# *2014-15*

*General Instructions*:

- Check that this question paper contains 12 printed pages.

- Check that this question paper contains 7 questions totalling 70 marks.

- Label the answers clearly.

- Attempt all questions.

- Programming Language: C++.

- The marks for individual questions are shown in round brackets.

- Include diagrams / examples in your answers where these are helpful.

- At the end of the examination use a treasury tag to attach your additional answer sheets with the main answer booklet.

- You are reminded of the importance of clear English and careful presentation in your answers.

- 15 minutes time has been allotted to read this question paper. You will read the question paper only and will not write any answer on the answer-book during this period.

1. (a) What is the difference between an array and a structure in C++? Give a suitable example to illustrate both using C++ code. (2)

   b) Observe the following C++ code:

```
#include <iostream.h>
#include <stdio.h>
#include <string.h>
#include <math.h>
void main()
{
char STR[80];
gets(STR);
puts(strrev(STR));
getch();
   }
```

Name the header file which is not necessary to run the above program and name the header file which is necessary for the successful compilation of the above program. (1)

(c) Rewrite the following code after removing all the syntax error(s) if any present in the code. Make sure that you underline each correction done by you in the code. (2)

Important Note:

- Assume that all required header files are already included, which are essential to run this code
- The correction made by you should not change the logic of the program.

```
int sum(const int arr[], int size)

void caller()
{
int A[10],i=0;
for(;i<10;i++)
cin>>A[i];
sum(A,10);
}

void main()
{
caller()
}

int sum(const int arr[], size)
{
int s=0,i=-1;
while(++i<size)
{
s=+arr[i];
}
return s;
}
```

(d) Obtain the output from the following C++ program as expected to appear on the screen after its execution. (2)

Important Note :

- All the desired header files are already included in the code , which are required to run the code.

```
void main()
{
```

```cpp
char *Text="TALenT@orG";
for(int i=0;Text[i]!='\0';i++)
{
if(!isalpha(Text[i]))
Text[i]='*';
else if(!isupper(Text[i]))
Text[i]=Text[i]+1;
else Text[i]=Text[i+1];
}
cout<<Text ;
}
```

(e) Obtain the output from the following C++ program as expected to appear on the screen after its execution. (3)

Important Note :

- All the desired header files are already included in the code , which are required to run the code.

```cpp
class STAR_CINEMA
{
char Movie_Name[25];
int No_Of_Tickets;
char Ticket_Type[10];
public:
STAR_CINEMA(char *MN="EYE", int NT=3, char *TT="BALCONY")
{
strcpy(Movie_Name,MN);
No_Of_Tickets=NT;
strcpy(Ticket_Type,TT);
}

void SHOW()
{
if(strcmp(Ticket_Type,"BALCONY")==0)
cout<<Movie_Name<<"\t"<<No_Of_Tickets<<"\t"<<Ticket_Type<<"\t"<<3.00 *No_Of_Tickets;
cout<<endl;
if(strcmp(Ticket_Type,"GENERAL")==0)
cout<<Movie_Name<<"\t"<<No_Of_Tickets<<"\t"<<Ticket_Type<<"\t"<<2.00 *No_Of_Tickets;
cout<<endl;
}

~STAR_CINEMA()
{
cout<<"Booked\n";
}
};
```

```
void main()
{
STAR_CINEMA T1;
T1.SHOW();
{
STAR_CINEMA T2("TROY", 2, "GENERAL");
T2.SHOW();
}
}
```

(f) Observe the following program & Find out the correct possible outputs from the options .
( Assuming that all required header files are included in the program)                    (2)

```
void main()
{
char serial[ ] = {'E', 'X','A','M','\0'};
int number [ ]= { 69,66,67,68};
randomize();
cout<<number[random(3)];
for( int i=0;i<4;i++)
cout<<serial[sizeof(int) + random(2)-1];
}
```

    (i)     67XXAX

    (ii)    69AXXA

    (iii)   66AAXA

    (iv)   67AAAM

2. (a) What is the difference between static data members and non-static data members in a class? Also give a suitable example in C++ to illustrate both.                    (2)

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

```
class HOTEL
{
char Name[25];
char Star_Rating[10];
int Number_Of_Rooms;
char Price_Review_Date[12];
HOTEL()                        // Constructor 1
{
strcpy(Name, "The Regency");
strcpy(Star_Rating,"*****");
Number_Of_Rooms=136;
strcpy(Price_Review_Date,"24-12-2014");
```

```
}
public:
HOTEL(char Hname[], char SR[], int R, char RD[])     // Constructor 2
{
strcpy(Name, Hname);
strcpy(Star_Rating,SR);
Number_Of_Rooms=R;
strcpy(Price_Review_Date, RD);
}
};

void main()
{
HOTEL H;   // Statement 1
}
```

i)     Will  Statement 1 initialize all the data members for object H with the values given in Constructor 1? (Yes
       or No). Justify your answer suggesting the correction(s) to be made in the above code.
ii)    Write a command/statement to invoke Constructor 2.


(c) Define a class PET_SHOP with the following specifications:                                              (4)


Private Members:
      • Pet_Id           integer
      • Pet_Name      character(15)
      • Animal_Type  character(10)
      • Color            character(12)
      • Age              integer
      • Discount       character(10);
Protected Members:
      • FEED_INFO()  - a member function that allows the user to input the values for Pet_Id, Pet_Name,
        Animal_Type, Color and Age.
      • SHOW_INFO() – a member function that allows the user to view the values of Pet_Id, Pet_Name,
        Animal_Type, Color, Age and Discount on screen.
Public Members:
      • A constructor to assign initial values of Pet_Id as 1, Pet_Name as Chuckle, Animal_Type as
        Budgie, Color as White and age as 1.
      • A function CAL_DIS(), which invokes the FEED_INFO() function and calculates the Discount as
        per the following conditions. After calculating the Discount invoke the SHOW_INFO() function to
        view the contents of the data members.


(d) Consider the following C++ code and answer the questions from (i) to (iv):                              (4)

```
class PUBLISHER
{
char Pub[12];
double Turnover;
protected:
void Register();
public:
PUBLISHER();
void Enter();
void Display();
};

class BRANCH
{
char CITY[20];
protected:
float Employees;
public:
BRANCH();
void Haveit();
void Giveit();
};

class AUTHOR : private BRANCH , public PUBLISHER
{
int Acode;
char Aname[20];
float Amount;
public:
AUTHOR();
void Start();
void Show();
};
```

(i) Write the names of data members, which are accessible from objects belonging to class AUTHOR.
(ii) Write the names of all the member functions which are accessible from objects belonging to class BRANCH.
(iii) Write the names of all the members which are accessible from member functions of class AUTHOR.
(iv) How many bytes will be required by an object belonging to class AUTHOR?

3. (a) Write an user defined function ABSOLUTE(), that takes an integer array, its size and an integer value to be searched from the array. If the integer value exist in the array, then the function should return the absolute value of the element and if the integer value does not exist in the array, then the function should return zero.   (3)

Note: Do not use library function to find the absolute value.

(b)  A company employees 500 salesmen to sell mobile phones. The sales figure for each salesman for each month in a year are held in a two dimensional array SALES[500][13] with the following structure:

| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|----|----|

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 10323 | 100 | 11 | 25 | 24 | 89 | | | | | | | | |
| 1 | 10322 | 29 | 112 | 20 | 50 | | | | | | | | | |
| 2 | 10432 | 12 | 10 | 98 | | | | | | | | | | |
| 3 | 10441 | | | | | | | | | | | | | |
| 4 | 10337 | | | | | | | | | | | | | |
| 5 | 10234 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| 499 | | | | | | | | | | | | | | |

( All cells are filled with integer data)

You may assume that no two months have the same sales figure for a given salesman. The first column (index 0) of the array contain the 5-digit ID code for salesman and the remaining columns contain the sales figures with column two (index 1) being January sales, column three (index 2) being February sales and so on.

Write an user defined function BEST(), which takes this two dimensional array as argument and returns the month number (1 - 12) in which any salesman achieved their maximum sales.          (2)

(c) An array A[2….5][-1….3] is stored in the memory along the row with each element occupying four words of storage. Find out the Base address and address of the element A[3][2] , if the element A[3][3] is stored at the address 1300. Also find the total number of elements in the A array.          (3)

(d) Evaluate the following postfix expression showing the stack status:          (2)

     5, 3, +, 2, *, 6, 9, 7, -, /, -

(e) Write a function PUSH() in C++ to perform insert operation on a dynamic stack, which contains FlightNo and Airlines. Consider the following definition of node while writing your C++ code:          (4)

```
struct MYNODE
{
char FlightNo[10];
char Airlines[25];
MYNODE *Link;
};
```

4.  (a) Observe the following program carefully and fill in the blanks using seekg( ) and tellg( ) functions :    (1)

```
#include<fstream.h>
class school
{
private :
char scode[10],sname[30];
float nofstu;
public:
void INPUT( );
```

```
                    void OUTPUT( );
                    int COUNTREC( );              //To count the number of records/objects in the file
                    };
                    int school::COUNTREC( )
                    {
                    fstream fin("scool.dat",ios::in | ios::binary);
                    _____ //statement 1
                    int B=_____ //statement 2
                    int C=B/sizeof(school);
                    fin.close( );
                    return C;
                    }
```

(b) Assume that a text file named "**ALPHA.TXT**" already contains some text written into it . But while writing into the file , the word **"are"** has been misspelled **"aer"** everywhere in the file . Write a function named Rectify() in C++ that reads the file **"ALPHA.TXT"** and corrects the word **"aer"** .          (2)

(c) Given a binary file MEMBERSHIP.DAT containing the records of the following type:

```
        struct MEM
        {
        int Member_Id;
        char Member_Name[25];
        char Paid;
        };
```

Write a function in C++, that reads the binary file MEMBERSHIP.DAT and set Paid as 'Y' for all members whose Paid is 'N'.          (3)

5.  (a) Layout the difference between Projection and Selection operation with respect to a relation. Also give an example to illustrate both.          (2)

NOTE: Answer the questions (b) and (c) on the basis of the following tables  OIL_COMPANY and SHARE_DETAILS

Table: OIL_COMPANY

| Headoffice | Noofcountries | Noofemployees | Profits | Code |
|------------|---------------|---------------|---------|------|
| Americas | 30 | 60000 | 8.0 | AR |
| Asia | 4 | 35000 | 5.0 | GZ |
| Americas | 22 | 40000 | 10.0 | KO |
| Americas | 11 | 56000 | 4.0 | OS |
| Europe | 51 | 102000 | 12.0 | SD |
| Americas | 15 | 50000 | 11.0 | SN |
| Americas | 31 | 70000 | 10.0 | ST |
| Europe | 40 | 90000 | 9.0 | Su |

| Europe | 44 | 80000 | 15.0 | WP |
|---|---|---|---|---|

Table:  SHARE_DETAILS

| Code | Companyname | Share |
|---|---|---|
| AR | Arrows | 39 |
| KO | Konoco | 18.55 |
| SD | Sand Oil | 15.3 |
| WP | Wasp Petrol | 92.8 |

(b) Write SQL Queries: (4)

   i) Display the oil companies (Companyname) have a share price less than 50 or whose Profits were greater than 8.0.
   ii) Show the number of oil companies in each Headoffice.
   iii) Display Companyname, Headoffice, Profit, and Share of all oil companies.
   iv) List the details of oil companies whose Noofcountries less than 30 and Headoffice is Americas.

(c) Write the output of the following SQL commands: (2)

   i) SELECT Headoffice FROM OIL_COMPANY WHERE Noofemployees= ( SELECT MIN(Noofemployees) FROM OIL_COMPANY);
   ii) SELECT COUNT(Headoffice), COUNT(DISTINCT Headoffice), COUNT(*) FROM OIL_COMPANY;
   iii) SELECT SHARE_DETAILS.Code, Profits, Headoffice FROM SHARE_DETAILS, OIL_COMPANY WHERE SHARE_DETAILS.Code=OIL_COMPANY.Code AND Share <20.0 AND Headoffice='Europe';
   iv) SELECT Headoffice, Companyname FROM OIL_COMPANY OC, SHARE_DETAILS SD WHERE Noofemployees BETWEEN 50000 TO 60000 AND OC.Code=SD.Code;

6. (a) Obtain the Boolean Expression for the following logic circuit, which is made up of NAND gates only.(2)
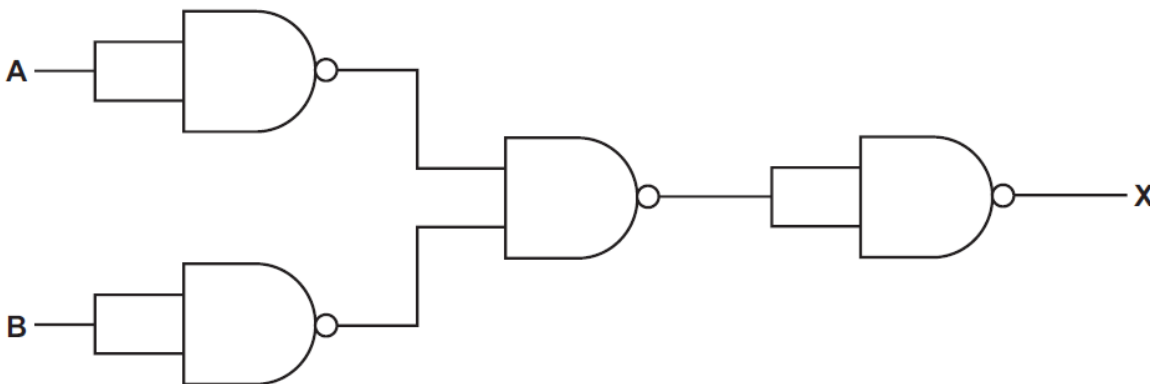


(b) State the DeMorgan's theorems and prove any one algebraically . (2)

(c). Obtain the minimal form for the following Boolean expression using Karnaugh Map: (3)

$$F(A,B,C,D) = M_1 \cdot M_3 \cdot M_4 \cdot M_5 \cdot M_6 \cdot M_7 \cdot M_{12} \cdot M_{13}$$

d) Convert the following Boolean expression into its equivalent Canonical Sum of Product form.     (1)

$$( U' + V' + W ) \cdot ( U + V' + W') \cdot ( U + V + W )$$

7. (a) Expand the following:     (1)
   - FDMA
   - CDMA

b) Five definitions are given on the left hand side of the diagram below. Five computer terms are shown on the right. By drawing arrows, connect each definition to the correct computer term.     (1)

| | |
|---|---|
| website that allows virtual communication; user joins a site and invites friends who, in turn, invite their own friends | chat room |
| technology that allows telephone calls to be made using computer networks, such as the Internet | social networking |
| online "place" where a group of people get together and discuss a number of topics | tagging |
| software that allows any user to freely create and edit a web page using their own web browser | VoIP |
| marking, saving and archiving certain websites or items (such as photos); for example, it allows users to track and organise favourite websites or photos | wiki |

(c) Name the following types of network topologies: Give one benefit and one drawback of networking computers.     (1)

**(i)**
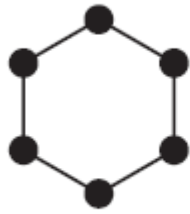


**(ii)**



d) State the difference between Virus and Worm. (1)

e) A football stadium has 25000 numbered seats.  During the season, supporters can buy tickets for matches at one of five ticket offices located in the city.  Supporters of the club are given a plastic card. The plastic card information that can be scanned into a computer. Supporters who attend more than five matches in a season are given a discount when they book for additional matches. The layout of the five ticket offices are given below:
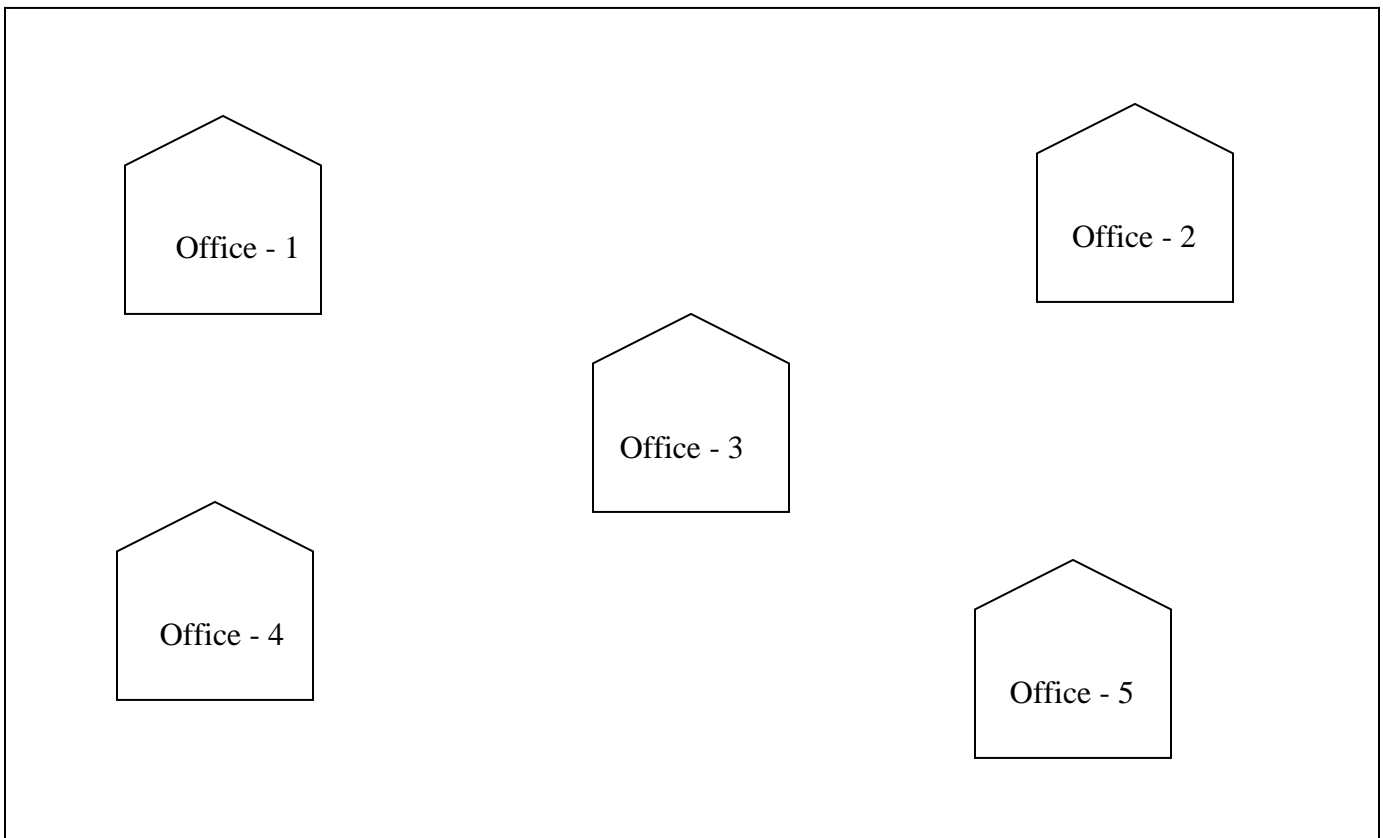


Office to Office distance (in KMs)

| From | To | Distance |
| --- | --- | --- |

| Office – 1 | Office -2 | 15 |
|------------|-----------|----|
| Office – 1 | Office - 3 | 3 |
| Office – 3 | Office – 2 | 3 |
| Office -1 | Office – 4 | 7 |
| Office – 2 | Office -5 | 7 |
| Office – 5 | Office – 4 | 15 |
| Office – 3 | Office – 4 | 6 |
| Office – 3 | Office – 5 | 6 |

Number of Workstations in each ticket office

| Ticket Office | Workstation |
|---------------|-------------|
| 1 | 5 |
| 2 | 3 |
| 3 | 7 |
| 4 | 5 |
| 5 | 3 |

The Stadium Manager likes to link all the ticket offices, so that each ticket office workstation will display which seats have not yet been sold, and no two supporters will get the same seat. As a network expert answer the following questions :

i) State the type of network used (1)
- Within the office
- Between the five offices

ii) Identify **two** items of hardware that affect communication speed. Communication between the offices needs speeding up. Outline **one** way in which the use of communications between the offices improves the working efficiency of the business. (1)

iii) Suggest the most appropriate office to install the server to keep track of the booking of tickets. (1)

iv) Draw an office to office cable layout to connect all the offices in the most appropriate manner for efficient communication. (1)

(f) What is proprietary software? (1)

(g) Name any two mobile phone operating systems. (1)


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