Subject Code: 01CT0101
Subject Name: Introduction to Computer Programming
B. Tech. Year – I (Semester I)

Objective:
In this basic course, we will move through a number of introductory C concepts, such as basic syntax, looping, arrays, pointers, and elementary functions and data types. The course will also aim to stimulate students into thinking like programmers and provide an understanding of programming techniques that reaches beyond familiarity and basic fluency with the C programming language.

Credits Earned: 04 Credits

Course Outcomes: After completion of this course, student will be able to:
1. To obtain the knowledge about the number systems this will be very useful for bitwise operations.
2. To develop programs using the basic elements like control statements, Arrays and Strings.
3. To solve the memory access problems by using pointers
4. To understand about the dynamic memory allocation using pointers which is essential for utilizing memory
5. To understand about the code reusability with the help of user defined functions.
6. To develop advanced applications using enumerated data types, function pointers and nested structures.
7. To learn the basics of file handling mechanism that is essential for understanding the concepts in database management systems.
8. To implement the concepts in data structure like linked lists.
9. To understand the uses of pre-processors and various header file directives.

Pre-requisite of course: NA

Teaching and Examination Scheme:

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial / Practical Marks		Total Marks
				E	I		V	T	
Theory	Tutorial	Practical		ESE	IA	CSE	Viva	Term Work	
3	0	2	4	50	30	20	25	25	150

Contents:

Unit	Topics	Contact Hours
1	**Introduction to c language** Pseudo code solution to problem, problem solving using flowchart and algorithm, Basic concepts in a C program, Structure of 'C' program, compilation and linking processes, Declaration, Assignment & Print statements, Data Types, operators and expressions, Type Conversion and Type Casting, Programming examples and exercises.	6
2	**Branching and looping** Two-way selection (if, if-else, nested if-else, cascaded if-else), switch statement, ternary operator? Go to, Loops (For, while-do, do-while) in C, break and continue, Programming examples and exercises.	6
3	**Arrays and strings** ARRAYS AND STRINGS: Using an array, Using arrays with Functions, Multi-Dimensional arrays. String: Declaring, Initializing, Printing and reading strings, string manipulation functions, String input and output functions, array of strings, Programming examples and Exercises.	6
4	**Functions & pointers** FUNCTIONS: Functions in C, Argument Passing – call by value, call by reference, Functions and program structure, location of functions, void and parameter less Functions, Recursion, Programming examples and exercises. POINTERS: Introduction to Pointers, Pointers as Function Parameter, Pointer Arithmetic, Pointers and Arrays, Function Pointers, Programming examples and exercises.	7
5	**Structure, union & file management** STRUCTURE: Need of Structure, Basic of structures, structure declaration and definition, structures and Functions, Array of structures, structure Data types, type definition UNION: Union declaration and definition, structure vs union FILE MANAGEMENT: Introduction to file management and its functions, opening and closing of files, Input and output operations, Programming examples and exercises.	8
6	**Pointers and preprocessors & data structures** Pointers and address, pointers and functions (call by reference) arguments, pointers and arrays, address arithmetic, character pointer and functions, pointers to pointer, Initialization of pointer arrays, Dynamic memory allocations methods, Introduction to Preprocessors, compiler control Directives, Programming examples and exercises. Introduction to Data Structures: Primitive and non-primitive data types, Abstract	9

data types, Definition and applications of Stacks, Queues, Linked Lists and Trees.		
	Total Hours	42

Suggested Text books / Reference books:
1. Paul Deitel, Harvey Deitel, C How to Program, Pearson, 7th edition
2. Pradip Dey & Manas Ghosh, Programming in C, Oxford Publication, 2nd edition
3. Ritchie Dennis M, Kernighan Brain W, C: Programming Language, Prentice Hall Of India Private limited, 2nd edition
4. E. Balagurusamy, Programming in ANSI C, Tata Mcgraw-Hill Publishing Com. Ltd., 7th edition
5. Yashavant P. Kanetkar, Let Us C, BPB Publications, 10th edition
6. E.V. Kameshwar, Numerical techniques in C, BPB Publications
7. Schildt, Herbert, The Complete Reference C, Tata Mcgraw-Hill Publishing Com. Ltd., 4th edition

Suggested Theory distribution:
The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process.

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyze	Evaluate	Create
10%	15%	30%	15%	15%	15%

Suggested List of Experiments:
1. Write a program to print student detail.
2. Write a program to calculate simple interest.
3. Write a program that accepts centigrade and convert it into Fahrenheit.
4. Write a program that accepts two numbers in A and B interchange value of A and B variable.
5. Write a program to demonstrate the use of the basic data types int, char and float.
6. Write a program to demonstrate the use of Arithmetic operators by getting two numbers from the user
7. Write a program that accepts a number from keyboard and find weather the number is ODD or EVEN using Conditional operators.
8. Write a program to demonstrate the use of increment and decrement operator.
9. Write a program to demonstrate the use of shorthand operators.
10. Write a program to demonstrate the use of sizeof() of operator.
11. Write a program to demonstrate the use of bitwise operators.
12. Write a program that accepts three numbers from the user and print maximum of them.
13. Demonstrate the use of GOTO statement.

14. Write a program to input the Name and the Salary of an Employee. Calculate and print the Name, Salary and Bonus of the Employee, where bonus= 5.3% if salary is at least Rs. 10,000 and 6.5% otherwise.

15. Admission to professional course is subject to the following conditions.
    Marks in Mathematics>=60
    Marks in Physics>=50
    Marks in Chemistry>=40
    Total in all three subjects>=200 or total in mathematics and physics>=150
    Given the marks in the three subjects, write a program to process the application to list the eligible candidates.

16. Write a program that accepts two numbers and one code (1,2,3,4) from the user. According to the code, the operations to be performed, using switch case statements as follows: (Code: 1→ Addition, 2→ Subtraction, 3→ Multiplication, 4→ Division).

17. Write a program that reads the marks for five subjects of a student. Calculate and print the grade for the student [i.e. Grade A, B, C, D and F] using Else-If ladder.

18. Write a program that do sum=1+3+5+……. N terms Print value of Sum.

19. Write a program to print the Fibonacci Series [i.e. 1,1,2,3,5,8,13…N terms].

20. Write a program to accept one number from the user.
    a. Display reverse of that number.
    b. Find if it is Armstrong or not.

21. Write a program that accepts a number from the user and print prime numbers from 0 to that number.

22. Write a C program to display following different Patterns.

1. 1 2. 1 2 3. 1 2 3 4. 1 2 3 4 5. 1 2 3 4 5	6. 1 7. 1 0 8. 1 0 1 9. 1 0 1 0 10. 1 0 1 0 1
11. 1 12. 2 1 13. 1 2 3 2 1 14. 2 3 4 3 2 1 15. 1 2 3 4 5 4 3 2 1	16. a 17. b c 18. d e f 19. g h i j 20. k l m n o
21. 1 22. A B 23. 1 2 3 24. A B C D 25. 1 2 3 4 5	26. 1 27. A B 28. 2 3 4 29. C D E F 30. 5 6 7 8 9

23. Write a program to accept 5 numbers in an array and display it.

24. Write a program to accept 9 numbers in form of matrix and display in matrix form.
25. Write a program to accept 5 numbers in array and find maximum and minimum value of it.
26. Write a program to accept 5 numbers in array and find maximum and minimum value of it.
27. Write a program to sort all elements of 1-D array in ascending and descending order.
28. Write a program to calculate and display addition of two matrix.
29. Write a program to count number of vowels in a given string.
30. Write a program to check whether entered string is palindrome or not.
31. Write a program for string concatenation without using library function.
32. Write a program to demonstrate the Library function for string.
33. Write a function which receives number as argument and return sum of digit.
34. Write a program for calculating Fibonacci series using UDF and call by value
35. Write a program to calculate Factorial using recursion in UDF.
36. Write a program to find Average, maximum and minimum of Array elements using UDF.
37. Write a program to calculate total number of positive, negative and zero value in array using UDF.
38. Write a program to swap two numbers using UDF and pointer.
39. Write a program using pointer to read in an array of integers and print its elements in reverse order.
40. Write a C program to create a structure of employees with Full Name, Last Name, City and Salary. Display it for n employees.
41. Write a program to demonstrate nested structure. (make structures for circle and rectangle)
42. Write a program to create array of structure. Make a structure for student having student_no, student_name, student_marks.
43. Write a program to create union cricketer having player_name, batting_avg, player_age.P for swapping of two values with help of UDF and call by reference.
44. Write a program to Display contents of a file on screen. Use functions (fopen,fclose, getc,putchar,eof)
45. Write a program to count number of characters in a file.

Instructional Method:

1. The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs, CANVAS etc.
2. The internal evaluation will be done based on continuous evaluation of students in the laboratory.
3. Students needs to develop small segment of coding (functions) which is used to make major project and evaluated by External examiner.
4. Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory

Open Ended Projects:

1. Library Management System
2. Student-Report Card Generator
3. Logo

4. Piano with Graphic Interface
5. Menu-based Scientific Calculator - The calculator should be like the one observed in windows systems...in terms of functionality. However, Graphics are not necessary... Program may be menu-driven.
6. Graph Generator based on given function and also if a set of data is given then the corresponding graph should be generated using Graphics with Curve-fitting methods
7. Student database system
8. Hang Man Game
9. School fee enquiry Management System
10. Supermarket Billing System
11. 3D Bounce in OpenGL
12. Bus Reservation System
13. Data Exchange between Notepad and Excel
14. Employee's Management System
15. Libray management
16. Snake Game
17. Quize Game KBC
18. Department store system
19. Tic-tac-toe game
20. Personal Dairy Management System
21. Telecom Billing Management System
22. Bank Management System
23. Contacts Management
24. Medical Store Management System
25. Calendar Application

Supplementary Resources:
1. http://nptel.ac.in/courses/106105085/4
2. http://nptel.ac.in/courses/106104128
3. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-087-practical-programming-in-c-january-iap-2010