

## POKHARA UNIVERSITY

Level: Bachelor

Semester – Spring

Year: 2020

Program: BE

Full Marks: 70

Course: Analysis and Design of Algorithm

Pass Marks: 31.5

Time: 2 hrs.

*Candidates are required to answer in their own words as far as practicable.*

*The figures in the margin indicate full marks.*

**Attempt all the questions.**

### Section - A: (5×10=50)

- Q. N. 1 Design an algorithm to find all the common elements in two sorted lists of numbers. 7+3  
For example, for the lists 2, 5, 5, 5 and 2, 2, 3, 5, 5, 7, the output should be 2, 5, 5.  
What is the maximum number of comparisons your algorithm makes if the lengths of the two given lists are m and n, respectively?

**OR**

What is algorithm analysis? Why it is necessary to analyze the algorithm? 3+3+4

Input: n

Output: nth Fibonacci number.

Algorithm: assume a as first(previous) and b as second(current) numbers

```
fib(n)
{
    a = 0, b = 1, f = 1 ;
    for(i = 2 ; i <= n ; i++)
    {
        f = a+b ; a=b ; b=f ;
    }
    return f ;
}
```

Compute the Time and space complexity of this algorithm.

- Q. N. 2 Can linear data structure be used to construct nonlinear data structure? Explain how we can implement binary search tree using array? Explain limitation of using array for binary search tree. 2+4+4
- Q. N. 3 How can we apply dynamic programming to multiply the chain of matrices? Write an algorithm to compute minimum number of computations required to multiply matrices: M1, M2, M3 and M4 with respective. Dimensions (5 x 10), (10 x 3), (3 x 7), (7 x 15). 5+5
- Q. N. 4 How can we determine if graph is strongly connected or not? Write an algorithm to find articulation points of a graph. 10
- Q. N. 5 What is backtracking technique in problem solving? Explain how can you solved 8-queens problem using backtracking? 10

**Section - B: (1×20=20)**

- Q. N. 6 Explain how divide and conquer approach is useful in problem solving? Compute  $x^{29}$  by using divide and conquer technique. Define how greedy approach is useful to find the solution of Job sequencing problem explain with suitable example and determine efficiency of the algorithm 5+5+5+5