ENGINEERING & COMPUTER GRAPHICS WORKBOOK

Using SolidWorks 2010



Table of Contents

1. Computer Graphics Lab 1: 2-D Computer Sketching I_____1-1

Introduction to SolidWorks; Screen Layout; Main Pull-Down Menu; Feature Manager Tree; View Orientation; View and Display Toolbars; Sketching Toolbars; Sketching Planes; Line Colors; Starting a New Part; Setting Grids and Units; Using Basic 2-D Primitives; Applying Basic Dimensions; Extruding and Revolving Simple Parts; Printing a Hardcopy.

Exercise 1.1: Metal Gasket	1-8
Exercise 1.2: Cover Plate	1-14
Exercise 1.3: Wall Bracket	1-19
Exercise 1.4: Machine Handle	1-22
Supplementary Exercises	1-25

2. Computer Graphics Lab 2: 2-D Computer Sketching II _____2-1

Review of All 2-D Sketch Entities; Advanced Sketching Tools; Sketch Editing Tools; Linear and Circular Repeats; Basic Dimensioning; Extruding and Revolving Simple Parts.

Exercise 2.1: Metal Grate	2-3
Exercise 2.2: Torque Sensor	2-8
Exercise 2.3: Scalloped Knob	2-11
Exercise 2.4: Linear Step Plate	2-14
Supplementary Exercises	2-19

3. Computer Graphics Lab 3: 3-D Solid Modeling of Parts I_____3-1

Adding Sketch Relations; 3-D Features Toolbar; Advanced Extrusion and Revolution Operations; Insert Reference Geometry; Mirror 3-D Feature; Create Linear and Circular 3-D Patterns; Building 3-D Solid Parts.

Exercise 3.1 Clevis Mounting Bracket	3-3
Exercise 3.2 Manifold	3-8
Exercise 3.3: Hand Wheel	3-12
Exercise 3.4: Toe Clamp	3-16
Supplementary Exercises	3-19

4. Computer Graphics Lab 4: 3-D Solid Modeling of Parts II ______4-1 Creating Advanced 3-D Features: Draft, Shell, Dome, Loft, Sweep; Advanced Extrusion and Revolution Operations; Building 3-D Solid Parts. Exercise 4.1: Drawer Tray ______4-2 Exercise 4.2: Tap-Light Dome ______4-7 Exercise 4.3 Acme Thread Lead Screw ______4-11 Exercise 4.4 Jack Stand ______4-17 Supplementary Exercises ______4-20 5. Computer Graphics Lab 5: Assembly Modeling and Mating ______5-1 Duilding Mating 2 D Parts Code Stable in the Station Advanced Station ______5-1

Building Multiple 3-D Parts; Color Shading of Parts in an Assembly; Starting a New Assembly File; Tiling the Screen Windows; Assembly Toolbar; Drag and Drop Parts into Assembly; Move and Rotate Component; Mate Parts with Different Mate Types; Print Assembly File.

Exercise 5.1: Terminal Support Assembly	5-4
Exercise 5.2: Swivel Eye Block Assembly	
Supplementary Exercises	5-25

6. Computer Graphics Lab 6: Analysis and Design Modification I_____6-1

Measure Function; Mass Properties Function; Types of Mass Properties and Applicable Units; Print Mass Properties Report; Design Modification of a Solid Model; Setting Up a Design Table; Setting Parameters for the Design Table; Configuration Manager; Print Assembly File.

Exercise 6.1: Rocker Arm Mass Properties	6-4
Exercise 6.2: Socket Plug Design Table	6-12
Supplementary Exercises	6-17

Introduction to Finite Element Analysis Using COSMOS/Works; Definition of FEA Terms; Building a Solid Model for an FEA Study; Beginning an FEA Study; Applying Loads and Constraints; Creating a Mesh; Analyzing the Model for Stress Distribution; Printing the von Mises Stress Distribution; Design Modification of a Solid Model Based on Analysis Results.

Exercise 7.1: Finite Element Analysis of a Pillow Block	7-3
Exercise 7.2: Finite Element Analysis of a Piston	7-14

Introduction to the SolidWorks Animation Wizard; Loading an Assembly File; Exploding an Assembly; Creating the Animation; Animation Controller; Editing the Animation; Saving an .AVI File; Introduction to Physical Simulation, Introduction to Rapid Prototyping; Saving an .STL File; Sample Solid Models for Rapid Prototyping.

Exercise 8.1: Exploded Animation of the Terminal Support Assembly	8-5
Exercise 8.2: Exploded Animation of the Swivel Eye Block Assembly	8-10
Exercise 8.3: Rapid Prototyping of a Solid Model Part	8-15

9. Computer Graphics Lab 9: Section Views in 3-D and 2-D_____9-1

Viewing 3-D Section Views of a Solid Model; Printing 3-D Section View; Inserting a Drawing Sheet; Setting Drawing and Hatch Pattern Options; Projecting Three Orthographic Views Onto a Drawing Sheet; Creating the Cutting Plane Line; Making a 2-D Section View; Completing a Section View Drawing; Print Section View Drawing.

Exercise 9.1: Rod Base Section Views	9-3
Exercise 9.2: Tension Cable Bracket Section Views	9-9
Exercise 9.3: Milling End Adapter Section Views	9-15
Exercise 9-4: Plastic Revolving Ball Assembly Section Views	9-21
Supplementary Exercises	9-27
	-

10. Computer Graphics Lab 10: Generating and Dimensioning Three-View Drawings______10-1

Inserting a Drawing Sheet; Setting Drawing Sheet Options; Projecting Three Orthographic Views of a Solid Model Onto a Drawing Sheet; Adding Centerlines and Completing the Drawing Views; Setting the Dimensioning Variables; Dimensioning the Drawing; Adding Title Block and Annotations; Print a Drawing.

Exercise 10.1: Guide Block Drawing	10-5
Exercise 10.2: Pipe Joint Drawing	10-9
Exercise 10.3: Pedestal Base Drawing	10-15
Exercise 10.4: Tooling Pad Drawing	10-19
Supplementary Exercises	10-27