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P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belgaum)

Second Semester, M.Tech. - Computer Engineering (MCEN)

Make-up Examination; July - 2016

Advanced Algorithm

Time: 3 hrs *Max. Marks: 100*

***Note**: i) Answer **FIVE** full questions, selecting **ONE** full question from each unit.*
ii) Assume missing data suitably.

UNIT - I

1 a. Define the asymptotic notations O, θ, Ω, o, ω. 5

b. Find the complexity of $T(n) = 2T\left(n/2\right) + n$. 5

c. Use a recursive tree to determine the upper bound of,

$T(n) = 3T\left(n/4\right) + Cn^2$ and use the substitution method for verifications. 10

2 a. Illustrate the potential method using stack operation. 8

b. Write and explain merge sort with an example and analyze its complexity. 12

UNIT - II

3 a. Explain with an example, Aggregate analysis. 6

b. Write the Bellman-Ford algorithm and use it to find shortest path distance from source 'S' and to all other vertices for graph given in Fig. 3(b).

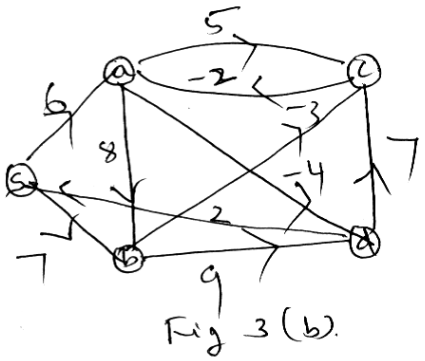

Fig 3 (b)

10

c. Find the residual network for graph given in Fig. 3(c).

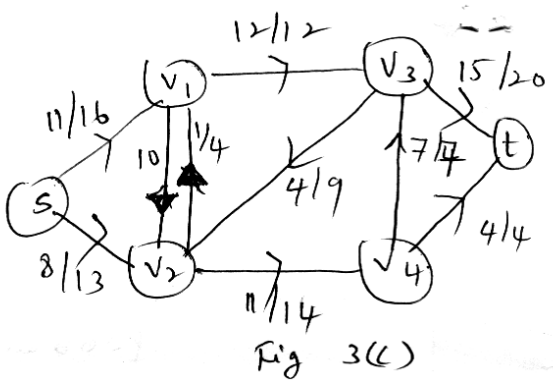

Fig 3(c)

4

Contd…2

4 a. Write and apply Johnson's Algorithm to find the shortest path for graph given in Fig.4(a) 10

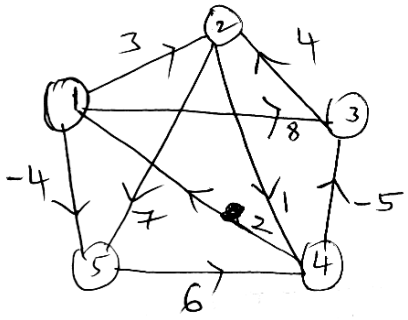

Fig - 4(a)

b. Write and apply matrix chain multiplication algorithm to multiply 6 matrices, $A_1(30 \times 35)$, $A_2(35 \times 15)$, $A_3(15 \times 5)$, $A_4(5 \times 10)$, $A_5((10 \times 20)$, A_6 (20×25) and find the total number of multiplication required. 10

UNIT - III

5 a. Give the pseudo code for computing extended Euclidian. Find GCD (99, 78) using the same and show the computation of each step. 10

b. Discuss the Chinese remainder Theorem. Find the solution to the equation, $A \equiv Z(\text{mod})5$ and $a \equiv 3(\text{mod } 13)$. 10

6 a. Give recursive procedure to find n^{th} Fibonacci number. Find the tree for *fib(4)* and analyze its complexity. 10

b. Write and apply Pollard's rho heuristic algorithm to find the factorization of 1387. 10

UNIT - IV

7 a. Give the Naïve string matching algorithm. Show how the algorithm works for pattern P = aab, and text T = acaabc. Why this algorithm is inefficient? 10

b. Draw the state transition diagram for the string matching automation that accepts all strings sending in the string ababaca. 5

c. Differentiate between P, NP, NP Hard Problems. 5

8 a. Explain the working procedure of Rabin Karp string matching Algorithm and apply the same to find pattern 3 14 1 5 in the text 2 3 5 9 0 2 3 1 4 1 5 2 6 7 3 9 9 2 1 use mod 13. 10

b. Explain polynomial verifications using do decahendron. 10

UNIT - V

9 a. Differentiate between probabilistic and randomized algorithms. 5

b. Write and explain Monte Carlo algorithm for any sorting technique. 10

c. State Amdahl's law and explain. 5

10 a. Write and explain the Lasvagas algorithm to compute the area of square. 10

b. Write randomized algorithms for linear search. 10

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