

CONTENTS

Chapter 1 – COMPUTER AIDED INSTRUCTION..... 1

1. Introduction	1
2. Computer Aided Instruction	4
2.1 Advantages of CAI	5
2.2 Principles to be followed in developing packages on CAI	5
3. CAI Packages for selected Data Structures	6
3.1 CAI for understanding the data structure Stack ..	7
3.2 Conversion of Infix Expression to Reverse Polish – A graphical presentation	8
3.3 Evaluation of Postfix expression – A Simulation	8
3.4 CAI for understanding IEEE representation of Floating Point Numbers	9
4. Question Bank Tool kit.....	10
5. Computers to teach B+-Tree	11
6. Computers and Water Distribution System	12
7. CAI for Teaching Titration	13

Chapter 2 – CAI METHODOLOGIES..... 14

1. Drill and Practice.....	14
1.1 Purpose of Drill and Practice.....	14
1.2 Methodology.....	14
1.3 Strengths.....	15
1.4 Limitations.....	15
2. Tutorial.....	15
2.1 Purpose of Tutorials.....	16
2.2 Methodology.....	16
2.3 Strengths.....	16
2.4 Limitations.....	16
3. Simulation.....	17
3.1 Purpose of Simulation.....	17
3.2 Methodology.....	17
3.3 Strengths.....	17
3.4 Limitations.....	18
4. Games.....	18
4.1 Purpose of Games.....	18
4.2 Methodology.....	19
4.3 Strengths.....	19
4.4 Limitations.....	19

I. Introduction	20
II. CAI for understanding the data structure Stack	21
1. Definitions and Preliminaries	21
1.1 Stack.....	21
1.2 Stack Operations.....	22
2. Software Development Methodology.....	22
2.1 Help on Stack.....	23
2.2 Simulation of PUSH.....	23
2.3 Simulation of POP.....	23
3. Software Implementation	23
4. Advantages	24
5. Limitations	24
III. Conversion of Infix Expression to Reverse Polish - A graphical presentation	29
1. Polish and Reverse Polish notations.....	29
2. Algorithm for Software Implementation	30
3. Example of an Infix Expression and the steps in converting the same to Postfix Expression using the algorithm in 2.....	31
4. Advantages	33
5. Assumptions and Limitations.....	33
IV. Evaluation of Postfix Expression - A Simulation ...	37
1. Definitions and Preliminaries	37
1.1 Algorithm for evaluating the given RP expression.....	37
1.2 Example of RP expression and the steps in evaluating the same using the algorithm given in 1.1.....	38
2. Software Implementation	38

3. Limitations and Assumptions	39
4. Control Checks.....	43
V. CAI for understanding IEEE representation of Floating Point Numbers	44
1. Introduction.....	44
2. Preliminaries.....	44
2.1 Floating Point representation.....	44
2.1.1 Sign Bit.....	46
2.1.2 Fractional Part.....	46
2.1.3 Exponent.....	47
2.2 Steps required to convert a given floating point number to its equivalent IEEE single format.....	48
2.3 Steps required to convert a given IEEE single format to its equivalent real number.....	49
2.4 Special cases in IEEE format.....	49
3. Methodology and Software Implementation.....	50
3.1 Help on IEEE formats.....	50
3.2 Conversion of real number to IEEE format....	50
3.3 Conversion of IEEE format to real number....	51
3.4 special cases in IEEE format.....	52
4. Advantages.....	52
5. Limitations.....	53

Chapter 4 – QUESTION BANK TOOL KIT..... 57

1. Introduction.....	57
2. QBToolkit Software Development Methodology.....	58
3. QBToolkit for Teachers.....	60
3.1 Question Bank File Selection.....	60
3.2 Question Bank Management.....	60
3.3 Question Bank Usage.....	61
3.3.1 Work File preparation.....	62
3.3.2 Administrative controls on the work file...	63
3.3.3 Security on the work file.....	63
3.4 Drill & Practice for Teachers.....	63
3.5 Utilities.....	64
3.5.1 Question Bank Printing.....	64
3.5.2 Question Bank Statistics.....	64
3.5.3 QBToolkit to Shell.....	65
3.5.4 Key File Generation.....	65
4. QBToolkit for Students.....	65
4.1 Drill & Practice.....	65
4.2 Quiz.....	66
4.2.1 Performance Assessment.....	66
4.2.2 Performance Report.....	67
4.2.3 Feedback on wrongly Answered/Skipped Questions.....	67
5. Friendly Help.....	67
6. Advantages.....	68
7. QBToolkit Standards.....	69
QBToolkit User Manual.....	70

Chapter 5 - COMPUTERS TO TEACH B+-TREE CONCEPTS..... 98

1. Introduction.....	98
2. B+-Tree Properties.....	101
3. Capacity of a B+-Tree.....	101
4. B+-Tree Operations.....	102
5. Insertion of a key in B+-Tree.....	103
5.1 Algorithm for Insertion.....	103
5.2 Illustration of above algorithm with an example..	105
6. Deletion of a key from B+-Tree.....	109
6.1 Algorithm for Deletion.....	109
6.2 Illustration of above algorithm with an example..	112
7. Search.....	118
8. Software Implementation.....	118
8.1 Help on B+-Tree.....	119
8.2 B+-Tree Insertion.....	119
8.3 B+-Tree Deletion.....	120
8.4 B+-Tree Search.....	120
9. Advantages.....	128
10. Limitations of CAI Package.....	129

Chapter 6 - COMPUTERS AND WATER DISTRIBUTION SYSTEM..... 130

1. Background Points.....	130
2. Traditional and popular method of water distribution SHEJPALI.....	131
3. Rotational Water Supply (RWS).....	131
4. Software Implementation Methodology.....	132
4.1 Structure of Canal Network.....	132
4.2 Canal Network and Water Distribution Methodology Terminology.....	133
4.3 Preparation of RWS schedule.....	134
4.4 Steps required for preparing RWS schedule.....	135
4.5 Simulation of fields getting water.....	137
4.6 Simulation of preparation of RWS schedule.....	137
5. Software Implementation.....	137
6. Advantages of CAI package.....	141
7. Limitations of CAI package.....	141

APPENDIX..... 146

CAI for Teaching Titration.....	146
---------------------------------	-----

REFERENCES..... 148