



## United International University (UIU)

Dept. of Computer Science and Engineering (CSE)

Mid Exam Year: 2021

Trimester: Summer

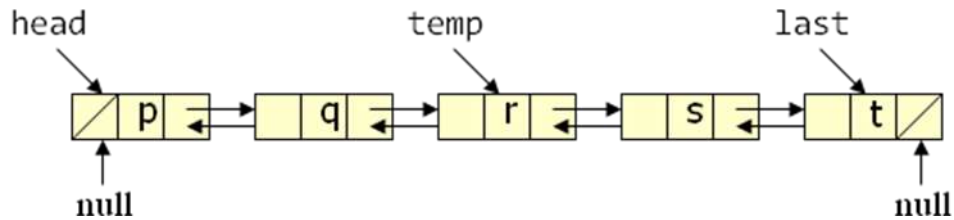
Course: CSE 2215/CSI 217 Data Structure and Algorithms I

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

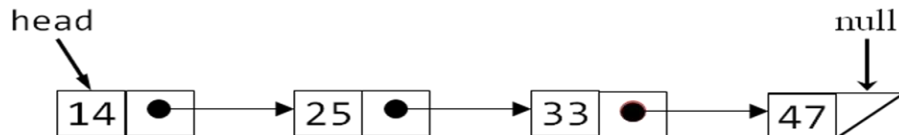
**(Any examinee found adopting unfair means will be expelled from the trimester / program as per UIU disciplinary rules)**

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

- 
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]