Q.P Code: CY3102C Hall Ticket No: | | | | | | | | | | |

NARSIMHAREDDY ENGINEERING COLLEGE
(UGC AUTONOMOUS)
III B.Tech I Semester (NR21) Regular Examination, December 2023 / January 2024
DESIGN AND ANALYSIS OF ALGORITHMS
(Computer Science and Engineering / Cyber Security)

Time: 3 Hours Maximum Marks: 70

Note:- This question paper contains two parts, A and B.
- Part A is compulsory, which carries 20 marks (10 sub questions are two from each carrying 2 Marks). Answer all questions in Part A.
- Part B consists of 5 Units. Answer one question from each unit. Each question carries 10 Marks and may have a, b-sub questions.

Part-A (20 Marks)
Answer all questions

Q.No		Question	M	CO	BL
1.	a.	State the best, average, and worst case analysis for binary search.	2	CO2	L1
	b.	Compute the average case time complexity of quick sort.	2	CO3	L2
	c.	Differentiate Graph and Tree.	2	CO1	L2
	d.	What is disjoint set? Write different types of disjoint set operation.	2	CO1	L1
	e.	Explain Prim's algorithm.	2	CO1	L2
	f.	Explain (n!) knapsack problem.	2	CO1	L2
	g.	What is single source shortest path?	2	CO3	L2
	h.	What is time complexity of spanning tree?	2	CO3	L3
	i.	Define Cook's theorem?	2	CO3	L3
	j.	Explain optimization problem.	2	CO3	L2

Part-B (50 Marks)
Answer all the Units
All Questions carry equal Marks

Q.No		Question	M	CO	BL
2.	a.	Define time and space complexity. Explain with examples.	5	CO1	L2
	b.	Explain about Asymptotic Notation in detail.	5	CO1	L3
		OR			
3.		Illustrate Merge sort algorithm and discuss its time complexity.	10	CO3	L4
		UNIT-II			
4.		How a Queen's problem can be solved using backtracking and explain with an example.	10	CO1	L4
		OR			
5.	a.	Apply branch and bound method to find a minimum cost of a 0/1 knapsack.	10	CO1	L4
	b.	Discuss time complexity of subset problem with an example.			

UNIT-III				
6.	Explain how solution will be provided for all pairs shortest path problem using dynamic programming.	10	CO2	L3
OR				
7.	Let and (a1, a2, a3) Construct optimal binary search for {a1, a2, a3, a4} (20, 60, 1f, while) P: 1 -> (3.3.1) Q: 0 (2.3.1).	10	CO3	L4
UNIT-IV				
8.	Derive time complexity of job sequencing with deadlines. Obtain the optimal solution when n=5 (p1, p2, ..., 20, 15, 10, 5, 1) and (d1, d2, ..., 2, 2, 1, 3, 3).	10	CO3	L4
OR				
9.	Define Greedy knapsack. Find the optimal solution of the Knapsack instance v = 7, M=15, (p1, p2, ..., p7) = (10, 5, 15, 7, 6, 8, 3) and w1, w2, ..., w7 = 7, 25, (5, 17, 14, 4).	10	CO3	L3
UNIT-V				
9.	Discuss in detail about the class P, NP, NP-hard and NP-complete problems. Give examples for each class.	10	CO3	L3
OR				
10.	Describe Travelling Salesperson Problem (TSP) using Branch and Bound.	10	CO2	L2

--ooOoo--

Code No: 156AN

R18

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech III Year II Semester Examinations, February/March - 2022
DESIGN AND ANALYSIS OF ALGORITHMS
(Computer Science and Engineering)

Time: 3 Hours **Max. Marks: 75**

Answer any five questions
All questions carry equal marks

\- - -

1.a) Discuss in detail various notations used for expressing the time complexity of algorithms, with examples.
b) What is Performance Analysis? Explain Space Complexity and Time Complexity with examples. [7+8]

2.a) Explain the process of merge sort by a list of any 11 integers (distributed randomly). Write the algorithm and analyze its time complexity.
b) Write an algorithm to find matrix multiplication using Strassen's. [8+7]

3.a) Describe the Backtracking technique to the m-coloring graph. Explain with an example.
b) Write an algorithm of weighted union and also compute the time complexity of the same. [8+7]

4.a) Draw the state space tree for 'm' coloring when n=3 and m=3.
b) Write an algorithm for the 8-queens problem using backtracking. [8+7]

5.a) Solve the solution for 0/1 knapsack problem using dynamic programming:
(p1,p2,p3, p4) = (11, 21, 31, 33), (w1, w2, w3, w4) = (2, 11, 22, 15), M=40, n=4.
b) State the principle of optimality in dynamic programming. How to apply this to the shortest path problem? [8+7]

6.a) Explain about OBST.
b) Write an algorithm of all pairs shortest path problem. [8+7]

7. Explain the problem of job sequencing with deadlines by taking an example. Write the algorithm to solve the problem using the Greedy Method. Show how the algorithm solves the following job sequencing with deadlines problem.
n = 4, (p1, p2, p3, p4) = (100, 10, 15, 27) and (d1, d2, d3, d4) = (2, 1, 2, 1) [15]

8.a) Explain Cook's theorem with an example.
b) Discuss the FIFO branch and bound. [8+7]

---oo0oo---

R18

Code No: 156AN

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech III Year II Semester Examinations, February - 2023
DESIGN AND ANALYSIS OF ALGORITHMS
(Common to CSE, ITE)

Time: 3 Hours **Max. Marks: 75**

Note: i) Question paper consists of Part A, Part B.
ii) Part A is compulsory, which carries 25 marks. In Part A, Answer all questions.
iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.

PART – A

(25 Marks)

1.a)	What is an algorithm?	[2]
b)	Explain about big-oh notation.	[3]
c)	Define static space tree.	[2]
d)	Write and explain general iterative backtracking method.	[3]
e)	What is the time complexity of all pairs shortest path?	[2]
f)	Explain about OBST.	[3]
g)	What is Greedy method?	[2]
h)	Distinguish between Prim's and Kruskal's algorithms.	[3]
i)	Define branch and bound technique.	[2]
j)	Explain about non-deterministic algorithms.	[3]

PART – B

(50 Marks)

2.a) Write and explain the general method of divide-and-conquer strategy.
b) Derive the time complexity of Strassen's matrix multiplication. [5+5]

OR

3.a) Write and explain recursive algorithm of binary search method.
b) What is space complexity? Explain with suitable examples. [5+5]

4.a) Describe recursive formulation of backtracking technique.
b) How to implement disjoint sets? Explain. [5+5]

OR

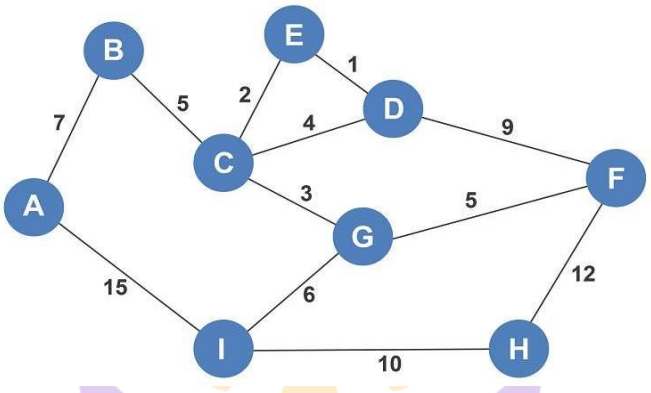
5.a) Explain about 4-queens problem with backtrack solution.
b) Discuss about number of connected components of a graph using disjoint set union. [5+5]

6. Use the function OBST to compute w(i, j), r(i, j), and c(i, j), $0 \le i < j \le 4$, for the identifier set (a1, a2, a3, a4) = (do, if, int, while) with p(1:4) = (3, 3, 1, 1) and q(0:4) = (2, 3, 1, 1, 1). Using the r(i, j)'s construct the optimal binary search tree. [10]

OR

7. Discuss about all pairs shortest problem using dynamic programming. [10]

8. Compute a minimum cost spanning tree for the graph shown below using
a) Prim's algorithm and
b) Kruskal's algorithm.
[5+5]



OR

9. Explain about single source shortest path problem in Greedy method. [10]

10. Describe LC branch and bound solution of 0/1 Knapsack problem in detail. [10]

OR

11. Explain the following:
a) Nondeterministic knapsack algorithm
b) FIFO branch and bound. [5+5]

---oooOooo---