

4

FYCS / Paper / Subject Code: 77304 / Data Structures. / 23

Q. P. Code: 33069

(2 1/2 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) Select appropriate option from following.
- 1 Python array is --
    - a) Built in data type b) Additional data type c) Abstract data type d) Both a&c
  - 2 What is the worst case for linear search?
    - a)  $O(n \log n)$  b)  $O(\log n)$  c)  $O(n)$  d)  $O(1)$
  - 3 Process of inserting an element in stack is called \_\_\_\_\_
    - a) Create b) Push c) Evaluation d) Pop
  - 4 The type of expression in which operator succeeds its operands is?
    - a) Infix Expression b) Prefix Expression c) Postfix Expression d) None of the mentioned
  - 5 . 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

- (b) Fill in the blanks
1. An ----- is object providing mechanism for general traversal.
  2. Queue is called as ----- type of structure.
  3. Binary search works only with ----- collection.
  4. In a stack, if a user tries to remove an element from empty stack it is called \_\_\_\_\_
  5. In ----- linked list last node pints to first node.

- (c) Short Answers.
1. State any application where stack can be used.
  2. With reference to Date ADT, what will be the output of statement `d=Date()` ?
  3. The type of expression in which operator succeeds its operands is?
  4. What is a hash table?
  5. What is a full binary tree?

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

- (a) What is ADT? Explain the types of operation on ADT.
- (b) How to implement array as an ADT?
- (c) Write note on SET ADT.
- (d) What is binary search? Explain with example.

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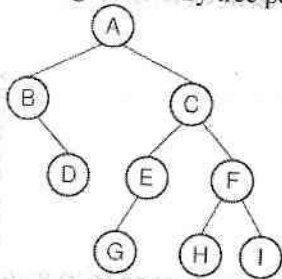
- (e) Write a program to accept city name from user & display message whether that name exists in predefined list?
- (f) Arrange this list 5,10,44,20,15 in ascending order by using selection sort. Write down step by step process.

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

- (a) What is linked list? Explain types of linked lists
- (b) Write a program to implement stack using python list with required functionality.
- (c) What is doubly linked list? Define function to append node in doubly linked list.
- (d) How stack can be used to check parenthesis balancing?
- (e) What is postfix notation? Convert following expressions to postfix.  
1.  $(a+b)/c$  2.  $a/b*c-d+e$  3.  $a-b/(a+b)$  4.  $a*b*c+d-e$
- (f) Explain the concept of priority queue.

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

- (a) What is recursion? State its properties.
- (b) With example explain clustering in hashing.
- (c) Discuss the steps in quick sort.
- (d) With respect to tree structure define following terms:  
Root, path, depth, width, height
- (e) Define recursive function to calculate nth term of Fibonacci series. Test this function to print 10 terms of series.
- (f) For a given binary tree perform inorder, preorder, and postorder traversal.



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

- (a) Write a program to read 10 numbers and arrange them in descending order using bubble sort.
- (b) What is list traversal? Explain algorithm for traversing singly linked list.
- (c) Write a note on recursive call tree working with runtime stack.
- (d) Build an expression tree for following expressions:  
1.  $a-(b*c+d)$  2.  $(a-c*d)+x/y$
- (e) What is binary search tree? With example explain insertion of node in this tree.

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