Data Structure and Algorithm

Year 2002

Group A:

Attempt any One

1. What do you mean by linked list? Write benefits of linked list over array and write a function for inserting node in to the list and deleting node from the list node in computer.
2. What do you mean by sorting? Write an algorithm for implementing selection sort. Why selection sort is efficient then insertion sort in case of larger list of element.

Group B: Attempt any five: (5*4=20)

1. What is the required condition to implement binary search? Write an algorithm of binary search.
2. Derive the ADT representation of array.
3. Discuss the Breadth first traversal in Graph. Also write an algorithm for the traversal.
4. Write a function to count the total number of nodes in a linear linked list.
5. Define binary tree, strictly binary tree. What are the methods of a traversing binary tree? Write a recursive function for one of the traversals.
6. What do you mean by Queue? Write a function to insert element in the queue.

Year 2003

Group A: Attempt any Three **[3×5 = 15]**

1. What do you mean by linked list? Write benefits of linked list over array and also write a function for inserting node into a list and deleting node from the linked list.
2. What is searching technique? Which searching technique is best in order to search an item from the large list? Write an algorithm or "C" function for such types of searching technique.
3. Define infix and post-fix Expression. Write an algorithm for evaluating a postfix expression.
4. What do you mean by queue? Write an algorithm or C-function for joining two queue of size each 5 into stack.

Group B: Attempt any Five **[5×3 = 15]**

1. Define multi dimensional array with example? Write an algorithm or "C" function for column major representation of array from the multi dimensional array.
2. Describe linked implementation of stack with suitable example? And write down its algorithm or "C" function.
3. Define expression Tree.
4. Make expression tree to the expression: AB-C+DEF-+$
5. Then write the post order traversal for above tree.
6. Trace bubble sort algorithm for the following data: 32 51 27 85 66 23 13 57 99 11
7. Define queue. Write an algorithm or C-function to insert elements in the empty queue.
8. What do you mean by sorting? Write algorithm or C-function for insertion-sort.
9. What do you mean by Abstract Data Type? Define queue as an Abstract Data Type.

2004

Long answer question (Any three):-

1. Define circular queue and differentiate it with liner queue . write a C – function or algorithm to insert an element into a circular queue .
2. Define binary tree with a suitable example ? write a algorithm or “C” function to construct a binary tree and construct a binary tree from the following given node { 12,8,14, 7 ,19, 4, 28, 2 , 30}
3. Write a C function or algorithm to implement a selection sort make a comparison between selection sort and insertion sort .
4. What do you mean by linked lit of stack ? explain with diagram write an algorithm or ‘C” function to implement linked list of stack .

Short answer question (attempt any FIVE)

1. trace selection sort algorithm for following data .{66, 29, 32, 59, 12}
2. Define recursive function. Write recursive function to generate Fibonacci resides.
3. Define graph. Make a graph from the given adjacency table.

Nodes	A	B	C	D
A	0	0	1	1
B	0	0	1	0
C	0	0	0	1
D	0	0	0	0
E	0	0	0	1

4. Use binary search algorithm for finding position of 67 in the given list 34 44 56 77 78 89 91 92 93 94 95

5. Apply the algorithm to evaluate postfix expression for given expression.

6. construct a binary tree the following given node { 10,8,12,7,9,11,18} and also write perorder , in order and post order traversal.

2007

Brief Answer Questions

1. Write down the main features of Stack.
2. How is circular queue more efficient than linear queue?
3. Write an algorithm of list traversal.
4. What do you mean by nesting depth and parenthesis count?
5. What is Big Oh(o) notation?
6. Differentiate between Sorting and Searching.
7. Define complete binary tree with examples.
8. What do you mean by AVL tree?
9. Define linked list.
10. What are the advantages of linked list over the contiguous list?

Group 'B'

1. What is row major order representation of an array? Explain with example.
2. Define expression tree. Create an expression tree of given infix notation.

((A*B) + C – D/E + (f*G))$H

3. What is the difference Insertion sort and Selection sort? In which situation insertion sort will perform better than selection sort.
4. Define linked list. Write an algorithm to delete a node from the end of singly linked list.
5. What is postfix expression? Evaluate the given expression

6 2 3 + – 3 8 2 / + * 2 $ 3 +

6. What is ADT? Define queue as an ADT.

Group 'C'

1. Define circular queue with an example. Write an algorithm or C function to insert an item in a circular queue.
2. Write an algorithm or C function to delete a node from Binary tree.
3. What is the difference between Quick sort and Merge sort? Sort the following data using Quick sort algorithm. 48, 37, 57, 92, 86,
4. What is searching? Write binary search algorithm. Search an element 15 from the given list of data using binary search algorithm.

10,15,28,31,33,35,44,45,80,84,96,100

Year 2009

Brief Answer Questions:

1. What is stack?
2. Define complete binary tree.
3. What is the Big Oh notation of quick sort?
4. What do you mean by height balance tree?
5. What is circular linked list?
6. What is Abstract Data Type?
7. Define priority queue.
8. Why binary search is better than sequential search?
9. What is dynamic memory allocation?
10. What is big Oh notation?

Group 'B'

Long answer Questions : (Any three):

2. Write an algorithm or "c" function for primitive operations of stack.
3. Create binary search tree for following list of elements 45, 30, 29, 88, 1, 1, 12, 7, 2, 6, 10 and display the In order traversal of that tree.
4. Write "c" function or algorithm for quick sort.
5. How is the limitation of linear queue solved by using circular queue? Write "c" function or algorithm to insert and element in a circular queue.

Group 'C'

6. Write properties of binary tree and algorithm or "c" function to create binary search tree and binary tree traversal in postorder.
7. Write a "c" function or algorithm to implement queue with insert, remove and display functions.
8. Sort following list of elements using merge sort: 11, 22, 33, 4, 5, 6, 8, 99, 9, 15. Show the tracing of algorithm.
9. Write "c" function or algorithm to implement to insert a node at beginning of double Link list.
10. Write a C – function or algorithm to evaluate postfix expression.
11. Construct expression tree of given expression A * B – C. Evaluate post fixed expression using stack (AB / C +) where A = 10, B = 5 and C = 2.

Year 2011

Brief Answer Questions: [10×1=10]

1. Define Abstract Data type.
2. When is approximation algorithm used as problem solving approach?
3. What must be done before inserting an element at the beginning of array?
4. Is it possible to convert all the recursions into iteration?
5. List any three applications of stack.
6. What do you mean by absurd situation in a queue?
7. How many start pointers are required in doubly linked list?
8. Distinguish between tree and forest.
9. When is collision resolution technique used?
10. Why is internal sorting faster than external sorting?

Group 'B'

2. What is linked list? Write an algorithm or C function to print all the elements of the linked list.
3. What is expression tree? Convert the given expression to postfix (A+B*C)$(A+B)*C).
4. Define stack. Write a program to implement the basic operations on stack.
5. What is Tree Traversal? Write an algorithm or C-function for inorder and preorder traversal of Binary Tree.
6. Define Min heap and Max heap. Construct a Max heap from the following data given in order:

1, 5, 3, 10, 2, 6, 9, 11.

7. Write a C function or algorithm to solve the TOH problem for n disks.

Group 'C'

8. What are the advantages of a circular queue? Write C-function or algorithm to perform insertion and deletion operations in a circular queue.
9. What is merging? Write an algorithm for merge sort and sort the following data using merge sort algorithm: 11, 22, 33, 4, 5, 6, 8, 99, 9, 15.
10. Write an algorithm to search an item using binary search technique. Search item 16 in the following data set using binary search algorithm: 111, 13, 14, 15, 17, 18, 19, 23, 29.

2012

Brief Answer Questions: [10×1=10]

1. Write the relationship between sorting and searching.
2. Differentiate between graph and tree.
3. What is the advantages of linked list over array?
4. Define expression tree.
5. How circular queue is better than linear queue?
6. Write the variations of linked list.
7. How do you decide to choose using specific algorithm from various available algorithms to do same thing?
8. Define hashing.
9. How AVL tree is constructed?
10. What is linear probing?

Group 'B'

2. Compare available searching techniques.
3. Write the application of priority queue. Write C function or algorithm to perform deletion operation in linear queue.
4. Differentiate between direct and indirect recursion. Write the recursive function to find the product of two numbers.
5. Define forest. Write C function or algorithm to insert new node in binary tree.
6. Trace Quick sort algorithm for the data: 10, 71, 89, 37, 67, 29, 54, 24

Group 'C'

7. Write the algorithm to evaluate postfix expression. Trace the algorithm for the following input:

ABCD- E/F*+; where A=3, B=5, C=1, D=6, E=4 and F=3.

8. Discuss the graph traversal method with example. Write C function or algorithm to find shortest path from A to B.
9. Write C function or algorithm to delete first node of doubly linked list.
10. Compare Selection and Bubble sort according to their complexities.

Year 2013

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Full Marks: 40
Time: 2 hrs.

2013

BIM / Third Semester / ITC 215: Data Structure and Algorithm

Candidates are required to answer all the questions in their own words as far as practicable.

Group "A"

1. ***Brief Answer Questions:*** *[10 × 1 = 10]*

   i. Why stack is called LIFO list?
   ii. Derive the big oh notation for quick sort algorithm.
   iii. What do you mean by complete binary tree?
   iv. What are the application areas of graph?
   v. What do you mean by time complexity of an algorithm?
   vi. What is recursion?
   vii. What is hash collision?
   viii. Differentiate between internal and external sorting.
   ix. What is Abstract Data Type (ADT)?
   x. What is tree traversal?

Group "B"

Short Answer Questions: *[5 × 3 = 15]*

2. What is list traversal? Write an algorithm or C function to print values in data field of the nodes of the linked.
3. Why tree rotation is required in AVL tree? Explain the left and right rotation with example.
4. Define stack as ADT.
5. Consider list 12, 15, 17, 18, 21, 22, 25, 27, 28, 35. Find position of element 28 using binary search algorithm. Show tracing of algorithm.
6. What is minimum spanning tree? Write Kruskal algorithm and explain.

Group "C"

Long Answer Questions: *[3 × 5 = 15]*

7. What are the applications of queue? What are the implementation strategies used by queue for insertion. deletion operations? Explain
8. Write algorithms to evaluate the postfix expression and trace the algorithm for the following expression 3 2 + 4 2 - *
9. What are the advantages of linked list over the array? Write algorithms to perform insertion and deletion operation on a doubly linked list.

1.1 Year 2014

Group-A

i. Define graph as an Abstract Data Types.
ii. Compare binary search and sequential search with respect to their time complexity.
iii. Arrange the following expressions by their growth rate from slowest to fastest.
Log^n,$logn^2$,n!,n^5
iv. What is greedy approach?
v. Differentiate between complete binary tree and almost complete binary tree.
vi. Why do we need the concept of collision resolution?
vii. Write the relationship between the stack and recursion.
viii. What is heap tree?
ix. What are the advantages of circular queue over linear queue?
x. What will be the result if we perform the post order traversal of an expression tree?

Group-B

1. What is the advantage of AVL tree over binary search tree? Construct an AVL tree from the given set of data: 3, 3, 1, 4, 5, 6, 7, 16, 15, 9,14
2. What do you mean by Minimum Spanning Tree (MST)? Write Kruskal's algorithm to construct MST with suitable example.
3. What is doubly linked list? Write an algorithm or C-function to insert a node at end of doubly linked list.
4. Write algorithm to solve problem of Tower of Hanoi.
5. Use stack to convert the expression into postfix expression and evaluate the value of postfix expression where assume A = 1, B = 2, C = 3, D = 4, E = 5, F =6
   A+(B + C) * D$(E * F)

Group-c

6. What are the benefits of linked list over array? Write C-function or algorithm to perform insertion operation at the start and end of singly linked list. Illustrate it with suitable diagram.
7. What is sorting? Which sorting algorithm is used to sort data in linked list? Sort the following data using merge sort algorithm: 25, 37, 12, 48, 57, 33, 86, 92
8. Differentiate between hashing and sequential search. How the collision in hashing can be reduced? Explain any one technique.

2015 Model-Question

Group-A

i.What is data structure?
ii.How doubly linked list differs from singly linked list?
iii.Differentiate between stack and queue.
iv.What is splaying?
v.What do you mean by bucket Addressing?
vi.What is average case complexity of algorithm?
vii.What is adjacency matrix of graph?
viii.What is heap?
ix.What is tail recursion?
x.What is skip list?

Group-B

2. Write Depth first traversal for graph.
3. Write a function in Java for insertion sorting.
4. Write a function in Java to insert a node in Binary Search tree.
5. Write a Java class to implement stack with push and pop functions.
6. Write a function in Java to delete element from a hash table.

Group-c

7.What are the advantages of B tree? Explain procedure to insert element in a B tree.
8.Explain quick sorting with an example.

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Full Marks: 40
Time: 2 hrs.

BIM / Fourth Semester / IT 218: Data Structure and Algorithm with JAVA

2015

Candidates are required to answer all the questions in their own words as far as practicable.

Group "A"

Brief Answer Questions: *[10 × 1 = 10]*

1. What is theta notation?
2. What is a self adjusting data structure?
3. What is priority queue?
4. What do you mean by tail recursion?
5. Define expression tree.
6. What do you mean by best case complexity of an algorithm?
7. What is a linear probing?
8. What is topological sorting?
9. What are the elementary sorting algorithms?
10. What is Binary tree?

Group "B"

Exercise Problems: *[5 × 4 = 20]*

11. Write a function in Java to sort integers. (Use any algorithm)
12. Write a program in Java to create a linear linked list.
13. Write a program in Java to create stack (push operation only).
14. Write a program in Java to store number in array using concept of hashing.
15. Create heap tree from given data: 20, 22, 33, 44, 12, 15, 18, 19, 20.

Group "C"

Comprehensive Answer Questions: *[2 × 5 = 10]*

16. Define graph. Write Dijkstra's algorithm to find shortest path in graph with example.
17. Explain B-tree of order 3 with example.

year 2016

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2016

Full Marks:
Time: 2 h

BIM / Fourth Semester / IT 218: Data Structure and Algorithm with JAVA

Candidates are required to answer all the questions in their own words as far as practicable.

Group "A"

Brief Answer Questions: *[10 × 1 = 10*

1. What is data structure?
2. Why is Big Oh notation used?
3. Why are linked lists preferred over arrays?
4. What is linear queue?
5. Define activation record.
6. What is Binary tree?
7. What is B tree?
8. List out the methods that can be used to represent graph in memory.
9. What is sorting?
10. For which purpose Kruskal's algorithm is used?

Group "B"

Exercise Problems: *[5 × 4 = 2*

11. Write a Java function to insert element into queue.
12. Write a Java function to delete the last node from a circular linked list.
13. Write a program in Java to display fourth element of the Fabonacci series.
14. Insert the following data in a Hash Table, where the table size is 10:

    22, 18, 37, 88, 50, 47, 69, 72

    (Use any suitable technique to resolve hash collision)
15. Show the steps to sort given data using Merge Sort:

    36, 48, 23, 59, 68, 44, 97, 99, 91, 18, 33

Group "C"

Comprehensive Answer Questions: *[2 × 5 =*

16. Write steps to insert key into B tree.
17. How a node of a binary tree can be deleted? Explain with examples.