SAMPLE PAPER: SET-1

CLASS: XII

SUBJECT: COMPUTER SCIENCE

NOTE: In this solution " ' " is used instead of " ¯ "

1(a) **What is the difference between #define and const? Explain with suitable example.** **2**

Ans.

#define	const
#define can only define simple constants.	*const* define almost any type of C constant, including things like structure classes.
The *#define* constant used in the program are not visible to compiler because they get replaced with their value by the pre-processor prior to compilation.	But the constant defined with *const* are visible to compiler and the compiler checks the syntax of *const* statement as per the language rules and follows normal c++ scope rules.
Example: #define MAX 10 /* Define a value using the preprocessor */	Example: Const int MAX 10 /* Define a C constant integer */

1(b) **Name the hader files that shall be needed for following code:** **1**

```
void main()
{
      char String[]="Peace";
      cout<<setw(20)<<string;
}
```

Ans.
1. iostream.h for cout
2. iomanip.h for setw()

1(c) **Rewrite the following program after removing the syntactical error(s), if any. Uderline each coreection.** **2**

```
#include<iostream.h>
void main()
{
       struct movie
       {
             char movie_name[20];
             char movie_type;
             int ticket_cost=100;
       }MOVIE;
       gets(movie_name);
       gets(movie_type);
}
```

Ans.

```
#include<iostream.h>
#include<stdio.h>
void main()
{
       struct movie
       {
             char movie_name[20];
             char movie_type;
             int ticket_cost;
       }MOVIE;
       MOVIE.ticket_cost=100;
       gets(MOVIE.movie_name);
       cin>>MOVIE.movie_type;
}
```

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

```
#include<iostream.h>
#include<string.h>
class student
{
      char *name;
      int I;
      public:
            student() { I=0; name=new char[I+1]; }
            student(char *s)
            {
                  I=strlen(s); name=new char[I+1];
                  strcpy(name,s);
            }
            void display() { cout<<name<<endl; }
            void manipulate(student &a, student &b)
            {
                  I=a.I + b.I;
                  delete name;
                  name=new char[I +1];
                  strcpy(name,a.name);
                  strcpy(name,b.name);
            }
};
void main()
{
      char *temp="Jack";
      student name1(temp),name2("Jill"),name3("John),S1,S2;
      S1.manipulate(name1,name2);
      S1.manipulate(S1,name3);
      S1.display();
      S2.display();
}
```

Ans.

Output:

JackJill

JackJillJohn

1(e) **Find the output of the following program:** **2**

```
      #include<iostream.h>
      void main()
      {
            long Number=7583241;
            int First=0,Second=0;
            do
            {
                  int R=Number%10;
                  if(R%2==0)
                        First+=R;
                  else
                        Second+=R;
                  Number/=10;
            }while(Number>0);
            cout<<First-Second;
      }
```

Ans.

Output:

-2

1(f) **Write definition for a function SumSequence() in c++ with two arguments/parameters – double x and int n.** **3**

	The function should return a value of type double and it should perform sum of the following series: **$1/x - 3!/x^2 + 5!/x^3 - 7!/x^4 + 9!/x^5$ - … up to n terms.** **(Note.** *The symbol ! represent Factorial of a number i.e., 5! = 5 x 4 x 3 x 2 x 1* **)**	

Ans.	`#include<iostream.h>`
	`#include<math.h>`
	`#include<conio.h>`
	`double SumSequence(double x, int n)`
	`{`
	`  int fact=1,sign=-1,factnum=3;`
	`  float sum=0,term;`
	`  sum+=1/x;  //first term added`
	`  for(int i=2;i<=n;i++)`
	`  {`
	`  fact=1;`
	`  for(int j=1;j<=factnum;j++)`
	`  fact*=j;`
	`  term=fact/pow(x,i)*sign;`
	`  sum+=term;`
	`  sign*=-1;`
	`  factnum+=2;  //number for which next factorial is to be calculated`
	`  }`
	`  return sum;`
	
	`}`
	`void main()`
	`{`
	`  clrscr();`
	`  int n;`
	`  float x,sum=0;`
	`  cout<<"How many terms: ";`
	`  cin>>n;`
	`  cout<<"Enter value of x: ";`
	`  cin>>x;`
	`  SumSequence(x,n);`
	`  cout<<"Series sum is:"<<sum<<endl;`
	`  getch();`
	`}`	

2(a)	**What is "this" pointer? Give an example to illustrate the use of it in C++.**	**2**

Ans.	The this pointer represents an object that invokes a member function. It stores the address of the object that is invoking a member function and it (this pointer) is an implicit argument to the member function being invoked. The this pointer is useful in returning the object (address) of which the function is a member.
	Example:
	`class Abc`
	`{`
	`  int x;`
	`  public:`
	`  int ret_x()`
	`};`
	`int Abc::ret_x()`
	`{`
	`  return this->x;`
	`}`	

2(b)	**Answer the question (i) and (ii) after going through the following program:** **`#include<iostream.h>`** **`#include<string.h>`**	**2**

	class Retail
	{
	char Category[20];
	char Item[20];
	int Qty;
	float Price;
	Retail() //Function 1
	{
	strcpy(Category,"Cereal");
	strcpy(Item,"Rice");
	Qty=100;
	Price=25;
	}
	public:
	void Show() //Function 2
	{
	cout<<Category<<"="<<Item<<":"<<Qty<<"@"<<Price<<endl;
	}
	}
	void main()
	{
	Retail R //Statement 1
	R.Show(); //Statement 2
	}
	(i) Will statement 1 initialize all the data members for object R with the values given in the Function 1? (Yes OR No). Justify your answer suggesting the correction(s) to be made in the above code.
	(ii) What shall be the possible output when the program gets executed? (Assuming, if required – the suggested correction(s) are made in the program)	

Ans.	(i) No, because the default constructor Retail() has been declared inside private section, thus, it cannot initialize the objects declared outside the class. Correction needed are: The constructor Retail() should be declared inside public section. (ii) Category-Rice: 100@25	
2(c)	**Declare a class *myfolder* with the following specifications:** **Private members of the class** **Filenames - an array of strings of size[10][25]** **(*to represent all the names of files inside myfolder*)** **Availspace - long** **(*to represent total number of bytes available in myfolder*)** **Usedspace - long** **(*to represent total number of bytes used in myfolder*)** **Public members of the class** **Newfileentry() - A function to accept values of Filenames, Availspace and Usedspace from user** **Retavailspace() - A function that returns the value of total Kilobytes available (1 Kilobyte = 1024 bytes)** **Showfiles() - A function that displays the names of all the files in myfolder**	**4**
Ans.	class myfolder { char Filenames[10][25]; long availspace; long Usedspace; public:	

```
      void Newfileentry();
      void Retavailspace();
      void Showfiles();
      };
void myfolder::Newfileentry()
{
      cout<<"enter names of files";
      for(int i=0;i<10;i++)
      {
            cout<<"Document"<<i+1<<":";
            gets(Filenames[i]);
      }
      cout<<"Enter Availspace:";
      cin>>Availspace;
      cout<<"Enter space used:";
      cin>>Usedspace;
}
long myfolder::Retavailspace()
{
      return Availspace * 1024;
}
void myfolder::Showfiles()
{
      for(int i=0;i<10;i++)
            cout<<Filenames[i]<<endl;
}
```

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

```
class furniture
{
      char Type;
      char Mode[10];
     public:
      furniture();
      void Read_fur_details();
      void Disp_fur_details();
};
class sofa:public furniture
{
      int no_of_seats;
      float cost_of_sofa;
     public:
      void Read_sofa_details();
      void Disp_sofa_details();
};
class office:private sofa
{
      int no_of_pieces;
      char delivery_date[10];
     public:
      void Read_office_details();
      void Disp_office_details();
};
void main()
{    office MyFurnitures;  }
```

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

	(ii) What is the size of MyFurniture in bytes? **(iii) Mention the names of functions accessible from the member function Read_office_details() of class office.**	**1** **2**
Ans.	(i) Data Members - None Member Functions - Read_office_details(),Disp_office_details() (ii) 30 Bytes (iii) Member Functions - Read_fur_details(),Disp_fur_details() Read_sofa_details(),Disp_sofa_details(); Read_office_details(), Disp_office_details();	
3(a)	**Write a function in C++ which accepts an integer array and its size as arguments/parameters and exchange the values of first half side elements with the second half side elements of the array.** **Example:** **If an array of eight elements has initial content as** **2, 4, 1, 6, 7, 9, 23, 10** **The function should rearrange the array as** **7, 9, 23, 10, 2, 4, 1, 6**	**3**

Ans.	`void Swap(int A[], int size)`
	`{`
	`  int i, j, tmp, mid=size/2;`
	`  if(size%2 == 0)`
	`  j=mid;`
	`  else`
	`  j=mid+1;`
	`  for(i=0;i<mid;i++,j++)`
	`  {`
	`  tmp=A[i];`
	`  A[i]=A[j];`
	`  A[j]=tmp;`
	`  }`
	`}`	

3(b)	**An array MAT[30][10] is stored in the memory column wise with each element occupying 8 bytes of memory. Find out the base address and the address of element MAT[20][5], if the location of MAT[5][7] is stored at the address 1000.**	**4**
Ans.	Base Address B No of rows m=30 Element size W=8 Lowest Row and column indices l_r, l_c=0 Address of Ith, jth element of array in column major order is: Address of MAT[I][J] = B + W(m(J - l_c) + (I - l_r)) MAT[5][7] = 1000 1000 = B + 8(30(7-0)+(5-0)) 1000 = B + 8(30(7)+(5)) 1000 = B + 8(210 + 5) 1000 = B + 8(215) 1000 = B + 1720 B = 1000 – 1720 B = -720 ⇨ Base address is -720 Now address of MAT[20][5] is computed as: MAT[20][5] = -720 + 8(30(5 – 0) + (20 – 0)) = -720 + 8(30(5) + (20)) = -720 + 8(150 + 20)	

	= -720 + 8(170) = -720 + 1360 = 640	
3(c)	**Introduction class stack** **{** **int data[10];** **int top;** **public:** **stack() { top=-1 }** **void push();** //to push an element into the stack **void pop();** //to pop an element from the stack **void Delete(int ITEM);** //to delete all element which are equal to ITEM **};** **Complete the class with all function definitions. Use another stack to transfer data temporarily.**	**4**

Ans.	`class stack`
	`{`
	`int data[10];`
	`int top;`
	`public:`
	`stack()`
	`{`
	`top=-1;`
	`}`
	`void push();`
	`void pop();`
	`void Delete(int ITEM);`
	`void display()`
	`{`
	`for(int i=top;i>=0;i--)`
	`cout<<data[i]<<"\n";`
	`}`
	`};`
	`void stack::push()`
	`{`
	`if(top==9)`
	`{`
	`cout<<"Over flow";`
	`return;`
	`}`
	`int x;`
	`cout<<"Enter the data:";`
	`cin>>x;`
	`top++;`
	`data[top]=x;`
	`}`
	`void stack::pop()`
	`{`
	`if(top==-1)`
	`{`
	`cout<<"Under flow";`
	`return;`
	`}`
	`int x;`
	`x=data[top];`
	`top--;`
	`cout<<x<<"Removed";`	

	}
	void stack::Delete()
	{
	stack t;
	if(top==-1)
	{
	cout<<"Under flow";
	return;
	}
	while(top>=0)
	{
	if(data[top]=ITEM)
	{
	t.top++;
	t.data[t.top]=data[top];
	}
	top--;
	}
	while(t.top>=0) //copy the temp data to current data
	{
	top++;
	data[top]=t.data[t.top];
	t.top--;
	}
	}	

3(d)	Write a function in C++ which accepts a 2D array of integers and its size as arguments and display the elements which lie on diagonals. [Assuming the 2D array to be a square matrix with odd dimentions i.e., 3x3, 5x5, 7x7 etc….] Example, if the array content is 5 4 3 6 7 8 1 2 9 Output through the function should be: Diagonal One: 5 7 9 Diagonal Two: 3 7 1	**2**

Ans.	const int n=5;
	void Diagonals(int A[n][n], int size)
	{
	int i,j;
	cout<<"Diagonal One:";
	for(i=0;i<n;i++)
	cout<<A[i]ij]<<" ";
	cout<<"\n Diagonal Two:"
	for(i=0;i<n;i++)
	cout<<A[i][n-(i+1)]<<" ";
	}	

3(e)	**Write an equivalent infix expression for *a, b, AND, a, c, AND, OR.***	**2**
Ans.	a AND b OR a AND c	
4(a)	**void main()** **{** **char ch='A';** **fstream fileout("data.dat",ios::out);** **fileout<<ch;** **int p=fileout.tellg();** **cout<<p;**	**1**

	} **What is the output if the file content before the execution of the program is the string "ABC" (Note that " " are not part of the file).**	
Ans.	1	
4(b)	**Write a function in C++ to count and display the number of lines starting with alphabet 'A' present in a text file "LINES.TXT".** **Example:** **If the file "LINES.TXT" contain the following lines,** **A boy is playing there.** **There is a playground.** **An aeroplane is in the sky.** **Alphabets and numbers are allowed in the password.** **The function should display the output as 3**	**2**

Ans.	`void CountAlines()`
	`{`
	`ifstream fin("STORY.TXT");`
	`char line[255];`
	`int count=0;`
	`while(!fin.eof())`
	`{`
	`fin.getline(line.255);`
	`if(line[0]=='a'||line[0]=='A')`
	`count++;`
	`}`
	`fin.close();`
	`cout<<"Total lines starting with a/A are:"<<count<<endl;`
	`}`	

4(c)	**Following is the structure of each record in a data file named "COLONY.DAT".** **`struct COLONY`** **`{`** **`char colony_Code[10];`** **`char colony_Name[10];`** **`int no_of_Pepple;`** **`};`** **Write a function in C++ to update the file with a new value of No_of_People. The value of Colony_code and No_of_People are rread during the execution of the program.**	**3**

Ans.	`void update()`
	`{`
	`COLONY c;`
	`int num;`
	`char col[10];`
	`long loc;`
	`cout<<"Enter the Colony Code:";`
	`gets(col);`
	`cout<<"Enter the No of People:";`
	`cin>>num;`
	`fstream file("COLONY.DAT",ios::in|ios::out|ios::binary);`
	`while(!file.eof())`
	`{`
	`loc=file.tellg();`
	`file.read((char*)&c,sizeof(c));`
	`if(strcmp(c.Colony_code,col)==0)`
	`{`
	`c.No_of_People=num;`
	`file.seekp(loc,ios::beg);`	

```
                file.write((char*)&c,sizeof(c));
                cout<<"\n File Updated";
                return;
            }
        }
        cout<<"\n Colony code not found";
}
```

5(a) **What do you understand by normalization? What is Second Normal form?** **2**

Ans. **Normalization:** Normalization is the process of transformation of logical data structures of the database into a computer representable form.

Second Normal Form (2NF): A relation is said to be in 2NF if and only if if it is in first normal form and every non-key attribute is functionally dependent in the primary key.

5(b) **Write SQL commands for the statements (a) to (i) and give outputs of the SQL Queries (i) to (vi) on the basis of CUSTOMER_DETAILS**

Table: CUSTOMER_DETAILS

CUST_ID	CUT_NAME	ACCT_TYPE	ACCULT_AMT	DOJ	GENDER
CNR_101	Manoj	Saving	1025000	1999-02-19	M
CNR_102	Rahul	Current	1326000	1998-01-11	M
CNR_103	John	Saving	1425000	1999-02-04	M
CNR_104	Steve	Salary Saving	1825000	1998-02-21	M
CNR_105	Manpreet	Current	1125000	1998-05-12	F
CNR_106	Catherine	Saving	1026000	1999-01-13	F
CNR_107	Ramesh	Saving	2025000	1998-04-22	M

i. **To select all the customer of Saving and Current account type.** **1**
ii. **To list the names of customer with their date of joining in descending order.** **1**
iii. **To list the customers who have joined after 1998 May 31.** **1**
iv. **To display female customers with accumulated amount greater than 1025000.** **1**
v. **To list the customer having 15 letters name.** **1**
vi. **To list the all account types.** **1**

Ans.

(i) SELECT * FROM CUSTOMER_DETAILS WHERE ACCT_TYPE IN ('SAVING', 'CURRENT');
(ii) SELECT CUT_NAME, DOJ FROM CUSTOMER_DETAILS ORDER BY DOJ DESC;
(iii) SELECT * FROM CUSTOMER_DETAILS WHERE DOJ > '1998-05-31';
(iv) SELECT * FROM CUSTOMER_DETAILS WHERE (GENDER = 'F' && ACCULT_AMT > 1025000)
(v) SELECT * FROM CUSTOMER_DETAILS WHERE CUT_NAME LIKE "_____" ;
(vi) SELECT DISTINCT ACCT_TYPE FROM CUSTOMER_DETAILS ;

6(a) **State and verify Distributive Law using truth table.** **2**

Ans. Distributive law state that (a) X(Y +Z) = XY + XZ (b) X + YZ = (X + Y)(X + Z)

(a) X(Y +Z) = XY + XZ

To prove this law, we will make a following truth table :

X	Y	Z	Y + Z	XY	XZ	X(Y + Z)	XY + XZ
0	0	0	0	0	0	0	0
0	0	1	1	0	0	0	0
0	1	0	1	0	0	0	0
0	1	1	1	0	0	0	0
1	0	0	0	0	0	0	0
1	0	1	1	0	1	1	1
1	1	0	1	1	0	1	1
1	1	1	1	1	1	1	1

From truth table it is prove that X(Y +Z) = XY + XZ

(b) X + YZ = (X + Y)(X + Z)

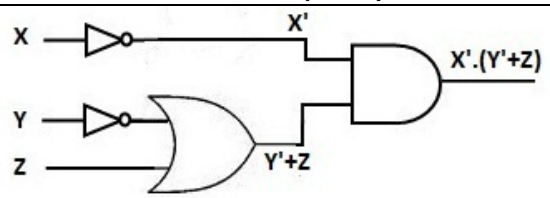
X	Y	Z	YZ	X + YZ	XZ	X + Y	X + Z	(X + Y)(X + Z)

0	0	0	0	0	0	0	0	0	
0	0	1	0	0	0	0	1	0	
0	1	0	0	0	0	1	0	0	
0	1	1	1	1	0	1	1	1	
1	0	0	0	1	0	1	1	1	
1	0	1	0	1	1	1	1	1	
1	1	0	0	1	0	1	1	1	
1	1	1	1	1	1	1	1	1	

6(b) **Draw a Logical circuit Diagram for the following Boolean Expression** **2**

X'.(Y' + Z)

Ans.



6(c) **Express P + Q'R in canonical SOP form.** **1**

Ans.

P+Q'R

= P.1.1 + Q'R.1 *(∵ P+P'= Q+Q' =R+R'= 1)*

= P.(Q+Q').(R+R')+Q'R.(P+P')

= (PQ+PQ').R + (PQ+PQ').R'+ PQ'R + P'Q'R

= PQR + PQ'R + PQR' + PQ'R' + PQ'R + P'Q'R *(∵ PQ'R + PQ'R = PQ'R)*

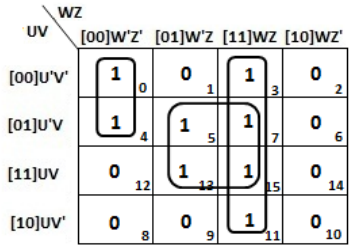
= PQR + PQ'R + PQR' + PQ'R' + P'Q'R

So the required canonical SOP form is *F = PQR + PQ'R + PQR' + PQ'R' + P'Q'R*

6(d) **Obtain a simplified form for the following Boolean Expression using Karnaugh's Map:** **3**

F(U,V,W,Z)= ∑(0,3, 4, 5, 7, 11, 13, 15)

Ans.



There are 1 Pair and 2 Quad that reduce as given below:

Pair-1($m_0 + m_4$) reduces to U'W'Z'

Quad-1 ($m_3 + m_7 + m_{11} + m_{15}$) reduces to WZ

Quad-2 ($m_5 + m_7 + m_{13} + m_{15}$) reduces to VZ

Simplified Boolean expression for given K-map is

F(U, V, W, Z) = U'W'Z' +' WZ + VZ

7(a) **What is VoIP?** **1**

Ans. VoIP is communication protocols and transmission technologies for delivery of voice communication and multimedia sessions over Internet Protocol (IP) networks, such as the internet. Also, we can say, VoIP are IP technology, internet telephony and broad-band telephony.

7(b) **Anuradha is a web developer. She has designed a login form to input the login id and password of the user. She has to write a script to check whether the login id and the corresponding password as entered by the user are correct or not. What kind of script from the following will be most suitable for doing the same?** **1**

(i) JSP (ii) Client side Script (iii) VB Script

Ans. (i) JSP is correct answer

7(c) **Ramanathan's friend Surya visited his office for giving and invitation for his wedding. During the visit, he requested Ramanathan to work on his office computer to send an urgent mail. While working on the computer, Surya was tempted by seeing some important document on his desktop and cleverly uploaded them to his Online Folder without taking consent (Surya did not even inform Ramanathan about this). What name from the following would you give to the above act committed by Surya?** **1**

(i) Trojan (ii) Cyber Crime (iii) Virus

Ans. (ii) Cyber Crime is correct answer

7(d) **What do you mean by IP Address? How is it useful in computer security?** **1**

Ans. An Internet Protocol (IP) address is a numerical identification and logical address that is assigned to devices connected in a computer network.
In a network every machine can be identified by a unique IP address associated with it and thus help in providing network security to every system connected in a network.

7(e) **UNIVERSITY OF CORRESPONDENCE in Allahabad is setting up the network between its difference wings. There are 4 wings named as Science (S), Journalism (J), ARTS (A) and Home Science(H).**

Distance between various wings are given below:

Wing A to Wing S	**100 m**
Wing A to Wing J	**200 m**
Wing A to Wing H	**400 m**
Wing S to Wing J	**300 m**
Wing S to Wing H	**100 m**
Wing J to Wing H	**450 m**

Number of Computers:

Wing A	**150**
Wing S	**10**
Wing J	**5**
Wing H	**50**

(i) Suggest a most suitable Topology for networking the computer of all wings. **1**
(ii) Name the wing where the Server to be installed. Justify our answer. **1**
(iii) Suggest the placement of Hub/Switch in the network. **1**
(iv) Mention in economic technology to provide internet accessibility to all wings. **1**

Ans.
(i) Star Topology can be used to network the computer of all wings.
(ii) The Server should be installed in Wing A, as Wing A has maximum number of computer and installing the server in this wing will help to reduce the network traffic.
(iii) Hub/Switch will be required in all Wings.
(iv) The economic way to provide internet accessibility to all wings is to use the proxy server at wing A and connect to the internet through a dial-up network.

NOTE: In this solution " ' " is used instead of " ¯ "