## **CONTENT**

			Page
Pref	ace		xvii
	out the A	uthor	xxi
1.	Introd	Introduction	
	1.1	A Brief History of management	1 1
	1.2	Definition of Management	3
	1.3	The Functions of management	4
	1.4	Types of Managerial Skills	4
	1.5	Management by Objectives (MBO)	5
	1.6	Goals of managers	6
	1.7	Management Levels	6
	1.8	Management Characteristics	7
	1.9	Useful Information on Engineering Management	7
	1.10	Need for Engineering management	8
	1.11	Summary	9
	1.12	Exercises	9
	1.13	References	10
2.	Organ		11
	2.1	Introduction	11
	2.2	Useful Guidelines for Planning an organization	11
	2.3	Designing an Organizational Structure of a Company	12
	2.4	Fundamental Relationships in Organizational Structures of Companies	13
	2.5	Span of Control	14
	2.6	Delegation  Controllization and Decentrolization of Organization	17 19
	2.7 2.8	Centralization and Decentralization of Organization Methods of Organization	20
	2.8	Functions of an Engineering Department	27
	2.10	Summary	28
	2.10	Exercises	29
	2.12	References	30
3.	Human Element in Engineering management		31
	3.1	Introduction	31
	3.2	Needs of an Engineer	31
	3.3	Routes Open to an Engineer for managerial Positions	32
	3.4	From Engineer to a Managerial Position	33
	3.5	Activities and Qualities of a manager	34
	3.6	Hints to Relieve Tensions	37
	3.7	Motivating Engineering Manpower	38
	3.8	Staff Meetings	39
	3.9	The Committees	41
	3.10	Displacing managers	43
	3.11	Summary	45
	3.12	Exercises	46
	3.13	References	46
4.	Creat	· · · · ·	49
	4.1	Introduction  Francisco de Salactico Francis Constituto	49
	4.2	Examination of Selective Factors in Creativity	50
	4.3	Creative Problem-Solving Steps	50
	4.4	Ways to Develop Creativity	51

	4.5	Characteristics of Creative Engineers and managers	52
	4.6	Climate for Creativity	53
	4.7	Attributes of a manager of Creative People	54
	4.8	Barriers to Creative Thinking	54
	4.9	Generation, Presentation and Evaluation of New ideas	56
	4.10	Ways to Kill Ideas	58
	4.11	Creativity Techniques	59
	4.12	Summary	62
	4.13	Exercises	63
	4.14	References	64
5.		ower Planning and Control	65
	5.1	Introduction	65
	5.2	Classification of Published Literature on manpower Planning and Control	65
	5.3	Manpower Planning and Control	66
	5.4	Selective mathematical models	68
	5.5	Summary	75
	5.6	Exercises	75
	5.7	References	76
6.		ing Engineering Projects	79
	6.1	Introduction	79
	6.2	Project Selection Factors	79
	6.3	Procedures for Engineering Project Selection and Feasibility analysis	81
	6.4	Project Selection models	88
	6.5	Summary	102
	6.6	Exercises	103
	6.7	References	103
7.		uction to Project management	105
	7.1	Introduction	105
	7.2	Need for Project management	106
	7.3	Characteristics of a project Management Procedure	106
	7.4	Responsibilities of a Project Organization	107
	7.5	Life Cycle Phases of the Project Organization and Functions of Project Management	
	7.6	Actions to Stimulate Project Success	109
	7.7	The Project Manager	109
	7.8	Critical Path Scheduling Techniques	110
	7.9	Symbols and Definitions used to Construct and Solve a CPM or a PERT Network	116
	7.10	Essential Formulas and a Procedure for Determining the Critical Path of a Network	
	7.11	Benefits and Drawbacks of the Critical Path Method	127
	7.12	Summary	128
	7.13	Exercises	128
	7.14	References	130
8.		gement of Technical Proposals and Specifications	131
	8.1	Introduction	131
	8.2	Technical Proposals	131
	8.3	Engineering Specifications	138
	8.4	Summary	141
	8.5	Exercises	142
	8.6	References	142
9.		gement of Engineering Contracts	145
	9.1	Introduction	145
	9.2	Essential Provisions of a Contract	146
	9.3	Engineering contract Documents	146
	9.4	Classifications of Contracts	148
	9.5	Selecting a Contractor for a Project	151
	9.6	Types of Tender and Determining the Progress of a Contract	152

	9.7	A Contract Negotiation Procedure	153
	9.8	Attributes of a Contract Negotiator and Useful Key Point for Successful Negotiation	
	9.9	Management of Bids	157
	9.10	Formulas for Determining Escalation in Price	159
	9.11	Summary	161
	9.12	Exercises	162
	9.13	References	163
10.	Techni	ques for Making Better Engineering Management Decisions	165
	10.1	Introduction	165
	10.2	Optimization Techniques	165
	10.3	Discounted Cash Flow Analysis	171
	10.4	Depreciation Techniques	177
	10.5	Business Operations Analysis	180
	10.6	Forecasting	183
	10.7	Decision Trees	192
	10.8	Fault Trees	195
	10.9	Summary	202
	10.10	Exercises	203
	10.11	References	205
11.	Mather	matical Models for Engineering Management Decision Making	207
	11.1	Introduction	207
	11.2	Large Plant Investment Decision Models	207
	11.3	Financial Investment Decision Models	207
	11.4	Engineering Equipment Repair Facility Decision Models	211
	11.5	Summary	214
	11.6	Exercises	214
	11.7	References	215
12.	Engine	pering Product Developing and Costing	217
	12.1	Introduction	217
	12.2	Product Developing	217
	12.3	Product Costing	224
	12.4	Summary	235
	12.5	Exercises	235
	12.6	References	236
13.	Manag	ement of Engineering Design	239
	13.1	Introduction	239
	13.2	Demand for Design	239
	13.3	Types of Design Work	241
	13.4	Eight-Step Procedure used in Designing	242
	13.5	Design Information Sources	247
	13.6	Design Specification	248
	13.7	Management Expectations from an Engineering Design Department and the Points	
		Associated with Design Requiring Decision	249
	13.8	Attributes of an Engineering Designer	250
	13.9	Management of Design Reviews	251
	13.10	Summary	254
		Exercises	255
	13.12	References	255
14.	Manag	ement of Engineering Drawings	257
	14.1	Introduction	257
	14.2	Types of Technical Illustrations and Drawings	257
	14.3	Users of Drawings	258
	14.4	Uses of Engineering Drawings	259
	14.5	Drawing Office	259
	14.6	Simple Rules for the Drafting Manager When Producing Original Drawings	263

	14.7	Ways to Reduce Drafting Costs	264
	14.8	An Approach for Releasing Engineering Drawings	266
	14.9	Management of Drawing Changes	267
	14.10	Engineering Drawing Check List	268
		Summary	268
		Exercises	269
	14.13	References	269
15.	Value Engineering and Configuration Management		271
	15.1	Introduction	271
	15.2	Value Engineering	272
	15.3	Configuration Management	275
	15.4	Summary	279
	15.5	Exercises	279
	15.6	References	279
16.	Management of Product Assurance Sciences		281
	16.1	Introduction	281
	16.2	Introduction to Reliability and Reliability Management	282
	16.3	Maintainability management	290
	16.4	Quality Control management	291
	16.5	System Safety Management	292
	16.6	Summary	294
	16.7	Exercises	295
	16.8	References	295
17.		eering Maintenance Management	297
	17.1	Introduction	297
	17.2	Functions and Organization of a Maintenance Engineering Department	297
	17.3	Maintenance Manual	298
	17.4	Contributing Objectives of Maintenance Engineering	300
	17.5	An Approach for Upgrading Maintenance	300
	17.6	Effective Maintenance Management	300
	17.7	Summary	307
	17.8 17.9	Exercises References	308 308
18.		uction to Marketing	309
	18.1	Introduction	309
	18.2	Functions of Marketing	309
	18.3	Marketing Approach	312
	18.4	Product Failure Due to Marketing Mistakes	314
	18.5	Mathematical Models Used in Marketing	314
	18.6	Summary	320
	18.7	Exercises	320
	18.8	References	320
19.	Product Warranties and Liabilities		323
	19.1	Introduction	323
	19.2	Warranties	324
	19.3	Product Liabilities	330
	19.4	Summary	332
	19.5	Exercises	333
	19.6	References	333
20.		uction to Work Study	335
	20.1	Introduction	335
	20.2	Reasons for and Criticisms of Performing Work Study	335
	20.3	Basic Approach to Performing Work Study	336
	20.4	Work Study Department and Engineer	336

	20.5	Method Study	338
	20.6	Work Measurement	342
	20.7	Incentive Plans	345
	20.8	Summary	347
	20.9	Exercises	347
	20.10	References	348
Index			349