

POKHARA UNIVERSITY

Level: Bachelor Semester: Fall Year : 2021
 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 is algorithm analysis? Why it is necessary to analyze the algorithm? 8

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. 7

- b) Briefly explain a stack data structure. Write algorithm to add and remove an element from the stack and compute the complexity of your algorithm

2. a) What do you mean by greedy method of problem solving? Explain optimal storage on tapes problem. Find the optimal storage of files on magnetic tape if n=3 and (I1, I2, I3) = (5, 10, 3) 7

- b) Consider a set of given jobs as shown. Find a sequence of jobs, which will be completed within their deadlines and will give maximum profit. 8

Job J1 J2 J3 J4 J5

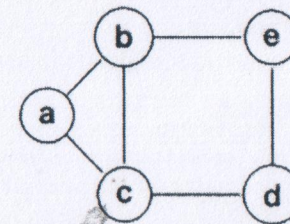
Deadline	2	1	3	2	1
Profit	60	100	20	40	20

3. a) Devise a divide and conquer algorithm for finding minimum and maximum element among a set of given elements. Write recurrence relation for your algorithm and give its big-O estimate. 7

- b) What are the characteristics of problem that can be solved by using dynamic programming Algorithm? Give the recursive definition of solving 0/1 knapsack problem. Trace the algorithm for $w = \{9, 7, 9, 7, 9\}$, $v = \{5, 1, 5, 3, 3\}$ and knapsack of capacity 8. 8

4. a) Explain and analyze the Floyd's warshall algorithm for all pair shortest path problem. Trace the algorithm with suitable example. 8

- b) Define spanning tree. Generate spanning tree for graph below using both BFS and DFS method. 7



5. a) What is the Backtracking method of problem solving? Explain how you solve the 8-queen problem using the backtracking method. 7

- b) Define articulation point and bi-connected component of the graph? Write the algorithm for finding articulation point in the graph with suitable example. 8

6. a) Solve the following recurrence relation using iterative substitution method. $T(n) = T(n/2) + n$ 8

- b) Write an algorithm for merge sort and find its time complexity. 7

7. Write short notes on: (Any two) 2x5

- a) Binary search tree
 b) Graph Colouring Problem
 c) Quick sort