

Contents

Preface — V

About the Author — XIII

1	Introduction to Computers and Programming — 1
1.1	History of computers — 1
1.2	Introduction to computer and computer science — 1
1.3	Introduction to software — 3
1.4	Programming languages — 6
1.5	Types of programming languages — 7
1.6	Review questions — 9
2	Introduction to Object-Oriented Programming and C++ — 11
2.1	Introduction — 11
2.2	Object-oriented concepts — 11
2.3	Introduction to C++ — 13
2.4	Versions of C++ — 14
2.5	Writing the first C++ program — 14
2.6	Compiling and running C++ Programs — 17
2.7	Running C++ programs online — 18
2.8	Running C++ programs in visual studio 2017 — 23
2.9	Running C++ programs in microsoft visual C++ — 28
2.10	Running C++ programs in codeblocks IDE — 32
2.11	Writing the first C++ program in CodeBlocks IDE — 38
2.12	Comprehensive understanding of object-oriented concepts in C++ — 41
2.13	Review questions — 45
3	Programming Basics — 47
3.1	Introduction — 47
3.2	Variables and identifiers — 47
3.3	C++ Keywords — 48
3.4	Data types — 49
3.5	C++ Literals and constants — 52
3.6	Type casting — 60
3.7	Input and output manipulators — 62
3.8	Storage duration and scope — 63
3.9	Review questions — 69

4	Operators and Expressions — 71
4.1	Introduction — 71
4.2	Relational and equality operators — 72
4.3	Arithmetic operators — 72
4.4	Bitwise operators — 73
4.5	Assignment operators — 77
4.6	Increment and decrement operators — 78
4.7	Logical operators — 80
4.8	Conditional operator — 80
4.9	Operator precedence — 81
4.10	Review questions — 83
5	Selection Statements — 85
5.1	Introduction — 85
5.2	The if statement — 85
5.3	The if-else statement — 87
5.4	The if-else-if statement — 89
5.5	Nested if-else statement — 90
5.6	The switch statement — 93
5.7	The ternary operator — 97
5.8	Review questions — 99
6	Looping Statements — 101
6.1	Introduction — 101
6.2	The while loop — 101
6.3	The do-while loop — 104
6.4	The for loop — 107
6.5	Nesting of loops — 111
6.6	The break statement — 112
6.7	The continue statement — 116
6.8	Review questions — 117
7	Arrays — 121
7.1	Introduction — 121
7.2	One-dimensional arrays — 122
7.3	Multidimensional arrays — 125
7.4	Applications of two-dimensional arrays — 127
7.5	Review questions — 135

8	Strings and Pointers — 137
8.1	Introduction — 137
8.2	String library functions — 141
8.3	Array of strings — 143
8.4	Introduction to pointers — 144
8.5	Pointer to pointer — 148
8.6	Pointers and arrays — 150
8.7	Array of pointers — 152
8.8	Review questions — 153
9	Searching and Sorting — 155
9.1	Introduction — 155
9.2	Searching — 155
9.3	Linear search — 155
9.4	Binary search — 157
9.5	Sorting — 159
9.6	Insertion sort — 160
9.7	Selection sort — 162
9.8	Bubble sort — 164
9.9	Sorting characters and strings — 167
9.10	Review questions — 172
10	Functions — 173
10.1	Introduction — 173
10.2	Defining a function — 174
10.3	Arguments and parameters — 177
10.4	Scope of function variables — 180
10.5	Static variables — 183
10.6	Scope resolution operator — 185
10.7	Functions and pointers — 187
10.8	Recursive functions — 190
10.9	Inline functions — 197
10.10	Built-in functions — 198
10.11	Review questions — 200
11	Structures and Unions — 203
11.1	Introduction — 203
11.2	Defining structures — 204
11.3	Initializing structures — 205
11.4	Accessing structure members — 206
11.5	Using <code>typedef</code> keyword — 208

11.6	Nested structures — 209
11.7	Structures containing arrays — 211
11.8	Arrays of structures — 215
11.9	Structures and pointers — 218
11.10	Structures and functions — 220
11.11	Unions — 223
11.12	Review questions — 226
12	Exception Handling — 227
12.1	Introduction — 227
12.2	Handling exceptions — 230
12.3	Multiple catch statements — 231
12.4	Exceptions within functions — 234
12.5	C++ standard exceptions — 235
12.6	Review questions — 237
13	Basic I/O and File Handling — 239
13.1	Introduction — 239
13.2	Standard input and output — 239
13.3	File I/O — 242
13.4	Review questions — 251
14	Classes and Objects — 253
14.1	Introduction — 253
14.2	Object definition — 253
14.3	Class definition — 254
14.4	Overloaded methods — 259
14.5	Multiple objects — 260
14.6	Array of objects — 261
14.7	Access modifiers — 264
14.8	Review questions — 267
15	Constructors and Destructors — 269
15.1	Introduction — 269
15.2	Default constructors — 271
15.3	Constructors with parameters — 273
15.4	Multiple constructors — 277
15.5	Copy constructor — 278
15.6	Destructors — 280
15.7	Review questions — 281

16 Inheritance — 283

- 16.1 Introduction — 283
- 16.2 Single inheritance — 283
- 16.3 Multiple inheritance — 288
- 16.4 Multilevel inheritance — 289
- 16.5 The protected keyword — 291
- 16.6 Overriding data and methods — 293
- 16.7 Constructors and inheritance — 294
- 16.8 Review questions — 298

17 Polymorphism — 299

- 17.1 Introduction — 299
- 17.2 Static polymorphism — 299
- 17.3 Dynamic polymorphism — 305
- 17.4 Pure virtual function and abstract classes — 312
- 17.5 Review questions — 313

18 Templates — 315

- 18.1 Introduction — 315
- 18.2 Function template — 317
- 18.3 Class template — 320
- 18.4 Standard template library — 322
- 18.5 Review questions — 325

Appendix A — 327**Appendix B — 335****Appendix C — 337****Appendix D — 343****Appendix E — 345****Index — 347**