CBCS SCHEME

USN

15CS554

Fifth Semester B.E. Degree Examination, Dec.2018/Jan.2019
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. Explain the various asymptotic notations with related graphs and examples. **(07 Marks)**

b. Using the master method, solve the following recurrences.

i) $T(n) = T(2n/3) + 1$

ii) $T(n) = 2T(n/2) + \theta(n)$ **(04 Marks)**

c. Apply Boyer-Moore algorithm to search for the pattern 'BAOBAB' in the text 'BESS_KNEW_ABOUT_BAOBABS. **(05 Marks)**

OR

2 a. Use a recursion tree to determine a good asymptotic upper bound on the recurrence $T(n) = 2T(n/2) + n$ **(08 Marks)**

b. 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? Also, indentify them. **(04 Marks)**

c. Compute the prefix function π for the pattern 'ababbabbabbababbabb' in the alphabet $\sum = \{a, b\}$ for the KMP algorithm. **(04 Marks)**

Module-2

3 a. Write the extended Euclid's algorithm and compute the values (d, x, y) that the call Extended_Euclid (99, 78) returns. **(05 Marks)**

b. Illustrate the Chinese remainder theorem to compute the solution to the equations

$a \equiv 2 \pmod 5$

$a \equiv 3 \pmod{13}$ **(05 Marks)**

c. Consider a key set with p = 11, q = 29 and e = 3. Make use of RSA algorithm to find the value of 'd' which should be used in the secret key. What is the encryption of the message M = 100? **(06 Marks)**

OR

4 a. Draw the group operation tables for the groups $(z_4, +_4)$ and $(z_5^*, \cdot_5)$. **(04 Marks)**

b. Find all solutions to the following equation using modular linear equation solver

$35x \equiv 10 \pmod{50}$ **(05 Marks)**

c. Write the Huffman code algorithm and apply it to find the optimal Huffman code for the following set of frequencies.

a : 45 b : 13 c: 12 d : 16 e : 9 f : 5 **(07 Marks)**

Module-3

5 a. Apply the Bellman – Ford algorithm for the following graph to find the shortest path from the source vertex 's' to all other vertices (Fig Q5(a).

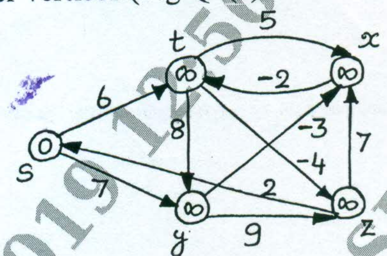

Fig Q5(a) **(10 Marks)**

b. Explain basic Ford-Fulkerson algorithm. **(06 Marks)**

OR

6 a. Write the single – source shortest path algorithm for DAG's. Apply this algorithm for the following graph (Fig Q6(a) by taking 's' as the source vertex. **(10 Marks)**

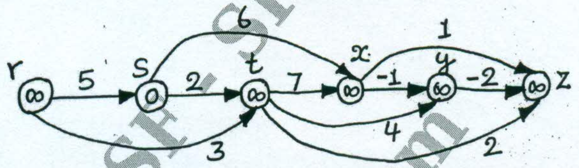

Fig Q6(a)

b. Define the DFT of a vector and also compute the DFT of the vector (0, 1, 2, 3). **(06 Marks)**

Module-4

7 a. Explain the algorithm for classifying a point relative to a directed line segment with examples. **(10 Marks)**

b. Briefly explain the basic concepts involving polygons with a diagram. **(06 Marks)**

OR

8 a. Write an algorithm to construct a star shaped polygonization for a set of points. Illustrate with an example. **(10 Marks)**

b. Explain edge rotation and flipping with C/C++ functions. **(06 Marks)**

Module-5

9 a. Explain the Cyrus – Beck line clipping algorithm with an illustrative example. **(10 Marks)**

b. Briefly, explain the triangulation of monotone polygons. **(06 Marks)**

OR

10 a. Write an explain the gift – wrapping method of finding convex hulls with a suitable example. **(10 Marks)**

b. Briefly explain the hidden surface removal problem. **(06 Marks)**

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