

**ANNUAL PAPER**  
**COMPUTER SCIENCE (THEORY)**

**Time allowed: 3 hours**

**maximum Marks: 70**

Note: All questions are compulsory. Programming Language: C++.

1. (a) Name the header file to which the following belong: 1

(i) pow()      (ii) random()

(b) Illustrate the use of inline function in C++ with the help of an example. 2

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

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

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

```
#include<iostream.h>
#include<string.h>
class student
{
    char *name;
    int l;
public:
    student() { l=0; name=new char[l+1]; }
    student(char *s)
    {
        l=strlen(s); name=new char[l+1];
        strcpy(name, s);
    }
void display() { cout<<name<<endl; }
void manipulate(student &a, student &b)
```

```

{
    l=a.l+b.1;
    delete name;
    name=new char [l+1];
    strcpy(name, a.name);
    strcat(name, b.name);
}
};
void main()
{
    char *temp="Jack";
    student name1(temp), name("Jill"), name3("John"), S1, S2;
    S1.manipulate(name1,name2);
    S2.manipulate(S1,name3);
    S1.display();
    S2.display();
}

```

(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;
}

```

(f) What is a default constructor? How does it differ from destructor?

2

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

2

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

2

```

class Exam
{
    int year;

```

```

public:
    Exam(int y){ year=y;}           //constructor 1
    Exam (Exam &t);                 // constructor 2
};

```

(i) Create an object, such that it invokes Constructor1.

(ii) Write complete definition for Constructor 2.

(c) Define a class named HOUSING in C++ with the following descriptions:

4

Private members:

REG_NO	integer
NAME	Array of characters
TYPE	character
COST	Float

Public members:

- Function Read\_Data() to read an object of HOUSING type.
- Function Display() to display the details of an object.
- Function Draw\_Nos() to choose and display the details of 2 houses selected randomly from an array of 10 objects of type HOUSING. Use fandon function to generate the registration nos. to match with REG\_NO from the array.

(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
{
    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.

(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 Object of class Institute.

3. 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. 3

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

(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;
```

```
};
```

(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. (both Diagonals) 3

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

25 8 3 - / 6 \* 10 +

4. (a) void main()

```
{  
    char ch='A';  
    fstream fileout("data.dat", ios::app);  
    fileout<<ch;  
    int p=fileout.tellg();  
    cout<<p;  
}
```

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). 1

(b) Write a function to count the number of blanks present in a text file named "PARA.txt". 2

(c) Following is the structure of each record in a data file named "PRODUCT.DAT". 3

```
struct PRODUCT  
{  
    char product_Code[10];  
    char product_Description[10];  
int Stock;  
};
```

Write a function in C++ to update the file with a new value of stock. The stock and the product\_Code, whose Stock to be updated, are read during the execution of the program.

5. (a) What are DDL and DML? 2

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

**TABLE: FLIGHTS**

FL_NO	STARTING	ENDING	NO_FLIGHTS	NO_STOPS
IC301	MUMBAI	DELHI	8	0
IC799	BANGALORE	DELHI	2	1

MC101	INDORE	MUMBAI	3	0
IC302	DELHI	MUMBAI	8	0
AM812	KANPUR	BANDALORE	3	1
IC899	MUMBAI	KOCHI	1	4
AM501	DELHI	TRIVANDRUM	1	5
MU499	MUMBAI	MADRAS	3	3
IC701	DELHI	AHMEDABAD	4	0

**TABLE: FARES**

FL_NO	AIRLINES	FARE	TAX%
IC701	Indian Airlines	6500	10
MU499	Sahara	9400	5
AM501	Jet Airways	13450	8
IC899	India Airlines	8300	4
IC302	Indian Airlines	4300	10
IC799	Indian Airlines	10500	10
MC101	Deccan Airlines	3500	4

- (i) Display FL\_NO and NO\_FLIGHTS from “KANPUR” to “BANGALORE” from the table FLIGHTS.
- (ii) Arrange the contents of the table FLIGHTS in the ascending order of FL\_NO.
- (iii) Display the FL\_NO and fare to be paid for the flights from DELHI to MUMBAI using the tables FLIGHTS and FARES, where the fare to be paid="FARE+FARE\*TAX%/100.
- (iv) Display the minimum fare “Indian Airlines” is offering from the table FARES.
- (v) SELECT FL\_NO, NO\_FLIGHTS, AIRLINES From FLIGHTS, FARE where STARTING="DELHI" AND FLIGHTS.FL\_NO=FARES.FL\_NO.
- (vi) SELECT count(distinct ENDING) from FLIGHTS.

6. (a) State and verify Absorption law in Boolean Algebra. 2

(b) Draw a Logical Circuit Diagram for the following Boolean Expression:  $A.(B+C')$  2

(c) Convert the following Boolean expression into its equivalent Canonical Product of Sum Form :

$$A.B'.C + A'.B.C + A'.B.C' \quad 1$$

(d) Reduce the following Boolean expression using K-map: 3

$$F(A,B,C,D) = \sum(0,1,2,4,5,8,9,10,11)$$

7. (a) What out of the following, will you use to have an audio-visual chat with an expert sitting in a far-away place to fix-up a technical issue? 1

- (i) VoIP      (ii) email      (iii) FTP

(b) Name one server side scripting language and one client side scripting language. 1

(c) Which out of the following comes under Cyber Crime? 1

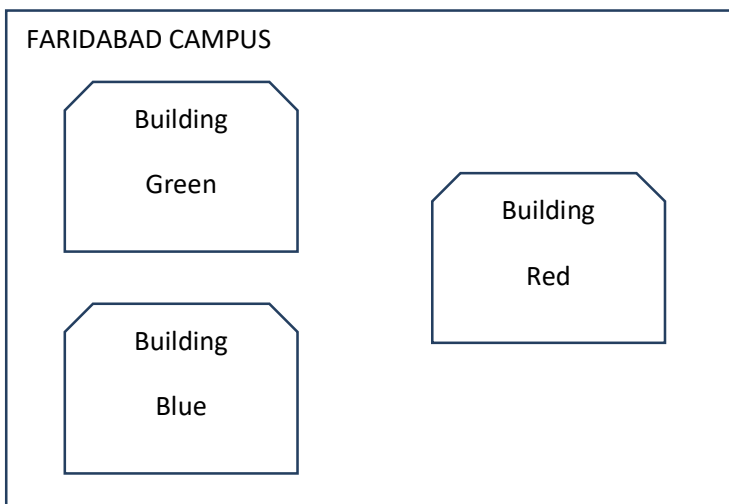
(i) Operating someone's internet banking account, without his knowledge.

(ii) Stealing a keyboard from someone's computer.

(iii) Working on someone's computer with his/her permission.

(d) Write one advantage of Bus Topology of network. Also illustrate how 4 computers can be connected with each other using star topology of network. 1

(e) Workalot C consultants are setting up a secured network for their office campus at Gurgaon for their day-to-day office and web-based activities. They are planning to have connectivity between 3 buildings and the head office situated in Mumbai. Answer the questions (i) to (iv) after going through the building positions is the campus and other details, which are given below: 2



Distances between various buildings:

Building "Green" to building "Red"	110 m
Building "Green" to building "Blue"	45 m
Building "Blue" to building "Red"	65 m
Faridabad to head office	1760 KM

Number of computers:

Building Green	32
Building Red	150
Building Blue	45
Head Office	10

(i) Suggest the most suitable place to house the server of this organization. Also give a reason to justify your suggested location.

(ii) Suggest a cable layout of connections between the buildings inside the campus.

(iii) Suggest the placement of the following devices with justification: 1. Switch 2. Repeater

(iv) The organization is planning to provide a high speed link with its head office situated in KOLKATA using a wired connection. Which of the following cables will be most suitable for this job?

1. Optical Fiber
2. Co-axial Cable
3. Ethernet Cable

(f) Give one suitable example of each URL and Domain Name. 1

(g) Name two proprietary software along with their applications. 1