# **Question Paper**

Exam Date & Time: 08-Feb-2021 (10:00 AM - 01:15 PM)



## MANIPAL ACADEMY OF HIGHER EDUCATION

### MANIPAL SCHOOL OF INFORMATION SCIENCES, MANIPAL FIRST SEMESTER MASTER OF ENGINEERING- ME (BIG DATA AND DATA ANALYTICS / MACHINE LEARNING) DEGREE EXAMINATION - FEBRUARY 2021

#### Algorithms and Data Structures for Big Data [BDA 602]

Marks: 100

#### Duration: 180 mins.

#### **MONDAY, FEBRUARY 8, 2021**

#### Answer all the questions.

1)	Define Data Structure, Algorithm and Program. List the conditions an algorithms should satisfy. Briefly explain the importance of time and space complexity. (TLO: 1.1) (3+2+5 marks)	(10)
2)	Design data structure for single linked list. Write functions to create new list, search element and delete specified element from linked list. (TLO: 2.1) (3+1+2+4 marks)	(10)
3)	Define Stack data structure. Provide data structure for linked list based Stack. Implement stack_push() and stack_pop() functions. (TLO:2.2) (1+3+3+3 marks)	(10)
4)	Design data structure for array based Queue. Write functions to create new queue, add to queue and delete from queue. (TLO: 2.3) (3+2+3+2 marks)	(10)
5)	Design data structure for BST. Build BST for input: 51, 12, 98, 34, 5, 29, 62, 46, 75 and 82. Provide In-order, pre-order, post-order and level-order traversals for the given list (No traversal codes required). (TLO: 2.4) (3+3+4 marks)	(10)
6)	Design data structure for hash table using linked list. Provide functions for creating hash table adding element and other required static functions. (TLO: 3.2) (3+7 marks)	(10)
7)	Implement selection and insertion sort. Discuss the time complexity of both sorting method. (TLO: 3.1) (5+5 marks)	(10)
8)	Design data structure for weighted graph (graph having cost for labels). Write functions to create adjacency list and find number of neighbours for a given vertex. Neighbours function should take O(1) time. (TLO: 3.3) (3+5+2 marks)	(10)
9)	Construct MaxHeap showing all steps for given list: 76, 12, 98, 34, 5, 29, 62, 46, 51 and 82. If a new element 43 is added to this heap, show final heap after adding new element. (TLO: 3.1) (7+3 marks)	(10)
10)	Let A and B represents two sorted single linked lists. Construct list C which is also a sorted list obtained by reading data from list A and B. All elements in list C should be unique. (TLO: 2.1) (10 marks)	(10)

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