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Course Code: MCA-102

Course Name: Data and File Structures

**Class Test - II**

Time: 1 Hour

Max Marks: 20

**A. State true or false.**

**(0.5×5 = 2.5)**

- (1) The process of deleting an element from a queue is called enqueue operation. [True] [False]
- (2) Two queues can be implemented in a single array. [True] [False]
- (3) Shell sort is not an in-place comparison sort. [True] [False]
- (4) External sorting is required when the data being sorted do not fit into the main memory of a computing device. [True] [False]
- (5) A burst error means that 2 or more bits in the data unit have changed. [True] [False]

**B. Fill in the blanks with appropriate answer.**

**(0.5×5 = 2.5)**

- (1) The maximum height of a binary tree with  $n$  nodes is ... ..
- (2) In ... .. tree, the data is stored in leaf nodes.
- (3) The full binary tree obtained by adding dummy nodes (external nodes) to a binary tree is called ... ..
- (4) Array-based representation of a graph is done using ... .. matrix.
- (5) ... .. is an approach for error detection.

**C. Choose the correct option.**

**(0.5×10 = 5)**

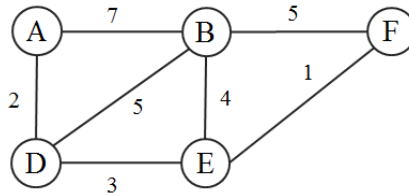
- (1) How many pointers need to be modified in inserting an element at the beginning of a doubly linked list?
  - a) 1
  - b) 2
  - c) 3
  - d) 4
- (2) Which one of the following is an application of stack data structure?
  - a) Managing function calls
  - b) The stock span problem
  - c) Arithmetic expression evaluation
  - d) All of the above

- (3) If a tree becomes unbalanced, when a node is inserted into the left subtree of the left subtree, then we perform
- single right rotation
  - double right rotation
  - single left rotation
  - double right rotation
- (4) In which of the following trees, all paths from the root to leaves have the same length?
- B-tree
  - Binary tree
  - Extended binary tree
  - Threaded binary tree
- (5) The minimum number of colors needed to color a graph having  $n (>3)$  vertices and 2 edges is
- 1
  - 2
  - 3
  - 4
- (6) Graph traversal is different from a tree traversal, because
- trees are not connected
  - graphs may have loops
  - trees have root
  - None of the above
- (7) The spanning tree of connected graph with 10 vertices contains
- 9 edges
  - 11 edges
  - 10 edges
  - 9 vertices
- (8) What is the time complexity to delete an element from the direct address table?
- $O(n)$
  - $O(\log n)$
  - $O(n \log n)$
  - $O(1)$
- (9) What is the best definition of a collision in a hash table?
- Two entries are identical except for their keys.
  - Two entries with different data have the exact same key.
  - Two entries with different keys have the same exact hash value.
  - Two entries with the exact same key have different hash values
- (10) Files are logically partitioned into storage units of fixed-length known as
- sectors
  - tracks
  - segments
  - blocks

**D. Answer the following questions.**

**(2×5 = 10)**

- (1) Write a function to remove all duplicate elements from a linear linked list.
- (2) Discuss the divide and conquer problem solving approach. List the name of searching and sorting techniques which follow divide and conquer principle
- (3) Construct a B-tree of order 3 by inserting numbers from 1 to 10.
- (4) Apply Kruskal's algorithm to construct the minimum cost spanning tree for the following graph:



- (5) Compare text file with binary file. Give examples of each.