

END TERM EXAMINATION

THIRD SEMESTER [MCA] DECEMBER 2009

Paper Code: MCA205
Paper Id-44205

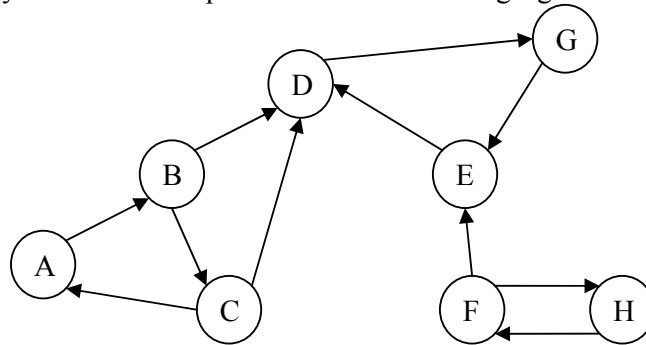
Subject: Design Analysis of Algorithm

Time: 3 Hours

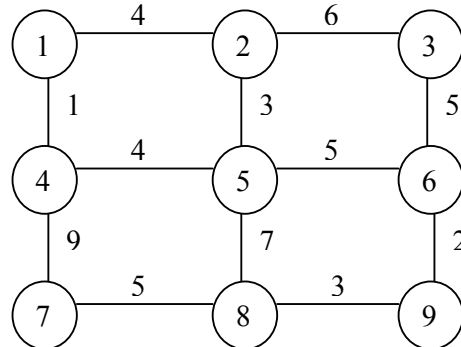
Maximum Marks: 60

Note: Q1 which is compulsory. Attempt one question from each Unit.

- Q.1 (a) Differentiate between quick sort and mergesort algorithms. (2)
 (b) Find the maximum and minimum element in an array with minimum complexity. (3)
 (c) Differentiate between Divide and Conquer and Dynamic programming. (2)
 (d) Give algorithm for native string matching. (2)
 (e) Find complexity of $\sum_{i=1}^n i^3$. (2)
 (f) Explain P, NP and NP complete. (3)
 (g) Find strongly connected components for the following figure: (2)



- (h) Find spanning tree for the following figure:- (2)



- (i) Solve using Strassen's Matrix multiplication method. (2)

$$\begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix} * \begin{pmatrix} 2 & 1 \\ 1 & 2 \end{pmatrix}$$

UNIT-I

- Q.2 (a) Solve $T(n) = 2T(n/4) + \sqrt{n}$ for $T(1) = 1$. (4)
 (b) Show how to multiply the complex numbers $(a+bi)$ and $(c+di)$ using only three real multiplications. (6)

- Q.3 (a) Solve $T(n) = T(n/2) + T(n/4) + T(n/8) + n$ for $T(1) = 1$. (5)
 (b) Give algorithm with complexity for selection in expected linear time. (5)

UNIT-II

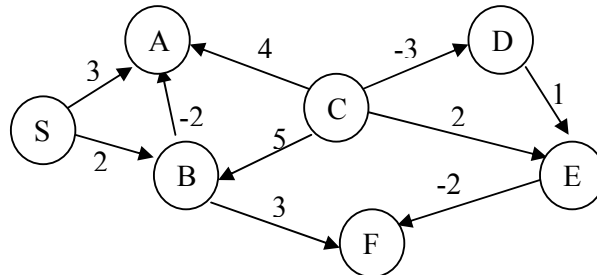
- Q.4 (a) Explain Matrix Chain Multiplication using dynamic programming. (5)
 (b) Find the Huffman code for (5)

Variables	A	B	C	D	E	F	G	H
Frequencies	0.25	0.25	0.14	0.14	0.055	0.055	0.055	0.055

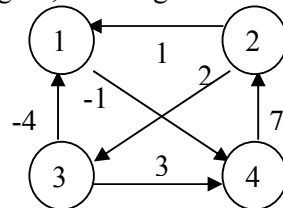
- Q.5 (a) Find the LCS of ABCDABCD and BCDADCB. (5)
 (b) Give the iterative algorithm with complexity for Activity Selection Problem. (5)

UNIT-III

- Q.6 (a) Find the shortest path from S to F for the following figure: (5)



- (b) Give Breath first traversal algorithm along with its complexity. (5)
- Q.7 (a) Apply Floyd Warshall algorithm for constructing shortest path for the following figure, showing the matrix. (5)



- (b) Give Dijkstra algorithm along with its complexity. (5)

UNIT-IV

- Q.8 (a) Construct the string matching automation for the pattern $P=ababcab$ and illustrate its operation on the text string $T=aaabababccab$. (5)
 (b) Prove that vertex cover problem is NP-complete. (5)
- Q.9 (a) Compute the prefix function (KMP method) for the pattern $ababbabbabababbabb$ when the alphabet is $\Sigma=\{a,b\}$. (5)
 (b) Prove that 3-satisfiability is NP-complete. (5)
