i) and (ii). Assume all necessary files are included :

```
class BOOK
{
    long Code;
    char Title[20];
    float Price;
public:
    BOOK() //Member Function 1
    {
        cout<<"Bought"<<endl;
        Code=10;strcpy(Title,"NoTitle");Price=100;
    }
    BOOK(int C,char T[],float P) //Member Function 2
    {
        Code=C;
        strcpy(Title,T);
        Price=P;
    }
    void Update(float p) //Member Function 3
    {
        Price+=P;
    }
    void Display() //Member Function 4
```

```
{
    cout<<Code<<": "<<Title<<": "<<Price<<endl;
}
~BOOK() //Member Function 5
{
    cout<<"Book Discarded!"<<endl;
}
};
void main() //Line 1
{ //Line 2
    BOOK B,C(101,"Truth",350); //Line 3
    for (int I=0;I<4;I++) //Line 4
    { //Line 5
        B.Update(50);C.Update(20); //Line 6
        B.Display();C.Display(); //Line 7
    } //Line 8
} //Line 9
```

- (i) Which specific concept of object oriented programming out of the following is illustrated by Member Function 1 and Member Function 2 combined together ? 1
- Data Encapsulation
 - Polymorphism
 - Inheritance
 - Data Hiding
- (ii) How many times the message "**Book Discarded!**" will be displayed after executing the above C++ code ? Out of line 1 to Line 9, which line is responsible to display the message "**Book Discarded!**" 1

- (c) Write the definition of a class CITY in C++ with following description : 4

Private Members

```
- Ccode      //Data member for City Code (an integer)
- CName      //Data member for City Name (a string)
- Pop        //Data member for Population (a long int)
- KM         //Data member for Area Coverage (a float)
- Density    //Data member for Population Density
              (a float)
- DenCal()   //A member function to calculate ---
              //Density as Pop/KM
```

Public Members

```
- Record()  //A function to allow user to enter values
              of
              //Acode,Name,Pop,KM and call DenCal()
              function
- View()    //A function to display all the data
              members
              //also display a message "Highly Populated
              City"
              //if the Density is more than 10000
```

- (d) Answer the questions (i) to (iv) based on the following : 4

```
class ITEM
{
    int Id;
    char IName[20];
```



```
protected:
    float Qty;
public:
    ITEM();
    void Enter();void View();
};
class TRADER
{
    int DCode;
protected:
    char Manager[20];
public:
    TRADER();
    void Enter();
    void View();
};
class SALEPOINT : public ITEM,private TRADER
{
    char Name[20],Location[20];
public:
    SALEPOINT();
    void EnterAll();
    void ViewAll();
};
```

- (i) Which type of Inheritance out of the following is illustrated in the above example ?
- Single Level Inheritance
 - Multi Level Inheritance
 - Multiple Inheritance
- (ii) Write the names of all the data members, which are directly accessible from the member functions of class SALEPOINT.
- (iii) Write the names of all the member functions, which are directly accessible by an object of class SALEPOINT.
- (iv) What will be the order of execution of the constructors, when an object of class SALEPOINT is declared ?

3. (a) Write the definition of a function FixSalary(float Salary[], int N) in C++, which should modify each element of the array Salary having N elements, as per the following rules : 2

Existing Salary Values	Required Modification in Value
If less than 1,00,000	Add 35% in the existing value
If $\geq 1,00,000$ and $< 20,000$	Add 30% in the existing value
If $\geq 2,00,000$	Add 20% in the existing value

- (b) R[10][50] is a two dimensional array, which is stored in the memory along the row with each of its element occupying 8 bytes, find the address of the element R[5][15], if the element R[8][10] is stored at the memory location 45,000. 3
- (c) Write the definition of a member function DELETE() for a class QUEUE in C++, to remove a product from a dynamically allocated Queue of products considering the following code is already written as a part of the program. 4

```

struct PRODUCT
{
    int PID; char PNAME[20];
    PRODUCT *Next;
};

class QUEUE
{
    PRODUCT *R,*F;
public:
    QUEUE () {R=NULL;F=NULL;}
    void INSERT();
    void DELETE();
    ~QUEUE ();
};

```

- (d) Write definition for a function DISPMID (int A[][5], int R, int C) in C++ 3
to display the elements of middle row and middle column from a two dimensional array A having R number of rows and C number of columns.

For example, if the content of array is as follows :

215	912	516	401	515
103	901	921	802	601
285	209	609	360	172

The function should display the following as output :

103 901 921 802 601

516 921 609

- (e) Convert the following Infix expression to its equivalent Postfix 2
expression, showing the stack contents for each step of conversion.

$P / (Q - R) * S + T$

4. (a) Write function definition of DISP3CHAR() in C++ to read the content of a text file KIDINME.TXT, and display all those words, which has three characters in it. 2

Example :

If the content of the file KIDINME.TXT is as follows :

When I was a small child, I used to play in the garden with my grand mom. Those days were amazingly funful and I remember all the moments of that time.

The function DISP3CHAR() should display the following :

was the mom and all the

- (b) Write a definition for function ONOFFER() in C++ to read each object of a binary file TOYS.DAT, find and display details of those toys, which has status as "ON OFFER". Assume that the file TOYS.DAT is created with the help of objects of class TOYS, which is defined below : 3

```
class TOYS
{
    int TID;char Toy[20],Status[20]; float MRP;
public:
    void Getinstock()
    {
        cin>>TID;gets (Toy) ;gets (Status) ;cin>>MRP;
    }
    void View()
    {
        cout<<TID<<" : "<<Toy<<" : "<<MRP<<" : "<<Status<<endl;
    }
    char *SeeOffer() {return Status;}.
};
```

- (c) Find the output of the following C++ code considering that the binary file CLIENT.DAT exists on the hard disk with a data of 1000 clients. 1

```
class CLIENT
{
    int Ccode;char CName[20];
public:
    void Register();void Display();
};
void main()
{
    ifstream CFile;
    CFile.open("CLIENT.DAT",ios::binary/ios::in);
    CLIENT C;
    CFile.read((char*)&C, sizeof(C));
    cout<<"Rec:"<<CFile.tellg()/sizeof(C)<<endl;
    CFile.read((char*)&C, sizeof(C));
    CFile.read((char*)&C, sizeof(C));
    cout<<"Rec:"<<CFile.tellg()/sizeof(C)<<endl;
    CFile.close();
}
```

SECTION - B

[Only for candidates, who opted for Python]

1. (a) Out of the following, find those identifiers, which cannot be used for naming Variables or Functions in a Python program : 2

```
Total*Tax, While, class, switch,  
3rdRow, finally, Column31, _Total
```

- (b) Name the Python Library modules which need to be imported to invoke the following functions. 1

(i) `sqrt()`

(ii) `dump()`

- (c) Rewrite the following code in Python after removing all syntax error(s). Underline each correction done in the code. 2

```
for Name in [Ramesh, Suraj, Priya]  
  
    IF Name[0]='S':  
  
        print(Name)
```

- (d) Find and write the output of the following Python code : 2

```
Values=[10,20,30,40]  
  
for Val in Values:  
  
    for I in range(1, Val%9):  
  
        print(I,"*",end="")  
  
print()
```

(e) Find and write the output of the following Python code :

3

```
class Book

def __init__(self,N=100,S="Python"): #constructor

    self.Bno=N

    self.BName=S

def Assign(self, N,S):

    self.Bno=self.Bno + N

    self.BName= S + self.BName

def ShowVal(self):

    print(self.Bno,"#",self.BName)

s=Book()

t=Book(200)

u=Book(300,"Made Easy")

s.ShowVal()

t.ShowVal()

u.ShowVal()

s.Assign(5, "Made ")

t.Assign(15,"Easy ")

u.Assign(25,"Made Easy")

s.ShowVal()

t.ShowVal()

u.ShowVal()
```

- (f) What are the possible outcome(s) executed from the following code ? Also specify the maximum and minimum values that can be assigned to variable PICKER. 2

```
import random
PICKER=random.randint(0,3)
COLOR=["BLUE","PINK","GREEN","RED"];
for I in COLOR:
    for J in range(1, PICKER):
        print(I,end="")
    print()
```

(i)	(ii)	(iii)	(iv)
BLUE	BLUE	PINK	BLUEBLUE
PINK	BLUEPINK	PINKGREEN	PINKPINK
GREEN	BLUEPINKGREEN	GREENRED	GREENGREEN
RED	BLUEPINKGREENRED		REDRED

2. (a) What is the difference between Multilevel and Multiple inheritance ? Give suitable examples to illustrate both. 2
- (b) What will be the output of the following Python code considering the following set of inputs ? 2

AMAR

THREE

A123

1200

Also, explain the try and except used in the code.

```
Start=0
```

```
while True:
```

```
    try:
```

```
        Number=int(raw_input("Enter Number"))
```

```
        break
```

```
    except ValueError:
```

```
        Start=Start+2
```

```
        print("Re-enter an integer")
```

```
print(Start)
```


- (c) Write a class CITY in Python with following specifications. 4

Instance Attributes

- Ccode # Numeric value
- CName # String value
- Pop # Numeric value for Population
- KM # Numeric value
- Density # Numeric value for Population Density

Methods :

- DenCal() # Method to calculate Density as Pop/KM
- Record() # Method to allow user to enter values Ccode, CName, Pop, KM and call DenCal() method
- View() # Method to display all the members also display a message "Highly Populated City" if the Density is more than 10000.

- (d) How do we implement abstract method in Python? Give an example for the same. 2

- (e) What is the significance of super() method? Give an example for the same. 2

3. (a) What will be the status of the following list after the First, Second and Third pass of the selection sort method used for arranging the following elements in descending order? 3

Note : Show the status of all the elements after each pass very clearly underlining the changes.

12, 14, -54, 64, 90, 24

- (b) For a given list of values in descending order, write a method in Python to search for a value with the help of Binary Search method. The method should return position of the value and should return -1 if the value not present in the list. 2

- (c) Write Insert (City) and Delete (City) methods in Python to add City and Remove City considering them to act as Insert and Delete operations of the data structure Queue. 4
- (d) Write a method in Python to find and display the prime numbers between 2 to N. Pass N as argument to the method. 3
- (e) Evaluate the following postfix notation of expression. Show status of stack after every operation. 2

12, 2, /, 34, 20, -, +, 5, +

4. (a) Write a statement in Python to perform the following operations : 1
- To open a text file "MYPET.TXT" in write mode
 - To open a text file "MYPET.TXT" in read mode
- (b) Write a method in Python to write multiple line of text contents into a text file daynote.txt line. 2
- (c) Consider the following definition of class Employee, write a method in Python to search and display the content in a pickled file emp.dat, where Empno is matching with 'A0005'. 3

```
class Employee:

    def __init__(self,E,NM):

        self.Empno=E

        self.ENAME=NM

    def display(self):

        print(self.Empno," - ",self.ENAME)
```

SECTION - C

[For all the candidates]

5. (a) Observe the following PARTICIPANTS and EVENTS tables carefully and write the name of the RDBMS operation which will be used to produce the output as shown in RESULT ? Also, find the Degree and Cardinality of the result. 2

PARTICIPANTS	
PNO	NAME
1	Aruanabha Tariban
2	John Fedricks
3	Kanti Desai

EVENTS	
EVENTCODE	EVENTNAME
1001	IT Quiz
1002	Group Debate

RESULT

PNO	NAME	EVENTCODE	EVENTNAME
1	Aruanabha Tariban	1001	IT Quiz
1	Aruanabha Tariban	1002	Group Debate
2	John Fedricks	1001	IT Quiz
2	John Fedricks	1002	Group Debate
3	Kanti Desai	1001	IT Quiz
3	Kanti Desai	1002	Group Debate

- (b) Write SQL queries for (i) to (iv) and find outputs for SQL queries (v) to (viii), which are based on the tables. 6

Table : VEHICLE

VCODE	VEHICLETYPE	PERKM
V01	VOLVO BUS	150
V02	AC DELUXE BUS	125
V03	ORDINARY BUS	80
V05	SUV	30
V04	CAR	18

Note : PERKM is Freight Charges per kilometer

Table : TRAVEL

CNO	CNAME	TRAVELDATE	KM	VCODE	NOP
101	K. Niwal	2015-12-13	200	V01	32
103	Fredrick Sym	2016-03-21	120	V03	45
105	Hitesh Jain	2016-04-23	450	V02	42
102	Ravi Anish	2016-01-13	80	V02	40
107	John Malina	2015-02-10	65	V04	2
104	Sahanubhuti	2016-01-28	90	V05	4
106	Ramesh Jaya	2016-04-06	100	V01	25

Note : • Km is Kilometers travelled

• NOP is number of passengers travelled in vehicle

(i) To display CNO, CNAME, TRAVELDATE from the table TRAVEL in descending order of CNO.

(ii) To display the CNAME of all the customers from the table TRAVEL who are traveling by vehicle with code V01 or V02.

(iii) To display the CNO and CNAME of those customers from the table TRAVEL who travelled between '2015-12-31' and '2015-05-01'.

(iv) To display all the details from table TRAVEL for the customers, who have travel distance more than 120 KM in ascending order of NOP.

(v) **SELECT COUNT (*) ,VCODE FROM TRAVEL
GROUP BY VCODE HAVING COUNT (*) >1 ;**

(vi) **SELECT DISTINCT VCODE FROM TRAVEL ;**

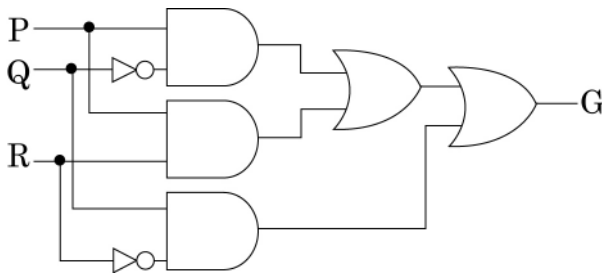
(vii) **SELECT A.VCODE ,CNAME ,VEHICLETYPE
FROM TRAVEL A,VEHICLE B
WHERE A.VCODE=B.VCODE AND KM<90 ;**

(viii) **SELECT CNAME ,KM*PERKM
FROM TRAVEL A,VEHICLE B
WHERE A.VCODE=B.VCODE AND A.VCODE='VO5' ;**

6. (a) Verify the following using Boolean Laws. 2

$$X' + Y'Z = X' \cdot Y' \cdot Z' + X' \cdot Y \cdot Z' + X'Y \cdot Z + X' \cdot Y' \cdot Z + X \cdot Y' \cdot Z$$

- (b) Write the Boolean Expression for the result of the Logic Circuit as shown below : 2



- (c) Derive a Canonical SOP expression for a Boolean function G, represented by the following truth table : 1

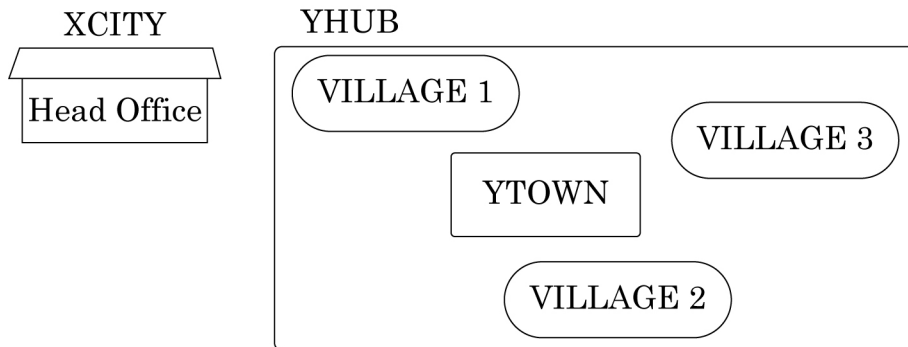
A	B	C	G (A, B, C)
0	0	0	1
0	0	1	0
0	1	0	1
0	1	1	0
1	0	0	0
1	0	1	0
1	1	0	1
1	1	1	1

- (d) Reduce the following Boolean Expression to its simplest form using K-Map : 3

$$F(P, Q, R, S) = \sum (0, 4, 5, 8, 9, 10, 11, 12, 13, 15)$$

7. (a) Differentiate between PAN and LAN types of networks. 1
- (b) Which protocol helps us to transfer files to and from a remote computer ? 1
- (c) Write two advantages of 3G over 2G Mobile Telecommunication Technologies in terms of speed and services ? 1
- (d) Write two characteristics of Web 2.0. 1
- (e) What is the basic difference between Computer Worm and Trojan Horse ? 1
- (f) Categorise the following under Client side and Server Side script category ? 1
- (i) Java Script
- (ii) ASP
- (iii) VB Script
- (iv) JSP
- (g) Intelligent Hub India is a knowledge community aimed to uplift the standard of skills and knowledge in the society. It is planning to set up its training centers in multiple towns and villages pan India with its head offices in the nearest cities. They have created a model of their network with a city, a town and 3 villages as follows.

As a network consultant, you have to suggest the best network related solutions for their issues/problems raised in (i) to (iv), keeping in mind the distances between various locations and other given parameters.



Shortest distances between various locations :

VILLAGE 1 to YTOWN	2 KM
VILLAGE 2 to YTOWN	1.5 KM
VILLAGE 3 to YTOWN	3 KM
VILLAGE 1 to VILLAGE 2	3.5 KM
VILLAGE 1 to VILLAGE 3	4.5 KM
VILLAGE 2 to VILLAGE 3	3.5 KM
CITY Head Office to YHUB	30 Km

Number of Computers installed at various locations are as follows :

YTOWN	100
VILLAGE 1	10
VILLAGE 2	15
VILLAGE 3	15
CITY OFFICE	5

Note : In Villages, there are community centers, in which one room has been given as training center to this organization to install computers.

The organization has got financial support from the government and top IT companies.

- (i) Suggest the most appropriate location of the SERVER in the YHUB (out of the 4 locations), to get the best and effective connectivity. Justify your answer. **1**
- (ii) Suggest the best wired medium and draw the cable layout (location to location) to efficiently connect various locations within the YHUB. **1**
- (iii) Which hardware device will you suggest to connect all the computers within each location of YHUB ? **1**
- (iv) Which service/protocol will be most helpful to conduct live interactions of Experts from Head Office and people at YHUB locations ? **1**