



GE-072002

Seat No. _____

B. C. A. (Sem. II) Examination

March / April – 2019

BCAOC202 : Data Structures

Time : 3 Hours]

[Total Marks : 70

Instructions

- (1) Figures on the right indicate the marks.
- (2) All Questions are compulsory.
- (3) Answer of each question must start on a new page.
- (4) Answer of all sub-questions of a question should be written in continuous order.

1 Answer the following: (Any 14)

14

- (1) Define Data Structure.
- (2) Which data structure is used for Breadth First Traversal of graph?
- (3) How many comparisons are required to sort N numbers using selection sort?
(a) N (b) N^2 (c) $N(N+1)/2$ (d) $N(N-1)/2$
- (4) A binary tree T has N leaf nodes then the number of nodes of degree 2 in tree T is _____.
(a) $\log N$ (b) $N-1$ (c) N (d) $2N$
- (5) What is the postfix form of the following prefix form $*+AB-CD$.
- (6) Write applications of graph data structure.
- (7) Explain use of flag variable in bubble sort.
- (8) What is the role of HEAD node in doubly linked list?
- (9) Explain Null Graph.
- (10) Which traversal of Binary search tree gives the data elements in ascending order?
- (11) How does a linked stack differ from a linear stack?
- (12) Define siblings.
- (13) Explain priority queue.
- (14) Explain threaded binary tree with suitable example.
- (15) Define Digraph.
- (16) Define Full Binary Tree.

2 Answer the following: (Any two)

14

- (1) Define singly linked list. Write the algorithm and explain insertion and deletion operation on singly linked list.
- (2) In which situation linked list data structure is used? What are the disadvantages of linked list data structure? Compare Array with Linked List.
- (3) Write an algorithm of quick sort and also arrange following element in sorted order using quick sort.
60, 20, 40, 10, 80, 70, 30, 50
- (4) What is searching? Explain program of sequential search with suitable example.

3 [A] Answer the following: (Any two)

14

- (1) Explain stack. List applications of stack. Write an algorithm for PUSH, POP, PEEP and CHANGE operation on stack using array representation.
- (2) Explain Queue data structure. Why it is known as FIFO? Write an algorithm for insertion and deletion operation on simple queue using array representation. What are the advantages of a circular queue over a simple queue?
- (3) Write an algorithm to convert infix expression to postfix form and explain which data structure would be used to convert the infix to postfix form. Trace the algorithm for the following infix expression. $A^B * C - C + D / A / (E + F)$.
- (4) Write algorithm of factorial using recursion and iteration. Discuss which is better and why?

4 Answer the following (Any Two)

14

- (1) Construct AVL tree for the following set of subject in computer stream. MP, MBS, MMT, NCP, AI, ACA, OOCs, DC, DS, OOP, OOMD.
- (2) What is a binary search tree (BST)? Insert the following values into a BST in the following order.
1, 3, 5, 8, 0, 9, 12, 4, 2, 15.
- (3) Define the characteristic of a B-Tree. Construct a B-tree of order 5 by inserting following elements: 3, 14, 7, 1, 8, 5, 11, 17, 13, 6, 23, 12, 20, 26, 4, 16, 18, 24, 25 and 19.
- (4) Explain the traversal operations in a binary tree with an example. Write the algorithm for preorder traversal.

5 Answer the following (Any Two)

14

- (1) Define graph. Explain different representation of graph with example. Also discuss advantage and disadvantage of all method.
- (2) For what purpose the Breadth First Search (BFS) and the Depth First Search (DFS) are used? Explain the BFS and DFS searching procedure with an example.
- (3) What is use of Prim's and Krushkal's algorithms? Apply Krushkal's algorithm for following graph. Demonstrate all intermediate steps and final result properly.

