CBCS SCHEME

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20SCS14

First Semester M.Tech. Degree Examination, Jan./Feb. 2023
Advanced Algorithm

Time: 3 hrs. Max. Marks:100

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

Module-1

1 a. Define Algorithm. Explain the different types of Asymptotic notations with related graphs. **(10 Marks)**

b. Use a recursion tree to determine a good asymptotic upper bound on the recurrence relation type, $T(n) = T(n|4) + T(n|2) + n^2$? **(10 Marks)**

OR

2 a. State the Master theorem. Using the Master theorem solve the following recurrences :

(i) $T(n) = 3T(n|2) + n^2$.

(ii) $T(n) = 2T(n|2) + n\log n$. **(10 Marks)**

b. Define Amortized Analysis. Classify different types. Explain incrementing a binary counter method. **(10 Marks)**

Module-2

3 a. Write and explain the Bellmon-Ford algorithm. **(10 Marks)**

b. Write an algorithm for single source shortest path in DAG. Also apply the algorithm for the following graph. Fig. Q3 (b) and taking source vertex as 's'.

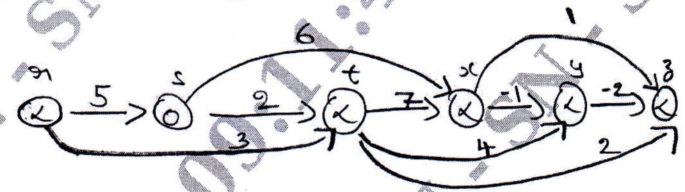

Fig. Q3 (b) **(10 Marks)**

OR

4 a. Write and explain Johanson Algorithm to solve all pairs shortest path problems. **(10 Marks)**

b. Write the algorithm for recursive FFT. **(10 Marks)**

Module-3

5 a. Write Extended Euclid algorithm. **(10 Marks)**

b. Using Euclid's Algorithm. Compute gcd(30, 21). **(06 Marks)**

c. Define group and list its properties. **(04 Marks)**

OR

6 a. Apply chainese remainder theorem to compute solution to the equations,

$a \equiv 2 (\bmod 5)$

$a = 3 (\bmod 13)$ **(10 Marks)**

b. Explain RSA Public Key Algorithm. Apply RSA Algorithm for the following data. Find private key d = ?, Cipher text C = ?

p = 11, q = 17, public key e = 7, plain text M = 5. **(10 Marks)**

Module-4

7 a. Explain Knuth-Morris Pratt Algorithm for prefix function. (10 Marks)

b. Explain Naïve Brute-Force Algorithm, write a string match for T = acaabc, P = aab. (10 Marks)

OR

8 a. Explain Rabin/Karp string matching algorithm with an example below, T = 31415926535, P = 26. (10 Marks)

b. Apply Boyer-Moore Algorithm for the following Text and Pattern.
Text : JIM_SAW_ME_IN_A_BARBERSHOP
Pattern : BARBER (10 Marks)

Module-5

9 a. Describe how to randomize the deterministic algorithm. Consider the following problems :
(i) Linear search algorithm
(ii) Quick Sort Algorithm. (10 Marks)

b. Differentiate Las Vegas and Monte Carlo method. (10 Marks)

OR

10 a. Write and explain an algorithm for polynomial testing using Monte-Carlo method. (10 Marks)

b. Explain with an example, numerical integration using Monte-Carlo method. (10 Marks)

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