

Question Bank on the subject

Data Structures using C (16MCA11)

The 2016 scheme of MCA course is of CBCS (Choice based credit system). So, every student is under the confusion how to prepare for the exam. Some students will be good at writing theory questions and some will be good at programming. Normally every question paper will be a mix of both theoretical and programming questions. To help all categories of students to **get at least passing marks**, here I am providing a list of possible questions under each unit.

Theoretical Questions:

Examples involved with theory questions can be just code segments, but need not be a full program.

Unit 1:

1. Explain formatted I/O functions.
 - printf() and scanf() : Students have to write syntax of the functions and give an example.
2. Explain unformatted I/O functions in C.
 - getchar(), gets(), putchar(), puts(). Each function with syntax and example.
3. Discuss controls structures in C.
 - if, else-if, switch-case. Explanation with syntax and example.
4. Discuss looping structures in C.
 - for, while, do-while. Syntax with example.
5. What are different ways of passing parameters to function?
 - Call by value, call by address. Explanation with a programming example.
6. Define an array. How do you initialize arrays?

Unit 2:

1. Define pointer and give an example.
2. Define structure. Give syntax and example.
3. Define data structures. Explain various types of data structures.
4. What do you mean by ADT? Give an example. (One can give ADT for rational numbers)
5. Discuss array as ADT.
6. Explain various operations on Strings as ADT.

Unit 3:

1. Define stack. Explain operations on stack.
2. Algorithm for infix to post-fix conversion
3. Algorithm for evaluation of postfix expression.
4. **Converting infix to postfix and prefix expression.**
5. Define recursion. What are the features/characteristics of recursive functions?
 - Features: every time problem size should be reducing and there must be at least one non-recursive terminating condition.
6. Explain tower of Hanoi problem along with its constraints.
 - Constraints: every time only one disc should be moved, and smaller disc must be kept on larger disc.
7. Define Queue. Explain operations on Queue.
8. What are the disadvantages of ordinary queue? How do you overcome it? (ans: circular queue)
9. Explain the concept of priority queues.
10. Meaning and types of Deques.

Unit 4:

1. Disadvantages of arrays.
 - Wastage or shortage of memory
 - Contiguous memory allocation
2. Concepts of dynamic memory allocation. Functions for the same.
 - Explain malloc(), calloc(), realloc() and free() with syntax and example
3. Need for circular list
4. Need for doubly linked list
5. Concept of header node

Unit 5:

1. Definition of various terms like root, siblings, internal node, external node, depth of tree, degree of a node, degree of a tree etc.
2. Algorithms for tree traversal techniques
3. Types of binary trees (strictly binary tree, almost complete, complete, BST)
4. Representation of trees (using array, using doubly linked list)
5. Given a tree, traverse it using all the methods
6. Given a set of numbers, construct binary search tree
7. Explanation and tracing of –
 - Bubble sort
 - Selection sort
 - Insertion sort
 - Quick sort
8. Explain the concept of binary search.
9. Define terms like hash table, hash key, hash function, hash address.
10. Techniques for resolving hash clashes (or collisions). Explain with example
 - Open hashing
 - Closed hashing

Programming Questions:

Unit 1:

1. Programs involving control structures like –
 - a. Quadratic equation
 - b. Area of a triangle
 - c. Prime numbers generation
 - d. Finding sum of digits of a number
 - e. Checking for number palindrome
 - f. Sine series, cosine series etc.
2. Programs involving arrays like –
 - a. Sum and average of numbers
 - b. Matrix addition and multiplication etc.
3. Programs related to passing array to a function.

Unit 2:

1. Programs on pointers like –
 - a. Finding sum and average of numbers using pointers to an array
 - b. Passing pointers to function (this is nothing but call by address)
 - c. Returning pointers from function
 - d. Pointers to functions

2. Programs on structures –
 - a. Reading and writing structures
 - b. Passing structures to functions
 - c. Pointers to structures
3. Programs on string operations without using built-in string functions –
 - a. Finding length of a string
 - b. Concatenation of two strings
 - c. Copy a string to another string
 - d. Comparing two strings etc.

Unit 3:

1. Programs on –
 - a. Stack implementation
 - b. Infix to postfix conversion
 - c. Evaluation of postfix expression
 - d. Fibonacci series
 - e. Factorial
 - f. GCD
 - g. Tower of Hanoi
 - h. Queue implementation
 - i. Circular queue

Unit 4:

1. Programs or functions for operations on singly linked list, doubly linked list and circular singly linked list –
 - a. Insert front
 - b. Delete front
 - c. Insert rear
 - d. Delete rear
 - e. Display
2. Program for implementing stack or queue using singly linked list or doubly linked list (combination of above functions only)

Unit 5:

1. Programs on binary search tree creation and all traversal.
2. Programs on sorting
 - a. Selection sort
 - b. Bubble sort
 - c. Insertion sort
 - d. Quick sort
3. Programs on searching
 - a. Binary search
 - b. Linear search