Programming for Problem Solving using C
(Common to CE, EEE, ME, ECE, CSE, IT, AIML, CSE(DS), PT & Min.E)

	L	T	P	C
Course Code: 241CS001	**2**	**0**	**2**	**4**

Course Outcomes: At the end of the Course, Student will be able to:

- **CO1:** Demonstrate basics of computer, algorithm and flow chart for problem solving.
- **CO2:** Make use of an appropriate control structures to solve given problems.
- **CO3:** Solve complex problems using arrays and strings.
- **CO4:** Develop modular programming using functions and dynamics memory allocations using pointers.
- **CO5:** Demonstrate file handling using file operations.

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11
CO1	2	3	2	1	3	-	-	2	-	-	1
CO2	2	3	2	1	3	-	-	2	-	-	1
CO3	2	3	2	1	3	-	1	2	-	-	1
CO4	2	3	2	1	3	-	1	2	-	-	1
CO5	2	3	2	1	3	-	1	2	-	-	1

Mapping of Course Outcomes with Program Specific Outcomes:

CO/PSO	PSO1	PSO2
CO1	2	2
CO2	2	2
CO3	2	2
CO4	2	2
CO5	2	2

UNIT – I

Introduction to Programming and Problem Solving

Introduction to Programming Languages, Basics of a Computer Program- Algorithms,Algorithmic approach, characteristics of algorithm, Problem solving strategies: Top-down approach, Bottom-up approach, Time and space complexities of algorithms. flowcharts (Using Dia Tool), pseudo code.
Structure of C Program Introduction to Compilation and Execution, Primitive Data Types, Variables, and Constants, Basic Input and Output, operators, keywords, identifiers, Type Conversion, and Casting.

Practice:

1.
   a. Basic linux environment and its editors like Vi,Vim & Emacs etc.
   b. Exposure to turbo C, gcc
   c. Explore to hacker rank or any other Online coding platform and compiler environment.
   d. “Hello world” in C
   e. Objective: Learn about the syntax of reading from stdin and writing to stdout. https://www.hackerrank.com/challenges/hello-world-c/problem?isFullScreen=true e

Write a simple program to read int, float, char and string using scanf() and display using printf() in all the above given platforms.

2. Basics and Operators
   a. Sum and Difference of 2 numbers
      Objective: Learn int and float data types.
      https://www.hackerrank.com/challenges/sum-numbers-c/problem?isFullScreen=true
   b. Playing with Characters
      Objective: Learn how to take a character, a string and a sentence as input in C.
      https://www.hackerrank.com/challenges/playing-with-characters/problem?isFullScreen=true
   c. Bitwise Operators
      Objective: Learn how to work with bits (0,1) and bitwise operators.
      https://www.hackerrank.com/challenges/bitwise-operators-in-c/problem?isFullScreen=true
   d. Conversion of Fahrenheit to Celsius and vice versa.
   e. Distance travelled by an object.
   f. Calculate Simple interest and compound interest.

3. Operators and Expressions, Variables and Type conversions
   a. Evaluate the following expressions
      i. a/b*c-b+a*d/3
      ii. j = (i++) + (++i)
   b. Square root of a given number.
   c. Find the area of circle, square, rectangle and triangle.
   d. Find the maximum of three numbers using conditional operator.
   e. Take marks of 5 subjects in integers, find the total in integer and average in float.

UNIT – II

Control Structures

Simple sequential programs Conditional Statements (if, if-else, else if ladder, switch), Loops (for, nested for loop, while, do-while) break and continue, goto statement

Practice:

1. Conditional Statements
   1. Objective: Understand if and else Conditional statements in C.
      https://www.hackerrank.com/challenges/conditional-statements-in-c/problem?isFullScreen=true
   2. Roots of a Quadratic Equation.
   3. Generate electricity bill.
   4. Simulate a calculator using switch case.
   5. Find the given year is a leap year or not.
2. Loops
   a. Objective: Learn the usage of the for loop in C.
      https://www.hackerrank.com/challenges/for-loop-in-c/problem?isFullScreen=true
   b. Sum of the digits of a 5-digit number.
      Objective: Learn the usage of while loop and usage of operators - % and /.
      https://www.hackerrank.com/challenges/sum-of-digits-of-a-five-digit-number/problem?isFullScreen=true
   c. Given number is a prime or not. (Also Prime numbers between a given range.)
   d. Armstrong Number or not.

e. Palindrome or not.
f. Objective: Print a pattern of numbers using Loops.
https://www.hackerrank.com/challenges/printing-pattern-2/problem?isFullScreen=true
g. Construct a Pyramid pattern.

UNIT – III

Arrays indexing, Accessing programs with array of integers, two dimensional arrays, Introduction to Strings, string handling functions.
Sorting techniques: bubble sort, selection sort.
Searching Techniques: linear, Binary search.

Practice:

1. Arrays
   a. Objective: Print the sum and free the memory where the array is stored.
   https://www.hackerrank.com/challenges/1d-arrays-in-c/problem?isFullScreen=true
   b. Objective: Working with indices in array
   https://www.hackerrank.com/challenges/reverse-array-c/problem?isFullScreen=true
   c. Search an element in array (Linear Search)
   d. Find min and max elements in array
   e. Insert an element into array
   f. Eliminate duplicate elements from array
   g. Sorting of elements in an array using Bubble sort
2. Arrays
   a. Sum of two 2-D arrays
   b. Multiplication of two 2-D arrays
   c. Transpose of a Matrix
   d. Trace of a Matrix
   e. Lower Triangular Matrix
3. Hacker Rank
   a. Objective: print each word of the sentence in a new line.
   https://www.hackerrank.com/challenges/printing-tokens- /problem?isFullScreen=true
   b. Count number of alphabets (lowercase, uppercase, consonants, vowels) and digits Lowercase to Uppercase, Uppercase to Lowercase, Toggle case, Sentential case
   c. Objective: Digit Frequency Objective: find the frequency of each digit in the given string.
   https://www.hackerrank.com/challenges/frequency-of-digits-1/problem?isFullScreen=true
   d. Find string length, concatenate 2 strings, reverse a string using built-in and without built-in string functions.

UNIT – IV

Functions: Introduction to Functions, Function Declaration and Definition, Function call Return Types and Arguments, arrays as parameters, Scope and Lifetime of Variables, storage class, recursion, functions & pointers, functions and arrays.

Practice: Functions in C

1. Objective: Learn simple usage of functions.
   https://www.hackerrank.com/challenges/functions-in-c/problem?isFullScreen=true
2. Objective: Fibonacci Numbers using recursive function.
   https://www.hackerrank.com/challenges/ctci-fibonacci-numbers/problem
3. Objective: N^{th} factorial using recursion.
   https://www.hackerrank.com/contests/ccc-veltech-practice-set-ende/challenges/factorial-

using-recursion-1

4. Objective: Find the super digit of the integer.
   https://www.hackerrank.com/challenges/recursive-digit-sum/problem
5. Implement LCM
6. Objective: Calculate the Nth term of series.
   https://www.hackerrank.com/challenges/recursion-in-c/problem?isFullScreen=true

UNIT – V

Introduction to Pointers, dereferencing and address operators, pointer and address arithmetic, array manipulation using pointers, modifying parameters inside functions using pointers, Command line Arguments, Dynamic memory allocation, Null Pointer, generic pointer, dangling pointer

File Handling:-Introduction to Files, Using Files in C, Reading from Text Files, Writing to Text Files, Random File Access.

Practice:

1. Pointers
   a. Objective: learn to implement the basic functionalities of pointers in C.
      https://www.hackerrank.com/challenges/pointer-in-c/problem?isFullScreen=true
   b. Objective: Learn using Pointers with Arrays and Functions
      https://www.hackerrank.com/challenges/students-marks-sum/problem?isFullScreen=true
   c. Objective: sort a given array of strings into lexicographically increasing order or into an order in which the string with the lowest length appears first.
      https://www.hackerrank.com/challenges/sorting-array-of-strings/problem?isFullScreen=true
   d. Find the sum of a 1D array using malloc()
   e. Swap two numbers using functions and pointers - call by value and reference.
   f. Objective: Dynamic Handling requests by a Librarian to place the books in the shelves.
      https://www.hackerrank.com/challenges/dynamic-array-in-c/problem?isFullScreen=true

2. File handling concepts
   a) Write text into and read text from a file.
   b) Write text into and read text from a binary file using fread() and fwrite().
   c) Copy the contents of one file to another file.
   d) Merge two files into the third file using command-line arguments
   e) Find no. of lines, words and characters in a file.

Additional Practice:

1. Variadic functions in C
   Objective: Understanding variable number of arguments
   https://www.hackerrank.com/challenges/variadic-functions-in-c/problem?isFullScreen=true
2. Small Triangles, Large Triangles
   Objective: Print sorted by their areas
   https://www.hackerrank.com/challenges/small-triangles-large-triangles/problem?isFullScreen=true
3. Permutations of Strings
   Objective: print all strings permutations in strict lexicographical order
   https://www.hackerrank.com/challenges/permutations-of-strings/problem?isFullScreen=true

Text Books:

1 Programming in C, Rema Theraja, Oxford, 2nd edition. ISBN 93-5497-9
2 "The C Programming Language", Brian W. Kernighan and Dennis M. Ritchie, Prentice-Hall. ISBN 13: 9780131103627

Reference Books:

1. Computing fundamentals and C Programming, Balagurusamy, E., McGraw-Hill Education. ISBN.No:9352604172
2. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill. ISBN No.0071367993
3. Let Us C Yashwanth,Kanetkar, Eighth edition, BPB Publications.ISBN No.1934015253
4. Programming in C A-Practical Approach Ajay Mittal. Pearson Education.ISBN No. 9788131729342
5. R G Dromey How to Solve It by Computer (Prentice-Hall International Series in Computer Science.ISBN-13 : 978-0134340012

Web Links:

1 https://www.hackerrank.com/
2 https://onlinecourses.nptel.ac.in/noc22_cs40/preview
3 https://archive.nptel.ac.in/courses/106/104/106104128/

Data Structures
(Common to EEE, ECE, CSE, IT, AIML & CSE (DS))

	L	T	P	C
Course Code: 241CS003	**2**	**0**	**2**	**4**

Course Outcomes:

At the end of the course, student will be able to:

CO1: Utilize structure, union and file operations to handle heterogeneous data.
CO2: Illustrate Time and Space complexities for different searching and sorting Algorithms
CO3: Demonstrate various operations on Linked Lists
CO4: Explain different operations on Stack and Queue with applications.
CO5: Demonstrate the importance and various operation on non-linear data structures

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11
CO1:	1	1	2	-	-	-	-	-	1	1	-
CO2:	1	1	2	2	-	-	-	-	1	1	-
CO3:	1	2	2	1	-	-	-	-	1	1	-
CO4:	1	1	2	1	-	-	-	-	1	1	-
CO5:	1	1	2	2	-	-	-	-	1	1	-

Mapping of Course Outcomes with Program Specific Outcomes:

	PSO1	PSO2
CO1:	3	-
CO2:	2	-
CO3:	2	-
CO4:	2	-
CO5:	2	-

UNIT – I
Structures and Unions: Introduction, Nested Structures, Arrays of Structures, Structures and Functions, Self-Referential Structures, Unions, Enumerated Data Type - enum variables, Using Typedef keyword, Bit Fields.
Data Files: Introduction to Files, Using Files in C, Reading from Text Files, Writing to Text Files.

Practice:

1. Write a C program to find the total, average of n students using structures
2. Copy one structure variable to another structure of the same type.
3. Read student name and marks from the command line and display the student details along with the total.

UNIT – II

Introduction to Linear Data Structures: Definition and importance of linear data structures, Abstract data types (ADTs) and their implementation, Overview of time and space complexity analysis for linear data structures.

Sorting Techniques: Quick sort, Merge sort, Radix sort

Practice:

1. Implement Merge sort using arrays.
2. Implement Quick sort using arrays
3. Implement Radix Sort using arrays

UNIT – III

Linked Lists: Singly linked lists: representation and operations, doubly linked lists and its operations and circular linked lists and its operations, Comparing arrays and linked lists, Applications of linked lists.

Practice:

1. Single Linked List: Perform different operations in single linked list.
2. Reversing a single linked list
3. Perform different operations in double linked list
4. Circular Linked List

UNIT – IV

Stacks: Introduction to stacks: properties and operations, implementing stacks using arrays and linked lists, applications of stacks.

Queues: Introduction to queues: properties and operations, Types of Queues, implementing queues using arrays and linked lists, applications of queues.

Practice:

1. Stack and its operations using arrays and Linked List
2. Implement a program to evaluate a postfix expression.
3. Queue and its operations using arrays and Linked List
4. Implement Circular Queue using Arrays

UNIT – V

Non-linear Data Structures:

Trees: Difinition of tree, Tree Terminology, types of trees, Binary tree traversals, Binary Search Tree – Insertion, Deletion.

Graphs: Definition and Terminology – Representation of Graphs-Adjacency Matrix and Linked list, Graph Traversals (BFT & DFT)

Practice:

1. Implement Binary search tree (BST).
2. Implement Binary search Tree (BST) Traversals.
3. Graph Traversal using Breadth First Search (BFS)
4. Graph Traversal using Depth First Search (DFS)

Additional Practice:

1. Using a structure for transporting some boxes through a tunnel
2. Delete duplicate-value nodes from a sorted linked list
3. Convert an infix expression into postfix expression
4. De Queue Implementation

Text Books:

1. Programming in C, Rema Theraja, Oxford, 3rd Edition. ISBN:978-9354979453
2. Data Structures, KV Sambasivarao, S Rama Sree, S.Chand. ISBN: 978-9358704730

Reference Books:

1. The Algorithm Design Manual, Steven S. Skiena, Springer Publication, Second Edition. ISBN: 978-1849967204
2. Fundamentals of data structures in C, Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed, Silicon Press. Data Structures and Algorithms by Maganti Venkatesh, Naresh. ISBN:9780929306407
3. Data Structures Using C,Reema Thareja, Oxford University Press, 2nd Edition. ISBN:978-0198099307

Web Links:

1. https://nptel.ac.in/courses/106102064
2. https://archive.nptel.ac.in/courses/106/105/106105225/
3. https://www.udemy.com/topic/data-structures/
4. https://www.coursera.org/specializations/data-structures-algorithms
5. https://ds1-iiith.vlabs.ac.in/List%20of%20experiments.html

Engineering Economics & Management
(Common to CE, EEE, ME, CSE, IT, AIML & CSE(DS)

	L	T	P	C
Course Code: 241MB001	**2**	**0**	**0**	**2**

Course Outcomes:
At the end of the course, student will be able to:

CO1: Explain the Business Economic concepts, law of demand and forecasting methods.
CO2: Identify the production, cost behaviour for managerial decision making with Break-Even Point (BEP).
CO3: Make use of financial accounting and capital budgeting techniques for decision making.
CO4: Summarize management and motivational theories to renovate the practice of Management.
CO5: Illustrate the functional management and project management using PERT and CPM.

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11
CO1								2	2		
CO2	1									2	
CO3										3	
CO4	1							1	1	2	
CO5										3	

UNIT-I

Introduction to Managerial Economics and demand Analysis:
Definition of Managerial Economics –Scope of Managerial Economics- Concept of Demand, Types of Demand, Determinants of Demand- Law of Demand and its limitations- Elasticity of Demand, Types- Demand forecasting and its Methods.

UNIT-II

Production and Cost Analyses:
Concept of Production function Law of Variable Proportions-Isoquants and Isocosts - Producer Equillibrium-, cost concepts: opportunity costs, explicit and implicit costs- Fixed costs, Variable Costs – Cost –Volume-Profit Analysis-Determination of Breakeven point (simple problems).

UNIT-III

Introduction to Markets and Financial Accounting: Market Structures-Classification of markets,.Introduction to Financial Accounting , Concepts and conventions, Accounting cycle, Journal entries and Ledger (Simple Problems),Methods of capital budgeting (Simple Problems).

UNIT-IV

Operations Management :
Concept nature and importance of Management, Generic Functions of Management, Theories of Motivation, Plant location and layout, Principles of organization,SWOT analysis.
Material Management: Need for Inventory control, EOQ, ABC analysis

UNIT – V

Functional Management And Project Management
Concept of HRM , HRD and PMIR, Functions of HR Manager , Job Evaluation and Merit Rating , Marketing Management, Functions of Marketing , Channels of distributions - Development of Network , Difference between PERT and CPM, Finding Critical Path (Simple Problems)

Text Books:

1 Managerial Economics and Financial Analysis, A. R. Aryasri , McGraw Hill Education, ISBN: 978-0070078031
2 Managerial Economics and Financial Analysis', N. Appa Rao, P. Vijay Kumar, Cengage Publications, New Delhi, ISBN: 978-8131515952
3 Management Science by Aryasri; Publisher: Tata McGraw Hill, 2009, ISBN: 978-0070090279
4 Management by James Arthur, Finch Stoner, R. Edward Freeman, and Daniel R. Gilbert 6th Ed; Publisher: Pearson Education/Prentice Hall, ISBN: 978-0131087477

Reference Books:

1 Principles of Marketing: A South Asian Perspective by Kotler Philip, Gary Armstrong, Prafulla Y. Agnihotri, and Eshanul Haque, 13th Edition, Publisher: Pearson Education/ Prentice Hall of India, ISBN: 9788131731017
2 A Handbook of Human Resource Management Practice by Michael Armstrong, 2010; Publisher: Kogan Page Publishers, ISBN: 978-1789661033

Web Links:

1 www.managementstudyguide.com
2 www.citehr.com
3 www.nptel.ac.in/courses/122106032
4 www.btechguru.com/courses--nptel--basic-course