

(2½ Hours)

[Total Marks: 75]

- N.B.
- 1) All questions are compulsory.
 - 2) Figures to the right indicate marks.
 - 3) Illustrations, in-depth answers and diagrams will be appreciated.
 - 4) Mixing of sub-questions is not allowed.

Q. 1 Attempt All(Each of 5Marks)**(15M)****(a) Multiple Choice Questions**

- 1) Which of the following is not the type of queue?
 - A. Ordinary queue
 - B. Single ended queue
 - C. Circular queue
 - D. Priority queue
- 2) What is the best case for linear search?
 - A. a) $O(n \log n)$
 - B. b) $O(\log n)$
 - C. c) $O(n)$
 - D. d) $O(1)$
- 3) What data structure can be used to check if syntax has balanced paranthesis?
 - A. queue
 - B. tree
 - C. list
 - D. Stack
- 4) After each iteration in bubble sort
 - A. At least one element is at its sorted position.
 - B. One less comparison is made in the next iteration.
 - C. Both A & B are true.
 - D. Neither A or B are true.
- 5) Which of the following algorithm cannot be designed without recursion –
 - A. Tower of Hanoi
 - B. Fibonacci Series
 - C. Tree Traversal
 - D. None of the above

- (b) Fill in the blanks
(data in memory, leaf, NULL, Space complexity, self-referential)
- 1) A tree node with no children is called a _____ node.
 - 2) A data structure that point to an object of the same type, as itself is known as a _____ data structure.
 - 3) After creating a linked list's head pointer, one should make sure it points to _____ before using it in any operations.
 - 4) _____ refers to the amount of storage the algorithm consumes.
 - 5) A data structure is a logical method of representing _____
- (c) Short Answers
- 1) Define array.
 - 2) Define Iterator.
 - 3) Define ADT.
 - 4) Define binary tree.
 - 5) Define List.

Q. 2 Attempt the following (Any THREE)(Each of 5Marks) (15M)

- (a) How to implement Multi Arrays ADT in data structure.
- (b) What is python set? Demonstrate union, intersection and addition operations on set with example.
- (c) Define Algorithm. List and explain different cases of Algorithm analysis.
- (d) Write a short note on Big O notation.
- (e) How to use List for maintaining sorted list .
- (f) Sort the given set of numbers using bubble sorting:
12, 5, 2, 15, 10, 3, 5
Show step by step process.

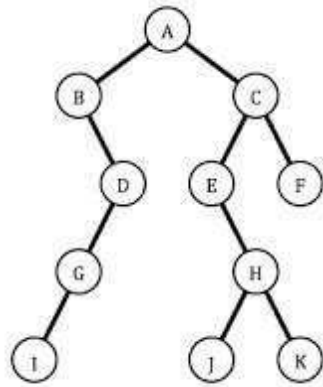
Q. 3 Attempt the following (Any THREE) (Each of 5Marks) (15M)

- (a) Define Linked list. Write a short note on Linked list iterators.
- (b) Write a python code to implement stack operations using python list.
- (c) Evaluate following postfix expression:
 - 1) $5\ 6\ 3\ +\ 10\ 5\ -\ 12\ 2\ -\ 8\ +\ / \ *$
 - 2) $3\ 23\ +\ 3\ 21\ -\ * \ 4\ 7\ +\ /$
- (d) Convert following infix expression to postfix:
 - i) $A + (B * C - (D / E - F) * G) * H$
 - ii) $A * (B + C * D) + E / 78$
- (e) How priority queue is implemented by using heap and tree.
- (f) Write short note on singly link list.

Q. P. Code: 33071

Q. 4 Attempt the following (Any THREE) (Each of 5Marks) (15)

- Define recursive function? List and explain its different properties.
- Explain Hashing linear probing.
- List and explain properties of Binary tree.
- Sort the given set of numbers using quick sorting technique:
1, 14, 5, 8, 9, 65, 2, 21
- Write a python code to find factorial of a number using recursive function.
- For a given binary tree perform inorder, preorder, and postorder traversal:



Q. 5 Attempt the following (Any THREE) (Each of 5Marks) (15)

- Represent following expressions using tree
 - $(A+B*C)-D/5$
 - $A+(B*C-D)/(F*E)+3$
- Differentiate between linear and binary search with example.
- Write an algorithm to convert infix into postfix.
- Write a python code to find execution time required to check whether a number is Armstrong number or not.
- Write short note on Doubly link list.