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16CS554

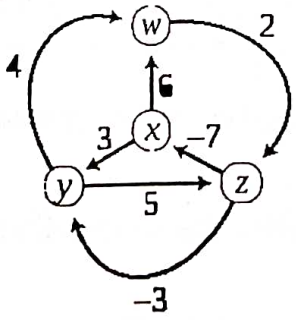
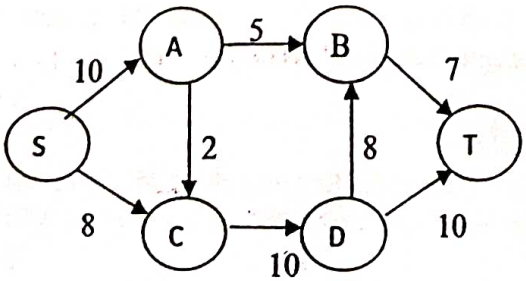
Fifth Semester B.E. Semester End Examination, Dec./Jan. 2019-20

ADVANCED ALGORITHMS

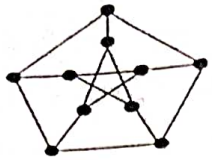
Time: 3 Hours

Max. Marks: 100

Instructions: 1. Answer any full five Questions from the following Units.

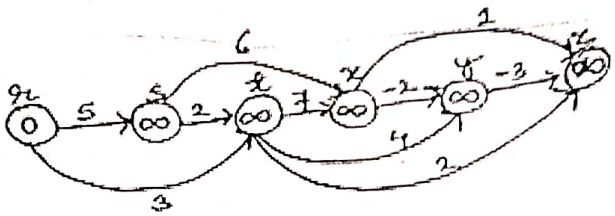
			L	CO	PO	M
		UNIT – I				
1	a.	Apply recurrence tree method to solve for the following recurrence relations. i) $T(n) = 3T(n/4) + cn^2$ ii) $T(n) = T(n/5) + T(4n/5) + n$	(3)	(1)	(1)	(10)
	b.	Explain in brief the Aggregate method and accounting method of amortized analysis with examples.	(2)	(1)	(1)	(10)
		OR				
2	a.	Apply substitution method for solving the following recurrence relations. i) $T(n)=T(n-2)+n^2$ ii) $T(n) = 2T(n/2) + n$	(3)	(1)	(1)	(10)
	b.	Apply Master's method for the following recurrence relation. i) $T(n) = 3T(n/2) + n^2$ ii) $T(n) = 2T(n/2) + n\log n$ iii) $T(n) = 2T(n/4) + n^{0.51}$ iv) $T(n) = \sqrt{2}T(n/2) + \log$	(3)	(1)	(1)	(10)
			L	CO	PO	M
		UNIT – II				
3	a.	Apply Johnson's Algorithm to find All pairs shortest path for the graph give below.  	(3)	(2)	(2)	(10)
	b.	Explain the term flow network. Write a algorithm and Find the maximum flow using the basic Ford Fulkerson algorithm from source(S) to sink(T)  	(3)	(2)	(2)	(10)
		OR				

4 a. Write a algorithm for graph coloring using backtracking and apply the same for the graph given below. [assume the numbering for the vertices].



(3) (2) (2) (10)

b. Explain Single source shortest paths for DAG algorithm and apply the same for the following graph taking 'r' as source vertex.



(3) (2) (2) (10)

L CO PO M

UNIT – III

5 a. Give the pseudo code for computing GCD of two numbers using extended Euclids algorithm. Also find the GCD (161,28) ad show the computational steps at each level of recursion.

(3) (3) (2) (10)

b. Write the procedural steps of RSA public key cryptosystem. And also consider an RSA key with p=11,q=29,n=319 and e=3.what value of d should be used in the secret key? What is the encryption of the message M=100.

(3) (3) (2) (10)

OR

6 a. Write the Chinese remainder theorem. Also find all the integers that leave the remainders 1,2,3 when divided by 9 ,8, 7 respectively using Chinese remainder theorem.

(3) (3) (2) (08)

b. State the Modular-Linear Equation –Solver algorithm and apply to find all solutions to the equation $35x \equiv 10 \pmod{50}$.

(3) (3) (2) (06)

c. Write an algorithm for Miller-Rabin for Primality test and solve the following with n=27,a= 2.

(3) (4) (2) (06)

UNIT – IV

L CO PO M

7 a. Write naïve string matching algorithm and show the comparisons the naïve string matcher makes for the pattern : P=" 111 " Text: T = "101110110".

(4) (5) (2) (10)

b. Give the Boyer-Moore string matching algorithm. Find the pattern "character" in the text "BMmatcher_shift_character_example" using the same.

(4) (5) (2) (10)

OR

8 a. Give algorithm for Knuth –Morris –Pratt algorithm and show the comparisons the Knuth –Morris – Pratt algorithm matcher makes for the pattern "00100201" in text "00100100200010020122000".

(4) (5) (2) (10)

b. Write a algorithm for string matching with finite automata and apply the same for the Text "abababacaba" and the patter "ababaca".

(4) (5) (2) (10)
L CO PO M

UNIT –V

9 a. Explain the need of randomizing for linear search and probabilistic linear search algorithms

(2) (6) (1) (10)

b. Write a note on Randomized algorithms.

(2) (6) (1) (10)

OR

10 a. Write a note NP –Hard ad NP-Complete problems.

(2) (6) (1) (10)

b. Explain Monte Carlo ad Las Vegas algorithms with suitable examples.

(2) (6) (1) (10)

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16CS554

Fifth Semester B.E. Fast Track Semester End Examination, July/August 2019
ADVANCED ALGORITHMS

Time: 3 Hours | Max. Marks: 100

Instructions: 1. *Unit I and V are compulsory*
2. *Answer five full questions*
3. *Diagrams if any must be neatly drawn*

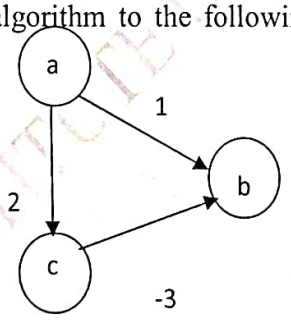
UNIT – I (compulsory)

			L	CO	PO	M
1	a.	Explain with an example, the Big-oh notation..	(2)	(1)	(1)	(05)
	b.	Explain all the three methods of amortized analysis with stack as an example	(2)	(1)	(1)	(09)
	c.	Apply Master's theorem to the following recurrence relations. i) $T(n)=T(n/2)+1$ ii) $T(n)=2T(n/2)+2n$	(3)	(1)	(2)	(06)

UNIT – II

			L	CO	PO	M
2	a.	List Johnson's algorithm and explain its working with an example	(2)	(2)	(1)	(10)
	b.	Write an algorithm to find shortest path in a Directed Acyclic Graph and explain its working with an example.	(2)	(2)	(1)	(10)

OR

			L	CO	PO	M
3	a.	Apply Floyd Warshal algorithm to the following graph to find shortest path between all pair of nodes  	(3)	(2)	(2)	(10)
	b.	List Ford-Fulkerson Algorithm and explain its working with an example.	(2)	(2)	(1)	(10)

UNIT - III

			L	CO	PO	M
4	a.	List Extended Euclid Algorithm and solve for x,y and d for GCD(84,56)	(3)	(3)	(2)	(12)
	b.	List modular exponentiation algorithm and explain its working	(2)	(3)	(1)	(08)

OR

			L	CO	PO	M
5	a.	State Fermat's theorem and explain how its used to implement Psuedo-Prime Algorithm	(2)	(4)	(1)	(10)
	b.	List RSA algorithm, explain how it can be used to encrypt and decrypt messages.	(2)	(3)	(1)	(10)

Note: L (Level), CO (Course Outcome), PO (Programme Outcome), M (Marks)

UNIT - IV

			L	CO	PO	M
6	a.	List Naïve Search algorithm and explain its working and analyze its complexity	(4)	(5)	(1)	(10)
	b.	List Finite State algorithm and explain its working with an example.	(2)	(5)	(1)	(10)

OR

7	a.	List KMP algorithm and discuss its complexity	(2)	(5)	(1)	(10)
	b.	List Boyer Moore algorithm and discuss the two cases with an example	(2)	(5)	(1)	(10)

UNIT –V (compulsory)

			L	CO	PO	M
8	a.	Bring out the importance of Randomized algorithms and explain with an example how algorithms can be sped-up with randomness.	(2)	(6)	(1)	(08)
	b.	Explain any one algorithm to illustrate the idea behind Monte-Carlo Approach	(2)	(6)	(1)	(08)
	c.	Compare and contrast Las Vegas and Monte-Carlo Algorithms	(2)	(6)	(5)	(04)

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16CS554/15CS55

Fifth Semester B.E. Makeup Examination, January 2019

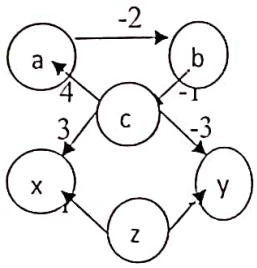
ADVANCED ALGORITHM

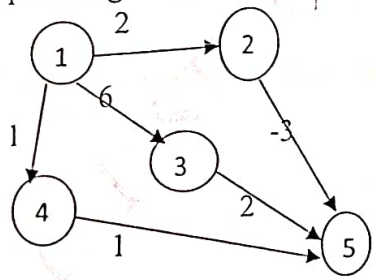
Time: 3 Hours

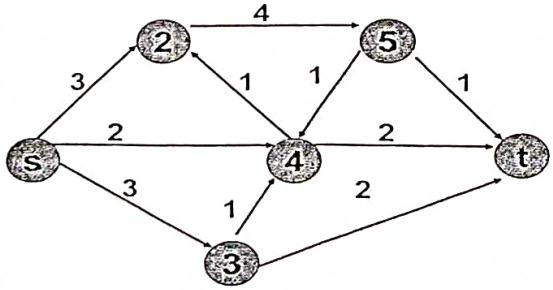
Max. Marks: 100

Instructions: 1. *Unit I and III are compulsory*
2. *Answer five full question by selecting at least one question from each UNIT.*

			L	CO	PO	M
		UNIT – I				
1	a.	Explain the three basic asymptotic notations with examples for each	(2)	(1)	(1)	(10)
	b.	State Master's theorem and apply the same to solve $T(n) = 7T(n/3)+n^2$	(3)	(1)	(2)	(10)
		UNIT – II				
2	a.	Use Johnson's algorithm to find all pairs shortest path for the graph below.	(3)	(2)	(2)	(10)
	b.	Explain with an example Floyds Warshals algorithm and analyze its complexity.	(4)	(2)	(2)	(10)
		OR				
3	a.	Explain Single source shortest path for Directed Acyclic Graph algorithm and apply the same for the graph taking '1' as the source vertex.	(3)	(2)	(2)	(10)
	b.	Apply FORD-FULKERSON algorithm for following graph to find out MAX FLOW from node s to t. Show all steps and residual graph.	(3)	(2)	(2)	(10)







Note: L : Level, CO : Course Outcome, PO : Programme Outcome, M : Marks

UNIT – III

4 a. State Chinese remainder theorem and explain with an example.
(2) (3) (1) (08)

b. Write steps in RSA cryptosystems. Apply RSA for p=11,q=29,n=319 and e=3 to show the encryption of M= 100.
(3) (3) (1) (08)

c State Fermat's theorem and write Pseudo-Prime Algorithm to test the Primality of a number
(2) (4) (1) (04)

UNIT – IV

5 a. Write Naïve string matching algorithm and show the comparisons the naïve string matcher makes for the pattern P=BAB in the text T=ABCABABCDD.
(2) (5) (2) (10)

b. Explain with an example the working of Boyer Moore algorithm.
(2) (5) (2) (10)

OR

6 a. Construct the transition table using Finite automata for the pattern P=aabab and illustrate its operation on the text string T=aaababaabaababaab
(5) (5) (2) (10)

b. Explain with an example Knuth-Morris-Pratt algorithm and analyze its complexity.
(4) (5) (2) (10)

UNIT –V

7 a. What are non-deterministic algorithms? Explain the concept NP-Hard and NP-Complete with an example for each.
(2) (6) (1) (06)

b. Discuss the process of randomizing the Quick sort
(2) (6) (1) (08)

c. Compare the working of LAS VEGAS algorithm with MONTE CARLO algorithm
(1) (6) (1) (06)

OR

8 a. Explain Monte Carlo algorithm for testing Polynomial Equality.
(2) (6) (1) (10)

b. Demonstrate with an example the process of RANDAMIZIng the Quicksort and linear search
(3) (6) (1) (10)

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16CS554/15CS55

Fifth Semester B.E. Semester End Examination, Dec/Jan 2018-19

ADVANCED ALGORITHMS

Time: 3 Hours

Max. Marks: 100

Instructions: 1. *UNIT-I and UNIT-III are compulsory*
2. *Answer five full questions by selecting at least one question from each UNIT*

			L	CO	PO	M
		UNIT – I				
1	a.	Explain different methods of solving recurrence relation.	(2)	(1)	(1)	(09)
	b.	Use the master's method to find tight asymptotic bound for the following recurrence: $T(n)=2T(n/2)+n^3$	(3)	(1)	(1)	(06)
	c.	Discuss the potential approach of amortized analysis method.	(2)	(1)	(1)	(05)
		UNIT – II				
2	a.	Write and apply the Johnson's all-pairs shortest-paths algorithm for graph in Figure 1				

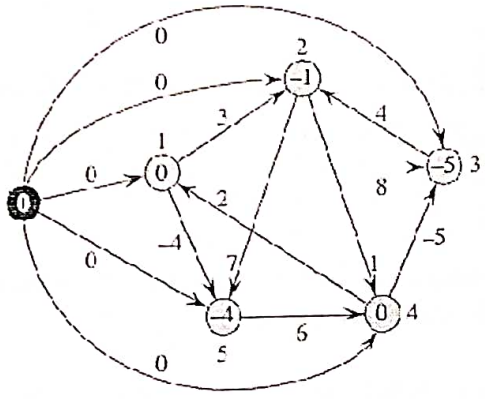

Figure 1

(3) (2) (2) (10)

	b.	Explain the working of FLOW networks and find max. flow for flow network in Figure 2				

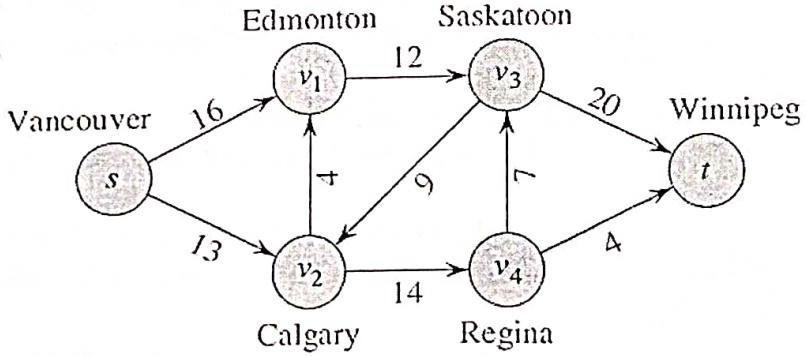

Figure 2

(3) (2) (2) (10)

OR

3 a. Write an algorithm for Floyd-warshall and apply the same for the graph in Figure 3

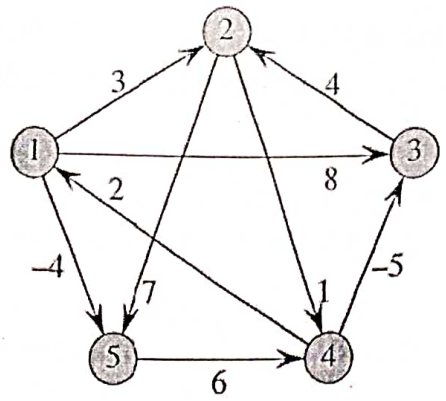

Figure 3

(3) (2) (2) (10)

b. Write DAG shortest path algorithm along with other necessary sub-algorithms used in it. (2) (2) (2) (10)

UNIT – III

4 a. State Chinese remainder theorem and apply the same to solve the following problem instance. (3) (3) (2) (10)
a=2 (mod 5)
a=3(mod 13)

b. Write the procedural steps of RSA public key cryptosystem .And also consider an RSA key set with p=11,q=13,e=11.What value of d should be used in the secret key. Solve for encryption of the message with M=7. (3) (3) (2) (10)

UNIT – IV

5 a. Compare and Contrast on Processing time and matching times of Naïve, Rabin-Karp, Finite automate and Knuth-morris algorithms. (2) (5) (1) (10)

b. Write the naive string-matching algorithm and Show the comparisons the naive string matcher makes for the pattern P = 0001 in the text T = 000010001010001. (4) (5) (1) (10)

OR

6 a. Write Rabin-Karp algorithm. Working modulo q=11, how many spurious hits does the Rabin-Karp matcher encounter in the text T=3141592653589793 when looking for the pattern P=26? (3) (5) (3) (10)

b. Explain the string matching concept using FINITE-AUTOMATON and Construct state-transition diagram for the string-matching automaton that accepts all strings ending in the string ababaca (5) (5) (1) (10)

UNIT - V

7 a. Define NP-Hard and illustrate the concept with the help of Travelling Salesperson Problem. (2) (6) (2) (10)

b. Discuss the LAS VEGAS algorithm and compare it with MONTE CARLO algorithm. (4) (6) (2) (10)

OR

8 a. Bring out the differences between NP-hard and NP complete problems. (4) (6) (2) (08)

b. Explain Monte-Carlo approach used in Polynomial multiplication. (2) (6) (2) (06)

c. Discuss the process of randomizing the Quick sort (2) (6) (2) (06)