

CBCS SCHEME

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15CS554

Fifth Semester B.E. Degree Examination, June/July 2018 Advanced Algorithms

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing one full question from each module.

Module-1

- 1 a. Define O , θ , Ω notations. (03 Marks)
- b. Use Recursion tree method to determine a good asymptotic upper bound on the recurrence $T(n) = 3T(n/4) + cn^2$. (08 Marks)
- c. Apply Boyer - Moore algorithm to search for the pattern 'BAOBAB' in the text 'BESS_KNEW_ABOUT_BAOBABS'. (05 Marks)

OR

- 2 a. State master theorem and solve the following recurrence relations using master theorem.
 - i) $T(n) = 9T(n/3) + n$
 - ii) $T(n) = T(2n/3) + 1$ (06 Marks)
- b. Explain string matching with finite automation. Also write the state transition diagram and the transition function δ for the string matching automation that accepts all the strings containing the pattern 'ababaca' and illustrate its operation on the text string 'abababacaba'. (10 Marks)

Module-2

- 3 a. Give the pseudocode for computing GCD of two numbers using extended form of Euclid's algorithm. Also find GCD (899, 493) and show the computational steps at each level of recursion. (08 Marks)
- b. Write Chinese remainder theorem. Also find all integers that leave remainders 1, 2, 3 when divided by 9, 8, 7 respectively using Chinese remainder theorem. (08 Marks)

OR

- 4 a. Give the pseudocode for constructing a Huffman code. Apply the same to find optimal Huffman code for the following set of frequencies : (08 Marks)

	a	b	c	d	e	f
Frequency	45	13	12	16	9	5

- b. Write the procedural steps of the RSA public key cryptosystem. Also, consider an RSA key set with $P = 17$, $q = 11$, $e = 7$. What value of d should be used in the secret key? What is the encryption of the message $M = 88$. (08 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

**Module-3**

- 5 a. Write and explain recursive FFT algorithm, which computes the DFT of an n – element vector. (06 Marks)
- b. Write Bellman – Ford algorithm. Apply the same to Fig Q5(b). to find shortest path from source S to remaining vertices.

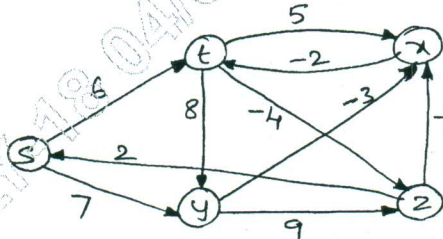


Fig Q5(b)

(10 Marks)

OR

- 6 a. Write the Johnson's algorithm to solve all pairs shortest path problem for sparse graphs. (06 Marks)
- b. Write Ford – Fulkerson method. Apply the same to find the maximum flow in the graph of Fig Q6(b).

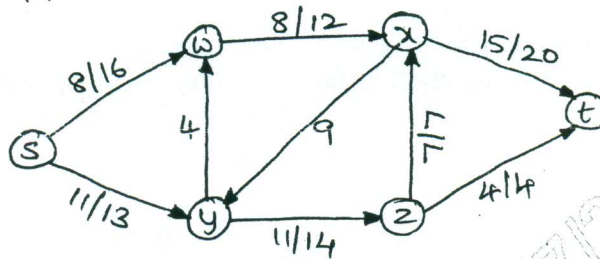


Fig Q6(b)

(10 Marks)

Module-4

- 7 a. Define vector. Explain the fundamental operations of vectors with neat diagrams. (05 Marks)
- b. Write a function to classify a point relative to a directed line segment. (05 Marks)
- c. Define Polygon. Write a function to find the least vertex in a polygon. (06 Marks)

OR

- 8 a. What are star shaped polygons? Write a function to find a star shaped polygon in a point set and explain with an example. (10 Marks)
- b. Explain the process of deciding whether a line intersects a triangle in space. (06 Marks)

Module-5

- 9 a. Explain Sutherland – Hodgman polygon clipping algorithm with an example. (08 Marks)
- b. What are the conditions that are maintained in triangulation algorithm? (08 Marks)

OR

- 10 a. Explain Graham Scan method of finding convex Hulls. (08 Marks)
- b. Write a short note on the following : (08 Marks)
- i) Gift wrapping
 - ii) Depth sorting.
