Engineering
Digital Library

Contents

Engineering Digital Library: Courses

Engineering

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- Polymers

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- Characteristics of Materials

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- Drilling and Finishes
- Fluid Power Diagrams
- Machine Elements
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- Dimensions
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- Drawing Standards
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Engineering

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- Fluid Power Cylinders
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- Preparatory Programming - Turning

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- C-Axis
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- Cycle Programming - Turning
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- Programming Linear and Tangential Start-Up and Coast-Down - Milling

Information Technology

- Charting Data
- Planning and Organizing Work Processes
- Process Planning

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- Forces on Threads
- Formula and Calculation of Tightening Torque
- Joining Procedures
- Joining with Glues
- Joining with Keys and Splines
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- Joining with Soldering
- Joining with Threads
- Lapping
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Engineering

Manufacturing Processes

- Bending
- Bending Operation Calculations
- Cutting and Angles of Cutting
- Cutting Metal
- Cutting Speed for Drilling
- Determining Data for Grinding
- Determining Data for Milling
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- Environmental Protection
- Erosive Manufacturing Processes
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- Forging
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- Forming Procedures
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- Joining with Welding

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- Bearings
- Calculation of Forces on Bearings
- Joining Hubs to Shafts
- Plain Bearings
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- Seals and Gaskets

Engineering

Electronics Test Equipment

- Signal and Pulse Generators

Engineering Science

- Calculating Work, Power and Efficiency
- Energy, Work and Efficiency
- Manufacturing Facilities
- Mass and Volume Flow Rate
- Material Conversion
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- Adjustable Speed Transmission
- Clutches
- Gear Calculations
- Gear Design Factors
- Gear Drives
- Simple and Compound Gears

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- Accuracy
- Calculating Lengths
- Calculation of Clearances and Fits
- Clearances and Fits
- Measurement Tolerances
- Measuring Lengths
- Quality Management

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- Maintenance and Accident Prevention
- Maintenance Documentation
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- Maintenance Principles
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- Characteristics of an Air Flow Transducer
- Characteristics of an Air Pressure Transducer
- Characteristics of an IC Temperature Sensor
- Characteristics of an NTC Thermistor
- Controller Responses

- Effect of Loading on the Potentiometer Output Voltage
- Environmental Measurement
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- On/Off Control Systems
- ON/OFF Heater System
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- Proportional Control - Step Input Response

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- HMI Panel Alarms
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- HMI Panel Monitoring and Supervising
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Engineering

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- Complete PETRA II Control Program
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- Moving a Part Round the PETRA II
- PETRA II Plant Control Program (Single PLC)
- Programming the PETRA II Carriage
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- Analogue Inputs
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- Construction and Function of a PLC
- Counters
- Counting Parts
- Create a New Project
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PLC Part Sorting Control

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- Creating a STEP 7 Project
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- Basic Structure of a PLC
- Components of a Sequence Control System
- Connecting a PLC
- Converting Logical Circuit to Functional Plan
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- Programmable Logic Controllers (PLCs)

Electronics

LIB 3: 08 Electronic Systems

Alarm Systems

- Components of Intruder and Fire Alarms
- Installing Intruder Alarms and Fire Alarms

Closed Loop Control

- An Example On/Off Control System
- Automatic Temperature Control
- RC Circuit Responses

Components

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- Characteristics of Non-Linear Components
- Maintenance Information and Component Selection
- Problem Solving - Identify Electronic Components
- Problem Solving - Recognize and Select Components

Energy and Power

- Extending System Life
- Small Energy Sources

Fault Finding Electronic Systems

- Electronic Systems Maintenance
- Fault Conditions
- Fault Location Techniques
- Faults and Fault Finding Aids
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LIB 3: 09 DC Circuits

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- Calculating Total Capacitance
- Capacitance of Capacitors
- Capacitor Discharge Curve
- Capacitor Timing Circuits
- Capacitors
- Capacitors in Series and Parallel
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- Resistance and the Time Constant

Electronics

Electrical Energy and Power

- Calculating Electrical Power for a Load
- Calculation of Electrical Power
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- Inductors - Graphs and Equations

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- Calculating Resistance Colour Code Values and Tolerance
- Calculating the Resistor Value for an LED Lamp Circuit
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- Investigating Whether Resistors are in Tolerance
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- Resistance and Conductance
- Resistance and Conductance Reciprocal Calculations
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- Resistor Characteristics and Applications
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- Basic Electrical Quantities in Circuits
- Circuit Diagrams
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Electronics

LIB 3: 10 Electrical Networks

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- Parallel Circuit Calculations
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Electronics

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- Calculating the Effective Values of Alternating Voltages and Currents
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- Graphical Representation and Equations of RC Circuits
- RC Circuits

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- Calculating the Resonant Frequency of an LC Oscillator Circuit
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Electronics

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Electronics

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Electronics

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Electronics

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Electronics

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Electronics

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Electronics

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Electronics

LIB 3: 21 Electronic Principles (D3000 Practice)

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Electronics

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- Basic Operational Amplifier - Worksheet W1
- Closed-Loop Amplifier - Exercise 1.3
- Comparator - Exercise 1.2
- Referenced Comparator - Exercise 2.2

Oscillators

- LC Oscillator - Exercise 1.1
- RC Ladder Oscillator - Exercise 1.2

RC Filters

- High-Pass Filter - Exercise 2.2
- Low-Pass Filter - Exercise 2.1
- Simple RC Filters - Worksheet W1
- Simple RC Filters - Worksheet W2

Rectification

- Effect of Varying Load - Exercise 1.2
- Simple DC Power Supply - Exercise 1.1

Summing Amplifier

- Scaling - Exercise 7.2

LIB 3: 23 Semiconductors (D3000 Practice)

Diodes

- Bridge Rectifier - Exercise 3.1
- Bridge Rectifier - Worksheet 4
- Diode Forward Characteristic - Exercise 1.1
- Diode Reverse Characteristic - Exercise 1.2
- Effect of Reservoir Capacitor - Exercise 3.2
- Half-Wave Rectifier - Exercise 2.1
- Half-Wave Rectifier - Worksheet 3
- Negative Power Supply - Exercise 2.3
- P-N Junction Diode - Worksheet 1
- P-N Junction Diode - Worksheet 2
- Reservoir Capacitor - Exercise 2.2

Electronics

Display Devices

- Bar Graph Display - Exercise 2.1
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- Liquid Crystal (Seven Segment) Display - Exercise 2.2

Transistor Amplifiers

- Alternating Signal Applied - Exercise 8.2
- Alternating Signal Drive - Exercise 2.2
- Alternating Signal Drive - Exercise 4.2
- Alternating Signal Drive - Exercise 5.3
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- Alternating Signal Drive - Worksheet W7
- Analog Switch with Direct Voltage Applied - Exercise 8.1
- Base Potential Divider Biasing and Stabilizing - Exercise 1.4
- Base Potential Divider Stabilized Amplifier - Exercise 7.2
- Bias Stability - Exercise 7.2
- Bias Stabilization - Worksheet 7
- Bias Stabilization - Worksheet 8
- Channel and Junction Resistances - Exercise 6.1
- Collector Feedback Biasing and Stabilizing - Exercise 1.3
- Collector Feedback Stabilization - Exercise 7.1
- Common Collector Amplifier (Emitter Follower) - Exercise 8.1
- Complementary PNP/NPN Pair - Worksheet W2
- Constant Current Sink - Worksheet W3
- Darlington Pair Emitter Follower - Worksheet W1
- DC and Quiescent Conditions - Exercise 4.1
- DC Transfer Characteristic - Exercise 5.2
- Differential Amplifier - Worksheet W4
- Directly Coupled (DC) Amplifier - Worksheet W5
- Directly Coupled (DC) Amplifier - Worksheet W6
- Emitter Decoupling Capacitor - Exercise 7.3
- Fault Diagnosis - Preparatory Investigation 1
- Fault Diagnosis - Preparatory Investigation 2
- Frequency Response of a Two-Stage Amplifier - Exercise 9.2
- JFET Characteristics - Exercise 6.2
- JFET Common Source Amplifier - Worksheet W8
- JFET Common Source Amplifier - Worksheet W9
- Need for Bias - Exercise 6.2
- Output Characteristic - Exercise 3.2
- PNP Common Emitter Amplifier - Exercise 8.2
- Quiescent Conditions - Exercise 3.1
- Quiescent Conditions - Exercise 5.1
- Quiescent Conditions - Exercise 7.1
- Quiescent Conditions and DC Drive - Exercise 2.1
- Quiescent Voltages and Currents - Exercise 1.1
- Signal Operation - Exercise 1.2

Transistors

- Regenerative Switch - Exercise 10.2

Electronics

LIB 3: 24 Power Electronics (D3000 Practice)

AC Motors

- AC Motor Principles, and the Three-Phase Synchronous Motor - Exercise 6.1
- AC Motor Principles, and the Three-Phase Synchronous Motor - Worksheet 6
- Capacitor Offset - Exercise 7.2
- Delta Connection of a 3-Phase Synchronous Motor to Wye Supply - Exercise 6.3
- Other AC Motors - Exercise 9.1
- Power Factor Correction - Exercise 8.1
- Power Factor Correction - Worksheet 8
- Single-Phase Synchronous Motor - Exercise 7.1
- Single-Phase Synchronous Motor - Worksheet 7

Power Transistors

- Audio Amplifier - Power Output - Exercise 4.2
- Audio Amplifier - Waveforms - Exercise 4.1
- Audio Power Amplifier - Worksheet W5
- Audio Power Amplifier - Worksheet W6
- Comparison of FET to BJT - Exercise 5.2
- Controlling a Lamp - Exercise 1.1
- Current Booster - Alternating Drive - Exercise 3.2
- Current Booster - DC Drive - Exercise 3.1
- Current Booster - Worksheet W4
- Duty Cycle Controller - Worksheet W3
- Duty Cycle/Load Power - Exercise 2.2
- MOSFET Characteristics - Exercise 5.1
- Power Dissipated in the Transistor - Exercise 1.2
- Power MOSFET - Worksheet W7
- Power Transistor - Worksheet W1
- Power Transistor - Worksheet W2

SCR Bridge Circuits

- Commutating Effects of Load on a Bridge Circuit - Exercise 2.6
- Effect of a Commutating Diode on a Half Controlled SCR Bridge Circuit - Ex 2.7
- Fully Controlled SCR Bridge with Capacitive/Resistive Load - Exercise 2.5
- Fully Controlled SCR Bridge with Inductive/Resistive Load - Exercise 2.4
- Fully Controlled SCR Bridge with Resistive Load - Exercise 2.2
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- SCR Bridge Circuits - Worksheet W2

SCR, Diac, Triac and UJT

- Controlled Angle Firing of a Thyristor - Exercise 7.2
- Lamp Dimmer - Exercise 9.2
- Optocoupler - Exercise 8.2
- Pulse Transformer - Exercise 8.1
- Silicon Controlled Rectifier - Worksheet W8

Electronics

Single and Bi-phase Control

- Effect of Differing Loads on a Full-wave Bi-phase Rectification Circuit - Ex 1.5
- Effect of Differing Loads on an SCR Circuit - Exercise 1.3
- Full-wave Bi-phase Rectification Power Limiting Control - Exercise 1.4
- Operation of an SCR Firing Circuit - Exercise 1.2
- Single and Bi-phase Control - Worksheet W1

Three-Phase Rectifiers and Inverters

- Dual-Polarity Supplies - Exercise 10.4
- Full-Wave Rectifier - Exercise 10.3
- Half-Wave Rectifier - Exercise 10.1
- Negative DC Supply - Exercise 10.2
- Over-Current Protection - Exercise 11.2

Three-Phase Supplies

- 3-Wire Connection of a 3-Phase Supply (Delta/Delta Connection) - Ex. 2.2
- 3-Wire Connection of a 3-Phase Supply (Delta/Delta Connection) - Exercise 2.2
- 6-Wire, 3-Wire and 4-Wire Connections, Delta/Delta Connection - Exercise 2.1
- 6-Wire, 3-Wire and 4-Wire Connections, Delta/Delta Connection - Worksheet 1
- 6-Wire, 3-Wire and 4-Wire Connections, Delta/Delta Connection - Worksheet 2
- Delta/Wye Connection - Exercise 3.1
- Delta/Wye Connection - Worksheet 3

LIB 3: 25 Digital Electronics (D3000 Practice)

Combinational Logic

- Characteristics of a Schmitt Inverter Gate - Exercise 9.1
- Characteristics of the EX-OR and EX-NOR Circuit - Exercise 1.1
- Characteristics of the Half Adder Circuit - Exercise 1.2
- Characteristics of the Wired-AND Circuit - Exercise 10.1
- Characteristics of the Wired-NOR Circuit - Exercise 10.2
- Diode AND and OR Gate Characteristics - Exercise 3.1
- Diode Logic - Worksheet 4
- Diode-Transistor Logic (DTL) - Worksheet 5
- Diode-Transistor Logic (DTL) - Worksheet 6
- Diode-Transistor Logic Gate Characteristics - Exercise 4.2
- Equivalent Logic Circuits 1 - Exercise 6.1
- Equivalent Logic Circuits 2 - Exercise 6.2
- Equivalent Logic Circuits 3 - Exercise 6.3
- EX-OR and EX-NOR Gates - Worksheet 1
- EX-OR and EX-NOR Gates - Worksheet 2
- EX-OR and EX-NOR Gates - Worksheet 3
- EX-OR and EX-NOR Gates - Worksheet 4
- Four-Variable Karnaugh Maps - Exercise 7.3
- Karnaugh Maps - Exercise 7.1
- Open Collector Gates - Worksheet 10
- Open Collector Gates - Worksheet 9
- Series and Parallel Connection of Switches - Exercise 2.1

Electronics

Digital Systems

- 2-bit Equal-Input Magnitude Comparator Circuit - Exercise 5.1
- Binary/BCD Counters and 7-Segment Decoder/Driver/Displays - Exercise 2.1
- Binary/BCD Counters, and 7-Segment Decoder/Driver/Displays - Worksheet 6
- Binary/BCD Counters, and 7-Segment Decoder/Driver/Displays - Worksheet 7
- Binary/BCD Counters, and 7-Segment Decoder/Driver/Displays - Worksheet 8
- Binary/BCD Counters, and 7-Segment Decoder/Driver/Displays - Worksheet 9
- Characteristics of a 1 to 1-of-4-line Demultiplexer Circuit - Exercise 3.2
- Characteristics of a 2-1 Multiplexer Using Three State Logic - Exercise 7.2
- Characteristics of a 2-4 Line Decoder Circuit - Exercise 2.2
- Characteristics of a 4-2 Line Encoder Circuit - Exercise 2.1
- Characteristics of a 4-bit Magnitude Comparator IC - Exercise 5.3
- Characteristics of a 4-input Multiplexer Circuit - Exercise 3.1
- Characteristics of a 4-input Priority Encoder Circuit - Exercise 4.1
- Characteristics of a Frequency Counter System - Exercise 5.2
- Characteristics of a Monostable IC (74LS123) - Exercise 1.4
- Characteristics of a Multiplexer/Demultiplexer Circuit - Exercise 3.3
- Characteristics of a Single-Bit Magnitude Comparator Circuit - Exercise 5.2
- Characteristics of a Three State Logic Bi-Directional Switch - Exercise 7.3
- Characteristics of a Three State Logic Circuit - Exercise 7.1
- Characteristics of a Timer/Counter System - Exercise 5.3
- Characteristics of a Triangular Waveform Generator System - Exercise 5.4
- Characteristics of an Analog Comparator IC (311) - Exercise 3.1
- Characteristics of an Analog Integrator IC (3140) - Exercise 3.2
- Characteristics of an Analog Switch IC (211) - Exercise 1.1
- Characteristics of an Analog Switch, S - R Bistable System - Exercise 1.5
- Characteristics of an Astable IC (4047) - Exercise 1.3
- Characteristics of an Incremental A-D Converter System - Exercise 4.2
- Characteristics of an S - R Latch IC (74LS00) - Exercise 1.2
- D-A Converter IC and an A-D Converter Circuit - Worksheet 11
- Determination of a 4-Bit Code Using a Magnitude Comparator - Exercise 5.4
- Encoder and Decoder Circuits - Worksheet 5
- Encoder and Decoder Circuits - Worksheet 6
- Encoder and Decoder Circuits - Worksheet 7
- Fault Diagnosis - Triangle Waveform Generator Circuit - Worksheet 12
- Full Adder Circuits - Exercise 6.1
- Full Adder Circuits - Exercise 6.2
- Full Adder Circuits - Worksheet 13
- Magnitude Comparator Circuits - Worksheet 12
- Multiplexer and Demultiplexer Circuits - Worksheet 8
- Multiplexer and Demultiplexer Circuits - Worksheet 9
- Priority Encoder Circuits - Worksheet 10
- Priority Encoder Circuits - Worksheet 11
- Signal Converters - Exercise 4.1

Interfacing

- CMOS Input and Output Characteristics - Exercise 8.2

Electronics

Number Systems

- Number Systems - Measurement of Voltage Levels - Exercise 1.1
- Number Systems - Worksheet 1
- Number Systems - Worksheet 2

Sequential Logic

- Binary Counters - Exercise 5.1
- Binary Counters - Worksheet 11
- Binary Counters - Worksheet 12
- Characteristics of a Binary Up Counter with Reduced Count - Exercise 5.3
- Characteristics of a Binary Up Counter with Reduced Count 2 - Exercise 5.4
- Characteristics of a D-Type 2-bit Shift Register - Exercise 4.1
- Characteristics of a D-Type Flip-Flop - Exercise 2.1
- Characteristics of a D-Type with D Connected to Q - Exercise 2.2
- Characteristics of a J-K 4-bit Binary Counter - Exercise 5.2
- Characteristics of a J-K 4-bit Shift Register - Exercise 4.2
- Characteristics of a J-K Flip-Flop - Exercise 3.1
- Characteristics of a J-K Flip-Flop Connected as a D-Type - Exercise 3.2
- Characteristics of a J-K Flip-Flop Connected as a T-Type - Exercise 3.3
- Characteristics of a NAND Gate S-R Latch - Exercise 1.1
- Characteristics of an S-R Latch IC - Exercise 1.2

LIB 3: 26 Microprocessors (D3000 Practice)

Developing PIC Programs

- Analog to Digital Conversion - Exercise 15
- Digital to Analog Conversion - Exercise 16
- EEPROM Programming - Exercise 14
- Interrupts - Exercise 10
- Keyboard Scanning - Exercise 12
- Logic Systems - Exercise 8
- Simple Closed Loop Process Control - Exercise 17

Programming Applications

- Basic Input/Output - Exercise 7
- Program Development - Exercise 6

The PIC Development System

- Interfacing - Exercise 5
- PIC Software - Exercise 4

The PIC Microcontroller

- Microprocessors, Microcomputers and Microcontrollers - Exercise 1
- Number Systems - Exercise 3
- Overview of PIC Microcontrollers - Exercise 2

Electronics

LIB 3: 27 Avionics (D3000 Practice)

Single Engine Aircraft Battery Power System

- Electronics/Avionics Busbar Isolation - Exercise 2.2
- Power Distribution - Exercise 2.1
- Single Engine Aircraft Electrical Systems - Worksheet W1
- Single Engine Aircraft Electrical Systems - Worksheet W2
- Single Engine Power Distribution Systems - Worksheet W3
- Single Engine Power Distribution Systems - Worksheet W4

Single Engine Aircraft Fuel Flow Measurement

- Fuel Measurement Using a Tank Resistor - Exercise 7.1
- Fuel Quantity and Fuel Flow Measurement - Worksheet W10
- Fuel Quantity and Fuel Flow Measurement - Worksheet W9
- Optical Rotor Fuel Flow Measurement and Digital Display - Exercise 7.2

Single Engine Aircraft Fuel Quantity Measurement

- Fuel Measurement Using a Capacitor Bridge - Exercise 6.1
- Fuel Measurement Using a Capacitor Bridge, Displayed Digitally - Exercise 6.2
- Fuel Quantity Measurement Using a Capacitor Bridge - Worksheet W8

Single Engine Aircraft Power Consuming Circuits

- Early Internal Lighting Systems - Exercise 5.1
- Electrical Landing Gear Control and Indication Systems - Exercise 7.2
- Flap Control Systems - Exercise 8.1
- Flap Control Systems - Worksheet W13
- Hydraulic Landing Gear Control and Indication Systems - Exercise 7.1
- Landing Gear Control and Indication Systems - Worksheet W12
- Landing, Taxi and Anti-Collision Lights - Exercise 6.3
- Single Engine Auxiliary Power Supply Systems - Exercise 3.2
- Single Engine External Lighting Systems - Worksheet W10
- Single Engine External Lighting Systems - Worksheet W11
- Single Engine Internal Lighting Systems - Worksheet W9

Single Engine Aircraft Power Generation System

- A Typical 1979 Alternator System - Exercise 4.2
- A Typical Alternator System From 1963 To 1968/69 - Exercise 4.1
- Cessna Single Engine Electrical Power Systems - Worksheet W7
- Cessna Single Engine Electrical Power Systems - Worksheet W8
- Single Engine Power Supply Systems - Worksheet W5
- Single Engine Power Supply Systems - Worksheet W6

Single Engine Aircraft Stall Warning Systems

- A Stall Warning System using a Vane Switch - Exercise 1.1
- Single Engine Aircraft Stall Warning Systems - Worksheet W1

Electronics

Single Engine Aircraft Take-Off Warning Systems

- Basic Logic Gates - Exercise 2.1

Single Engine Aircraft Temperature Measurement

- Nickel Wire Sensor Temperature Systems - Worksheet W4
- Nickel Wire Sensor Temperature Systems - Worksheet W5
- Nickel Wire Temp Sensor - Ratiometer and Analog Display - Exercise 4.3
- Nickel Wire Temp Sensor - Wheatstone Bridge and Analog Display - Exercise 4.1
- Nickel Wire Temp Sensor - Wheatstone Bridge and Digital Display - Exercise 4.2

LIB 3: 28 Electronic Systems (Series 9 Practice)

Components

- Amplifier and Loudspeaker
- Applying Power to a Device
- DC Operated Buzzer
- Light Dependent Resistor - LDR
- Logic Source Switches
- Output Driver
- Relay
- Seven Segment Display (Digital Signals)

Signal Processing

- Analog Signals
- Automatic Light Switch System
- Combined Analog/Digital Signals
- Creating a Reference Voltage
- Digital Signals
- Fire Detector (Sprinkler) System
- Latching Switch System
- Lighting/Temperature Failure Warning System
- Sensor Voltage Divider

LIB 3: 29 Electronic Principles (Series 9 Practice)

AC Circuits

- Alternating Current - AC
- Alternating Voltage Values
- Capacitor on an AC Supply
- Capacitors in Parallel
- Capacitors in Series
- Capacitors with AC Applied
- Inductors with AC Applied
- Plotting Frequency Responses of RC and RL Circuits
- Capacitor Charge Time
- Capacitor on a DC Supply
- CR Integrator

- Investigation of a Wheatstone Bridge
- Kirchhoff's Current Law
- Kirchhoff's Voltage Law
- Other Ways to Calculate Power
- Resistor Measurements
- Series-Parallel Combinations

Magnetism and Electromagnetism

- Attraction and Repulsion
- Electromagnet Field Plot
- Electromagnetic Induction
- Investigating Change-Over and Latching Circuits
- Investigation of a Basic Transformer
- Other Magnetic Materials

LIB 3: 30 Linear Electronics (Series 9 Practice)

Current Amplifier Circuits

- Improving the performance of Push-pull Amplifier (1)
- Improving the performance of Push-pull Amplifier (2)
- Measuring Power in Single-ended and Push-pull Amplifiers
- Operation of a Current Amplifier

Operational Amplifier Circuits

- AC Comparator
- Feedback Amplifier
- Gain-Bandwidth Product in Practice
- Investigation of an Integrator
- Non-Inverting Amplifier
- Regenerative Comparator Under AC Conditions
- Regenerative Comparator Under DC Conditions
- Slew Rate Limitation of an Amplifier

LIB 3: 31 Semiconductors (Series 9 Practice)

Diodes

- Half-Wave Rectifier

SCRs

- Capacitor Commutation
- CR Phase Shift Control Circuit
- DC Control of an SCR with AC Applied
- Silicon Controlled Rectifier - SCR

Transistor Amplifiers

- Common Collector Amplifier - Emitter Follower
- Differential Amplifier Under AC Conditions
- Differential Amplifier Under DC Conditions

- Elimination of Crossover Distortion
- Emitter Decoupling Capacitor
- Emitter Follower Circuits
- Investigation of the Amplifier with an Applied Signal
- JFET Common Source Amplifier Investigation
- Loading a Voltage Divider
- Measurement of Quiescent Voltages
- Simple Current Biasing

Transistors

- Current Gain Characteristic
- Darlington Pair Switch Circuit
- Investigation of an N-channel JFET
- NPN Transistor Switch
- Output Characteristic
- Regenerative NPN/PNP Switch

LIB 3: 32 Digital Electronics (Series 9 Practice)

Combinational Logic

- AND Gate From NAND Gates
- Boolean Expressions From Logic Circuits
- Combinational Logic Circuits
- Diode Logic
- Diode Transistor Logic (DTL)
- Logic Gate Switches
- NOR Gate From NAND Gates
- NOT Gate From a NAND Gate
- Operation of the Schmitt NOT Gate
- OR Gate From NAND Gates

Digital Systems

- 1-4 Line Demultiplexer
- 2-1 Multiplexer
- 2-4 Line Decoder
- 4-1 Line Multiplexer
- 4-2 Line Encoder
- 4-Bit Binary Full Adder
- 4-Bit Magnitude Comparator
- Analog Switch
- Analog to Digital Converter
- Astable IC Circuit
- BCD Counter and 7-Segment Decoder
- Bi-Directional Switch
- Digital to Analog Converter
- Encoder-Decoder Circuit
- Full Adder
- Half Adder
- Monostable IC Circuit

- Multiplexer-Demultiplexer Circuit
- Seven-Segment Display

Number Systems

- Practical Investigation of Number Systems

Sequential Logic

- 3-Bit Down-Counter
- 3-Bit Up-Counter
- Binary Counter IC
- D-Type (Data) Flip-Flop
- Modulo-N Counter

LIB 3: 33 Microprocessors (Series 9 Practice)

Developing PIC Programs

- Defining Device Type and Clock Speed
- Introduction to Interrupts
- Loops and Conditional Branching
- Programming Fundamentals

PIC Microcontroller

- Arithmetic and Logic Operations
- Commands to set up an Interrupt on Portb
- Creating Delays

The PIC Development System

- Introduction to the PIC Basic Software
- Introduction to the PICShell Software
- Introduction to the Software and Hardware

The PIC Microcontroller

- Features of a PIC
- Introduction to PICs

Support

LIB 3: 61 Engineering Mathematics

Algebra

- Algebra - Simple Formula
- First, Second, and Third Order Brackets
- Rule of Three (Direct Proportion)
- Rule of Three (Inverse Proportion)

Angles

- Angular Measure
- Calculating with Angles
- Measuring Angles

Approximation

- Approximations

Arithmetic

- Adding and Subtracting
- Multiplication and Division of Decimal Numbers
- Multiply Sums

Equations

- Addition Method for Solving Simultaneous Equations
- Calculate the Unknown Variable in an Equation
- Distributive Law
- Equating Method for Solving Simultaneous Equations
- Multiply Out Brackets
- Performing Calculations
- Sign Rules for Mathematical Operations

Factorization

- Simple Factorization

Fractions

- Add and Subtract Fractions with Different Denominators
- Add and Subtract Fractions with the Same Denominator
- Convert Decimal Numbers to Fractions
- Convert Fractions to Decimal Numbers
- Convert Improper Fractions into Mixed Numbers
- Convert Mixed Numbers into Improper Fractions
- Expand Fractions
- Fractions - Addition and Subtraction
- Fractions - Multiplication and Division
- Simplify Fractions

Graphs and Charts

- Graphs - Pie Chart
- Graphs - Square Law
- Graphs - Straight Line Graphs

Support

Indices
- Indices
- Indices - Addition and Subtraction
- Indices - Letter Notation
- Indices - Multiplication and Division
- Indices - Powers of 10
- Powers

Length, Area and Volume
- Calculate the Area of a Complex Shape
- Calculate the Area of a Rectangle
- Calculate the Perimeter of a Rectangle
- Calculate Volume
- Lengths, Surface Area and Volume
- Lengths, Surface Area, and Volume
- Lengths, Units and Prefixes

Number Systems
- Binary and Decimal Conversions

Percentages
- Calculate Percentage Increases
- Calculate Percentage Reductions
- Calculate Percentages of Values
- Parts per Thousand
- Percentages

Phasors
- Phase Angles
- Phasor Diagrams

Trigonometry
- Basic Trigonometry
- Lengths and Pythagoras' Theorem
- Pythagoras' Theorem

LIB 3: 62 English Language Skills

Language
- Language Acquisition

Reading
- Citing Strong and Thorough Evidence
- Determining a Writer's Perspective
- Evaluating Arguments and Specific Claims Made in a Text
- Identifying and Analysing Ideas in a Text

Support

Speaking and Listening

- Discussing Different Perspectives
- Engage in a Two-Way Conversation
- Engaging in Group Discussions
- How to Introduce Yourself
- Justifying Decisions with Reasoning
- Listening and Understanding
- Planning, Writing, Presenting, and Evaluating
- Presenting a Perspective to an Audience

Writing

- Arguing a Perspective
- Creating an Informative Text
- Formal Letters with a Perspective
- Informing an Audience
- Presenting a Persuasive Perspective

LIB 3: 63 Business Skills

Cost Accounting

- Marginal Cost Calculations

Economics

- Economic Flow Models
- Economic Measures
- Economic Systems
- Location Factors
- Monetary Policy and Price Level Stability
- Needs, Wants and Demand
- Pricing and Types of Markets
- Production Factors

Financial Accounting and Bookkeeping

- Accounting - Valuation Principles
- Accruals and Pre-Payments
- Balance Sheet Accounting
- Balance Sheet Changes
- Inventory Accounting: The Periodic Method
- Inventory Accounting: The Perpetual Method
- List Price Determination
- Profit and Loss Accounts
- Purchase Cost Calculations

Fundamentals of Business Organization

- Business Organizational Structure
- Business Process Optimization
- Corporate Mission and Goals
- Quality and Environmental Management

Support

Investing and Financing

- External Financing
- Financing Rules
- Internal Financing
- Investment Analysis
- Investment Planning
- Profit and Loss Analysis

Legal Framework

- Breach of Contract
- Contracts and UN Law
- Process Chains and Networks

Procurement

- Controlling Procurement
- International Commercial Terms and Contracts
- Management of Hazardous Substances
- Material Procurement
- Material Requirements Planning (MRP)
- Monitoring Purchasing
- Organizing Procurement
- Purchasing Calculations

Production

- Analytical Techniques
- Controlling Production
- Improving Production
- Product Range
- Product Range Development
- Production Management
- Production Planning
- Production Process Control
- Production Process Planning
- Quality Control

Sales and Marketing

- Advertising and the Marketing Mix
- Communications and the Marketing Mix
- Control of the Customer's Order
- Distribution and the Marketing Mix
- Marketing Planning
- Pricing Strategies
- Product and the Marketing Mix
- Product Promotion
- Sales and Marketing Measures

Social Skills

- Common Courtesy
- Dress Code

Support

- Handle Collective Property
- Personal Space
- Punctuality

LIB 3: 64 Freight Logistics

Efficiency and Optimization of the Warehouse

- Quality Management in the Warehouse

Event Driven Process Chains

- EPC Diagrams

Human Resources

- Accident Prevention in the Warehouse
- Handling of Hazardous Materials

Information Processing

- Privacy Policy

Internal Transport and Loading

- Conveying
- Internal Transport and Loading Overview
- Loading Systems
- Picking Vehicles and Lifting Equipment
- Securing Loads

Loading

- Loading Goods Overview

Packaged Goods

- Packaging
- Packaging Aids
- Packaging of Goods

Picking Stock

- Key Figures of Picking
- Organization of Picking

Route Planning

- Accompanying Documents
- Event Driven Process Chain for Route Planning
- Freight Costs
- Legal Regulations for Shipping

Stowage Planning

- Planning for Stowage

Support

LIB 3: 65 Workplace Problem Solving

Construction

- Car Park Construction - Calculating Materials
- Installing a Flag Pole
- Perimeter Fencing - Calculating Materials

Customer Service

- Handling a Telephone Call

Distribution

- Calculating Shipping Costs
- Planning Logistics

Finance

- Calculating Costs for a Building Project
- Calculating Stationery Costs
- Calculating VAT Rates
- Comparing Crane Hire Costs
- Phone Contracts - Comparing Deals

Human Resources

- Attending a Meeting
- Choosing a Computer Monitor
- Improving the Workplace

Production

- Calculating Costs in a Food Factory
- Choosing Packaging for Parts
- Comparing Machine Productivities
- Machine Productivity for Cutting Metal Shapes
- Mass Production - Calculating Quantities
- Paint Mixing - Calculating Materials
- Programming a Drinks Bottling Plant
- Running a Bicycle Parts Production Line
- Running Two Production Lines for Bicycle Parts
- Setting Up a Paint Filling Machine

Sales and Marketing

- Calculating Sales Discounts
- Sales Conversion - Calculating Rates

Engineering
Digital Library

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p +61 3 9557 7993
e info@pullmangroup.com.au
w www.pullmangroup.com.au
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