Logic Building with Computer Science (Offline)

Complete Question Bank - Including Recursion

Course: Programming in C | Semester: 1 | Total Marks: 30

Examination Instructions

Dear Students,

This comprehensive question bank covers **all possible questions** for your Logic Building with Computer Science examination. The exam will consist of **3 coding questions for 30 marks** total.

Exam Pattern:

- **Total Questions:** 3
- **Total Marks:** 30 (10 marks each question)
- **Duration:** 3 hours
- **Question Types:** Programming problems requiring code implementation

Topics Covered:

1. Basic C Programming Concepts
2. Operators and Expressions
3. Decision Making (if, if-else, nested if, switch)
4. Loops (for, while, do-while)
5. Nested Loops and Control Statements
6. Pattern Programs
7. Functions
8. **Recursion** (Important Topic)
9. Arrays (1D and 2D)
10. Strings
11. Pointers

Section 1: Basic C Programming Concepts

Theory Questions

Q1.1 Explain the structure of a C program with an example. (3-4 Marks)

Q1.2 What are the different data types in C? Explain with examples. (4-5 Marks)

Q1.3 What is the difference between int, float, and char data types? (3-4 Marks)

Programming Questions

Q1.4 Write a C program to print 'Hello World'. (2-3 Marks)

Q1.5 Write a C program to add two numbers. (2-3 Marks)

Q1.6 Write a C program to find the area of a circle. (3-4 Marks)

Q1.7 Write a C program to swap two numbers using a temporary variable. (3-4 Marks)

Q1.8 Write a C program to swap two numbers without using a temporary variable. (4-5 Marks)

Q1.9 Write a C program to convert Celsius to Fahrenheit. (3-4 Marks)

Q1.10 Write a C program to calculate simple interest. (3-4 Marks)

Section 2: Operators and Expressions

Theory Questions

Q2.1 What are the different types of operators in C? (4-5 Marks)

Q2.2 Explain the difference between i and i. (3-4 Marks)

Q2.3 What is operator precedence? Give examples. (4-5 Marks)

Q2.4 Explain logical operators (&&, ||, !) with examples. (4-5 Marks)

Q2.5 What is the difference between = and == operators? (2-3 Marks)

Programming Questions

Q2.6 Write a C program to demonstrate all arithmetic operators. (3-4 Marks)

Q2.7 Write a C program to check if a number is even or odd using bitwise operators. (4-5 Marks)

Q2.8 Write a C program to evaluate the expression: (a+b)*(c-d). (3-4 Marks)

Q2.9 Explain relational operators with a C program example. (4-5 Marks)

Q2.10 Write a C program to find the largest of three numbers using the ternary operator. (4-5 Marks)

Section 3: Decision Making (if, if-else, nested if, switch)

Theory Questions

Q3.1 What is the difference between if-else and switch-case? (3-4 Marks)

Programming Questions

Q3.2 Write a C program to check if a number is positive, negative, or zero. (3-4 Marks)

Q3.3 Write a C program to find the largest of three numbers using if-else. (4-5 Marks)

Q3.4 Write a C program to check whether a year is a leap year or not. (4-5 Marks)

Q3.5 Write a C program to create a simple calculator using switch-case. (5-6 Marks)

Q3.6 Explain nested if-else with an example program. (5-6 Marks)

Q3.7 Write a C program to find the grade of a student based on marks. (4-5 Marks)

Q3.8 Write a C program to check if a character is a vowel or consonant. (3-4 Marks)

Q3.9 Write a C program to solve quadratic equation $ax^2+bx+c=0$. (6-8 Marks)

Q3.10 Write a C program to check if a triangle is valid or not. (4-5 Marks)

Section 4: Loops (for, while, do-while)

Theory Questions

Q4.1 What is the difference between while and do-while loops? (3-4 Marks)

Programming Questions

Q4.2 Write a C program to print numbers from 1 to 10 using a for loop. (2-3 Marks)

Q4.3 Write a C program to print numbers from 1 to 10 using a while loop. (2-3 Marks)

Q4.4 Write a C program to print numbers from 1 to 10 using a do-while loop. (2-3 Marks)

Q4.5 Write a C program to find the factorial of a number using a for loop. (4-5 Marks)

Q4.6 Write a C program to find the sum of first n natural numbers. (3-4 Marks)

Q4.7 Write a C program to print the multiplication table of a number. (3-4 Marks)

Q4.8 Write a C program to reverse a number. (4-5 Marks)

Q4.9 Write a C program to check if a number is palindrome or not. (4-5 Marks)

Q4.10 Write a C program to find the sum of digits of a number. (4-5 Marks)

Q4.11 Write a C program to find the Fibonacci series up to n terms. (5-6 Marks)

Q4.12 Write a C program to check if a number is prime or not. (4-5 Marks)

Q4.13 Write a C program to print all prime numbers between 1 and n. (5-6 Marks)

Q4.14 Write a C program to find the LCM and GCD of two numbers. (5-6 Marks)

Q4.15 Write a C program to print all Armstrong numbers between 1 and 1000. (6-8 Marks)

Section 5: Nested Loops and Control Statements

Theory Questions

Q5.1 What is a nested loop? Explain with an example. (3-4 Marks)

Q5.2 What is the difference between break and continue statements? (3-4 Marks)

Programming Questions

Q5.3 Write a C program to print a multiplication table from 1 to 10. (5-6 Marks)

Q5.4 Explain the use of break statement with an example. (3-4 Marks)

Q5.5 Explain the use of continue statement with an example. (3-4 Marks)

Q5.6 Write a C program to exit a loop when a certain condition is met. (4-5 Marks)

Q5.7 Write a C program to skip even numbers in a loop using continue. (3-4 Marks)

Q5.8 Write a C program to find the sum of even numbers from 1 to n. (3-4 Marks)

Q5.9 Write a C program to demonstrate nested loops with a simple pattern. (4-5 Marks)

Q5.10 Write a C program using goto statement. (4-5 Marks)

Section 6: Pattern Programs

Important Note: Pattern programs are very common in exams. Practice these thoroughly!

Q6.1 Write a C program to print a right-angled triangle star pattern. (4-5 Marks)

Example Output:

```
*
* *
* * *
* * * *
* * * * *
```

Q6.2 Write a C program to print an inverted right-angled triangle star pattern. (4-5 Marks)

Example Output:

```
* * * * *
* * * *
* * *
* *
*
```

Q6.3 Write a C program to print a full pyramid star pattern. (5-6 Marks)

Example Output:

```
    *
   * *
  * * *
 * * * *
* * * * *
```

Q6.4 Write a C program to print an inverted pyramid star pattern. (5-6 Marks)

Q6.5 Write a C program to print a diamond star pattern. (6-8 Marks)

Q6.6 Write a C program to print a hollow square pattern. (5-6 Marks)

Q6.7 Write a C program to print Floyd's triangle. (5-6 Marks)

Example Output:

```
1
2 3
4 5 6
7 8 9 10
```

Q6.8 Write a C program to print Pascal's triangle. (6-8 Marks)

Q6.9 Write a C program to print a number pyramid pattern. (5-6 Marks)

Q6.10 Write a C program to print an hourglass pattern. (6-8 Marks)

Q6.11 Write a C program to print a zig-zag pattern. (6-8 Marks)

Q6.12 Write a C program to print alphabet patterns. (5-6 Marks)

Q6.13 Write a C program to print a butterfly pattern. (6-8 Marks)

Q6.14 Write a C program to print a hollow diamond pattern. (6-8 Marks)

Q6.15 Write a C program to print a cross pattern. (5-6 Marks)

Section 7: Functions

Theory Questions

Q7.1 What is a function in C? Explain its types. (4-5 Marks)

Q7.2 What is the difference between call by value and call by reference? (4-5 Marks)

Q7.3 What are function prototypes? Why are they used? (3-4 Marks)

Q7.4 Explain the concept of function with return type and without return type. (3-4 Marks)

Q7.5 What is the difference between actual and formal parameters? (3-4 Marks)

Q7.6 Explain storage classes in C (auto, static, extern, register). (5-6 Marks)

Programming Questions

Q7.7 Write a C program to add two numbers using a function. (3-4 Marks)

Q7.8 Write a C program to swap two numbers using functions (call by reference). (5-6 Marks)

Q7.9 Write a C program to find the factorial of a number using functions. (5-6 Marks)

Q7.10 Write a C program to check if a number is prime using functions. (5-6 Marks)

Q7.11 Write a C program to find the largest of three numbers using functions. (4-5 Marks)

Q7.12 Write a C program using a function that returns multiple values. (6-8 Marks)

Q7.13 Write a C program to find the power of a number using functions. (4-5 Marks)

Q7.14 Write a C program to convert decimal to binary using functions. (6-8 Marks)

Q7.15 Write a C program demonstrating static variables in functions. (5-6 Marks)

Section 8: Recursion (VERY IMPORTANT!)

Special Note: Recursion is explicitly mentioned in your syllabus. Expect at least one question from this section in your exam!

Theory Questions

Q8.1 What is recursion? Explain with an example. (4-5 Marks)

Q8.2 What is the difference between recursion and iteration? (4-5 Marks)

Q8.3 What is tail recursion? Explain with an example. (5-6 Marks)

Q8.4 What are the advantages and disadvantages of recursion? (4-5 Marks)

Programming Questions - Basic Recursion

Q8.5 Write a C program to find the factorial of a number using recursion. (5-6 Marks)

Q8.6 Write a C program to print Fibonacci series using recursion. (5-6 Marks)

Q8.7 Write a C program to find the sum of natural numbers using recursion. (5-6 Marks)

Q8.8 Write a C program to reverse a number using recursion. (5-6 Marks)

Q8.9 Write a C program to find the power of a number using recursion. (5-6 Marks)

Q8.10 Write a C program to find the GCD of two numbers using recursion. (5-6 Marks)

Q8.11 Write a C program to print all natural numbers from 1 to n using recursion. (4-5 Marks)

Q8.12 Write a C program to print all even numbers from 1 to n using recursion. (4-5 Marks)

Q8.13 Write a C program to print all odd numbers from 1 to n using recursion. (4-5 Marks)

Q8.14 Write a C program to find sum of digits using recursion. (5-6 Marks)

Q8.15 Write a C program to find the length of a string using recursion. (4-5 Marks)

Programming Questions - Advanced Recursion

Q8.16 Write a C program to find the LCM of two numbers using recursion. (6-8 Marks)

Q8.17 Write a C program to convert decimal to binary using recursion. (6-8 Marks)

Q8.18 Write a C program to find the product of two numbers using recursion (without using *). (6-8 Marks)

Q8.19 Write a C program to check if a number is palindrome using recursion. (6-8 Marks)

Q8.20 Write a C program to check if a string is palindrome using recursion. (6-8 Marks)

Q8.21 Write a C program to reverse a string using recursion. (5-6 Marks)

Q8.22 Write a C program to copy one string to another using recursion. (5-6 Marks)

Q8.23 Write a C program to calculate power using tail recursion. (6-8 Marks)

Q8.24 Write a C program to find the nth Fibonacci number using recursion. (5-6 Marks)

Q8.25 Write a C program to solve Tower of Hanoi using recursion. (8-10 Marks)

Section 9: Arrays (1D)

Theory Questions

Q9.1 What is an array? How is it declared in C? (3-4 Marks)

Programming Questions

Q9.2 Write a C program to read and print array elements. (3-4 Marks)

Q9.3 Write a C program to find the sum of all elements in an array. (4-5 Marks)

Q9.4 Write a C program to find the largest element in an array. (4-5 Marks)

Q9.5 Write a C program to find the smallest element in an array. (4-5 Marks)

Q9.6 Write a C program to search an element in an array (linear search). (5-6 Marks)

Q9.7 Write a C program to search an element in an array (binary search). (6-8 Marks)

Q9.8 Write a C program to sort an array in ascending order (bubble sort). (6-8 Marks)

Q9.9 Write a C program to sort an array in ascending order (selection sort). (6-8 Marks)

Q9.10 Write a C program to reverse an array. (4-5 Marks)

Q9.11 Write a C program to copy one array to another. (3-4 Marks)

Q9.12 Write a C program to insert an element at a specific position in an array. (5-6 Marks)

Q9.13 Write a C program to delete an element from an array. (5-6 Marks)

Q9.14 Write a C program to merge two arrays. (5-6 Marks)

Q9.15 Write a C program to find the frequency of each element in an array. (5-6 Marks)

Section 10: Arrays (2D) and Matrices

Theory Questions

Q10.1 What is a 2D array? How is it declared? (3-4 Marks)

Programming Questions

Q10.2 Write a C program to read and print a 2D array (matrix). (4-5 Marks)

Q10.3 Write a C program to add two matrices. (5-6 Marks)

Q10.4 Write a C program to subtract two matrices. (5-6 Marks)

Q10.5 Write a C program to multiply two matrices. (6-8 Marks)

Q10.6 Write a C program to find the transpose of a matrix. (5-6 Marks)

Q10.7 Write a C program to check if a matrix is symmetric. (5-6 Marks)

Q10.8 Write a C program to find the sum of diagonal elements of a matrix. (4-5 Marks)

Q10.9 Write a C program to find the trace of a matrix. (4-5 Marks)

Q10.10 Write a C program to check if a matrix is an identity matrix. (5-6 Marks)

Section 11: Strings

Theory Questions

Q11.1 What is a string in C? How is it declared? (3-4 Marks)

Programming Questions

Q11.2 Write a C program to find the length of a string without using strlen(). (4-5 Marks)

Q11.3 Write a C program to copy one string to another without using strcpy(). (4-5 Marks)

Q11.4 Write a C program to concatenate two strings without using strcat(). (5-6 Marks)

Q11.5 Write a C program to compare two strings without using strcmp(). (5-6 Marks)

Q11.6 Write a C program to reverse a string. (4-5 Marks)

Q11.7 Write a C program to check if a string is palindrome. (5-6 Marks)

Q11.8 Write a C program to count vowels and consonants in a string. (5-6 Marks)

Q11.9 Write a C program to convert a string to uppercase. (3-4 Marks)

Q11.10 Write a C program to convert a string to lowercase. (3-4 Marks)

Section 12: Pointers

Theory Questions

Q12.1 What is a pointer? How is it declared? (3-4 Marks)

Q12.2 What is the difference between * and & operators? (3-4 Marks)

Q12.3 Explain pointer arithmetic with examples. (4-5 Marks)

Q12.4 What is a null pointer? (2-3 Marks)

Q12.5 What is a void pointer? (3-4 Marks)

Programming Questions

Q12.6 Write a C program to demonstrate pointer declaration and initialization. (4-5 Marks)

Q12.7 Write a C program to swap two numbers using pointers. (5-6 Marks)

Q12.8 Write a C program to access array elements using pointers. (5-6 Marks)

Q12.9 Write a C program to find the largest element in an array using pointers. (5-6 Marks)

Q12.10 Write a C program demonstrating pointer to pointer. (6-8 Marks)

Important Tips for Exam Preparation

1. Focus Areas (High Priority)

- **Recursion:** This is explicitly mentioned in your syllabus. Practice all recursion problems.
- **Loops:** Master all three types (for, while, do-while) and nested loops.
- **Pattern Programs:** These are very common in logic building exams.
- **Functions:** Understand call by value vs call by reference.
- **Arrays:** Both 1D and 2D array operations.

2. Practice Strategy

- Start with easy programs (Basic I/O, simple calculations)
- Move to medium difficulty (Loops, conditions, patterns)
- Master difficult topics (Recursion, sorting, searching)
- Practice writing complete programs with proper syntax
- Test your programs in VS Code or any C compiler

3. Common Mistakes to Avoid

- Missing semicolons (;)
- Incorrect header files (#include<stdio.h>)
- Wrong format specifiers (%d, %f, %c)
- Array index out of bounds
- Infinite loops (missing loop condition updates)
- Missing return statement in main()
- Forgetting base case in recursion

4. Exam Day Strategy

- Read all questions carefully before starting

- Attempt easy questions first to secure marks

- Write neat and properly indented code

- Add comments to explain complex logic

- Test your logic with sample inputs mentally

- Keep time for reviewing your answers

5. Quick Revision Points

Basic Structure:

```
#include<stdio.h>
int main() {
    // Your code here
    return 0;
}
```

Common Input/Output:

```
scanf("%d", &variable);  // Input
printf("%d", variable);   // Output
```

Loop Templates:

```
// For loop
for(int i=0; i<n; i++) {
    // code
}

// While loop
while(condition) {
    // code
}

// Do-while loop
do {
    // code
} while(condition);
```

Recursion Template:

```
returnType functionName(parameters) {
    // Base case
    if(baseCondition) {
        return baseValue;
    }
```

```
    // Recursive case
    return functionName(modifiedParameters);
}
```

Sample Question Paper Format

Time: 3 Hours | **Maximum Marks:** 30

Instructions:

- Attempt all questions
- Each question carries 10 marks
- Write complete C programs with proper syntax
- Assume appropriate header files

Q1. Write a C program to find the factorial of a number using recursion. Also explain how recursion works with a diagram. **(10 Marks)**

Q2. Write a C program to print the following pattern: **(10 Marks)**

```
    *
   ***
  *****
 *******
*********
```

Q3. Write a C program to read n elements into an array, sort them in ascending order using bubble sort, and then search for an element using binary search. **(10 Marks)**

Conclusion

This question bank contains **155 comprehensive questions** covering all topics from Basic C Programming to Advanced Recursion. Practice these questions systematically to ensure thorough preparation for your examination.

Topic-wise Question Count:

- Basic C Programming: 10 questions
- Operators and Expressions: 10 questions
- Decision Making: 10 questions
- Loops: 15 questions
- Nested Loops and Control: 10 questions
- Pattern Programs: 15 questions
- Functions: 15 questions
- **Recursion: 25 questions** (Most important!)

- Arrays (1D): 15 questions
- Arrays (2D): 10 questions
- Strings: 10 questions
- Pointers: 10 questions

All the best for your examination!

Prepared by: Your Professor
Course: Logic Building with Computer Science (Offline)
Semester: 1 | **Academic Year:** 2024-25