Preface

List of contributors

1 Mechanical engineering principles

Status of rigid bodies · Strength of materials · Dynamics of rigid bodies · Vibrations · Mechanics of fluids · Principles of thermodynamics · Heat transfer · References

2 Electrical and electronics principles

Basic electrical technology \cdot Electrical machines \cdot Analogue and digital electronics theory \cdot Electrical safety \cdot References \cdot Further reading

3 Microprocessors, instrumentation and control

Summary of number systems · Microprocessors · Communication standards · Interfacing of computers to systems · Instrumentation · Classical control theory and practice · Microprocessor-based control · Programmable logic controllers · The z-transform · State variable techniques · References · Further reading

4 Computers and their application

Introduction · Types of computer · Generations of digital computers · Digital computer systems · Categories of computer systems · Central processor unit · Memory · Peripherals · Output devices · Terminals · Direct input · Disk storage · Digital and analogue input/output · Data communications · Computer networks · Data terminal equipment · Software · Database management · Language translators · Languages

5 Computer-integrated engineering systems

CAD/CAM: Computer-aided design and computer-aided manufacturing ·Industrial robotics and automation · Computer graphics systems · References · Further reading

6 Design standards

 $\begin{array}{l} Standardization \ in \ design \ \cdot \ Drawing \ and \ graphic \\ communications \ \cdot \ Fits, \ tolerances \ and \ limits \ \cdot \ Fasteners \ \cdot \\ Ergonomic \ and \ anthropometric \ data \ \cdot \ Total \ quality - a \\ company \ culture \ \cdot \ References \end{array}$

7 Materials, properties and selection

Engineering properties of materials · The principles underlying materials selection · Ferrous metals · Non-ferrous metals · Composites · Polymers · Elastomers · Engineering ceramics and glasses · Corrosion · Non-destructive testing · References · Further reading

Contents

8 Mechanics of solids

Stress and strain \cdot Experimental techniques \cdot Fracture mechanics \cdot Creep of materials \cdot Fatigue \cdot References \cdot Further reading

9 Tribology

Basic principles · Lubricants (oils and greases) · Bearing selection · Principles and design of hydrodynamic bearings · Lubrication of industrial gears · Rolling element bearings · Materials for unlubricated sliding · Wear and surface treatment · Fretting · Surface topography · References · Further reading

10 Power units and transmission

Power units · Power transmission · Further reading

11 Fuels and combustion

Introduction · General fuel types · Major property overview · Major fuel groupings · Combustion · Conclusions · References

12 Alternative energy sources

Introduction · Solar radiation · Passive solar design in the UK · Thermal power and other thermal applications · Photovoltaic energy conversion · Solar chemistry · Hydropower · Wind power · Geothermal energy · Tidal power · Wave power · Biomass and energy from wastes · Energy crops · References

13 Nuclear engineering

Introduction \cdot Nuclear radiation and energy \cdot Mechanical engineering aspects of nuclear power stations and associated plant \cdot Other applications of nuclear radiation \cdot Elements of health physics and shielding \cdot Further reading

14 Offshore engineering

Historical review \cdot Types of fixed and floating structures \cdot Future development \cdot Hydrodynamic loading \cdot Structural strength and fatigue \cdot Dynamics of floating systems \cdot Design considerations and certification \cdot References

15 Plant engineering

Compressors, fans and pumps · Seals and sealing · Boilers and waste-heat recovery · Heating, ventilation and air conditioning · Refrigeration · Energy management · Condition monitoring · Vibration isolation and limits · Acoustic noise · References vi Contents

16 Manufacturing methods

Large-chip metal removal · Metal forming · Welding, soldering and brazing · Adhesives · Casting and foundry practice · References · Further reading

17 Engineering mathematics

Trigonometric functions and general formulae · Calculus · Series and transforms · Matrices and determinants · Differential equations · Statistics · Further reading

18 Health and safety

Health and safety in the European Community \cdot Health and safety at work – law and administration in the USA \cdot UK legislation and guidance \cdot The Health and Safety at Work etc. Act 1974 \cdot The Health and Safety Executive \cdot Local Authorities \cdot Enforcement Notices \cdot Control of Substances Hazardous to Health Regulations 1988 \cdot Asbestos \cdot Control of lead at work \cdot The Electricity at Work Regulations 1989 \cdot The Noise at Work Regulations 1989 \cdot Safety of machines \cdot Personal protective equipment \cdot Manual handling \cdot Further reading

19 Units, symbols and constants

SI units \cdot Conversion to existing imperial terms \cdot Abbreviations \cdot Physical and chemical constants \cdot Further reading

Index