The Bhawanipur Education Society College

B.Sc. Second Year (Honours)
2018
Department of Computer Science

Practice Assignment List for C-Language

Note: [Create a Software Assignment Note Book containing selected assignments from the following list. Each of the assignment should contain the following in order:

1. Problem statement
2. Algorithm
3. Program source code
4. Sample Output

Everything should be Computer processed (MS Word). Hand written Note Book is not allowed.]

Students are divided into two groups :-
1. Group A (Students with odd class roll numbers)
2. Group B (Students with even class roll numbers)

Group A will submit the assignments marked in blue.
Group B will submit the assignments marked in green.

***Programs that are marked in red are for both groups.**
*Remaining programs are for practice.

Basic Programs

1. Write a program to take input of a number and display the square of that number.
2. (i) Write a program to swap two number using third variable.
   (ii) Write a program to swap two numbers without using third variable.
3. Write a program to convert Celsius to Fahrenheit and vice versa
4. Write a program to check whether a number is odd or even
5. Write a program to check whether a year is leap year or not

6. Write a program to generate the "Grade System"

Marks	Grade
(i) Above 90	Grade "A"
(ii) 81 - 90	Grade "B"
(iii) 71 - 80	Grade "C"
(iv) 61-70	Grade "D"
(v) 51-60	Grade "E"
(vi) Otherwise	Grade "Fail"

7. Write a menu driven program to calculate area and perimeter of Rectangle.
8. Write a program to find out the roots of a quadratic equation and keep provision for imaginary root.
9. Write a program to take three integers as input and display the maximum and minimum.
10. Write a program to compute the sum of the first n odd numbers.
11. Write a program to calculate the factorial of an integer.
12. Write a program to check whether a number is Peterson number or not (sum of factorials of digits is equal to the given number).
13. Write a program to compute the sum of the first n terms of the following series, S =1-2+3-4+5…….
14. Write a program to print the sum and product of digits of an integer.
15. Write a program to reverse a number and check whether it is palindrome or not.
16. Write a function to find whether a given no. is prime or not. Use the same to generate the prime numbers less than 100.
17. Write a program to find all Armstrong numbers within a given range.
18. Write a program to display all the perfect numbers within a given range.
19. Write a C-program to find all prime factors of a positive integer.
20. Write a program to find GCD and LCM of two integers.
21. Write a menu driven program to convert a number from binary to decimal and vice versa.
22. (a) Write a program to generate Fibonacci series up to a certain range.
    (b) Write a program to generate Fibonacci series up to n terms.
    (c) Write a program to display n^{th} Fibonacci term.
    (d) Write a program to generate non- fibonacci series up to a certain range.
23. Write a program to check whether a number is divisible by 11 or not (Sum of digits in odd positions should be equal to sum of digits in even positions. Eg: 121-> 1+1=2)
24. Write a C-program to find the digital root of a number.
    (eg: 256->2+5+6=13->1+3=4)

25. Evaluate: (a) S= 1! + 2! + 3! + 4! + …..... + n!

(b) $S = 1+x^1 + x^2 + x^3 + x^4 + \ldots\ldots\ldots\ldots + x^n$

(c) S = 1+1/2+1/3+1/4+……

(d) S= (1) + (1+2) + (1+2+3) + (1+2+3+4) + ... + (1+2+3+4+...+n)

26. (a) Write a program to find the sum of sine series taking x (in radian) and n (number of terms) as input. Print the result at the output terminal. Correct up to 4 decimal places.

$$\left[Sin(x) : x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \ldots\ldots\ldots\ldots\ldots \pm \frac{x^n}{n!} \right]$$

(b) Write a program to find the sum of cosine series taking x (in radian) and n (number of terms) as input. Print the result at the output terminal. Correct up to 4 decimal places.

$$\left[Cos(x) : 1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \frac{x^6}{6!} + \ldots\ldots\ldots\ldots\ldots \pm \frac{x^n}{n!} \right]$$

27. Write C-Program to display the following structure with variable height.

(a)
```
4 3 2 1
4 3 2
4 3
4
```

(b)
```
   *
  ***
 *****
*******
```

(c)
```
          1
        1   1
      1   2   1
    1   3   3   1 ……Up to n level.
```

28. Write a program to find the permutations and combinations of n number of items (integers) taken r at a time.

29. Write a macro that swaps two numbers. Write a program to use it.

Bitwise Operators

30. Write a program to count the number of 1s in a given number using bitwise operator.
31. Write a program to check whether a number is palindrome or not using bitwise operator.
32. Write a program to print all the bits of a given number.
33. Write a program to check whether the MSB of a number is set or not using bitwise operator.
34. Write a program to check the length of the register using bitwise operator.

Array Based Programs

35. Write a menu driven program to perform following actions on an array entered by the user:
(i) Print the even/odd-valued elements
(ii) Calculate and print the sum and average of the elements of array
(iii) Print the maximum and minimum element of array
(iv) Insert and delete elements in an array of n elements
(v) Remove the duplicates from the array
(vi) Print the array in reverse order
(vii) Sort elements of an array in ascending/descending order
(viii) Reverse elements of an array and display its content.
(ix) Find frequency of a given number
The program should present a menu to the user and ask for one of the options. The menu should also include options to re-enter array and to quit the program.
36. Given two ordered arrays of integers, write a program to merge the two-arrays to get an ordered array.
37. Write a program in which a function passes address of two variables and then alter its contents.
38. Write a program that will read 10 integers from user and store them in an array. Implement array using pointers. The program will print the array elements in ascending and descending order.
39. Write a function that reverses the elements of an array in place. The function must accept only one pointer value and return void.
40. Write a menu-driven program to perform following Matrix operations (2-D array implementation):
a) Sum b) Difference c) Product d) Transpose.
41. Write a program to find determinant of a matrix.

42. Write a program to arrange the elements of each column of a square matrix of order 'n' in ascending order. Input the value of 'n' during runtime.

Numerical Analysis

70. Write a program to compute the real roots of the following non linear equation by Newton-Raphson method:

$$X^3 - 4x + 1 = 0$$

Correct up to 5 significant digits.

71. Write a program to fit a straight line to the following set of data points by least squares technique:

X:	1951	1961	1971	1981	1991
Y:	33	43	60	78	96

Print the values of slope and intercept of the line. Calculate the value of 'y' when x=2001.

72. Write a program in C to determine one of the roots of the equation, $x^2-2x-1=0$ by bi-section method. Input the error tolerance as 0.00001. Also print the number of operations.

73. Write a program to find the value of $\int f(x)dx$ using Trapezoidal rule and Simpson's 1/3 rule and compare the results using the functions:

a. $F(x) = \frac{1}{x} + a + bx^2$

b. $F(x) = \text{Sin}(2x) / (1 + x)^5$

74. Given dy/dx=x3+y, y(0)=1. Write a program to compute y(0.02), by Euler method correct upto 4 decimal places taking step length h=0.01.

75. Write a program to find the roots of a system of linear equations by Gauss elimination method. Test your program with the following example:

$1.2x_1 + 2.1x_2 - 1.1x_3 + 4.0x_4 = 6.0$

$-1.1x_1 + 2.0x_2 + 3.1x_3 + 3.9x_4 = 3.9$

$-2.1x_1 - 2.2x_2 + 3.7x_3 + 16.0x_4 = 12.2$

$-1.0x_1 - 2.3x_2 + 4.7x_3 + 12.0x_4 = 4.0$

76. Write a C program to solve the set of linear equations by using

Gauss Sidel method:

$x-8y+3z= -4$

$2x-y+9z=12$

$8x+2y-2z=8$

Graph Theory

77. Write a C program to convert an adjacency matrix to its corresponding incident matrix and vice-versa for given graph.
78. Write a program to implement Dijkstra's method to calculate shortest distance from one vertex to all vertices in a directed or undirected graph.
79. Write a program to implement *Breadth First Search* of a given undirected graph.
80. Write a program to find a circuit from a connected graph.
81. Write a program to check whether a given undirected graph g with n vertices is connected or not.

Functions & Recursion

43. Write a program which takes the radius of a circle as input from the user, passes it to another function that computes the area and the circumference of the circle and displays the value of area and circumference from the main() function.
44. WAP to display Fibonacci series using recursion.
45. WAP to calculate Factorial of a number using recursion.
46. WAP to calculate GCD of two numbers with recursion.

String Based Programs

47. Write a program that simulates string using menu driven program:

a) Show address of each character in a string
b) String length (using pointers)
c) Convert all lowercase characters to Uppercase
d) Convert all uppercase characters to Lowercase
e) String Concatenation
f) String Reverse
g) String Compare
h) String Copy
i) Word count within a String
j) Letter count Within a String
k) Vowel count

48. Write a program to check whether a given string is palindrome or not.
49. Squeeze the blanks (more than one) from a given string. Ex: He is a boy.
Output: He is a boy.

50. Write a program for replacing string within a given string after search for a string.

Data Structure

57. a) Write a C Program to accept an infix expression and convert it to its postfix equivalent using stack.
b) Write a program to accept a postfix expression and evaluate the expression.
58. Write a menu driven program in C to implement a linear queue using array incorporating the following items:
    a. Adding elements to queue
    b. Deleting from queue
    c. Display the queue
    d. Quit

    The program should take care of the situations when the queue is empty.
59. Write a program to create a circular queue using an array and do the following:
    a. Initialize the queue.
    b. Insert elements to the queue.
    c. Delete elements from the queue.
60. Write a program in C to perform the following:-
    a. Create a singly linked list.
    b. Display
    c. Reverse the list.
    d. Insert a node at any position of the list.
    e. Delete a specific node from the list and from any position.
61. Implement STACK data structure using menu driven program. Stack should be implement by linked structure. Perform the basic operations Initialize(), IsFull(), IsEmpty(), PUSH(), POP(), Display().

62. Write a menu driven program in C to implement a linear queue using linked list incorporating the following items:
    f. Adding elements to queue
    g. Deleting from queue
    h. Display the queue
    i. Quit

    The program should take care of the situations when the queue is empty.
63. Write a program in C to implement Addition and Subtraction of two Polynomials. The implementation of the polynomial is using Linked List.
64. Write a C program to create a singly CIRCULAR linked list and perform the following operations.
    j. Insert into the list at any given position.

k. Delete a node from any given position.
l. Display the content of the list……. In modular structure.

65. Write a program to create a doubly linked list containing integer elements.
a) Write a function "beginlist" to insert a node at the beginning of the list. (This list may be empty or non-empty.)
b) Write a function "afterlist" to insert a node after a given node.

66. Merge two linked lists and store the result in a third list in sorted order. Same nodes are not to be repeated. Display the resultant list.

67. Write a menu driven program to sort n element using
i. Bubble Sort
ii. Insertion sort
iii. Selection sort
iv. Quick sort
v. Merge sort
vi. Radix sort
vii. Heap sort

68. Write a program to find an element by Binary Search Method.
69. Write a program to build a binary search tree having characters as the content of each node.
a) Visit the created tree in preorder, inorder and postorder sequence. Display the output in suitable format.
b) Count the number of leaf nodes.

File Programming & Command Line Arguments

51. Write a program that prints a table indicating the number of occurrences of each alphabet in the text entered as command line arguments.
52. Write a program to write a paragraph in a file and find the frequency of a given word.
53. Write a c program that accepts three text files (say f1,f2,f3) as command line arguments and merge lines alternately from two files 'f1' and 'f2' and writes the results into the third file 'f3'. If one of the two files is finished earlier the remaining lines from the larger file will be simply copied to the third file 'f3'. Finally print all the three files.
54. Copy the contents of one text file to another file, after removing all whitespaces.
55. Write a C program that will count number of newlines, number of characters, number of words in a file when the filename is supplied as command line argument. Your program should support the following options:

1. –l(counting only number of lines)
2. –w(counting only words)
3. –c(counting only characters)

The options along with the filename must be passed as command line arguments. In absence of all the options stated above, your program should give all the three outputs.