

**Ministry of Higher Education
Colleges of Applied Sciences
Final Exam Academic Year 2008/2009**

Course Number/Name: SFDV3004 Data Structures 2

Date: 25th March 2009

Time: 02:00PM

Student's Name _____	
Group No. _____	Student ID: _____

Instructions for students

This exam lasts for 1 hour and is worth 20% to your final mark for SFDV3004
Please, place all mobile phones, bags/folders ...etc at the front or back of the room.
DO NOT TALK during the exam without permission from the invigilator
Hand the exam paper back to your invigilator at the end of the exam

For Lecturer use only

Question	Mark allotted	Mark scored				
Section A Multiple choice (10 x 1)	10					A-Total
Section B Short Answer (4x2.5)	10	1	2	3	4	B-Total
Total	20	Test Total				

Examiner:

Signature

Checked by:

Signature

MULTIPLE CHOICE ANSWER SHEET:

	a	b	c	d
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Please mark your answers on the matrix below.

Example If you think the correct answer for Q1 is “b”

Q1	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
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If you change your mind to “d”

Q1	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
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	a	b	c	d		a	b	c	d		a	b	c	d		a	b	c	d			
Q1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		Q2	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		Q3	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		Q4	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Q5	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		Q6	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		Q7	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		Q8	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Q9	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		Q10	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>												

Section A: Multiple Choice Questions

This section should be answered using the multiple choice questions answer sheet provided in the previous page.

1. To sort an array of strings it is better to use:
 - a. Radix sort
 - b. Quick sort
 - c. Insertion sort
 - d. Counting sort

2. To sort the numbers 329, 457, 657, 839 using Radix sort, the number of passes or iterations required is
 - a. 0
 - b. 1
 - c. 2
 - d. 3

3. If $H(k,i) = (h(k) + i) \% m$, where k is the key, i is the number of collisions and m is the size of the hash table, then one of the major disadvantage of this function is
 - a. Overflow
 - b. Non-retrieval key
 - c. Primary clustering
 - d. Secondary clustering

4. Here is an array which has just been partitioned by the first step of quick sort.
3, 0, 2, 4, 5, 8, 7, 6, 9
Which of these elements could be the pivot?
 - a. 4
 - b. 5
 - c. 2
 - d. a or b

5. The property of good hash function is that
 - a. It minimizes the rate of overflow
 - b. It preserves the order of key value
 - c. It minimizes number of collisions
 - d. None of the above

6. Among the following is a sorting technique that doesn't compare elements and is stable. Identify the technique
 - a. Bubble sort
 - b. Count sort

- c. Merge sort
 - d. Insertion sort
7. Bucket sort is more suitable for
- a. Character string data
 - b. Float data in the interval [0,1]
 - c. Integer data in the interval [0,n - 1]
 - d. All the above
8. To sort an array of doubles, it is better to use:
- a. Radix sort
 - b. Quick sort
 - c. Insertion sort
 - d. Counting sort
9. If there are positive numbers c and n_0 such that $f(n) \leq c \cdot g(n)$ for all $n \geq n_0$, means
- a. $f = O(g)$
 - b. $f = \Theta(g)$
 - c. $f(n) = c \cdot (f(n-1))$
 - d. $f = \Omega(n)$
10. Which of the following sorting algorithm is of the divide-and-conquer type ?
- a. Bubble sort
 - b. Insertion sort
 - c. Quick sort
 - d. None of these

Section B: Short answers questions:

1. Write a C function that swaps two values. Your function should be called as follows:

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int a = 5; int b = 9;
swap(a, b);
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2. Observe the following algorithm,

1. $n \leftarrow$ length of array A
2. for $i \leftarrow 0$ to $n-1$ do
3. insert $A[i]$ into $B[\lfloor n * A[i] \rfloor]$
4. for $i \leftarrow 0$ to $n - 1$ do
5. sort $B[i]$ using insertion sort
6. concatenate the lists $B[0]$ up to $B[n-1]$ in order

if the array A is, 0.79, 0.13, 0.16, 0.64, 0.39, 0.20, 0.89, 0.53, 0.71, 0.42, show the values of $B[7]$ before concatenation.

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3. Write an algorithm that can be called by quick sort to select a mid point in the data then rearrange elements so that any thing greater than this mid point will be after it and anything less than mid point will be before it.

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4. Insert the following numeric keys into an array of capacity 13 using the hash function

$$h(\text{key}) = \text{key} \% m, \text{ where } m = 13$$

use chaining to resolve collision

75, 11, 68, 79, 52, 63, 84, 56, 46, 55, 77

How many collisions occurred?

0 1 2 3 4 5 6 7 8 9 10 11 12

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