

**B. E. (Information Technology), Third Semester
PC-IT-301: Data Structures**

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Part.

x-x-x

1. Answer the followings with suitable examples: (10)
- a) Garbage collection
 - b) Disadvantages of using array
 - c) Heap Sort
 - d) BFS of a graph
 - e) Complete binary tree

PART – A

2. a) What is data structure? Describe its different types. What type of operations can be performed over any data structure? (7+3)
- b) Define Big O, theta and omega notations of time complexity.
3. a) Define header linked list. Write an algorithm to delete the node with given data from the single header linked list.
- b) Translate the given infix expression into its equivalent postfix notation (6+4)
- $A * (B+D)/E - F * (G +H/K)$
4. a) A sequence of integers is stored on a stack. Write an algorithm to construct a queue containing the same integers from this stack.
- b) Explain the applications of stack with examples. (6+4)

PART – B

5. What is B-Tree? Construct 4-tree for the followings data : (10)
- 2, 3, 4, 5, 101, 99, 98, 23, 12, 89, 78, 66, 16, 32, 45, 77, 68, 30
6. a) What are height balanced tree? Why rotations are used in height balanced tree. Write the algorithm for inserting the data into height balanced tree.
- b) Is heap another form of BST? Justify. (7+3)
7. a) What is hashing? Insert the following numbers into hash table of size 12 using quadratic probing with $c_1=1$ and $c_2=2$: 98, 56, 23, 50, 45, 89, 43, 12
- b) What is the principle of radix sort? Explain the algorithm with suitable example. (5+5)

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