

Contents

Chap. 1: Organism and Machine

- 1.1 Character of organism and machine
- 1.2 Interdisciplinary field of study

Chap. 2: Unit and Measurement

- 2.1 Unit and significant digit
 - 2.1.1 Unit
 - 2.1.2 Significant digit
- 2.2 Measurement
 - 2.2.1 Resolution
 - 2.2.2 Measurement system
 - 2.2.3 Alternating component
 - 2.2.4 Non-invasive
 - 2.2.5 Non-linear and equilibrium
 - 2.2.6 Noise and statistics

Chap. 3: Materials

- 3.1 Deformation
 - 3.1.1 Classification of deformation
 - 3.1.2 Cutting and fixation of specimen
 - 3.1.3 Setting of origin and range of measurement
 - 3.1.4 Stress-strain diagram
 - 3.1.5 Elastic region and plastic region
 - 3.1.6 Sphere
 - 3.1.7 Bending
- 3.2 Properties and Destruction of Material
 - 3.2.1 Fatigue fracture
 - 3.2.2 Crystal and lattice defect
 - 3.2.3 Stress concentration
 - 3.2.4 Composite material and environment

Chap. 4: Flow

- 4.1 Fluid and solid

- 4.1.1 Fluid and pressure
- 4.1.2 Elasticity and viscosity
- 4.1.3 Viscoelasticity

- 4.2 Resistance of flow and distribution of velocity
 - 4.2.1 Resistance of flow
 - 4.2.2 Hagen-Poiseuille Flow
 - 4.2.3 Requirement for Hagen-Poiseuille Flow
 - 4.2.4 Couette Flow
 - 4.2.5 Flow between parallel walls
 - 4.2.6 Secondary flow

- 4.3 Steady flow and non-steady flow
 - 4.3.1 Pulsatile flow
 - 4.3.2 Laminar flow and turbulent flow

Chap. 5: Energy

- 5.1 State of substance
 - 5.1.1 Temperature
 - 5.1.2 Hydrogen ion concentration index
 - 5.1.3 Heat
 - 5.1.4 Phase transformation

- 5.2 Energy conversion
 - 5.2.1 Form of energy
 - 5.2.2 Conversion efficiency

- 5.3 Substance transportation
 - 5.3.1 Permeability through membrane
 - 5.3.2 Osmotic pressure

Chap. 6: Movement

- 6.1 Balance among forces and control of movement
 - 6.1.1 Balance among forces
 - 6.1.2 Description of movement

6.2 Lubrication and wear

6.2.1 Machine elements and systems

6.2.2 Coefficient of friction

6.2.3 Contact

6.2.4 Surface tension and hydrophilic property

6.2.5 Wear

6.2.6 Lubrication

Chap. 7: Designing and Machining

7.1 Design

7.1.1 Specifications

7.1.2 Draft

7.1.3 Surface roughness

7.2 Machining

7.2.1 Type of machining

7.2.2 Finishing and biological reaction

7.2.3 Assembly