

Dec-2023

[This question paper contains 12 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 2393

G

Unique Paper Code : 2344001102

Name of the Paper : Programming with Python

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

Semester : 1

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. (a) Draw a flow chart to find whether a positive integer is even or odd. (3)

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(b) Construct logical expression for representing the following condition : (3)

RollNo should not be negative and Marks should be in between 0 and 100.

(c) Identify valid/invalid identifiers from the following :

(i) First Number

(ii) Number1

(iii) Number#List

(iv) Pass

(v) _Number

(vi) Del (3)

(d) List any 3 operators of dictionary that can be used only with the keys of the dictionary. Give example of one operator with its usage. (3)

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(e) Consider a tuple $t = ("Harry", "Jack", [40,35])$

Indicate error (if any) in the following code segments else write no error. Justify your answer.

(i) $t[1] = "Rinni"$

`print(t)`

(ii) $t[2][0] = 45$

`print(t)`

(3)

(f) Describe three modes used for opening a text file. (3)

(g) Consider a dictionary :

(3)

```
papers = {'GE1': 'Python File', 'GE2': 'DBMS',  
'GE3': 'Computer Networks', 'GE4': 'Information  
Security'}
```

What will be the output of the following function calls :

(i) `print(papers.get('GE5'))`

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(ii) `print(papers.get('GE5', "No such paper exist"))`

(h) Identify two exceptions that may be raised while executing the following statement and justify your answer. (3)

`product = x/y`

(i) Consider a string : (3)

`str1 = "SEC, Front End Web Design and Development"`

Find the output of the following statements :

(i) `str1[17:]`

(ii) `str1[-len(str1) : len(str1)]`

(j) Consider the following : (3)

`names = ["Abhinav", "Riya", "Kirti", "Divya"]`

`rollno = (101, 104, 106, 109)`

`subject = ["Maths", "English", "Chemistry", "Economics"]`

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What will be the output of the following statements :

(i) `data = list(zip(names, rollno, subject))`

`print(data)`

(ii) `names.sort()`

`print(names)`

Section - B

2. (a) Write a function `FuStr()` in Python to accept a string from the user. Replace all the consonants in the given string with the symbol "#". Return the modified string from the function. (5)

(b) Consider three sets : (5)

`set1 = {1,2,3}`

`set2 = {4,5,6,2,3}`

`set3 = {4,5,7,8,9,2}`

What will be the output of the following :

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- (i) `set.intersection(set1, set2, set3)`
- (ii) `set1.intersection(set2.intersection (set3))`
- (iii) `set.difference(set3, set2, set1)`
- (iv) `set3.difference(set2.difference(set1))`
- (v) `set3.difference(set2.union(set1))`

(c) Differentiate between `extend()` and `append()` functions of the list, with the help of an example for each. (5)

3. (a) Write a function to print the following pattern: (5)

```
5 5 5 5 5
4 4 4 4
3 3 3
2 2
1
```

(b) Consider the following function : (6)

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```
def funct():
    name = int(input("Enter your name"))
    salary = 25000
    salary = salary + incentive
    info = name + salary
    print(info)
```

`funct()`

Identify and describe 3 exceptions that can be raised while executing the above function `funct()`.

(c) What will be the output/error (if any) of the following code segment : (4)

```
marks = 65
def func(marks, IA):
    IA = 23
    marks = marks + IA
    return marks
```

(i) `print(func(57))`

(ii) `print(func(53, 24))`

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(iii) `print(func(1A = 12))`

(iv) `print(func(67, 20, 5))`

4. (a) Write a function `Freverse()` that accepts a number from the user and print the reverse of the entered number. (5)

(b) Consider the following string : (5)

`Pname = "Programming with python"`

What will be the output of the following:

(i) `Pname.count('P')`

(ii) `Pname.partition(' ')`

(iii) `Pname.swapcase()`

(iv) `Pname.rfind('n')`

(v) `Pname.split(' ')`

(c) Differentiate between `copy()` and `deepcopy()` functions of the list, with the help of an example. (5)

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5. (a) Write a function `FnFactor()` that accepts a number as input parameter and print its factors. (4)

(b) What will be the output of the following code segments : (6)

(i) `x = [1,2,3,4,5,6,7,8,9,10]`

`result = 0`

`for i in x:`

`if i%2 != 0:`

`result += i`

`print(result)`

(ii) `series = [i for i in range(1, 50) if i%5 == 0]`
`print(series)`

(c) Identify the output/error (if any) for the following. Justify your answer if it is an error. (5)

(i) `set1 = ["Word", "Excel", "PowerPoint"]`
`print(set1[2])`

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- (ii) `tuple = (10)`
`print(tuple.index(10))`
- (iii) `list1 = [54, 76, 34, 'Hello', 42]`
`print(sum(list1))`
- (iv) `str1 = "Hi, wow are you?"`
`str1[4] = 'h'`
- (v) `dict1 = {'A': 65, 'B': 66, 'A': 67}`
`print(dict1)`

6. (a) Write a function that takes two files `file1` and `file2` as input. The function should read the contents of file `file1` line by line and should write them to another file `file2`. Display the contents of file 2. (6)

- (b) Identify the error(s) in the following : (4)

- (i) `list1 = ['Apple', 'Mango', 'Orange', 'Cherry']`
`list1[5] = 'Pineapple'`
- (ii) `tuple1 = (1, 'a', 4, 'r', 7, 9)`
`print(min(tuple1))`

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- (iii) `total = 0`
`total = total + x`
`print(total)`
- (iv) `if age > 18`
`print("Eligible for License")`

- (c) Write a function in Python that accepts a list of integers `L` from the user. The function should count and return the number of elements that are greater than 50. (5)

- (a) Write a function in Python that takes a digit (from 0 to 9) as an input parameter and returns the corresponding text in words. For example, on input 5, the function should return 'Five'. Use a dictionary for mapping digits to their string representation. (5)

- (b) What will be the output of the following code segment if the file being opened does not exist : (5)

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(i) try:

```
f = open('file1.txt', 'r')
```

```
except IOError:
```

```
    print("Problem with input output")
```

```
else:
```

```
    print("No problem with input output")
```

(ii) try:

```
f = open('file1.txt', 'w')
```

```
except IOError:
```

```
    print("Problem with input output")
```

```
else:
```

```
    print("No problem with input output")
```

- (c) Write statements in Python to accept two strings S1 and S2 from the user. Subsequently, display distinct characters in both the strings in ascending order. (5)

[This question paper contains 8 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 3858 **G**
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. All questions in **Section A** are compulsory.
3. Attempt any **four** questions from **Section B**.
4. All parts of a question should be answered together.

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SECTION A

1. (i) Write any two differences between TCP and UDP. (2)
- (ii) Illustrate Geostationary Satellites. (2)
- (iii) Describe search engines. Give two examples. (3)
- (iv) Give an HTML command to the below given tasks. (3)
 - (a) To insert an image into a cell of a table
 - (b) To add the comment "COMPUTER NETWORKS" in an HTML document.
- (v) With the help of a diagram show different parts of coaxial cable? Write one use of coaxial cable. (3)
- (vi) What do you mean by Network Topology? Give two differences between ring and bus topologies? (3)

- (vii) For n devices in a network, what is the number of cable links required for star, ring, mesh topologies? (3)
- (viii) Create an HTML document having the following headings Product id, Product name and cost in tabular form. Add two rows. (4)
- (ix) What do you mean by Data Communications? List various components of a data communication system. (4)
- (x) What is CSS? Describe different ways of using CSS in HTML documents with one example each. (4)
- (xi) Give use and full form of below given Application Layer Protocols. (4)
 - (a) HTTP
 - (b) SMTP

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SECTION B

2. (a) Describe simplex, half-duplex and full-duplex modes of communication. Give one example of full-duplex communication. (4)
- (b) Differentiate between TCP/IP and OSI network models on the basis of layers and functionalities/services. (6)
3. (a) What is the use of description lists in HTML? Write HTML code to create the below given description list. (4)

Computer

Needs a setup Mobile

Can be carried in pockets Laptop

Can be carried in bags

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- (b) What is the role of the following network devices : (6)
- (i) Router
 - (ii) Switch
 - (iii) Bridge
 - (iv) Gateway
 - (v) Repeater
 - (vi) Hub
4. (a) What do you understand about Guided and Unguided transmission media? Describe Fiber-Optic Cable. (6)
- (b) Write the use of a DNS system. Give two examples of sub-domains used by websites. (4)

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5. (a) Write the role of different agents present in the architecture of the e-mail system. (4)
- (b) Create an Examination Form of a College with the following in order (6)
- (i) One textbox for Name.
 - (ii) One textbox for password.
 - (iii) One check box for Complete attendance.
 - (iv) Selection menu containing label Year with options I, II, III
 - (v) Textarea for Comment.
 - (vi) Submit button using input type, select and textarea commands in HTML.
6. Creating a HTML webpage having die following : (10)

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- (i) Add webpage title "HTML Web Page" and the defined character set
 - (ii) To add an email link to die email address "ge@du.ac.in" in the footer area.
 - (iii) To add an image to die HTML Web Page and make the image link to "http://www.du.ac.in".
 - (iv) An ordered list
 1. Table
 2. Chair
 3. Bed
 - (v) Add a CSS declaration that sets die background color of the header element to white.
7. Write short note on any five of the following : (10)
- (i) URL

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- (ii) FTP
- (iii) Telnet
- (iv) Video Conferencing
- (v) Web server
- (vi) Radio Waves
- (vii) LAN

[This question paper contains 8 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1753

G

Unique Paper Code : 2342572301

Name of the Paper : Computer System Architecture

Name of the Course : B.Sc. (Prog.)

Semester : III

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 No. 1 in Section-A is compulsory.
3. Attempt any 4 questions from among questions 2 to 7 in Section-B.
4. Parts of a question must be answered together.

Section-A

1. (a) State associative law. Prove or disprove algebraically if associative law holds for NOR operation or not. (3)

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(b) List the truth table of the function :

$$F = x'yz + xy' + x'y \quad (3)$$

(c) What do you understand by edge-triggered circuits? List the characteristic tables for SR flip-flop and T- flip-flop. (3)

(d) Subtract 10001 from 10011 using 2's complement. (3)

(e) Represent $(-48)_{10}$ using following representation:

(i) Sign-magnitude representation

(ii) 1's complement Representation

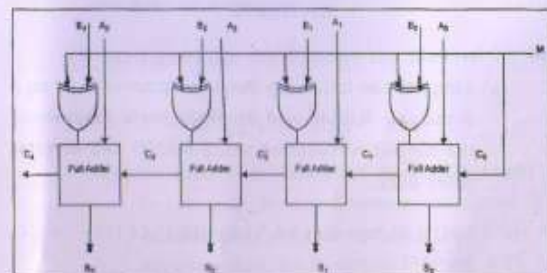
(iii) 2's complement representation. (3)

(f) The binary adder-subtractor circuit has the following values for the input-mode M and the data input A and B. Determine the values of the outputs S_3, S_2, S_1, S_0 , and the carries generated i.e. C_4 and C_0 . (3)

$$M = 0, A = 1100, B = 1101$$

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(g) Identify the addressing mode that facilitates :

(i) Program relocation

(ii) The implementation of pointers to memory

(iii) Indexing of data (3)

(h) Write the micro-instructions for the complete instruction cycle (from time signal T_0 onwards) for the BUN (Indirect mode) machine instruction along with control conditions. (3)

(i) Explain the importance of following condition bits:

(i) IEN-flag

(ii) R-flag

(iii) O-flag (3)

(j) Draw the flowchart for the CPU program to input data. (3)

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Section-B

2. (a) Simplify the following Boolean function F using a 4-variable K-Map and draw the logic diagram of the simplified function using NAND and inverter gates only.

$$F(A, B, C, D) = \Sigma (1, 3, 4, 5, 10, 11, 12, 13, 14, 15) \quad (4)$$

- (b) Design a 3-bit combinational circuit-2's complementor. The output generates the 2's complement of the input binary number. (5)

- (c) What is meant by fetch sequence? Consider the instruction that can be accommodated in one word of 4096×16 size memory. The Instruction has the format as mentioned below :

I	OPC	Address
15	14	12 11
		0

Write the micro-instructions for the fetch sequence of the instructions having the above-mentioned instruction format. (6)

3. (a) How many half adders and OR gates are required to implement a full adder? Explain and justify with

the help of a diagram. (2+2)

- (b) (i) Determine the base of the number for the following operation to be correct:

$$24 + 17 = 40$$

- (ii) Perform the arithmetic operation $(+85) + (+35)$ with binary numbers in signed 2's complement representation. Use 8-bit to accommodate each operand along with its sign. Identify, if this operation results in overflow or not. (2+3)

- (c) Explain the Interrupt cycle with the help of a flowchart. (6)

4. (a) Perform the following conversions : (4)

(i) $(198.46)_{10}$ to $(\quad)_{10}$

(ii) $(234)_{10}$ to Binary, Hexadecimal and Octal.

- (b) Describe the functioning of a 4-bit binary-incrementer with the help of diagram. (5)

- (c) The initial content of PC is 7FF. The content of memory at 7FF is EA9F. The content of the memory at A9F is 0C35. The content of memory at address C35 is FFFF. Assuming an ISZ indirect is to be fetched from memory and executed.

- (i) Specify the micro-instruction to be executed at each timing signal.
- (ii) Show the contents in hexadecimal of registers PC, AR, DR, IR, and SC of the basic computer.

Give the answer in a table with 6-columns. Column-1 must contain the micro-instructions. Column 2-6 must display the contents for each register and a row for each timing signal. Show the content of registers after the positive transition of each clock-pulse. (6)

5. (a) (i) How many $32K \times 8$ RAM chips are needed to provide a memory capacity of 256K bytes?
(ii) How many lines of the address must be used to access 256K bytes? (4)
- (b) (i) The content of a 4-bit register is initially 1011. The register is shifted 3 times to the right with the serial input being 10110. Show the content of the register after each shift.
(ii) Write the formula to find the r 's complement where r represent the base of the number. Also find the 5's complement of $(234)_5$. (3+2)

- (c) What is the difference between isolated I/O and memory mapped I/O? What are the advantages and disadvantages of each? (6)
6. (a) What is meant by register addressing mode? Explain the benefits of using this addressing mode. (4)
- (b) Find the complement of $F = wx + yz$; then show that
 $F \cdot F' = 0$ and
 $F + F' = 1$. (5)
- (c) A two-word instruction is stored in memory at an address designated by the symbol M. The address field of the instruction (stored at M+1) is designated by the symbol A. The operand used during the execution of the instruction is stored at an address symbolized by B. An index register contains the value X. Draw the memory map diagram for the given case study. State how B is calculated from the other addresses if the addressing mode of the instruction is :
 (i) Immediate
 (ii) Direct

(iii) Indirect

(iv) Relative

(v) Indexed

(6)

7. (a) A computer uses a memory unit of 128K words of 32-bits each. A binary instruction code is stored in one word of the memory. The instruction has four parts: an addressing mode field to specify one of the eight-addressing modes, and operation code, a register code part to specify one of the 30 registers and an address part. How many bits are there in addressing mode part, opcode part, register code part, and the address part? Draw the instruction format clearly specifying the bit numbers required for each part. (6)

(b) Differentiate between (Attempt any three):

- (i) Index-register addressing mode and Base-register addressing mode
- (ii) Register-Reference and memory reference Instructions.
- (iii) Combinational and sequential circuits
- (iv) Peripheral devices and CPU. (9)

(500)

[This question paper contains 8 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 4766

G

Unique Paper Code : 42343307

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

Name of the Course : **B.Sc. Programme (CBCS-
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 **three** questions from **Section B**.
4. Parts of a question must be answered together.

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**Section A
(Compulsory)**

1. (a) Write one difference between NumPy array and Pandas Series. (2)

- (b) Give the output of the following code: (2)

```
a=np.arange(10).reshape(4,3)
```

```
print(a)
```

```
a[(a>4)]=-1
```

```
print(a)
```

- (c) Write Python statements to generate random numbers from 1 to 20 and plot its cumulative data distribution. (2)

- (d) Consider the DataFrame df and write output of the following commands (1+1+2)

```
df = pd.DataFrame([[1.4, np.nan], [7.1, -4.5],
                  :[np.nan, np.nan], [0.75, -1.3]], index=['a', 'b', 'c',
                  'd'], columns=['one', 'two'])
```

(i) print(df)

(ii) df.idxmax()

(iii) df1=df.sum(axis='columns')

Section B

2. Consider the following DataFrame EMP containing attributes Job Title, Gender, Experience and Salary of employees of a company. (1+2+2)

	Job Title	Gender	Experience	Salary
0	Business analyst	Female	2	48000
1	Business analyst	Male	1	42000
2	Business analyst	Female	3	51000
3	Senior analyst	Male	5	62000
4	Senior analyst	Female	6	71000
5	Senior analyst	Male	8	73000
6	Head analyst	Female	10	82000
7	Head analyst	Male	11	87000
8	Head analyst	Female	12	91000

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Write Python statement(s) to do the following:

- (i) To display first 5 rows of the DataFrame EMP.
 - (ii) Display total number of Females along with their average Salary.
 - (iii) Delete rows with Salary less than the average Salary of all employees.
3. (a) Given an excel file 'marks.xlsx' with following content: (3)

Name	Age	Weight
Rohan	22	55
Divya	20	50

Use Pandas module to read the given file 'marks.xlsx' to DataFrame. Also, plot a scatterplot between Age and Weight.

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(b) Give output of the following code: (2)

```
b=np.array([[1,2],[3,4]])
```

```
(i) c=np.zeros_like(b)
```

```
print(c)
```

```
(ii) d=np.ones_like(b)
```

```
print(d)
```

4. Consider the following array named marksArray having average marks of 10 students of a class. (1+2+2)

```
marksArray = [75,60,58,47,83,79,60,65,25,50]
```

Write Python statement(s) to perform the following operations:

- (i) Calculate the mean and median of marksArray.
- (ii) Calculate standard deviation and variance of marksarray.

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(iii) Find number of students securing marks greater than the average marks of the class.

5. Consider the following NumPy 2d array : (5)

```
matrix=[[23,78,55],
```

```
[10,12,40],
```

```
[30,27,70],
```

```
[12,43,80]]
```

Give the output of the following NumPy commands :

(i) `matrix[[1,3,0],[2,1,0]]`

(ii) `matrix[2][:2]`

(iii) `matrix[[-2,-3]]`

(iv) `matrix[:, :-1]`

(v) `matrix.T`

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6. (a) Consider the following Python statements to generate data and do the given operations on the generated DataFrame

```
data = pd.DataFrame([[1., 6.5, 3.], [1., NA, NA],  
[NA, NA, NA], [NA, 6.5, 3.]])
```

(i) Delete the column having all null values only.

(ii) Fill all null values using 'fill' method.

(2)

(b) Consider the following Series :

(3)

```
a=pd.Series([9,7, 5, 7, 4, 2, 1, 4,3])
```

Give the output of the following commands:

(i) `a.rank()`

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(ii) `a.rank(method='max')`

(iii) `a.rank(method='first')`

(1000)

[This question paper contains 8 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 4804

G

Unique Paper Code : 42344304

Name of the Paper : Operating System

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

Semester : III [Year of Admission 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) Name the default shell used in Unix/Linux. (1)

(b) Name the memory management technique that supports the programmer's view of memory.

(1)

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- (c) What do you mean by privileged instructions? (1)
- (d) Why are Solid-State Disks (SSDs) preferable to Hard Disks? (2)
- (e) How do blade servers differ from the traditional multiprocessor systems? (2)
- (f) List two system calls each for process control and file management. (2)
- (g) Is Interrupt-driven I/O suitable for transferring bulk data? Justify your answer. (2)
- (h) Why should long-term scheduler select a good process mix of I/O bound and CPU bound processes? (2)
- (i) How do the multiple processors work in an asymmetric multiprocessing system? (2)
- (j) If page size=2048 bytes and process size=72,766 bytes, then find the number of pages needed for a process to be allocated using paging memory management technique. (2)

- (k) Define Constant Angular Velocity (CAV) and Constant Linear Velocity (CLV) w.r.t. secondary storage devices. (2)
- (l) Differentiate between absolute path name and relative path name. (2)
- (m) Consider the following segment table: (2)

Segment	Base	Limit
0	219	600
1	2200	24
2	1190	100
3	1900	210

Calculate the physical addresses for the following logical addresses:

- (i) 1,10
- (ii) 3,400
- (n) Given a datafile F1 in which each row consists of 5 comma separated values- First Name, Last Name, Age, Percentage and Grade. Use a Linux command to retrieve First Name and Grade from the file and store this data in file F2. (2)

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2. (a) How do user programs and system services interact in a Microkernel architecture? Illustrate with a suitable diagram. Discuss the advantages and disadvantages of this approach for Operating System design. (6)
- (b) Define Operating System. Describe any three services provided by Operating System. (4)
3. (a) Describe three general methods for passing parameters to the operating system. (3)
- (b) Differentiate between : (4)
- (i) Multilevel Queue Scheduling and Multilevel Feedback Queue Scheduling
 - (ii) Long term scheduler and Short term scheduler
- (c) List the tasks performed by dispatcher in CPU scheduling. (3)

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4. (a) Define process. Explain different states of a process with the help of a suitable diagram. (6)
- (b) What is the purpose of fork() system call? What are the two values returned by fork() on success? (2)
- (c) Explain convoy effect with respect to CPU scheduling. (2)
5. Consider the following processes. (6+4)
- | Process | Arrival Time (ms) | Burst Time (ms) | Priority |
|---------|-------------------|-----------------|----------|
| P1 | 0 | 6 | 1 |
| P2 | 1 | 3 | 2 |
| P3 | 2 | 1 | 3 |
| P4 | 3 | 7 | 4 (high) |
- (i) Draw Gantt charts illustrating the execution of these processes using First-Come, First-Served (FCFS) and Preemptive Priority scheduling.

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- (ii) Calculate average waiting time and average turnaround time for the above mentioned scheduling algorithms.

6. (a) Consider the memory partitions of size 100 KB, 500 KB, 200 KB, 300 KB, 600 KB (in order). These partitions need to be allocated to four processes of sizes 215 KB, 417 KB, 112 KB and 420 KB in that order.

Perform the allocation of processes using-

- (i) First Fit Algorithm
- (ii) Best Fit Algorithm

Compute the external fragmentation for both the cases. Rank the algorithms in terms of how efficiently they use the memory. (6)

- (b) Consider a paging system with the page table stored in memory. If a memory reference takes 150 ns, TLB is added and 70% of all page table reference are found in the TLBs, what is the effective memory time?

(Assume that finding the page-table entry in the TLBs takes 10 ns, if the entry is there). (4)

7. (a) Under what circumstances do page faults occur? Describe the actions taken by the operating system to handle the page fault with the help of a diagram. (6)

- (b) Explain Tree-Structured directories with a suitable diagram. (4)

8. (a) Write a Unix command for each of the following :

(i) Merge the 3 files F1, F2 and F3 and store the merged contents in file F4.

(ii) Sort the contents of file F1 in reverse order.

(iii) Display the detailed list of directory D1.

(iv) Display the date in mm/dd/yy format.

(v) Give permission to a file F2 such that OWNER has all the three permissions (read, write, execute), GROUP and OTHERS have read and execute permissions.

(vi) Count the number of lines and words in the file F3. (6)

(b) Write a shell script to find the sum of digits of a given number N (e.g., if $N=258$ then the sum of digits $=2+5+8=15$). (4)

[This question paper contains 12 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1672

G

Unique Paper Code : 2343012001

Name of the Paper : Python Programming for
Data Handling

Name of the Course : Common Prog Group (DSE/
GE)

Semester : III

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. Attempt All questions from Section A.
3. Attempt any 4 questions from Section B.
4. All the parts of a question must be answered together.

Section A

1. (a) What is a dictionary in python? Explain using an example. (3)

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(b) Give output of the following code : (2)

```
(i) n = [1,2,3,4,5,6,7,8,9,10]
    r = 0
    for i in range(0, 10):
        if (n[i]%2 == 0):
            r += c[i]
    print(r)
```

(ii) gv = 10 (3)

```
def func():
    lv = 20
    gv = 30
    print(gv)
    print(lv)
func()
print(gv)
```

(c) Write a function in python to find the sum and maximum of three integers. (2)

(d) Explain the following functions of files in python : (6)

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(i) f.seek()

(ii) f.tell()

(iii) f.readline()

(e) Differentiate between : (6)

(i) startswith() and endswith()

(ii) break and continue

(iii) Radiobutton and Checkbutton

(f) Evaluate the following expressions : (4)

(i) abs(-5.4)

(ii) math.floor(25.7)

(iii) $x = 2 + 9 * ((3 * 12) - 8) / 10$ (iv) $5 \% 10 + 10 - 25 * 8 // 5$

(g) What is the use of a layout manager in Tkinter? Briefly discuss the 'grid' layout manager and the purpose of 'row' and 'column' parameters. (4)

Section B

2. Consider the code segment given below for a student form :

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```
import tkinter as tk
root = tk.Tk()

#Name of the Student
name_var = tk.StringVar(root)
name_inp = tk.Entry(root, textvariable=name_var)

#Roll Number of the Student
rollno_var = tk.IntVar(root)
rollno_inp = tk.Entry(root, textvariable=rollno_var)
```

- (a) Identify all the Tkinter Control Variables in the code above. Write python code for adding a 'Save' button. (5)
- (b) Write a callback function 'on_save' for the 'Save' button which does the following :
- Collect 'name' and 'rollno' from the form using 'get' and store it in a Python dictionary object. (5)
 - Using the CSV DictWriter class, write the students record ('Name', 'Roll No') collected in a dictionary object to file 'students.csv'. Create a new file if the file doesn't exist. Also write a header in the 'students.csv' file using the dictionary keys. (5)

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3. (a) Consider the code segment given below :

```
import tkinter as tk
window = tk.Tk()
myform = tk.Frame(window)
myform.grid()

tk.Label(myform, text="Welcome").pack()
tk.Entry(myform, text="Enter some Text").pack()

window.mainloop()
```

- What is the widget hierarchy? Identify the different widgets and their child widgets in the code above. (5)
 - Draw the graphical user interface created by the program. Sizes of widgets doesn't need to be precise but ensure that the positioning of widgets relative to one another is correct. (5)
- (b) Choose the best option : (5)
- def f():
x=15
print(x)
x=12
f()

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- (a) Error
 (b) 12
 (c) 15
 (d) 1512
- (ii) `x = [i for i in range(3)]`
`for i in x:`
`print(i)`
 (a) 0 1 2
 (b) Error
 (c) 0 1 2 0 1 2
 (d) None of the mentioned
- (iii) `math.ceil(54.6)`
 (a) 54
 (b) Error
 (c) 55
 (d) 54.5
- (iv) `5 % 10 + 10 < 50` and `29 >= 29`
 (a) True
 (b) False

- (c) Error
 (d) None of the above.
- (v) `T = 0`
`count = 20`
`while count > 5:`
`T += count`
`count -= 1`
`print(T)`
 (a) Error
 (b) 190
 (c) 195
 (d) 196
4. (a) Write an assignment statement using a single conditional expression for the following *if - else* code : (5)
- ```
if marks >= 70:
 remarks = 'good'
else:
 remarks = 'Average'
```

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(b) What is the difference between a Mutable data type and an Immutable data type? Explain giving an example of each type. (5)

(c) Write a python program to print the following pattern : (5)

```

*
**

**
*

```

5. (a) Consider the following code segment: (5)

```
Msg = "Happy New Year 2024 !!"
```

Determine the output or indicate error on executing the following statements :

- (i) `print(match.lower())`
- (ii) `print(match[:2])`
- (iii) `print(match[-4:-11])`

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(iv) `print(match.index('n'))`

(v) `print(match.partition('/'))`

(b) Differentiate between the following : (5)

(i) `append()` and `extend()`

(ii) `x=10` and `x==10`.

(c) Write a python function to return the sum of the digits of a number, passed to it as an argument. (5)

6. (a) Consider the following function : (5)

```
def nfunc(a = 0, num = 1):
 return a * num
```

Give the output produced for each of the following function calls :

- (i) `nfunc(5)`
- (ii) `nfunc(5, 6)`
- (iii) `nfunc(num = 7)`
- (iv) `nfunc(num = 6, a = 5)`
- (v) `nfunc(5, num = 6)`

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(b) Identify the error, if any, in the following code segments : (5)

(i) #SET

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

(ii) #FUNCTION

```
def example(a):
 a = a + '2'
 a = a*2
 return a
example("hello")
```

(iii) #TUPLE

```
t=([40,50], "Ram", [40,30])
t[0][1]= "Ram"
print(t)
```

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(iv) for a in range(7, 20):

```
if (a = 6):
 print('EXITING")
 Continue
print(a)
```

(v) print("%5d", % 12345)

(c) Write short note on : (5)

- (i) map and reduce operations
- (ii) islower, lower, istitle functions of strings

7. (a) Write a python program to performs the following operations : (5)

- (i) Create a file 'file1.txt' and write the following text in it :

*Python is a popular language*

- (ii) Read 'file1.txt' and copy the contents of the file to output file 'file2.txt'.

(b) Consider the file 'vowels.txt' having following line : (5)

*aeiouAEIOU*

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The file is opened in 'r+' mode and the operations below are performed sequentially. What will be the output after each operation?

(i) `f.write('12345')`

(ii) `f.read()`

(iii) `f.seek(0)`

(iv) `f.read(5)`

(v) `f.read()`

(c) What are the following functions used for: (5)

(i) *eval* function

(ii) *append* in lists

(iii) *reverse* in lists

(iv) *isalpha* in strings

(v) *encode* in strings

[This question paper contains 8 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 4827 **G**

Unique Paper Code : 42347501

Name of the Paper : Data Structures

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) What is the difference between a binary tree and binary search tree? (2)

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- (b) Explain sparse matrix using a diagram. (2)
- (c) Differentiate between linear search and binary search using an example. (2)
- (d) Give any two applications of a stack. (2)
- (e) Explain the situation in which insertion sort works better than quicksort? (2)
- (f) What will happen if we attempt to remove a node from an empty linked list? Give one way to solve this problem. (2)
- (g) Give two differences between arrays and linked list. (2)
- (h) What is row major mapping and column major mapping? Explain with the help of an example. (3)
- (i) Define Priority queue. How priority queue can be implemented using linked list. (4)
- (j) List two advantages and disadvantages of recursion. (4)

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## Section B

2. (a) Many operations can be performed faster on sorted data than on unsorted data. Explain for which of the following operations is this the case :
- Finding an item with a minimum value
  - Finding the middle value (median)
  - Computing the average of values (6)
- (b) Is merge sort the best sorting algorithm? Justify your answer. (4)
3. (a) Consider the following stack of characters, where stack is allocated  $n = 6$  memory cells : (6)
- stack: a, d, e, f, g, \_
- (where "\_" means empty memory cell)
- Describe the stack as the following operations take place :
- push (stack, k)
  - pop (stack, item)
  - push (stack, l)

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(iv) push (stack, s)

(v) pop (stack, item)

(vi) push (stack, t)

(b) Convert the following infix expression to a postfix expression using a stack. Show the status of the stack at each step. What is the maximum number of symbols that appear on the stack at any point of time during the evaluation of this expression?

$$A * (B + D) / E - F * (G + H / K) \quad (4)$$

4. (a) Consider the following sequence of letters and asterisks:

C O \* M P \* U \* \* T E R \*

Consider the queue data structure that has the following two operations enqueue and dequeue. Suppose that for the above sequence, each letter (such as C) corresponds to an enqueue of that letter into the queue and each asterisk (\*) corresponds to a dequeue operation on the queue. Show the sequence of the values in the queue using a diagram.

(b) Consider an initially empty circular queue of the size four implemented using arrays. Perform the given sequence of operations and show the position of front and rear after each operation. (4)

(i) enqueue (14),

(ii) dequeue (),

(iii) dequeue (),

(iv) enqueue (3),

(v) enqueue (7),

(vi) enqueue (9),

(vii) enqueue (0),

(viii) enqueue (2)

5. (a) Write member functions to perform the following operations on Singly Linked List: (6)

(i) Insert an element after  $n^{\text{th}}$  element of the list.

(ii) Delete an element present at the end of the list.

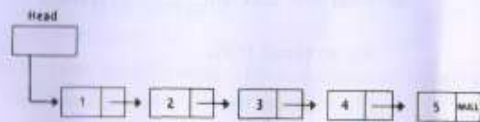
(iii) Search an element with value 'V'.



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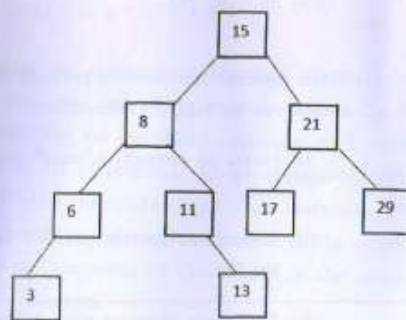
6

- (b) What will be the output of the following 'func' for the given linked list with first node as head? (4)



```
void func (class Node* head)
{
 if (head == NULL)
 return; func (head -> next);
 cout << head->data << " ";
}
```

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



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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) Differentiate between the breadth first and depth first traversal with the help of an example using a diagram. (4)

7. (a) What will be the output of the given recursive function : (6)

```
int fun (int i)
{
 if (i==2)
 return 1;
 else
 return (i-1) * fun(i-1);
}
```

Show the steps and the values to be returned when the following functions are called :

- (i) fun(6)  
(ii) fun(1)

- (b) Write the pseudocode for the recursive function to compute the sum of the 'n' numbers stored in an array. (4)

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8. (a) Explain the 'Tower of Hanoi' problem. Also write the recursive function to solve this problem.

(6)

(b) Calculate the address of the element  $A[3][2]$  of the 2-D array defined as  $A(5, 5)$  if the element is stored in :-

(i) Row major order

(ii) Column major order

(4)

[This question paper contains 8 printed pages.]

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K2/17

Your Roll No.....

Sr. No. of Question Paper : 4732

G

Unique Paper Code : 42343503

Name of the Paper : Web Design Using HTML5  
(SEC)

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

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. Question no. 1 is compulsory.
3. Attempt any **three** questions from Q. no. 2 to Q. no. 6.

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1. (a) How does a Webserver process a static webpage?  
Explain with the help of a suitable diagram. (2)
- (b) What are the advantages of keeping the CSS rules in a separate file rather than embedding in a STYLE tag in the HTML file? Give the code to use an external style sheet. (2)
- (c) Mention any two coding styles that need to be taken care of, to make a website accessible to people with disabilities. (2)
- (d) Write the code to make the image (DU.jpg) as a hyperlink, such that on click the user is directed to <http://www.du.ac.in/> in a new window. (2)
- (e) What is the effect of the following four lines of code on the webpage display? (2)

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- (i) `body {background-color: #FFFFFF;}`
  - (ii) `h1 {color: #00F;}`
  - (iii) `h2 {color: red;}`
  - (iv) `h3 {color: rgb(0%, 100%, 0%);}`
2. (a) Differentiate between an id attribute and a class attribute with a suitable example. How do we identify these attributes in a CSS file? (2)
  - (b) A web page contains information about Global Warming. Write CSS properties for the following:
    - (i) For the main element, add 40 pixels of padding to the right and left.

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(ii) Add a linear gradient as the background for the heading H1 on the web page.

(iii) Add the top and bottom padding to the heading H2.

(iv) Adding a colourful shadow to the heading H3 "Mother Earth".

(v) For keeping the description of Ozone Depletion to the right of the web page.

(vi) For setting the font to Calibri with size 11 point. (3)

3. (a) Write an HTML code to create the table given below : (3)

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| DU                         | JNU | IITD | DTU                                 | NSIT |
|----------------------------|-----|------|-------------------------------------|------|
| Ph. D. Programme           |     |      | M.Tech. Ph. D. Integrated Programme |      |
| M. Tech. Programme         |     |      |                                     |      |
| Entrepreneurship Programme |     |      | B. Tech. Programme                  |      |

(b) Write an HTML code to print the following :

The standard equation of a circle with center at  $(x_1, y_1)$  and radius  $r$  is  $(x - x_1)^2 + (y - y_1)^2 = r^2$  (2)

4. (a) What is a pseudo class selector? Explain with example. (1)

(b) Give a CSS code for an image rollover between a picture of the sun and a picture of a cloud. (2)

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(vi) A numeric password field of length 4.