Program : **Diploma in Computer Engineering / Computer Hardware Engineering/ Information Technology / Cloud Computing and Bigdata / Cyber Forensics and Information Security / Communication and Computer Networking / Computer Science & Engineering / Artificial Intelligence / Artificial Intelligence Engineering**	
Course Code : **2139**	Course Title: **Problem Solving and Programming Lab**
Semester : **2**	Credits: **No Credit**
Course Category: **Engineering Science**	
Periods per week: **3 (L:0 T:0 P:3)**	Periods per semester: **45**

Course Objectives:

- Provide an exposure to problem solving through programming.
- Write programs for solving computing problems using C language as a tool.
- Code, debug and execute programs using different software tools.

Course Prerequisites:

Topic	Course code	Course name	Semester
Basic knowledge in Computer systems		Introduction to IT systems Lab	I

Course Outcomes :

On completion of the course, the student will be able to:

COn	Description	Duration (Hours)	Cognitive Level
CO1	Apply basic programming concepts to solve simple mathematical problems.	10	Applying
CO2	Solve problems using different control structures.	13	Applying
CO3	Apply the basic concept of Modular program design to solve problems effectively.	6	Applying

CO4	Develop programs using single and multi dimensional arrays.	13	Applying
	Lab Exam	3	

CO – PO Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3			3			
CO2	3			3			
CO3	3			3			
CO4	3	3	3	3		3	

3-Strongly mapped, 2-Moderately mapped, 1-Weakly mapped

Course Outline

Module Outcomes	Name of the Experiment	Duration (Hours)	Cognitive Level
CO1	**Apply basic programming concepts to solve simple mathematical problems.**		
M1.01	Identify basic operating system commands, editor softwares/IDEs.	2	Applying
M1.02	Translate C programs into executable programs.	1	Applying
M10.3	Experiment with input and output operations in C using simple programs.	2	Applying
M1.04	Develop programs to evaluate simple mathematical expressions.	4	Applying
M1.05	Make use of built in functions in C to solve problems.	1	Applying
CO2	**Solve problems using conditional control structures.**		
M2.01	Use if – else structure to solve decision making problems	1	Applying
M2.02	Make use of if-else-if, nested if - to solve problems	3	Applying
M2.03	Develop programs using switch – case and conditional operator.	2	Applying
M2.04	Make use of looping structures in C – while, do-	4	Applying

	while, for - to solve problems		
M2.05	Use break and continue statements to early exit from loops	1	Applying
M2.06	Develop programs using conditional structures and looping statements to solve real world problems	2	Applying
	Lab Exam - I	1.5	
CO3	**Apply the basic concept of Modular program design for developing C programming solutions.**		
M3.01	Develop user defined functions to solve problems in C.	6	Applying
CO4	**Develop programs using single and multi dimensional arrays.**		
M4.01	Develop C programs to solve problems using one dimensional arrays.	4	Applying
M4.02	Develop C programs to solve problems using two dimensional arrays.	3	Applying
M4.03	Open Ended Experiments **	6	Applying
	Lab Exam - II	1.5	

**** - Sample Open Ended Experiments**

(Not for End Semester Examination but compulsory to be included in Continuous Internal Evaluation. Students can do open ended experiments as a group of 2-3. There is no duplication in experiments between groups)

1. Write a program that computes the cost of a long-distance call. The cost of the call is determined according to the following rate schedule:

   Any call started between 8:00 am and 6:00 pm, Monday through Friday, is billed at a rate of ₹ 0.40 per minute.

   Any call starting before 8:00 am or after 6:00 pm, Monday through Friday, is charged at a rate of ₹ 0.25 per minute.

   Any call started on a Saturday or Sunday is charged at a rate of ₹0.15 per minute.

   The input will consist of the day of the week, the time the call started, and the length of the call in minutes. The output will be the cost of the call. The time is to be input in 24-hour notation, so the time 1:30 pm is input as 13:30.

   The program should include a loop that lets the user repeat this calculation until the user says she or he is done.

Text / Reference

T/R	Book Title/Author
T1	Balagurusamy E, Programming in ANSI C 7th Ed.
T2	Byron Gottfried - Schaum's Outline Of Programming With C
R2	Paul J. Deitel, Harvey Deitel, C How to Program
R3	Yashavant Kanetkar, Let Us C
R4	Herbert Schild, C: The Complete Reference
R5	Brian W. Kernighan, Dennis M. Ritchie, C Programming Language, 2nd Ed.

Online Resources

Sl.No	Website Link
1	https://nptel.ac.in/courses/106104128/
2	https://www.programiz.com/c-programming
3	https://www.tutorialspoint.com/cprogramming/index.htm