Table of Contents

CII	apter 1: Introduction	1
1.1	Understanding Risk and Risk Analysis	1
1.2	A Brief Historical Account of Risk Analysis	13
Ch	apter 2 : Mathematics of Reliability & Safety Analysis	21
2.1	Elements of Probability Theory	21
2.2	Elements of Estimation Theory	36
2.3	Elements of Event Algebra (Boolean Algebra)	40
2.4	Bayes' Theorem and Bayesian Inference	44
Appe	endix 2.1: Main probability Distribution Functions	48
Ch	apter 3 : Reliability & Safety Analysis of Elementary Systems	51
3.1	Probability Concepts for Failure Analysis	51
3.2	Reliability and Availability of Single Components or Units of a System	55
3.3	Estimation of Reliability Parameters	59
Appe	endix 3.1: Laplace Transform	63
Ch	apter 4 : Qualitative Systems Risk Analysis Methods	67
4.1	Introduction	67
4.2	Preliminary Hazard List (PHL) and Preliminary Hazard Assessment (PHA) Methods	70
4.3	Method Organized for a Systematic Analysis of Risk (MOSAR)	74
Ch	apter 5 : Semi-Quantitative Systems Risk Analysis Methods	79
5.1	Introduction	79
5.2	Failure Modes, Effects and Criticality Analysis (FMECA)	79
5.3	Hazard and Operability Analysis (HAZOP)	88

Chapter 6: Quantitative Systems Risk Analysis Methods		95
6.1	Introduction	95
6.2	Success Path Analysis (SPA) – Reliability Block Diagram (RBD)	95
6.3	Fault Tree Analysis (FTA)	108
6.4	Event Tree Analysis (ETA)	120
6.5	Cause-Consequence Analysis (CCA)	134
6.6	Other Methods	139
Appendix 6.1: Binary Decision Diagrams		140
Bibliography		145