

Course Title:	<b>Principles of Programming using C (POPC)</b>		
Course Code:	<b>BPOPS103</b>	CIE Marks	50
Course Type (Theory/Practical /Integrated)	Integrated	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L: T: P: S)	2-0-2-0	Exam Hours	03
Total Hours of Pedagogy	32 Hours Theory + 10-12 Lab Slots	Credits	03

### Course Learning Objectives

- CLO 1. Understand the functionalities of a computer and basic concepts of C programming.  
CLO 2. Apply programming constructs of C language to solve real-world problems.  
CLO 3. Gain knowledge of functions and strings of C program.  
CLO 3. Explore data structures like arrays, structures, and pointers in implementing solutions to problems.  
CLO 4. Design and Develop solutions to problems using C programming constructs.

### Teaching-Learning Process

Teachers can use these sample strategies to accelerate the attainment of the various course outcomes.

1. Lecturer method (L) need not to be only a traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.
2. Use of Video/Animation to explain the functioning of various concepts.
3. Encourage collaborative (Group Learning) Learning in the class.
4. Adopt Problem-Based Learning (PBL), which fosters students' analytical and thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.
5. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding
6. Use any of these methods: Chalk and board, Active Learning, Case Studies

#### Module-1

**8 Hours**

Introduction to computers, designing efficient programs, **Introduction to C:** Structure of C program, writing the first c program, Files used in C program, Compiling and executing C programs, using comments, C Tokens, Character set in C, Keywords, Identifiers, Basic Data Types, variables, constants.

**Textbook 1:** Chapter 1- 1.1 to 1.5, Chapter 8 – 8.1 to 8.5, Chapter 9 – 9.2 to 9.13

#### Module-2

**8 Hours**

Input/output statements in C, Operators in C, Type conversion and typecasting, **Decision control and Looping statements:** Introduction to decision control, Conditional branching statements, iterative statements, nested loops, break and continue statements, goto statement.

**Textbook 1:** Chapter 9 – 9.14 to 9.16, Chapter 10 – 10.1 to 10.6

#### Module-3

**8 Hours**

**Functions:** Introduction, using functions, function declaration, Function definition, function call, return statement, passing parameters to functions, scope of variables, recursive function **Arrays:** Introduction, Declaration of arrays, accessing the elements of an array, storing values in arrays, Operations on arrays, Passing arrays to functions, two-dimensional arrays, operations on two-dimensional arrays, passing two-dimensional arrays to functions.

<b>Textbook 1:</b> Chapter 11 – 11.1 to 11.8,11.10, Chapter 12– 12.1 to 12.9	
<b>Module-4</b>	<b>8 Hours</b>
<b>Strings:</b> Introduction, operations on strings, Miscellaneous string, and character functions, arrays of strings. <b>Pointers:</b> Introduction to pointers, declaring pointer variables, null pointers, generic pointers, passing arguments to functions using pointers.	
<b>Textbook 1:</b> Chapter 13 - 13.1,13.4 to 13.6, Chapter 14 - 14.2 to 14.7	
<b>Module-5</b>	<b>8 Hours</b>
<b>Structure and Union:</b> Introduction, Nested structures, array of structures, structures and functions, Unions, array of unions variables, unions inside structures, structures inside unions <b>Files:</b> Introduction to files, using files in C, reading and writing data files, Detecting end of file	
<b>Textbook 1:</b> Chapter 15 - 15.1 to 15.4, 15.6 to 15.9, Chapter - 16.1 to 16.5	
<b>Programming Exercises:</b>	
<ol style="list-style-type: none"> <li>1. Simulation of a simple calculator.</li> <li>2. Compute the roots of a quadratic equation by accepting the coefficients. Print appropriate messages.</li> <li>3. Find the Armstrong Number between 1 to 1000.</li> <li>4. Display the pascal triangle by reading the number of rows as input,</li> <li>5. Implement Binary Search on Integers.</li> <li>6. Implement Matrix multiplication and validate the rules of multiplication.</li> <li>7. Compute <math>\sin(x)/\cos(x)</math> using Taylor series approximation. Compare your result with the built-in library function. Print both the results with appropriate inferences.</li> <li>8. Sort the given set of N numbers using Bubble sort.</li> <li>9. Write functions to implement string operations such as compare, concatenate, and find string length. Use the parameter passing techniques.</li> <li>10. Implement structures to read, write and compute average- marks of the students, list the students scoring above and below the average marks for a class of N students.</li> <li>11. Compute the sum, mean and standard deviation of all elements stored in an array of N real numbers using pointers.</li> <li>12. Copy a text file to another file, read both the input file name and target file name.</li> </ol>	
<b>Course Outcomes</b>	
At the end of the course, the students should be able to:	
<b>CO 1: Understand</b> the basic concepts of computer, operator, datatypes, functions, arrays, strings, pointer and structure.	
<b>CO 2: Apply</b> the concepts of functions, strings, and data structures to solve the problem.	
<b>CO 3: Analyze</b> the various flow control statements and data structures.	
<b>CO 4: Explore</b> the knowledge of C programming for real-world problems.	

## CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	2										
CO2	3	2									2
CO3	2	3									2
CO4	2	2			2						2

### Textbooks

1. Computer fundamentals and programming in c, "Reema Thareja", Oxford University, Second edition, 2017.

### Reference Books

1. E. Balaguruswamy, Programming in ANSI C, 7th Edition, Tata McGraw-Hill.
2. Brian W. Kernighan and Dennis M. Ritchie, The 'C' Programming Language, Prentice Hall of India.

### Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

#### Continuous Internal Evaluation (CIE):

The CIE marks for the theory component of the IC shall be **25 marks** and for the laboratory component **25 Marks**.

#### CIE for the theory component of the IC

- Two Tests each of 25 Marks scaled down to 15 Marks after the completion of the syllabus of 40-50% and 90-100% respectively.
- Two Assignments/two quizzes/ seminars/one field survey and report presentation/one-course project totaling 10 marks.

Total Marks scored (test + assignments) (15+10) **25 marks**

#### CIE for the practical component of the IC

- On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. The 15 marks are for conducting the experiment and preparation of the laboratory record, the other 10 marks shall be for the test conducted at the end of the semester.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 15 marks. Marks of all experiments' write-ups are added and scaled down to 15 marks.
- The laboratory test (duration 02 hours) at the end of the 15th week of the semester after completion of all the experiments (whichever is early) shall be conducted for 50 marks and scaled down to 10 marks.

- Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IC/IPCC for 25 marks (10+15).
- The minimum marks to be secured in CIE to appear for SEE shall be 10 (40% of maximum marks) in the theory component and 10 (40% of maximum marks) in the practical component. The laboratory component of the IC/IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included. The maximum of 05 questions is to be set from the practical component of IC/IPCC, the total marks of all questions should not be more than 25 marks.

The theory component of the IC shall be for both CIE and SEE.

### **Semester End Examination (SEE):**

#### **SEE for IC**

Theory SEE will be conducted by the Institute as per the scheduled time-table, with common question papers for the course (duration 03 hours)

- The question paper will have ten questions. Each question is set for 20 marks.
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.
- The students have to answer 5 full questions, selecting one full question from each module.

**The theory portion of the Integrated Course shall be for both CIE and SEE, whereas the practical portion will have a CIE component only. Questions mentioned in the SEE paper shall include questions from the practical component).**

#### **Passing standard:**

- The minimum marks to be secured in CIE to appear for SEE shall be 10 (40% of maximum marks-25) in the theory component and 10 (40% of maximum marks -25) in the practical component. The laboratory component of the IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included. The maximum of 04/05 questions to be set from the practical component of IPCC, the total marks of all questions should not be more than 25 marks.

SEE will be conducted for 100 marks and students shall secure 35% of the maximum marks to qualify for the SEE. Marks secured will be scaled down to 50.