

**Second year of Five Years integrated M. Sc. (Physics)  
M.Sc.-II, Semester-III**

	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>MM 210: FUNDAMENTALS OF COMPUTER PROGRAMMING</b>	<b>3</b>	<b>1</b>	<b>2</b>	<b>5</b>

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- **COMPUTER FUNDAMENTALS** **(06 Hours)**  
Preliminary Concepts of Algorithms. Flow Charts and their execution traces. A simplified model of a Computer. Bit, byte, nibble, word, structure of computer (Von Neumann), I/O unit, ALU, CPU, CU, MU, different types of I/O devices.

- **DIGITAL TECHNIQUES** **(08 Hours)**  
Number system: Decimal, binary, octal, hexa decimal. Conversion. BCD, EBCD, ASCII code, Arithmetic operations on binary numbers: addition, subtraction using 1's and 2's complement, multiplication, division.

- **LOGIC GATES** **(06 Hours)**  
AND, OR, NOT, NAND, NOR, XOR gate, truth tables.

- **PROGRAMMING IN C BASICS** **(22 Hours)**

VARIABLES – CONSTANTS – EXPRESSIONS - Operators and their precedence and associativity. Basic input and out put statements. Control structures. Simple programs in C using all the operators and control structures.

#### **FUNCTIONS**

Concepts of a function – Parameters and how they are passed – Auto Variables – Recursion – Scope and extent of variables. Writing programs using recursive and non-recursive functions.

#### **ARRAYS AND STRINGS**

Single and Multi dimensional arrays – Character array as a string. Functions on strings. Writing C Programs using arrays and for string manipulation.

#### **STRUCTURES**

Declaring and using structures. Operations on structures – Arrays of structures. User defined data types. Pointers to using Files.

#### **FILES**

Introduction- File Structure. File handling functions. File types. Error handling. C programming examples for using files.

**(Total Contact Time (Theory) : 42 Hours)**

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## PRACTICALS:

1. Write program to read x, y coordinates of 3 points and then calculate the area of a triangle formed by them and print the coordinates of the three points and the area of the triangle. What will be the output from your program if the three given points are on a straight line
  2. Write a program which generates 100 random integers in the range of 1 to 100. Store them in an array and then print the array. Write 3 versions of the program using different loop constructs e.g. for, while, do while
  3. Write a set of string manipulation functions e.g. for getting a sub string from a given position. Copying one string to another, reversing a string, adding one to another
  4. Write a program which determines the largest and the smallest number that can be stored in different data types like short, long, float and double. What happens when you add 1 to the largest possible integer number that can be stored
  5. Write a program which generates 100 random numbers in the range of 10.0 to 20.0 and sort them in descending order
  6. Write a function for transposing a square matrix in place i.e. do not use full temporary matrix
  7. First use an editor to create file with some integer numbers. Now write a program to read these numbers from the file to compute their mean and standard deviation
  8. Given two points on the surface of a sphere, write a program to determine the smallest arc length between them
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## BOOKS RECOMMENDED:

1. **Rajaraman V.**, "*Programming in C*", PHI, 1994.
2. **Gottfried B. S.**, "*Theory and Problems of Programming with C*", Schaum Publishing Company, New York, 1995.
3. **K.R. Venugopal & Sudeep R Prasad**, "*Programming with C*": TMH, New Delhi, 2002.
4. **Mano M. Morris**, "*Computer Engineering: Hardware Design*", Prentice Hall, US edition, 1988.
5. **Balagurusamy E.**, "*Programming in ANSI C*", 3rd Ed., TMH, New Delhi, 2004.