CBCS SCHEME

USN | | | | | | | | | | |

20SCS14

First Semester M.Tech. Degree Examination, July/August 2022
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. List and explain the various asymptotic notations with example. **(10 Marks)**

b. With a neat sketch, explain the recursion tree method to determine a good asymptotic upper bound on the recurrence $T(n) = T(n/3) + T(2n/3) + cn$ and verify the result by substitution method. **(10 Marks)**

OR

2 a. Define aggregate analysis. Write algorithm for incrementing a binary counter and apply the aggregate analysis for the same. **(09 Marks)**

b. Explain how to solve recurrence using master method. Solve the below recurrence using master theorem. $T(n) = 3T[n/4] + n \lg n$ **(06 Marks)**

c. Write a short note on :
i) Floor and ceilings ii) Exponential. **(05 Marks)**

Module-2

3 a. Write and explain Dijikstra's algorithm. Apply the algorithm for the following graph taking 's' as source vertex.

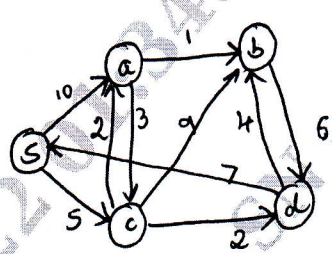

Fig Q3(a) **(12 Marks)**

b. Explain the properties of flow networks. **(08 Marks)**

OR

4 a. Write and explain recursive FFT algorithm. Also determine its running time. **(10 Marks)**

b. Write Johnson algorithm. Use same to find shortest path between all pairs of vertices in the graph given in Fig Q4(b)

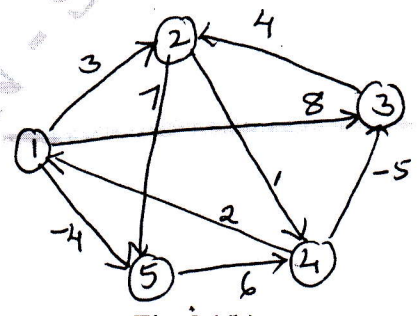

Fig Q4(b) **(10 Marks)**

Module-3

5 a. Write and explain the Miller – Robin primality testing. **(10 Marks)**

b. Explain extended form of Euclid's algorithm to compute GCD of two numbers. Compute the values (d, x, y) that call extended Euclid (99, 78) returns and prove d = gcd (a, b) = ax + by. **(10 Marks)**

OR

6 a. What is the use of public key cryptosystem? Explain RSA public key cryptosystem. **(10 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 abelian group. **(10 Marks)**

Module-4

7 a. With an algorithm, explain the working procedure of Rabin-Karp for string matching. Discuss its time efficiency. **(10 Marks)**

b. Explain Finite automata – Matcher algorithm and construct the string matching automation for the pattern P = ababaca and illustrate o text string T = abababacaba. **(10 Marks)**

OR

8 a. Explain Bayes – Moore algorithm for string matching. Trace the algorithm for the following text and pattern. Text: BESS_KNEW_ABOUT_BAOBABS, Pattern: BAOBAB. **(10 Marks)**

b. Define finite automata. Explain the state transition diagram for the pattern P = ababaca and illustrate its operation as the text string T = abababacaba. Also give the algorithm for computing transition function. **(10 Marks)**

Module-5

9 a. Discuss how to randomize the deterministic algorithm by considering the following problems.
i) Linear searching algorithm ii) Quick sort algorithm. **(10 Marks)**

b. With algorithm explain Monte Carlo algorithm for testing polynomial equality with suitable example. **(10 Marks)**

OR

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

b. Define probabilistic algorithms? Discuss four types with suitable example. **(10 Marks)**

* * * * *