END SEMESTER EXAMINATION, APRIL-2018

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.

Subject/Course Learning Outcome	*Taxonomy Level	Ques. Nos.	Marks
Ability to state and explain the basic programming syntax, semantics, building blocks.	L1	1(c), 2(a), 3(a)	6
Ability to develop java programs using programming constructs like conditional statements, looping, array, methods and class.	L3	2(b,c), 3(b)	6
Ability to analyze, debug and test the programs and correctly predict their outputs.	L2,L3	1(a,b)	4
Ability to differentiate the behavoiurs of different data structures and their memory representations.	L4	6(a,b,c), 7(a,b,c), 8(a,b,c), 9(a,b)	22
Ability to choose appropriate data structures that efficiently model the problem of intrest.	L4	5(a,b,c), 9(c), 10(c)	10
Ability to apply advanced programming techniques for developing solutions of different problems.	L3	3(c), 4(a,b,c), 10(a,b)	12

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

1. (a) Define Big-Oh(O) notations.Find Big-Oh(O) notation for the following code segment.   **2**

```
for(int i=1;i<=n;i++){
    for(int j=1;j<=n;j++){
        for(int k=1;k<=n;k=k*2)
```

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9. (a) Differentiate between depth and height of a tree with suitable figure.   **2**

   (b) Write the recursive procedure for pre-order and post-order traversal of binary tree.   **2**

   (c) Define Binary tree. Sketch the binary tree for the following array.**2**

A	B		C	D			E	F	G

10. (a) Consider a binary search tree(BST) for the given set of elements12,25,30,11,5,20,7,9,28,36,4,1.   **2**

    (b) Differentiate between Complete Binary Tree and Almost complete binart tree with proper examples.   **2**

    (c) Construct a binary tree using following post-order and in-order traversals.   **2**

†

```
        System.out.print("ITER");}
    }
```

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

```
public class exam{
  public static int fun(int a,int b){
    if(b==0)return a;
    else return fun(a+a,b/2);}
 public static void main(String args[]){
    System.out.print(fun(4,3));}
}
```

(c) Differentiate between public, private and protected modifiers.   **2**

2. (a) Write the use of super and this keyword in java.   **2**

(b) 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**

(c) Define an interface to declare methods display() and count(). Another class contains a static data member maxcount, instance member name & method display() to display the name of a person, count the no. of characters present in the name of the person.   **2**

3. (a) State the difference between throw and throws keywords used in exception handling mechanism.   **2**

(b) Create a class student & enter mark, name of the student. If mark is more than 100, create user defined exception MarksOutOfBoundException and throw it using Java.   **2**

(c) Write a Java methopd using Generics to count the occurance of an element in an array of any type. The signature of count method is public static $< T >$ int count (T[]array, T item).   **2**

4. (a) Write a recursive method in java to find the factorial of a given number.   **2**

(b) Write a recursive java method that determines if a string is palindrome string or not.   **2**

(c) Write a recursive method in java to search an element in an array using binary search technique.   **2**

5. (a) Write a java method to POP an element from the stack, which is implemented using the linked list. $A+(B/C)*((E+F)*G)-H.$ **2**

(b) Convert the following infix expression to its corresponding postfix expression(show the stack trace).   **2**

(c) Evaluate the postfix expression: $4, 6, *, 8, 4, /, +, 6, -, 5, +$ using stack. In the process of evaluation find total numbers of PUSH and POP operations.   **2**

6. (a) Write a java method to insert a new element into the queue implemented using ARRAY.   **2**

(b) Write the java statements for OVERFLOW and UNDERFLOW condition of Queue, implemented using ARRAY.   **2**

(c) Consider a stack of fixed size say 4, to store the alphabets. Initially the stack contains the number **5**. The following operations takes place:**PUSH(2)**,**PUSH(9)**, **PUSH(7)**,**POP**, **POP**, **PUSH(4)**, **PUSH**(3). Show the value of top after each operation and display the contents of the stack.

7. (a) State the difference between linked list and Array.   **2**

(b) Write a java method to insert a new node after the desired node in a single linked list. (Display the appropriate message if the new node could not be inserted)   **2**

(c) Write a method in java to reverse a single linked list.   **2**

8. (a) State the advantages and limitations (if any) of double linked list over single linked list.   **2**

(b) Write a java method to insert a new node at any desired position of a double linked list.   **2**

(c) Write a method in java to delete a node before any desired position of a double linked list. (Display the appropriate message if the new node could not be deleted)   **2**