

Table of Contents

<i>Preface</i>	<i>iii</i>
<i>Introduction</i>	<i>xvii</i>
Chapter 1: Overview of Production and Operations Management	1
1.1 Introduction	2
1.2 Concept of Production and Operations Management	2
1.2.1 Evolution of Production and Operations Management	3
1.2.2 Elements of Production and Operations Management	4
1.2.3 Objectives of Production and Operations Management	4
1.2.4 Scope of Production and Operations Management	5
1.2.5 Advantages of POM	6
1.3 Role and Responsibilities of a Productions and Operations Manager	7
1.4 Recent Trends in Production and Operations Management	8
1.5 Summary	11
1.6 Key Terms	11
1.7 Exercise.....	11
Multiple Choice Questions	11
Short Answer Type Questions	14
Long Answer Type Questions	14
Chapter 2: Operations Strategy	15
2.1 Introduction	16
2.2 Concept of Strategy	16
2.2.1 Features and Importance of Strategy	17
2.2.2 Levels of Strategy.....	18
2.2.3 Role of Strategists	19
2.3 Concept of Strategic Management	20
2.3.1 Definition of Strategic Management	21
2.3.2 Need of Strategic Management	21
2.3.3 Components of Strategic Management	22
2.3.4 Process of Strategic Management.....	22
2.3.5 Role of Strategic Management in an Organization	24

2.4	Concept of Operations Strategy	26
2.4.1	Competitive Priorities	26
2.4.2	Relationship among Organization, Operations, and Marketing Strategies	28
2.4.3	Factors Influencing Operations Strategy	29
2.4.4	Types of Operations Strategies.....	30
2.5	Modification of an Operations Strategy	36
2.6	Summary	37
2.7	Key Terms	37
2.8	Exercise.....	37
	Multiple Choice Questions	37
	Short Answer Type Questions	40
	Long Answer Type Questions	40
Chapter 3:	Forecasting.....	41
3.1	Introduction	42
3.2	Concept of Forecasting	42
3.2.1	Period of Forecasting.....	42
3.2.2	Forecasting in Different Departments	43
3.2.3	Steps in Forecasting	44
3.3	Techniques of Forecasting	45
3.3.1	Survey Method	45
3.3.2	Statistical Methods	47
3.4	Limitations of Forecasting.....	64
3.5	Criteria for Efficient Forecasting	65
3.6	Summary	67
3.7	Key Terms	67
3.8	Exercise.....	67
	Multiple Choice Questions	67
	Short Answer Type Questions	70
	Long Answer Type Questions	70
Chapter 4:	Product Analysis.....	71
4.1	Introduction.....	72
4.2	Concept of Product and its Characteristics.....	72
4.2.1	Levels of Product	72
4.2.2	Product Classification	73
4.2.3	Product Differentiation and its Basis	75
4.2.4	Product Line Analysis.....	76
4.2.5	Product Mix Analysis.....	77
4.3	Product Selection.....	79
4.4	Product Design	80
4.4.1	Factors to be Considered for Product Design.....	80
4.4.2	Design for Manufacture and Assembly (DFMA).....	87

4.4.3	Service Design	87
4.4.4	Different Techniques Used for Product Design.....	90
4.5	Concept of Product Development	90
4.5.1	Advantages of Product Development	91
4.5.2	Process of Developing the Existing Product	91
4.5.3	New Product Development Process.....	92
4.6	Summary	97
4.7	Key Terms	97
4.8	Exercise.....	98
	Multiple Choice Questions	98
	Short Answer Type Questions	100
	Long Answer Type Questions	100
Chapter 5:	Capacity Management	101
5.1	Introduction	102
5.2	Concept of Capacity	102
5.2.1	Short Run Average Costs	102
5.2.2	Long Run Average Cost	103
5.2.3	Long Run Marginal Cost	104
5.2.4	Economies of Scale	104
5.2.5	Diseconomies of Scale	105
5.3	Concept of Capacity Management.....	106
5.3.1	Determining Capacity Requirements.....	107
5.3.2	Relationship among Design Capacity, System Capacity, and Actual Output	107
5.4	Estimation of Equipment Requirements.....	108
5.5	Concept of Capacity Planning	110
5.6	Methods for Measuring Capacity	111
5.6.1	Linear Programming	111
5.6.2	Decision Tree Analysis	117
5.7	Summary	119
5.8	Key Terms	119
5.9	Exercise.....	119
	Multiple Choice Questions	119
	Short Answer Type Questions	122
	Long Answer Type Questions	122
Chapter 6:	Quality Management: Strategic Issues.....	123
6.1	Introduction.....	124
6.2	Quality Management.....	124
6.2.1	Dimensions of Quality.....	124
6.2.2	Evolution of Quality Management.....	126
6.2.3	Fourteen Points of Dr. Edward Deming for Quality	126
6.2.4	Importance of Better Quality	127

6.3	Total Quality Management	128
6.3.1	Importance of TQM	129
6.3.2	Barriers to the Implementation of TQM.....	129
6.4	Cost of Quality.....	130
6.4.1	Cost of Prevention	130
6.4.2	Cost of Inspection	131
6.4.3	Cost of Failure	131
6.5	International Organization for Standardization	131
6.5.1	Steps in ISO 9000 Registration	133
6.5.2	Advantages and Limitations of ISO 9000 Series	134
6.6	Summary	135
6.7	Key Words.....	136
6.8	Exercise.....	136
	Multiple Choice Questions	136
	Short Answer Type Questions	138
	Long Answer Type Questions	138
Chapter 7: Facility Location and Layout		139
7.1	Introduction	140
7.2	Concept of Facility Location.....	140
7.2.1	Factors Affecting a Facility Location	141
7.2.2	Alfred Weber's Theory of Industrial Location	142
7.2.3	Sargent Florence's Theory of Industrial Location	143
7.2.4	Influence of Government on Industry Location	143
7.3	Current Trends in Industry Location	143
7.4	Concept of Plant Layout.....	144
7.4.1	Objectives of an Effective Plant Layout.....	144
7.4.2	Types of Layouts	145
7.4.3	Factors Affecting a Plant Layout	147
7.4.4	Principles for Selecting a Layout	147
7.4.5	Prerequisites for Developing a Plant Layout	148
7.4.6	Process of Designing a Layout.....	148
7.4.7	Designing of a Plant Layout through Computers.....	148
7.4.8	Revision of an Existing Layout.....	149
7.5	Summary	151
7.6	Key Terms.....	151
7.7	Exercise.....	151
	Multiple Choice Questions	151
	Short Answer Type Questions	154
	Long Answer Type Questions	154

Chapter 8: Productivity	155
8.1 Introduction	156
8.2 Concept of Productivity	156
8.2.1 Factors Affecting Productivity	157
8.2.2 Ways to Improve Productivity	157
8.3 Concept of Job Analysis	158
8.3.1 Methods for Accumulating Job Analysis Data.....	159
8.3.2 Process of Job Analysis.....	162
8.4 Concept of Job Description	164
8.4.1 Guidelines for Job Description	165
8.4.2 Limitations of Job Description.....	165
8.5 Concept of Job Specification	166
8.5.1 Guidelines for Job Specification	166
8.5.2 Purpose of Job Specification	167
8.6 Concept of Job Design	167
8.6.1 Techniques of Job Design.....	167
8.6.2 Purpose of Job Design	171
8.7 Concept of Job Evaluation.....	172
8.7.1 Process of Job Evaluation	172
8.7.2 Limitations of Job Evaluation.....	174
8.7.3 Job Evaluation and Compensation.....	174
8.7.4 Pre-Requisites for Effective Job Evaluation	175
8.8 Work Study.....	175
8.8.1 Objectives of Work Study.....	175
8.8.2 Process of Work Study.....	176
8.8.3 Benefits of Work Study	176
8.9 Method Study	176
8.9.1 Objectives of Method Study	177
8.9.2 Advantages of Method Study	177
8.9.3 Process of Method Study	177
8.10 Motion Study	179
8.10.1 Principles of Motion Study	179
8.10.2 Micro-motion Study	180
8.10.3 Memo-motion Study	181
8.11 Work Measurement.....	181
8.11.1 Benefits of Work Measurement.....	182
8.11.2 Process of Work Measurement	182
8.11.3 Techniques of Work Measurement	182
8.13 Solved Illustrations	187
8.14 Summary	191
8.15 Key Terms	191
8.16 Exercise	191

Multiple Choice Questions 191
 Short Answer Type Questions 194
 Long Answer Type Questions 194

Chapter 9: Aggregate Planning 195

9.1 Introduction 196
 9.2 Concept of Aggregate Planning 196
 9.2.1 Master Production Schedule 197
 9.2.2 Functions of Master Production Schedule 197
 9.2.3 Requisites for Aggregate Planning 198
 9.2.4 Costs of Aggregate Planning 198
 9.2.5 Aggregate Planning Process 198
 9.2.6 Strategies of Aggregate Planning 199
 9.3 Concept of Linear Programming 200
 9.3.1 Assumptions of Linear Programming 200
 9.3.2 Advantages and Limitations of Linear Programming 201
 9.3.3 Formulation of Linear Programming Problems 202
 9.3.4 Methods to Solve Linear Programming Problems 204
 9.3.5 Sensitivity Analysis 214
 9.3.6 Important Applications of Linear Programming 218
 9.3.7 Refinements and Variations in the Linear Programming Model 219
 9.4 Transportation Model 219
 9.4.1 Mathematical Formulation of Transportation Problems 220
 9.4.2 Procedure for Solving Transportation Problems 222
 9.5 Summary 225
 9.6 Key Terms 225
 9.7 Exercise 225
 Short Answer Type Questions 228
 Long Answer Type Questions 228

Chapter 10: Material Requirement Planning 229

10.1 Introduction 230
 10.2 Introduction to Material Requirement Planning 230
 10.2.1 Concept of Dependent Demand 231
 10.2.2 Evolution of MRP 231
 10.2.3 Factors Affecting MRP 231
 10.2.4 MRP Guidelines 232
 10.2.5 Advantages and Disadvantages of MRP 232
 10.3 Inputs of MRP 233
 10.3.1 Master Production Schedule 233
 10.4 Lot Sizing 235
 10.5 MRP Updating 236
 10.6 Capacity Requirements Planning 236

10.7	Enterprise Resource Planning.....	237
10.8	Summary	239
10.9	Key Terms	239
10.10	Exercise.....	239
	Multiple Choice Questions	239
	Short Answer Type Questions	242
	Long Answer Type Questions	242
Chapter 11:	Materials Management.....	243
11.1	Introduction.....	244
11.2	Materials Management.....	244
	11.2.1 Objectives of Materials Management.....	244
	11.2.2 Importance of Materials Management.....	245
	11.2.3 Scope of Materials Management.....	245
	11.2.4 Hierarchical Structure of Materials Management.....	246
11.3	Materials Planning and Control	246
	11.3.1 Concept of Materials Planning.....	246
	11.3.2 Concept of Materials Budgeting.....	248
	11.3.3 Concept of Materials Control.....	248
11.4	Purchase Management.....	249
	11.4.1 Objectives of Purchasing	249
	11.4.2 Functions of a Purchase Department	249
	11.4.3 Purchase Organization	250
	11.4.4 Purchasing Cycle	250
	11.4.5 Value Analysis	252
11.5	Stores Management	252
	11.5.1 Objectives of Stores Management.....	253
	11.5.2 Functions of Stores Department.....	253
	11.5.3 Stores Location and Layout.....	253
	11.5.4 Types of Stores Layout	253
	11.5.5 Measurement of Stores Efficiency	254
	11.5.6 Stock Verification	254
	11.5.7 Classification and Codification.....	255
11.6	Materials Handling	255
	11.6.1 Objectives of Materials Handling.....	255
	11.6.2 Materials Handling Survey.....	256
	11.6.3 Classification of Materials Handling Equipment.....	258
	11.6.4 Selection of Materials Handling Equipment	259
11.7	Supply Chain Management.....	259
	11.7.1 Logistics	260
	11.7.2 Warehousing.....	261
11.8	Summary	263
11.9	Key Terms.....	263

11.10 Exercise..... 263
 Multiple Choice Questions 263
 Short Answer Type Questions..... 266
 Long Answer Type Questions 266

Chapter 12: Inventory Management..... 267

12.1 Introduction 268
 12.2 Concept of Inventory Management..... 268
 12.2.1 Objectives of Inventory Management 269
 12.2.2 Different Types of Inventory 269
 12.2.3 Inventory Costs..... 269
 12.2.4 Benefits of Inventory..... 270
 12.2.5 Process of Inventory Management 271
 12.3 Reorder Point 272
 12.4 Safety Stock..... 273
 12.5 Techniques of Inventory Management..... 273
 12.5.1 Stock Levels 273
 12.5.2 VED Analysis 275
 12.5.3 FSD Analysis 276
 12.5.4 Just in Time (JIT) Inventory Management..... 276
 12.5.5 Always Better Control (ABC) Analysis 276
 12.5.6 Economic Order Quantity (EOQ) Model..... 278
 12.6 Solved Illustrations..... 280
 12.7 Summary 286
 12.8 Key Terms 286
 12.9 Exercise..... 286
 Multiple choice questions..... 286
 Short Answer Type Questions..... 288
 Long Answer Type Questions 288

Chapter 13: Production Planning and Control 289

13.1 Introduction 290
 13.2 Concept of Production Planning..... 290
 13.3 Production Planning- A Part of Corporate Planning..... 290
 13.4 Meaning of Production Control 291
 13.5 Integration between Production Planning and Production Control..... 292
 13.6 Concept of Production Planning and Control 292
 13.4.1 Scope of Production Planning and Control..... 293
 13.4.2 Significance of Production Planning and Control..... 294
 13.4.3 Limitations of Production Planning and Control 295
 13.4.4 Process of Production Planning and Control..... 295

13.5	Concept of Line of Balance.....	298
13.5.1	Steps Involved in LOB Technique	298
13.5.2	Benefits of LOB Technique in Production	300
13.6	Summary	303
13.7	Key Terms	303
13.8	Exercise.....	303
	Multiple Choice Questions	303
	Short Answer Type Questions	305
	Long Answer Type Questions	306
Chapter 14:	Production Scheduling.....	307
14.1	Introduction	308
14.2	Overview of Production Scheduling	308
14.3	Concept of Loading	309
14.3.1	Types of Loading.....	309
14.3.2	Charts Used in Loading.....	310
14.3.3	Assignment Problems in Loading	312
14.4	Sequencing.....	324
14.4.1	Rules of Priority.....	325
14.4.2	Sequencing ‘n’ Jobs on One Machine	326
14.4.3	Sequencing ‘n’ Jobs on Two Machines	329
14.4.4	Sequencing ‘n’ Jobs on Three Machines	330
14.5	Project Scheduling	333
14.5.1	Developing a Project Network.....	333
14.5.2	Estimation of Time.....	336
14.5.3	Project Network Analysis.....	338
14.6	Summary	345
14.7	Key Terms	345
14.8	Exercise.....	346
	Multiple Choice Questions	346
	Short Answer Type Questions	348
	Long Answer Type Questions	348
Chapter 15:	Quality Control	349
15.1	Introduction	350
15.2	Concept of Quality Control.....	350
15.2.1	Functions of Quality Control.....	351
15.2.2	Significance of Quality Control	351
15.2.3	Process of Quality Control	352
15.2.4	Scope of Quality Control.....	353
15.3	Statistical Quality Control	353
15.4	Tools of Descriptive Statistics	354

15.5	Tools of Statistical Process Control.....	356
15.5.1	Control Charts for Variables.....	356
15.5.2	Control Charts for Attributes	360
15.6	Tools for Acceptance Sampling.....	362
15.6.1	Types of Sampling Plans	362
15.6.2	Operating Characteristic Curve	363
15.7	Six Sigma.....	363
15.7.1	Benefits of Six Sigma.....	364
15.7.2	Principles of Six Sigma	364
15.7.3	DMAIC Framework-A Six Sigma Methodology	364
15.8	Process Capability.....	365
15.9	Quality Circles	367
15.9.1	Objectives of Quality Circles.....	367
15.9.2	Structure of Quality Circles.....	367
15.10	Summary.....	369
15.11	Key Terms.....	369
15.12	Exercise	370
	Multiple Choice Questions	370
	Short Answer Type Questions	372
	Long Answer Type Questions	372
Chapter 16:	Maintenance Management	373
16.1	Introduction.....	374
16.2	Concept of Maintenance Management	374
16.2.1	Objectives of Maintenance Management.....	374
16.2.2	Types of Maintenance	375
16.3	Replacement of Equipment	377
16.3.1	Factors Responsible for Replacement	377
16.3.2	Replacement Analysis.....	378
16.3.3	Systematic Equipment Replacement Program.....	380
16.3.4	Advantages of Systematic Equipment Replacement Program	381
16.4	Concept of Reliability.....	381
16.4.1	Reliability Engineering.....	381
16.4.2	Maintenance and Reliability	382
16.5	Maintenance Management System	383
16.5.1	Benefits of Maintenance Management System.....	383
16.5.2	Procedures for Maintenance Management System Design	383
16.6	Total Productive Maintenance	384
16.6.1	Evolution of Total Productive Maintenance	384
16.6.2	Objectives of Total Productive Maintenance	384
16.6.3	Impact of Total Productive Maintenance	385
16.6.4	Overall Equipment Efficiency	386
16.6.5	Pillars of Total Productive Maintenance	386

16.7	Summary	389
16.8	Key Terms	389
16.9	Exercise	389
	Multiple Choice Questions	389
	Short Answer Type Questions	392
	Long Answer Type Questions	392
Chapter 17:	Just-in-Time System.....	393
17.1	Introduction	394
17.2	Concept of Just-in-Time	394
	17.2.1 Objectives of JIT	395
	17.2.2 Characteristics of JIT.....	395
	17.2.3 Little JIT and Big JIT	396
17.3	Elements of JIT	396
17.4	Ideal Production System and JIT Production.....	397
17.5	Benefits of JIT	398
	17.5.1 Improved Organizational Efficiency	399
	17.5.2 On-Time Delivery of Materials	399
	17.5.3 Reduced Machine Breakdowns	400
	17.5.4 Improved Quality	400
	17.5.5 Reduced Costs	400
	17.5.6 High Employee Morale	400
17.6	Tools and Techniques of JIT	401
	17.6.1 Kanban.....	401
	17.6.2 SMED	402
17.7	Implementation of JIT	403
17.8	JIT in Service Sector.....	404
17.9	Synchronous Production and JIT	405
17.10	DBR Mechanism.....	405
17.11	Summary	407
17.12	Key Terms.....	407
17.13	Exercise	408
	Multiple Choice Questions	408
	Short Answer Type Questions	410
	Long Answer Type Questions	410
Chapter 18:	Change Management.....	411
18.1	Introduction	412
18.2	Concept of Change.....	412
18.3	Factors Responsible for Change in Production Environment	413
18.4	Interventions for Change Management in Production Environment.....	415
18.5	Challenges in Change Management.....	415
18.6	Operational Change Management.....	416

18.7	Business Process Re-engineering in Change Management.....	417
18.7.1	Principles of Re-engineering.....	418
18.7.2	Implementation of BPR Project	418
18.7.3	Rapid Completion of BPR Project	419
18.8	Summary	421
18.9	Key Terms	421
18.10	Exercise	421
	Multiple Choice Questions	421
	Short Answer Type Questions	424
	Long Answer Type Questions	424
Case Studies		429
	Case Study-1: Product Design in ABC Motors	429
	Case Study-2: Inventory Management by PPL Ltd.	430
	Case Study-3: Strategic Analysis of Tata Group	432
	Case Study-4: Assignment Problem at Sky Travels Pvt. Ltd.....	434
	Case Study-5: Materials Management at CCG Biotech	436
	Case Study-6: Operations Strategy of Airline Industry	437
	Case Study-7: Service Delivery Strategy of PepsiCo	438
	Case Study-8: Role of ERP in Inventory Management System-A Case of Boeing	439
	Case Study-9: Supply Chain Management at Walmart	440
	Case Study-10: Just in Time at McDonalds	441
Additional Questions.....		442
Glossary.....		449
Index		453
Online Resource Available with the Book		456