Uka Tarsadia University (Diwaliba Polytechnic)
Diploma in Computer Engineering/Information Technology
Assignment (Data and File Structures- CE1006)

Unit-1 Basic Concepts of Data Structures

1. What is Data Structure?
2. Classification of Data Structure
3. What is algorithm? Write the key features of algorithm .
4. Explain Priimitive Data structure in detail?
5. Explain Non-primitive data structurein detail?
6. Explain linear data structure in detail?
7. Explain Non-linear data structure in detail?
8. Difference between linear and non-linear data structure
9. Difference between Primitive and non-primitive data structure
10. Explain operation on data structure.
11. Explain Time and space analysis of algorithm.
12. How to find algorithm efficiency.
13. Explain Time and space complexity of algorithms.
14. Explain worst case complexity, Average case complexity and best case complexity.
15. Explain Array in detail.
16. Differentiate one dimensional array and two dimensional array.
17. Explain multi dimensional array in detail.
18. Write the application of array.
19. Write an algorithm to search an element from array.
20. Write an algorithm to insert an element from array.
21. Write an algorithm to delete an element from array.
22. Write a C program to print array elements.
23. Write a C program to print array elements in reverse order.
24. Write a C program to find the largest and smallest element of an array.

Unit-II Stack and Queue

1. Define stack. Which operation can be performed on stack?
2. Give an example of LIFO data structure. Explain it.
3. What is the role of TOP counter in stack?
4. Which are the applications of stack?
5. Explain PUSH operation on stack.
6. Explain POP operation on stack.

7. Explain PEEP operation on stack.
8. Explain any one application of stack with an example.
9. Write an algorithm to convert infix to postfix with the help of stack.
10. Write an algorithm to convert infix to prefix with the help of stack.
11. Write an algorithm to evaluate postfix operation using stack.
12. Consider the given stack with size 3. Perform following operations:
    I) PUSH A,B,C,D
    II) POP 2 elements
    III) PEEP (2)
    IV) PEEP (4)
    V) POP 3 elements
13. Consider the given stack with size 4. Perform following operations:
    I) POP
    II) PUSH 11,21
    III) PEEP(3)
    IV) POP
    V) PUSH 31,41
14. Convert following infix expression into equivalent postfix expression:
    I) A + B * (C * (D +E) /F)-G
    II) A ^ B + C + D * F / G ^ H
15. Convert following infix expression into equivalent prefix expression:
    I) x * y + (z-q) /p / (g-h)
    II) p + q ^ r – (s + t + u)
16. Evaluate following postfix expression:
    I) 4 2 10 + * 8 – 10 /
    II) 6 9 + 3 / 5 – 4 –
17. Evaluate following postfix expression:
    I) + 8 / 6 3 2
    II) / + * 5 4 1 + 5 2
18. What is queue?
19. Write application of queue.
20. Explain the role of front and rear pointer of queue.
21. Enlist type of queue.
22. Discuss the scenario of insertion and deletion operation of simple queue.
23. Write an algorithm to insert an element into simple queue.
24. Write an algorithm to delete an element from simple queue.
25. What is the drawback of simple queue? What is solution for it?
26. Explain circular queue with an example.
27. Discuss the Insertion and deletion operation in circular queue.
28. Write an algorithm to insert an element into circular queue.

29. Write an algorithm to delete an element from circular queue.
30. Perform following operation on empty circular queue having max size 4. Initial position of front and rear is 0.
    I) Insert A,B,C,D
    II) Delete A
    III) Insert E
    IV) Delete B
    V) Insert E
31. Draw the simple queue structure for each case with front and rear position when following operations are performed on an empty queue. Initial position of front and rear is 0. (Consider size of queue is 5)
    I) Insert 5,10
    II) Delete one elements
    III) Insert 30,50
    IV) Delete 1 element
    V) Insert 45
32. Explain deque with an example.
33. Explain priority queue with an example.

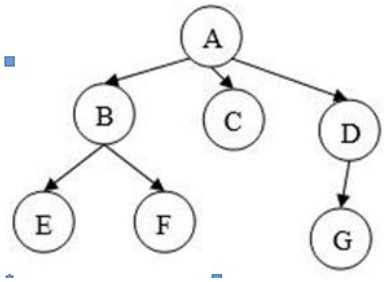
Unit-III Linked List

1. Explain following terms:
   I) Data field / Info field
   II) Link field / Next field
2. What is linked list? Draw graphical representation of linked list.
3. Write structure to declare the linked list.
4. Enlist types of linked list with its graphical representation.
5. Explain the structure of node used in linked list.
6. Explain array representation of linked list.
7. What are the advantages and disadvantages of singly linked list?
8. Write differences between array and linked list.
9. Enlist operations that can be performed on linked list.
10. Explain static memory allocation and dynamic memory allocation.
11. Explain following functions:
    I) malloc()
    II) calloc()
    III) realloc()
    IV) free()
12. Explain the insertion operation on linked list.
13. Describe steps to perform deletion operation on linked list.

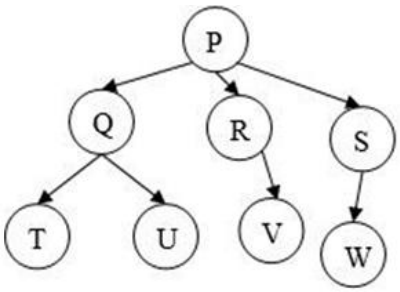
14. What is circular linked list? Explain insertion and deletion operation on it.
15. What are differences between singly linked list and circular linked list?
16. What is doubly linked list? Explain it with a diagram.
17. Write an algorithm to traverse the linked list.
18. Write an algorithm to create a linked list.
19. Write an algorithm to insert node at front in singly linked list.
20. Write an algorithm to insert node at end in singly linked list.
21. Write an algorithm to insert node at specific position in singly linked list.
22. Write an algorithm to delete node from front in singly linked list.
23. Write an algorithm to delete node from end in singly linked list.
24. Write an algorithm to delete node whose value is specified from singly linked list.

Unit-IV Tree

1. Generate binary tree from the given two traversal sequences. Also give the postorder traversal for the same.
   Preorder: {10, 20, 40, 30, 50, 70, 80, 60}
   Inorder: {40, 20, 10, 70, 50, 80, 30, 60}
2. Enlist applications of binary tree.
3. Define the following terms with respect to tree.
   - forest
   - subtree
4. Convert following general tree into binary tree:



5. What is level order traversal?
6. Create binary tree from the given two traversal sequences. Also give the postorder traversal for the same.
7. Create binary tree from the given two traversal sequences. Also givethe postorder traversal for the same.
   Inorder = {g, d, h, b, e, I, a, f, j, c}
   Preorder = {a, b, d, g, h, e, I, c, f, j}
8. Convert following general tree into binary tree.



9. Define the following terms with respect to tree.
    - Leaf node
    - Depth
10. Give the application of traversal.
11. Generate binary tree from the given two traversal sequences. Alsogive the preorder traversal for the same.
    Inorder = {4,2,5,1,6,3,7}
    Postorder = {7,6,3,5,4,2,1}

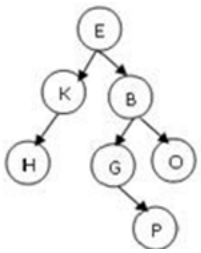
12. Give true/ False.
    I) The node has not child nodes is called terminal node.
    II) Nodes having a number of edges called degree in tree.
13. Draw binary tree from given data.
    Inorder = {m,h,d,i,b,e,n,j,a,f,o,k,c,g,p,l }
    Preoder = {a,b,d,h,m,i,e,j,n,c,f,k,o,g,l,p }
14. Draw binary search tree for given data.
    m, n, o, p, a, c, z, q, t, i, h, k, j, d, f
15. Define the following terms with figure :
    I) Internal nodes
    II) Parent node
16. State the properties of a binary tree.
17. Construct binary search tree for the given data and write preorder and postorder traversal for the created tree.
    7, 4, 10, 9, 12, 2, 1, 3
18. Generate binary tree from the given two traversal sequences. Alsogive the post order traversal for the same.
    Preorder = {2, 3, 5, 9, 10, 11, 12, 6, 4, 7, 8}
    Inorder = {9, 5, 11, 10, 12, 3, 6, 2, 7, 4, 8}
19. Explain complete binary tree with proper example
20. Construct binary search tree for the given data and write inorder andpostorder traversal for the created tree.
    25, 10, 4, 12, 22, 18, 24, 50, 35, 44, 70, 66, 90
21. Generate binary tree from the given two traversal sequences. Alsogive the preorder traversal

for the same.
Inorder={B, D, A, G, E, C, J, H, K, F, I, L}
Post order={D, B, G, E, J, K, H, L, I, F, C, A}

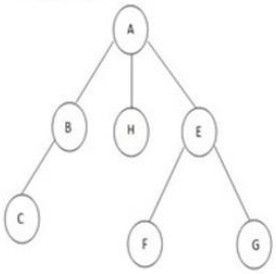
22. Draw binary search tree for given data.
    {10, 20, 30, 5, 4, 40, 8, 11, 14}
23. Explain following terms:
    I) Strictly binary tree
    II) Complete binary tree
24. Show that binary tree with height h has atmost 2^{h+1} -1 nodes with proper example.

Generate binary tree from the given two traversal sequences. Also give the postorder traversal for the same.
Preorder= {30, 20, 10, 12, 40, 37, 45}
Inorder= {10, 12, 20, 30, 37, 40, 45}

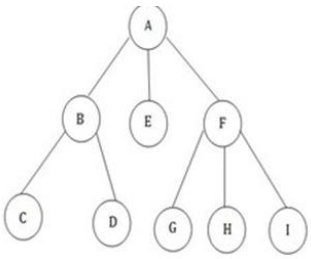
25. Write the preorder, Postorder and inorder traversal sequences for the binary search tree given in below figure.



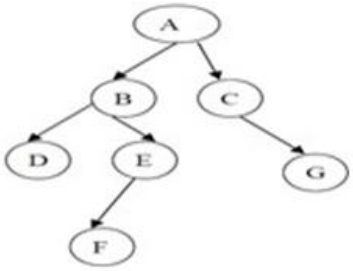
26. Explain the following terms:
    I) Strictly binary tree
    II) Extened binary tree
27. Show that number of leaf nodes in a complete binary tree at depth d has 2^d nodes with proper example.
28. Construct binary search tree for the given data and write inorder and preorder traversal for the created tree.
    45, 39, 56, 12, 34, 78, 32, 10, 89, 54, 67, 81
29. Generate binary tree from the given two traversal sequences. Also give the postorder traversal for the same.
    Inorder= {D, B, F, E, A, G, C, L, J, H, K}
    Postorder= {D, F, E, B, G, L, J, K, H, C, A}
30. Convert the following general tree to binary tree.



31. Generate binary tree from the given two traversal sequences. Also give the postorder traversal for the same.
    Preorder= {1, 2, 4, 8, 9, 10, 11, 5, 3, 6, 7}
    Inorder= {8, 4, 10, 9, 11, 2, 5, 1, 6, 3, 7}
32. Construct binary search tree for the given data and write inorder, preorder, and postorder traversal for the created tree.
    10, 3, 15, 22, 6, 45, 65, 23, 78, 34, 5.
33. Explain the following terms:
    I) Height of the tree
    II) Sibling
34. Differentiate binary tree and binary search tree.
35. Convert the following general tree to binary tree.



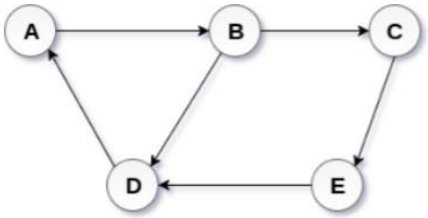
36. Generate binary tree from the given two traversal sequences. Also give the postorder traversal for the same.
    Preorder: {101, 95, 18, 47, 99, 108}
    Inorder: {18, 48, 95, 99, 101, 108}
37. Find the inorder traversal of the following tree.



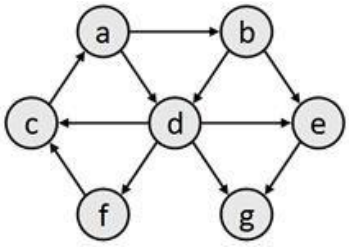
38. Explain the following terms:
    I) Level of node
    II) Degree of tree
39. Prove that a binary tree of n-elements has n-1 edges.
40. Draw binary search tree for the following data, also write preorder traversal of created tree:
    8, 3, 11, 5, 9, 12, 13, 4, 6, 20

Unit-V Graph

1. Define following terms
   I) Complete graph
   II) Weighted graph
2. Explain multi-graph with an example.
3. Consider the graph given below and answer the following from thegraph:
   I) What is the outdegree of node B?
   II) What is the indegree of node D?
   III) Write a path from node A to node E.
   IV) Is this graph is a multigraph? Justify your answer.
   V) What is the total degree of node C?



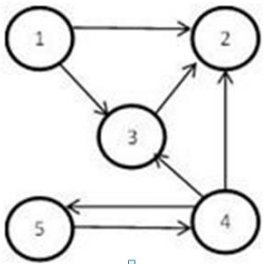
4. Explain graph data structure with proper example.
5. Answer following for given graph:
   I) What is the indegree of node d?
   II) What is the outdegree of node g?
   III) Is it multi graph? Justify.
   IV) Possible paths from node a to node g.
   V) What is the total degree of c?



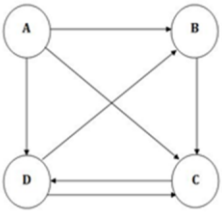
6. Fill in the blanks.
   I) The edges have some value is called_____graph.
   II) Each nodes are connected with all other nodes is called _____graph.
   III) Graph is a collction of_____and_____.
7. Explain degree of a vertex in a graph.
8. Explain following terms.
   I) Directed graph
   II) Weighted edge
9. Define the following terms:

I) Graph
II) Tree

10. Explain indegree and outdegree of graph.
11. Explain directed graph with an example.
12. Do as directed for given graph.
    I) Write the indegree of node 1.
    II) Write the outdegree of node 2.
    III) Write numbers of cycles in given graph.
    IV) Is given graph is complete graph?
    V) Write indegree and outdegree for node 4 and node 5.

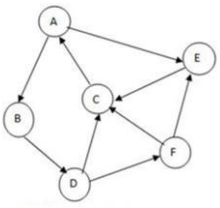


13. Differentiate graph and tree.
14. Enlist the applications of graph.
15. Diffrentiate directed and undirected graph.
16. Explain following terms:
    I) Root
    II) Path
17. Consider the graph given below.



Answer the following from the graph:
I) What is the outdegree of node A?
II) What is the indegree of node C?
III) Write a path from node B to node D.
IV) Is this graph a multigraph? Justify your answer.
V) What is the total degree of node D?

18. Consider the graph given below.



Answer the following from the graph:

I) What is the outdegree of node A?
II) What is the indegree of node C?
III) Write a path from node B to node E.
IV) Is this graph a directed graph? Justify your answer.
V) What is the total degree of node D?

Unit-VI Hashing and Files

1. Explain symbol table.
2. What is Hashing? Explain types of hashing.
3. Explain various hashing functions.
4. Explain sequential files.
5. Explain Indexed sequential file structures.
6. Explain the terms: File, Field, Record, Database, Key
7. What are the advantages of Hashing?
8. Discuss problem of collision in Hashing.
9. Discuss collision resolution techniques.
10. Define the following terms:
    I) Sequential file
    II) Direct sequential file
    III) Index sequential file