GRADE XII – Computer Science (283)

Time allowed: 3 Hours +15 Min.Reading Time **Max. Marks: 70**

General Instructions:

- *All questions are compulsory.*
- *Programming Language : C++*
- *Questions 2(b, d) ,3 and 4 have internal choices.*

1(a) What is known as C++ token? Name the types of tokens in the following C++ Statement: (2)
double money = 6500 ;

(b) Observe the following program very carefully and write the name of those header file(s), which are essentially needed to compile and execute the following program successfully: (1)

```
void main( )
{ char name[15], result;  int mark;
  cout <<  "enter your name, age and grade";
  gets(name);
  cin>>mark;
  result= mark>=40?'p':'f';
  cout<<setw(30)<<name<<setw(3)<<(char)toupper(result)<<endl;
}
```

(c) Rewrite the following C++ code after removing any/all Syntactical Error(s) with each correction underlined. Note : Assume all necessary header files are included, (2)

```
typedef  char[50] STR;
void main( )
{   STR  Message;
    Message = "Happiness is the key to Success";
    int length =strlen(Message) - 1;
for ( index = 0 ;  index < length / 2 ;   index ++ )
    {       Message[index] =  Message[ length – index ] ;
            cout<< Message <<  \n;
     }
 }
```

(d) Predict the output of the following C++ program code: Note: Assume all required header files are already being included in the program. (3)

```
void main( )
{    clrscr();
    double  marks[] = {32 ,  87,  99 ,  83 , 72, 56 };
    double *ptr = marks + 5;
    int x,x1;
    for ( x = 1;  x<=6 ; x++)
    {   if  (*ptr != (int) *ptr )
            if (*ptr >70)
               *ptr = (int)*ptr;
            else
               *ptr =(*ptr)+1;
            if (*ptr < 40)
                  *ptr +=x;
          ptr--;
    }
    for (x = 1; x<=6; x++)
```

```
    {
        for(x1=0;x1<x;x1++)
cout<<*(marks+x1)<<" @,  ";
        cout<<endl;
    }
}
```

(e) Predict the output of the following C++ program code: Assume all required header files are already being included in the program. (2)

```
char * StrReturn( char  ch[])
{
 for(int i=0;ch[i]!='\0';i++)
 {
 if (islower(ch[i]))
 { ch[i] = ch[i] + 1;  }
  else if(isupper (ch[i] ==0))
  { ch[i] -= 1;  }
  else
  ch[i]+=3;
}
  return ch;
}
void main( )
{ char OS[] = "PoinTers4See";
  char Res[40],r[40];
  int x =0,l=strlen(r)-1;
  strcpy(r,StrReturn(OS));
  for ( ;OS[x]!='\0';x++)
  {       Res[x]=r[l];l--;
          }
  Res[x]='\0';   puts(Res);}
```

(f) Observe the following program and find, which output(s) out of (i) to (iv) will be expected from the program? What will be the minimum and the maximum value assigned to the variable START?(Note: Assume all required header files are included in the program.) (2)

```
void main( )
{ randomize();
   char  Exams[][15]={"MidTerm", "Quarterly", "Halfyearly",  "Revision", "Annual"};
   randomize();
   int START =  random(3) + random(2);
   for (int RNo  = START ; RNo > 0;   RNo --)
         cout<<Exams[RNo]<<"#";  }
```

(i) Quarterly#MidTerm#
(ii) Quarterly#
(iii) Halfyearly#Quarterly#
(iv) Annual#Revision#Halfyearly#Quarterly#

2 (a) Explain, passing argument by value and by reference to C++ function, with illustration. (2)

(b) **Study the given code carefully to answer the questions (i) and (ii)**

```
class Ample
{public :
int data;
Ample( )  { data = 0;}                    // Member 1
Ample(int argu)    { data = argu;}        // Member 2
```

```
Ample (Ample &S)   { data = S.data;  }          // Member 3
~ Ample( ) { }                                 // Member 4
} ;
Ample fun ( Ample  x )                         // line 1
{ x.data*=3;                                   // line 2
 return x;}                                    // line 3
void main ( )
{  Ample  test1 (75);                          // line 4
   Ample  test2 (test1);                       // line 5
   Ample test3;                                // line 6
   test3   =   test1;                          // line 7
   test1 = fun( test2);    }                   // line 8
```

(1)

(i) Which Object Oriented Programming characteristics is demonstrated by Member1, Member 2 and Member 3 , together? (1)

(ii) Which of the lines (1 to 8) would invoke Member 3?

(or)

(b) Predict the output of the following C++ code.

```
void Stars ( int n,  int m  = 2)                    // Function 1
{    cout<< pow(n, m) <<" Stars" <<endl;
}
void Stars (double a)                               // Function 2
{ cout<<a * a <<"Stars"<<endl; }
void Stars  (int x, double  y )                     // Function 3
{cout<< (int) ( x  +  y )<<"Stars"<<endl    ;     }
void  Stars (char T, double N)                      // Function 4
{  cout<<(char)(T - N) << "Star"<<endl;   }
void main ( )
{  char W = 69;
  int  X=7, Y=2;
  double Z=3.6;
Stars(X) ;
Stars (X,Z) ;
Stars ( Y, X);
Stars ((char) W , Z);
}
```

(c) Define a class Exam_Result in C++ with the following descriptions: (4)

Private Members :

RegNo — any whole number
Name — Maximum 50 characters
Sub_Mark — an integer
Grade — any alphabet between A and D
Compute_grade() — function to compute & return grade as per the criteria

Sub_Mark	Grade
75-100	A
60-74	B
40-59	C
Otherwise	D

Public Members :

Get_Details( ) — function to input RegNo, name and mark and also to compute grade
Find_name( ) — function that returns the Name
Print_Details( ) — function to display all the details

(d)
```
class CUSTOMER
{ int Cust_ID;
  char Cust_Name[30];
protected:
void Register();
public:
CUSTOMER();
void Status();
};
class SALESMAN
{ int SID;
char SName[30];
protected:
     long double Salary;
public:
SALESMAN();
void Enter();
void Show();
};
class SHOP : protected CUSTOMER , public SALESMAN
{char Invoice_Code[12];
protected:
char Date[8];
public:
SHOP();
void Sales_Entry();
void Sales_Detail();
};
```

(i) Write the names of all the members which are accessible from an object of SHOP class (1)

(ii) Write all the protected members of class SHOP (1)

(iii) How many bytes will be required for an object of SHOP class (1)

(iv) Identify the form of inheritance depicted in the code (1)

(or)

(d)
```
class CUSTOMER
class CUSTOMER
{ int Cust_ID;
  char Cust_Name[30];
  public:
        void INPUT ( )                          // function 1
        {  cin>>Cust_ID; gets(Cust_Name);}
        CUSTOMER( )
        {  cout<<"New Customer"<<endl;}
 };
class DATE
{  protected : int dd, mm, yy;
   public :   DATE ( ) {  cout<<"Bill "<<endl;}
};
class SHOP : public  CUSTOMER , private DATE
{char Invoice_Code[12];
 public:
    void INPUT ( )                          // function 2
```

```
    { gets (Invoice_code); }
    SHOP ( ) { cout<<"Shop Details "<<endl;}
    ~SHOP ( ) { cout<<"Generated"<<endl;}
};void main( )
{ SHOP EZ_Shopee;
  _____          // statement 1 : invokes function1
  _____          // statement 2 : invokes function 2
}
```

(i) Fill in the blanks statement 1 and statement 2 that invoke function 1 and function 2 respectively. (1)

(ii) What will be the output of the program snippet (1)

(iii) Name the type of inheritance 1

(iv) Write all the private members of class SHOP class (1)

3(a) Write user-defined function Greatest_Sum( ) that accepts 2D integer array and its size as arguments, displays the sum of all odd numbers in each row and returns the largest sum amongst the row sums. (2)

Ex: if the array contains the following data

7 1 6 4

3 5 2 9

Then the function has to display the row sums as 9 and 17 and to return 17

(or)

Write a user-defined function Swap_Digits( ) that takes 2D integer array and its size as arguments and returns the smallest number with the digit 7 in its unit place.

Eg : For example if the content of array is:

27 16 47

17 107 4

Then the function has to return 17

(b) Write user-defined function Rotate_Elements ( ) that accepts an integer array , its size and a number, say n, as arguments and shifts all the elements to 'n' places in clockwise direction. Elements at the end of the array have to shifted to the beginning of the array as shown in the example (3)

If the array initially contains the following elements

45	12	23	67	77	88	10

Then after the function is invoked with the n value = 3, the array should be as follows

77	88	10	45	12	23	67

(or)

Write a user-defined function Palindrome() that accepts an integer array and its size as arguments and returns the sum of 3 digit palindrome numbers in the array.

For example, if the array contains the following characters

202	22	4224	535

then the function has to return 737

(c) A column major array Data[- 1 ... 10] [-5 ... 15] is stored in the memory with each elements occupying 2 bytes of memory space. Find the memory location of Data [3][10], if the base address of the array is 5000. (3)

(or)

A row major array M[25] [40] is stored in the memory with each elements occupying 8 bytes of memory space. Find the base address of the array if the element M[8][30] is at the memory address 7000.

(d) Define the member function DynaQ_Insert( ) in the class to insert a new node in the dynamic queue implemented with the help of the given structure. (4)

```
struct book { char name[20]; int price; book *next;};
```

```
class  DynaQ { book *first, *last;
public : DynaQ( )  { first = last = NULL;}
void DynaQ_Insert();
};
```

(or)

Write user defined function CQ_Insert( ) to insert a new element in the **circular queue array** that is implanted with the help of the structure 'student'.

```
struct  student { int RegNo;   char Name[30];}
```

(e) Convert the following Infix expression to its equivalent Postfix expression, showing the stack contents for each step of conversion. (2)

P * R – Q / S + T * U

(or)

Evaluate the following Postfix expression :

9, 2 , + , 14 , 5 , 2 , +, * ,30,-

4.(a) Write user-defined function that reads a text file "summary.txt" and prints only the words that start and end with the same character. (2)

(or)

Write a user-defined function that returns the number of upper case letters in a text file "note.txt"

(b) Given a binary file **consumer.dat**, containing records of the structure type (3)

struct consumer { char name[20]; int age;};

Write user-defined function to input a customer name and delete the details of the consumer from the binary file.

(or)

Assuming a binary file "**tele.dat**", containing objects of the following class, Write the member function AddData() to append a new object of the class in it.

```
class Directory { char name[20], address[30], phone[11];
public : void AddData ( ) ; // to append a record in tele.dat
};
```

(c) If a text file "one.txt" contains data mentioned in the box (words are separated by a space), what will be the output of the code. Justify your answer (1)

C# and C++ are multi-paradigm programming languages.

```
#include <fstream.h>;
void main( )
{ char buffer[10];
ifstream f("one.txt"); if(!f) return;
f.get ( buffer, 10, '#'); cout<<f.tellg( );
f.getline ( buffer, 10, '+'); cout<<f.tellg( );
f.close( ); }
```

(or)

The following code is meant to display the N-th record from a binary file sample.dat contains objects of the structure 'S' as mentioned below. Write the missing statements.

```
struct S { char data[40]; } obj;
void disp(int N)
{ ifstream f("sample.dat");
if (!f) {cout<<"error"; return;}
_____ // missing statement 1
_____ // missing statement 2
cout<<obj.data; }
```

5) Consider the following MySQL tables and answer the questions given below :

Table Name : House

House_Name	House_Captain	House_Points
Red Rose	Yathin	243
Lotus	Hari Narayan	298
Blue Bells	Anil Sharma	220
Sun Flower	Felicita	260

Table Name : Game

Game_Name	House_Name	Winner	Place	Score
Long Jump	Red Rose	Karthik	3	14
Throw Ball	Blue Bells	Rithwik	2	21
Swimming	Red Rose	Jeeja	1	35
Long Jump	Sun Flower	Keerthi	2	20
Swimming	Lotus	Mathew	2	23
Throw Ball	Lotus	Hari	1	33
Throw Ball	Red Rose	Umesh	3	12
Long Jump	Lotus	Mathew	1	36
Marathon	Lotus	Deepti	1	48

(a) What is meant by degree and cardinality of a table? Find the degree and cardinality of Cartesian Product of the above two tables (1)

(b) Write Relational Algebraic notation for each of the following operations (1)
- (i) List all winner name and their places from Game table
- (ii) List the details of Lotus and Sun Flower houses from House table

(c) **Write SQL queries for the following :**

(i) List the house name, house captain, house points and the gamesparticipated by corresponding houses (1)

(ii) List the game name, winner, score and their places in alphabetical order of game name and decreasing order of score. (1)

(iii) Display the House name, captain and game name of all first places. (1)

(iv) List Game name and score of the winners whose name end with letter "k" (1)

(d) **Predict the output of the following queries**

(i) SELECT DISTINCT GAME_NAME FROM GAME; (½)

(ii) SELECT MAX(SCORE) , HOUSE_NAME FROM GAME GROUP BY HOUSE_NAME HAVING COUNT(*) >2; (½)

(iii) SELECT * FROM HOUSE WHERE HOUSE_POINTS>250; (1/2)

(iv) SELECT AVG(SCORE) FROM GAME WHERE PLACE=3;(1/2)

6(a) State De Morgan's law and verify the same algebraically. (2)

(b) Draw circuit diagram using only NOR gates for the Boolean function: (2)
F(P, Q, R) = P ' Q + R

(c) Plot the Boolean function M(A,B,C) = A'B + B'C in a truth table (1)

(d) Reduce the following Boolean Expression to its simplest form using K- Map: (3)
F(W.X,Y,Z,W)= Σ (0,1,2,3,4,5,6,8,9,10,11)

7(a) Compare star topology and bus topology (2)

(b) Write any one server side and one client site web scripting language (2)

(c) Identify the network protocols (1)
A standard protocol for accessing e-mail from your local server.
A primary protocol for transmitting data across the network.

(d) Write the expanded names for the following abbreviated terms used in Networking and communications: (2)

(i)URL (ii)CDMA(iii)WLL iv)XML

(e) AtoZschool in Chennai wants to set up network of all its four blocks namely : admin office, computer lab, Library and accounts department. No. of computers in each block and the distance between them are mentioned in the tabular column. Study the details and answer the questions (i) to (iv) (4)

Block	No. of computers
Admin office	40
Computer lab	85
Library	20
Accounts department	18

Distance between blocks :

Admin to Library	140 meters
Computer Lab to Accounts department	60 meters
Admin to Computer lab	95 meters
Accounts department to Library	80 meters
Library to Computer lab	30 meters
Admin to Accounts department	50 meters

(i) Suggest an ideal block for the placement of server and justify your answer

(ii) Suggest the placement of (a) hub/switch and (b) repeater in the network

(iii) Draw a feasible and efficient cable layout for interconnecting the blocks and also name the topology

(iv) The school wants to connect to its partner school at Singapore for a video conference session.

(a) Suggest type of network to be formed

(b) Name the network protocol and one s/w that could be installed for the video conferencing session

~~~~~~~ All The Best ~~~~~~~