b.i. Write an algorithm for factorial using recursion. (4 Marks)

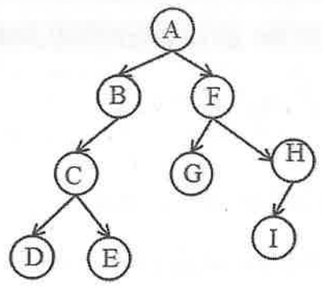
ii. Write an algorithm for the following queue operations. Explain with an example
- Enqueue
- Dequeue (8 Marks)

30. a. Write an algorithm for the following operations on singly linked list. Explain with neat diagram
(i) Insert a new node after a given node
(ii) Insert a new node into a sorted list
(iii) Delete the node following a given node

(OR)

b. Discuss the concept of doubly linked list. Write an algorithm for all possible cases of insertion. Explain with suitable diagrams.

31. a. Explain the operation required for tree traversal for the given tree. Write an algorithm for each traversal



(OR)

b. Describe hashing tables and explain different hashing functions with an example.

32. a. Write an algorithm for sequential and binary search. Explain with an example.

(OR)

b. Explain Quick sort algorithm and sort the given number using quick sort
44, 78, 22, 7, 98, 56, 34, 2, 38, 45

* * * * *

Reg. No.														

B.Tech. DEGREE EXAMINATION, MAY 2019
Fifth/ Sixth/ Seventh Semester

CS1201 – DATA STRUCTURES
(For the candidates admitted during the academic year 2013 – 2014 and 2014 – 2015)

Note:
(i) **Part - A** should be answered in OMR sheet within first 45 minutes and OMR sheet should be handed over to hall invigilator at the end of 45th minute.
(ii) **Part - B** and **Part - C** should be answered in answer booklet.

Time: Three Hours Max. Marks: 100

PART – A (20 × 1 = 20 Marks)
Answer **ALL** Questions

1. Assuming int is of 4 bytes, what is the size of int arr [15]?
(A) 15 bytes (B) 19 bytes
(C) 11 bytes (D) 60 bytes

2. Which of the array declarations is valid?
(A) Int a[3]; (B) Int [3];
(C) a [3] of int; (D) Int a [0-3];

3. To represent the linear time algorithms, which of the following notations is used?
(A) O (k^n) (B) O (n^k)
(C) O (n) (D) O (1)

4. An ADT is defined to be a mathematical model of a user defined type along with the collection of all _____ operations on that model.
(A) Primitive (B) Structured
(C) Cardinality (D) Assignment

5. In a stack, if a user tries to remove an element from empty stack it is called
(A) Underflow (B) Empty collection
(C) Overflow (D) Garbage collection

6. The postfix form of the expression $(A+B)*(C*D-E)*F/G$ is
(A) $AB+CD*E-FG/**$ (B) $AB+CD*E-F**G/$
(C) $AB+CD*E-*F*G/$ (D) $AB+CDE*-*F*G/$

7. The data structure required for breadth first traversal on a graph is
(A) Stack (B) Array
(C) Queue (D) Tree

8. If the elements "A", "B", "C", and "D" are placed in a queue and are deleted one at a time, in what order will they be removed?
(A) DCBA (B) ABCD
(C) DCAB (D) ABDC

9. In linked list each node contain minimum of two fields, one field is data field to store the data, second field is
   (A) Pointer to character (B) Pointer to integer
   (C) Pointer to node (D) Node

10. To represent the empty linked list we use
   (A) Start = Null (B) PTR = Null
   (C) Start → Next = Null (D) PTR → Next = Null

11. A linked list in which last node contain the link of the first node is called
   (A) Singly linked list (B) Circular linked list
   (C) Doubly linked list (D) Multi list

12. In a linked list, the pointer of the last node contains the special value called
   (A) Linked to the first node (B) Null
   (C) Link (D) Pointer to the tail node

13. Binary tree can have, how many number of children?
   (A) 2 (B) Any number of children
   (C) Atmost 2 children (D) 0 or 1

14. Which of the following tree produces the elements in ascending order while performing in-order traversal?
   (A) AVL (B) B-tree
   (C) Binary Search Tree (BST) (D) General Tree

15. A graph with all vertices having equal degree is known as a
   (A) Multi graph (B) Regular graph
   (C) Simple graph (D) Complete graph

16. Space complexity for an adjacency list of an undirected graph having large values of 'V' (vertices) and 'E' (edges) is
   (A) O (E) (B) O (V * V)
   (C) O (E + V) (D) O (V)

17. Which of the following sorting algorithm is slowest?
   (A) Quick sort (B) Bubble sort
   (C) Tree sort (D) Shell sort

18. The quick sort algorithm is based on which techniques?
   (A) Divide and conquer (B) Greedy techniques
   (C) Backtracking (D) Dynamic programming

19. What is the worst case for linear search?
   (A) O (n log n) (B) O (log n)
   (C) O (n) (D) O (1)

20. The complexity of merge sort algorithm is
   (A) O (n) (B) O (log n)
   (C) O (n^2) (D) O (n log n)

PART – B (5 × 4 = 20 Marks)
Answer **ANY FIVE** Questions

21. Describe classification of data structure.

22. Suppose the following STACK of integers is in memory, where STACK is allocated N = 6 memory cells.
   TOP = 3 STACK: 5, 2, 3, - , - , -
   Find the output of the following program
   (i) Call POP (STACK, ITEM A)
   Call POP (STACK, ITEM B)
   Call PUSH (STACK, ITEM B + 2)
   Call PUSH (STACK, 8)
   Call PUSH (STACK, ITEM A + ITEM B)
   (ii) Repeat while top ≠ 0
   Call POP (STACK, ITEM)
   Write ITEM
   [end of loop]

23. Perform addition of the given polynomial and represent the resultant polynomial using singly linked list
   (i) $3x^{12} + 5x^9 + 8x^7 + 3x^6 + 5x^3$
   (ii) $2x^8 + x^7 + 5x^6 + 4x^4 + 7x^2 + 9x + 25$

24. Explain circular linked list with an example.

25. Write a procedure for converting general tree to binary tree.

26. Which data structure is suitable for depth first search? Illustrate with an example.

27. Write an algorithm for selection sort. Explain with suitable example.

PART – C (5 × 12 = 60 Marks)
Answer **ALL** Questions

28. a. i. Describe various algorithmic notations. (4 Marks)

   ii. How do you measure efficiency of an algorithm? Explain different asymptotic notation with an example. (8 Marks)

(OR)

   b. Illustrate various operation on Array Data Structure. Explain each operation with an algorithm.

29. a.i. Write an algorithm to transform infix expression into postfix expression.

   ii. Consider the following arithmetic infix expression Q:
   $Q : A + (B * C - (D \mid E \uparrow F) * G) * H$ into equivalent postfix expression P.

(OR)