

COMPUTER SCIENCE (Theory)

Class-XII

Time Allowed: 3 Hours

Maximum Marks: 70

*Note. (i) All questions are compulsory.
(ii) Programming Language: C++*

Section –A

Ques 1

- (a) Is prototyping mandatory in C++ program? Justify your answer with a suitable example [2]
 (b) Observe the following C++ code and write the name(s) of the header file(s), which will be essentially required to run it in a C++ compiler [1]

```
void main()
{
char x;
cin>>x;
if(isupper(x))
{cout<<"uppercase";}
else
{cout<<"Not Uppercase";}
}
```

- (c) Rewrite the following program after removing the syntactical error(s), if any underline each correction. [2]

```
#include<iostream.h>
const int Dividor;
void main()
{
Number=15;
for(int count=1, count<=5,count++,Number-=3)
if(Number%Dividor==0)
cout<<Number/Dividor;
cout<<endl;
else
cout<<Number+Dividor<<endl;
}
```

- (d) Observe the following C++ code carefully and obtain the output, which will appear on the screen after execution of it. [2]

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

```
#define Diff(N1,N2)((N1>N2)?N1-N2:N2-N1)
void main()
{
int A,B,Num[]={10,23,14,54,32};
for(int Cnt=4;Cnt>0;Cnt--)
{
A=Num[Cnt];
B=Num[Cnt-1];
cout<<Diff(A,B)<<"@";
}
```

```
}
}
```

(e) Find and write the output of the following program:

[3]

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

```
void main()
{
int *Point,Score[]={ 120,65,75,150,95,100};
Point=Score;
for(int L=0;L<6;L++)
{
if((*Point)%10==0)
*Point/=2;
else
*Point-=2;
if((*Point)%5==0)
*Point/=5;
Point++;
}
for(L=5;L>=0;L--)
cout<<Score[L]<<"#";
}
```

(f) Study the following C++ program and select the possible output(s) (i) to (iv) from it and also, find the maximum and minimum value or variable M.

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

```
void main()
{
randomize();
int N=random(3), M=random(4);
int DOCK[3][3]={ 1,2,3,2,3,4,3,4,5 };
for(int R=0;R<N;R++)
{
for(int C=0;C<M;C++)
cout<<DOCK[R][C]<<" ";
cout<<endl;
}
}
```

Option (i)

| | | |
|---|---|---|
| 1 | 2 | 3 |
| 2 | 3 | 4 |
| 3 | 4 | 5 |

Option (ii)

| | | |
|---|---|---|
| 1 | 2 | 3 |
| 2 | 3 | 4 |

Option (iii)

| | |
|---|---|
| 1 | 2 |
| 2 | 3 |

Option (iv)

| | |
|---|---|
| 1 | 2 |
| 2 | 3 |
| 3 | 4 |

Ques 2

- (a) What is 'this' pointer? Give example to illustrate the use of it in C++. [2]
 (b) Observe the following C++ code and answer the questions (i) and (ii). [2]

```

class Readbook
{
int Bcode;
char Bname[25];
float Price;
public:
Readbook() //Function1
{
cout<<"Bought"<<endl;
Bcode=101;
strcpy(Bname,"Computer");
Price=350;
}
Readbook(int C, char N[],float P) //Function2
{
Bcode=C;
strcpy(Bname,N);
Price=P;
}
void Rate(float P) //Function3
{
Price+=P;
}
void Output() //Function4
{
cout<<Bcode<<": "<<Bname<<": "<<Price<<endl;
}
~Readbook()
{
cout<<"Book Finished"<<endl;
}
};

void main() //Line1
{ //Line2
Readbook R1,R2(112,"Information PR",425); //Line3
for(int i=0;i<=3;i++) //Line4
{ //Line5
R1.Rate(5.0); //Line6
R2.Output(); //Line7
R2.Rate(225); //Line8
R1.Output(); //Line9
} //Line10
} //Line11
  
```

- (i) How many times the message "Book Finished" will be displayed after executing the above C++ code? Out of Line1 to Line11, which line is responsible to display the message "Book Finished"?

(ii) Which specific concept of object oriented programming out of the following is illustrated by Function 1 and Function 2 combined together?

- I. Polymorphism
- II. Inheritance
- III. Data Hiding
- IV. None of the Above

(c) Define a class SalesCounter with following specifications:

[4]

Data members:

Net_amt, Amount – Real values

ClothType - string(30), Pay_mode string (30)

Member functions

- Constructor to initialize the Amount as 0, ClothType as “Cotton”, Pay_mode as “Cash”, Net_amt as 0
- Calc_net () – to calculate discount and net_amt . The Company offers discount scheme on each purchase to the customer . The scheme is as follows
 - For Cotton
 - Purchase above 5000 and avail discount of 10%
 - Purchase above 7500 and avail discount of 15%
 - For Silk
 - Purchase above 5000 and avail discount of 5%
 - Purchase above 7500 and avail discount of 10%
 - For Synthetic
 - Purchase above 5000 and avail discount of 15%
 - Purchase above 7500 and avail discount of 25%

Now if the customer is paying by Cash an additional 2% discount will be given to them. If by Cheque no discount will be given, if payment mode is credit card 2.5% tax has to be paid by the customer on the total purchase.
- Purchase () – The Salesman will enter the detail of the purchasing made by the customer and will also enter the payment mode(CASH/CHEQUE/CREDIT CARD) , and will invoke the Calc_net() to calculate the net amount
- Show() – The function will generate the bill to the customer along with the purchase details and the amount to be paid

(d) Consider the following declaration and answer the questions (i) and (iv)

[4]

```
class Mydata
{protected:
int Data;
public:
void getMydata(int);
void MainpData(int);
void ShowData(int);
};
class Mydata1
{
protected:
int Data1;
public:
```

```

void getMydata1(int);
void ShowData1(int);
};
class Person: public Mydata, Mydata1
{
public:
void ShowData(void);
};

```

(i) Which type of inheritance is depicted in the above class definition?

- I. Single Level Inheritance
- II. Multi Level Inheritance
- III. Multiple Inheritance

(ii) List the data and functions inherited by the class Person.

(iii) What will be the size of an object (in byte) of class mydata1?

(iv) Name the data members that can be accessed from function show data1(int)

Ques 3

(a) Write the definition of a function CHANGE (int P [], int N[], int size) in C++, to copy the elements of array P into array N in such a way that all the negative elements of P appear in the beginning of N, followed by all the positive elements, followed by all the zeros maintain their respective orders in array P [2]

e.g If the contents of array P are:

8, -24, 5, 0, -11, -7, 6, 0

The contents of array N should be:

-24, -11, -7, 8, 5, 6, 0, 0

(b) An array Arr[50][35] is stored in the memory along the column with each of its elements occupying 8 bytes. Find out the base address and the address of an element Arr[2][5], if the location Arr[5][10] is stored as the address 4020. Also write the total number of byte(s) required to store Arr. [3]

(c) Write a function in C++ to Delete an element from a dynamically allocated Queue where each node contains a real number as data.

Note: Show the content before deletion and confirm from the user. [4]

Assume the following definition of MYNODE for the same.

```

struct MYNODE
{
float NUM;
MYNODE = *Link;
};

```

(d) Write a user defined function Uhalf() which takes a two dimensional array A, with size N rows and N columns as argument and print the upper half of the array. [3]

Example:-

| | | |
|-------------------|--------------------|-----------|
| 2 3 1 5 0 | | 2 3 1 5 0 |
| 7 1 5 3 1 | | 1 5 3 1 |
| If A is 2 5 7 8 1 | the output will be | 7 8 1 |
| 0 1 5 9 1 | | 9 1 |
| 2 6 8 7 0 | | 0 |

e) Evaluate the following postfix notation of expression: [2]

20, 300, +, 50, 40, -, *

Ques 4

(a) Assuming that a text file named TEXT1.TXT already contains some text written into it, write a function named vowelwords(), that reads the file TEXT1.TXT and create a new file named TEXT2.TXT, which shall contain only those words from the file TEXT1.TXT which ends with a vowel (i.e. with a, e, i, o, u). [2]

For eg. if the file TEXT1.TXT contains
Carry Umbrella and overcoat when it rains,
Then the file TEXT2.TXT shall contain
Umbrella

(b) Write a definition for function CountPics() in C++ to read each object of a binary file Photos.dat, find and display the total number of photos of type PORTRAIT. Also write the coding in C++ to add the same in new file PORTRAIT.DAT. Assume that the file Photos.dat is created with the help of objects of class Photos, which is defined below: [3]

```
class PHOTOS
{
    int PCODE;
    char PTYPE[20];

public:
    void ENTER()
    {
        cin >> PCODE;
        gets(PTYPE);
    }
    void SHOWCASE()
    {
        cout << PCODE << ":" << PTYPE << endl;
    }
    char *GETPTYPE()
    {return PTYPE;};
};
```

(c) Observe the following code segment [1]

```
class Person
{
    char name[20];
    int age;
    float salary;
public:
    void Enter()
    {
        cout << "Enter name";
        gets(name);
        cout << "Enter age and salary";
        cin >> age >> salary;
    }
    void Show()
```

```

{
cout<<name<<"\t"<<age<<"\t"<<salary";
};
void main()
{
fstream f;
f.open("Personrec.dat",ios::out);
Person p1;
f.write((char*)&p1,sizeof(p1));
f.write((char*)&p1,sizeof(p1));
f.close();
}

```

Assume that the following records are present in the file:

| | | |
|---------|----|-------|
| Nitin | 34 | 30000 |
| Ravi | 30 | 10000 |
| Shivani | 26 | 25000 |

Suppose the data entered by the user is “Savita”, 28, 35000. What will be the content of the file “Personrec.Dat” after the above code is being executed? Justify your answer.

Section –B

Ques 5

(a) What do you mean by Primary Key? Observe the following table carefully and write the name(s) of the most appropriate column(s), which can be considered as Primary key. Also explain the meaning of domain. [2]

| Name | EmpNo | DeptNo | Job | Sal | Comm |
|--------------|-------|--------|-----------|-------|------|
| G.Hussain | 2098 | 10 | President | 70000 | |
| Pallav | 3099 | 30 | Manager | 9000 | 1400 |
| Y.D.Sharma | 8001 | 20 | Clerk | 8500 | |
| Bhawna | 7901 | 10 | President | 4520 | 300 |
| A. Das Gupta | 5400 | 20 | Analyst | 6580 | |
| P.Arora | 3400 | 10 | Clerk | 1200 | |
| Col. Singhvi | 2100 | 30 | Manager | 12000 | 500 |
| Amit | 3100 | 30 | Analyst | 3250 | |
| A Desouza | 2211 | 10 | Clerk | 6900 | |

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

Table: DOCTOR

| Id | Name | Dept | Sex | Experience |
|-----|--------|------------|-----|------------|
| 101 | Jhon | ENT | M | 12 |
| 104 | Smith | Orthopedic | M | 5 |
| 107 | George | Cardiology | M | 10 |
| 114 | Lara | Skin | F | 3 |

| | | | | |
|-----|----------|------------|---|----|
| 109 | K George | Medicine | F | 9 |
| 105 | Johnson | Orthopedic | M | 10 |
| 117 | Lucy | ENT | F | 3 |
| 111 | Bill | Medicine | F | 12 |
| 130 | Morphy | Orthopedic | M | 15 |

Table: SALARY

| Id | Basic | Allowance | Consultation |
|-----|-------|-----------|--------------|
| 101 | 12000 | 1000 | 300 |
| 104 | 23000 | 2300 | 500 |
| 107 | 32000 | 4000 | 500 |
| 114 | 12000 | 5200 | 100 |
| 109 | 42000 | 1700 | 200 |
| 105 | 18900 | 1690 | 200 |
| 130 | 21700 | 2600 | 300 |

- (i) Display name of all doctors who are in "Medicine" having more than 10 yrs experience from the table DOCTOR.
- (ii) Display the average salary of all doctors working in "ENT" department using the tables DOCTOR and Salary. (Salary= Basic + Allowance)
- (iii) Display the minimum Allowance of female doctors.
- (iv) Display the highest consultation among all male doctors.
- (v) SELECT Count (*) FROM DOCTOR WHERE Experience =12:
- (vi) SELECT Name Dept. Basic from Doctor. Salary Where Dept. 'ENT' and Doctor. ID=SALARY. ID:
- (vii) SELECT MAX (Basic) MIN(Basic) From SALARY:
- (viii) SELECT Id. Name Experience. Consultation WHERE DOCTOR. Id= SALARY. Id AND Name LIKE 'L%'

Ques 6

- (a) $A'+B'C=A'B'C'+A'BC'+A'BC+A'B'C+A.B'C$ [2]
- (b) Draw logic circuit diagram for the following expression: [2]
 $(U+V')(U+W)(V+W')$
- (c) Write the POS form of a Boolean function F, Which is represented in a truth table as follow: [1]

| U | V | W | F |
|---|---|---|---|
| 0 | 0 | 0 | 1 |
| 0 | 0 | 1 | 0 |
| 0 | 1 | 0 | 1 |
| 0 | 1 | 1 | 0 |
| 1 | 0 | 0 | 1 |
| 1 | 0 | 1 | 0 |
| 1 | 1 | 0 | 1 |
| 1 | 1 | 1 | 0 |

- (d) Obtain simplified form for the following Boolean expression using K-map. [3]
 $F(X,Y,Z,W) = \sum(1,2,3,4,5,7,9,11,12,13,15)$

Ques 7

- (a) Give one example of PAN and LAN type? [1]

- (b) Write two advantages of 4G over 3G Mobile Telecommunication Technologies in terms of speed and services. [1]
- (c) Differentiate between wireless and mobile computing. [2]
- (d) Which protocol helps us to browse through Web pages using internet browsers? Also name one Internet Browser. [1]
- (e) The following is a 32 bit binary number usually represented as 4 decimal values, each representing 8 bits, in the range 0 to 255 (known as octets) separated by decimal points. [1]

140.180.220.200

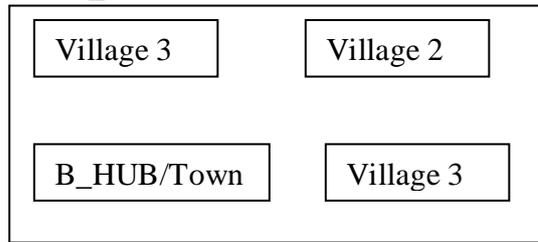
What is it? What is its importance?

- (f) Uplifting skills Hub India is knowledge and skill Community which has an aim to uplift the standard of knowledge and skills 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 location and other given parameters. [4]

A_City



B_HUB



Shortest distance between various locations

| | |
|-----------------------------|-------|
| Village 1 to B_Town | 2km |
| Village 2 to B_Town | 1.0km |
| Village 3 to B_Town | 1.5km |
| Village 1 to Village 2 | 3.5km |
| Village 1 to Village 3 | 4.5km |
| Village 2 to B_Town | 2.5km |
| A_CITY Head Office to B_HUB | 25km |

Number of Computers

| | |
|--------------------|-----|
| B_HUB | 120 |
| Village 1 | 15 |
| Village 2 | 10 |
| Village 3 | 15 |
| A_CITY Head Office | 6 |

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