

Aryan College

C Programming with Data Structures

Unit I:

Overview and Expressions in C

1. What is flow chart? [2017,2016]
2. Enumerate fundamental data types and their size? [2017]
3. Explain typedef used in C language? [2017]
4. List logical operators used in C language with their truth table? [2017]
5. Explain bitwise operator? [2016]
6. How does perform type conversion in C language? [2016]
7. Describe the storage classes in C language? [2016,2014]
8. Define an Expression? [2015]
9. Explain composite data type? [2015]
10. Explain table lookup field? [2015]
11. What are the storage classes available in "C" language? [2015]
12. What is range of integer in C? [2014]
13. What will be the output of the following code `printf("%d", (1=1)?(3=4)?5:6:4);` ? [2014]
14. What will be the output of following code: [2014]
`int var= 18;`
`printf("%d", var>>2);`
15. Which operator works with variable but not with literals? [2014]
16. Arrange the following operators in higher order to lower order precedence:
`&&, ||, *(multiply), !` ? [2014]
17. Write a program to print factorial using recursion in C? [2014]
18. Write a program to print reverse of given number? [2014]
19. What is difference between Pseudo code and Flow chart? [2013]
20. What is the significance of constant data type in C language? [2013]
21. Why we used typedef in linked list programming? [2013]

Unit II:

I/O and Decision Making

1. Write syntax of switch case statement? [2017,2016]
2. Explain various types of control and condition statement with example? [2016,2015]

Unit III:

Looping and Functions

1. Write syntax of for loop? [2017]
2. What is break statement? [2016]
3. Differentiate between formal and actual arrangement? [2015]
4. How does the recursion terminate? [2015]
5. Explain various memory allocations and releasing function with their syntax and example? [2014]
6. Explain the role of continue with an example? [2013]

Aryan College

7. What is recursion?

[2013]

Unit IV:

Arrays and String

1. Explain 2D string? [2015]
2. Write a "C" Program using pointers to determine the length of a character string? [2015]
3. Write an algorithm to read a MxN matrix using row major mapping? [2013]

Unit V:

Pointer, Structure and Union

1. Define structure used in C language? [2017,2016]
2. Define pointers used in C language? [2017]
3. Write the difference between Structure and Union? [2016]
4. Explain pointer to function? [2015]
5. What is difference between array of pointers and pointer to an array? [2014]
6. What type of operation can be performed on pointers? Give example for each? [2014]
7. Write the 'C' structure code for Binary Tree? [2013]

Unit VI:

Searching and Sorting

1. Write complexity of Quick sort algorithm in best case and worst case? [2017]
2. Write selection sort algorithm? Explain it? [2017]
3. Explain merge sort algorithm with the help of an example? What is time complexity of merge sort? [2017,2016,2015]
4. Explain radix sort algorithm with the help of a suitable example. What are the limitations of radix sort? [2017]
5. Write the various methods of external sorting? [2016]
6. Find the complexity of the simple selection sort? [2015]
7. How many number of swaps required to swap n elements using selection sort, in worst case? [2014]
8. Which sorting algorithm is preferred to sort 20 randomly generated numbers? [2014]
9. How many comparisons are required to sort 7 items using radix sort (assume that each item is 4 digit decimal number)? [2014]
10. Explain insertion sort algorithm with suitable examples? [2014]
11. Write a program to sort an array using insertion sort in C? [2014]
12. Explain selection sort algorithm with suitable examples? [2014]
13. Write a program to sort an array using selection sort in C? [2014]
14. What data structure is used in RADIX sort? [2013]
15. Write an algorithm for Merge sort Technique (sorting is in decreasing order)? [2013]
16. Write short note on Bubble sort? [2013]

Unit VII:

Stack, Linked List and Queue

Aryan College

1. Define linked list? [2017]
2. What is recursion? [2017,2016]
3. Write the following expression in prefix and postfix notations: [2017]
 $(A*B+C)*D-E/F+G$.
4. Write algorithm for the following operations on a linked list pointed by START: [2017]
 - a. Insertion of new data item
 - b. Deletion of data item
5. Let FRONT and REAR are pointers to first and last node of a Queue. Write algorithm to insert and delete operations for the Queue? [2017]
6. What is stack? Write algorithms for pop and push operations of a stack, pointer to whose top-most node is namely TOP? [2017,2013]
7. How doubly linked list differ from singly linked list? [2016]
8. Discuss all different types of queue in brief? [2016]
9. Convert the following infix expressions into equivalent Prefix and Postfix expressions: [2014]
 - i. $(A+B^*C)/(D-E)*F$
 - ii. $A/(B+C)*D-E/(F-G*H)$
10. Give the postfix for the following expression: [2015]
 $P*(Q+R)/S-T$
11. What is the difference between linear list and generalized list? [2015]
12. What is Header linked list [2015]
13. Find postfix equivalent of the infix: [2014]
 $A=B*(C+D)/F+D*E$
14. Explain various functions of stack with their algorithm and diagrams? [2014]
15. Is it possible to store two stacks in one array? [2013]
16. What is DEQUEUE? [2013]
17. Write an algorithm to implement insertion at last node in doubly linked list? [2013]
18. Write algorithm for postfix expression evaluation. Show each step for the following postfix expression evaluation: [2013]
 $A \uparrow BC * D$. Where $A=2, B=1, C=2, D=2$.
19. Can the tower of Hanoi problem be solved using recursion? [2013]
20. How can a polynomial be represent in a linked list? [2013]
21. How a sparse matrix can be represented using a linked list? [2013]

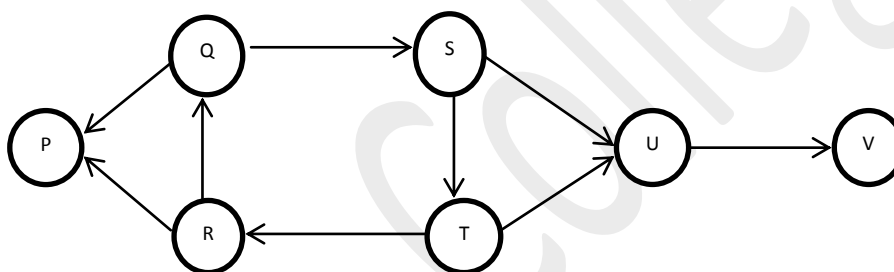
Unit VIII:

Tree and Graphs

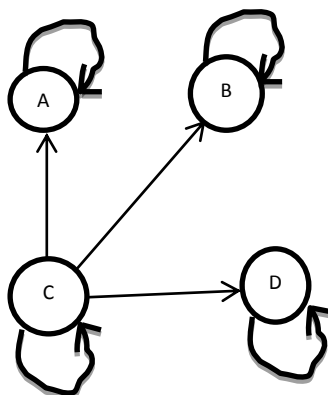
1. Create binary search tree from following ordered list: [2017]
 35,25,45,20,30,40,32
2. Write algorithm for pre-order traversal of a binary tree? [2017]
3. Let $A < B < C < P < Q < R < L < M < N$, then construct a binary search tree whose post order traversal is given by – ACBPLNMRQ [2017]

Aryan College

4. Write BFS algorithm to traverse a graph. Explain it? [2017,2014,2013]
5. Write DFS algorithm to traverse a graph? Explain it? [2017]
6. What is a minimum spanning tree of a graph? With the help of a suitable example explain prim's algorithm to find MST of a given graph? [2017,2015,2013]
7. With the help of suitable example Kruskal's algorithm to find minimum spanning tree of a given graph? [2017,2015,2014]
8. What is the difference between DFS and BFS? [2016]
9. What are the two popular methods of graph traversal in detail? [2016]
10. Write short note on Binary Tree? [2015]
11. What is sparse table? [2015]
12. Explain splay tree? [2015]
13. Prove that maximum number of nodes in a binary tree of height "k" is $2^{k-1}-1$? [2015]
14. Apply DFS and BFS to visit all vertices in the following graph. Show each step clearly? [2015]



15. Describe the concept of Trees. Explain various types of trees with suitable examples? [2015]
16. What is the sum of the degrees of each vertex for an undirected graph G with 5 vertices and 6 edges? [2014]
17. Write algorithm for pre order, post order and in order traversing in a binary tree? Explain these with suitable example? [2014]
18. Write the adjacency matrix for the Graph: [2013]



19. Discuss the Array and linked list representation of a complete Graph? [2013]

Aryan College

20. The pre order traversal sequence of a binary search tree is 30,20,10,15,25,23,39,35,42.

What is the post order sequence of the tree? [2013]

21. Write an algorithm for in order traversing in a tree? [2013]

22. Write an algorithm to delete a particular node from a binary tree? [2013]

Unit IX:

Fundamentals of Algorithm

1. Define theta notation? [2017]
2. What is algorithm? [2016]
3. What is Pseudo Code? [2016]
4. What is space time complexity of an algorithm? [2016]
5. What is table lookup field? [2016]
6. What is running time of an algorithm? [2015]
7. Explain trade-off between time and space complexity of algorithm using suitable example? [2015]
8. What are complexity measures of an algorithm? [2013]
9. Justify whether the statements below are correct: [2013]
 - i. $3n+2=O(n)$
 - ii. $3n+2=\Omega(n)$
 - iii. $3n+2=\theta(n)$
 - iv. $10n^2+4n+2=O(n^2)$
 - v. $6 \times 2^n + n^2 \neq \theta(n^2)$