



United International University (UIU)

Dept. of Computer Science and Engineering (CSE)

Mid Exam Year: 2021

Trimester: Summer

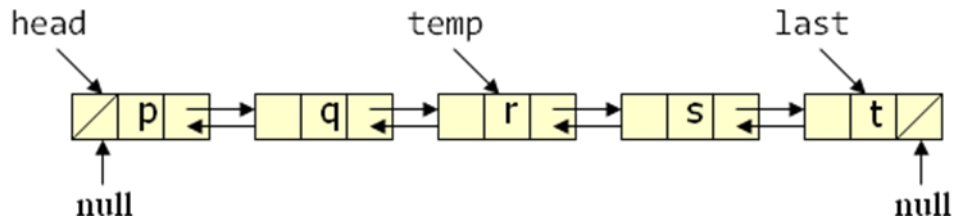
Course: CSE 2215/CSI 217 Data Structure and Algorithms I

Total Marks: 20, Time: 1 hour, Upload & Download Time: 15 min

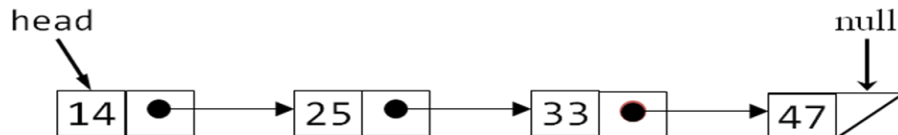
(Any examinee found adopting unfair means will be expelled from the trimester / program as per UIU disciplinary rules)

There are FOUR questions. Answer all of them. Figures in the right-hand margin indicate full marks.

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1. a) How does the descending order merge sort algorithm work on the following data? [2]
y p z x r t
Here, x =last two digits of your student id+1, $y=x+3$, $z=x+y$, $p=y+z$, $r=x+2$, $t=50$
- b) Discuss the time complexity of the following algorithm. [2]
sum=0;
for(i=0; i<n; i++){
scanf("%d", &A[i]);
j=n-1;
while(j>=0){
sum=sum+A[i]+A[j];
j--;
}
}
2. a) Find the memory location of A[15][20] if $\text{loc}(A[0][0])=800+c$, where c =last three digits of your student id. Assume row-wise memory is allocated in the integer array A[50][60], where each integer data is 4 bytes. [2]
- b) How does the Binary Search algorithm work for the following data? Also find the total number of element comparisons needed in this case. [2]
Input Data: x y z p r
Search Key=x
Here, x =last two digits of your student id, $y=x+3$, $z=x+y$, $p=y+z$, and $r=z+p$
- c) If $f(n)=kn^2+3n-2$, prove that $f(n)=O(n^2)$. Here, k =last digit of your student id+5. [2]
3. a) Answer the following questions for the doubly linked list as shown below, where p = last two digits of your student id + 7, $q = p+2$, $r = p+q$, $s = r-2$, $t = r+s$. [2.5]
- a) head \rightarrow next \rightarrow value = ?
 - b) last \rightarrow prev \rightarrow value = ?
 - c) temp \rightarrow next \rightarrow next \rightarrow next = ?
 - d) temp \rightarrow prev \rightarrow next \rightarrow value = ?
 - e) last \rightarrow prev \rightarrow prev \rightarrow value = ?



b) Assume that you are given a single linked list as shown below. Write the statements to make it circular linked list. [1.5]



4. a) Show the status of a STACK implemented by an array of size, $m=2$ for the operations given below. Here, $x = \text{last digit of your student id} + 1$, $y = x + 1$, and $z = y + 2$. [2]

Push($x+y$), Push($y+z$), Pop(), Push($y*z$), Push($x*y$), Pop(), Pop(), Pop()

- b) Show the status of a Queue implemented by a linear (singly) linked list for the following operations. Here, Enqueue and Dequeue mean insert and delete respectively, and $x = \text{last digit of your student id} + 2$, $y = x + 1$, and $z = y + 2$. [2]

Enqueue($x+y$), Enqueue($y+z$), Dequeue(), Dequeue(), Dequeue()

- c) Evaluate the postfix expression, $a \ b \ + \ c \ d \ / -$ for $a = \text{last digit of your student id} + 3$, $b = a + 1$, $c = a + b$ and $d = 1$ using STACK. [2]