his question paper contains 10 printed pages.]

**Your Roll No.....**

. **No. of Question Paper** : **46** **I**

nique Paper Code : 32341101

ame of the Paper : Programming Fundamentals using C++

ame of the Course : **B.Sc. (H) Computer Science**

emester : I

uration : 3 Hours Maximum Marks : 75

**nstructions for Candidates**

Write your Roll No. on the top immediately on receipt of this question paper.

The question paper consists of **two** Sections. Section **A** is compulsory.

Attempt any **four** questions from Section **B.**

## Section A

a) Write a single C++ statement to calculate following (assuming variables ***a***, ***b*** and ***c*** are already declared as integers): 2

$$c = \frac{\sqrt{a^2 + b^2}}{4a}$$

b) Consider three integer variables initialized as: ***x=1***, ***y=0***, and ***z=1***. What are the values of ***x***, ***y***, and ***z*** after executing the following code segment? 2

P.T.O.

```
if(x>y&&x>z)
{
   y=x;
   z=x+1;
}
else if(x+y>=z)
{
   x++;
   z=x+1;
}
else y=z+x;
```

c) Given the following declarations: 2

```
int num=10;
int *val=&num;
```

What will be printed on execution of following statements (consider each part independent of other)?

(i) `cout<<*val;`

(ii) `cout<<(*val+1)*2;`

d) Find output of each of the following code segments: 2X4

(i)
```
String s1="Hello",s2="Beautiful world!!! ";
String s3="Be Happy";
String s=s1+"  "+s2+"  "+s3;
s.append(5,'! ');
cout<<s<<endl;
cout<<s.rfind("Be");
```

(ii)
```
void main()
{
     int val=1;
     do
     {
          val++;
          ++val;
      }while(val++>25);
      cout<<val;
 }
```

(iii)
```
int x=0,y=0,z=1;
     if(z<x||y>=z&&z==1)
          if(z&&y)
               y=1;
          else
               x=1;
        cout<<x<<" "<<y<<" "<<z;
```

(iv)

```
class Base
{
   public:
      void print()
      {
         cout<<"\n Print Base Class";
      }
      virtual void show() = 0;
};

class Derived:public Base
{
   public:
     void print()
     {
        cout<<"\nPrint Derived Class";
     }

     void show()
     {
        cout<<"\n Show Derived Class";
     }
};

void main()
{
   Base *Bptr;
   Derived D;
   Bptr = &D;
   Bptr->print();
   Bptr->show();
}
```

e) Find error(s) (if any) in each of the following code segments: 2+2

(i)

```
int func1(int *aa,int &bb)
{
      &bb=8;
      aa[0]=bb;
}
```

(ii)

```
class Fun
{
      private:   int x;
      protected: int y;
      public:    int z;
};
```

P.T.O.

```
class Funny:public Fun
{
    private:    int u;
    protected:  int v;
    public:     int w;
};

void main()
{
     Fun fun;
     Funny funny;
     fun.z = 2;
     funny.y =12;
     funny.u= 5;
     funny.z=10;
 }
```

f) What is a copy constructor? Illustrate the use of copy constructor with the help of an example. 1+2

g) Give one word answer for the following: 4

(i) In the following declaration for the class **Test**, indicate scope of the variable ***x (private, public or protected).***

```
class Test
{   int x;
};
```

(ii) Consider the following code segment:

```
class base
{   public:
        int x;
        int y;
};
class derived : private base
{...};
```

Indicate access scope of variables x and y in the **derived** class.

(iii) Which type of class variable(s) can be accessed by a ***static*** member function of a class?

(iv) What do we call a class that has at least one pure virtual member function?

h) Write a function named `replace` with the following prototype: 4

```
String replace(String str1);
```

The function returns a new string obtained by substituting all the lower case letters by uppercase letters in the string ***str1*** passed to it as a parameter. For example, for the input string `"Hello World!!!"`. The function should output `"HELLO WORLD!!!"`

i) Write a function that returns the sum of first n terms of the following series: 4

$$\sum_{i=1}^{n} \frac{2}{i^2}$$

j) Given the following declaration: 2

```
float num = 576.21f;
```

What will be printed on executing the following **cout** statement?

```
cout<<"The tax is"<<setw(8)
    << setprecision(6)<<num;
```

## Section B

2 a) Rewrite the following code segment using a ***switch*** statement: 2

```
if(ch=='A'||ch == 'a')
        countA++;
elseif(ch=='B'||ch=='b')
        countB++;
elseif(ch=='C'||ch=='c')
        countC++;
else
        cout<<"Error-Not A, B, or C \n";
```

b) Consider three integer variables to be initialized as: ***x=4, y=7*** and ***z=-4***. What are the values of ***x, y*** and ***z*** after evaluation of each of the following expressions (consider each part independent of other)? 4

(i) `x++ + y - z--`
(ii) `++x + 2`
(iii) `x-1 + y++ + ++z`
(iv) `++z + ++y + x--`

P.T.O.

c) Assume that you are provided a function named ***fact*** to find the factorial of any number (passed to it as a parameter) with the following prototype: 4

```
int fact(int num);
```

Using this ***fact*** function, write a program to print the factorial of first ***n*** even numbers.

3 a) Find output of the following code segment: 4

```
void main()
{
    int i,j;
    for(i=10; i>=0; i--)
    {
        cout<<" \n ";
        for(j=i; j>=0; j--)
        {
          cout<<j;
          if(j==5) break;
        }
    }
}
```

b) Assuming you are given with two 2-Dimensional matrices $A_{n\times n}$ and $B_{n\times p}$. Write program segments to perform the following matrix operations: 3+3

(i) $A\times B$ (Multiplication of two matrices)
(ii) $A^T$ (Transpose of the square matrix)

4 a) Find output of the following code segment: 2

```
void main()
{
     int arr[]={1, 2, 3, 4, 5, 6, 7, 8, 9};
     int *ptr1, *ptr2;
     ptr1=arr;
     ptr2=ptr1+2;
     cout<<ptr2-ptr1;
}
```

b) Find error(s) in the following code segment: 3

```
class X
{
     private:
          int i,j;
          X() { i=1; j=1;}
     virtual void show()=0;
     public:
            void print()
             {
                    cout<<i<<" "<<j;
             }
    }
class Y: public X
{
         int k;
       public:
         void print()
         {
                cout<<k;
         }

         Y()
         {i=j=k=2;}

};
void main()
{ Y w;
  w.print();
}
```

c) Write a program that reads a text file, say, ***Test.txt*** and prints the total number of vowels in it. 5

5 a) Find output of the following: 2

```
class polygon
{
    protected:

       int width,height;
    public:
       void set_values(int a, int b)
       {
          width=a; height=b;
       }
};
class output1
{
```

P.T.O.

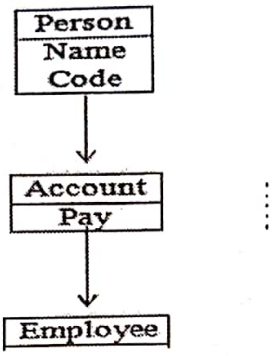
```
    public:
        void output(int i);
};

void output1::output(int i)
{
      cout<<i<<endl;
}

class rectangle:public polygon,public outpu
t1
{
 public:
     int area()
     {
        return(width * height);
     }
};
class triangle:public polygon,public output
1
{
 public:
      int area()
      {
        return (width*height/2);
      }
};
void main()
{
      rectangle rect;
      triangle trgl;
      rect.set_values(4, 5);
      trgl.set_values(4, 5);
      rect.output(rect.area());
      trgl.output(trgl.area());
}
```

b) Name the header files for the following operations: 2

(i) Console input and output.
(ii) Using formatting functions like ***setw()***

c) Declare the classes **Person, Account** and **Employee** having inheritance hierarchy shown in the figure below. Create the required objects to demonstrate runtime polymorphism for the following operations: 6

(i) Accept the information of an employee.
(ii) Display information of an employee.




6 a) Rectify the error (if any) in each of the following statements: 4

(i) `cout>>put(c);`
(ii) `cin<<get(c);`
(iii) `cout.get(c);`
(iv) `cin.put(c);`

b) Define a function ***mysqr*** with the following prototype: 2+4

```
int mysqr(int n);
```

Write a program to compute the square of a number using this function. The input value **n** given to this function must be tested for validity and if found negative, this program should raise an exception that must be caught.

7 a) Write C++ declarations/definitions for the following: 4

(i) A function ***func1*** accepting a reference to a floating point number, a string and an array of integers. It returns a pointer to a character.
(ii) A two dimensional integer array ***A*** of size 3 rows and 4 columns with each of its elements initialized to zero.
(iii) Initialize a static member $x$ of a class ***Test*** to 100.
(iv) A parameterized constructor for a class ***Test1*** having three integer arguments ***x, y*** and ***z,*** where, ***y*** is a default argument.

P.T.O.

b) Create a class **`Location`** consisting of data members **`longitude`** and **`latitude`**. Write the following member functions for this class: 2+4

(i) A parameterized constructor to initialize the data members.
(ii) A function for overloading + operator to add two **`Location`** objects.

This question paper contains 4+2 printed pages]

Roll No. | | | | | | | | | | | |

S. No. of Question Paper : 47

Unique Paper Code : 32341102 I

Name of the Paper : Computer System Architecture

Name of the Course : B.Sc. (H) Computer Science

Semester : I

Duration : 3 Hours Maximum Marks : 75

*(Write your Roll No. on the top immediately on receipt of this question paper.)*

Question No. 1 is compulsory.

Attempt any 4 questions out of Question Nos. 2 to 7.

Parts of a question must be answered together.

1. (*a*) Convert the following numbers with the indicated bases to decimal : 2

(*i*) $(121121)_3$

(*ii*) $(4310)_5$.

(*b*) Given the Boolean expression $F = x'y + xyz'$, show that $F.F' = 0$. 2

P.T.O.

47

(*c*) Draw a block diagram and function table of 4-to-1 line multiplexer. 2+2=4

(*d*) Simplify the following Boolean function using a three-variable Karnaugh map : 4

$$F(x, y, z) = \Sigma(1, 2, 3, 6, 7).$$

(*e*) Differentiate between a direct and an indirect address instruction. How many references to memory are needed for each type of instruction to bring an operand into a processor register ? 2+2=4

(*f*) Explain the purpose of Auto-increment and Auto-decrement addressing modes. 2

(*g*) Write *two* instructions needed in the basic computer in order to set the extended bit E to 1. 2

(*h*) Specify the 14-bit binary control word that must be specified to the processor in terms of SELA, SELB, SELD and OPR to implement the following micro-operation :

$$R1 \leftarrow R2 - R3.$$

Where the binary code for OPR is 00101, and the three bit binary code for the selecting the register corresponds to the register number. 2

(*i*) Determine the number of clock cycles that it takes to process 150 tasks in a six-segment pipeline. 2

(*j*) List *three* uses of an I/O processor. 3

(*k*) What is Content Addressable Memory (CAM) ? Explain its hardware organization with the help of a block diagram. 1+3=4

(*l*) Write micro-operations for implementing the following memory reference instructions : 2+2=4

(*i*) BUN

(*ii*) STA.

2. (*a*) Explain why each of the following register transfer language statements cannot be directly executed in a basic computer. Also specify the right sequence of micro-operations that will be required to perform these operations : 2+2=4

(*i*) $IR \leftarrow M[PC]$

(*ii*) $AC \leftarrow AC + TR$.

P.T.O.

7. (*a*) Design full adder and derive the Boolean expressions for sum and carry outputs of the full adder. 6

(*b*) A computer uses a memory unit with 1024K words of 32 bits each. A binary instruction code is stored in one word of memory. The instruction has 4 parts : an indirect bit, an operation code, a register code part to specify one of 128 registers and an address part : 4

(*i*) How many bits are there in the data and address lines ?

(*ii*) Draw the instruction word format and compute the number of bits required for each part.

[This question paper contains 10 printed pages.]

**Your Roll No.....**

**Sr. No. of Question Paper : 844** **I**

Unique Paper Code : 32345102

Name of the Paper : Introduction to Programming

Name of the Course : **Computer Science : Generic Elective for Honours**

Semester : I

Duration : 3 Hours Maximum Marks : 75

**Instructions for Candidates**

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Question **1** is compulsory.
3. Attempt any **five** questions out of **Q.2** to **Q.8.**
4. Parts of a question must be answered together.

1. (a) Write a statement that uses the ternary conditional operator to set an integer variable `ticket` to `1` if `speed` is greater than `55` and `0` otherwise. (2)

(b) Write a single C++ statement that outputs the string `Generic Elective I` and the number `75` as shown below: `Generic Elective I 75` (2)

(c) An integer variable `temp` has the initial value 10. Write a C++ statement that uses a prefix decrement operator to decrease the value of `temp` to 9. (1)

P.T.O.

(d) Declare a structure named `employee` for storing employee details (`name, salary, age, gender`). (3)

(e) Rewrite the following C++ code snippet using a for loop:

```
x=1;n=10;
while(x<n)
{
   cout<<x<<"\t";
   ++x;
}
```
(2)

(f) Write C++ statements to:

1) Define a constant `N` to be `100`.

2) Declares a one dimensional array called `dArray` of type `double` that holds `N` elements.

3) Display the tenth element of the array `dArray`.
(2)

(g) What will be the output of following C++ code segment:

```
int age =9;
cout<<age++;
```
(1)

(h) Give the output of the following C++ code snippets:

i)
```
while(0)
   cout << "I am inside while " << endl;
cout << "I am outside while " << endl;
```
(1)

ii)
```
for (int i = 1; i <= 10; i++)
    if(i%2 == 0) cout << i <<" ";
```
(2)

iii)
```
int i = 10;
for (; i<13 ; i++)
    cout<<"I am inside for loop "
    << endl;
```
(2)

(i) What is wrong with the following code snippet?

```
class First{
  int a;
  public:
    First(int i)
    {
      a = i;
    }
    void set(int n)
    {
      a = n;
    }
    void disp()
    {
      cout << "a = " << a << "\n";
    }
};
int main()
{
```

```
    First  obj1;
    obj1.set(2);
    obj1.disp();
    return  0;
}
```

(3)

(j) Declare a class `Student` that is publicly derived from a class `Person`. Assume suitable data and member functions and their types. Function definitions are not required. (4)

2. (a) A ten-digit phone number, such as `2127678900`, has three parts: a 3-digit area code (such as `212`), a 3-digit exchange (such as `767`), and a 4-digit number (such as `8900`). Write a C++ program that uses a structure named `phone` to store these three parts of a phone number separately. Declare and initialize a structure variable of type `phone`. Also write C++ statements to display this phone number. (6)

(b) Write a C++ program to display the first `n` even numbers, where `n` is a user entered parameter. (4)

3. (a) Write a C++ program that asks the user to enter the number of rows (`r`) and number of columns (`c`) of a 2-dimensional integer matrix `marks`. Here, `r` and `c` respectively refer to student ID and subject. Each cell value depicts the marks obtained by a student in a particular subject. Accept the `marks` matrix of order `r*c` from the user. Find the total marks for each student. (6)

(b) Write a C++ program to print squares of numbers entered by the user using a while loop. When the number entered is negative, the loop should be exited. (4)

4. (a) Write a function `count in C++` that accepts a one dimensional array `list` of integers. Also accept an integer variable `num` from the user. The function `count` returns the number of occurrences of `num` in `list`. Call this function from `main()` and display the result in `main()`. (4)

(b) Write a C++ program that accepts two floating point numbers from the user and displays the following menu.

```
1. Multiply
2. Divide
```

According to the choice entered by the user, the program employs a switch statement to perform the desired operations and display the result. (6)

5. (a) Find the errors in the following code snippet and give reasons for the same:

```
class C1
{
  int i;
  public:
```

```
    C1()
    {
      i=0;
    }
  protected:
    int  k;
};
class  C2  :  public  C1
{
  public:
    void  add()
    {
      cout  <<  k  +  i;
    }
};
int  main()
{
  C1  obj1;
  C2  obj2;
  cout<<obj1.i;
  obj2.add();
}
```

(4)

(b) What is the output for the following code snippet?

```
i) int  x  =  5,  y  =  7;
   if  (x  =  y)
```

```
        cout << x << " is same as " <<
        y << endl;

      else
        cout << x << " is not same as "
        << y << endl;
```

(2)

ii)
```
int i = 15 ;
for (int j = 2 ; j <= i/2; j++)
  if ( i%j == 0 )
    cout <<j<< " is a factor of "
    <<i<< endl;
```

(4)

(a) Create a class `Triangle` having three floating point data members (`side1`, `side2` and `side3`) corresponding to the three sides of the triangle. (2)

(b) Define a parameterized constructor for the `Triangle` class which takes three parameters to set the three sides of the triangle. (2)

(c) Define member functions for the following :

(i) Display the sides of the triangle

(ii) The function should return zero if the triangle is not equilateral and one otherwise. An equilateral triangle has all the three sides equal. (3)

P.T.O.

(d) Create an object of `Triangle` class in main function and show usage of the above member functions. (3)

7. (a) Create a class `Building` having the following integer data members:

`no_Rooms, no_Floors and Area.`

Derive the following two classes from `Building`:

1) `House` with two integer variables `no_bedrooms, no_washrooms`

2) `College` with two integer variables `no_classrooms, no_offices` (6)

(b) Write a function `factors()` in C++ that accepts an integer parameter `num` from the function `main()`. The function `factors()` returns the sum of all the factors of `num`. Recall that a number n is said to be a factor of m if n divides m. For example, 3 is a factor of 6; but 3 is not a factor of 7. (4)

8. (a) Declare a structure `Time` that includes three integer variables viz. `hours, minutes and seconds`. Declare a `Time` type structure variable `CurrentTime`. Write a C++ statement that sets `hours` member of the `CurrentTime` structure variable equal to 11, `minutes` member of the `CurrentTime` structure variable equal to 25 and `seconds` member of the `CurrentTime` structure variable equal to 12. (3)

(b) What is the output of the following code snippet?

```
char ch = 'x' ;
switch( ch )
{
   case 'a' :
   case 'e' :
   case 'i' :
   case 'o' :
   case 'u' :
   cout <<" Vowel "<< endl;
   default : cout <<" Consonant "<< endl;
}
```

(2)

(c) What is the output of the following code snippet?

```
void MyFunction(int a, int b = 40)
{
  cout<<" a = "<< a <<" b = "<< b << endl;
}
int main()
{
  MyFunction(20, 30);
  return 0;
}
```

(2)

(d) What is the output of the following code snippet?

```
class A{
    int k;
    public:
        A()
        {
            k=1;
        }
        void set(int n)
        {
            k = n;
        }
        void disp()
        {
            cout << "k = " << k << "\n"
        }
};
A f()
{
    A ob;
    ob.set(50);
        return ob;
}
int main()
{
    A obj1;
    obj1.disp();
    obj1 = f();
    obj1.disp();
    return 0;
}
```

[This question paper contains 8 printed pages.]

**Your Roll No.....**

**Sr. No. of Question Paper : 48** **I**

Unique Paper Code : 3234301

Name of the Paper : Data Structures

Name of the Course : **B.Sc. (H) Computer Science**

Semester : III

Duration : 3 Hours Maximum Marks : 75

**Instructions for Candidates**

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Section **A** is Compulsory.
3. Attempt any **4** questions out of **6** questions from Section **B**.

## Section A

1. (a) Evaluate the following postfix expression using stack, showing stack after each step.

   12 7 3 – / 2 1 5 + * + (4)

   (b) Consider the following list of numbers :

   12, 28, 45, 53, 62, 76, 90, 95, 100

P.T.O.

To search a given number in the above list, which of the searching technique (linear/binary) is better suited and why? (2)

(c) An array A of integers with size 2×3 is stored in memory in column-major order, base address of A is 100, and each integer takes 4 bytes of memory. Find the address of A[1,2]. (3)

(d) The elements of the following sequence are inserted in a binary search tree one by one.

40, 30, 42, 5, 7, 23, 9, 19

Show the binary search tree after every insertion. What is the height of the binary search tree you have constructed? (4)

(e) Give an example of a situation where an array will be preferred over linked list. (2)

(f) What is the maximum numbers of passes required to sort list of n numbers using bubble sort algorithm?

Give first two passes required to sort the following sequence: in ascending order using bubble sort.

45, 23, 10, 9, 1, 40, 100, 25, 65, 90 (4)

(g) Draw all possible binary search trees that can be generated with three nodes having key values A, B, and C. (5)

(h) Find the post order traversal of the tree if its preorder and inorder traversals are given below:

Preorder traversal: 1,2,4,8, 5,10,3,6,11,7,12

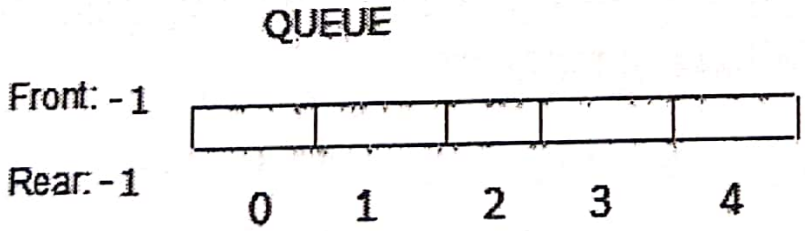
Inorder traversal: 8,4,2,5,10,1,6,11,3,12,7 (6)

(i) If an upper triangular matrix M of n x n dimension is stored as a one dimensional array A, how many elements will the array A have? Also give formula to map A [i,j]*th* element of M into array A. (5)

## Section B

2. (a) Write a recursive function to find and return the length of a linked list. (4)

(b) A queue is represented in memory using a circular array of size 5 as given below :




Represent Front and Rear in the queue after each step as given below :

P.T.O.

(i) insert A, B and C in sequence

(ii) delete

(iii) insert D and E

(iv) a sequence of three deletions

(v) insert F

(vii) delete

(viii) insert H and K (6)

3. (a) Write a program to merge two ordered singly linked list into a new ordered list. Give the necessary class definition with all required constructors. (4+2)

(b) Write a non-recursive function for in-order traversal of a binary tree. (4)

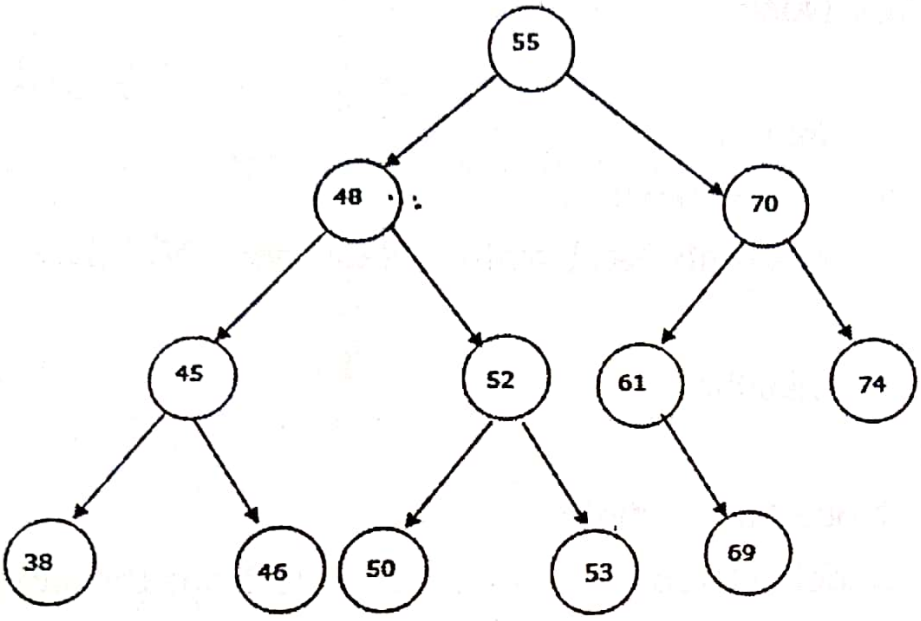
4. (a) Design a class for doubly linked list having integer data and write a function to delete all odd numbered nodes. (6)

(b) Name an in-place algorithm that can be used to sort the following numbers.

18, 14, 25, 21, 18, 9, 85, 40, 76

Make use of the algorithm that you mention to show first two iterations on the above data. (4)

5. (a) (4+2)




(i) List the nodes of the above tree in the order in which they will be traversed when each of the following algorithms is used.

- Breadth First
- Pre-order
- In-order
- Post- order

(ii) Delete node 48 using deletion by merging and show the resultant tree after deletion.

(b) Suppose the following class definitions of a singly linked list are given :

```
class Node
{
        int info;
        Node *next;
        Node(int data) {info = data; next=NULL;}
}
class linkedlist
{
   Node *head, *tail;
   // delete()function deletes a node from the head
    delete()
       {
          Node *pTemp = head;
          delete pTemp;
          head = head->next;
       }
       // insert() function inserts a node at the beginning
      insert(int info)
       {
          Node *pNode = new Node(info);
          pNode->next = head;
       }
};
```

Spot the errors in the insert() and delete() function given in the above code. Suggest the corrections. (4

6. (a) H is a recursive function defined as follows :

$H(n,m) = m+1$ if $n=0$;

$= H(n-1,1)$ if $n > 0$, $m=0$

$= H(n-1, H(n,m-1))$ otherwise

Find the value of

(i) H (0,0)

(ii) H (1,1) (4)

(b) Insert the keys: 15, 9, 30, 0, 17, and 28 into a hash table with open addressing of size 11 (in that order). Use the hash function k%9 and linear probing for collision resolution. Show the status of table after each insertion. If chaining is used for collision resolution, then show the status of table after each insertion. Write one advantage and one disadvantage of using linear probing over chaining for collision resolution? (6)

7. (a) What are self-organizing lists? For a given linked list having E,F,G,H show the list after each step using i) Move to Front and ii) Transpose. Steps are :

(i) Access G (ii) Access E

(iii) Access H (iv) Access E

(v) Access F

(vi) Access H

(vii) Access G

(viii) Access E

(5)

(b) Construct a B+ tree by inserting the following keys:

19, 24, 3, 6, 4, 1, 7, 6, 5, 8

Maximum number of keys allowed in a node is four.

Show the B+ tree diagrammatically after each key insertion.

(5)

This question paper contains 8 printed pages]

Roll No. | | | | | | | | | | |

S. No. of Question Paper : 49

Unique Paper Code : 32341302 I

Name of the Paper : **Operating Systems**

Name of the Course : **B.Sc. (H) Computer Science**

Semester : III

Duration : 3 Hours Maximum Marks : 75

*(Write your Roll No. on the top immediately on receipt of this question paper.)*

Question No. 1 of 35 marks is compulsory.

Attempt any *four* questions from Q. Nos. 2 to 7.

1. (*a*) Fill in the following blanks : 5

(*i*) The two modes of execution of an operating system are ..... and .....

(*ii*) ..... provide(s) an interface to the services provided by an operating system.

(*iii*) A necessary condition for a deadlock which states that a resource held by a process cannot be taken away forcibly .....

P.T.O.

(*iv*) ..... scheduling is approximated by predicting the next CPU burst with an exponential average of the measured lengths of previous CPU bursts.

(*v*) The mapping of a logical address to a physical address is done in hardware by the .....

(*b*) What is a file allocation table ? 2

(*c*) Differentiate between : 4

(*i*) binary semaphore and mutex

(*ii*) counting semaphore and binary semaphore ?

(*d*) What is a bootstrap program ? Where is it stored ? 2

(*e*) Given five memory partitions of sizes 750 KB, 575 KB, 225 KB, 510 KB, 300 KB (in order). How would the best-fit algorithm place processes of sizes 450 KB, 540 KB, 200 KB, and 560 KB (in order) ? 2

(*f*) What are the advantages of using loadable kernel modules ? 2

(*g*) Which of the following scheduling algorithms could result in starvation ? Justify your answer : 2

(*i*) First-come, first-served

(*ii*) Shortest job first

(*iii*) Round robin

(*iv*) Priority.

(*h*) Given that the actual pids of the parent and child in the following program fragment are 1500 and 1700 respectively, identify the pids at lines (*a*), (*b*), (*c*) and (*d*) (assume that fork is executed successfully) : 4

```
{
pid_t pid1, pid2;
pid1 = fork();
if (pid1 == 0){
    pid2 = getpid();
    printf("pid1 = %d", pid1);        /* (a) */
    printf("pid2 = %d", pid2);        /* (b) */
    }
else{
    pid2 = getpid();
    printf("pid1 = %d", pid1);        /* (c) */
    printf("pid2 = %d", pid2);        /* (d) */
    wait (NULL);
    }
}
```

P.T.O.

(*i*) What is the use of `pthread_join( )` function ? 2

(*j*) Consider a logical address space of 128 pages with 2 KB page size, mapped onto a physical memory of 64 frames : 3

(*i*) How many bits are required in the logical address ?

(*ii*) How many bits are required in the physical address ?

(*k*) Assume a program has just referenced an address in virtual memory. Which of the following scenarios can occur and which cannot. Justify your answer : 3

(*i*) TLB hit and page fault

(*ii*) TLB miss with no page fault.

(*l*) What is a mount point ? 2

(*m*) Describe the in-memory structures for file system management. 2

2. (*a*) Compare client-server computing and peer to peer computing. 3

(*b*) Consider the following code segment : 4

```
pid_t pid;
pid = fork();
if (pid == 0){
    fork();
    thread_create( . . .);
}
fork();
```

(*i*) How many unique processes are created ?

(*ii*) How many unique threads are created ?

(*c*) What are the three mechanisms for implementing index block for large files in the indexed allocation scheme ? 3

3. (*a*) Differentiate between internal and external fragmentation. Which of the following memory organization schemes suffer from external fragmentation : contiguous memory allocation, paging. Give arguments to support your answer. 2+3

(*b*) Describe the Readers Writers synchronization problem. Suggest the process structures to solve this problem. 5

4. (*a*) Consider the following set of processes, with the length of the CPU burst given in milliseconds. Given that the order of arrival of the processes is P1, P2, P3 and P4 (all at time zero), determine the average waiting time of each process for the following scheduling algorithms : 6

(*i*) SJF (non-preemptive)

(*ii*) RR (quantum = 2)

| Process | Burst Time |
|---|---|
| P1 | 4 |
| P2 | 3 |
| P3 | 9 |
| P4 | 6 |

(*b*) How many memory accesses are required in the case of a TLB hit and TLB miss ? Consider a paging system with the page table stored in TLBs. Given that 90 percent of the page references are found in the TLBs, determine the effective memory reference time if a memory reference takes 150 nanoseconds. (Assume that finding a page-table entry in the TLBs takes zero time, if the entry is there.) 4

5. (*a*) Two processes P1 and P2 are simultaneously accessing the following code. Demonstrate the impact of race condition in this scenario : 3

```
x = 1
Func( )
{
    If (x ==0)
        Return;
    X--;
}
```

(*b*) What do you understand by *locality of reference* ? Explain the working set model to avoid thrashing. 3

(*c*) List the different types of directory structures giving one advantage of each. 4

6. (*a*) Explain the following in the context of demand paging : 4

(*i*) Belady's anomaly

(*ii*) copy-on-write.

(*b*) Assuming a 2 KB page size, what are the page numbers and offsets for the following address references provided as decimal numbers (assume that the page numbers begin with zero) : 2

(*i*) 7825

(*ii*) 17239.

P.T.O.

(c) For a 32 bit logical address, calculate the number of bits in the page number and page offset fields given that the page size is 2 KB. 2

(d) Would it be appropriate to have a web server run as a single-threaded process ? Why or why not ? 2

7. (a) Write two methods that implement the `wait( )` and `signal( )` operations for a semaphore *s*. 4

(b) Consider the following page reference string : 4

9, 5, 3, 6, 5, 8, 2, 1, 9, 9, 0, 7.

Assuming demand paging with four frames, how many page faults would occur for the following replacement algorithms ?

- FIFO replacement
- Optimal replacement.

(c) Justify that the mutual exclusion condition is necessary for a deadlock to occur. 2

This question paper contains 4+2 printed pages]

Roll No. | | | | | | | | | | |

S. No. of Question Paper : 50

Unique Paper Code : 32341303 I

Name of the Paper : Computer Networks

Name of the Course : B.Sc. (Hons.) Computer Science

Semester : III

Duration : 3 Hours Maximum Marks : 75

*(Write your Roll No. on the top immediately on receipt of this question paper.)*

Question No. 1 is compulsory.

Attempt any *four* questions from Question Nos. 2 to 7.

1. (*a*) Describe how piggybacking is used in the sliding window protocol ? 2

(*b*) How is ARP different from RARP ? 2

(*c*) Write the standard port numbers used by the following protocols : 2

(*i*) HTTP

(*ii*) TELNET

(*iii*) FTP

(*iv*) SMTP.

P.T.O.

50

(*d*) Let the data rate of 128 QAM signal be 14Kbps. Find the maximum bandwidth required to transmit this signal. 3

(*e*) Explain all the six flag bits used in the TCP segment Header. 3

(*f*) The following character encoding is used in a data link protocol : 3

A : 10110110; B : 10101110; FLAG : 01111110; ESC : 11100000 show the bit sequence transmitted (in binary) for the four character frame : A B ESC FLAG when each of the following framing methods are used :

(*i*) Character count,

(*ii*) Flag bytes with byte stuffing,

(*iii*) Starting and ending flag bytes, with bit stuffing.

(*g*) Describe various components of a URL. 3

(*h*) Explain the TCP connection termination process. 3

(*i*) Which layer(s) in the OSI model, performs the following services ? 3

(*i*) Process to Process Communication

(*ii*) Synchronization

(*iii*) Encryption and Decryption

(*iv*) Mail Services

(*v*) Node to Node Communication

(*vi*) Access Control.

(*j*) Draw the pulse diagram for the bit stream 110011000011 using the following encoding techniques : 5

(*i*) Manchester encoding

(*ii*) Differential Manchester encoding,

(*iii*) NRZ-I,

(*iv*) AMI

(*v*) HDB3.

(*k*) Distinguish between the following : 6

(*i*) Virtual Circuit Switching and Datagram Packet Switching

(*ii*) Non-Persistent CSMA and P-Persistent CSMA

(*iii*) Time Division Multiplexing and Frequency Division Multiplexing.

P.T.O.

2 (*a*) What is the Binary Exponential Backoff algorithm used in Ethernet ? How does it reduce the probability of collision in the Ethernet ? 4

(*b*) Let an IPV4 datagrams is received with the following field values HLEN = 10, Total Length = 200, Fragment Offset = 100, and MF = 1 :

(*i*) Find the Payload carried by the Datagram.

(*ii*) What is the size of the option field in the header ?

(*iii*) What is the starting and end byte of the payload for the Datagram ? 4

(*c*) What are the periodic signals and why are they commonly used in the analog transmission ? 2

3 (*a*) Explain Distance Vector Routing Algorithm. Also discuss the Count to Infinity problem. 4

(*b*) The network 180.242.0.0/16 has been subdivided into /19 networks : 6

(*i*) How many /19 sub networks are there ? Give their addresses.

(*ii*) How many hosts can be on each network ?

(*iii*) Determine which network the IP address 180.242.108.93 belongs to.

4 (*a*) How does the sliding window protocol handling flow control in the network ? Explain using the Go Back N protocol. 4

(*b*) A receiver receives the vector 11110111001. Using the Hamming code algorithm, find the original code that was sent. 4

(*c*) A digital signal with 8 levels needs to transmit on a noiseless channel. Assuming the channel bandwidth is 100 kHz. Find the maximum data rate of the signal. 2

5 (*a*) What is PPP protocol and its features ? Also give the frame format of PPP. 4

(*b*) Give a brief description of HTTP message headers and their types. 4

(*c*) Define DNS and give *one* example each of absolute domain name and relative domain name. 2

6 (*a*) List *all* the problems that are associated with Remote Procedure Calls. 4

(*b*) Explains *all* the fields of the IP header frame format with the help of a diagram. 4

(*c*) Assume that source S and destination D are connected through three intermediate routers. Determine how many times each packet has to visit the network and data link layer during transmission from S to D. 2

50

7 (*a*) A channel has a bit rate of 8Kbps and a propagation delay of 40 ms. For what range of frame sizes, Stop and Wait protocol give an efficiency of at least 50 percent ? 2

(*b*) Why do we need a guard band in Frequency Division Multiplexing ? 2

(*c*) Write short notes on the following (do any *three*) : 6

(*i*) WWW

(*ii*) DHCP

(*iii*) Guided Media

(*iv*) UDP.

*This question paper contains 6 printed pages.*

*Your Roll No.* .....

| | |
|---|---|
| *S. No. of Paper* | : **144** |
| *Unique Paper Code* | : **32353301** |
| *Name of the Paper* | : **Latex and HTML** |
| *Name of the Course* | : **B.Sc. (Math. Sc.) / B.Sc. (Hons.) / B.Sc. (Prog.) - II : SEC** |
| *Semester* | : **III** |
| *Duration* | : **2 hours** |
| *Maximum Marks* | : **38** |

I

*(Write your Roll No. on the top immediately on receipt of this question paper.)*

*All questions are compulsory*

1. Fill in the blanks: 4×1/2=2

(i) LaTeX was designed by .....

(ii) ..... environment creates numbered equations in LaTeX.

(iii) The command ..... is used to emphasize text in LaTeX.

(iv) Paragraphs are produced with the ..... element in HTML.

(v) To create a hyperlink in HTML ..... element is used.

2. Answer any *eight* parts from the following : 8×2=16

P. T. O.

(i) Give the command to include the figure, "myfig.jpg" in a LaTeX document.

(ii) Typeset the statement in LaTeXa:

The volume of a regular tetrahedron of edge length 1 is $\frac{\sqrt{2}}{12}$.

(iii) What is the output of the command:

```
$$\int_{0}^{\inf ty}e^{-t}t^{-1/2}dt = \sqrt{\ pi}$$
```

(iv) Correct the following input:

If theta=pi, then sin theta=0.

(v) Give the output of the command:

```
\psline(1,1)(5,1)(1,4)(1,1).
```

(vi) What does ⟨*head*⟩.....⟨/*head*⟩ section of a webpage contain?

(vii) Write the postfix notation in standard form:

x 1 add 2 exp 1 x sub div.

(viii) Write the output of the command:

```
\put(200,35){\circle{40}}.
```

(ix) Write the HTML for creating a hyperlink? Explain with an example.

(x) What is the significance of the *alt* tag?

3. Answer any *five* questions from the following: 5×4=20

(i) Draw the picture of a circle with radius $r$ and a shaded sector.

(ii) Find errors in the following code and write the corrected version and its output:

```
\Documentclass{article}

\title{My Document}

\author{Student}

\date{13-10-2017}

\maketitle

\begin{document}

\begin{enumerate}

\item Suppose that $x = 137$.

\item Let n=3. Then n^2+1=10.

\end{document}
```

(iii) Write a code in LaTeX for typesetting the following expression:

$$\tan(\alpha+\beta+\gamma) = \frac{\frac{\tan\alpha+\tan\beta}{1-\tan\alpha\tan\beta}+\tan\gamma}{1-\left(\frac{\tan\alpha+\tan\beta}{1-\tan\alpha\tan\beta}\right)\tan\gamma}$$

(iv) Write a code in LaTeX for typesetting the following:

Define:

P. T. O.

$$V_n = \begin{bmatrix} 1 & 1 & 1 & \cdots & 1 \\ x_1 & x_2 & x_3 & \cdots & x_n \\ x_1^2 & x_2^2 & x_3^2 & \cdots & x_n^2 \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ x_1^{n-1} & x_2^{n-1} & x_3^{n-1} & \cdots & x_n^{n-1} \end{bmatrix}$$

We call $V_n$ the *Vandermonde matrix* of order $n$. Claim:

$$\det V_n = \prod_{1 \le i < j \le n} (x_j - x_i).$$

(v) Create the following presentation in LaTeX:

Slide 1

Armstrong Number

Student A

October 13, 2017

Slide 2

Definition

Armstrong number is a number that is equal to the sum of cubes of its digit.

Slide 3

Example

Armstrong number is a number that is equal to the sum of cubes of its digit.

Example: $153= 1^3+5^3+3^3$

P. T. O.

(vi) Put an image of a mathematical object on your webpage and describe the image.

[This question paper contains 4 printed pages]

**Your Roll No.** : .....

**Sl. No. of Q. Paper** : **482** **I**

Unique Paper Code : 32343305

Name of the Course : **B.Sc.(Hons.) Computer Science : SEC**

Name of the Paper : Android Programming

Semester : III

***Time : 2 Hours*** ***Maximum Marks : 25***

**Instructions for Candidates :**

(a) Write your Roll No. on the top immediately on receipt of this question paper.

(b) **Section-A** is compulsory.

(c) Attempt any **three** questions from **Section-B.**

## Section - A

**1.** (a) Why JAVA is considered to be platform independent ? 1

P.T.O.

(b) Describe the requirement of Kernel layer in Android architecture. 2

(c) Write code snippet to handle click event on a button named "ButtonA" in an activity. 2

(d) Explain the following terms : 2

(i) SDK manager

(ii) Android emulator

(e) Write down a query( ) method to get the name, rollno, and course for the student with name "Andy" from table named StudentInfo. Assume 'db' is an object of SQLite Database class. 3

## Section - B

**2.** (a) Describe the linear layout in android. 2

(b) Differentiate between function overloading and function overriding in JAVA with an example. 3

3. Describe SQLite database. Write the code for adding and removing data from SQLite database. 5

4. (a) What are ART and DVM ? Explain. 3

(b) Suppose there are two activities : Activity A and Activity B. Acitivity A calls Activity B when user presses a button. Then user presses back button twice. Write down the status of activity stack (assume stack is empty) and the change in the states of Activity A and Activity B using lifecycle methods. 3

5. (a) Write any **three** components of android. 2

(b) Explain the following classes 3

(i) Check Box

(ii) Image View

**6.** Give the necessary code snippets that need to be incorporated to send or to receive broadcast messages. 5

[This question paper contains 4 printed pages.]

**Your Roll No.....**

**Sr. No. of Question Paper : 974** **I**

Unique Paper Code : 32345301

Name of the Paper : Computer Networks and Internet Technologies

Name of the Course : **Computer Science : G.E. for Honours**

Semester : III

Duration : 3 Hours Maximum Marks : 75

**Instructions for Candidates**

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. All questions in **'Section A'** are compulsory.
3. Attempt any **five** questions from **'Section B'**.
4. Parts of a question should be answered together.

## Section A

1. (i) Identify a layer of the OSI model responsible for the following functions :

   (a) Route Determination

   (b) Interface to Transmission Media

   (c) Providing access for the end user

   (d) Flow control

(ii) Differentiate between the terms Internet and Intranet. (2)

(iii) List any two advantages of a multipoint connection over a point-to-point connection. (2)

(iv) Differentiate between TCP and UDP. (2)

(v) Define Functions in JavaScript. How are these different from methods? (2)

(vi) Differentiate between Break and Continue statements with suitable example. (2)

(vii) Differentiate between Alert and Confirm dialogue boxes. (2)

(viii) Explain any two attributes of Table tag with example in HTML. (2)

(ix) What is the significance of the twisting in twisted pair cable? (2)

(x) Differentiate between Hub and Repeater. (2)

(xi) List any two advantages of star topology in computer networks. (2)

(xii) What is the difference between ordered and unordered list? Write HTML statement to display ordered list. (3)

## Section B

2. (a) Explain functions of Transport Layer in the OSI model. (5)

(b) Identify components of a data communication system. (5)

3. (a) Define TELNET. Illustrate Remote Log-in using TELNET with the help of a diagram. (5)

(b) What are the advantages of Fiber Optics over Copper as a transmission medium? (5)

4. (a) Create a Registration Form for admission in a college with ***Input Type***, ***Select*** and ***Text Area*** commands in HTML. (5)

(b) Create an HTML document containing Roll Number, student's name and Grades in a tabular form. (5)

5. (a) What do you understand by Events in JavaScript ? Write any three JavaScript event handlers with brief explanation. (5)

(b) Write a program that creates an HTML page accepting the name of user. Add a button to the page, on clicking which, the user should be greeted. (5)

6. (a) Write a program in JavaScript to read a list of n numbers and count the number of even numbers in the list. (5)

(b) Create an HTML form that displays two text boxes and two radio buttons. The first text box accepts a numeric value. Write a JavaScript code such that:

(i) If the first radio button is checked, the second text box should display the double value of the number entered in the first text box.

(ii) If second radio button is checked, the second text box should display the square of the number entered in the first text box. (5)

7. (a) Explain logical operators with their syntax in JavaScript. (5)

(b) Discuss the different ways to apply a style sheet to an HTML document using examples. (5)

8. Write short notes on the followings **(any two)** :

(a) Radio Waves

(b) Real-time Conferencing

(c) Bridge

(d) Uniform Resource Locator (10)

This question paper contains 4 printed pages]

**Roll No.** | | | | | | | | | | | |

S. No. of Question Paper : **51**

Unique Paper Code : **3341501** **I**

Name of the Paper : **Internet Technologies**

Name of the Course : **B.Sc. (H) Computer Science**

Semester : **V**

**Duration : 3 Hours** Maximum Marks : **75**

*(Write your Roll No. on the top immediately on receipt of this question paper.)*

## Section A

Attempt *all* questions from this section.

1. (*a*) Write a JavaScript code block with the following validations for username and password : 3

(*i*) If the name or password field is not entered, display an error message showing "You forgot one of the required fields. Try Again".

(*ii*) In case the fields entered do not match the hard coded values, display an error message showing "Enter valid username and password".

(*iii*) If the values entered match, display the message : "Welcome" username.

P.T.O.

(*b*) What is the difference in the operators "= =" and "= = =" ? Explain with the help of an example. 2

(*c*) Write JavaScript code to validate phone number. 3

(*d*) Write a program to add 10 numbers to an array list and print the sum of numbers using for each loop. 5

(*e*) What is the purpose of Resultset object ? Give an example of Scrollable Resultset showing all the functions. 4

(*f*) Describe Bean persistence briefly. How can a Bean be made persistent ? 4

(*g*) Explain *two* methods used to send http request parameters to server and how does the structure of request objects vary in both cases. 4

(*h*) What is the difference between include directive & jsp:include ? 3

(*i*) What are the advantages of JSP over Pure Servlets ? 3

(*j*) Explain the life cycle of JSP. 4

## Section B

Attempt any *four* questions from this section.

2. (*a*) What are the different types of JSTL tags ? Explain each with a suitable example. 5

(*b*) Write a JSP program to set Student Bean properties (Name, Age and Grade) from the JSP page. Display these properties using standard JSTL action element. 5

3. (*a*) Explain MVC Model in context of JSP application design. 5

(*b*) Design an HTML form to input the product details(Product name(string having less than 20 characters), product type(Electronics, Sanitary), Price range(1-10000), Warranty(1 or 2)) and check whether all the fields have been filled with valid values, at the time of submitting the form. 5

4. (*a*) Explain the HTTP request and response message formats in the context of JSP. 5

(*b*) Explain the following JavaScript methods with examples : 5

eval( ), parseInt( ), join( ), substring( ), alert( ).

5. (*a*) Write a JavaScript code which will greet user according to Current time. 5

(*b*) Write the difference between Accessor and Mutator methods. Define a rectangle class with *one* accessor and *one* mutator method. 5

6. (*a*) UPDATE the student with Roll No=205 from 'Student' database. 5

(*b*) Explain the difference between executeQuery( ) and executeUpdate( ) methods with examples. 5

7. (*a*) Explain the following in terms of Java Beans with the help of an example : 5

(*i*) Constraint property

(*ii*) Indexed property.

(*b*) Design a Student Bean using BeanInfo interface with properties Student Name, Roll No., Class, Marks. 5

This question paper contains 4 printed pages]

**Roll No.** | | | | | | | | | | | |

S. No. of Question Paper : **52**

Unique Paper Code : **32341502** **I**

Name of the Paper : **Theory of Computation**

Name of the Course : **B.Sc. (H.) Computer Science**

Semester : **V**

Duration : **3 Hours** Maximum Marks : **75**

*(Write your Roll No. on the top immediately on receipt of this question paper.)*

*Instructions for Candidates* :

(1) All questions from Part A are compulsory. Attempt any *four* questions from Part B.

(2) Assume $\Sigma = \{a\ b\}$ is the underlying alphabet unless mentioned otherwise. Parts of a question must be answered together.

## Part A

1. (*a*) Prove that for all sets S, $(S^+)^* = S^*$. 2

(*b*) Give regular expression for the language of all strings that do not end with double letter. 2

P.T.O.

52

(c) Show that (ab)*a and a(ba)* defines the same language over alphabet {a b}. 3

(d) Build an FA that accepts only those words that have exactly four letters. 4

(e) Build an FA that accepts only those words that do not end with ba. 4

(f) Find a CFG for the language Trailing count=$\{sa^{length(s)}$ for all s in (a+b)*}. 4

(g) Use the pumping lemma to show that the language Square=$\{a^n$ where n is a square} is non-regular. 4

(h) Show that if $L_1$ and $L_2$ are regular language then so are $L_1+L_2$, $L_1L_2$ and $L_1$*: 4

(i) Construct a PDA for the language L=$\{a^n b^{2n}$ $n=0$ 1 2 3.....}. 4

(j) Design a right shifting turing machine. 4

## Part B

2. (*a*) Define Regular Expression. 2

(*b*) Build a regular expression for all words that have odd no. of b's. 3

(*c*) Build an FA that accepts all strings that start and end with different letters. 5

3. (*a*) For languages, $L_1=(a+b)^*a$ and $L_2=(a+b)^*aa(a+b)^*$, find the deterministic finite automata for $L_1+L_2$. 6

(*b*) Show that the following context free grammar is ambiguous : 4

S–>aSb | Sb | Sa | a.

4. (*a*) Use the pumping lemma to show that the language $a^nba^n$ where n=1 2 3 . . . is non-regular. 4

(*b*) For the given, $L_1=(a+b)^*a$ and $L_2=b(a+b)^*$, find the automata and regular expression for $L_1 \cap L_2$. 6

5. (*a*) Construct a PDA for the language $a^nb^ma^mb^n$ where $m, n \geq 1$. 6

(*b*) Construct a CFG for the language $(ba+ab)^*$. 4

P.T.O.

52

6. (*a*) Prove that a recursive language is also recursively enumerable. 6

(*b*) Using pumping lemma prove that the language $a^n b^n a^n b^n$ for n=1 2 3 ..... is non-context free. 4

7. (*a*) Design a turing machine for the language $a^n b^n c^n$ where n=1 2 3 ..... 6

(*b*) Describe "Universal Turing Machine". 4

*This question paper contains 6 printed pages.*

*Your Roll No.* .....

*Sl. No. of Ques. Paper:* **545** I

*Unique Paper Code* : **32347503**

*Name of Paper* : **Operational Research for Computer Science**

*Name of Course* : **B.Sc. (H) Computer Science : DSE-1**

*Semester* : **V**

*Duration* : **3 hours**

*Maximum Marks* : **75**

*(Write your Roll No. on the top immediately on receipt of this question paper.)*

*The question paper consists of two Sections. Section A is compulsory. Attempt any four questions from Section B.*

*All parts of a question must be attempted together.*

## SECTION A

1. (a) For what value of $k$ will the following system of linear equations:

$X+Y+Z=3$, $X+2Y+3Z=4$ and $X+4Y+kZ=6$

not have a unique solution? 5

(b) What do you mean by convex set? Check whether the set:

$$Q=\{(x, y) \mid 2x+3y \leq 6\}$$

is convex or not. 5

(c) Write the dual of the following LPP:

P. T. O.

Maximize $Z=2x_1+9x_2+x_3$

Subject to $x_1+4x_2+2x_3\geq 5$

$3x_1+x_2+2x_3\geq 4$

$x_1+2x_2+3x_3=90$

$x_1, x_2\geq 0$ and $x_3$ unrestricted in sign. 5

(d) Consider the following LP with two variables:

Maximize $Z=2x_1+3x_2$

Subject to $x_1+3x_2\leq 12$

$3x_1+2x_2\leq 12$

$x_1, x_2\geq 0.$

Determine all the basic solutions of the problem, and classify them as feasible and infeasible. Verify optimal solution graphically. Show how infeasible basic solutions are represented on graphical solution space. 5

(e) A product is manufactured at three factories A, B and C and is supplied to four stores I, II, III and IV. The unit transportation costs are given in the following table. Use Vogel's approximation method to find the initial basic feasible solution so as to minimize the transportation cost. 5

| *Factories* | *Stores* | | | | |
|---|---|---|---|---|---|
| | *I* | *II* | *III* | *IV* | *Supply* |
| *A* | 10 | 2 | 20 | 11 | 15 |
| *B* | 12 | 7 | 9 | 20 | 25 |
| *C* | 4 | 14 | 16 | 18 | 10 |
| *Demand* | 5 | 15 | 15 | 15 | |

(f) Classify the state of following Markov Chain. If the chain is periodic, determine its period. 5

$$\begin{vmatrix} 1/2 & 1/4 & 1/4 & 0 \\ 0 & 0 & 1 & 0 \\ 1/3 & 0 & 1/3 & 1/3 \\ 0 & 0 & 0 & 1 \end{vmatrix}$$

(g) For the queueing model M/M/1, set up the transition diagram and then write and solve the steady state equations to determine P0, the probability that the system has no customers at an arbitrary point of time. 5

## Section B

2. Ozark Farms uses at least 800 lb of special feed daily. The special feed is a mixture of Corn & Soyabean Meal with the following composition:

| *Feed Stuff* | *Protein* | *Fiber* | *Cost ($ / lb)* |
|---|---|---|---|
| Corn | 0·09 | 0·02 | 0·30 |
| Soyabean Meal | 0·60 | 0·06 | 0·90 |

The dietary requirements of the special feed are at least 30% protein and at the most 5% fiber. Ozark Farms wishes to determine the daily minimum cost feed mix. Formulate the above as LPP and solve graphically. 10

3. Solve the following LPP using two-phase method:

Maximize $Z=3x_1+2x_2+3x_3$

Subject to $2x_1+x_2+x_3=4$

P. T. O.

$$x_1+3x_2+x_3=12$$

$$3x_1+4x_2+2x_3=16$$

$$x_1, x_2, x_3 \geq 0$$ 10

4. (a) Consider the following system of equations:

$$x_1+2x_2-3x_3+5x_4+x_5=8$$

$$5x_1-2x_2+6x_4+x_6=16$$

$$2x_1+3x_2-2x_3+3x_4+x_7=6$$

$$-x_1+x_3-2x_4+x_8=0$$

$$x_1, x_2, x_3, x_4, x_5, x_6, x_7, x_8 \geq 0$$

Let $x_5, x_6, x_7, x_8$ be the given initial basic feasible solutions. Suppose that $x_1$ becomes a basic. Which of the given basic variables must become non-basic at zero level to guarantee that all the variables remain non-negative, and what is the value of $x_1$ in the new solution? Repeat this procedure for $x_2, x_3$ and $x_4$. 5

(b) Solve the following LP model using Simplex:

$$\text{Maximize } Z=4x_1+14x_2$$

$$\text{Subject to } 2x_1+7x_2+x_3=21$$

$$7x_1+2x_2+x_4=21$$

$$x_1, x_2, x_3, x_4 \geq 0$$ 5

5. (a) Solve the following assignment problem using Hungarian method: 5

| | *Job* 1 | *Job* 2 | *Job* 3 | *Job* 4 |
|---|---|---|---|---|
| Worker 1 | 1 | 4 | 6 | 3 |
| Worker 2 | 9 | 7 | 10 | 9 |
| Worker 3 | 4 | 5 | 11 | 7 |
| Worker 4 | 8 | 7 | 8 | 5 |

(b) Every year, during the March through September growing season, a gardener uses a Chemical test, to check soil condition. Depending on the outcome of test, productivity for the new season can be one of the three states: (i) good, (ii) fair, (iii) poor. Over the years, the gardener has observed that last year's soil condition impacts current year's productivity and that the situation can be described by following Markov Chain:

$$P = \begin{vmatrix} \cdot 2 & \cdot 5 & \cdot 3 \\ 0 & \cdot 5 & \cdot 5 \\ 0 & 0 & 1 \end{vmatrix}$$

Determine the steady state probabilities for above situations. 5

6. In a railway marshalling yard, goods trains arrive at a rate of 30 trains per day. Assume that the inter-arrival time follows an exponential distribution and the service time distribution is also exponential with an average 36 minutes.

Calculate the following:

(i) The mean queue size

(ii) The probability that the queue size exceeds 10.

(iii) Average size of non-empty queue.

(iv) The probability of no train waiting in queue. 10

7. (a) Consider the following linear programming problem:

$$\text{Maximize } z = 3x_1+2x_2+5x_3$$

$$\text{subject to } x_1+2x_2+x_3+x_4=30$$

$$3x_1+2x_3+x_5=60$$

$$x_1+4x_2+x_6=20$$

$$x_1, x_2, x_3, x_4, x_5, x_6 \geq 0$$

It is given $x_4, x_5, x_6$ are the slack variables. Write the dual of this primal problem. Find the values of the optimal dual variables and check the feasibility of the solution when it is given that the optimal primal basic solution is:

Basic variables: $(x_4, x_5, x_6)$

Inverse =

$$\begin{vmatrix} 1 & -\frac{1}{2} & 0 \\ 0 & \frac{1}{2} & 0 \\ 0 & 0 & 1 \end{vmatrix}$$ 5

(b) Write short notes on the following:

(i) Future of solution after phase-1

(ii) Markov chain

(iii) Queue discipline. 5

[This question paper contains 7 printed pages]

**Your Roll No.** : .....

**Sl. No. of Q. Paper** : **546** **IC**

Unique Paper Code : 32347504

Name of the Course : **B.Sc.(Hons.) Computer Science : DSE - 1**

Name of the Paper : Microprocessors

Semester : V

***Time : 3 Hours*** ***Maximum Marks : 75***

**Instructions for Candidates :**

(a) Write your Roll No. on the top immediately on receipt of this question paper.

(b) Attempt **all** questions from **Section–A**.

(c) Attempt any **four** questions from **Section –B**.

(d) Attempt **all** parts of a question together.

P.T.O.

## Section - A

1. (a) Explain the purpose of following Flag Bits : 3

(i) Interrupt

(ii) Carry

(iii) Sign

(b) How does relative program addressing mode function ? Explain with an example. 3

(c) Explain the operation of LEA instruction. How is it different from MOV with OFFSET instruction ? 3

(d) Give the difference between Near JMP and Far JMP instructions. 3

(e) List the differences between 8086 and the 8088 microprocessors. 3

(f) How are different write strobes generated for different banks of memory for interfacing memory with 8086 ? 3

(g) Differentiate between memory-mapped I/O and isolated I/O. 3

(h) Define the function of following interrupts : 3

(i) Type 1 (ii) Type 2 (iii) Type 5

(i) Give the three software commands of DMA Controller - 8237. 3

(j) "Segment and Offset addressing Scheme Allows Relocation" - Justify this statement. 3

(k) Explain the function of LOOP and LOOPNE instructions. 3

(l) Differentiate between Minimum Mode and Maximum Mode operation of 8086/8088 microprocessors. 2

## Section - B

**2.** (a) Draw the descriptor format of 80386 and explain. 5

(b) Explain following string instructions : 5

(i) STOS

(ii) MOVS

**3.** (a) Describe the following data memory addressing modes : 5

(i) Register indirect data memory addressing mode

(ii) Relative data memory addressing mode

(b) Suppose that DS = 1200H, DI = 2024H, ARRAY = 0012H, BX = 1012H, SS = 2000H and BP = 3000H. Find the physical address of the data moved into AL, in the following cases : 5

(i) MOV AL, ARRAY

(ii) MOV AL , ARRAY[BX]

(iii) MOV AL , ARRAY[BX+DI]

(iv) MOV AL, [BP]

(v) MOV AL, [BP+DI]

4. (a) What do you mean by bus cycle ? What happens in T1, T2, T3 and T4, T- States of bus cycle of 8086 ? 5

(b) Explain the operation of NEAR CALL and FAR CALL with examples. 5

**5.** (a) Explain the strobed-output operation of Programmable Peripheral Interface 8255 with the help of timing diagram. 5

(b) Give the differences in architecture of Pentium and Pentium pro microprocessor. 5

**6.** (a) Explain the Operation Command Words (OCWs) of Programmable Interrupt Controller 8259. 5

(b) Draw the format of Command register of DMA Controller and explain. 5

**7.** (a) Give the function of following pins of 8086 : 5

(i) ALE

(ii) DEN

(iii) READY

(iv) HOLD

(v) HLDA

(b) Draw the circuit diagram, showing address decoding of eight 2K×8 EPROM chips so that addresses assigned to them is FC000H-FFFFFH. 5

*This question paper contains 6 printed pages.*

*Your Roll No. .....*

| | |
|---|---|
| *Sl. No. of Ques. Paper* | : **690** **IC** |
| *Unique Paper Code* | : **32347503** |
| *Name of Paper* | : **Operational Research for Computer Science** |
| *Name of Course* | : **B.Sc. (H) Computer Science : DSE – 2** |
| *Semester* | : **V** |
| *Duration* | : **3 hours** |
| *Maximum Marks* | : **75** |

*(Write your Roll No. on the top immediately on receipt of this question paper.)*

*Question No. 1 is compulsory (7×5 = 35 marks).*

*Attempt any **four** questions from 2 to 7 (10 marks each).*

*Parts of a question must be answered together.*

*Use of simple calculator is allowed.*

*The symbols have their usual meaning.*

## SECTION A

*(All parts carry equal marks.)*

1. (a) Define a convex set. Show that the following set is convex :

$$S = \{(x_1, x_2) \mid 5x_1 + 6x_2 \leq 10, x_1 \geq 0, x_2 \geq 0\}.$$ 5

(b) Show that the dual of the dual problem yields the given original problem:–

Max $z = x_1 + x_2$

Subject to:

P.T.O.

$$2x_1 + x_2 = 5$$

$$3x_1 - x_2 = 6$$

$x_1, x_2$ unrestricted. 5

(c) Show algebraically that all the basic solutions of the following LP are infeasible :

Max $z = x_1 + x_2$

Subject to :

$$-x_1 - 2x_2 \geq -6,$$

$$2x_1 + x_2 \leq 16,$$

$x_1, x_2 \geq 0$. 5

(d) Solution Tech is a chip manufacturer company. It needs to assign 4 jobs to its 4 technicians. The cost of performing a job is a function of the skills of the technicians. Given table summarizes the cost of the assignments. Technician 1 cannot do job3, and Technician 3 cannot do job4. Determine the optimal assignment using Hungarian Method.

| | | *Job* | | | |
|---|---|---|---|---|---|
| | | *1* | *2* | *3* | *4* |
| | *1* | \$50 | \$50 | – | \$20 |
| *Technician* | *2* | \$70 | \$40 | \$20 | \$30 |
| | *3* | \$90 | \$30 | \$50 | – |
| | *4* | \$70 | \$20 | \$60 | \$70 |

5

(e) What do you mean by ergodic state of a Markov chain? Also, check if the given Markov chain is ergodic or not.

$$\begin{pmatrix} 1/2 & 1/4 & 1/4 & 0 \\ 0 & 0 & 1 & 0 \\ 1/3 & 0 & 1/3 & 1/3 \\ 0 & 0 & 0 & 1 \end{pmatrix}$$ 5

(f) Consider (M/M/1) queue with FCFS scheduling and infinite queue capacity. In an eight-hr day find the expression for the time for which the server would remain idle. 5

(g) In the transportation problem in given table, the total demand exceeds the total supply. Suppose that the penalty cost per unit of unsatisfied demand are \$5, \$3 and \$2 for destinations 1, 2 and 3 respectively. Find optimum solution.

| | *D1* | *D2* | *D3* | *Demand* |
|---|---|---|---|---|
| *S1* | \$5 | \$1 | \$7 | 10 |
| *S2* | \$6 | \$4 | \$6 | 80 |
| *S3* | \$3 | \$2 | \$5 | 15 |
| *Supply* | 75 | 20 | 50 | |

5

## SECTION B

2. Reddy Mikks produces both interior and exterior paint from two raw materials, Ml and M2. The following table provides the basic data of the problem :

| | *Tons of raw material per ton of* | | *Maximum daily availability* |
|---|---|---|---|
| | *Exterior Paint* | *Interior Paint* | |
| Raw Material, Ml | 6 | 4 | 24 |
| Raw Material M2 | 1 | 2 | 6 |
| Profit Per Ton | 5 | 4 | |

A market survey indicates that the daily demand for interior paint cannot exceed that for exterior paint by more than 1 ton. Also, the maximum daily demand for interior paint is 2 tons.

Reddy Mikks want to determine the optimum product mix of two types of paint to maximize the total daily profit. Formulate the above problem as linear programming problem and solve it graphically. 10

3. (a) Suppose that whether or not it rains today depends on previous weather conditions through the last two days. If it has rained for past two days, then it will rain tomorrow with probability 0.7; if it rained today but not yesterday, then it will rain tomorrow with probability 0.5; if it rained yesterday but not today, then it will tomorrow with probability 0.4; if it has not rained in the past two days, then it will rain tomorrow with probability 0.2. Explain why above is a Markov chain and form the transition probability matrix. 5

(b) What do you mean by linearly independent vectors? Check whether the two vectors (1, 1) and (–3, 2) form a basis for $R_2$ or not. 5

4. (a) Solve the following LPP using Big M method :

Max $z = 2x_1 + 3x_2 - 5x_3$

Subject to :

$$x_1 + x_2 + x_3 = 7$$

$$2x_1 - 5x_2 + x_3 \geq 10$$

$$x_1, x_2, x_3 \geq 0.$$ 5

(b) Solve the following problem by inspection, and justify the method of solution in terms of the basic solutions of the simplex method :

Max $z = 5x_1 - 6x_2 + 3x_3 - 5x_4 + 12x_5$

Subject to :

$x_1 + 3x_2 + 5x_3 + 6x_4 + 3x_5 \geq 90,$

$x_1, x_2, x_3, x_4, x_5 \geq 0.$ 5

5. A central server of computer systems serves one computer system at a time and provides place for three computer systems as waiting area. If the place is full, customers go elsewhere. Arrivals occur according to a Poisson Distribution with mean 12 per day (8 hr day). The time to get a service is exponential with mean 2 customers per 3 hrs. Determine the following:

(a) The steady-state probabilities, $P_0$ and $P_n$.

(b) The expected number of customers in the shop.

(c) The probability that customers will go elsewhere because the shop is full. 4+3+3=10

6. Consider the following LP model :

Max $z = 5x_1 + 2x_2 + 3x_3$

Subject to,

$x_1 + 5x_2 + 2x_3 \leq b_1$

$x_2 - 5x_2 - 6x_3 \leq b_2$

$x_1, x_2, x_3 \geq 0$

The following optimal table corresponds to specific values of $b_1$ and $b_2$ :

| *Basic* | $X_1$ | $X_2$ | $X_3$ | $X_4$ | $X_5$ | *Solution* |
|---|---|---|---|---|---|---|
| $Z$ | 0 | $a$ | 7 | $d$ | $e$ | 150 |
| $X_1$ | 1 | $b$ | 2 | 1 | 0 | 30 |
| $X_2$ | 0 | $c$ | –8 | –1 | 1 | 10 |

Determine the following :

(a) The right-hand side values $b_1$ and $b_2$.

(b) The optimal dual solutions.

(c) The elements $a$, $b$, $c$, $d$ and $e$. 2+3+5=10

7. (a) Solve the following using Simplex Method. Comment on nature of solution.

Max $z = 2x_1 + 5x_2$

Subject to :

$3x_1 + 2x_2 \geq 6$

$2x_1 + x_2 \leq 2$

$x_1, x_2 \geq 0$. 5

(b) Formulate Assignment problem as LPP. 5

This question paper contains 7 printed pages]

Roll No. | | | | | | | | | | |

S. No. of Question Paper : 1366

Unique Paper Code : 62347501 IC

Name of the Paper : Visual Programming

Name of the Course : B.A. Programme : Computer Application : DSE-1

Semester : V

Duration : 3 Hours Maximum Marks : 75

*(Write your Roll No. on the top immediately on receipt of this question paper.)*

Question No. 1 is compulsory.

Answer any *five* questions from the Section B.

## Section A

1. (*a*) What are the windows present in VB environment ? 2

(*b*) Write the names and use of any *three* controls present in the tool box. 3

(*c*) What is an assignment statement ? Explain its use with example. 2

(*d*) Differentiate between check box and option button. 3

P.T.O.

(*e*) What is the Tool Tip property of a control ? How can you set this property ? 3

(*f*) What are Named and Intrinsic constants in VB ? Explain with examples. 3

(*g*) What is a Message box ? Give its general form. 2

(*h*) Define an array. Write the VB statement to declare single dimensional array of marks of class of 25 students. 2

(*i*) Write the output of the following statements : 3

(*a*) Printer. Print 1,2,3,4,5

(*b*) Printer. Print Tab(10); "name"; Tab(30); "Pay"

(*c*) Printer. Print.

(*j*) What is Variant Data type ? Explain with an example. 2

## Section B

2. (*a*) What do you mean by scope of a variable ? How can variables and constants be declared in a project having multiple modules ? 1+3

(*b*) Differentiate between Step Into and Step Over in respect of debugging of a program. 2

(*c*) Explain any *two* Format functions available in VB. 4

3. (*a*) State the difference between Do/Loop and For/Next loop with an example. 4

(*b*) What is a Function ? How is it different from Procedure ? 4

(*c*) Define Variable and Constant. How are they declared in a VB program ? 2

4. (*a*) How can you Add and Remove forms from a project ? 2

(*b*) What are the different ways to add items in a List box ? Why does a list need both ItemData property and ListIndex property ? 2+4

P.T.O.

(*c*) Give the output of the following VB statement : 2

```
Private Sub Cmd_Click ()
Dim A as Integer
Dim B as String
Dim C as String
A=5, B="5"
C=A & B
End Sub.
```

5. (*a*) What is the purpose of Val function ? 2

(*b*) What are Data Control and Data Bound Controls ? Give any *two* properties of each. 2+4

(*c*) Write the VB statement to set caption of a label to italics at design time. 2

6. (*a*) Write the Select Case statement for the following conditions : 4

(*i*) If Age <=12, label should display "child"

(*ii*) If Age >12 and <=18, label should display "teenager"

(*iii*) If Age >18 and <=59, label should display "adult"

(*iv*) If Age >59 , label should display "Senior Citizen".

(*b*) Write the VB statement to do the following tasks : 6

(*i*) Declare an array named CurTemp with 3 rows and 3 columns.

(*ii*) Set the elements in the array as per the following table :

| | Delhi | Mumbai | Srinagar |
|---|---|---|---|
| **Jan** | 15 | 25 | -4 |
| **Feb** | 20 | 35 | 10 |
| **Mar** | 25 | 35 | 20 |

7. (*a*) Write a VB program to input 10 numbers in a list box and find the sum of the numbers. 5

P.T.O.

(*b*) Write If-Then-Else construct for the following conditions : 5

(*i*) If weight >10 kg, label should display "Zone A"

(*ii*) If weight <=10 kg and >=5kg, label should display "Zone B"

(*iii*) If weight <=5 kg and >=3 kg, label should display "Zone C"

(*iv*) Otherwise label should display "Zone D".

8. Create a project that takes an employee's name and sales as input. Each employee receives a basic pay of Rs.900 plus a sales commission of 6 percent of sales. Calculate the Gross Pay, Deductions and Net Pay as per the following condition : 3+7

Commission 6% of sales

Gross Pay Basic Pay + commission

Deductions 18% of gross pay

Net Pay

Gross Pay—deductions.

(*a*) Design a form having Text boxes for employee name and sales. Use label to display the result of the calculations. Create command buttons for Calculate, Clear and Exit.

(*b*) Write the code for calculating Gross pay, Deductions and Net Pay.

This question paper contains 7 printed pages]

**Roll No.** | | | | | | | | | | | |

S. No. of Question Paper : **1367**

Unique Paper Code : **62347502** **I**

Name of the Paper : **Programming with Python**

Name of the Course : **B.A. (Programme) Computer Application : DSE-1**

Semester : **V**

Duration : **3 Hours** Maximum Marks : **75**

*(Write your Roll No. on the top immediately on receipt of this question paper.)*

Question No. **1** is compulsory.

Attempt any **5** of Question Nos. **2** to **8**.

Parts of a question must be answered together.

1. (*a*) Which of the following is an *invalid* name ? 3

(*i*) `my_string_1`
(*ii*) `2nd_string`
(*iii*) `foo`
(*iv*) `__init__`
(*v*) `in`
(*vi*) `it`

(*b*) Which of the following is an *invalid* statement ? 1

(*i*) `abc = 1,000,000`
(*ii*) `a b c = 1000 2000 3000`
(*iii*) `a,b,c = 1000, 2000, 3000`
(*iv*) `a_b_c = 1,000,000`

P.T.O.

(c) What is the output of the following code segments ? 6

(i)
```
x = 'abcd'
for i in range(len(x)):
    x = 'a'
    print(x)
```

(ii)
```
i = 1
while True:
    if i%007 == 0:
        break
    print(i)
    i += 1
```

(iii)
```
def foo(k):
    k[0] = 1
q = [0]
foo(q)
print(q)
```

(d) What is the output of the following Python code fragment ? Justify your answer : 3

(i)
```
weekdays =
['sun','mon','tue','wed','thu',
'fri','sun','mon','mon']
print(weekdays.count('mon'))
```

(ii)
```
weekdays =
['sun','mon','tue','wed','thu','fri',
'sun','mon','mon']
print([[x,weekdays.count(x)] for x in
set(weekdays)])
```

(e) Translate the following `while` loop into a `for` loop : 3

```
i = 20
while (i > 0):
    print "i = ", i
i =- 1
```

(f) Rectify the error (if any) in the given statements : 2

```
>>> str= "Hello Python"
>>> str[6]= "S"
```

(g) Under what conditions is binary search used ? Give the outline of binary search algorithm. Given : 7

```
testlist=[0,1,2,8,13,17,19,32,42],
```

Illutsrate the operation of the binary search algorithm to search for the number 13.

What is the output of the following code segments ? 10

(i)

```
class test:
    def __init__(self,a="Hello World"):
        self.a=a

    def display(self):
        print(self.a)
obj=test()
obj.display()
```

(*ii*)
```
class test:
    def __init__(self,a):
        self.a=a

    def display(self):
        print(self.a)
obj=test()
obj.display()
```

(*iii*)
```
def power(x, y=2):
    r = 1
    for i in range(y):
        r = r * x
        return r
print power(3)
print power(3, 3)
```

(*iv*)
```
x = 2
for i in range(x):
    x -= 2
    print (x)
```

(*v*)
```
i = 0
while i < 3:
    print(i)
    i += 1
else:
    print(0)
```

3. (*a*) For the given array `arr = [1,2,4,3]`, apply bubble sort algorithm to sort the array elements and also show the modified list after each iteration. 5

(b) What is a queue ? Write a Python code to create an empty queue. Initialize front and rear suitably. 5

4. What will be the output of the applying the following list Functions on list given below ? 10

```
L1=[1, 3, 2, 12, 2, 4, 3]
L.append(10)
L.count(2)
L.index(12)
L.insert(2,15)
L.remove(2)
```

5. (*a*) Write a function to compute the following series : 3

$$Sum=1+1/2^2+1/3^2+...+1/n^2$$

(*b*) Evaluate the following expressions : 3

(*i*) `-7*20+8/16*2+54`

(*ii*) `5%10+10-25*8//5`

(*iii*) `10+6*2**2!=9//4-3 and 29>=29/9`

(*c*) What will be the output of the following code segment ? 4

```
for letter in 'geeksforgeeks':
    if letter == 'e' or letter == 's':
        continue
    print 'Current Letter :', letter
```

6. (*a*) Write the output of the following code segments : 5

(*i*)

```
for letter in 'geeksforgeeks':
    if letter == 'e' or letter == 's':
        break
print 'Current Letter :', letter
```

....3.

(*ii*)
```
def myfunc(a):
    a = a + 2
    a = a * 2
    return a
print myfunc(2)
```

(*b*) Write a python function to find the sum of all the numbers provided by the user as the input. [5]

7. (*a*) Differentiate between type conversion and type coercion with the help of an example. [5]

(*b*) What will be the output the following code ? [5]

```
def f(x,l=[]):
    for i in range(x):
        l.append(i*i)
    print(l)

f(2)
f(3,[3,2,1])
f(3)
```

8. (*a*) Write the output of the following python code : 5

```
lis = [1, 2, 3]
lis1 = [4, 5, 6]
lis2= lis + lis1
print ('list after concatenation is')
for i in range(0,len(lis2)):
        print (lis2[i]),
print ("\r")
lis3 = lis * 3
print ('list after combining is')
for i in range(0,len(lis3)):
        print (lis3[i]),
```

(*b*) Write output of the following python code : 5

(*i*)

```
x = "Welcome to GeeksforGeeks"
print x[2:5]
print x[4:10:2]
print x[-5:-3]
```

(*ii*)

```
i = 0
while i < 5:
    print(i)
    i += 1
    if i == 3:
        break
else:
    print(0)
```

This question paper contains 4 printed pages]

**Roll No.** | | | | | | | | | | |

S. No. of Question Paper : **1441**

Unique Paper Code : **62343502** **I**

Name of the Paper : **Open Source Software**

Name of the Course : **B.A. (Prog.) Computer Applications : Skill Enhancement Course**

Semester : **V**

Duration : **2 Hours** Maximum Marks : **25**

*(Write your Roll No. on the top immediately on receipt of this question paper.)*

Question No. **1** is compulsory.

Attempt any *three* questions from rest of the five.

1. (*i*) Which loop repeats a group of statements for each item in a collection of objects for each element in an array ?

   (*a*) While loop

   (*b*) do while loop

   (*c*) do until loop

   (*d*) for loop

P.T.O.

(*ii*) A _____ variable is declared inside a procedure.

(*a*) global

(*b*) local

(*c*) external

(*d*) internal

(*iii*) _____ indicates whether a particular condition is on or off.

(*a*) Text box

(*b*) Check box

(*c*) Combo box

(*d*) List box

(*iv*) A_____ is used for both input and output.

(*a*) label

(*b*) text box

(*c*) combo box

(*d*) command button

(*v*) Variable declaration is done using the _____ keyword.

(*a*) Var

(*b*) Dim

(*c*) Declare

(*d*) Static

(*vi*) Which file format offers the best image compression ?

(*a*) JPG

(*b*) GIF

(*c*) PNG

(*d*) BMP

(*vii*) What is the shortcut key combination in GIMP, to cut the selected item ?

(*a*) Ctrl + Y

(*b*) Ctrl + C

(*c*) Ctrl + X

(*d*) Ctrl + Z

(*viii*) What will happen if GIMP image is bigger than the image window ?

(*a*) Image resize dialog box appears

(*b*) GIMP displays the image in a reduced zoom level

(*c*) Error message is shown

(*d*) Image is not displayed

(*ix*) Which programming language is used to write plug-ins in GIMP ?

(*a*) C

(*b*) Java

(*c*) Lua

(*d*) Python

(x) What is the shortcut key combination in GIMP, for undoing the last action ?

(a) Ctrl + Z

(b) Ctrl + C

(c) Ctrl + X

(d) Ctrl + Y. 10×1=10

2. (a) Highlight any *three* features of BSD License. 5

(b) Briefly explain *two* features of Academic License. 2

3. (a) Which two licenses permit commercial use of the Open Source Software ? 3

(b) List *two* disadvantages of open source software. 2

4. (a) Define the term "warranty of merchantability". 3

(b) What do you understand by the term Open Source ? 2

5. (a) How is LGP different from GPL ? 3

(b) What does the term "You" mean in Apache License ? 2

6. (a) Differentiate between Contributor and Licensor. 2

(b) What does Academic License state about Jurisdiction, Venue and Governing Law ? 3

This question paper contains 4 printed pages]

Roll No. | | | | | | | | | | | |

S. No. of Question Paper : 1480

Unique Paper Code : 62345501 IC

Name of the Paper : IT Fundamentals

Name of the Course : B.A. (Programme) Computer Application : G-E

Semester : V

Duration : 3 Hours Maximum Marks : 75

*(Write your Roll No. on the top immediately on receipt of this question paper.)*

Question No. 1 is compulsory.

Answer any *five* questions from the Section B.

**Section A**

1. (*a*) Define the following terms : 4

(*i*) Web Page

(*ii*) Web Browser.

(*b*) What are the main functions of an operating system ? 4

(*c*) Briefly explain different modes of data transmission ? 3

(*d*) What is the use of RAM in computer system ? 2

(*e*) Explain the terms entity and relation in database management system. 2

P.T.O.

(*f*) What do you mean by computer network ? 2

(*g*) Give full forms of the following : 4

(*i*) OCR

(*ii*) BIOS

(*iii*) WWW

(*iv*) URL.

(*h*) Write short notes on : 4

(*i*) Cache Memory

(*ii*) Primary Key.

## Section B

2. (*a*) List and explain different types of scanners. 4

(*b*) Explain various components of a computer system with the help of block diagram. 6

3. (*a*) What is ROM ? Differentiate between EPROM and EEPROM. 4

(*b*) Describe any *three* guided and unguided data transmission media used in data communication. 6

4. (*a*) Explain the functions of any *four* registers used in a computer system. 4

(*b*) What is system bus ? Explain various types of the system bus. 6

5. (*a*) Write short notes on the following devices : 4

(*i*) Touch Screens

(*ii*) Joystick.

(*b*) Differentiate between the following : 6

(*i*) Printer and Plotter

(*ii*) Pointing and Picking devices.

6. (*a*) What is an operating system ? Explain the following types of operating system : 5

(*i*) Batch Processing Operating System

(*ii*) Multiprocessor Operating System.

(*b*) Explain the different components of a data communication system. 5

P.T.O.

7. (*a*) What are the different types of relationships in a database management system ? Explain with the help of a suitable example. 6

(*b*) Explain *four* advantages of database management system. 4

8. (*a*) Describe electronic mail as a way to communicate with other internet users. Also explain its working with the help of an example. 4

(*b*) Explain LAN, WAN and MAN with a suitable example of each. 6