

# CONTENTS

## **Preface**

## **Section I Introduction**

Solving engineering problems on programmable pocket calculators	3
---	---

## **Section II Engineering Mathematics**

Choosing the right formula for calculator curve fitting	15
Solving graphical problems on a calculator	17
Program correlates data	26
Curve fitting for two variables	31
Fitting data to a family of lines	39
Correlating one dependent variable with two independent variables	48
Second-degree-polynomial calculator program	56
Calculator solution to a three variable problem	63
Correlating the hyperbolic function	75
Calculator program for normal and log-normal distribution	79

## **Section III Physical Properties Correlation**

Properties of chemical compounds	87
Volumes of pure liquids	92
Volumes of saturated liquid mixtures	99
Viscosities of pure gases	107
Viscosities of liquids and mixtures	118
Vapor pressure vs. temperature	127
Latent heat of vaporization	138
Gas equations	147
Equations of state variables	152
Properties of gas mixtures	164
Thermodynamic properties of pure gases and binary mixtures	179
Thermal conductivities of pure gases	185

## Section IV Fluid Flow

Pressure-drop calculations	197
Friction factor	205
Piping design	207
Centrifugal-pump hydraulics	215
Orifice sizes for gas flows	221
Hole-area distribution for liquid spargers	227

## Section V Heat Transfer

Heat-exchanger performance by successive summation	235
Heat transfer through composite walls	242
Radiant heat flux in direct-fired heaters	247
Quench-tower design	254

## Section VI Mass Transfer

Absorption and leaching problems	261
Flash computations	266
Packed-tower design	271
Designing packed towers	278
Sour-water-stripper design	281
Kinetics of fixed-bed sorption processes	298
Design of spouted beds	303
Cyclone efficiency equations	308

## Section VII Engineering Economics

Project financial analysis	317
Boiler efficiency and economics	323