SVKM'S
Mithibai College of Arts, Chauhan Institute of Science &
Amrutben Jivanlal College of Commerce and Economics (Autonomous)
Academic Year (2022-23)
Year: 2 / Semester: IV

Program: B.Sc. Computer Science **Max. Marks: 75**
Course: Fundamentals of Algorithms
Date: **Duration: 2 ½ hrs.**

REGULAR EXAMINATION

Instructions:

1) This question paper contains 2 pages.
2) All questions are compulsory
3) Answer to each new question to be started on a fresh page.
4) Figures in brackets on the right hand side indicate full marks.
5) Assume Suitable data if necessary
6) Draw neat and well labelled diagrams wherever necessary.
7) Use of scientific calculator is permitted

Q.1 **Attempt any three.** [21]

A What is Algorithm? Discuss different types of algorithm analysis. Which is the most commonly used analysis? Why?

B What is the complexity of the following code? Detail each step.

```
def func1(n):
    i=1
    while i<=n:
        i=i*2
        print(i)
    for j in range(0, n):
        print(j)
```

C Given following python code find its complexity.

```
def func(n):
    cnt=0
    if n<=0:
        return
    for i in range(0,n) :
        for j in range(0,n):
            cnt=cnt+1
    func(n-3)
    print(cnt)
```

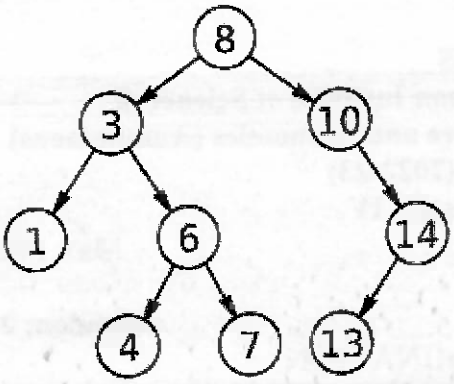
D Develop recursive python program to find x^y. Find its complexity.

Q.2 **Attempt any three:** [21]

A What are heaps? Explain heapsort with following example: 8,3,7,1,2,5,6

B What is string matching? Describe naïve approach of the string matching with an example.

C Explain the concept of threaded binary tree with its node structure. Given following binary tree generate threaded binary tree.



D Discuss median of median algorithm with suitable example.

Q.3 **Attempt any three.** [21]

A Explain following methods of algorithm classification:

- Linear Programming
- Reduction
- Deterministic or Non-Deterministic
- Exact or Approximate

B Find out longest common subsequence of "longest" and "stone".

C Write a program of quick sort as an application of divide and conquer strategy.

D Given following character frequencies:

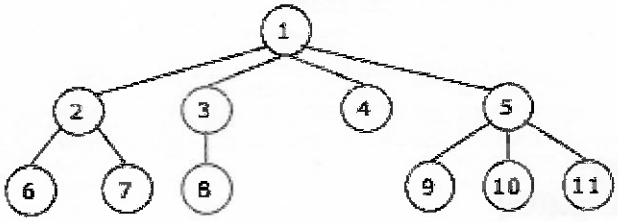
Character	a	e	i	o	u	s	t
Frequency	10	15	12	3	4	13	1

Find its Huffman code.

Q-4 **Attempt any three:** [12]

A Given recurrence relation $T(n)=16T(n/4)+n$ find its Θ.

B What is Generic tree? Given the following generic tree convert it into the corresponding binary tree.



C Explain the programming terminology by which D & C divides problems in sub-problems. Draw visualization of divide and conquer strategy.

D Explain properties and approaches of dynamic programming