

15. (a) Consider a hash table with 9 slots. The hash function is $h(k) = k \bmod 9$. The following keys are inserted in the order 5, 28, 19, 15, 20, 33, 12, 17, 10. Draw the contents of the hash table when the collisions are resolved by
- Chaining
 - Linear probing
 - Double hashing. The second hash function $h_2(x) = 7 - (x \bmod 7)$ (13)
- Or
- (b) (i) Write a function to perform merge sort. Give example (6)
- (ii) Write a routine for Insertion sort. Sort the following sequence using Insertion sort.
3, 10, 4, 2, 8, 6, 5, 1. (7)

PART C — (1 × 15 = 15 marks)

16. (a) (i) Indicate whether you use an Array, Linked List or Hash Table to store data in each of the following cases. Justify your answer. (6)
- A list of employee records needs to be stored in a manner that it is easy to find max or min in the list.
 - A library needs to maintain books by their ISBN number. Only thing important is finding them as soon as possible.
 - A data set needs to be maintained in order to find the median of the set quickly.
- (ii) Define data abstraction. Write the ADT for the data structure in which the same condition can be used appropriately, for checking overflow and underflow. Define all basic functions of this ADT. (9)
- Or
- (b) (i) When do you perform rehashing? Illustrate with example. (8)
- (ii) From the Figure 16. (b), in what order are the vertices visited using DFS and BFS starting from vertex A? Where a choice exists, use alphabetical order. (7)

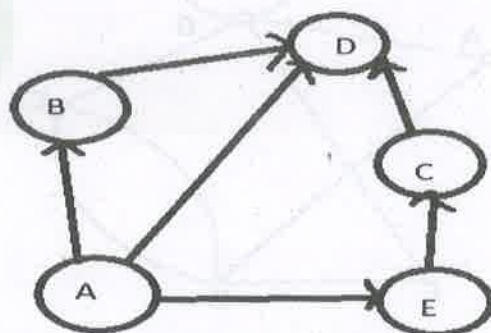


Figure 16. (b)

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B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY, 2019.

Third Semester

Computer Science and Engineering

CS 8391 — DATA STRUCTURES

(Common to Computer and Communication Engineering/Information Technology)

(Regulation 2017)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

- What are the advantages of Linked List over arrays?
- Illustrate the differences between linear linked list and Circular linked list.
- Convert the following infix expression to postfix expression using Stack
 $a + b * c + (d + e + f) / g$.
- A priority queue is implemented as a Max-Heap. Initially it has 5 elements. The level order traversal of the heap is : 10, 8, 5, 3, 2. Two new elements 11 and 7 are inserted into the heap in that order. Give the level order traversal of the heap after the insertion of elements.
- How to resolve null links in a binary tree?
- The depth of complete binary tree is 8 and compute the number of nodes in leaf.
- What is Bi-connectivity?
- Given a weighted, undirected graph with $|V|$ nodes, Assume all weights are non-negative. If each edge has weight $\leq w$, What can you say about the cost of Minimum spanning tree?
- Brief about Extendible hashing.
- Compare linear search and Binary search.

- (b) (i) Write a routine for AVL tree insertion. Insert the following elements in the empty tree and how do you balance the tree after each element insertion?

Elements : 2, 5, 4, 6, 7, 9, 8, 3, 1, 10. (8)

- (ii) Brief about B+ Tree. And discuss the applications of heap. (5)

14. (a) Apply an appropriate algorithm to find the shortest path from 'A' to every other node of A. For the given graph Fig. 14(a) (13)

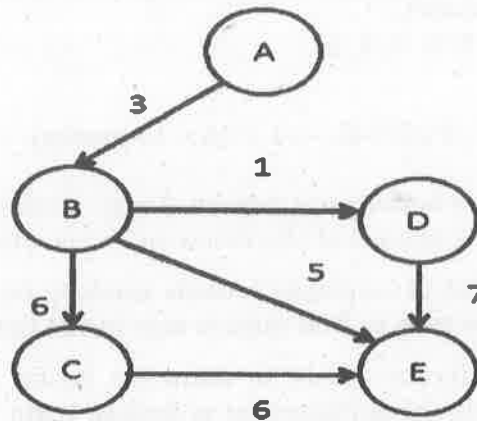


Fig. 14(a)

Or

- (b) (i) Explain in detail about strongly connected components and illustrate with an example. (7)
- (ii) Find an Euler path or an Euler circuit using DFS for the following graph Fig. 14(b). (6)

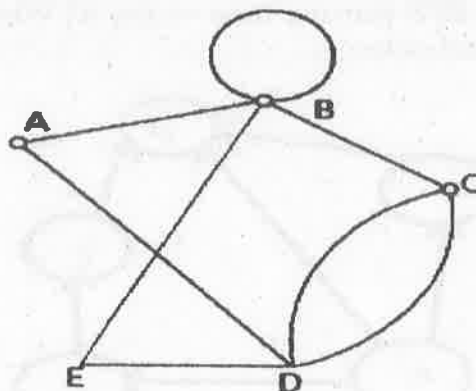


Fig. 14(b)