

COMPUTER SCIENCE (THEORY)

STD. XII

MARKS: 70

Note: Attempt all questions. Answers should be to the point.

- Q.1 a) Why main function is special? Give 2 reasons. 2
b) Name the header files containing the following functions: 2
(i) getc() (ii) setw() (iii) isdigit() (iv) fabs()
c) Give the output of the following program segment assuming that all required header files are included: 2
- ```
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]--;
 cout<<NAME<<endl;
```
- d) Identify and correct the error in the following code fragment: 2
- ```
struct first {    int a;
                float b;
                } S1;
struct second {    int a;
                  float b;
                  }S2;
// elements read in S1 and S2
.....
.....
S1=S2;
.....
.....
```
- e) Using pointers write a function in C++ to compress any given string such that the multiple blanks present in it are eliminated. The function should return the compressed string. 2
- Q.2 a) How does a class enforce data hiding, abstraction and encapsulation? 2
b) Define a class student with the following specifications: 4
private members of class student:
admno integer
sname 20 characters
eng, math, sci float

total float
ctotal() A function to calculate eng+math+sci with float return type

public member functions of class student:

Takedata() function to accept values for all data members and to invoke ctotal() to calculate the total.

Showdata() function to display all the data members on the screen.

c) Write a program to swap the private data values of two classes. Use a common friend function for this task. **4**

d) Consider the following and answer the questions given below: **4**

```
class university
{
    int NOC;           // Number of Colleges
protected:
    char Uname[25]; // University Name
public:
    university();
    char state[25];
    void enterdata();
    void displaydata();
};
class college : public university
{
    int NOD;           // Number of Departments
    char cname[25];   // College name
protected:
    void affiliation();
public:
    college();
    void enroll(int, int);
    void show();
};
class department : public college
{
    char dname[25];   //Department name
    int NoF;         // Number of Faculty
public:
    Department();
    void display();
    void input();
};
```

i) Which class's constructor will be called first at the time of declaration of an object of class department?

ii) How many bytes does an object belonging to class department require?

iii) Name the member function(s), which are accessed from the object(s) of class department.

iv) Name the data member(s), which are accessible from the object(s) of class college.

e) What is the difference between the functioning of ios::ate and ios::app file modes? **2**

f) Write a C++ program that initializes a string variable to the content: “Time is a great teacher but unfortunately it kills all its pupils. –Berlioz”, and output the string one character at a time to the disk file OUT.TXT. Include all the header files required. **4**

Q.3 a) What are data structures? What are their types and sub types? Give examples. **3**

b) An array X[7][20] is stored in the memory with each element requiring 2 bytes for 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. **3**

c) Assume an array E containing elements of structure Employee is required to be arranged in descending order of salary. Write a C++ function to arrange the same with the help of Bubble Sort, the array and its size is required to be passed as parameters to the function. Definition of structure Employee is as follows:

```
struct Employee
    { int eno;
      char name[25];
      float salary;
    }; 4
```

Q.4 a) Evaluate the following post fix operation using a stack and show the contents of stack after the execution of each operation: 120, 45, 20, +, 25, 15, -, +, *. **2**

b) Write an algorithm to insert or delete an element from a queue (implemented as an array) depending upon the user’s choice. The elements are shifted towards the left to combine all the free spaces in the right. **2**

c) Translate the following infix expressions to their equivalent postfix expressions: **2**

- i) $(A+B \wedge D)/(E-F)+G$
- ii) $A * (B+D)/E-F-(G+H/K)$

Q.5 a) What is Relational Algebra? What are the different operations defined in it? List them as unary and binary operations. **3**

b) Given the following LAB relation,

LAB

No	ItemName	CostPerItem	Quantity	DateOfPurchase	Warranty	Operational
1	Computer	60000	9	21/5/96	2	7
2	Printer	15000	3	21/5/97	4	2
3	Scanner	18000	1	29/8/98	3	1
4	Camera	21000	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

c) From the table give commands for the following:

- i) List the item names purchased after 31/10/97. **1**
- ii) List the item names in ascending order of the date of purchase where quantity is more than 2. **1**
- iii) To insert a new record in the Lab table with the following data: **1**
8, “VCR”,1000, 2,{2/2/2000},1,2

- d) Give the output of the following SQL commands: 2
- i) `SELECT MIN(Warranty) FROM LAB WHERE Quantity = 2.`
 - ii) `SELECT AVG(CostPerItem) FROM LAB WHERE DateOfPurchase < {1/1/99}`
- Q.6 a) State and verify Duality Principle. 2
- b) Prove algebraically: $XY + YZ + YZ' = Y$ 2
- c) Obtain the simplified form of a Boolean expression using K-map 2
- $F(x,y,z) = \Sigma (2,3,6,7)$
- d) Draw a logic circuit diagram for: 2
- $(A+B) (B+C) (C+A)$
- Q.7 a) What are the uses of microwave signals? 2
- b) Define the following: 2
- i) Data channel ii) Baud iii) Bps iv) Bandwidth
- c) What is Internet? How did it evolve? 2
- d) What are cookies? 1
- e) What is cyber law? 1

All The Best