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Question Paper Code: 41232

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2016

Third Semester

Computer Science and Engineering

14UCS302 - DATA STRUCTURES

(Regulation 2014)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

- _____ is very useful in situation when data have to stored and then retrieved in reverse order.
(a) Stack (b) Queue (c) List (d) Link list
- A queue is a
(a) FIFO (b) LIFO (c) FILO (d) LOFI
- The post order traversal of a binary tree is DEBFCA. Find out the pre order traversal
(a) ABFCDE (b) ADBFEC (c) ABDECF (d) ABDCEF
- Which of the following statements hold true for binary search trees?
(a) The left subtree of a node contains only nodes with keys less than the node's key
(b) The right subtree of a node contains only nodes with keys greater than the node's key
(c) Both (a) and (b)
(d) No left and right subtree nodes contains only nodes with keys less than the node's key
- In _____ tree, the heights of the two child sub trees of any node differ by at most one.
(a) Binary tree (b) Red Black tree
(c) Splay tree (d) AVL tree

6. In a heap, element with the greatest key is always in the _____ node.
- (a) Leaf (b) Root
(c) First node of left sub tree (d) First node of right sub tree
7. Key value pair is usually seen in
- (a) Hash tables (b) Heaps (c) Both (a) and (b) (d) Skip list
8. A union find data-structure is commonly applied while implementing
- (a) A depth-first search traversal of a graph
(b) A breadth-first search traversal of a graph
(c) Computing the minimum spanning tree of a graph using the Kruskal algorithm
(d) Computing the all-pairs shortest path in a graph
9. To implement Dijkstra's shortest path algorithm on un-weighted graphs so that it runs in linear time, the data structure to be used is
- (a) Queue (b) Stack (c) Heap (d) B-Tree
10. In a graph if $e=[u, v]$, Then u and v are called
- (a) endpoints of e (b) adjacent nodes (c) neighbors (d) all the above

PART - B (5 x 2 = 10 Marks)

11. Mention the advantages of representing stacks using linked lists than arrays.
12. What is the use of threaded binary tree?
13. What do you mean by balance factor of a node in AVL tree?
14. Define an equivalence relation.
15. What is meant by strongly connected and weakly connected in a graph?

PART - C (5 x 16 = 80 Marks)

16. (a) Develop an algorithm to implement a stack ADT. Give relevant example and diagrammatic illustrations. (16)

Or

- (b) Write an algorithm to convert infix to postfix notation and prefix notation using stack. (16)
17. (a) List the different types of tree traversal. Develop an algorithm for traversing a binary tree. Validate the algorithm with a suitable example. (16)

Or

- (b) (i) Construct binary search tree to insert the following key elements: 23, 44, 18, 35, 20, 12, 52, 19, 38 and delete 44 from it. (8)
- (ii) Explain expression tree with an example. (8)
18. (a) Briefly explain the single and double rotation of AVL tree with examples. (16)

Or

- (b) (i) Write a program that performs the following operations in a binary heap: (1) Insert (2) DeleteMin (3) Build Heap and (4) FindMin. (8)
- (ii) Explain the various rotations in splaying strategy. Also explain insertion and deletion in a splay tree with example. (8)
19. (a) Create extendible hash structure to insert the following key elements 2, 3, 5, 7, 11, 17, 19, 23, 29, 31. Show the extendible hash structure for this file if the hash function is $h(x) = x \text{ mod } 8$ and buckets can hold three records. (16)

Or

- (b) (i) Explain the smart union algorithm with example. (8)
- (ii) Write a program to determine the effects of path compression and various union strategies. (8)
20. (a) Develop an algorithm to compute the shortest path using Dijkstra's algorithm. Validate the algorithm with an example. (16)

Or

- (b) (i) Write an algorithm to implement Depth-first search? How is Depth-first search differing from Breadth-first search? (8)
- (ii) Discuss about Euler circuit with suitable example. (8)

