

**BT 0065**

**C Programming and Data Structures**

<b>Contents</b>	
<b>Unit 1</b>	
Introduction to C Language	1
<b>Unit 2</b>	
Algorithms and Flow Charts	12
<b>Unit 3</b>	
Introduction to Programming	25
<b>Unit 4</b>	
Arrays	53
<b>Unit 5</b>	
Functions	75
<b>Unit 6</b>	
Structures, Unions and Pointers	99
<b>Unit 7</b>	
File Structures	120
<b>Unit 8</b>	
Overview of Data Structure	140
<b>Unit 9</b>	
Stacks and Queues	150

Edition: Spring 2009

BKID – B0949 10<sup>th</sup> Dec. 2008

<hr/>	
<b>Unit 10</b>	
Linked Lists	199
<hr/>	
<b>Unit 11</b>	
Trees and Their Applications	229
<hr/>	
<b>Unit 12</b>	
Graphs and Their Applications	272
<hr/>	
<b>Unit 13</b>	
Searching and Sorting	292
<hr/>	

Manipal

**Prof. V. B. Nanda Gopal**

Director &amp; Dean

Directorate of Distance Education

Sikkim Manipal University of Health, Medical &amp; Technological Sciences (SMU DDE)

**Board of Studies****Dr. U. B. Pavanaja (Chairman)**

General Manager – Academics

Manipal Universal Learning Pvt. Ltd.

Bangalore

**Prof. Bhushan Patwardhan**

Chief Academics

Manipal Education, Bangalore

**Dr. Harishchandra Hebbar**

Director, Manipal Centre for

Info. Sciences, Manipal

**Dr. N. V. Subba Reddy**

HOD – CSE

Manipal Institute of Technology

Manipal

**Dr. Ashok Hegde**

Vice President

MindTree Consulting Ltd., Bangalore

**Dr. Ramprasad Varadachar**

Director, Computer Studies

Dayanand Sagar College of Engg.

Bangalore

**Mr. M. K. N. Prasad**

Controller of Examinations

Sikkim Manipal University – DDE, Manipal

**Mr. Nirmal Kumar Nigam**

HOP – IT

Sikkim Manipal University – DDE

Manipal

**Dr. A. Kumaran**

Research Manager (Multilingual)

Microsoft Research Labs India, Bangalore

**Mr. Ravindranath P. S.**

Director (Quality)

Yahoo India, Bangalore

**Dr. Ashok Kallarakkal**

Vice President

IBM India

Bangalore

**Mr. H. Hiriyannaiah**

Group Manager

EDS Mphasis, Bangalore

**Mr. Ashok Kumar K.**

Additional Registrar

Sikkim Manipal University – DDE

Manipal

**Content Preparation Team****Content Writing****Mr. Arindam Ray**

Senior Lecturer – IT

Sikkim Manipal University – DDE, Bangalore

**Language Editing****Mr. Shridhar Bhat**

HOD – English, Govt. First Grade College for Women, Ajjarkadu, Udupi

**Content Editing****Dr. E. R. Naganathan**

Professor &amp; HOD – IT

Sikkim Manipal University

Manipal – 576 104

**Edition: Spring 2009**

This book is a distance education module comprising a collection of learning material for our students. All rights reserved. No part of this work may be reproduced in any form by any means without permission in writing from Sikkim Manipal University of Health, Medical and Technological Sciences, Gangtok, Sikkim. Printed and published on behalf of Sikkim Manipal University of Health, Medical and Technological Sciences, Gangtok, Sikkim by Mr. Rajkumar Mascaren, GM, Manipal Universal Learning Pvt. Ltd., Manipal – 576 104. Printed at Manipal Press Limited, Manipal.



**Manipal**

## **SUBJECT INTRODUCTION**

This book explores role and importance of C Programming Language and data structures. It discusses the features of C Programming Language like basic constructs, functions, pointers, and files. It also covers the data structures used to optimize the usage of memory. Data structures are explained clearly with C programming examples and illustrations.

### **Unit 1: Introduction to Language C**

This unit covers the historical development, character sets, variables, data types, operators and expressions.

### **Unit 2: Algorithms & Flowcharts**

This unit covers the description and application of algorithms and flowcharts.

### **Unit 3: Introduction to Programming**

This unit covers fundamental units of C language, statements, and program writing. Sample programs are given to support the concepts described in this unit.

### **Unit 4: Arrays**

This unit covers the Definitions and concept of an array, single and double dimension array, C Preprocessor, and storage classes.

Definition of pointers, Declaring pointer variable, pointer operators, Pointers and Arrays, Pointers and Functions, structures, Declaring initializing of structure, processing of structure, Structure with array.

### **Unit 5: Functions**

This unit introduces general structure of a function. The different categories of functions, like library functions and user defined functions, are also discussed with examples.

### **Unit 6: Structures, Unions and Pointers**

This unit covers the definition and declaration of pointer variables, pointer operators & arithmetic, and manipulation of pointers. It also discusses the general structures of structure and union data types and their implementation in C.

### **Unit 7: File Structures**

This unit demonstrates the usage of file structure. It focuses on file creation, file manipulation, and file closing operations.

### **Unit 8: Overview of Data Structure**

This unit covers the overview of the Data structure, Definition of Data structure, Data types and Structured data type, Abstract data type, pre and post conditions, Linear Data structure, and also discussed the implementation methods using C, Non linear data structures.

### **Unit 9: Stack and Queue**

This unit covers the definition, declaration, and manipulation of the data structures stack and queue. It also covers algorithms and applications of stack and queues. Various operation are illustrated using C.

### **Unit 10: Linked List**

This unit covers the Introduction of Lists, Linear list, Linked list, Typical basic linked-list operations, singly-linked list, circular singly linked list, with its operations Doubly linked list with its operations. Various list operation examples are illustrated using C.

### **Unit 11: Trees and their Applications**

This unit covers the Introduction of Trees, Definitions, Binary tree, Storage representation of a Binary tree, Various operations on binary trees using linked representation, Binary Search tree [BST], and operations of BST.

**Unit 12: Graphs and their Application**

This unit covers the Overview of Graphs, and their applications. Various graph algorithms are also discussed in this unit.

**Unit 13: Searching & Sorting**

This unit covers basic searching techniques and performance analysis of searching techniques, sorting algorithms and performance criteria used in evaluating sorting algorithms.

**Note: Softcopies of Programs are available in TeL Portal**



Manipal



**Manipal**