[This question paper contains 8 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1243 **D**

Unique Paper Code : 2344001102

Name of the Paper : Programming With Python

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

Semester : I

Duration : 3 Hours Maximum Marks : 90

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Question **1** in **Section A** is compulsory.
3. Attempt any **4** questions from **Section B**.
4. Answer all parts of a question together.

Section A

1. (i) What will be the output of the following code segment? (2)

```
a=40
```

P.T.O.

```
b=10
a=a+b
b=a+b
a=a+b
print(a,b)
```

(ii) Give the output of the following code segment: (3)

```
total=0
N=10
for i in range(1, N+1):
    if i%2==0:
        continue
    for j in range (1, i+1):
        total+=1
        if j == i/2.0:
            break
print(total)
```

(iii) Give the output of the following code segment:

```
a= [1, 2, 3]
b=a*2
print (b)
```

(2)

(iv) Write a function to count the number of vowels in a string. (3)

(v) Evaluate the following expressions: (5)

(i) int (4.00/(2.0+2.0))

(ii) X=2+9*((3*12)–8)/10

(iii) float (4+int (2.39) %2)

(iv) 2** (3**2)

(v) (2**3) **2

(vi) Identify and Rectify the error (if any) in the given statements: (2)

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

(vii) Write a function that accepts two numbers and returns its average. (2)

(viii) Identify valid/invalid identifiers from the following : (3)

(i) My_string_1

(ii) 2nd_string

(iii) Foo

(iv) _int_

(v) String%

(vi) It

(ix) What is the type of arguments used in the definition of function add(). Write the output that will be produced on the execution of the following code segment: (5)

```
def add(a=3, b=5, c=7):
  return(a+b+c)
print(add())
print(add(7))
print(add(6,8))
print(add(c=9))
```

(x) Design a flow chart to display the largest factor of a positive number. (3)

Section B

2. (a) Write a function f1(n1,n2,n3) which returns the minimum and maximum of three arguments viz n1, n2, and n3. (5)

(b) What will be the output of 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)
```

(c) Write a function named FnSeriesSum(), which accepts an integer argument (n) to calculate the sum of the first n terms of the following series

and returns the computed sum. (5)

1 – 4 + 9 – 16 + 25 – 36 + ...

3. (a) Use the given list L to find the output for the following methods. Write down the updated content of list L after applying each method. (5)

L = [1, 3, 2, 12, 2, 4, 3]

(i) L.append(10)

(ii) L.count(2)

(iii) L.index(12)

(iv) L.insert(2,15)

(v) L.remove(2)

(b) Write a function FnCommon() to find the common elements in given two lists, L1 and L2 and store them in third list L3. Also, function needs to return the computed list L3. (5)

(c) Write a Python function, with appropriate comments, that takes the name and age of a person as input and displays an appropriate message whether the person is eligible to vote or not based on age where minimum age for voting is 18 years. Also check that input name must contain at least 4 characters, else display inappropriate name. (5)

4. (a) Write a function in Python to generate the following two patterns: (6)

(i)

```
    * * *
  * * * * *
* * * * * * *
```

(ii)
```
4 3 2 1
  3 2 1
    2 1
      1
```

(b) Consider the following strings to find the output of the following print statements: (5)

```
s = 'abcdefxyyzxyzxzxyy'
```

(i) print(s.islower)

(ii) print(s.count ('xy'))

(iii) print(s.find('cd'))

(iv) print(s.replace('xy', 'pq'))

(v) print (s.split ('x'))

(c) Rewrite the following code using for loop: (4)

```
i=10
while(i>0):
    print('i=', i)
i=-1
```

5. (a) Consider tuple T1=(12, 3, 45, 'Hockey', 'Anil', ('a', 'b')) to answer the following: (5)

(i) Display the first element of 'T1'.

(ii) Display the last element of 'T1'.

(iii) Display tuple 'T1' in reverse order.

(iv) Display 'b' from tuple 'T1'.

(v) Display 'Anil' from tuple 'T1'.

(b) Write a function that takes two files, textl.txt and text2.txt, as input. The function must read the content of the file textl.txt line by line and should write them to another file text2.txt. Display the content of file text2.txt. Use appropriate exceptions for file handling. (5)

(c) Write a function to print every character of a string entered by the user in a new line using the for loop. Also, display total number of characters in the string at the end. (5)

6. (a) What will be the output of the following code segment? (5)

```
for letter in 'programming with python':
    if letter=='a' or letter=='n':
        continue
    print('current letter:', letter)
```

(b) Write a function that accepts a list (L) of 10 elements to find the frequency of each distinct element in L. Use dictionary to store element and its count in key- value pair form. Also, display the elements with maximum count using dictionary. (6+4)

P.T.O.

7. (a) WritePython statements to accept a roll number from the user and displays its name from the following dictionary D in which key represents roll number and value is name. (2)

D={1: 'Amit', 2: 'Sumit', 5: 'Kavita'}

(b) (i) Find the output of the following code: (2+1)

```
def fn(x):
    try:
        print(5/x)
    except ZeroDivisionError:
        print("except block")
    else:
        print("else block") finally:
        print("finally block")
fn(0)
```

(ii) What error is returned by the following statement if file "try.txt" does not exist?

```
f=open("try.txt")
```

(c) Write two differences between lists and tuples? Give one example showing their usage. (4)

(d) Write a user-defined function SUMSQUARES(n) in Python that accepts a number n as an argument. The function returns the sum of squares of the first n numbers. Also, write statement to call this function for n=5 and print the returned value. (6)

Dec-2022

[This question paper contains 12 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1002 **D**

Unique Paper Code : 2342571101

Name of the Paper : Programming Fundamentals Using C++

Name of the Course : **B.Se. (Multidisciplinary Courses of Study with Three Core Disciplines under UGCF 2022)**

Semester : First (I)

Duration : 3 Hours Maximum Marks : 90

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. **Section A** is compulsory.
3. Answer any **four** questions from **Section B**.
4. Parts of a question must be answered together.
5. Write program statements in C++ language.

P.T.O.

Section A

1. (a) Name any three built-in data types used in C++. Also write number of bytes used by each of them. (3)

(b) Identify the errors in the following C++ statements:

(i) `char ch="Hello";`

(ii) `int b(6);`

(iii) `int line count=4;` (3)

(c) Rewrite the following code using `while` loop:

```
for(int number=1; number<=12;number++)
  cout<<number;
```
(3)

(d) Give the output of the following code: (3)

```
int total=0;
int N=5;
for(int i=0; i<N; i++)
  total+=1;
cout<< total;
```


(e) Write a function `swap()` to interchange the values of two numbers using call by reference. (3)

(f) Name the type of inheritance for class B, class C and class D in the following code segment. (3)

```
class A{...};
class B: public A{...};
class C: public A{...};
class D: public B, public C{...};
```

(g) List any three properties of constructor function. (3)

(h) State True or False for each of the following statements: (3)

(i) The member function of the derived class can access the protected members of the base class.

(ii) The while loop runs at least one time.

(iii) Statement `return (0);` at the end of `main()` function indicates an error.

(i) Which file mode would you use while opening a file under following situations: (3)

(i) To add data to the end of the file only.

(ii) To open a file for the purpose of writing only.

(iii) To delete the contents of the file if it exists.

(j) Identify the error in the following code and correct it. Give the output of the corrected code. (3)

```
class one{
 public:
   int i;
   one(int x){
     i=x;
     cout<<"Object created with value "<<i<<endl;
 }
~one(int x){
  cout<<"Bye! "<<i<<"\n";
}
};
int main(){
  one obj1(20);
  one obj2(70);
return 0;
}
```


Section B

2. (a) Write a function in C++ that takes a number 'n' as input and returns its factorial if 'n' is an even number else returns 0. (5)

(b) What will be the output of the following code segments: (5)

(i)
```
int a=10;
int b=a-- +3;
cout<<"a="<<a<<endl<<"b="<<b;
```

(ii)
```
int x=5;
if (x=30)
      cout<<"\n x is odd";
 else
      cout<<"\n x is even";
```

(c) Find the output of the following expressions in C++: (5)

(i) `20 >> 3`

(ii) `(21==22)?5:6`

(iii) `19%3`

(iv) `56!=90||56<100`

(v) `4+9*6/2`

3. (a) Write a C++ program to display the following pattern on the output screen. The number of rows should be taken from the user as an input. For example if the number of rows is 5 then the following output should come. (5)

```
A
BB
CCC
DDDD
EEEEE
```

(b) (i) Identify the error(s) if any, correct the error(s) and give output of the following code: (5)

```
int main()
{int a=3500, b=3000
 cout<<"a+b", -(a+b);
 return 0;
}
```

(ii) Give the output of the following code segment:

```
int i;
for(i=8; i>=0; i--)
if(i%2==0)
   continue;
else
   cout<<i<<endl;
```


(c) Explain the significance of using scope resolution operator :: in C++. Give the output of the following program: (5)

```
#include<iostream>
using namespace std;
int m=10;
int main()
{
   int m=20;
   {
      int k=m;
      int m=30;
      cout<<"we are in inner block \n";
      cout<<"k="<<k<<"\n";
      cout<<"m="<<m<<"\n";
      cout<< "::m=" << ::m <<"\n";
   }
   cout<< "\n We are in outer block \n";
   cout<< "m=" <<m<<"\n";
   cout<< "::m=" << ::m << "\n";
   return 0;
}
```

4. (a) Write a program to compute the area of a circle and a rectangle using function overloading. (5)

(b) Consider the following code segment: (5)

```
switch(choice)
{
case 1:
case 4:cout<<"Hello ";
       cout<<"World\n";
       break;
case 2:
case 3:cout<<"Banana\n";
       cout<<"Apple\n";
default:cout<<"Orange\n";
        cout<<"Guava\n";
break;
}
```

What will be the output for following values of choice :

(i) `choice=1`

(ii) `choice=3`

(c) With the help of a suitable example explain the concept of inline functions. Under what circumstances does an inline function not work? (5)

5. (a) Write a program to create a class `Complex` which has two data members: real part a (integer) and imaginary part b (float). Write the following member functions for this class: (5)

- A default constructor to initialize a and b to 0.
- A parameterized constructor to initialize a and b to passed values.
- A function `print()` to display the complex number in the form `a+ib`, i.e. for `a=4` and `b=5`, the output of print should be `4+i5`.

(b) Add appropriate `catch` blocks for the following piece of code: (5)

```
try{
if(x == 1)
   throw x;
if(x== 0)
   throw 'x';
if(x == -1)
   throw 1.0;
}
```

(c) Differentiate between compile-time polymorphism and run-time polymorphism. Explain the concepts of early binding and late binding related to the same. (5)

6. (a) Write a C++ program to open a text file and to display the total number of characters it contains. (5)

(b) Give output of the following C++ program. (5)

```
#include <iostream>
using namespace std;
class Base{
   public:
       void display( ) {
            cout<< "\n Display base ";
       }
       virtual void show( ){
            cout<< "\n Show base";
       }
};
class Derived: public Base{
   public:
       void display( ){
            cout<<"\n Display derived";
       }
       void show( ){
            cout<< "\n show derived";
       }
};
int main( ){

   Base B;
   Derived D;
   Base *bptr;

   bptr = &B;
   bptr->display( );
   bptr->show( );
   bptr = &D;
   bptr->display( );
   bptr->show( );
   return 0;
}
```


(c) What is an exception? Discuss in brief the exception handling mechanism in C++. (5)

7. (a) Write a C++ function to perform linear search in an array. Also rewrite this function using templates. (5)

(b) Write the sequence of constructors and destructors being called in the following inheritance: (5)

```
class A{...};
class B: public A{...};
class C{...};
class D: public C{...};
class E: public D, public B{...};
E obj;
```

(c) Consider the following C++ program and write the final output. (5)

```
#include <iostream>
using namespace std;
int main ()
{ int arr[] = {10,20,30,40,50};
   int *ptr;
ptr = arr;
```

P.T.O.

```
cout<<" \nValue at ptr: "<< *ptr<<endl;
ptr=ptr+3;
cout<<" \nValue at ptr+3 "<< *ptr<<endl;
ptr++;
cout<<"\nValue at ptr++ "<< *ptr<<endl;
cout<<"\nValue at ptr-- "<< *(ptr--)<<endl;

return 0;
}
```

[This question paper contains 8 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1758 **C**

Unique Paper Code : 32345104

Name of the Paper : Programming Using Python

Name of the Course : **Computer Science : G.E. 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 No. **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) Draw a block diagram to illustrate the basic organization of a computer system. (2)

   (b) What is the output of following snippet: (2)

P.T.O.

```
x, y = 0, 4
x, y = y + x, 2
print(x)
print(y<<2)
```

(c) Identify the error in following code snippet: (2)

```
grade= {"A+", "A", "A–"}
grade1 = grade + {1}
print(grade1)
print(grade[2:])
```

(d) A tuple t is defined as (2)

```
t = (1, 2, 3, [40, 50], 9)
```

Give the output/indicate error in each of the following code snippets :

(i)
```
t[3] [0] = 100
print(t)
```

(ii)
```
t[1] [1] = '2'
print(t)
```

(e) Explain exception handling with the help of an example. (2)

(f) Consider the string match = "India v/s England !!". Determine the output of the following statements :

(i) print (match. lower())

(ii) print (match[: : 2]) (2)

(g) Write a program to display all duplicate items from the list given below : (2)

```
sample_list=[10, 20, 60, 30, 20, 40, 30, 60, 70, 80]
```

(h) Write a function to find the maximum of five numbers. (2)

(i) Evaluate the following expression (2)

```
3**3%10 – 5*18 //5 + 15
```

(j) Write full form of the following term : (2)

(i) RAM

(ii) EPROM

(iii) ROM

(iv) EEPROM

(k) List any two membership operators. (2)

(l) What is the result on execution of the following two expressions : (1)

x=10 and x==10.

quantity : Quantity of the item available in the stock

The class should support the following methods:

(i) purchase() for updating the quantity after a purchase made by the customer. The method should take the number of items to be purchased as an input.

(ii) increaseStock() for updating the quantity of an item for which newstock has arrived. The method should take the number of items to be added as an input.

(iii) display() that displays information about an item.

5. (a) Given a string s='Python Programming' what is the output of following statements : (4)

(i) print(S[:10] + S[10:])

(ii) print(S[0:10:2])

(iii) print(S[-5:])

(iv) print(S[0:10:2])

(b) Given the tuple t = (1, 2, 3, [40, 50], 9) identify the errors, if any, in the following expressions. Give reasons. (3)

(i) t[2] = 100

(ii) t[3] [0] = 100

(c) Explain the use and working of destructors in Python with the help of an example. (3)

6. Write the output of the following code snippets : (4+2+4=10)

(a)
```
L1 = list()
L2 = list()
for i in range (1,5):
    L1.append(i**2)
    L2.append (i>>2)
print(L1, L2)
```

(b)
```
SqSum=0
for i in range(1,10,1) :
    SqSum+=i*i
print(SqSum)
```

(c)
```
m=n=14
x=y=20
if m<10:
    if b>5:
        x+=1
    else:
        y+=1
```

```
print(x)
print(y)
```

7. (a) Writea program to accept a string from the user. Replace all the vowels in the given string with the symbol "*" and spaces with "-". Display the modified string. (5)

   (b) Writea program to check if the entered string is a palindrome or not. (5)

8. (a) Write a function that accepts a string as a parameter and computes the sum of all digits present in it. If there are no digits in the string, the function should return the value 0. (5)

   (b) Givena stack s = [2,3,4]. Pictorially represent the following operations on this stack. (5)

   push 9, pop, pop, pop, push 5, push 2, pop, pop, pop, pop

[This question paper contains 8 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1897 **C**

Unique Paper Code : 32345302

Name of the Paper : GE – Computer Networks

Name of the Course : **Generic Elective for Hons. Courses**

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. This paper has **two** sections.
3. All questions in **Section A** are compulsory.
4. Attempt any **four** questions from **Section B**.

SECTION A

1. (i) What is meant by the term URL? Can one URL point to two different locations? Justify 3 your answer. (3)

P.T.O.

(ii) Describe the purpose of each of the following layers of OSI model : (3)

(a) Data Link Layer

(b) Transport Layer

(c) Network Layer

(iii) There is a user who is unable to see the image on a web page on the browser. Write syntax of the attribute that can be used to assist the user to get some idea about what the image is?

Give an example of image tag attributes used to :

(a) Specify the image's path

(b) Set the width to 150 pixels (3)

(iv) A college wants to set up a network connection, which should have adequate 3 connections, low

installation cost and fast transmission. The college wants to ensure that there should be a possibility to add new devices in the network. Which topology should be chosen for the connection? Explain your answer. (3)

(v) Write the HTML code to perform the following tasks : (3)

(a) Set the background color as "aqua"

(b) Align a paragraph to the left

(c) Insert a horizontal line between two paragraphs

(vi) Describe the purpose of CSS? Write the code to link your web page to a CSS file. (3)

(vii) In a classroom, there are different communications taking place, based on these identify how it is similar to data flow in a network : (3)

(a) Student asking question and then teacher answering it

(b) Teacher giving instructions to the class monitor

(c) Students talking to each other after the teacher leaves the class

(viii) Illustrate with a suitable example of the use of the Internet and intranet. What is the meaning of the term extranet? (4)

(ix) Illustrate the use of coaxial and twisted pair cables with suitable examples. (4)

(x) Give one advantage and one disadvantage of wireless LAN. (2)

(xi) Parabolic dish antennas are used for microwave communication. What is the purpose of selecting a parabola shaped antenna for the same? (2)

(xii) Which is the main protocol that enables the use of email service? (2)

SECTION B

2. (a) What do you understand about the term ISP? What role does an ISP play to provide service to your home's broadband connection? (4)

(b) Describe the use of point-to-point communication and multi-point communication with suitable examples. (6)

3. (a) Differentiate between star and mesh topologies in networks. (4)

(b) Complete the following table with appropriate details : (6)

Device	Layer	Purpose
Router		
Hub		
Gateway		

4. (a) How does video conferencing help in teaching-learning activities? Explain any two other applications of the Internet which you use in day to day lives. (6)

(b) Describe the difference between IP address and MAC address. (4)

5. (a) (i) Write the CSS code to insert the image of the butterfly with name btfly.gif as a background image for a web page. (6)

(ii) Write a CSS style specification rule that would make all unordered lists have square bullets and a purple background.

(iii) Write HTML code that displays a hyperlink to your school website. The website should open in a new window when the user clicks on the hyperlink.

(b) Describe the remote login process using TELNET with the help of a diagram. (4)

6. (a) Write a HTML code structure to create the following output on the webpage : (7)

Admission Criteria for UG Courses

Eligibility Conditions:

i) At least 55% in the qualifying examination

ii) Must have studied the following subjects in class XII:
- One language
- 3 stream specific subjects

Please note meeting eligibility condition does not guarantee admission.

Declaration:

☐ I hereby declare I have read and understood the eligibility conditions.

SUBMIT

(b) What is DNS? Give an example of each website which uses '.org' and '.ac.in' domains. (3)

7. Write short notes on the following **(any five)** :

(a) Hyperlinks

(b) Search Engine

(c) Repeaters

(d) HTTP

(e) VoIP

(f) m-commerce

(g) Social Networks (10)

[This question paper contains 8 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1669 **C**

Unique Paper Code : 42343307

Name of the Paper : Data Analysis using Python Programming (SEC)

Name of the Course : **B.Sc. (P) Physical Science with Computer Science (LOCF)**

Semester : III

Duration : 2 Hours Maximum Marks : 25

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 3** questions from **Section B**.
4. Parts of a question must be answered together.

P.T.O.

SECTION A

(Compulsory)

1. Consider the following Arrays : (5)

```
arr1 = np.array([[1, 1, 0], [9, 7, 8], [6, 8, 4]])

arr2 = np.array([[[5, 2, 1], [2, 1, 8]], [[1, 2, 3], [4, 5, 6]]])
```

Find output of the following :

(a) arr2[0]

(b) arr2[1][1]

(c) arr1[:2, -1]

(d) arr1[:,2:]

(e) arr1[-1,:]

2. Consider the following Data Frame : (1+2+1+1=5)

```
Data = {'State': ['Delhi', 'Mumbai', 'Bangalore',
        'Delhi', 'Kolkata', 'Pune']
```



```
'Year': [2001, 1992, 1995, 2005, 1992, 2001]

'Population': [5.2, 1.8, 1.5, 7.8, 1.2, 2.5]

}

df = pd.DataFrame(Data)
```

Answer the following :

(a) Rename the indexes as "One", "Two", "Three", "Four", Five", "Six"

(b) Add another column in the Data Frame "Extra" having values True corresponding to state 'Delhi' else False.

(c) Name all the states with Population more than 2.

(d) Drop rows 'Three' and 'Six'.

SECTION B

(Attempt any **3** *questions)*

(Parts of a question must be answered together.)

3. Consider the Dataset given below : (1+2+1+1=5)

P.T.O.

Name	Nationality	Sex	Age	Handedness
Neha	India	Female	24	Left
Rahul	India	Male	28	Right
Katherine	USA	Female	32	Right
Zenitsu	Japan	Male	16	Left
Linda	USA	Female	28	Left
Mikasa	Japan	Female	22	Right
Aryan	India	Male	42	Right
Gabriel	USA	Female	32	Right
Kiran	India	Female	20	Left
Shishir	USA	Male	40	Right

Answer the following using Contingency Table:

(a) Find frequency distribution between Sex and Handedness

(b) Find relationship between Sex, Nationality, and Handedness. Also, display total.

(c) Normalize the table in part 'b' over each column.

(d) Find the average of age in part 'a'.

4. (a) Explain a few ways to handle missing values. (2)

(b) Consider the following DataFrame : (3)

```
df = pd.DataFrame([('bird', 2, 2),
('mammal', 4, np.nan),
('arthropod', 8,0),
('bird', 2, np.nan)],
index=('falcon', 'horse', 'spider', 'ostrich'),
columns=('species', 'legs', 'wings'))
```

What will be the output of the following statements?

(i) df.mode()

(ii) df.mode(drop_NA = False)

(iii) df.mode(axis = 'columns', numeric_only = True)

5. Consider the following Series : (5)

SR = pd.Series([8, -2, 6, 4, 3, 0, 6, -1], index = [0, 3, 4, 6, 7, 10, 12, 14]) Find the output of the following :

(a) SR.rank()

(b) SR.rank(method = 'first')

(c) SR.rank(ascending = False, method = 'min')

(d) SR.reindex(range(6), method = 'ffill')

(e) SR.replace({-2: np.nan, 6: 0})

6. Consider the following (df): (1+2+2=5)

S. No	Restaurant Name	Location	User Rating	User Review
1	Sky Bar	Hauz Khas	3.4	Good
2	Diggin	Chanakyapuri	4.2	Very Good
3	Cafe Dori	Nehru Place	4.0	Very Good
4	Art of Dumplings	Connaught Place	4.6	Excellent
5	Flying Saucer	Connaught Place	4.0	Very Good
6	Imperfecto	Hauz Khas	4.2	Very Good
7	Sutra	Chanakyapuri	4.4	Excellent
8	Dunkin Donuts	Nehru Place	3.8	Good
9	Wrangler	Connaught Place	4.8	Excellent
10	Cha Bar	Connaught Place	4.2	Very Good

(a) Group the Restaurants according to their locations and find the restaurant with the highest rating.

(b) Make a world cloud of column User Review. Also use 'Bad' and 'Very Bad' for Stopwords.

(c) Plot Box Plot of User Rating in Data Frame df.

7. Consider the following list : (5)

x1 = [32, 21, 65, 89, 33, 23, 22, 40, 21, 32, 56, 45, 44, 38, 52]

(a) From 'xl' create an ndarray 'x2' with 5 rows and 3 columns.

(b) Find Mean, Variance, Median of data in x2 along the rows.

(c) Find cumulative sum of rows in 'x2'.

(d) Sort the data in 'x2' along the columns.

(e) Replace values greater than 40 in 'x2' with 0 using 'where' function.

(3)

[This question paper contains 8 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1703 **C**

Unique Paper Code : 42344304

Name of the Paper : Operating System

Name of the Course : **B.Sc. Programme / B.Sc. Mathematical Science**

Semester : III [Admission of 2019-2021]

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 no. **1** is compulsory.
3. Attempt any **FIVE** questions from Question no. **2** to **8**.

1. (a) Which address binding scheme generates different logical and physical addresses? (1)

   (b) Name the scheduler responsible for transition of a process from ready to running state. (1)

P.T.O.

(c) Name the piece of code that loads operating system into the memory and starts its execution. (1)

(d) How many new processes are created in the following code? (2)

```
main()
{
int i;
for (i=0;i<3;i++)
        fork();
}
```

(e) Briefly describe any two advantages of Multiprocessor systems. (2)

(f) Which of the following instructions are privileged?

(i) Set value of timer

(ii) Read the clock (2)

(g) Assuming a 1-KB page size, what are the page numbers and offsets for the following address references (provided as decimal numbers):

(i) 2378

(ii) 9360 (2)

(h) What is the purpose of command interpreter? Why is it usually separated from the kernel? (2)

(i) Write the Linux commands for the following : (2+2)

(i) Count the number of occurrences of the word "hello" in a file named "file1.txt".

(ii) Sort the data in descending order of marks in a two-column file "file2.txt" containing names of students and marks obtained.

(j) Differentiate between : (2+2)

(i) Multi-programming and Multi-tasking Operating System

(ii) Renaming and copying a file

(k) Define the following terms : (1×4)

(i) Dispatch Latency

(ii) Seek Time

(iii) Rotational Latency

(iv) Response Time

2. Consider the following set of processes, with the length of CPU burst time given in milliseconds :

Process	Arrival Time	Burst Time
P_1	0	5
P_2	2	3
P_3	5	6
P_4	6	2

(i) Draw Gantt charts illustrating the execution of these processes using non-preemptive Shortest Job First (SJF) and Round Robin (Time Slice = 2) scheduling algorithms.

(ii) Calculate the turnaround time and waiting time of each process for each of the above-mentioned scheduling algorithms. (6+4)

3. (a) Consider a paging system with the page table stored in memory.

(i) If a memory reference takes 200 nanoseconds, how long does a paged memory reference take?

(ii) If we add TLBs and 80% of all page table references are found in the TLBs, what is the effective memory access time? Assume that the time taken to access a TLB is 20 nanoseconds. (2+4)

(b) List the circumstances under which a CPU scheduling decision may take place. (4)

4. (a) Why is it important for operating system to differentiate between CPU-bound and I/O-bound processes/jobs? Name the scheduler that takes care of this requirement. (3+1)

(b) Describe the Two-Level Directory structure with the help of a suitable diagram. (3)

P.T.O.

(c) Name the system programs which perform the following tasks : (3)

(i) Create or modify the contents of file.

(ii) Compile a program written in high level language.

(iii) Load a program into the main memory.

5. (a) What is a Process control block? Describe the information contained in it. (1+3)

(b) Enumerate any four activities of operating system in regard to the following :

(i) Process Management

(ii) File Management (2+2)

(c) List any two reasons for a parent process to terminate execution of its children processes. (2)

6. (a) Write a shell script to find the greatest common divisor of two numbers. (4)

(b) Explain three different uses of 'cat' command. Illustrate with suitable examples. (3)

(c) Discuss the main advantage of Demand Paging. How is Effective Access Time computed for a demand-paged memory? (3)

7. (a) Given memory partitions of 100KB, 500KB, 200KB, 300KB and 600KB (in order), how would each of the Best-fit and Worst-fit algorithms place processes of size 212KB, 417KB, 120KB and 426KB (in order)? Which algorithm makes the most efficient use of memory? (6)

(b) Differentiate between external and internal fragmentation by taking suitable examples. (4)

8. (a) Consider a logical address space of eight pages of 1024 words each, mapped onto a physical memory of 32 frames.

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

(ii) How many bits are there in the physical address? (4)

(b) What are the main advantages of using Layered Approach over Simple Structure for Operating System design? What are the disadvantages of using the Layered Approach? (4)

(c) What do you understand by Swapping? List any two reasons why swapping is not supported on Mobile systems. (2)

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1470 **C**

Unique Paper Code : 42343502

Name of the Paper : Advance Programming in Java

Name of the Course : **B.Sc. (Prog.) Physical Science/Mathematical Science**

Semester : V

Duration : 2 Hours Maximum Marks : 25

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. This paper has **two** Sections. **All** the Questions in **Section A** are compulsory. Attempt any **three** questions from **Section B**. Parts of a question must be answered together.

Section A
(Compulsory)

1. (a) Name the method used to obtain the current size of windows. (1)

P.T.O.

(b) What is the purpose of declaring a method final? (1)

(c) What is the difference between this and super keywords in Java? Explain with the help of suitable example. (2)

(d) What is the difference between abstract class and interface in Java? Explain with the help of suitable example. (3)

(e) What will be the output generated by the code given below : (3)

```
class OperatorsDemo{
  public static void main(String args[]) {
      int a = 4;
      int b = 8;
      System.out.println(a | b);
      System.out.println(a & b);
      System.out.println(a ^ b);
      System.out.println(a >> a);
      System.out.println(b << b);
      System.out.println(~b);
  }
}
```


Section B

(Attempt any **three**)

2. (a) What is an interface? What is the importance of interface in Java? (2)

   (b) Write a code to explain how one interface can extends multiple interfaces in Java. (3)

3. (a) What do you mean by packages in Java? What are the different types of packages in Java? (2)

   (b) What are the advantages of using packages in Java? Write syntax of creating package in Java. (3)

4. (a) What is an Event Listener? What are the major requirements for Event Listener? (2)

   (b) Write an applet to draw a circle with (20,20,120,120). Fill the circle with green colour. (3)

5. (a) What is the difference between byte stream and character stream? Write two stream classes of each. (2)

(b) Create a try block that will generate three different types of exceptions and then introduce appropriate catch blocks to catch and handle these exceptions. (3)

6. (a) What is a finally block? When and how it is used? Explain with suitable example. (5)

[This question paper contains 8 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1499 C

Unique Paper Code : 4234750l

Name of the Paper : Data Structure

Name of the Course : B.Sc. (P) LOCF (DSE)

Semester : V

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. The paper has **two** sections. **All** questions in **'Section A'** are compulsory.
3. Attempt any **five** questions from **'Section B'**. Parts of a question must be answered together.

SECTION A

1. (a) Mergesort needs additional storage for merging arrays which is a serious drawback for large amounts of data. Give one solution for this problem. (2)

P.T.O.

(b) Consider the linear array a (5 : 50). Suppose base (a) = 300 and w = 4 words per memory cell for a. Find the address of a [15], a [35]. (2)

(c) Explain briefly the two main operations on a stack. (2)

(d) Differentiate between an array and a linked list. (2)

(e) Draw a diagram for a complete binary tree having five nodes. (2)

(f) Which one is more efficient, binary search or linear search? Justify your answer. (2)

(g) What operation does the following code perform on a singly linked list. Explain (2)

```
void func( int x)
{
    head = new node (x, head);
    if ( tail = = 0)
        tail = head;
}
```

(h) Suppose a circular queue of capacity n elements is implemented with an array of n elements. Assume that the insertion and deletion operation are carried out using FIRST and LAST as array index variables, respectively. Initially, FIRST = LAST = –1. Write the conditions to detect if the queue is full, and the queue is empty. (3)

(i) Show all the steps of a stack while adding 679 and 2530. (4)

(j) Write a pseudocode for a recursive function to find the factorial of a number. (4)

SECTION B

2. (a) An array <77, 66, 55, 44, 33, 22, 11> is to be sorted in ascending order using quick sort. Show the status after each pass. (6)

(b) Consider a circular queue "CQueue" of size 5. Show the status of the circular queue and the value of the variable FRONT and REAR after each of the following operations :

(i) Insert A, B, C, D, E to the "CQueue"

(ii) Delete A, B from the "CQueue"

(iii) Insert F

(iv) Delete C, D, E, F (4)

3. (a) Consider the following arithmetic expression P, written in postfix notation where

A=12, B=7, C=3, D=2, E=1, F=5:

P: A B C - / D E F + * +

(i) Translate P into its equivalent infix expression

(ii) Evaluate the infix expression (show the steps using stack) (6)

(b) Write a pseudocode to add two large numbers using stack. (4)

4. (a) Consider the following code fragment : (6)

```
Stack stack1 = new Stack();
```



```
while (!queue.isEmpty())
    stack1.push(queue.dequeue());
while (!stack1.isEmpty())
    queue.enqueue(stack1.pop());
```

What function does it perform on the queue? What will happen if we swap the queue and stack in the above-mentioned code fragment?

(**Note**: enqueue will now become push and vice versa. Also, pop now becomes dequeue and vice versa.)

(b) What kind of error can occur in an array implementation of queue? Give examples to illustrate it. How can this error be avoided? (4)

5. (a) Differentiate between linked list and circular linked list with the help of an example. Also write a function to add a node at the end of a circular linked list. (6)

(b) Explain the depth first and breadth first traversal of a tree with the help of an example. (4)

P.T.O.

6. (a) Consider the following sequence of operations performed on an initially empty doubly linked list :

(i) addtohead (25),

(ii) addtohead (28),

(iii) addtotail (23),

(iv) addtotail (20),

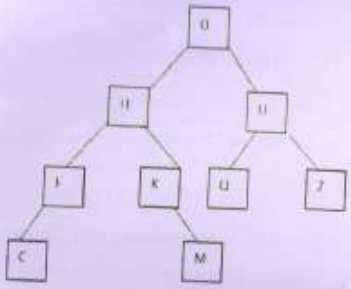
(v) deletefromhead ( ),

(vi) deletenode (23)

Show the HEAD, TAIL, content of the list, and links between the nodes after each operation. (6)

(b) Write a code to insert a node at the end of a singly linked list. (4)

7. (a) Consider the following binary tree: (6)



Determine the inorder, preorder, postorder traversal of the given tree. Also give the height of the above tree. Is the above tree a complete binary tree? Justify your answer.

(b) Define the following terms with the help of an example :

(i) Binary Search tree

(ii) Priority Queues (4)

8. (a) Consider the following code: (6)

```
int mul(int x)
{
    if (x<5)
        return (3*x);
    else
        return (2*mul(x-5)+7);
}
```

What value will be returned by function when mul is called. Explain each step of recursion. (10)

(b) Write the recursive function to calculate the GCD of the number. (4)