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Question Paper Code : 50423

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MARY 2023.

Third/Sixth/Seventh/Eighth Semester

Computer Science and Engineering

CS 8391 – DATA STRUCTURES

(Common to: Computer and Communication Engineering/Electrical and Electronics
Engineering/Electronics and Instrumentation Engineering/Instrumentation and
Control Engineering/Information Technology)

(Regulations 2017)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are different ways the list ADT can be implemented?
2. State the limitation of singly linked list.
3. What are the applications of queue?
4. State the operations of stack.
5. What are the structural properties of B-tree?
6. State the applications of the heap.
7. What is topological sort?
8. Define cut-vertex.
9. What is binary search? State the limitations.
10. Define Radix sort.

PART B — (5 × 13 = 65 marks)

11. (a) (i) What are linked list? State the different types of linked list with examples. (6)
- (ii) Write a function to find an element in the linear linked list. (7)
- Or
- (b) (i) What are the application of the list? Explain with examples. (6)
- (ii) Write a function to add two polynomials using linked list. (7)
12. (a) (i) What is Queue? State the basic operations on queue. Explain with example. (6)
- (ii) Write a routing to implement queue using linked list. (7)
- Or
- (b) (i) What is a priority Queue? Give example. State the applications. (6)
- (ii) For the given expression, convert the infix to postfix expression and evaluate the postfix expression using stack. (7)
- Input: $((A + B) - C * (D/E)) + F$
- (A = 2, B = 2, C = 3, D = 1, E = 1, F = 4)
13. (a) (i) Distinguish between binary tree and binary search tree. What are the operations that are performed on binary search tree? Explain any one with example. (6)
- (ii) Show the result of inserting 3,1,4,6,9,2,5,7 into an initially empty binary search tree and show the result of deleting the root. (7)
- Or
- (b) (i) What are threaded binary tree? State and explain the operation on threaded binary tree. (6)
- (ii) Write a routing to perform insertion and deletion in a B-tree. (7)

14. (a) (i) What are the various representations of the graph? Explain with example. (6)
- (ii) Explain Bi-connectivity with example. (7)
- Or
- (b) Distinguish between BFS and DFS. Explain both BFS and DFS traversal using the corresponding data structure with example.
15. (a) Sort the sequence 4,6,8,2,9,5,1,7 and 3 using the following
- (i) Merge sort (6)
- (ii) Quicksort (picking the first element as the pivot). (7)
- Or
- (b) Given input {4371, 1323, 6173, 4199, 4344, 9679, 1989} and a hash function $h(x) = x \pmod{10}$, show the resulting. (3+3+3+4)
- (i) open hash table
- (ii) closed hash table using linear probing
- (iii) closed hash table using quadratic probing
- (iv) closed hash table using double hashing

PART C — (1 × 15 = 15 marks)

16. (a) (i) Write a non-recursive procedure to reverse a singly linked list in O(N). (8)
- (ii) Construct an expression tree for the given expression. (7)
- $((A + B) - C * (D/E)) + F$
- Or
- (b) (i) A binary tree T has 9 nodes. The inorder and post order traversals of T yield the following. (8)
- Inorder traversal (I): E A C K F H D B G
- Postorder traversal (Po): E C K A H B G D F
- Draw a binary tree T.
- (ii) Consider the real time scenario of cars lined up at car wash. Implement this using appropriate an appropriate data structure. (7)