**16/17SCS23**

**Second Semester M.Tech. Degree Examination, Aug./Sept.2020**
## Advanced Algorithm

Time: 3 hrs.                                                                       Max. Marks: 80

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

### Module-1

1 a. Explain various asymptotic notations.                                      **(08 Marks)**
  b. Explain different methods to solve recurrence equations.                   **(08 Marks)**

**OR**

2 a. Use a recurrence tree to determine asymptotic upper bound on the recurrence equation
     $$T(n) = 3T(n/4) + Cn^2$$                                                 **(08 Marks)**
  b. What is amortized analysis? Explain aggregate analysis using stack.       **(08 Marks)**

### Module-2

3 a. Write and explain 'initialize single source' and 'relax edge' procedures.  **(08 Marks)**
  b. Write the Bellman-Ford algorithm and use it to find shortest path from source S to all
     vertices. [Refer Fig.Q3(b)].                                              **(08 Marks)**
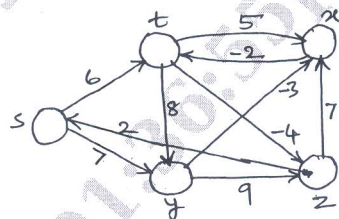


Fig.Q3(b)

**OR**

4 a. Write Ford-Fulkerson algorithm and use it to find the maximum flow of following network.
     [Refer Fig.Q4(a)].



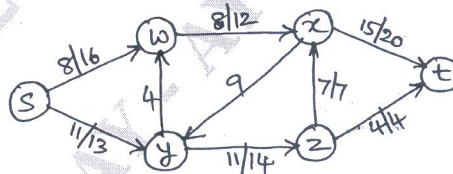Fig.Q4(a)                                                                       **(08 Marks)**
  b. Write and explain the algorithm for recursive FFT Determine its running time.  **(08 Marks)**

### Module-3

5 a. Write extended Euclidean algorithm. Find gcd(99, 78) using extended Euclidean.  **(08 Marks)**
  b. Define group and give its properties. Write the group table for the multiplicative group
     modulo 15.                                                               **(08 Marks)**

**OR**

6  a. Explain Chinese remainder theorem. Find the solution to $a \equiv 2(\bmod 5)$ and $a \equiv 3(\bmod 13)$.
(08 Marks)

   b. Write RSA public key cryptosystem algorithm. Find the value of d used in secret key when $p = 11, q = 29, n = 319$ and $e = 3$.
(08 Marks)

## Module-4

7  a. Write naïve string-matching algorithm. Show how this algorithm works for the pattern $p = aab$ and $T = acaabc$. Why this algorithm is inefficient?
(08 Marks)

   b. With an algorithm explain the working of Rabin-Karp algorithm for string matching.
(08 Marks)

**OR**

8  a. Explain string matching automation with algorithm. Draw the state transition diagram that accepts all strings ending in the string ababaca.
(08 Marks)

   b. Write KMP matcher algorithm with prefix function.
(08 Marks)

## Module-5

9  a. Explain the randomized algorithm with example.
(08 Marks)

   b. Explain the difference between Monte Carlo and Las-Vegas algorithm.
(08 Marks)

**OR**

10 a. Explain probabilistic algorithm with example.
(08 Marks)

   b. Explain probabilistic numeric algorithms.
(08 Marks)

\* \* \* \* \*