# Contents

About the Author Preface Roadmap to the Model Syllabus

#### 1. Fundamentals of Computers 1.1

- 1.1 Introduction 1.1
- 1.2 History of Computers 1.2
- 1.3 Generations of Computers 1.3
- 1.4 Classification of Computers 1.7
- 1.5 Basic Anatomy of a Computer System 1.8
- 1.6 Input Devices 1.9
- 1.7 Processor 1.11
- 1.8 Output Devices 1.11
- 1.9 Memory Management 1.13
- 1.10 Types of Software 1.14
- 1.11 Overview of Operating System 1.15
- 1.12 MS Word 1.21
- 1.13 MS Excel 1.32
- 1.14 Networking Concepts 1.46

Just Remember 1.49 Multiple Choice Questions 1.49 Review Questions 1.50

Key Terms 1.52

# 2. Computing Concepts 2.1

- 2.1 Introduction 2.1
- 2.2 Binary Number System 2.1
- 2.3 Binary Codes 2.2
- 2.4 Binary Arithmetic Operations 2.4
- 2.5 Logic Gates 2.9

- 2.6 Derived Logic Gates 2.12
- 2.7 Programming Languages 2.14
- 2.8 Programming Environment 2.17
- 2.9 Introduction to the Design and Implementation of Correct, Efficient and Maintainable Programs 2.17

ii

ix

xi

- 2.10 Structured Programming 2.18
- 2.11 Translator Programs 2.18
- 2.12 Problem Solving Techniques 2.19
- 2.13 Tracing an Algorithm 2.29
- 2.14 Using the Computer 2.30

Just Remember 2.31 Multiple Choice Questions 2.31 Review Questions 2.32 Review Exercises 2.33 Key Terms 2.34

- 3. Overview of C *3.1* 
  - 3.1 History of C *3.1*
  - 3.2 Importance of C 3.2
  - 3.3 Sample Program 1: Printing a Message 3.3
  - 3.4 Sample Program 2: Adding Two Numbers 3.6
  - 3.5 Sample Program 3: Interest Calculation *3.7*
  - 3.6 Sample Program 4: Use of Subroutines 3.8

## vi Contents -

- 3.7 Sample Program 5: Use of Math Functions 3.9 Basic Structure of C Programs 3.11 3.8 3.9 Programming Style 3.11 3.10 Executing a 'C' Program 3.12 3.11 UNIX System 3.13 3.12 MS-DOS System 3.14 Just Remember 3.15 Multiple Choice Ouestions 3.15 Review Ouestions 3.16 Programming Exercises 3.18 Key Terms 3.19 4. Constants, Variables, and Data Types 4.1 4.1 Introduction 4.1 4.2 Character Set 4.1 4.3 C Tokens 4.2 4.4 Keywords and Identifiers 4.3 4.5 Constants 4.4 4.6 Variables 4.7 4.7 Data Types 4.8 4.8 Declaration of Variables 4.10 4.9 Declaration of Storage Class 4.13 4.10 Assigning Values to Variables 4.14 4.11 Defining Symbolic Constants 4.19 4.12 Declaring a Variable as Constant 4.20 4.13 Declaring a Variable as Volatile 4.20 4.14 Overflow and Underflow of Data 4.21 Just Remember 4.21 Multiple Choice Questions 4.22 Case Study 4.23 Review Questions 4.25 Programming Exercises 4.26 Kev Terms 4.27 5. Managing Input and Output **Operations** 5.1 5.1 Introduction 5.1 5.2 Reading a Character 5.1 5.3 Writing a Character 5.4
  - 5.4 Formatted Input 5.5

5.5Formatted Output5.13Just Remember5.19Multiple Choice Questions5.20Case Study5.21

Review Questions 5.24 Programming Exercises 5.26 Key Terms 5.27

#### 6. Operators and Expressions 6.1

- 6.1 Introduction 6.1
- 6.2 Arithmetic Operators 6.1
- 6.3 Relational Operators 6.3
- 6.4 Logical Operators 6.4
- 6.5 Assignment Operators 6.5
- 6.6 Increment and Decrement Operators 6.7
- 6.7 Conditional Operator 6.7
- 6.8 Bitwise Operators 6.8
- 6.9 Special Operators 6.8
- 6.10 Arithmetic Expressions 6.10
- 6.11 Evaluation of Expressions 6.10
- 6.12 Precedence of Arithmetic Operators 6.11
- 6.13 Some Computational Problems 6.12
- 6.14 Type Conversions in Expressions 6.13
- 6.15 Operator Precedence and Associativity 6.16
- 6.16 Mathematical Functions 6.18
- Just Remember 6.19
- Multiple Choice Questions 6.19
- Case Study 6.20
- Review Questions 6.22
- Programming Exercises 6.24
- Key Terms 6.26

## 7. Decision Making and Branching 7.1

- 7.1 Introduction 7.1
- 7.2 Decision Making with if Statement 7.1
- 7.3 Simple if Statement 7.2
- 7.4 The if.....Else Statement 7.5
- 7.5 Nesting of If....else Statements 7.7
- 7.6 The else if Ladder 7.9
- 7.7 The Switch Statement 7.12
- 7.8 The ? : Operator 7.15
- 7.9 The Goto Statement 7.17

Just Remember 7.20

Multiple Choice Questions 7.20

Case Study 7.21

- Review Questions 7.25
- Programming Exercises 7.28

Key Terms 7.30

## 8. Decision Making and Looping 8.1

- 8.1 Introduction 8.1
- 8.2 The while Statement 8.3
- 8.3 The do Statement 8.48.4 The for Statement 8.6
- 8.5 Jumps in Loops 8.13
- Just Remember 8.19
- Multiple Choice Questions 8.20
- Case Study 8.21
- Cuse Sinny 6.21
- Review Questions 8.27
- Programming Exercises 8.29
- Key Terms 8.31

# 9. Arrays 9.1

- 9.1 Introduction 9.1
- 9.2 One-dimensional Arrays 9.2
- 9.3 Declaration of One-dimensional Arrays 9.3
- 9.4 Initialization of One-dimensional Arrays 9.5
- 9.5 Two-dimensional Arrays 9.13
- 9.6 Initializing Two-dimensional Arrays 9.17
- 9.7 Multi-dimensional Arrays 9.20
- 9.8 Dynamic Arrays 9.21
- 9.9 More About Arrays 9.22 Just Remember 9.22

Multiple Choice Questions 9.23 Case Study 9.23 Review Questions 9.34

Programming Exercises 9.36 Key Terms 9.38

## 10. Character Arrays and Strings 10.1

- 10.1 Introduction 10.1
- 10.2 Declaring and Initializing String Variables 10.1
- 10.3 Reading Strings from Terminal 10.3
- 10.4 Writing Strings to Screen 10.7
- 10.5 Arithmetic Operations on Characters 10.10
- 10.6 Putting Strings Together 10.12
- 10.7 Comparison of Two Strings 10.13
- 10.8 String-handling Functions 10.13
- 10.9 Table of Strings 10.18
- 10.10 Other Features of Strings 10.19

Just Remember 10.20

Multiple Choice Questions 10.20 Case Study 10.21 Review Questions 10.24 Programming Exercises 10.26 Key Terms 10.27

## 11. User-Defined Functions 11.1

- 11.1 Introduction 11.1
- 11.2 Need for User-Defined Functions 11.1
- 11.3 A Multi-function Program 11.2
- 11.4 Elements of User-Defined Functions 11.4
- 11.5 Definition of Functions 11.4
- 11.6 Return Values and their Types 11.6
- 11.7 Function Calls 11.7
- 11.8 Function Declaration 11.9
- 11.9 Category of Functions 11.10
- 11.10 No Arguments and No Return Values 11.11
- 11.11 Arguments but No Return Values 11.12
- 11.12 Arguments with Return Values 11.15
- 11.13 No Arguments but Returns a Value 11.18
- 11.14 Functions that Return Multiple Values 11.18
- 11.15 Nesting of Functions 11.20
- 11.16 Recursion 11.21
- 11.17 Passing Arrays to Functions 11.22
- 11.18 Passing Strings to Functions 11.26
- 11.19 The Scope, Visibility and Lifetime of Variables 11.27
- 11.20 Multifile Programs 11.36
- Just Remember 11.37
- Multiple Choice Questions 11.38
- Case Study 11.39
- Review Questions 11.41
- Programming Exercises 11.44
- Key Terms 11.45

#### 12. Structures and Unions 12.1

- 12.1 Introduction 12.1
- 12.2 Defining a Structure 12.1
- 12.3 Declaring Structure Variables 12.2
- 12.4 Accessing Structure Members 12.4
- 12.5 Structure Initialization 12.5
- 12.6 Copying and Comparing Structure Variables 12.6
- 12.7 Operations on Individual Members 12.8

#### viii Contents -

12.8 Arrays of Structures 12.8
12.9 Arrays within Structures 12.10
12.10 Structures within Structures 12.12
12.11 Structures and Functions 12.14
12.12 Unions 12.16
12.13 Size of Structures 12.17
12.14 Bit Fields 12.17
Just Remember 12.20
Multiple Choice Questions 12.21
Case Study 12.22
Review Questions 12.25
Programming Exercises 12.27
Key Terms 12.29

#### 13. Pointers 13.1

- 13.1 Introduction 13.1
- 13.2 Understanding Pointers 13.1
- 13.3 Accessing the Address of a Variable 13.3
- 13.4 Declaring Pointer Variables 13.4
- 13.5 Initialization of Pointer Variables 13.5
- 13.6 Accessing a Variable through its Pointer 13.6
  13.7 Chain of Pointers 13.7
- 15./ Chain of Pointers 15./
- 13.8 Pointer Expressions 13.9
- 13.9 Pointer Increments and Scale Factor 13.10
- 13.10 Pointers and Arrays 13.11
- 13.11 Pointers and Character Strings 13.14
- 13.12 Array of Pointers 13.15
- 13.13 Pointers as Function Arguments 13.16
- 13.14 Functions Returning Pointers 13.18
- 13.15 Pointers to Functions 13.19
- 13.16 Pointers and Structures 13.21 Just Remember 13.23

Multiple Choice Questions 13.24

Case Study 13.25

- Review Questions 13.29
- Programming Exercises 13.31
- Key Terms 13.32

# 14. Dynamic Memory Allocation and Linked Lists 14.1

- 14.1 Introduction 14.1
- 14.2 Dynamic Memory Allocation 14.1
- 14.3 Allocating a Block of Memory: Malloc 14.2

- 14.4 Allocating Multiple Blocks of Memory: Calloc 14.4
- 14.5 Releasing the Used Space: Free 14.4
- 14.6 Altering the Size of a Block: Realloc 14.5
- 14.7 Concepts of Linked Lists 14.6
- 14.8 Advantages of Linked Lists 14.9
- 14.9 Types of Linked Lists 14.10
- 14.10 Pointers Revisited 14.10
- 14.11 Creating a Linked List 14.12
- 14.12 Inserting an Item 14.15
- 14.13 Deleting an Item 14.18
- 14.14 Application of Linked Lists 14.19

Just Remember 14.20

Case Study 14.20

- Review Questions 14.26
- Programming Exercises 14.27

## 15. File Management in C 15.1

- 15.1 Introduction 15.1
- 15.2 Types of Files 15.2
- 15.3 Defining and Opening a File 15.2
- 15.4 Closing a File 15.4
- 15.5 Input/Output Operations on Files 15.4
- 15.6 Error Handling During I/O Operations 15.9
- 15.7 Random Access to Files 15.11
- 15.8 Command Line Arguments 15.15

Just Remember 15.17 Multiple Choice Questions 15.18 Review Questions 15.19 Programming Exercises 15.20 Key Terms 15.20

#### 16. The Standard C Preprocessor 16.1

- 16.1 Introduction 16.1
- 16.2 Macro Substitution 16.2
- 16.3 File Inclusion 16.5
- 16.4 Compiler Control Directives 16.6
- 16.5 ANSI Additions 16.9
- Review Questions 16.11 Programming Exercises 16.12

1 rogramming Exercises 10.12

Appendix A:Database Management SystemA-A.1Appendix B:Introduction to Data StructuresA-B.1Appendix C:C99 FeaturesA-C.1

Solved Question Paper-B.Tech. Q.1