**BHARATIYA VIDYA BHAVAN'S V.M.PUBLIC SCHOOL, VADODARA**
**SAMPLE PAPER**

**Class : XII** **Max Marks : 70**
**Subject : Computer Science** **Time Allotted : 3 hrs**

**General Instructions** :
**Programming Language** : **C++.**
**All questions are compulsory**
**Q. 1.**

a. Name the header file to which the following belong: **(1)**
(i) gets( )
(ii) open( )

b. Illustrate the use of local and global variables in C++. **(2)**

c. Rewrite the following program after removing the syntactical error(s), if any Underline each correction, **(2)**

```
#include <iostream.h>
void main( )
{    struct TV
     {    char Manu_name[20];
          char Tv_Type;
          int Price = 17000;
}    New Tv;
     gets(Manu_name);
     gets(Tv_Type);
}
```

d. Find the output of the following program: **(3)**

```
#include<iostream.h>
#include<string.h>
class country
{       char *country name;
        int length;
        public:.
        country ( ) {length =0; country_name=new char [length+1];}
        country (char *s)
        {       length = strlen(s); country_name=new char [length +1];
                strcpy (country_name, s);
        }
        void display () { cout<<country_name<<endl;}
        void Replace (country & a, country & b)
        {       length a.length + b.length;
              delete country_name;
              country_name=new char [length + 1];
              strcpy (country_ name, a.country_name);
              strcat (country_name, b.country name);
              }
};
```

```
void main ( )
{       char * temp = “India”;
        country country1 (temp), country2 (“Nepal”), country3 (“China”), S1,S2;
        S1.Replace (country1, country2);
        S2.Replace (S1,country3);
        S1.display( );
        S2.display ( );
}
```

e. Find the output of the following program: **(3)**

```
#include <iostream.h>
void main( )
{       int *Pointer Array [10];
        int marks [ = {75, 68, 90, 34, 0, 10, 90, 65};
        for (int I = 0; marks [ I]!=0; I++)
        {       PointerArray [I]=&marks[I];
                * (PointerArray [I] ) += 5;
        }
        int index = 0;
        while(index < I )
        {       int p=*(PointerArray[index] );
                if(p >=60) cout<<p<<’,’;
                index ++;
        }
}
```

**f.** Observe the following program SCORE.CPP carefully, if the value of Num entered by the user is 5, choose the correct possible output(s) from the options from (i) to (iv), and justify your option. **(2)**

```
//program : SCORE.CPP
#include<stdlib.h>
#include<iostream.h>
void main()
{ randomize ();
intNum, Rndnum;
cin>>Num;
Rndnum = random (Num) + 5;
  for (int N = 1; N<=Rndnum; N++) cout<<N<<“ “;          }
```

Output Options: (i) 1 2 3 4 (ii) 1 2 (iii) 1 2 3 4 5 6 7 8 9 (iv) 1 2 3

**Q 2.**

a. What is the difference between Multilevel and Multiple Inheritance in context to object oriented programming? **(2)**

b. Given a class as follows: (2)

```
class Match
{   int Time;
    public:
    Match (int y) { Time = y;}      //Constructor 1
```

```
    Match (Match& t);          //Constructor 2
};
```

i. Create an object, such that it invokes Constructor 1.

ii. Write complete definition for Constructor 2.

c. Define a class named MOVIE in C++ with the following description: **(4)**

Private members

| | |
|---|---|
| HALL_NO | integer |
| MOVIE_NAME | Array of characters (String) |
| WEEK | integer (Total number of weeks the same movie is shown) |
| WEEK_COLLECTION | Float |
| TOTAL_COLLECTION | Float |

Public Members

- Function Read_Data( ) to read an object of ADMISSION type
- Function Display( ) to display the details of an object
- Function Update( ) to update the total collection and Weekly collection once the week changes. Total collection will be incremented by Weekly collection and Weekly collection is made Zero.

Answer the questions (i) to (iii) based on the following code:

```
class toys
{
    char Code;
    char Manufacturer [10];
    public:
    toys( );
    void Read_toy_details ( );
    void Disp_toy_details( );
};
class electronic : public toys
{
    intno_of_types;
    float cost_of_toy;
    public:
    void Read_elect_details ( );
    void Disp_elect_details ( );
};
    class infants : private electronic
{
    intno_of_buyers;
    char delivery date[10];
    public:
    void Read_infant_details ();
    void Disp_jnfant_details();
```

```
};
void main ( )
{       infants MyToy;      }
```

i)Mention the member names which are accessible by MyToy declared in main () function. **(1)**

ii)What is the size of MyToy in bytes? **(1)**

iii) Mention the names of functions accessible from the member function

Read_infant_details () of class printer. **(2)**

**Q. 3.**

a. Write a function in C++ which accepts an integer array and its size as arguments/ parameters and then assigns the elements into a two dimensional array of integers in the following format: **(4)**

If the array is 1, 2, 3, 4, 5, 6
The resultant 2 D array is given below

| | | | | | |
|---|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 0 | 1 |
| 0 | 0 | 0 | 0 | 2 | 1 |
| 0 | 0 | 0 | 3 | 2 | 1 |
| 0 | 0 | 4 | 3 | 2 | 1 |
| 0 | 5 | 4 | 3 | 2 | 1 |
| 6 | 5 | 4 | 3 | 2 | 1 |

If the array is 1, 2, 3
The resultant 2 D array is given below

| | | |
|---|---|---|
| 0 | 0 | 1 |
| 0 | 2 | 1 |
| 3 | 2 | 1 |

b. An array MAT [15] [7] is stored in the memory along the column with each element occupying 2 bytes of memory. Find out the base address and the address of element MAT [2] [5], if the location of MAT [5] [4] is stored at the address 100. **(4)**

c. Write a function in C++ to perform Delete operation in dynamically allocated Queue containing names of students. **(4)**

d. Write a function bubble_sort to sort the passed array of 10 integers in descending order using bubble sort. **(2)**

e. Evaluate the following postfix expression using a stack and show the contents of the stack after execution of each operation.

5,10,*,20,2,/,+ **(2)**

**Q. 4.**

a. Write a function to count the number of VOWELS present in a text file named “PARA.TXT”. **(2)**

b. Following is the structure of each record in a data file named "VEHICLE.DAT".

```
struct VEHICLE
{     char Vehicle_Code [10];
      char Vehicle_Name[10];
      float cost;
};
```

Write a function in C++ to update the tile with a new value of cost for a particular Vehicle. The value of Vehicle_Code and cost are read during the execution of the program. **(3)**

**Q. 5.**

a. What is a Candidate Key? **(2)**

b. Study the following tables STAFF and SALARY and write SQL commands for the questions (i) to (iv) and give outputs for SQL queries (v) to (vi). **(6)**

**TABLE: STAFF**

| ID | NAME | DEPT | SEX | EXPERIENCE |
|---|---|---|---|---|
| 101 | Siddharth | SALES | M | 12 |
| 104 | Raghav | FINANCE | M | 5 |
| 107 | Naman | RESEARCH | M | 10 |
| 114 | Nupur | SALES | F | 3 |
| 109 | Janvi | FINANCE | F | 9 |
| 105 | Rama | RESEARCH | M | 10 |
| 117 | James | SALES | F | 3 |
| 111 | Binoy | FINANCE | F | 12 |
| 130 | Samuel | SALES | M | 15 |

c.

**TABLE SALARY**

| ID | BASIC | ALLOWANCE | COMMISSION% |
|---|---|---|---|
| 101 | 12000 | 1000 | 3 |

| | | | |
|---|---|---|---|
| 104 | 23000 | 2300 | 5 |
| 107 | 32000 | 4000 | 5 |
| 114 | 12000 | 5200 | 10 |
| 109 | 42000 | 1700 | 20 |
| 105 | 18900 | 1690 | 3 |
| 130 | 21700 | 2600 | 30 |

i. Display NAME of all staff who are in “SALES” having more than 10 years experience from the table STAFF.

ii. Display the average salary of all staff working in “FINANCE” department using the tables STAFF and SALARY. SALARY BASIC + ALLOWANCE.

iii. Display the minimum ALLOWANCE of female staff.

iv. Display the highest commission% among all male staff.

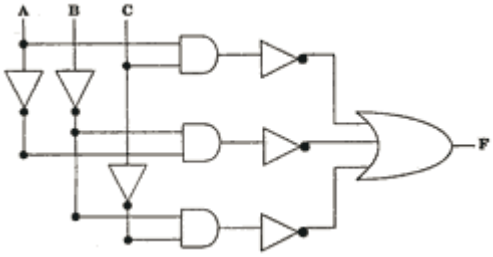
v. SELECT count (*) from STAFF where SEX = “F”.

vi. SELECT NAME, DEPT, BASIC from STAFF, SALARY where DEPT = “SALES” and STAFEID = SALARY.ID.

**Q. 6.**

a. State and verify De Morgan’s theorem. **(2)**

b. Write the equivalent expression for the following logical circuit: **(2)**




c. Express P’ + QR’ in canonical SOP form. **(2)**

d. Reduce the following Boolean expression using K-Map: **(3)**
F(P,Q,R,S)=∑(l,3,5,8,11,12,15

**Q. 7.**

a. Explain function of Modem and Switch. **(1)**

b. Expand the following terms: **(1)**

i. FTP ii. XML

c. Write one advantage of BUS topology as compared to STAR topology. **(1)**

d. ABC SWITCHEARS LTD in srinagar is setting up the network between its different departments located in different wings. There are 4 wings named as Manufacturing (M), Research (R), Administration (A) and Personnel (P). Distances between various wings are given below:

| | |
|---|---|
| Wing A to Wing M | 100 m |
| Wing A to Wing R | 200 m |
| Wing A to Wing P | 400 m |
| Wing M to Wing R | 300 m |
| Wing M to Wing P | 100m |
| Wing R to Wing P | 450 m |

e. **Number of Computers:**

| | |
|---|---|
| Wing M | 15 |
| Wing R | 100 |
| Wing A | 50 |
| Wing P | 150 |

i. Suggest a suitable Topology for networking the computers of all wings. **(1)**

ii. Name the wing where the Server is to be installed. Justify your answer. **(1)**

iii. Suggest the placement of Hub/Switch in the network. **(1)**

iv. Mention an economic technology to provide Internet accessibility to all wings. **(1)**

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**General Instructions** :
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Q1. (a)What is the difference between Type Casting and Automatic Type conversion? Also, give a suitable C++ code to illustrate both. (2)

(b) Write the names of the header files, which is/are essentially required to run/execute the following c++ code: (1)

```
void main ( )
{ char CH,Text[ ] ="+ve Attitude";
for (int I=0 ; Text[I] ! ='\0' ;I++)
if (Text[I]== ' ') cout<<end1;
else
{ CH=toupper (Text [I]) ;  cout<<CH; } }
```

(c) Rewrite the following program after removing the syntactical errors (if any). Underline each correction. (2)

```
include<iostream.h>
typedef char [80] String;
void main ( )
{ String S= "Peace";
 int L=strlen(S) ;
 cout<<S<< 'has'<<L<< 'characters'<<end1;  }
```

(d) Assuming all required files are included find the output of the following program codes: (3)

```
 (i) void SwitchOver(int A [ ], int N, int Split)
  { for (int K=0 ; K<N; K++)
   if (K<Split)   A[K]+ =K;
   else
   A [K]*=K;  }
   void Display (int A [ ], int N)
  { for (int K=0 ; K<N ; K++)
   (K%2==0)? cout<<A[K]<<"%":cout<<A[K]<<end1; }
  void main ( )
 { int H[ ]= {30,40,50,20,10,5};
  SwitchOver (H, 6, 3);
  Display (H, 6);  }
```

(ii) (2)

```
  void Encrypt(char T[ ])
  { for (int i=0;T[i]!='\0';i+=2)
   if (T[i]=='l' || T[i]=='O') T[i]='#';
   else if (islower(T[i])) T[i]=toupper(T[i]);
   else T[i]='@';  }
   void main()
```

```
  {  char Text[ ]="hEllO WOrlD";//The two words in the string Text are separated by single space
     Encrypt(Text);
  cout<<Text<<endl;   }
```

(e) Go through the C++ code shown below, and find out the possible output or outputs from the suggested Output Options (i) to (iv). Also, write the minimum and maximum values, which can be assigned to the variable MyNum. (3)

```
#include<iostream.h>
#include <stdlib.h>
void main ( )
{
randomize ( ) ;
int MyNum, Max=5;
MyNum = 20 + random (Max) ;
for (int N=MyNum; N<=25;N++)
cout<N<"*";
}
```

(i) 20*21*22*23*24*25
(ii) 22*23*24*25*
(iii) 23*24*
(iv) 21*22*23*24*25

2. (a) Differentiate between Constructor and Destructor function with respect to Object Oriented Programming. (2)

(b) Write the output of the following C++ code. Also, write the .name of feature of Object Oriented Programming used in the following program jointly illustrated by the function [I] to [IV] (2)

```
#include<iostream.h>
void Line ( ) //Function [I]
{for (int L=1;L<=80;L++) cout<<"-";
cout<<endl; }
void Line (int N) //Function[II]
{for (int L=1 ;L<=N;L++) Cout<<"*";
cout<<endl; }
void Line (char C, int N) //Function [III]
{for (int L=1 ; L<=N;L++) cout<<C;
cout<<endl; }
void Line (int M, int N) //Function [IV]
{ for (int L=1;L<=N;L++) cout<<M*L;
 cout<<endl;}
void main ( )
{ int A=9, B=4, C=3;
 char K= '#' ;
 Line (K,B);
 Line (A,C); }
```

(c) Define a class Applicant in C++ with following description: (4)

Private Members

_ A data member ANo (Admission Number) of type long

_ A data member Name of type string
_ A data member Agg (Aggregate Marks) of type float
_ A data member Grade of type char
_ A member function GradeMe() to find the Grade as per the Aggregate Marks obtained by a student. Equivalent Aggregate Marks range and the respective Grades are shown as follows:

| Aggregate Marks | Grade |
|---|---|
| >=80 | A |
| less than 80 and >=65 | B |
| less than 65 and >=50 | C |
| less than 50 | D |

Public Members
_ A function ENTER() to allow user to enter values for ANo, Name, Agg & call function GradeMe() to find the Grade.
_ A function_RESULT( ) to allow user to view the content of all the data members.
(d) Answer the questions (i) to (iv) based on the following: (4)

```
class Student
{ int Rollno:
char SName[20];
float Marksl;
protected:
void Result ( ) ;
public:
Student ( ) ;
void Enroll ( ) ;void Display ( ) ; } ;
class Teacher
{ long TCode;
 char TName [20];
 protected:
 float Salary;
 public:
 Teacher ( );
 void Enter ( ) ;   void Show ( ) ; } ;
class Course: public Student, private Teacher
{ long CCode [10]; char CourseName [50];
 char StartDate [8] , EndDate [8];
 public:
 Course ( ) ;
 void Commence ( );
 void CDetail ( ) ; } ;
```

(i) Write the names of member functions, which are accessible from objects of class Course
(ii) Write the names of all the data members, which is/are accessible from member function Commence of class
Course
(iii) Write the names of all the-members, which are accessible from objects of class Teacher.
(iv) Which type of Inheritance is illustrated in the above C++ code?

3. (a) Write a Get2From1() function in C++ to transfer the content from one array ALL[ ] to two different arrays Odd[ ] and Even[ ]. The Odd[ ] array should contain the values from odd

positions (1,3,5,...) of ALL[ ] and Even [ ] array should contain the values from even positions (0, 2, 4,…..) of ALL [ ]. (2)

Example
If the ALL[ ] array contains
12, 34, 56, 67, 89, 90
The Odd[ ] array should contain
34, 67, 90
And the Even [ ] array should contain
12,56,89

(b) An array G[50][20] is stored in the memory along the row with each of its elements occupying 8 bytes. Find out the location of G[10][15], if G[0][0] is stored at 4200. (3)

(c)Write a function SWAP2BEST (int ARR[], int Size) in C++ to modify the content of the array in such a way that the elements, which are multiples of 10 swap with the value present in the very next position in the array.
For example : (2)
If the content of array ARR is
80, 66, 45, 20, 44, 54
The content of array ARR should become
66, 80, 45, 44, 20, 54

d)Write a function in C++ to perform Delete operation in dynamically allocated Queue containing names of students. (4)

e)Evaluate the following postfix expression using a stack and show the contents of the stack after execution of each operation. (2)

5,10,*,20,2,/,+

4. (a) Observe the program segment given below carefully and fill the blanks marked as Statement 1 and Statement 2 using seekg( ), seekp( ) tellp( ) and tellg( )functions for performing the required task. (1)

```
#include <fstream.h>
class ITEM
{
int Ino;char Iname[20]; float Price;
public:
void ModifyPrice() ;//The function is to modify
price of a particular ITEM
} ;
void item: :ModiyPrice()
{
fstream File;
File.open ("ITEM.DAT", ios::binary | ios::in | ios: :out) || ;
int CIno;
cout<<"Item No to modify price:";cin>>CIno;
while (file.read ((char*) this, sizeof (ITEM)))
{
```

```
if (CIno==Ino)
{ cout<<"Present Price:"<<Price<<end1;
 cout<<"Changed price:"; cin>>Price;
 int FilePos = _____ ; //Statement 1,
 _____; //Statement 2
 File.write((char*)this,sizeof(ITEM)) ;
 // Re-writing the record
}  }
File.close( ) ; }
```

(b) Write a function in C++ to count the no. of "He" or "She" words present in a text file "STORY. TXT". (2)

If the file "STORY. TXT" content is as follows:

He is playing in the ground. She is Playing with her dolls.

The program should display 2

(c) Write a function in C++ to search for a camera from a binary file "CAMERA.DAT" containing the objects of class" CAMERA (as defined below). The user should enter the Model No and the function should search and display the details of the camera. (4)

```
class CAMERA
{ long ModelNo;
float MegaPixel;
int Zoom;
char Details[120];
public:
void Enter ( ) {cin>>ModelNo>>MegaPixel>>Zoom;gets(Details);}
void Display ( )
{cout<<ModelNo<<MegaPixel<<Zoom<<Details<<endl;}
long GetModelNo ( ) {return ModelNo;}
};
```

5. (a) What do you understand by Selection & Projection operations in relationalalgebra? (2)

Consider the following tables ESHOP and ITEM and answer(b) and (c) parts of this question:

Table: ESHOP

| ID | Name | Address |
|---|---|---|
| E001 | Amita computronics | Karelibagh |
| E002 | Tech Services | O P Road |
| E003 | Zeon | O P Road |
| E004 | Lynx Communication | AB Complex |
| E005 | Param Computers | Naya Bazar |

Table: ITEM

| INo | IName | Price | ID |
|---|---|---|---|
| I01 | Mother Board | 10000 | E001 |
| I02 | Hard Disk | 5000 | E002 |
| I03 | Mouse | 300 | E002 |
| I04 | Mother Board | 14000 | E004 |
| I05 | LCD | 7000 | E003 |

| | | | |
|---|---|---|---|
| I06 | Hard Disk | 12000 | E005 |
| I07 | Mouse | 350 | E004 |

(b) Write SQL queries for the following: (4)

(i) To print all the details of the items with price more than 5000.

(ii)To count the number of shops in the table ESHOP.

(iii) To display the item name of the item with maximum price.

(iv) To increase the price of mouse by 50 in the table ITEM.

(c) Write the output of the following SQL queries: (2)

(i) Select IName from ITEM ,ESHOP where ITEM.ID=ESHOP.ID;

(ii) Select count(*) from ITEM;

(iii) Select IName , Price from ITEM order by Price Desc;

(iv) Select MAX(Price) from ITEM where IName =”Mother Board”;

6 (a) Verify the following using Truth Table: (2)

X+Y. Z=(X+Y).(X+Z)

(b) Draw the logic circuit for the following Boolean expression: (1)

AB’+A’C+A’B’C

(c) Write the SOP form of a Boolean function F, which is represented in a truth table as follows: (1)

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

(d) Reduce the following Boolean Expression using K-Map: (3)

F(P , Q , R , S) = Σ (0,1, 2, 4, 5, 6, 7, 8, 10)

7. (a) How Message Switching is different from Circuit Switching. (1)

(b) Differentiate between HTTP and FTP. (1)

(c) Give one advantage of using Star Topology. (1)

(d) Out of the following, identify client side script (s) and server side script (s). (1)

(i) Javascript (ii) ASP (iii) vbscript (iv) JSP

(e) Great Studies University is setting up its Academic schools at Sunder Nagarand planning to set up a network. The university has 3 academic schools andone administration center: (4)

Center to center distances between various buildings is as follows :

| | |
|---|---|
| Law School to Business School | 60m |
| Law School to Technology School | 90m |
| Law School to Admin Center | 115m |
| Business School to Technology School | 40m |
| Business School to. Admin Center | 45m |
| Technology School to Admin Center | 25m |

Number of Computers in each of the Schools/Center is follows:

| | |
|---|---|
| Law School | 25 |
| Technology School | 50 |
| Admin Center | 125 |
| Business School | 35 |

(i) Suggest the most suitable place (i.e. School/Center) to install theserver of this university with a suitable

reason.
(ii) Suggest an ideal layout for connecting these schools/ center for awired connectivity.
(iii) Which device will you suggest to be placed/installed in each of theseschools / center to efficiently
connect all the computers within theseschools / center?
(iv) The university is planning to connect its admission office in the closestbig city, which is more than 350 km from the university. Which type ofnetwork out of LAN, MAN or WAN will be formed?
Justify your answer.
**********