

**Question 1.**

- (a) Illustrate the concept of function overloading with the help of an example.  
 (b) Name the header file, to which following built-in functions belong:  
 (i) isupper() (ii) setw() (iii) exp() (iv) strcmp()  
 (c) Will the following program execute successfully? If no, state the reason (s).

```
#include<stdio.h>
void main ()
{
int s1, s2, num;
s1 = s2 = 0;
for (x = 0; x<11; x++)
{
cin << num;
if (num>0)
s1 += num;
else
s2 = /num;
}
cout << s1 << s2;
}
```

- (d) Give the output of following program segment (Assuming all required header files are included in the program).

```
char *NAME = "a ProFile";
for (int x=0;x<strlen(NAME);x++)
if (islower(NAME[x]
NAME [x] = toupper(NAME)[x];
else
if (isupper(NAME[x])
if (x%2!=0)
NAME [x]=tolower(NAME[x-1]);
else
NAME [x]--;
```

- (e) Write the output of the following program:

```
# include <iostream.h>
int func(int &x, int y = 10)
{ if (x%y == 0)
return ++x;
else
return y--;
```

```
}
void main()
{
int p=20, q=23;
q=func (p,q);
cout << p << " " << " " << q << endl;
p=func (q);
cout<< p << " " << " " << q << endl;
q=func (p);
cout << p << " " << " " << q << endl;
}
```

- (f) Write a function SEQSUM() in C++ with two arguments, double x and int n. The function should return a value of type double and it should find the sum of the

Following series :

$$1 + x / 2! + x^2 / 4! + x^3 / 6! + x^4 / 8! + x^5 / 10! + \dots + x_n / (2n)!$$

**Question 2.**

- (a) Why is a destructor function required in classes? Illustrate with the help of an example.  
 b) Define a class WORKER with the following specification :

**Private members** of class WORKER:

wno integer

wname 25 characters

hrwrk, wgrate float (hours worked and wage rate per hour)

totwage float (hrwrk \* wgrate)

calcwg () A function to find hrwrk \* wgrate with float return type.

**Public members** of class WORKER

in\_data () a function to accept values for wno, wname, hrwrk, wgrate and invoke calcwg() function to calculate totpay.

out\_data () a function to display all the data members on the screen. You should give definitions of functions.

c) Consider the following and answer the questions given below : 4

```
class School
{
int A;
protected :
int B,C;
public:
void INPUT (int);
void OUTPUT ();
};
class Dept: protected School
{
int X Y;
protected :
void IN (int, int);
public:
void OUT();
};
class Teacher : public Dept
{
int P;
void DISPLAY (void);
public :
void ENTERO;
};
```

- i. Name the base class and derived class of the class Dept.
- ii. Name the data member (s) that can be accessed from function OUT ().
- iii. Name the private member function(s) of class Teacher.
- iv. Is the member function OUT() accessible by the objects of Dept?

### Question 3.

- (a) Suppose A, B, C are arrays of integers of size M, N, and M + N respectively. The numbers in array A appear in ascending order while the numbers in array B appear in descending order. Write a user defined function in C++ to produce third array C by merging arrays A and B in ascending order. Use A, B and C as arguments in the function.
- b) An array VAL ([1..15][1..10]) is stored in the memory with each element requiring 4 bytes of storage. If the base address of array VAL is 1500, determine the location of VAL (12) [9], when the array VAL is stored (i) Row wise (ii) Column wise. 3
- c) Write a user-defined function in C++ to find and display the sum of both the diagonal elements of a two-dimensional array MATRIX [6] [6] containing integers.
- d) Evaluate the following postfix expression using a stack. Show the contents of stack after execution of each operation.

20, 8, 4,/, 2,3,+,\*,-

- e) Give necessary declarations for a queue containing float type numbers; also write a user-defined function in C++ to insert a float type number in the queue. You should use linked representation of queue.

### Question 4.

(a) Name two member functions of ofstream class.

(b) Assuming the class? DRINKS defined below, write functions in C++ to perform the following:

i. Write the objects of DRINKS to a binary file.

ii. Read the objects of DRINKS from binary file and display them on the screen when DNAME has value "INDY COLA".

```
class DRINKS
{
int DCODE;
char DNAME[13]; // Name of the drink
int DSIZE; // Size in liters
float DPRICE;
public:
void GETDRINKS()
{
cin >> DCODE >> DNAME >> DSIZE >> DPRICE;
}
void SHOWDRINKS ()
{
cout << DCODE << DNAME << DSIZE << DPRICE << endl;
}
char *GETNAME ()
{
return DNAME;
}
};
```

### Question 5.

a) What is the need for normalization ? Define first, second and third normal forms.

Write SQL commands for (b) to (e) and write the outputs for (g) on the basis of table CLUB.

Coach ID	Coach Name	AGE	SPORTS	Date of app	PAY	SEX
1	KUKE RJA	35	KARATE	27/03/1996	1000	M
2	RAVIN A	34	KARATE	20/01/1998	1200	F
3	KARAN	34	SQUASH	19/02/1998	2000	M
4	TARUN	33	BASKETBALL	01/01/1998	1500	M
5	ZUBIN	36	SWIMMING	12/01/1998	750	M
6	KETAKI	36	SWIMMING	24/02/1998	800	F
7	ANKIT	39	SQUASH	20/02/1998	2200	F
8	ZAREEN	37	KARATE	22/02/1998	1100	F
9	KUSH SH	41	SWIMMING	13/01/1998	900	M
10	SH	37	BASKETBALL	19/02/1998	1700	M

**QUESTION 6.**

a) Encapsulation is one of the major properties of OOP. How is it implemented in C++?

b) Name the header file to be included for the use of following built-in functions:

(i) frexp() ii) toupper()

c) Identify the syntax error (s), if any (giving reason for error)

```
class ABC
```

```
{  
int x = 10;  
float y;  
ABC ()  
{ y = 5;}  
~ABC(){  
};  
void main ()
```

```
{  
ABC a1,a2;  
}
```

d) Give the output of the following program (Assuming all required header files are included in the program) :

```
void main()  
{  
int array[]={2,3,4,5};  
int *arptr = array;  
int value = *arptr;  
cout << value << „\n’;  
value = *arptr++;  
cout<< value <<□\n□;  
value = *arptr;  
cout << value << „\n□’;  
value = *++arptr;  
cout << value << „\n’;  
}
```

e) Give the output of the following program

```
# include <iostream.h>  
int global = 10;  
void func(int &x, int y)  
{  
x = x - y;  
y = x * 10;  
cout << x << << y << „\n’;  
}  
void main()  
{  
int global = 7;  
func (::global, global);  
cout << global << „’ << ::global <<□\n□;  
func(global,:: global);  
cout<< global << “,’<<::global<<„\n□;  
}
```

f) Write a function name SUMFUN(), with arguments x and N, which returns the sum of the following series

$1 - x^2/2 + x^3/3 - x^4/4 + x^5/5 - x^6/6 + \dots + x^N/N$

**QUESTION 7.**

a) Illustrate the use of "self referential structures" with the help of an example.

b) Define a class BOOK with the following specifications :

Private members of the class BOOK are

BOOK NO integer type

BOOKTITLE 20 characters

PRICE float (price per copy)

TOTAL\_COST() A function to calculate the total cost for N number of copies where N is passed to the function as argument. Public members of the class BOOK are

INPUT() function to read BOOK\_NO, BOOK TITLE, PRICE

PURCHASE() function to ask the user to input the number of copies to be

purchased. It invokes TOTAL\_COST() and prints the total cost to be paid by the user. Note :

*You are also required to give detailed function definitions.*

c) Give the output of the following program :

```
#include <iostream.h>
#include <string.h>
class per
{
char name [20];
float age;
public:
per (char*s, float a)
{
strcpy(name, s);
age = a;
}
per &GR (per &x)
{
if (x.age >= age)
return x;
else
return *this;
}
void display()
{
cout << "Name : " << name << "\n";
cout << "Age : " << age << "\n";
}
};
void main ()
{
per P1 ("RAMU", 27.5), P2 ("RAJU", 53), P3("KALU", 40);
per P ("", 0);
P = P1.GR (P3);
P.display();
P = P2.GR (P3);
P.display();
}
```

### QUESTION 8.

a) Given two arrays of integers A and B of sizes M and N respectively. Write a function named MIX () with four arguments, which will produce a third array named C. such that the following sequence is followed.

All even numbers of A from left to right are copied into C from left to right.

All odd numbers of A from left to right are copied into C from right to left.

All even numbers of B from left to right are copied into C from left to right.

All odd numbers of B from left to right are copied into C from right to left. A, B and C are passed as arguments to MIX ().

e.g., A is {3, 2, 1, 7, 6, 3} and B is {9, 3, 5, 6, 2, 8, 10} the resultant array C is {2, 6, 6, 2, 8, 10, 5, 3, 9, 3, 7, 1, 3}

An array X [7] [20] is stored in memory with each element requiring 2 bytes of storage. If the base address of the array is 2000, calculate the location of X[3][5] when the array X is stored in Column major order.

Note: X[7][20] means valid row indices are 0 to 6 and valid column indices are 0 to 19.

(d) Write a user defined function named Upper-half() which takes a two dimensional array A, with size N rows and N columns as argument and prints the upper half of the array.

2	3	1	5	0
7	1	5	3	1
2	5	7	8	1
0	1	5	0	1
3	4	9	1	5

OUTPUT  
-->

2	3	1	5	0
	1	5	3	1
		1	7	8
			0	1
				5

d) Convert the expression (True && False) || !(False || True) to postfix expression. Show the contents of the stack at every step.

(e) Each node of a STACK contains the following information, in addition to required pointer field :

- i) Roll number of the student
- ii) Age of the student

Give the structure of node for the linked stack in question TOP is a pointer which points to the topmost node of the STACK. Write the following functions.

- i) PUSH() - To push a node to the stack which is allocated dynamically
- ii) POP() - To remove a node from the stack and release the memory.

**QUESTION 9.**

- a) Distinguish between serial files and sequential files.
- b) Consider the class declaration:

```
class BUS
{
int bus_no;
char destination[20];
float distance;
public :
void Read(); // To read an object from the keyboard
void Write (); // To write an object into a file
void Show (); // To display the file contents on The monitor
};
```

Complete the member functions definitions.

**QUESTION 10.**

- (a) What are DDL and DML ?
- (b) Write SQL commands for (i) to (vii) on the basis of the table STUDENT

Student No.	Class	Name	Game	GGrade	SupW	SGrade
10	7	Sameer	Cricket	B	Photography	A
11	8	Sujit	Tennis	A	Gardening	C
12	7	Kamal	Swimmi ng	B	Photography	B
13	7	Veena	Tennis	C	Cooking	A
14	9	Archna	Basket Ball	A	Literature	A
15	10	Arpit	Cricket	A	Gardening	C

- (i) Display the names of the students who are getting grade 'C' in either Game or SupW.
- (ii) Display the number of students getting grade 'A' in Cricket.
- (iii) Display the different games offered in the school.
- (iv) Display the SUPW taken up by the students, whose name starts with „A□.

- (v) Add a new column named 'Marks'.
- (vi) Assign a value 200 for Marks for all those who are getting Grade 'B' or above in Game.
- (vii) Arrange the whole table in the alphabetical order of SUPW.
- (c) If R1 is a relation with 5 rows and R2 is a relation with 3 rows, how many rows will the Cartesian product of R1 and R2 have ?

**QUESTION 11.**

- (a) State and verify Involution law.
- (d) Prove algebraically :  $X.Y + X\bar{Z} + Y.Z = X.Y + X\bar{Z}$
- (c) If  $F(a, b, c, d) = \sum(0, 2, 4, 5, 7, 8, 10, 12, 13, 15)$ , obtain the simplified form using K-Map.
- (d) Represent NOT using only NOR gate(s).
- e) Given the following circuit

What is the output if

- (i) both inputs are False
- (ii) one is False and the other is True
- (f) Draw the circuit of a Half Adder using only NAND gates.

**QUESTION 12**

- (a) What are Routers?
- (b) What do you understand by a backbone network?
- (c) Name two switching circuits and explain any one.
- (d) Mention one difference between Circular and Star Topologies in networking.

**QUESTION 13.**

- (a) What the purpose of a header file in a program?  
Name the header files C++ to which the following functions belong:

(i) write() (ii) arc (iii) open() (iv) strlen()

- c) Find the syntax error(s), if any, in the following program:

```
#include <iostream.h>
void main()
{
int x;
cin<< x;
for(int y = 0; y<10; y++);
cout>>x + y;
}
```

- d) Find the output of the following program:

```
void main()
{
int x=5,y=5;
cout << x++;
cout<<",";
cout<< ++x;
cout<< ",";
cout << y++<<">,"<< ++y;
}
```

- (e) Write the output of the following program:

```
#include <iostream.h>
void X(int A, int &B)
{
A = A+B;
B = A-B;
```

```

A = A-B;
}
void main()
{
int a=4, b=18;
X(a,b);
cout<< a <<" "<<b;
}

```

(d) Raising a number to a power  $p$  is the same as multiplying  $n$  by itself  $p$  times. Write a function called `power` that takes two arguments, a double value for  $n$  and an int value for  $p$ , and return the result as double value. Use default argument of 2 for  $p$ , so that if this argument is omitted the number will be squared. Write the main function that gets value from the user to test `power` function.

#### QUESTION 14.

(a) What do you understand about a base class and a derived class? If a base class and a derived class each include a member function with the same name and arguments, which member function will be called by the object of the derived class if the scope operator is not used ?

(b) Considering the following specifications :

#### Structure name Data Type Size

Name first array of character 40

mid array of character 40

last array of character 60

Phone area array of character 4

exch array of character 4

numb array of character 6

#### Class name Data Type

P\_rec name Name

Phone Phone

With member functions constructor and `display_rec`.

Declare a class of `P_rec`.

Define the constructor (outside the class `P_rec`) that gathers information from the user for the above two structures `Name` and `Phone`.

Define the `display_rec` (outside the class `P_rec`) that shows the current values.

c) consider the following class declaration and answer the question below :

```

class SmallObj
{
private :
int some;
more;
void err_1() {cout<<"error";}
public:
void Xdata(int d) {some=d; more=d++;}
void Ydata() {cout<<some<<" "<<more;}
};

```

(i) Write the name that specifies the above class.

(ii) Write the data of the class with their access scope.

(iii) Write all member function of the class along with the access scope.

(iv) Indicate the member function of the `SmallObj` that sets data.

#### QUESTION 15.

(a) Define `Queue` and `Stack`.

(b) Given the following class :

```

char *msg[ ] = {"overflow" , "under flow"}
class Stack
{
int top; // the stack pointer
stk[5]: //the elements
void err_rep(int e_num)
{
cout << msg[e_enum];
}
}

```



```

} // report error message
public :
void init()
{
top=0;
} // initialize the stack pointer
void push(int); // put new value in stk
void pop(); // get the top value
};

```

Define push outside the Stack. In your definition take care of overflow condition. Function push has to invoke err\_rep to report over flow.

c) Use a stack to evaluate the following postfix expression and show the content of the stack after execution of each operation. Don't write any code. Assume as if you are using push and pop member functions of the stack.

AB - CD + E \* + (where A=5, B=3, C=5, D =4, and E=2)

d) The array A[20] [10] is stored in the memory with each element requiring one byte of storage if the base address of A is C<sub>0</sub>. Determine C<sub>0</sub> when the location of A[10] [5] is 2000.

e) Considering the following key set: 42, 29, 74, 11, 65, 58. Use bubble sort to sort the data in ascending order and indicate the sequences of steps required.

### QUESTION 16.

a) What is the difference between get() and read() ?

b) Write a C++ program, which reads one line at a time from the disk file TEST.TXT, and displays it to a monitor. Your program has to read all the contents of the file. Assume the length of the line not to exceed 80 characters. You have to include all the header files if required.

### QUESTION 17.

(a) What is relation ? Define the relational data model.

Given the following Lab relations :

Write SQL command for questions (b) to (g).

LAB No.	ItemNam	Cost	Quantity	DateofPurchase	Warranty	Operational
1	Computer	60000	9	21/5/96	2	7
2	Printer	15000	3	21/5/97	4	2
3	Scanner	13900	1	29/8/98	3	1
4	Camera	21901	2	13/6/96	1	2
5	Hub	8000	1	31 10/99	2	1
6	UPS	5000	5	21/5/96	1	4
7	Plotter	25000	2	11/1/2000	2	2

**QUESTION 18.** (a) Differentiate between a Run Time Error and Syntax Error. Also give suitable examples of each in C++. 2

(b) Name the header file(s) that shall be needed for successful compilation of the following C++ code 1

```

void main ( )
{
char String [20];
gets (String);
strcat (String, "CBSE");
puts (String);
}

```

(c) Rewrite the following program after removing the syntactical error(s) if any.

Underline each correction. 2

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

Roll No. Please check that this question paper contains **12** 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.**

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```
const int Max 10;
void main ( )
{
int Numbers [Max];
Numbers = { 20, 50,10, 30,40 } ;
for (Loc= Max-1 ; Loc > = 0 ; Loc - -)
cout>>Numbers [Loc];
}
```

(d) Find the output of the following program : 2

```
# include < iostream.h>
void main ( )
{
intArray[] = {4,6,10,12};
int *pointer = Array ;
for (int I=1 ; I<=3 ; I++)
{
cout<<*pointer<<#" ;
pointer ++;
}
cout<<endl;
for (I=1 ; I<=4 ; I++)
{
(*pointer)*=3 ;
-- pointer;
}
for(I=1; I<5; I + + )
cout << Array [I-1] << "@" ;
cout << endl;
}
```

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

```
# include < iostream.h>
void Withdef (int HisNum = 30)
{
for (int I=20 ; I<= HisNum; I+=5)
cout<<I<<" ";
cout<<endl;
}
```

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```
void Control (int &MyNum)
{
MyNum+=10;
Withdef(MyNum);
}
void main ( )
{
int YourNum=20;
Control (YourNum);
Withdef();
}
```

```
cout<<"Number="<<YourNum<<endl;
}
```

(f) In the following C++ program what is the expected value of MyMarks from

Options (i) to (iv) given below. Justify answer. 2

```
#include<stdlib.h >
# include<iostream.h>
void main ()
{
randomize ();
int Marks [ ]= {99, 92, 94, 96, 93, 95}, MyMarks;
MyMarks = Marks [1 + random (2) ];
cout<<MyMarks<<endl;
}
```

**(i) 99 (ii) 94**

**(iii) 96 (iv) None of the above**

**QUESTION 19.** (a) Differentiate between Constructor and Destructor function in context of Classes and Objects using C++ 2

(b) Answer the questions (i) and (ii) after going through the following class 2

```
class Maths
{
char Chapter [20];
int Marks;
public:
Maths ( ) //Member Function 1
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{
strcpy (Chapter, "Geometry");
Marks = 10;
cout<<"Chapter Initialised";
{
~Math ( ) //Member Function 2
}
cout<<"Chapter Over";
}
};
```

(i) Name the specific features of class shown by Member Function 1 and Member Function 2 in the above example.

(ii) How would Member Function 1 and Member Function 2 get executed?

(c) Define a class Tour in C++ with the description given below : 3

Private Members :

TCode of type string

NoofAdults of type integer

NoofKids of type integer

Kilometres of type integer

TotalFare of type float

Public Members :

• A constructor to assign initial values as follows :

TCode with the word "NULL"

NoofAdults as 0

NoofKids as 0

Kilometres as 0

TotalFare as 0

• A function AssignFare ( ) which calculates and assigns the value of the data member TotalFare as follows

For **each** Adult

### Fare(Rs) For Kilometres

500 >=1000

300 <1000 &>=500

200 <500

For **each** Kid the above Fare will be 50% of the Fare mentioned in the above table

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For example :

If Kilometres is 850, NoofAdults = 2 and NoofKids = 3

Then TotalFare should be calculated as

NumofAdults \* 300 + NoofKids \* 150

i.e.  $2*300 + 3*150=1050$

- A function EnterTour( ) to input the values of the data members TCode, NoofAdults, NoofKids and Kilometres; and invoke the Assign Fare( ) function.
- A function ShowTour( ) which displays the content of all the data members for a Tour.

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

```
class Trainer
{
char TNo [5], TName [20], Specialisation [10];
int Days;
protected :
float Remuneration;
void AssignRem (float);
public :
Trainer ( ) ;
void TEntry ( );
void TDisplay ( );
};
class Learner
{
char Regno [10], LName [20], Program [10];
Protected :
int Attendance, Grade;
public:
Learner ( );
void LEntry ( );
void LDisplay ( );
};
class Institute : public Learner, public Trainer
{
```

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```
char ICode[10], IName [20];
```

```
public:
Institute ( );
void IEntry ( );
void IDisplay ( );
};
```

- (i) Which type of Inheritance is depicted by the above example?  
(ii) Identify the member function(s) that cannot be called directly from the objects of class Institute from the following

TEntry()

LDisplay()

IEntry()

- (iii) Write name of all the member(s) accessible from member functions of

class Institute.

(iv) If class Institute was derived privately from class Learner and privately from class Trainer, then, name the member function(s) that could be accessed through Objects of class Institute.

**QUESTION 20.** (a) Write a function in C++ which accepts an integer array and its size as arguments and replaces elements having odd values with thrice its value and elements having even values with twice its value.

Example : if an array of five elements initially contains the elements as

3, 4, 5, 16, 9

then the function should rearrange the content of the array as

9, 8, 15, 32, 27 4

(b) An array Array[20][15] is stored in the memory along the column with each element occupying 8 bytes. Find out the Base Address and address of the element Array[2][3] if the element Array [4] [5] is stored at the address 1000. 4

(c) Write a function in C++ to delete a node containing Book's information, from a dynamically allocated Stack of Books implemented with the help of the following structure. 4

```
struct Book
{
int BNo;
char BName[ 20 ];
Book *Next;
};
```

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(d) Write a function in C++ which accepts a 2D array of integers and its size as arguments and displays the elements which lie on diagonals. 2

[Assuming the 2D Array to be a square matrix with odd dimension  
i.e. 3×3, 5×5, 7×7 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

(e) Evaluate the following postfix notation of expression : 2

25 8 3 - / 6 \* 10 +

**QUESTION 21.** (a) Observe the program segment given below carefully, and answer the question that follows: 1

```
class PracFile
{
intPracno;
char PracName[20];
int TimeTaken;
int Marks;
public:
// function to enter PracFile details
void EnterPrac( );
// function to display PracFile details
void ShowPrac( ):
// function to return TimeTaken
int RTime() {return TimeTaken;}
// function to assign Marks
void Assignmarks (int M)
```

```

{ Marks = M;}
};
void AllocateMarks( )
{ fstream File;
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File.open("MARKS.DAT", ios::binary | ios::in | ios::out);
PracFile P;
int Record = 0;
while (File.read(( char*) &P, sizeof(P)))
{
if(P.RTime()>50)
P.Assignmarks(0)
else
P.Assignmarks(10)
_____ //statement 1
_____ //statement 2
Record + + ;
}
File.close();
}

```

If the function AllocateMarks () is supposed to Allocate Marks for the records in the file MARKS.DAT based on their value of the member TimeTaken.

Write C++ statements for the **statement 1** and **statement 2**, where, **statement 1** is required to position the file write pointer to an appropriate place in the file and **statement 2** is to perform the write operation with the modified record.

(b) Write a function in C++ to print the count of the word is as an independent word in at text file DIALOGUE.TXT. 2

For example, if the content of the file DIALOGUE. TXT is

This is his book. Is this book good?

Then the output of the program should be 2.

(c) Given a binary file GAME.DAT, containing records of the following structure type 3

```

struct Game
{
char GameName [20];
char Participant [10] [30];
};

```

Write a function in C++ that would read contents from the file GAME.DAT and creates a file named BASKET.DAT copying only those records from GAME.DAT where the game name is "Basket Ball"

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5. (a) Differentiate between primary key and alternate key. 2

(b) Consider the following tables. Write SQL commands for the statements (i) to (iv) and give outputs for SQL queries (v) to (viii) 6

**TABLE:SENDER**

**SenderID SenderName SenderAddress SenderCity**

ND01 R Jain 2, ABC Appts New Delhi

MU02 H Sinha 12, Newtown Mumbai

MU15 S Jha 27/A, Park Street Mumbai

ND50 T Prasad 122-K, SDA New Delhi

**TABLE : RECIPIENT**

**RecID SenderID RecName RecAddress RecCity**

KO05 ND01 R Bajpayee 5, Central Avenue Kolkata

ND08 MU02 S Mahajan 116, A Vihar New Delhi

MU19 ND01 H Singh 2A, Andheri East Mumbai

MU32 MU15 P K Swamy B5, C S Terminus Mumbai  
ND48 ND50 S Tripathi 13, B1 D, Mayur Vihar New Delhi

(i) To display the names of all Senders from Mumbai

(ii) To display the RecID), SenderName, SenderAddress, RecName, RecAddress  
for every Recipient

(iii) To display Recipient details in ascending order of RecName

(iv) To display number of Recipients from each city

(v) SELECT DISTINCT SenderCity FROM Sender;

(vi) SELECT A. SenderName, B.RecName

FROM Sender A, Recipient B

WHERE A. SenderID = B.SenderID AND B.RecCity = 'Mumbai';

(vii) SELECT RecName, RecAddress

FROM Recipient

WHERE RecCity NOT IN ('Mumbai', 'Kolkata');

(viii) SELECT RecID, RecName

FROM Recipient

WHERE SenderID='MU02' OR SenderID='ND50';

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**QUESTION22.** (a) State Distributive law and verify the same using truth table. 2

(b) Write the equivalent Canonical Sum of Product expression for the following  
Product of Sum Expression 2

**F(X,Y,Z) =  $\pi$  (1,3,6,7)**

(c) Write the equivalent Boolean Expression for the following Logic Circuit. 2

(d) Reduce the following Boolean expression using K-Map 2

**F(U,V,W,Z) =  $\Sigma$  (0, 1, 2, 3, 4, 10, 11)**

**7.** (a) What is the significance of Cyber law ? 1

(b) Expand the following terms with respect to Networking : 2

(i) CDMA (iii) FTP

(ii) WLL (iv) HTML

(c) Which of the following unit measures the speed with which data can be  
transmitted from one node to another node of a network? Also, give the expansion  
of the suggested unit. 1

(i) Mbps

(ii) KMph

(iii) MGps

(d) "Bhartiya Connectivity Association" is planning to spread their offices in four  
major cities in India to provide regional IT infrastructure support in the field of  
Education & Culture. The company has planned to setup their head office in  
New Delhi in three locations and have named their New Delhi offices as "Front  
Office", "Back Office" and "Work Office". The company has three more regional  
offices as "South Office", "East Office" and "West Office" located in other three  
major cities of India. A rough layout of the same is as follows : 4

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Approximate distances between these offices as per network survey team is as  
follows:

**Place From Place To Distance**

BackOffice Front Office 10KM

Back Office Work Office 70 Meter

Back Office East Office 1291 KM

BackOffice West Office 790 KM

Back Office South Office 1952 KM

In continuation of the above, the company experts have planned to install the  
following number of computers in each of their offices :

Back Office 100

Front Office 20

Work Office 50  
East Office 50  
West Office 50  
South Office 50  
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(i) Suggest network type (out of LAN, MAN, WAN) for connecting each of the following set of their offices :

- Back Office and Work Office
- Back Office and South Office

(ii) Which device you will suggest to be procured by the company for connecting all the computers with in each of their offices out of the following devices?

- Switch/Hub
- Modem
- Telephone

(iii) Which of the following communication medium, you will suggest to be procured by the company for connecting their local offices in New Delhi for very effective and fast communication?

- Telephone Cable
- Optical Fiber
- Ethernet Cable

(iv) Suggest a cable/wiring layout for connecting the company's local offices located in New Delhi. Also, suggest an effective method/technology for connecting the company's regional offices-"East Office", "West Office" and "South Office" with offices located in New Delhi.

**QUESTION23.** (a) What is the difference between call by value and call by reference? Give an example in C++ to illustrate both. 2

(b) Write the names of the header files to which the following belong:

(i) puts( ) (ii) sin( ) 1

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

```
#include [iostream.h]
#include [stdio.h]
class Employee
{
int EmpId=901;
char EName[20];
public
Employee( ) { }
void Joinint( ) { cin>>EmpId; gets(EName); }
void List( ) { cout<<EmpId<<":"<<EName<<endl; }
};
void main( )
{
Employee E;
Joining.E( );
E.List( )
}

```

(d) Find the output of the following program:

```
3
#include<iostream.h>
void main()
{
int X[]={ 10,25,30,55,110};
int *p=X;
```



```

while(*p<110)
{
if(*p%3!=0)
*p=*p+1;
else
*p=*p+2;
p++;
}
for(int I=4;I>=1;i--)
{
cout<<X[I]<<"*";
if(I%3==0) cout<<endl;
}
cout<<X[0]*3<<endl;
}

```

e) Find the output of the following program : 2

```

#include<iostream.h>
#include<ctype.h>
void Encode(char Info[ ], int N);
void main( )
{
char Memo[ ] = "Justnow";
Encode(Memo,2);
cout<<Memo<<endl;
}
void Encode(char Info[ ], int N)
{
for (int I=0,Info[I]!='\0';I++)
if (I%2==0)
Info[I]=Info[I]-N;
else if (islower(Info[I]))
Info[I] = toupper(Info[I]);
else
Info[I]=Info[I]+N;
}

```

(f) Study the following program and select the possible output from it: 2

```

#include<iostream.h>
#include<stdlib.h>
void main( )
{
randomize( );
int Points;
Points = 100 + random(LIMIT);
for (int P=Points; P>=100;P--)
cout<<P<<"#";
cout<<endl;
}

```

- (i) 103#102#101#100#
- (ii) 100#101#102#103#
- (iii) 100#101#102#103#104#
- (iv) 104#103#102#101#100#

**QUESTION 24.** (a) What is copy constructor? Give an example in C++ to illustrate copy constructor. 2

(b) Answer the question (i) and (ii) after going through the following class : 2

```

class WORK
{

```

```

int WorkId; char WorkType;
public:
~WORK() //Function 1
{
cout<<"Un-Allocated"<<endl;
}
void Status() // Function 2
{
cout<<WorkId<<":"<<WorkType<<endl;
}
WORK() // Function 3
{
WorkId=10; WorkType='T';
}
WORK (WORK &W) // Function 4
{
WorkId = W.WorkId+12; WorkType=W.WorkType+1;
}
};

```

(i) Which member function out of Function 1, Function 2, Function 3 and Function 4 shown in the above definition of class Work is called automatically, when the scope of an object gets over? Is it known as Constructor OR Destructor OR Overloaded Function OR Copy Constructor?

ii) WORK W; //Statement 1  
WORK Y(W); // Statement 2

Which member function out of Function 1, Function 2, Function 3 and Function 4 shown in the above definition of class Work will be called on execution of statement written as Statement 2? What is this function specifically known as out of Destructor or Copy Constructor or Default Constructor?

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

**Private Members:**

Rno // Data member to store Room No  
Name // Data member to store customer name  
Charges // Data member to store per day charges  
Days // Data member to store number of days of stay  
COMPUTE() // A function to calculate and return Amount as  
Days\* Charges and if the value of Days \* Charges  
is more than 11000 then as 1.02 \* Days \* Charges

**Public Members :**

Getinfo() // A function to enter the content Rno, Name, Charges and Days  
Dispinfo() // A function to display Rno, Name, Charges, Days and Amount  
(Amount to be displayed by calling function COMPUTE() )

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

class FaceToFace

```

{
char CenterCode[10];
public:
void Input( );
void Output( );
};

```

class Online

```

{
char website[50];
public:
void SiteIn( );
void SiteOut( );
}

```

```

};
class Training: public FaceToFace, private online
{
long Tcode;
float charge;
int period;
public:
void Register( );
void show( );
};

```

(i) Which type of inheritance is shown in the above example?

(ii) Write names of all the member functions accessible from Show( ) function of class Training.

(iii) Write name of all the member accessible through an object of class Training.

(iv) Is the function Output( ) accessible inside the function SiteOut( )? Justify your answer?

3 (a) Write a function SORTPOINTS( ) in C++ to sort an array of structure Game in descending order of Points using Bubble Sort.

Note: Assume the following definition of structure Game

```

Struct Game
{
long Pno; // Player Number
char PName[20];
long Points;
};

```

Sample Content of the array (before sorting)

```

PNo Pname Points
103 Ritika Kapur 3001
104 John Philip 2819
101 Razia Abbas 3451
105 Tarun Kumar 2971

```

Sample Content of the array (after sorting)

```

Pno Pname Points
101 Razia Abbas 3451
103 Ritika Kapur 3001
105 Tarun Kumar 2971
104 John Philip 2819

```

(b) An array S[40][30] is stored in the memory along the column with each of the element occupying 4 bytes, find out the base address and address of element S[20][15], if an element S[15][10] is stored at the memory location 7200. 4

(c) Write a function QUEINS( ) in C++ to insert an element in a dynamically allocated Queue containing nodes of the following given structure: 4

```

struct Node
{
int PId; // Product Id
char Pname[20];
NODE *Next;
};

```

(d) Define a function SWAPCOL( ) in C++ to swap (interchange) the first column elements with the last column elements, for a two dimensional integer array passed as the argument of the function. 3

Example: If the two dimensional array contains

```

2 1 4 9
1 3 7 7
5 8 6 3
7 2 1 2

```

After swapping of the content of 1st column and last column, it should be:

9 1 4 2

7 3 7 1

3 8 6 5

2 2 1 7

(e) Convert the following infix expression to its equivalent postfix expression showing stack contents for the conversion: 2

$X - Y / (Z + U) * V$

4 (a) Observe the program segment given below carefully and fill the blanks marked as Line 1 and Line 2 using fstream functions for performing the required task. 1

```
#include<fstream.h>
class Stock
{
long Ino; // Item Number
char Item[20]; // Item Name
int Qty; // Quantity
public:
void Get(int);
Get(int); // Function to enter the content
void Show( ); // Function to display the content
void Purchase(int Tqty)
{
Qty+= Tqty; // Function to increment in Qty
}
long KnowIno( )
{ return Ino;}
};
void Purchaseitem(long PINo, int PQty)
// PINo -> Info of the item purchased
// PQty -> Number of items purchased
{
fstream file;
File.open("ITEMS.DAT",ios::binary|ios::in|ios::cut);
int Pos=-1;
Stock S;
while (Pos== -1 && File.read((char*)&S, sizeof(S)))
if (S.KnowInc( ) == PINo)
{
S.Purchase(PQty); // To update the number of items
Pos = File.tellg()- sizeof(S);
//Line 1 : To place the file pointer to the required position
_____
;
//Line 2 : To write the objects on the binary file
_____
;
}
if (Pos == -1)
cout<<"No updation done as required Ino not found...";
File.close( );
}
(b) Write a function COUNT_DO( ) in C++ to count the presence of a word „do□ in a
text file “MEMO.TXT”. 2
Example :
If the content of the file “MEMO.TXT” is as follows:
I will do it, if you
request me to do it.
It would have been done much
```

earlier.

The function COUNT\_DO( ) will display the following message:

Count of -do- in file: 2

(c) Write a function in C++ to read and display the detail of all the users whose status is „A□ (i.e. Active) from a binary file “USER.DAT”. Assuming the binary file “USER.DAT” is containing objects of class USER, which is defined as follows:

```
class USER
{
int Uid; // User Id
char Uname[20]; // User Name
char Status; // User Type: A Active I Inactive
public:
void Register( ); // Function to enter the content
void show( ); // Function to display all data members
char Getstatus( )
{
return Status;
}
};
```

**QUESTION 25** (a) What are candidate keys in a table? Give a suitable example of candidate keys in a table. 2

(b) Consider the following tables GARMENT and FABRIC. Write SQL commands for the statements (i) to (iv) and give outputs for SQL queries (v) to (viii) 6

Table: GARMENT

GCODE	DESCRIPTION	PRICE	FCODE	READYDATE
10023	PENCIL SKIRT	1150	F03	19-DEC-08
10001	FORMAL SHIRT	1250	F01	12-JAN-08
10012	INFORMAL SHIRT	1550	F02	06-JAN-08
10024	BABY TOP	750	F03	07-APR-07
10090	TULIP SKIRT	850	F02	31-MAR-07
10019	EVENING GOWN	850	F03	06-JUN-08
10009	INFORMAL PANT	1500	F02	20-OCT-08
10007	FORMAL PANT	1350	F01	09-MAR-08
10020	FROCK	850	F04	09-SEP-07
10089	SLACKS	750	F03	31-OCT-08

Table: FABRIC

FCODE	TYPE
F04	POLYSTER
F02	COTTON
F03	SILK
F01	TERELENE

(i) To display GCODE and DESCRIPTION of each GARMENT in descending order of GCODE

(ii) To display the details of all the GARMENTS, which have READYDATE in between 08-DEC-07 and 16-JUN-08 (inclusive of both the dates).

(iii) To display the average PRICE of all the GARMENTS, which are made up of FABRIC with FCODE as F03.

(iv) To display FABRICwise highest and lowest price of GARMENTS from GARMENT table. (Display FCODE of each GARMENT along with highest and lowest price).

(v) SELECT SUM(PRICE) FROM GARMENT WHERE FCODE=□F01□;

(vi) SELECT DESCRIPTION, TYPE FROM GARMENT, FABRIC WHERE GARMENT.FCOD E =FABRIC.FCOD E AND GARMENT.PRICE > = 1260;

(vii) SELECT MAX(FCODE) FROM FABRIC;

(viii) SELECT COUNT (DISTINCT PRICE) FROM GARMENT;

**QUESTION 26** (a) Verify  $X \oplus Y + X \cdot Y \oplus + X \oplus \cdot Y \oplus = (X \oplus + Y \oplus)$  using truth table. 2

(b) Write the equivalent Boolean Expression for the following Logic Circuit: 2

(c) Write the POS form of a Boolean Function H, which represented in a truth table as follows: 2

A B C H

0 0 0 0

0 0 1 1

0 1 0 1

0 1 1 1

1 0 0 1

1 0 1 0

1 1 0 0

1 1 1 1

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

$F(P, Q, R, S) = \Sigma(1, 2, 3, 5, 6, 7, 9, 11, 12, 13, 15)$  3

7 (a) What is the difference between STAR topology and BUS topology of network?

(b) Expand the following abbreviations: 2

(i) GSM (ii) CDMA

(c) What is protocol? Which protocol is used to search information from Internet using the Internet Browser? 1

(d) Name two switching techniques used to transfer data between two terminals (computers). 1

(e) Freshminds University of India is starting its first campus in Ana Nagar of South India with its center admission office in Kolkata. The University has 3 major blocks comprising of office block, science block and commerce block in the 5 KM area campus. 4

As a network experts, you need to suggest the network plan as per (E1) to (E4) to the authorities keeping in mind the distances and other given parameters. Expected Wire distances between various locations:

Office Block to Science Block 90 m

Office Block to Commerce Block 80 m

Science Block to Commerce Block 15 m

Kolkata Admission Office to Ana Nagar Campus 2450 KM

Expected number of Computers to be installed at various locations in the university are as follows:

Office Block 10

Science Block 140

Commerce Block 30

Kolkata Admission Office 8

(E1) Suggest the authorities, the cable layout amongst various blocks inside university campus for connecting the blocks.

(E2) Suggest the most suitable place (i.e. block) to house the server of this university with a suitable reason.

(E3) Suggest an efficient device from the following to be installed in each of the blocks to connect all the computers:

(i) MODEM

(ii) SWITCH

(iii) GATEWAY

(E4) Suggest the most suitable (very high speed) device to provide data connectivity between Admission Office located in Kolkata and the Campus located in Ana

Nagar from the following options:

- Telephone Line

- Fixed- Line Dial-up connection

- Co-axial Cable Network

- GSM

- Leased Line
- Satellite Connection