POKHARA UNIVERSITY

Level: Bachelor Semester: Spring Year : 2018
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) Explain the term Big-oh, Big-omega and Big-theta. Show that a function $f=3n^2+4n+7$ is big theta of n^2. 8
   b) In each of the following situations, indicate whether $f = O(g)$, or $f = \Omega(g)$, or both (in which case $f = \Theta(g)$). 7

	f(n)	g(n)
(a)	$n-100$	$n-200$
(b)	$n^{\frac{1}{2}}$	$n^{\frac{2}{3}}$
(c)	$\log 2n$	$\log 3n$
(d)	$10 \log n$	$\log n^2$
(e)	$n!$	2^n

2. a) Briefly explain a circular queue. Write algorithm to add and remove an element from the circular queue and compute the complexity of your algorithm. 7
   b) Briefly explain a link list data structure. Write algorithm to add and remove an element from the link list and compute the complexity of your algorithm. 8
3. a) Write an algorithm for bubble sort and trace out the algorithm for bubble sort with suitable example. 7
   b) Discuss how Strassen's method can perform matrix multiplication of two n x n matrix in $O(n^{\log_2 7})$. 8
4. a) Explain prim's algorithm for computing the MST of a given graph and analyze it. Also verify the correctness of this algorithm. 8
   b) Briefly explain the dynamic programming method for problem solving. What is the basic difference between Dynamic programming and Greedy method? 7

5. a) How can dynamic programming technique be applied to The Travelling salesman problem? 7
   b) Explain Dijkstra's algorithm for computing the single source shortest path in a graph with suitable example. 8
6. a) Write an algorithm to determine biconnected components in a graph. 7
   b) Let $\omega = \{5, 7, 10, 12, 15, 18, 20\}$ and $m = 35$. Use Backtracking algorithm to systematically search the solution space to find few possible subsets of w that sum to m. Also, draw a portion of the tree diagram that shows the organization of state space. 8
7. Write short notes on: **(Any two)** 2×5
   a) Binary Search Tree
   b) Knapsack 0/1 problem
   c) Graph Coloring Problem