CBCS SCHEME

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16/17SCS23

Second Semester M.Tech. Degree Examination, Dec.2019/Jan.2020
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 three asymptotic notation use to determine the running time of an algorithm. **(06 Marks)**

b. Apply recursion tree method to find solution to the recurrence $T(n) = 3T(n/3) + Cn$, where C is a constant. Use the substitution method to verify your answer. **(10 Marks)**

OR

2 a. Define amortized analysis. Explain accounting method with an example. **(10 Marks)**

b. Define Master theorem. Solve $T(n) = 9T(n/3) + n$ using the same. **(06 Marks)**

Module-2

3 a. Find the single source 'S' shortest path using Bellman-Ford algorithm for the given graph. Write the analysis of the algorithm. (Refer Fig.Q.3(a)) **(10 Marks)**

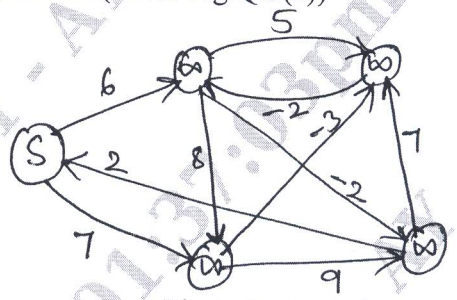

Fig.Q.3(a)

b. Explain an efficient polynomial multiplication process with neat diagram. **(06 Marks)**

OR

4 a. Explain the Johnson's algorithm and apply the same for the following graph: (Refer Fig.Q.4(a)) **(10 Marks)**

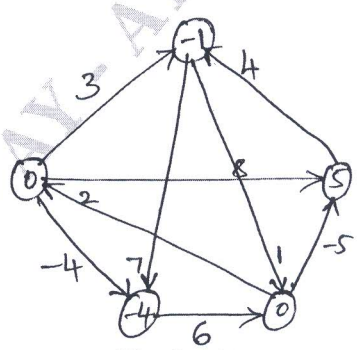

Fig.Q.4(a)

b. Define FFT, DFT and butterfly operation. **(06 Marks)**

Module-3

5 a. Give extended Euclid algorithm to find GCD of integers and apply the algorithm for (99, 78). **(08 Marks)**

b. Define Group. When it is called abelian group? Give a table for group operation multiplication modulo 15 and show that it is an abelien group. **(08 Marks)**

OR

6 a. Explain Chinese remainder theorem. Find all possible solutions for the set of equations:
$a \equiv 2 \pmod 5$
$a \equiv 3 \pmod{13}$ **(08 Marks)**

b. Write RSA public key cryptosystem algorithm and solve the following problem with $p = 11$, $q = 29$, $n = 319$ and $C = 3$ find the value of d and encrypt the message 100. **(08 Marks)**

Module-4

7 a. Write a Robin-Karp string matching algorithm. Search for a pattern 65358 in the Text string 3141592653589793 with $q = 11$. **(08 Marks)**

b. Discuss KMP matcher algorithm with steps. Find pattern 001002 in text 001001002000100201 **(08 Marks)**

OR

8 a. Explain Finite-Automation-Matcher algorithm and construct the string matching automation for pattern P = ababaca and illustrate its operation on the text string T = abababacaba. **(10 Marks)**

b. Apply BM string matching algorithm on pattern P = BARBER and T = JIM_SAW_ME_IN_A_BARBERSHOP **(06 Marks)**

Module-5

9 a. Explain randomizing deterministic algorithm taking Quick sort algorithm as example. **(08 Marks)**

b. What are probabilistic algorithms? Discuss four types with example. **(08 Marks)**

OR

10 a. Explain in detail the Miller-Rabin Randomized primality testing algorithm. **(08 Marks)**

b. Explain Monteo-Carlo and Las Vegas algorithms with appropriate examples. **(08 Marks)**

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