

**DATA STRUCTURES & ALGORITHMS
(2019 Pattern) (Semester - III) (214443)**

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

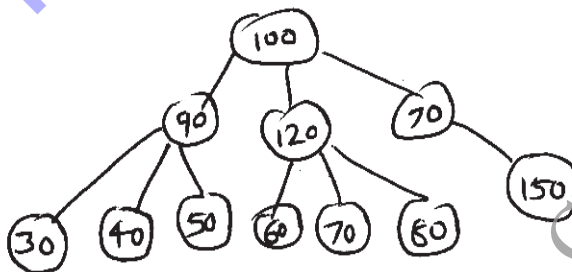
- 1) Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Figures to the right indicate full marks.

- Q1)** a) Define stack as an ADT. Use this stack to swap two no.s (Write Sudo Code). [6]
- b) Discuss the merits of circular queue over linear queue and write sudo code for over flow and under flow conditions of circular queue. [8]
- c) Discuss the time complexity of removing an item from priority queue if sequential memory organization is used. [4]

OR

- Q2)** a) Contrast between the characteristics of stack & queue data structures.[4]
- b) Convert the following infix expressions to postfix and show the contents of stack for each operation.
- i) $p * (X/Y * Z - Q/(A+B))$.
 - ii) $A + B \$ (M-N)/D$ (\$ for power operation). [8]
- c) Explain with example the significance of priority queue over simple queue. [6]

- Q3)** a) Discuss the merits & demerits of implementing threaded binary tree. [6]
- b) Describe the characteristics of a general tree. Convert the following general tree into binary tree. [8]



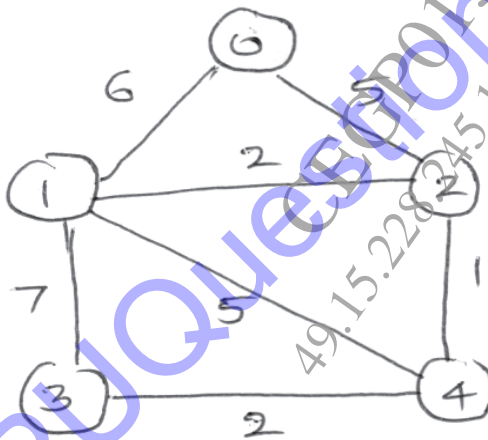
- c) Discuss the time complexities of inserting & deleting a node from BST.[4]

OR

- Q4)** a) Discuss the applications of Binary search tree & expression tree. [4]
 b) Write sudo code for non-recursive inorder tree traversal of binary tree.[6]
 c) For the following binary tree, show (draw) threaded binary tree (inorder).



- Q5)** a) Write sudo code of Kruskal's algorithm for creating a MST. Demonstrate with steps for the following graph MST using same algorithm. [9]



- b) Discuss with example, what is AVL & time complexity to insert a node in an AVL. [8]

OR

- Q6)** a) Explain the time complexity of heap sort & sort the following No.s in ascending order using heap sort. 5, 3, 17, 10, 84, 19, 22. [9]
 b) Contrast between the approaches of finding MST using prim's algorithm & Kruskal's algorithm. Discuss the time complexities of both algorithms. [8]

Q7) a) Explain prototype of the following function in C++ with examples. [8]

i) Seekg

ii) Seekp

iii) tellg

iv) tellp

b) Enlist characteristics of a good hash function. Create a hash table for the following set of integers, taking modulus function as hash function ($h(k)=k\%10$).

29, 50, 28, 19, 17, 15, 18, 14, 38.

Demonstrate Chaining with replacement. [9]

OR

Q8) a) Write pseudo codes to perform following operations on index sequential file. [8]

i) inserting a record.

ii) updating a given record.

b) Discuss with examples at least three types of hashing functions, clearly mentioning the advantages & disadvantages of each. [9]

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