

Page No... /

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**NEW SCHEME**

**Fourth Semester MCA Degree Examination, Dec. 06 / Jan. 07**  
**Master of Computer Applications**  
**Analysis and Design of Algorithms**

Time: 3 hrs.]

[Max. Marks:100

**Note: Answer any FIVE full questions.**

1. a. What are the characteristics of a good algorithm? Explain the algorithm design and analysis process with suitable example in each step. (12 Marks)  
 b. Explain the concept of asymptotic notation indicating the commonly used notations. (08 Marks)
  
2. a. Write the algorithm for bubble sort and analyze the algorithm for its time complexity. (10 Marks)  
 b. Give any two examples for exhaustive search. Briefly explain. (10 Marks)
  
3. a. Give an algorithm for merge sort and trace the operation for the following sequence. Brief on its complexity. (08 Marks)  
 8 3 2 9 7 1 5 4  
 b. Give an algorithm for quick sort and trace the algorithm with an example. Analyze its time complexity for the best case. Draw recursive tree for the example chosen. (12 Marks)
  
4. a. Write the algorithm for insertion sort and analyze its time complexity for the best and the worst case. (10 Marks)  
 b. Find the topological order for the graph shown in fig.4(b) using Breadth First Search technique and write the algorithm. (10 Marks)

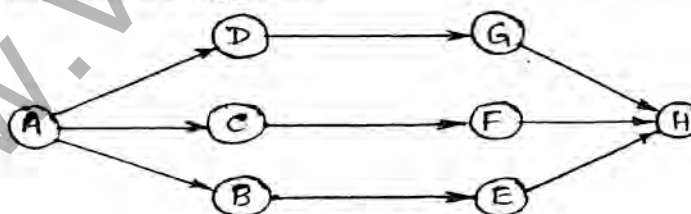


Fig.4(b)

5. a. What is a heap? Outline an algorithm to construct a heap. Sort the following array using heap sort technique. What is its complexity? (12 Marks)  
 2, 9, 7, 6, 5, 8  
 b. Define AVL tree. Construct an AVL tree for the following data items. How an AVL tree is different from 2-3 tree? (08 Marks)  
 5, 6, 8, 3, 2, 4, 7

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- 6 a. Find the pattern "BARBER" in the string "JIM\_SAW\_ME\_IN\_A\_BARBER\_SHOP" using Horspol's algorithm. (08 Marks)
- b. With the help of Floyd's algorithm find all pair shortest path for the following graph shown in fig.6(b): (12 Marks)

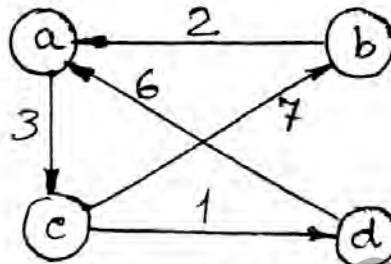


Fig.6(b)

- 7 a. Apply Dijkstra's algorithm to find shortest paths for the following problem shown in fig.7(a): (12 Marks)

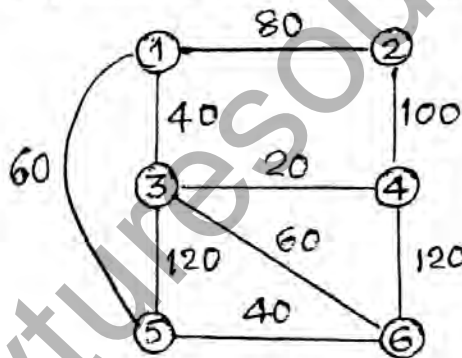


Fig.7(a)

- b. Find the subset from the given sum using back tracking method  $S = \{1, 2, 5, 7\}$  and  $d = 8$ . (08 Marks)
- 8 Write short notes on:
- 4 - Queens problem.
  - Memory functions in dynamic programming.
  - Huffman's trees.
  - Decision trees.
- (20 Marks)

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