Computer Science - 2014

Group – A
(Multiple Choice Type Questions)

Q.1. (a) Name the header file to which the following belong:
(i) floor ( ) (ii) setw ( )

Ans. (i) malh.h (ii) isomanip.h

(b) How does a class accomplish data abstraction and encapsulation?

Ans. A class bind together data and its associated functions under one unit thereby enforcing encapsulation as encapsulation means wrapping up data and associated function together into a single unit. A class groups its members into three section private, public and protected. The private and protected members remain hidden from outside world. Thus through private and protected members, a class enforces data-hiding.

The outside world is given only essential and necessary information through public members, rest of the things remain hidden, where is nothing but abstraction. An abstraction means representation of essential features without including one background details or explanation.

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

```
struct emp;
{
    int id;
    char name [20];
private :
    getemp (void);
    showemp (void)
}
main ( )
{
    do
    {
        count<<in<<loop;
        counter++;
    }   while (1)
}
```

Ans.

```
class emp
{
    int id ;
    char name [20] ;
public ;
    void gatemp (void) ;
    void showemp (void) ;
} ;
void main ( )
{
    do
    {
        count << in << loop ;
        counter ++ ;
    } while (1) ;
}
```

undeclared variable in, loop and counter.

(d) Find the output of the following program.

```
#include <iostream.h>
#include <string.h>
#include<stype.h>
void funnystr (char * s, int n=2)
{
    int i = n;
    while (i < strlen (s))
    {
        s [i] = '-';
        i = i + n ;
    }
    i = 0 ;
    while (s [i] ! = '\0 ')
    }
        if (s [i] > 'A' && s [i] < 'P')
            s [i] = tolower (s [i]) ;
        else if (s [i] > 'a' && s [i] < 'p')
        {
            if (i % 3 == 0)
                s [i] = tolower (s [i-1]) ;
            else
                s [i] = tolower (s [i]) ;
        }
        i++ ;
    }
    void main ( )
    {
        char str [ ] = "MiCroSoFT" ;
        funnystr (str, 3) ;
        count << str ;
    }
```

Ans. mic-oS-11

(e) Find the output of the following program:

```
#include < iostream.h>
int update1 (int  b3)
{
    int  temp;
    temp = b3 - (b3%10+2) ;
    return  temp;
}
void update2 (int s1, int &s2, int s3 = 40)
{
    if (s1 > s2)
        s1  = s1 - 2 ;
    else
        s1 = s2 - s1 ;
    if   (s2 > s3)
        s2 = s3 - s3 ;
    else
        s2  = s2 - s3 ;
    s3 = update1 (s3) ;
    count << s1 << " ; " << s3 << " ; " s3 << endl ;
}
void main ( )
{
    int x, y, z ;
    x = 100 ; y = 200 ; z = 300 ;
    update2 (x, y, z) ;
    count << x << " ; " << y << " ; " << z << endl ;
    update2 (y, z) ;
    count << x << " ; " << y << " ; " << z << endl ;
}
```

Ans.
100 ; 100 ; 298
100 ; 100 ; 300
200 ; 260 ; 38
100 ; 100 ; 260

Q.2. (a) Reusability of classes is one of the major properties of OOP. How is it implemented in C++?

Ans. This pillar of object-oriented programming is usually called inheritance, but inheritance is actually one of several

techniques for achieving the broader goal of resusavility. Resuability means being able to create a new class that used the features of an existing class without recoding those features. There are actually several ways to achieve reusability in object-oriented programming.
Inheritance means reusing code in a hierachical structure. For instance, a Basic Programmer is a Programmer is a Worker is a Person, is an Animal. All Animals have heads, and therefore the Head property of a Basic Programmer should inherit all the general features of Animal heads plus all the features of Person heads plus all the features of Worker heads plus all the features of Programmer heads. When creating a Head property for a Basic Programmer object, you should need to write only the head code unique to Basic Programmers. There's a lot of debate in the object-oriented community about the value of deep levels of inheritance such as the one described above, but there's no doubt that inheritance can be a useful way to achieve reusability.

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

```
class serial
{
    int serial code ;
    char title [ 20 ] ;
    float duration ;
    int no_of_episode ;
public :
    serial ( )          // function 1
    { duration = 30 ;
    no_of_episode = 10 ;
    }
    serial (int d, int noe) // function 2
    { duration = d ;
    no_of_episode = noe ;
    }
    serial (&s1)        // function 3
    { }
    ~serial ( )    // function 4
    {
        count << "Destroying Object" << endl ;
    }
} ;
```

(i) Complete definition of function 3.

(ii) Give example how function 1 and function 2 get executed when object is created.

Ans. (i)

```
serial (serial &s1)
{
    duration = s1. duration ;
    no_of_episode = s1. no_of_episode ;
}
```

(ii) Function 1 is executed when no argument passed through the special member function serial i.e. constructor member function no argument.
Function 2 is executed when two arguments passed through the special member function serial i.e. constructor member function with two arguments.

(c) Define a class Bank to represent the bank account of a customer with the following specifications :

Private Members:

- **Name** of type character array (string)
- **Account_no** of type long
- **Type_of_account** (S for Savings Account, C for Current Account) of type char
- **Balance** of type float)

Public Members :

A constructor to initialize data members as follows:

- **Name** NULL
- **Account_no** 100001
- **Type_of_account** 's'
- **Balance** 1000

A function New Account ( ) to input the values of the data members Name, Account_no, Type_of_account and Balance with following two conditions:

- **Minimum Balance for Current account is Rs. 3,000**
- **Minimum Balance for Savings account is Rs. 1,000**

A function Deposit ( ) to deposit money and update the Balance amount.

A function Withdrawal ( ) to withdraw money. Money can be withdrawn if minimum balance is as >=1000 for Savings account and >=3000 for Current account.

A function Display ( ) which displays the contents of all the data members for an account.

Ans.

```
class bank
{
    private: char name [10] ;
        long int account_no ;
        char typeofacc ;
        float balance ;
    public: bank ( )
        {
            name [ ] = " " ;
            account_no = 100001 ;
            typeofacc = 'S' ;
            balance =1000 ;
        }
        void new_account ( )
        {
            count <<"Enter your name:" ;
            cin >> name ;
            count <<"Enter your Account No:" ;
            cin >> account_no ;
            count <<"Enter your Account Type:" '
            typeofacc = getchar ( ) ;
            cout <<"Enter your Min. Balance Rs.
                    1000/- for Saving and" ;
            count <<"Rs. 3000/- for Current:" ;
            cin >> balance ;
        }
        void deposit ( )
        {
            float amount ;
            long int account_no1 ;
            cout <<"Enter Deposit Amount:" ;
            cin >> amount ;
            cout <<"Enter your Account No:" ;
            cin >> account_no1 ;
            if (account_no==account_no1)
                balance=balance+amount;
        }
        void withdrawal ( )
        {
            float w_amount;
            long int account_no1;
            cout <<"Enter Withdrawal Amount:";
            cin>w_amount;
            cout <<"Enter your Account No:";
            cin>>account_no1;
            if (account_no==account_no1 &&
                typeofacc='s' && balance>1000)
                balance=balance-w_amount;
            if (account_no==account_no1&&
                typeofacc='s' && balance>=3000)
                balance=balance-w_amount;
        }
        void display ( )
        {
            count <<"Name:";
```

```
        cout << name;
        cout << "Account No.";
        cout << account_no;
        cout <<"Account Type:";
        putchar(typeoface);
        cout <<"Balance";
        cout << balance;
    }
};
```

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

```
class livingbeing
{
    char specification [20] ;
    int averageage ;
public :
    void read ( ) ;
    void show ( ) ;
} ;
class ape:private livingbeing
{
    int no_of_organs, no_of_bones ;
protected :
    int iq_level ;
public :
    void readape ( ) ;
    void showape ( ) ;
} ;
class human : public ape
{
    char race [20] ;
    char habitation [30] ;
public :
    void readhuman ( ) ;
    void showhuman ( ) ;
} ;
```

(i) Name the members which can be accessed from the member functions of class human.

(ii) Name the members, which can be accessed by an object of class human.

(iii) What will be the size of an object (in bytes) of class human?

(iv) Name the class (es) that can access read ( ) declared in livingbeing class.

(v) What is protected access mode in OOP?

Ans. (i) Data Members: int iq_level;
char race [20];
char habitation [30];
Member Functions: void readape(); void showape(); void readhuman(); void showhuman();

(ii) Member Functions: void readape();
void showape();
void readhuman();
void showhuman();

(iii) 78 bytes

(iv) Member Functions: void readape();
void showape();

(v) **Protected visibility mode:** The protected derivation means that the derived class can access the public and private members of the base class protected. With protected by derived class, the public and protected members of the base class become protected members of the derived class. That means the inherited members are now not available to the outside world and can be accessed only through the member functions of the derived class and the classes based upon the derived classes. These members can be inherited further if any classes are inheriting from the derived class.

Visibility Mode	Inheritable public member becomes (in derived class)	Inheritable protected member becomes (in derived)
Protected	Protected	Protected

Q.3. (a) **Write a function in C++ which accepts an integer 2D array, its size and row number as arguments and display the sum of particular row.**

If 2D array is $\begin{bmatrix} 1 & 5 & 9 & 13 \\ 2 & 6 & 10 & 14 \\ 3 & 7 & 11 & 15 \\ 4 & 8 & 12 & 16 \end{bmatrix}$

row NUmber is 3.
Then 3 + 7 + 11 + 15 = 36.
Output is : Sum = 36.

(b) **An array S[40] [30] is stored in the memory along the row with each of the elements occupying 2 bytes. Find out the memory location for the element S[15] [5], if an element S[20] [10] is stored at the memory location 5500.**

(c) **Write a user defined function in C++ which intakes one dimensional array and size of array as argument and find sum of elements which are positive.**
If 1D array is 10, 2, -3, -4, 5, -16, -17, 23,
then positive numbers in above array is 10, 2, 5, 23
Sum = 10 + 2 + 5 + 23 = 40
Output is 40

(d) **Evaluate the following Postfix expression showing the stack contents.**
2, 4, *, 3, -, 10, 5, +, /

Ans. (a)
```
void sumrow (intr, intc, int a[r][c], int r)
{
    int s=0;
    for(int i=0;i<c;i++)
        s=s + a[r] [i];
    cout <<"Sum of "<<r<<"row:"<<s<<endl;
}
```

(b) Give No. of Rows R = 40
No. of Column C = 30
Element size W = 2
Base Address B = ?
Lowest Row I_r = 0
Lowest Column I_c = 0
Given that s[20] [10] has address = 5500

$s = > \quad [P][Q] = B + W(C(P-I_r)+(Q-I_c))$
$5500 = B + 2(30(20-0) + (10-0))$
$5500 = B + 2(30(20) + (10))$
$5500 = B + 2(30 * 30)$
$5500 = B + 1800$
$B = 3700$
$=> s[I][J] = s[15][5]$
$= B + W(C(I-I_r) + (J-J_c))$
$= 3700 + 2(30(15-0) + (5-0))$
$= 3700 + 2(30(15) + (15))$
$= 3700 + 2(30 * 20)$
$= 3700 + 2 * 600$
$= 3700 + 1200$
$= 4900.$

(c)
```
void sumofpos (int a[], int n)
{
    int s=0;
    for (int(i=0; i<n; i++)
    {
        if(a[ i ]>0)
        s=s+a[ i ];
    }
    cout <<"Sum of +ve Nos.:" <<s<<endl;
}
```

(d) 1. 2 : operand : PUSH 2

2. 4 : operand : PUSH 2,4
3. *:binary operator : POP 2 elements #
4. Calculate 2 * 4 = 8
5. PUSH back the result 8
6. 3 : operand : PUSH 8, 3
7. -:binary operator : POP 2 elements #
8. Calculate 8-3 = 5
9. PUSH back the result 5
10. 10 : operand : PUSH 5, 10
11. 5 : operand : PUSH 5,10,5
12. + : binary operator : POP 2 elements 5
13. Calculate 5 + 10 = 15
14. PUSH back the result 15, 5
15. /:binary operator : POP 2 elements #
16. Calculate 15/5=3
17. PUSH back the result 3
18.): end of expression : POP and display the result. The result is 3

Q.4. (a) Write a C++ statement that reads 15 bytes from 35th byte onwards from an input stream file.

(b) Write a function in C++ to count the number of lines present in a 'chapter.txt' file.

(c) Given a binary file 'AMOUNT.DAT', containing records of the given class outstand type.

```
class outstand
{
    int memno ;
    int outamt ;
public :
    void get it ( )
    {   cin >> memno >> outamt ;        }
    void put it ( )
    {   count << memno << outamt ;      }
    int returnamt ( )
    {   return outamt ;         }
} ;
```

Write a function in C++ to write objects having outamt more than Rs. 10,000 into CRITICAL.DAT file.

Ans. (a)

```
istream & seekg (35, 15);
        OR
ifstream F;
F seekg (35, 15);
```

(b)

```
void countline ()
{
    ifstream FIL ("chapter.txt") ;
    int lines = 0;
    char str [80];
    while (FIL. getline(str,80))
        lines++;
    cout<<"No. of Lines."<<lines<<endl;
}
```

(c)

```
void outmat 1()
{
    ifstream fin;
    ofstream foul;
    fin.open("amount.dat",ios::in|ios::out|ios;:binary);
    fout.open("critical.dat",ios::in|ios::out|ios::binary);
    outstand obj;
    while (!fin.eof())
    {
        fin.read ((cahr*) &obj, sizeof(obj));
        if(obj.returnamt()>1000)
            fout.write((char*) &obj,sizeof(obj));
    }
    fin.close();
    fout.close();
}
```

Q.5. (a) What is data independence? How is logical data independence different from physical data independence?

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

EMPLOYEE

W_ID	FIRSTNAME	LASTNAME	CITY
102	SAM	TONES	PARIS
105	SARAH	ACKERMAN	NEW YORK
144	MANILA	SENGUPTA	NEW DELHI
210	GEORGE	SMITH	HOWARD
255	MARY	JONES	HUSTON
300	ROBERT	SAMUEL	WASHINGTON
335	HENRY	WILLIAMS	BOSTON
400	RONNY	LEE	NEW YORK
451	PAT	THOMPSON	PARIS

DESIG

W_ID	SALARY	BENEFITS	DESIGNATION
102	75000	15000	MANAGER
105	85000	25000	DIRECTOR
144	70000	15000	MANAGER
210	76000	12500	MANAGER
255	50000	12000	CLERK
300	45000	10000	CLERK
335	40000	10000	CLERK
400	32000	7500	SALESMAN
451	28000	7500	SALESMAN

(i) Display First Name and City of Employee having salary between 50,000 and 90,000.

(ii) Display details of Employees who are from "PARIS" city.

(iii) Increase the benefits of employee having W_ID = 210 by 500.

(iv) Count number of employees whose name starts from character 'S'.

(v) Select MAX (salary) from DESIG.

(vi) Select First Name from employee, design where designation = 'MANAGER' and employee, W_ID = desig. W_ID.

(vii) Select COUNT (DISTINCT designation) from DESIG.

(viii) Select designation, SUM (salary) from DESIG Group by designation having count (*) > 2 ;

Ans. (a) Date Independence: The separation of metadata (data description) from the application programs that use the data is called data independence. In the database environment, it allows for changes at one level of the database without affecting other levels. These changes are absorbed by the mappings between the levels. This property of data systems allows an organisation's data to change and evolve (within limits) without changing the application programs that process the data.

In physical data independence, the conceptual schema in sulates the users from changes in the physical storage of the data. Changes to the internal schema, such as using different file organisations or storage structure, using different storage devices, modifying indexes or hashing algorithms, must be possible without changing the 'conceptual or external schemas.

In logical data independence, the users are shielded from changes in the logical structure of the data or changes in the choice of relations to be stored. Changes to he conceptual schema.

(b) (i) select e.firstname, e.city from employee e,desig d
Where e.w_id = d.w_id and (d.salary>=50000 and d.salary<=90000);

(ii) select e.w_id, e.firstname, e.lastname, e.city, d.salary, d.benefits, d.designation from employee e.desig d where e.w_id=d.w_id and e.city='parts';

(iii) update desig set benefits=benefits+500 Where w_id = 210;

(iv) select count(firstname) from employee Where firstname like 's%'

(v) output: 85000

(vi) output: Sam
Manila
George

(vii) output: 4

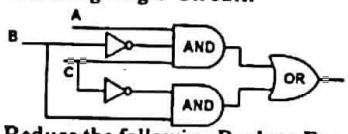
(viii) output: clerk 135000
Manager 220000

Q.6. (a) State Involution Law and verify the same using truth table.

(b) Write the Product of Sum from the function F (X, Y, Z). Truth table representation of F is given below:

X	Y	Z	F
0	0	0	0
0	0	1	1
0	1	0	0
0	1	1	0
1	0	0	1
1	0	1	1
1	1	0	0
1	1	1	1

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



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

$F(A,B,C,D) = \sum(0,2,4,5,6,7,8,10,13,15)$

Ans. (a) Involution Law states $\overline{\overline{X}} = X$

Truth Table for $\overline{\overline{X}} = X$

X	$\overline{X}$	$\overline{\overline{X}}$
0	1	0
1	0	1

(b) $(X+Y+Z).(X+Y'+Z).(X+Y'+Z').(X'+Y'+Z)$

(c) $A\overline{B}C+B\overline{C}$

(d)

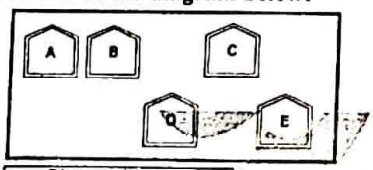
	$\overline{C}\overline{D}$	$\overline{C}D$	CD	$C\overline{D}$
$\overline{A}\overline{B}$	1			1
$\overline{A}B$	1	1	1	1
AB		1	1	
$A\overline{B}$	1			1

Result: $\overline{B}\overline{D}+\overline{A}B+BD$

Q.7. (a) Write one advantage and disadvantage of Ring Topology.

(b) Differentiate between HTML and XML.

(c) Standard Bank has set up its new centre in India for its office and web based activities. It has five buildings as shown in the diagram below:



Distance between Various buildings	
A to B	50 Mts
B to C	30 Mts
C to D	30 Mts
D to E	35 Mts
E to C	40 Mts
D to A	120 Mts
D to B	45 Mts
E to B	65 Mts

No. of computers	
A	55
B	150
C	60
D	55
E	70

(i) Suggest a possible cable layout for connecting the buildings.

(ii) Suggest the most suitable place to install the server for this organization with a suitable reason.

(iii) Suggest the placement of the following devices with justification:
- **(a) Hub / Switch**
- **(b) Modem**

(iv) The company wants to link its head office in 'A' building to its office in Sydney.
- **(a) Which type of transmission medium is appropriate for such a link?**
- **(b) What type of network does this connection result into?**

Ans. (a) Ring Topology: A LAN using the ring topology is connected in the closed loop. The data packets transmitted, circulate along the ring. The destination station copies the packet content on recognizing its address on the packet. After a packet travels a full circle, it is removed at the source station.

Advantage-
1. Short cable length and simple writing layout
2. Resilient Architecture

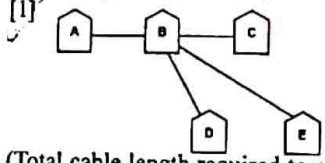
Disadvantages-
1. Fault diagnosis is difficult.
2. Fault isolation is difficult.

(b) **HTML:** Hyper Text Markup Language is a document layout and hyperlink specification language, used for creating web pages.

XML: XML is a eXtensible Markup Language for creating documents containing structured information. In HTML, both tag semantics and log set are fixed but, XML specifies neither semantics nor tagset. Rather it provides a facility to define tags and relationships among them.

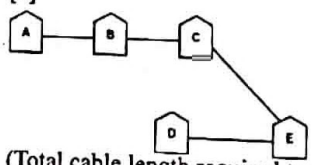
(i) The possible cable layouts can be

[1]



(Total cable length required to connect buildings through this layout = 190 mts)

[2]



(Total cable length required to connected buildings = 155 mts.)

(ii) Thicknet coax cable as these can support networks of upto 500 meters (1640 ft.)

(iii) (a) In both above the layouts, a hub/switch each would be needed in all the buildings, to interconnect the group of cables from the different computers in each building.
(b) Modem is placed in building B.

(iv) (a) Satellite as it can cannot offices across globe.
(b) WAN (Wide Area Network).

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