

POKHARA UNIVERSITY

Level: Bachelor Semester: Spring Year : 2017
 Programme: BE Full Marks: 100
 Course: Analysis and Design of Algorithm Pass Marks: 45
 Time : 3hrs.

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Attempt all the questions.

1. a) What are the measures that we take to measure the efficiency of an algorithm? Write an algorithm to find an element from an array and discuss about its best and worst case while finding an element. 8
 - b) Define aggregate method of amortized analysis with suitable example. 7
 2. a) Find the run time using recurrence tree method and by master method $T(n) = T(n/4) + T(n/2) + cn^2$ 8
 - b) Consider an array $a[]$ of n numbers that has $n/2$ distinct elements and $n/2$ copies of another element. The problem is to identify the repeated element. Any deterministic algorithm needs at least $n/2 + 2$ time, so how could you improve the efficiency by using randomized algorithm in this case. 7
 3. a) Find the time and space complexity for following algorithm to find Greatest common Divisor (GCD) 8
- Inputs:** Two numbers a and b
Output: G.C.D. of a and b
Algorithm: assume (for simplicity) $a > b >= 0$
- ```

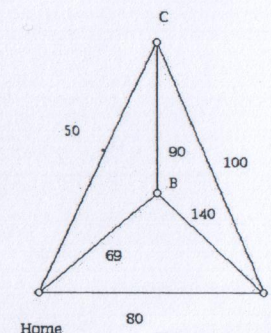
gcd(a,b)
{
 While(b!=0)
 {
 d=a/b:
 temp=b:
 b=a-b*d:
 a=temp:
 }
 return a:
}

```

- b) Find the minimum edit distance to transform the string  $X=aabab$  into  $Y=babb$ . 7
4. a) Compare Divide and conquer and Dynamic Programming approaches of algorithm design with examples. 8
- b) State the 0/1 knapsack problem. Suppose  $n=4$  and  $W=16$  and we have following. 7

| i | Pi   | Wi | Pi/Wi |
|---|------|----|-------|
| 1 | \$40 | 2  | \$20  |
| 2 | \$30 | 5  | \$6   |
| 3 | \$50 | 10 | \$5   |
| 4 | \$10 | 5  | \$2   |

5. a) Explain the graph traversal techniques of BFS and DFS with help of algorithm. 7
- b) Solve the following Travelling Salesman Problem starting from Home using greedy approach. 8



OR

Explain backtracking algorithm and write down the Backtracking algorithm for N-queen problem.

6. a) What do you mean by graph coloring problem how this problem could be solved with the help of Backtracking algorithm, explain with algorithm. 8
  - b) Differentiate between P, NP, NP-hard and NP-complete with an example of each. 7
  7. Write short notes on: (Any two) 2×5
- a) Hamiltonian Cycle
  - b) Optimal merge pattern
  - c) Las Vegas Algorithm