

## END SEMESTER EXAMINATION, APRIL-2019

## DATA STRUCTURE AND ALGORITHMS(CSE 2001)

Programme: B.Tech(All Branches)

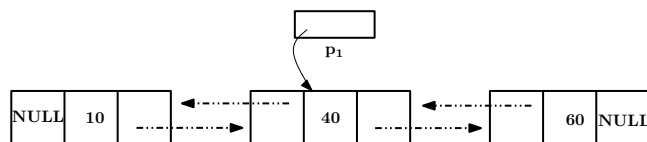
Semester:2nd

Full marks: 60

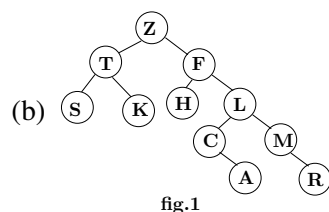
Time: 3 hours

*Answer all Questions. Each Question carries equal mark.*

8. (a) Write the java statements to count total number of nodes in the given linked list using reference  $p_1$ . The linked list may contain further nodes in both direction. **2**



- (b) Write the java statements to delete the node that  $p_1$  pointing of the above figure. **2**
- (c) Write the java statements to find sum of odd elements present in a double linked list. **2**
9. (a) Using 10 number of nodes which type of tree can be constructed among almost complete binary tree and complete binary tree. Justify your answer. **2**



For the given tree in *fig.1* find the height and depth of every node. **2**

- (c) For the given tree in *fig.1* find inorder traversal. **2**
10. (a) **20, 12, 14, 21, 5, 9, 13, 7, 18, 19, 16, 17** for the given series construct a binary search tree(BST). **2**
- (b) Write down the array representation of the given tree given in *fig.1*. **2**
- (c) Write a java method to search an element from the below given array using binary search. **2**

45	40	30	28	25	15	5	-5
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Subject/Course Learning Outcome	*Taxonomy Level	Ques. Nos.	Marks
Ability to state and explain the basic programming syntax, semantics, building blocks.	L1	2(c), 3(a),5(b), 6(c), 9(b)	10
Ability to develop java programs using programming constructs like conditional statements, looping, array, methods and class.	L3	2(a,b),3(c), 4(a), 7(c)	10
Ability to analyze, debug and test the programs and correctly predict their outputs.	L2,L3	1(a)	2
Ability to differentiate the behaviours of different data structures and their memory representations.	L4	1(b,c), 3(b), 5(a), 6(a), 7(a,b), 8(a,b,c), 9(a,c), 10(a,b,c)	30
Ability to choose appropriate data structures that efficiently model the problem of interest.	L4	5(c),6(b)	4
Ability to apply advanced programming techniques for developing solutions of different problems.	L3	4(b,c)	4

\*Blooms taxonomy levels: Knowledge (L1), Comprehension (L2), Application (L3), Analysis (L4), Evaluation (L5), Creation (L6)

1. (a) Find the output of the below given code snippet. **2**

```
int sum=0,n=5,i,j;
for(i=0;i<n;i++){
```

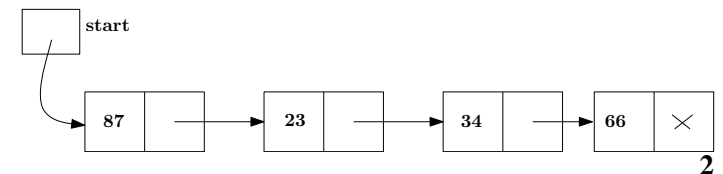
```

for (j=0; j<=i; j++) {
    sum=sum+j;
}
sum=sum*i+j;
System.out.print(sum+" ");
}

```

- (b) Find Big-Oh(O) notation for the above given code snippet in *question no. 1 (a)*. **2**
- (c) The queue data structure is implemented using linked list, keeping track of front and rear reference(s). State the reference(s), that will be updated to insert an element into the queue containing no elements. Represent the above scenario through diagram(s).
2. (a) Write a java method which, given a string, return true if all the characters are distinct and false if any character is repeated. **2**
- (b) Create a class Student and enter mark, name of the student. If mark is more than 100, create exception MarksOutOfBoundException and throw it using Java. **2**
- (c) Explain the uses of this with proper examples. **2**
3. (a) Create a node called student having data members regdno,name and cgpa. **2**
- (b) Dynamically allocate memory to the above node student given in *Question 3(a)* for one student and input some information(e.g:1412545, Amit, 9.3). **2**
- (c) Define a class called Complex with instance variables real, imag and instance methods setData(), display(), add(). Write a Java program to add two complex numbers. The prototype of add method is: *public Complex add(Complex, Complex)*. **2**
4. (a) Create an abstract class Shape and the derived classes Square, Triangle and Circle. Write a java program to display area of different shapes. **2**
- (b) Write a recursive method in Java to return the greatest common divisor(gcd) of two integers m and n, given that in general,  $\text{gcd}(m,n)=\text{gcd}(n, m \bmod n)$ . **2**
- (c) Write a recursive function which, given an integer  $n$ , print it with its digits reversed. For example, given 4735 it prints 5374. **2**

5. (a) Convert the infix expression  $P - Q * R / D + E^M$  into its equivalent postfix expression using stack. **2**  
**Hint:**  $2^3=2^3$ , Precedence from higher to lower:  $^, (*, /), (+, -)$
- (b) In the process of conversion in *Question 5(a)* find how many number of PUSH and POP operation takes place in the stack. **2**
- (c) Evaluate the postfix expression  $5, 2, 3, -, 25, 5, /, *, +$  using stack. In the process of evaluation find how many numbers of PUSH and POP operation takes place in stack. **2**
6. (a) Write a java method for deletion operation in linked list implementation of queue. **2**
- (b) Consider a linear last-in-first-out data structure of fixed size say 3, to store the alphabets with the following operations: **pop, push('A'), push('T'), push('K'), push('M'), pop, pop, push('D'), push('W'), push('S')**. Show the value of top after each operation and display the contents of the data structure.
- (c) Distinguish between Stack and Queue. **2**
7. (a) Write the java statements to insert a new node after the node which info value is 23. **2**



- (b) Write a java method to insert a node at the end of the single linked list. **2**
- (c) Why multiple inheritance is not supported in java. Explain with examples. **2**