

Fourth Semester MCA Degree Examination, Dec.2018/Jan.2019
Analysis and Design of Algorithms

Time: 3 hrs.

Max. Marks:100

Note: Answer any FIVE full questions.

- 1 a. Explain the various stages of Algorithm design and analysis process with the help of flow chart. (10 Marks)
- b. Prove that if $t_1(n) \in O(g_1(n))$ and $t_2(n) \in O(g_2(n))$ then $t_1(n) + t_2(n) \in O(\max(g_1(n), g_2(n)))$. (06 Marks)
- c. Compare order of growth for $\frac{1}{2}n(n-1)$ and n^2 using limits. (04 Marks)
- 2 a. Write the steps for analyzing efficiency of non-recursive algorithm and obtain the time complexity for matrix multiplication. (10 Marks)
- b. Write an algorithm for selection sort and illustrate with the following list:
E, X, A, M, P, L, E (10 Marks)
- 3 a. Write an algorithm for Quicksort and illustrate it with the following list.
5, 8, 3, 2, 9, 7, 1, 4 (10 Marks)
- b. Explain the procedure to multiply two large integers based on divide and conquer strategy and analyse. (10 Marks)
- 4 a. Write an algorithm for DFS traversal and apply that to the graph shown in Fig.Q4(a) starting with vertex g. Also write the corresponding DFS forest. (10 Marks)

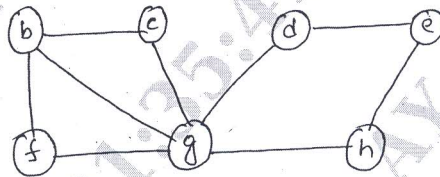


Fig.Q4(a)

- b. What is topological ordering of a graph? Explain any one method to find topological ordering with example. (10 Marks)
- 5 a. Write Horspools algorithm to search a pattern in a given text and apply it to search for the pattern "BARBER" in the text "JIM_SAW_ME_IN_THE_BARBERSHOP". (10 Marks)
- b. What is hashing? When does collision occur in hash table? Discuss different collision resolution technique. (10 Marks)
- 6 a. Write an algorithm for computing binomial coefficient $c(nk)$ using dynamic programming and hence compute $c(6, 3)$. (10 Marks)
- b. Write Floyd's algorithm and obtain all pair shortest path for the following graph in Fig.Q6(b). (10 Marks)

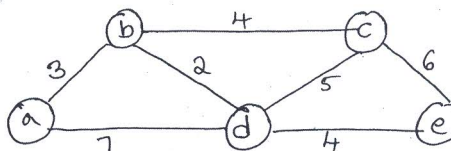


Fig.Q6(b)

- 7 a. Explain and design Prim's algorithm and apply it for the given graph in Fig.Q7(a) to find minimum cost spanning tree. (10 Marks)

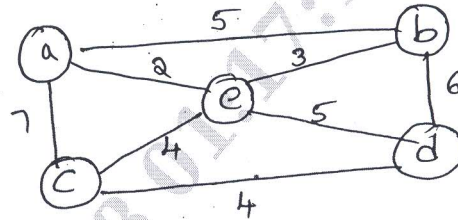


Fig.Q7(a)

- b. Construct a Huffman code for the following data :

Character	A	B	C	D	-
Probability	0.4	0.1	0.2	0.15	0.15

Encode the test ABACABAD
and decode 100010111001010.

(10 Marks)

- 8 Write short notes on :
- Sum of subset problem
 - Decision tree
 - n-Queens problem
 - Master Theorem

(20 Marks)
