Ref. 620.192 BAE

CONTENTS

		Page
1	**Chemical Composition of Plastics**	**1**
	The Synthesis of Plastics	4
	Polymer Characterization	54
2	**Crystal Structure and Morphology**	**88**
	Configurations of Olefin Polymers	89
	Configurations of Condensation Polymers	93
	Measurement of Crystallinity	94
	Control of Crystallinity	104
	The Effect of Crystallinity on Properties	108
	Crystallization Kinetics	113
	Unit Cells of Polymer Crystals	118
	Crystal Morphology in Polymers	125
	Spherulites	132
	Summary	138
3	**Viscoelastic Behavior and Time-Temperature Relationships**	**143**
	Theoretical Background	143
	Experimental	174
4	**Viscoelastic Analysis**	**199**
	Fundamental considerations	199
	Three-Dimensional Viscoelastic Stress-Strain Relations and Mechanical Model Characterization	203
	Special Stress-Strain Representations for Steady-State Materials Properties	220
	Linear Elastic-Viscoelastic Analogies	228
	Application of Elastic-Viscoelastic Analogies to the Solution of Some Problems	241
	Viscoelastic Analysis	
	Solution of Some Problems without Use of Elastic-Viscoelastic Analogies	251
	Nonlinear Viscoelastic Stress-Strain Relations	260
5	**Mechanical Behavior**	**277**
	Introduction	277
	Materials Behavior	284
	Structural Behavior	365
	Summary	391
6	**Thermal Stability**	**400**
	Reversible Property Changes	400
	The Glass Transition Temperature	401
	The Melting Point	404
	Irreversible Property Changes: Decomposition	412
	Determination of Thermal Stability	423
	Thermal Stability and Structure	431
7	**Electrical Properties**	**437**
	Introduction	437
	Fundamentals	441
	Electric Breakdown	444
	Resistance	500
	AC Characteristics	530
	Special Electrical Characteristics	578
8	**Optical Properties**	**589**
	Transparency	589
	Index of Refraction	593
	Reflection	602
	Permanence of the Optical Properties of Plastics	603

	Photoelastic Properties	604
	Plastics in Lighting	606
	Special Optical Applications	607
9	**Permeability and Chemical Resistance**	**609**
	General Theory	610
	The Measurement of P,D, and S	617
	The Nature of the Transport Process	623
	Solubility	625
	Diffusion and Permeation	644
10	**Surface Properties**	**689**
	Wetting and Spreading of Liquids on Solids	689
	Surface Effects in Adhesion and Abhesion	705
	Friction and Wear of Plastics	719
11	**Stress-Cracking**	**742**
	Environmental Stress-Cracking	743
	Other Forms of Stress-Cracking	774
	Summary and Conclusions	788
12	**Impact Behavior**	**795**
	Introduction	795
	Test Methods	797
	High-Rate Tension Behavior of Polymers	803
	Conclusion	812
13	**Ablation**	**815**
	Introduction	815
	Historical Development	816
	Advantages and Limitations	817
	Ablative Process	818
	Simplified Ablation Theory	821
	Performance Criteria	827
	Materials Characterization	830
	Performance	843
	Thermostructural Design	857
	Typical Applications	858
	Concluding Remarks	863
14	**Reinforced Plastics**	**869**
	Introduction	869
	Fundamental Concepts of Fibrous Reinforcement	873
	Mechanical Behavior Under Static Loads	879
	Reinforcement-Matrix Interaction and Modes of Failure	897
	Influence of Fibrous Reinforcement on Composite Strength	914
	Influence of Resin Characteristics and Resin-Reinforcement Interaction on Composite Strength	935
	Influence of Flaws Associated with Fabrication on Composite Strength	956
	Summary	986
15	**Plastic Foams**	**995**
	Introduction	995
	Plastic Foams	**998**
	Foam Structure	1002
	Foam Properties	1045
	Applications	1061
	Fabrication Techniques	1067
	Summary	
16	**Processing Factors in Plastics Product Design**	**1072**
17	**Finishing and Fabricating**	**1092**
	Introduction	1092
	Machining Operations	1093
	Finishing Operations	1094
	Assembly Operations	1107
	Decorating Operations	1118
	Conclusion	1123

18 Bearings and Gears **1124**
Friction and Wear Properties 1124
Bearing Applications 1131
Gear Applications 1134
19 Applied Economics **1140**
20 General Design Procedure **1155**

Index 1189