Printed Page:- 04		ge:- 04 Subject Code:- ACSBS0501	
		Roll. No:	
1	NOIDA	A INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA	
		(An Autonomous Institute Affiliated to AKTU, Lucknow)	
		B.Tech	
		SEM: V - THEORY EXAMINATION (2024 - 2025)	
Tim	о·3 Ц	Subject: Design and Analysis of Algorithms Hours Max Marks: 10	Ω
Gener	al Inst	structions.	U
IMP:	Verify	v that you have received the question paper with the correct course. code. branch etc.	
1. Thi	s Ques	estion paper comprises of three Sections -A, B, & C. It consists of Multiple Choice	
Quest	ions (1	MCQ's) & Subjective type questions.	
2. Ma	ximun	n marks for each question are indicated on right -hand side of each question.	
3. Illu	strate	your answers with neat sketches wherever necessary.	
4. Ass	sume st	suitable data if necessary.	
5. <i>Pre</i>	eferabl	ly, write the answers in sequential order.	
6. No	sheet.	should be left blank. Any written material after a blank sheet will not be	
evalu	ated/cl	checked.	
SECT	TION.		0
1. Att	empt a	all parts:-	U
1-a.	Tl	The Θ notation in asymptotic evaluation represents: (CO1, K1)	1
	(a)	Worst Case	
	(b)	Average Case	
	(c)	Best Case	
	(d)	Null Case	
1-b.	If	f for an algorithm time complexity is given by $O(1)$ then the complexity of it	1
	is	s: (CO1, K3)	
	(a)	Exponentail	
	(b)	Polynomial	
	(c)	Constant	
	(d)	None	
1-c.	If	f a problem can be broken into subproblems which are reused several times, the	1
	pr	problem possesses property. (CO2, K3)	

- Overlapping subproblems (a)
- (b) Prim's algorithm
- Kruskal algorithm (c)

- Bellmen Ford Shortest path algorithm (d)
- In dynamic programming, the technique of storing the previously calculated 1-d. 1 values is called: (CO2, K1)

	(b)	Storing value property	
	(c)	Memoization	
	(d)	Mapping	
1-e.	Time complexity of Breadth First Search algorithm is: (CO3, K1)		1
	(a)	O(E+V)	
	(b)	O(V lg E)	
	(c)	O(lg V)	
	(d)	O(E lg E)	
1-f.	W	Ve can solve Single-Source shortest path problem using: (CO3, K1)	1
	(a)	Kruskal's Algorithm	
	(b)	Prim's Algorithm	
	(c)	Dijkstra's Algorithm	
	(d)	Flyod-Warshal Algorithm	
1-g.	Р	roblems that can be solved in polynomial time are called: (CO4, K1)	1
	(a)	intractable problems	
	(b)	Tractable problems	
	(c)	decision problems	
	(d)	complete problems	
1 - h.	_	is the class of decision problems that can be solved by non-	1
	deterministic polynomial algorithms. (CO4, K1)		
	(a)	NP	
	(b)	P	
	(c)	Hard	
	(d)	Complete	
1-i.	U	Unix sort command uses as its sorting technique. (CO5, K1)	1
	(a)	P=BPP problem	
	(b)	NP=co-NP problem	
	(c)	Do one way problems exist?	
	(d)	All of the mentioned	
1-j.	Prisonner's dilemma can be related to the following: (CO5, K1)		1
	(a)	Quick Sort	
	(b)	Bucket Sort	
	(c)	Radix Sort	
	(d)	Merge Sort	
2. At	tempt	all parts:-	
2.a.	D	Distinguish algorithm from Pseudocode. (CO1, K4)	2

Saving value property

(a)

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Briefly discuss Bin Packing problem? (CO2, K2)

2.b.

2.c.	Point out the drawbacks of Dijkstra's Algorithm. (CO3, K3)	2
2.d.	Describe Cook's Theorem? (CO4, K2)	2
2.e.	Approximation algorithms are useful to solve which type of problem and How? (CO5, K3)	2
<u>SECTI</u>	<u>ON-B</u>	30
3. Ansv	ver any <u>five</u> of the following:-	
3-a.	State the need to analyze an algorithm and Write five characteristics of an algorithm? (CO1, K4, K1)	6
3-b.	What do you understand Time and space complexity of an algorithm? Analyze the below code and find the time complexity of the following code: (CO1, K3) int $a = 0$; for (i = 0; i < N; i++) { for (j = N; j > i; j) { a = a + i + j; }	6
3-с.	How Branch and bound technique is used to solve n-Queens problem? Explain. (CO2, K3, K2)	6
3-d.	Explain Topological sorting using suitable example. (CO2, K2)	6
3.e.	Compare BFS and DFS ?(CO3, K4)	6
3.f.	Find the transitive closure of the given graph. (CO4, K3)	6
3.g.	Explain class of problems beyond NP – P SPACE . (CO5, K2)	6
<u>SECTI</u>	<u>ON-C</u>	50
4. Ansv	ver any <u>one</u> of the following:-	
4-a.	Solve the following recurrence relation using recursive tree and substitution method (Induction method): (CO1, K3) $T(n)=T(n-1) + \log n$ for all n>0 T(n)=1 when n=0	10
4 1		10

4-b. Discuss performance measurement of an algorithm? Explain asymptotic analysis 10 of an algorithm. (CO1, K2)

5. Answer any one of the following:-

5-a.	Write down the advantage and disadvantage of Brute Force algorithm. Also write the applications of Brute Force algorithm. (CO2, K2)	10		
5-b.	Discuss backtrack problem with a suitable example. How it is used in n-Queens problem? (CO2, K3)	10		
6. Answe	ar any <u>one</u> of the following:-			
6-a.	Find shortest path using Bellman's Ford algorithm with a suitable graph. (CO3, K3)	10		
6-b.	Explain Minimum Spanning tree in detail. Differentiate Prim's and Krushkal's algorithm. (CO3, K2, K4)	10		
7. Answe	r any <u>one</u> of the following:-			
7-a.	Explain computability of theorems. Differentiate NP-Complete and NP-Hard problem. (CO4, K2, K4)	10		
7-b.	What is the use of reduction technique in an algorithm? Explain. (CO4, K3,K2)	10		
8. Answe	8. Answer any <u>one</u> of the following:-			
8-a.	Write short notes on the following terms: (CO5, K1) (A) Randomized Algorithm (B) Quantum Algorithm (C) Class of problems beyond NP – P SPACE	10		
8-b.	What do you mean by CO- NP class and what are the problems that belong to this class? (CO5, K3)	10		