



جامعة كفرالشيخ - كلية الهندسة - قسم الهندسة الكهربائية

امتحان نهاية الفصل الاول للعام الجامعي 2019 - 2020

الممتحن: د/علي صقر يوم الامتحان : 2020/ 1 / 19

المادة: - تصميم وتحليل خوارزميات الحاسب الفرقة 3 حاسبات الدرجة من 90 صفحات

اجب عن التالي - كل سؤال مخصص 10 درجات - الاختبار يحقق ILOs - NARS التالية:

A4,a8, a12, a16,b2, b6,b9, b11,b12, b14,c3, c5,c12,c15,c16,d1,d4,d6

1- write an algorithm that search for n elements (x,y,k,...) in a vector of m elements using linear search. How many comparisons (in worst case). Apply the algorithm for the next data (m=20), search for the numbers 41, 19, 54 . (n=3)

6, 11, 12, 48, 15, 7, 19, 22, 23, 77, 25, 29, 3, 41, 54, 5, 14, 49, 2, 64

Write algorithm to sort 2 sorted vectors X,Y, where X includes 10 items, Y includes 20 items, what is the maximum size of the new sorted vector.

2- Write an algorithm that sorts n elements using merge sort algorithm. Apply for the next data (n=20), discuss algorithm complexity.

2, 22, 41, 64, 44, 5, 29, 55, 17,71,25, 33, 31, 43, 50, 46, 82, 49, 23, 54

Re-sort the next data using hash function , use h=4.

3- construct a binary tree to sort next data, write the algorithm, discuss complexity of the algorithm.(n=20). What if you deleted the item 61

2, 22, 41, 64, 14, 15, 29, 55, 17,71,25, 93, 61, 43, 50, 46, 82, 39, 23, 54

Re- sort last data, using linked list , write the algorithm, discuss complexity of the algorithm. Delete the item 25 from linked list, Find the new linked list. Write the instructions for deletion.

4- Use stack to compute value of the next expression, write the postfix expression:

$$(2*8)^2 - (12-3)*4 / (10^2) + 5* 6$$

construct the binary tree and generate the postfix expression. Re-evaluate the expression

5- Write an algorithm that sorts n elements, using radix sort technique. Apply for the next data,

12, 2, 41, 64, 14, 15, 29, 55, 17, 16, 25, 33, 61, 43, 50, 46, 80, 19, 23, 56

Re-sort the data using insertion algorithm. Discuss complexity in each case

6- Use bubble sort to sort next items, write the algorithm, deduce number of comparisons.

12, 2, 41, 64, 14, 15, 29, 55, 17, 16, 25, 33, 61, 43, 50, 46, 80, 69, 23, 56

Re-sort the data using quick sort algorithms. Compare number of cycles.

7- construct the next tree, Write the algorithm. Re-construct the next nodes using the double linked list (right=next, left = previous).

12	11	10	9	8	7	6	5	4	3	2	1	sequence
0	0	0	0	0	10	8	0	0	6	4	2	Right
L	k	j	i	h	g	f	e	d	c	b	a	info
0	0	12	0	0	11	9	0	0	7	5	3	left

using the double linked list, Delete element (h). insert item P to be a right child for item "k". let P has a left child x. write the algorithm.

8- Let a set of tasks to be processed in a FCFS queue using one server, find the average completion time, average waiting time, consider front =1, rear= 15. find number of waiters in queue (queue length) each time when a new task is processed.

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	Task num.
5	10	5	10	40	20	2	10	30	50	2	20	12	22	25	Expected execution time

What if 2 independent processors are used for service. Write instructions for insertion and delete items in a queue.

9- given a text := daliadaliadalia, use the key: abcdefghijklmno, to encrypt that text.

Write an algorithm for generating the ciphered text. Write the ciphered text,

search for pattern ali in the text daliadaliadalia