

Question Paper

Exam Date & Time: 27-Jun-2022 (02:00 PM - 05:00 PM)



MANIPAL ACADEMY OF HIGHER EDUCATION

Manipal School of Information Sciences, Manipal
Second Semester M.Sc. Information Science Degree Examination - June 2022

Data Structures and Algorithms [MIS 502]

Marks: 100

Duration: 180 mins.

Monday, June 27, 2022

Answer all the questions.

- 1) Define Data structure, Algorithms and Program. Explain the conditions an algorithm should satisfy. (10)
(TLO 1.1) (3+6 marks)
- 2) List any four applications of Stack. Design data structure required to implement linked list based Stack. It should have `stack_push()` and `stack_pop()` functions. (TLO 1.3) (2+4+4 marks) (10)
- 3) Define Queue data structure. List applications of queue. Design data structure for array based Queue with `queue_new()`, `queue_full()` and `queue_empty()` functions. (TLO 1.3) (1+1+4+4 marks) (10)
- 4) Design Data Structure for Single linked. Provide functions to delete element at head and count number of elements in list. (TLO 1.3) (4+6 marks) (10)
- 5) Implement quick sort and discuss the time complexity. (TLO 2.1) (5+5 marks) (10)
- 6) Define minimum heap. Given a list 25 8 65 45 15 38 72 81 5 28 build minimum heap. Draw all the stages of building heap. (TLO 2.1) (2+8 marks) (10)
- 7) List the properties of binary search tree. Write methods to find the height of BST and count number of nodes in BST. (TLO 2.3) (4+6 marks) (10)
- 8) Define collision in Hashing. Describe various techniques to overcome collision. (TLO 2.2) (2+8 marks) (10)
- 9) Provide different techniques for representing graph. Describe Prim's algorithm with example. (TLO 3.1) (4+6 marks) (10)
- 10) Discussing the conditions for attack, write N-Queen's algorithm using backtracking technique. (TLO 3.3) (3 + 7 marks) (10)

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