**Programming for Problem Solving-2**

COURSE CODE: 19B11CI111

COURSE CREDITS: 2

CORE/ELECTIVE: CORE

L-T-P: 2-0-0

**Pre-requisite:** None

**Course Objectives**:

1. To formulate simple algorithms for arithmetic and logical problems.
2. To translate the algorithms to programs (in C language).
3. To test and execute the programs and correct syntax and logical errors.
4. To implement conditional branching, iteration and recursion.
5. To decompose a problem into functions and synthesize a complete program using divide and conquer approach.
6. To use arrays, pointers and structures to formulate algorithms and programs.
7. To apply programming to solve matrix addition and multiplication problems and searching and sorting problems.
8. To apply programming to solve simple numerical method problems, namely rot finding of function, differentiation of function and simple integration

|  |  |  |
| --- | --- | --- |
| **S.NO** | **Course outcomes** | **Level of Attainment** |
| CO-1 | To formulate simple algorithms for arithmetic and logical problems. | Familiarity |
| CO-2 | To translate the algorithms to programs (in C language). | Familiarity |
| CO-3 | To test and execute the programs and correct syntax and logical errors. | Usage |
| CO-4 | To implement conditional branching, iteration and recursion. | Usage |
| CO-5 | To decompose a problem into functions and synthesize a complete program using divide and conquer approach. | Usage |
| CO-6 | To use arrays, pointers and structures to formulate algorithms and programs. | Usage |
| CO-7 | To apply programming to solve matrix addition and multiplication problems and searching and sorting problems. | Assessment |
| CO-8 | To apply programming to solve simple numerical method problems, namely rot finding of function, differentiation of function and simple integration | Assessment |

**Course outcomes:**

**Course Contents:**

|  |  |  |
| --- | --- | --- |
| **Unit** | **Contents** | **Lectures required** |
|  | **Course Starts on 01 August 2023** |  |
| **1** | **Introduction to Programming (4 lectures)**  Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.) - (1 lecture).  **Idea of Algorithm:** steps to solve logical and numerical problems. Representation of Algorithm: Flowchart/Pseudocode with examples. (1 lecture)  From algorithms to programs; source code, variables (with data types) variables and memory locations, Syntax and Logical Errors in compilation, object and executable code- (2 lectures) | **3** |
| **2** | **Arithmetic expressions and precedence**(**2 lectures**) | **2** |
| **3** | **Loops:**  Conditional Branching and Loops (**6 lectures**)  Writing and evaluation of conditionals and consequent branching (3 lectures)  Iteration and loops (3 lectures) | **3** |
|  | **LAB COORDINATOR to align lab practical with Theory Course** |  |
|  | **Tl Examination (05 September – 12 September 2023)** |  |
|  |  |  |
| **4** | **Basic Algorithms:**  Searching, Basic Sorting Algorithms (Bubble, Insertion and Selection), Finding roots of equations, notion of order of complexity through example programs (no formal definition required. | **3** |
| **5** | **Function:**  Functions (including using built in libraries), Parameter passing in functions, call by value, Passing arrays to functions: idea of call by reference  **Recursion:**  Recursion, as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Tower of Hanoi, Ackerman function etc. Quick sort or Merge sort. | **3**  **3** |
|  | **LAB COORDINATOR to align lab practical with Theory Course** |  |
|  | **T2 Examination (16October – 21October 2023)** |  |
| **6** | **Arrays:**  Arrays (1-D, 2-D), Character arrays and Strings | **3** |
| **7** | **Structure:**  Structures, Defining structures and Array of Structures | **3** |
| **8** | **Pointers:**  Idea of pointers, Defining pointers, Use of Pointers in self-referential structures, notion of linked list (no implementation)  **File handling (To be covered in LAB)** | **3**  **2** |
|  | **LAB COORDINATOR to align lab practical with Theory Course** |  |
|  | **T3 Examination (11December – 16December 2023)** |  |
| **Total lectures** | | **28** |

**Suggested Text Book(s):**

1. P. J. Deitel and H.M. Deitel, C How to Program, Pearson
2. Byron Gottfried, Schaum's Outline of Programming with C,McGraw-Hill

**Suggested Reference Book(s):**

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India
2. Introduction to Computing Systems: From Bits and Gates to C and Beyond , Yale N. Patt. Sanjay J. Patel ,McGraw-Hill
3. E. Balaguruswamy, Programming in ANSI C, TataMcGraw-Hill
4. Computer Fundamentals and Programming in C. ReemaThareja, Oxford Publication

**Other useful resource(s):**

1. Link to NPTEL course contents: <https://onlinecourses.nptel.ac.in/noc23_cs121/preview> (Enrollment Ends : 31 Jul 2023)
2. Link to topics related to course:
   1. **https://www.learn-c.org/**
   2. **https://www.programiz.com/c-programming**
   3. **https://www.codechef.com/ide**
   4. **https://www.hackerrank.com/**

**EvaluationScheme:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S. No** | **Exam** | **Marks** | **Duration** | **Coverage / Scope of Examination** |
| 1 | T-1 | 15 | 1 Hour. | Syllabus covered upto T-1 |
| 2 | T-2 | 25 | 1.5 Hours | Syllabus covered upto T-2 |
| 3. | T-3 | 35 | 2 Hours | Entire Syllabus |
| 4. | Teaching Assessment | 25 | Entire Semester | Assignment (2) - 10  Quizzes(2) -10  Attendance - 5 |

**Course Outcomes (COs) contribution to the ProgrammeOutcomes(POs)**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Course outcomes (Programming for Problem Solving )** | **PO-1** | **PO-2** | **PO-3** | **PO-4** | **PO-5** | **PO-6** | **PO-7** | **PO-8** | **PO-9** | **PO-10** | **PO-11** | **PO-12** | **Average** |
| **CO-1** | 3 | 2 | 3 | 2 | 2 | 3 | 2 | 3 | 2 | 2 | 3 | 3 | **2.5** |
| **CO-2** | 3 | 2 | 3 | 2 | 2 | 3 | 3 | 2 | 2 | 3 | 3 | 3 | **2.6** |
| **CO-3** | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 2 | 2 | 3 | 3 | **2.4** |
| **CO-4** | 3 | 2 | 3 | 2 | 3 | 2 | 2 | 3 | 3 | 3 | 2 | 2 | **2.5** |
| **CO-5** | 3 | 2 | 2 | 2 | 3 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | **2.4** |
| **CO-6** | 2 | 3 | 3 | 3 | 3 | 2 | 3 | 2 | 2 | 3 | 3 | 2 | **2.6** |
| **CO-7** | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 2 | 2 | 3 | 3 | **2.4** |
| **CO-8** | 3 | 2 | 3 | 2 | 2 | 3 | 2 | 3 | 2 | 2 | 3 | 3 | **2.5** |
| **Average** | **2.6** | **2.1** | **2.6** | **2.1** | **2.4** | **2.6** | **2.5** | **2.6** | **2.1** | **2.5** | **2.9** | **2.8** |  |