# Experiment No. 1

Setting up of drawing environment by setting drawing limits, drawing units, naming the drawing, naming layers, setting line types for different layers using various type of lines in engineering drawing, saving the file with .dwg extension. And Auto CAD Commands

## Measuring Commands

**GRID:**   Displays a grid of dots at a desired spacing on the screen.
Command:  GRID (enter)
On/Off/Tick spacing(x)/Aspect:  (enter value) (enter)

**SNAP:**   Specifies a "round off" interval so that points entered with the mouse can be locked into alignment with the grid spacing.
Command:  SNAP (enter)
On/Off/Value/Aspect/Rotate/Style:  (enter value) (enter)

## Basic Draw Commands

**CIRCLE:**   Draws circles of any size.
Command:  Circle (enter)
3P/2P/TTR/<center point>:  (pick a center point)
Diameter or <Radius>:  (Pick a point on the circle)

**LINE:**   Draws straight lines between two points
Command:  LINE (enter)
From Point:  (pick a point using the mouse)
To Point:  (Pick a point using the mouse)
To Point:  (Press return to end the command)

**ARC:**   Draws an arc (any part of a circle or curve) through three known points.
Command:  ARC (enter)
Center/ < Start point > :  (pick the first point on the arc)
Center/End/ < Second point > :  **C**
Center:  (pick the arc's center point)
Angle/Length of chord/ <End point > :  (pick the arc endpoint)

## Display Commands

**LIMITS:**   Sets the size of the drawing paper.  For size "A" drawing paper the limits should be set for 10.5 x 8.
Command:  LIMITS (enter)
On/Off/Lower left corner <0.0000> (enter)
Upper right corner: 10.5,8 (enter)

**ZOOM:**   Enlarges or reduces the display of a drawing.
Command: ZOOM (enter)
All/Center/Dynamic/Extents/Left/Previous/Vmax/Window/<Scale(x/XP)>:
(pick a point to define one corner of a rectangular viewing window then pick a point to define   the second point to define the opposite diagonal corner of the viewing window)

Note:  To return the picture to its original viewing size enter **ALL** and press the enter key when prompted instead of defining a window.

**PAN:**   **A**llows you to move your view point around the drawing without changing the magnification   factor.
Command:  PAN (enter)

## Editing Commands

**CHANGE:**   Alters properties of selected objects
Command:  CHANGE (enter)
Select objects or window or Last (select objects to be changed)
Properties/<Change point>:  (type P)
Change what property (Color/Elev/LAyer/LType/Thickness)?  (type Layer)
New Layer:  (enter new layer name and press enter)

# Experiment No. 1

**ERASE:**   Erases entities from the drawing.
Command:  ERASE (enter)
Select objects or Window or Last: (Select objects to be erased and press enter when finished)

**EXTEND:**   Lengthens a line to end precisely at a **boundary edge.**
Command:  Extend (enter)
Select boundary edge(s)...
Select Objects  (pick the line which represents the boundary edge which lines will be extended
to)
(press enter when finished selecting cutting edges)
<Select object to extend>/Undo:  (pick the line(s) that need to be extended

**TRIM:**   Trims a line to end precisely at a **cutting edge**.
Command:  Trim (enter)
Select cutting edge(s)...
Select Objects  (pick the line which represents the cutting edge of line in which objects will be
trimmed to)
(press enter when finished selecting cutting edges)
<Select object to trim>/Undo:  (pick the line(s) that need to be trimmed)

## GRIPS

You can edit selected objects by manipulating grips that appear at defining points on the object.  Grips is not a command.  To activate grips simply pick the object.  Small squares will appear at various entity-specific positions.  By selecting an end grip you can stretch the entity to change its size.  By selecting the center grip you can move the entity to a new location.  To remove grips press CTL-C twice.  You can perform the following using grips: Copy, Multiple Copy, Stretch, Move, Rotate, Scale, and Mirror.

## Creating Layers

**LAYER:**   Creates named drawing layers and assigns color and linetype properties to those layers.
Command: LAYER (enter)
A Layer & Linetype Properties dialog box will be displayed.  To add a new layer, pick the New button.  A new layer listing appears, using a default name of Layer1.  the layer name can be changed by highlighting the layer name.  Colors and Linetypes can be assigned to each new layer by picking the color box to assign a color and picking the linetype box to assign a line type.

### Standard AutoCAD colors

| | | | |
|---|---|---|---|
| 1 = Red | 2 = Yellow | 3 = Green | 4 = Cyan |
| 5 = Blue | 6 = Magenta | 7 = White | |

### Standard AutoCAD linetypes

**Hidden2** = hidden lines
**Center2** = center lines
**Phantom2** = phantom or cutting-plane lines

## Construction Commands

**ARRAY:**   Makes multiple copies of selected objects in a rectangular or circular pattern
Command:  ARRAY (enter)
Select objects or Window or Last:  (select object to array)
Rectangular or Polar array (R/P) <current>: (P)
Center point of array:  (pick the point around which to form the array)
Angle to fill (+=CCW, -=Cw) <360>:  (enter)

**COPY:**   Draws a copy of selected objects.
Command:  COPY (enter)
Select objects or Window or Last:  (select objects to be copied)
Base point or displacement:  (pick a point on the object to be use as a reference point)
Second point of displacement:  (pick a point which represents the new location of the copied object)

**MIRROR:**   Makes mirror images of existing objects.
Command:  MIRROR (enter)
Select objects or Window or Last: (select objects to be mirrored)
First point of mirror line:  (pick a point on top of the mirror line)
Second point:  (pick a point  on the bottom of the mirror line)
Delete old objects? <N> y or n  (enter)

# Experiment No. 1

## Measuring

**MOVE:** Moves designated entities to another location.
Command: MOVE (enter)
Select objects or Window or Last: (select objects to move)
Base point or displacement: (pick a point on the object to be use as a reference point)
Second point of displacement: (pick a point which represents the new location of the object)

**OFFSET:** Constructs an entity parallel to another entity at a specified distance. Offset can be used with lines, circles, arcs, and polylines.
Command: OFFSET (enter)
Offset distance or Through <last>: (enter a distance value)
Select object to offset: (select object to offset)
Side to offset: (Pick any point on the side of the object you wish to offset)

**FILLET:** Changes any corner to a rounded corner.
Command: FILLET
Polyline/Radius/Angle/Trim/Method/ <Select first line > : (pick the first line)
Select second line: (pick the second line)

**CHAMFER:** Changes any corner to an angled corner.
Command: CHAMFER
Polyline/Distance/Angle/Trim/Method/ < Select first line > : (pick the first line)
Select second line: (pick the second line)

**OSNAP**
Instantly locates exact points relative to existing objects (points).
Object Snap Modes: Endpoint, Midpoint, Center, Quadrant, Intersection, Insertion, Perpendicular, Tangent, Nearest, Node, and None.

## Placing lettering on a drawing

**TEXT:** Draws text characters of any size.
Command: TEXT (enter)
Justify/Style/<Start point>: (pick a starting point or enter a justification letter)
Height (0) (enter the height of the lettering)
Rotation Angle (0) (enter)
Text: (enter the desired lettering) (enter)

### Summary of Options

| | |
|---|---|
| **<Start Point>** | Left-Justifies text along its baseline |
| **Justify** | Justifies text according to the alignment options |
| **Style** | Enters a new text style |
| **Null reply** | Enters a new line of text below the previous text. (space or Enter key will give a Null reply) |

### Text Alignment Options

| Alignment | Abbreviation | Orientation |
|---|---|---|
| Aligned | A | Aligns text between two points. Text height will adjust automatically |
| Fit | F | Fits text between two points. Text height will not change |
| Centered | C | Centers text at the baseline of a specified point |
| Middle | M | Centers text horizontally and vertically at the baseline of a specified point |
| Right | R | Right Justify text at the baseline of a specified point |
| Alignment | Abbreviation | Orientation |
| Top Left | TL | Left Justifies text at the top of text |
| Top Center | TC | Centers text at the top of text |
| Top Right | TR | Right justifies text at the top to text |
| Middle Left | ML | Left justifies text at the middle of text |
| Middle Center | MC | Centers text both horizontally and vertically |
| at the middle of the text | | |
| Middle Right | MR | Right justifies text at the middle of text |
| Bottom Left | BL | Left justifies text at the bottom of text |
| Bottom Center | BC | Centers text a the bottom of text |
| Bottom Right | BR | Right justifies text at the bottom of text |

The SPELL command will check the spelling of a group of text.
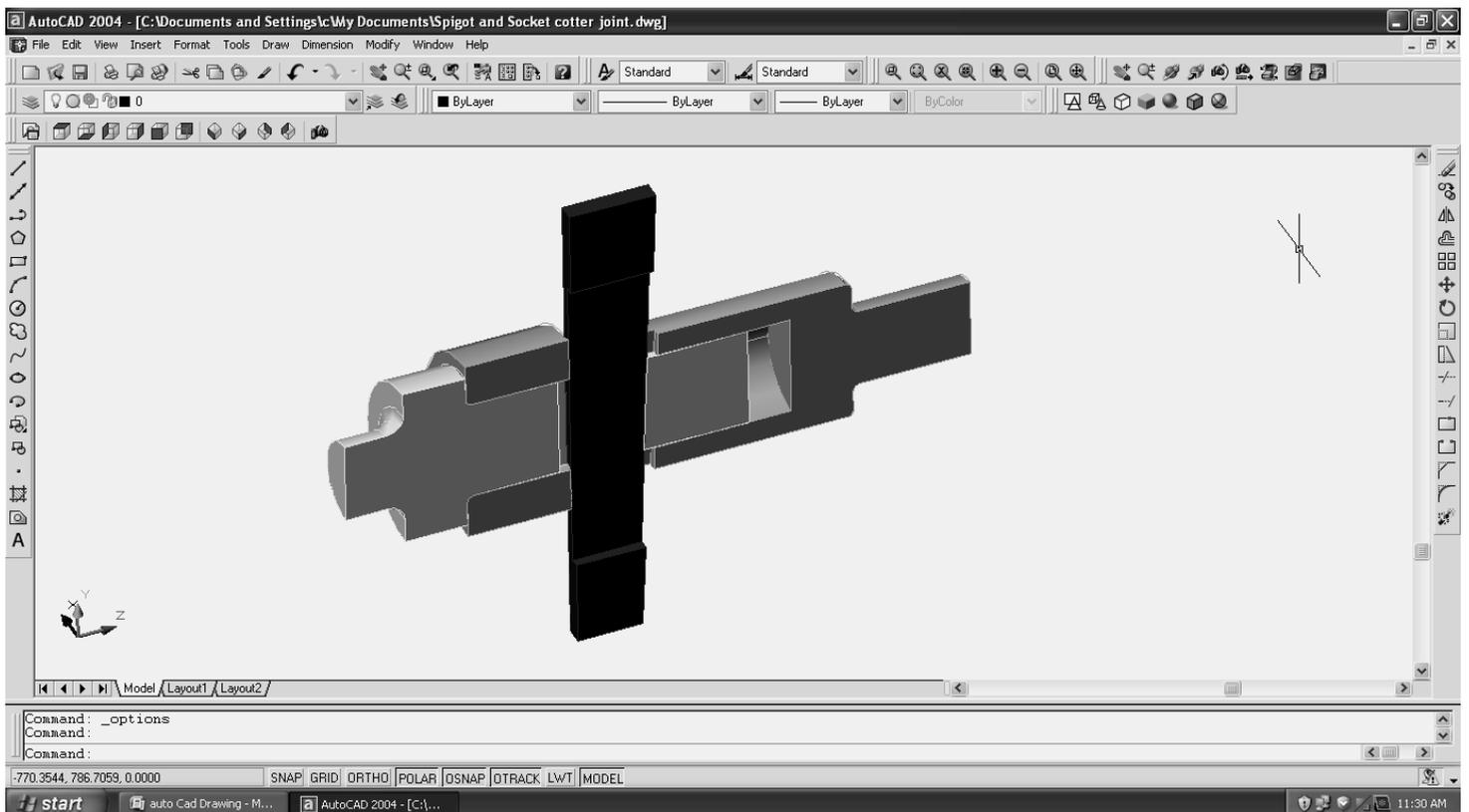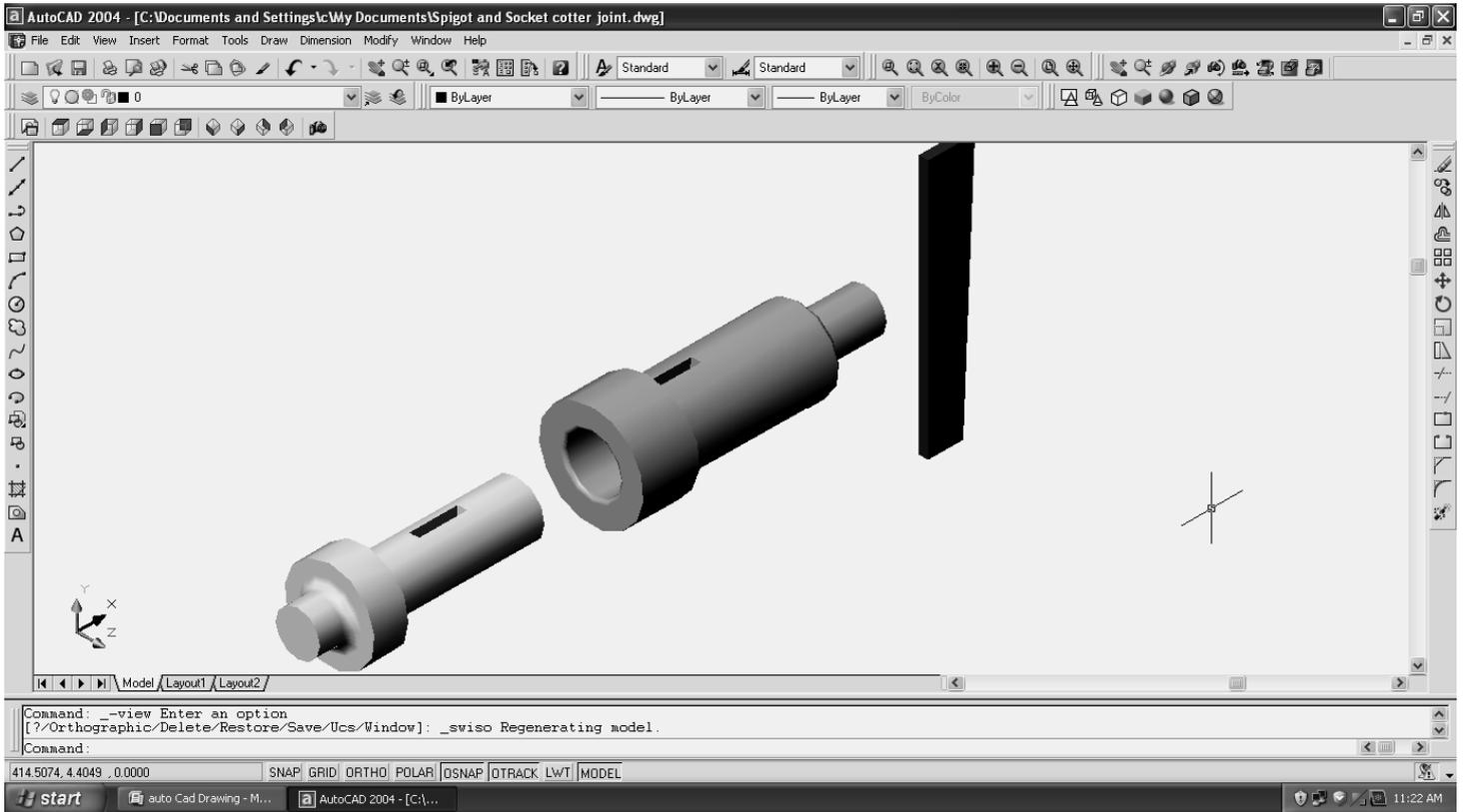
# Experiment No. 2

Layout drawing of a building using different layer and line colors indicating all Building details. Name the details using text commands, Make a title Block.
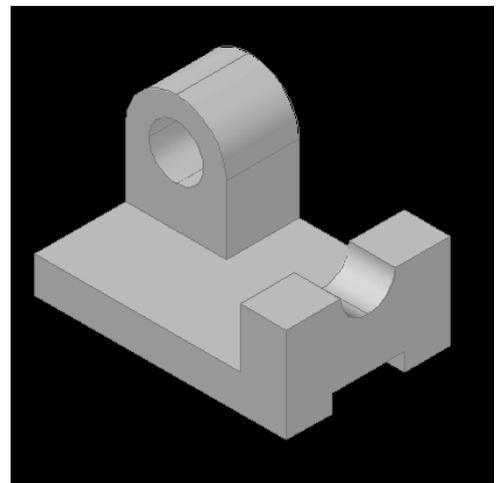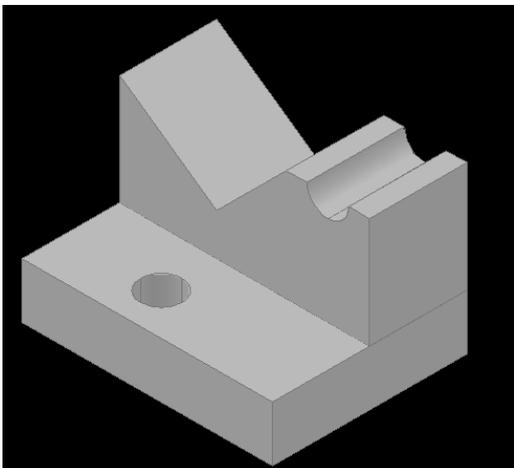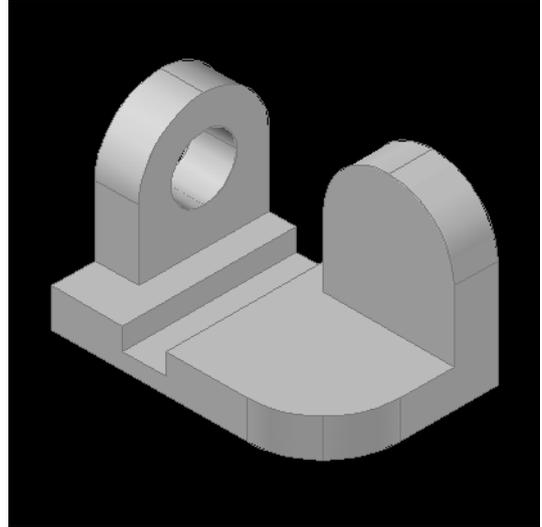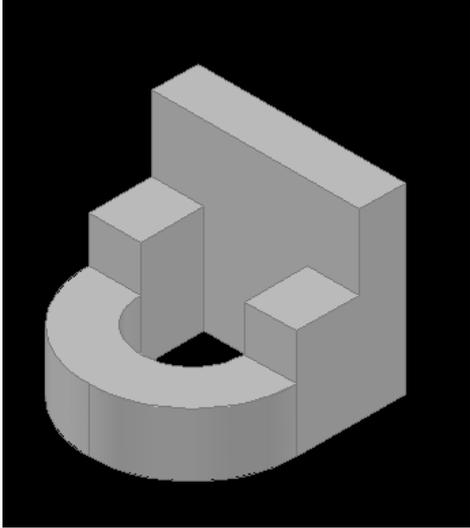
# Experiment No. 3

Make an Isometric dimensioned drawing of a connecting Rod using isometric grid and snap.
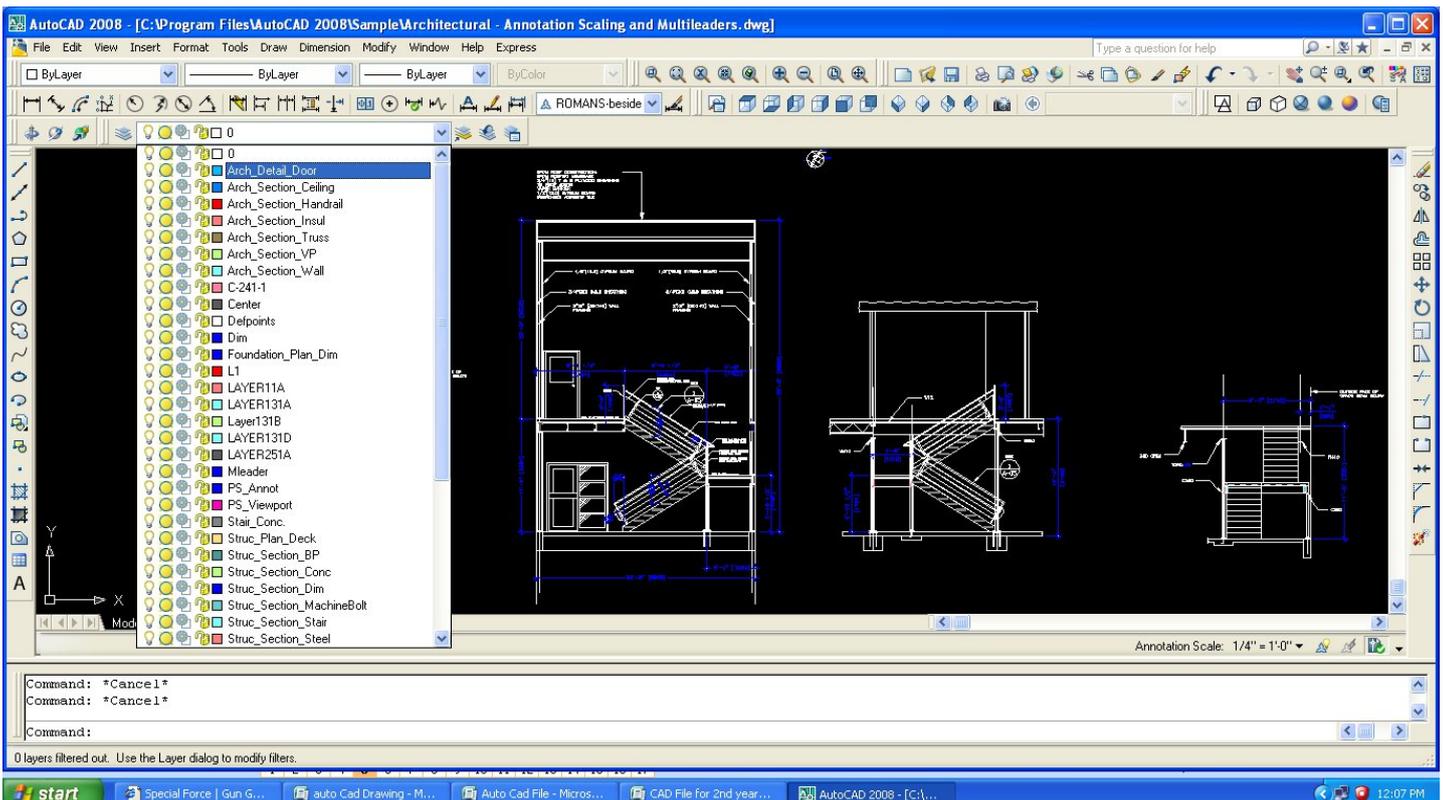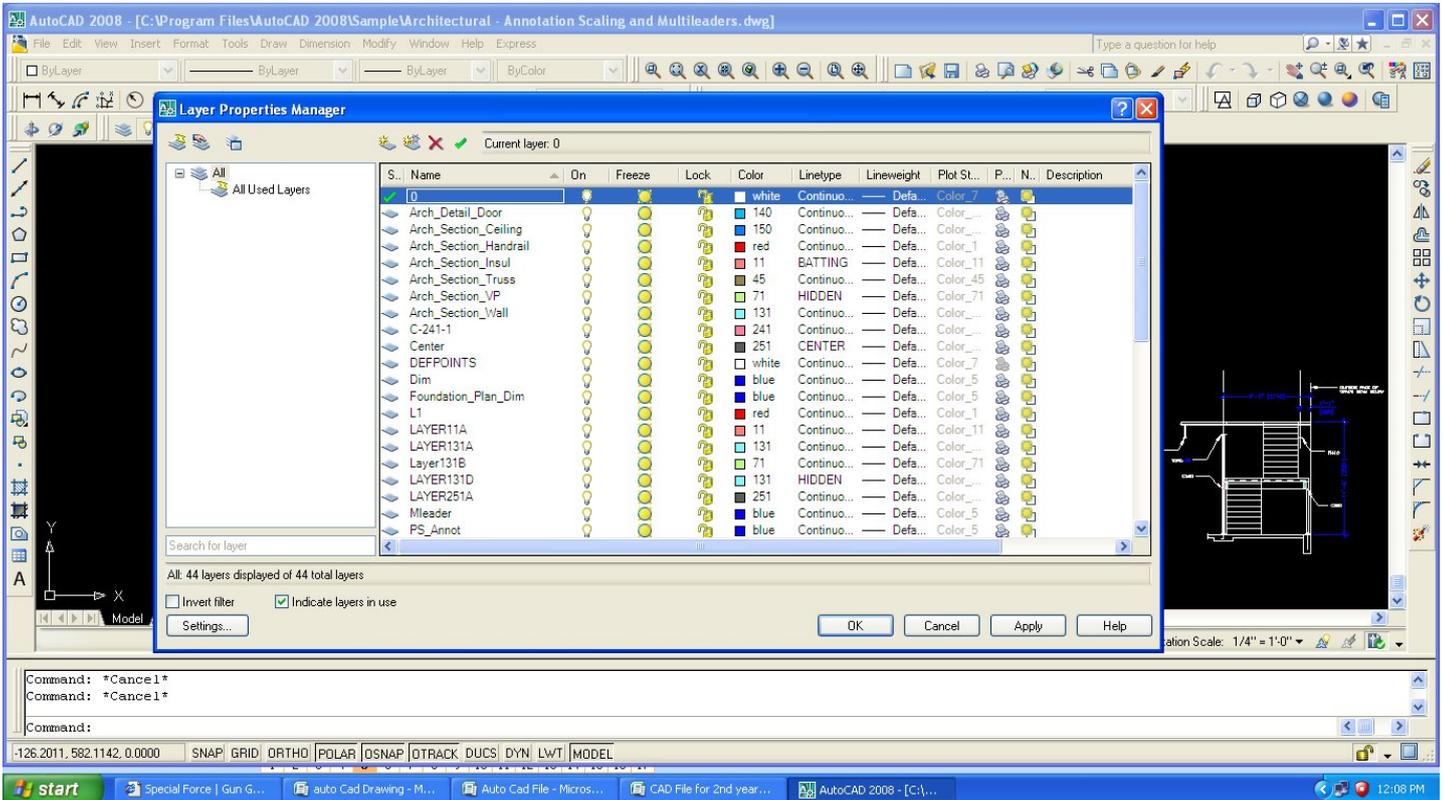
# Experiment No. 3
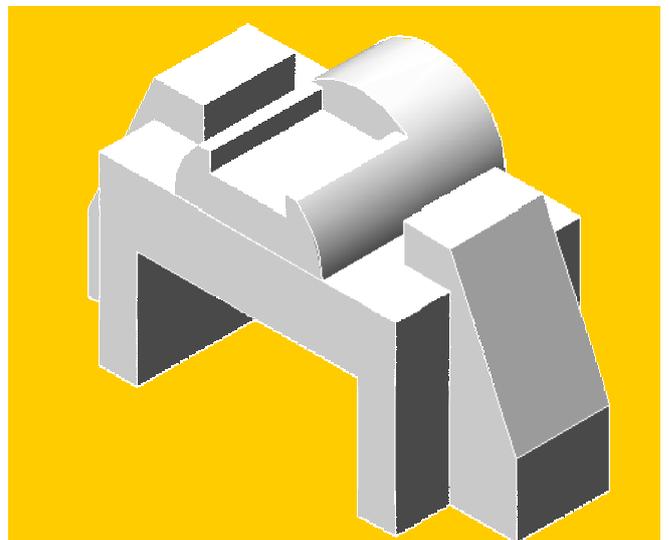
# Experiment No. 4

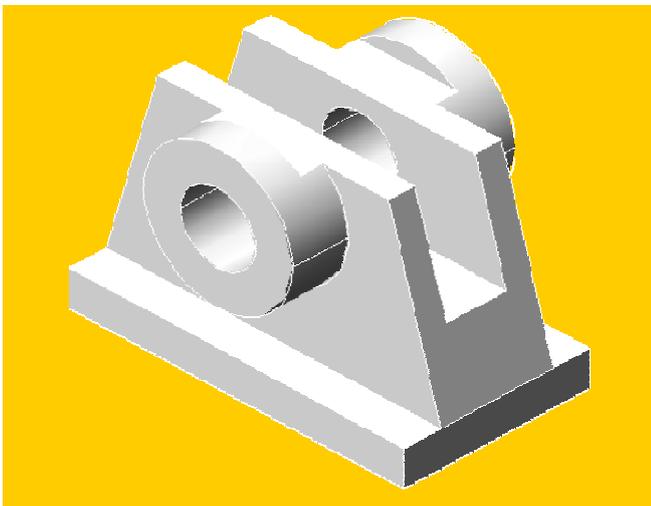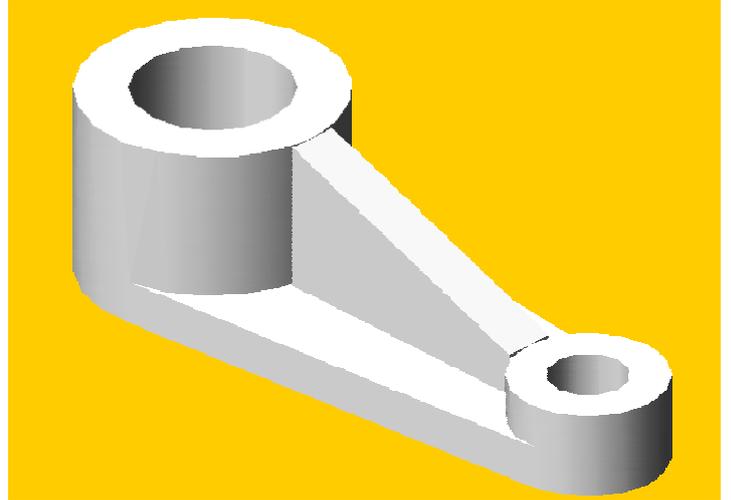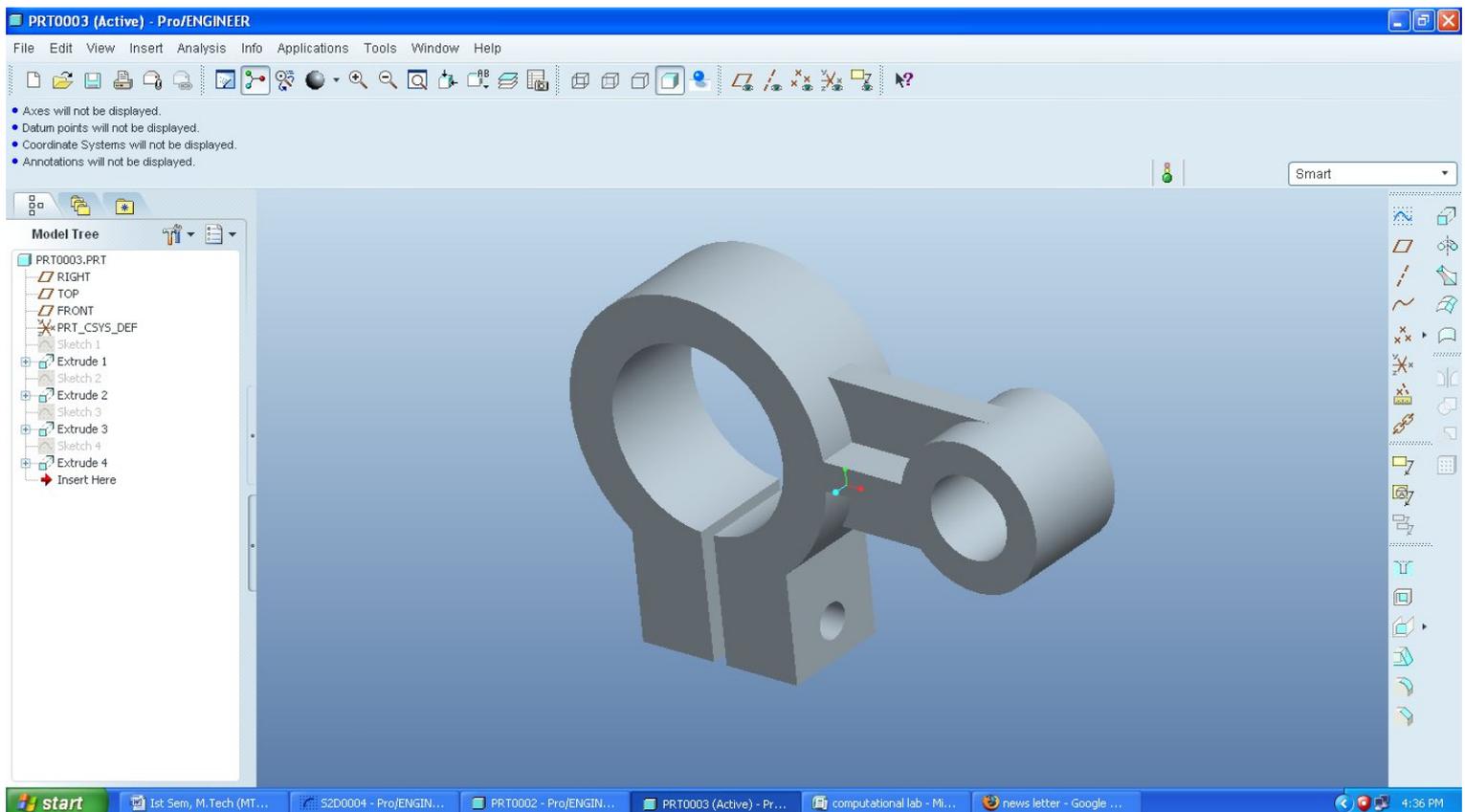Draw quarter sectional isometric view of a cotter joint.

# Experiment No. 4

# Experiment No. 5

Draw 3D models by extruding simple 2D objects, dimension and name the objects

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Draw 3D models by extruding simple 2D objects, dimension and name the objects
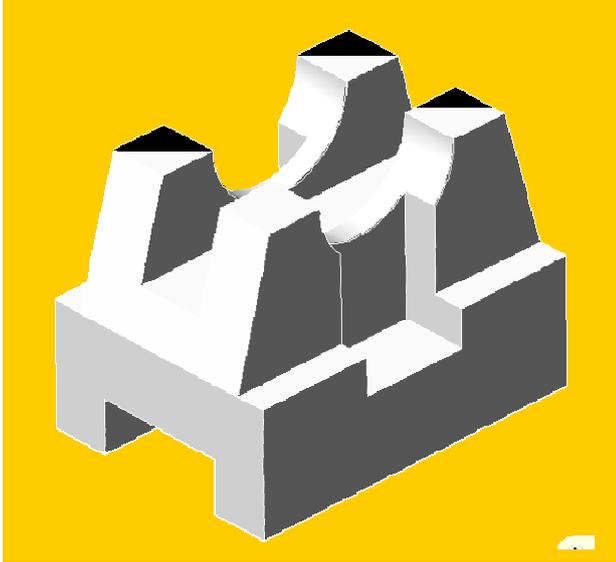
# Experiment No. 5

Draw 3D models by extruding simple 2D objects, dimension and name the objects (Pro –E)
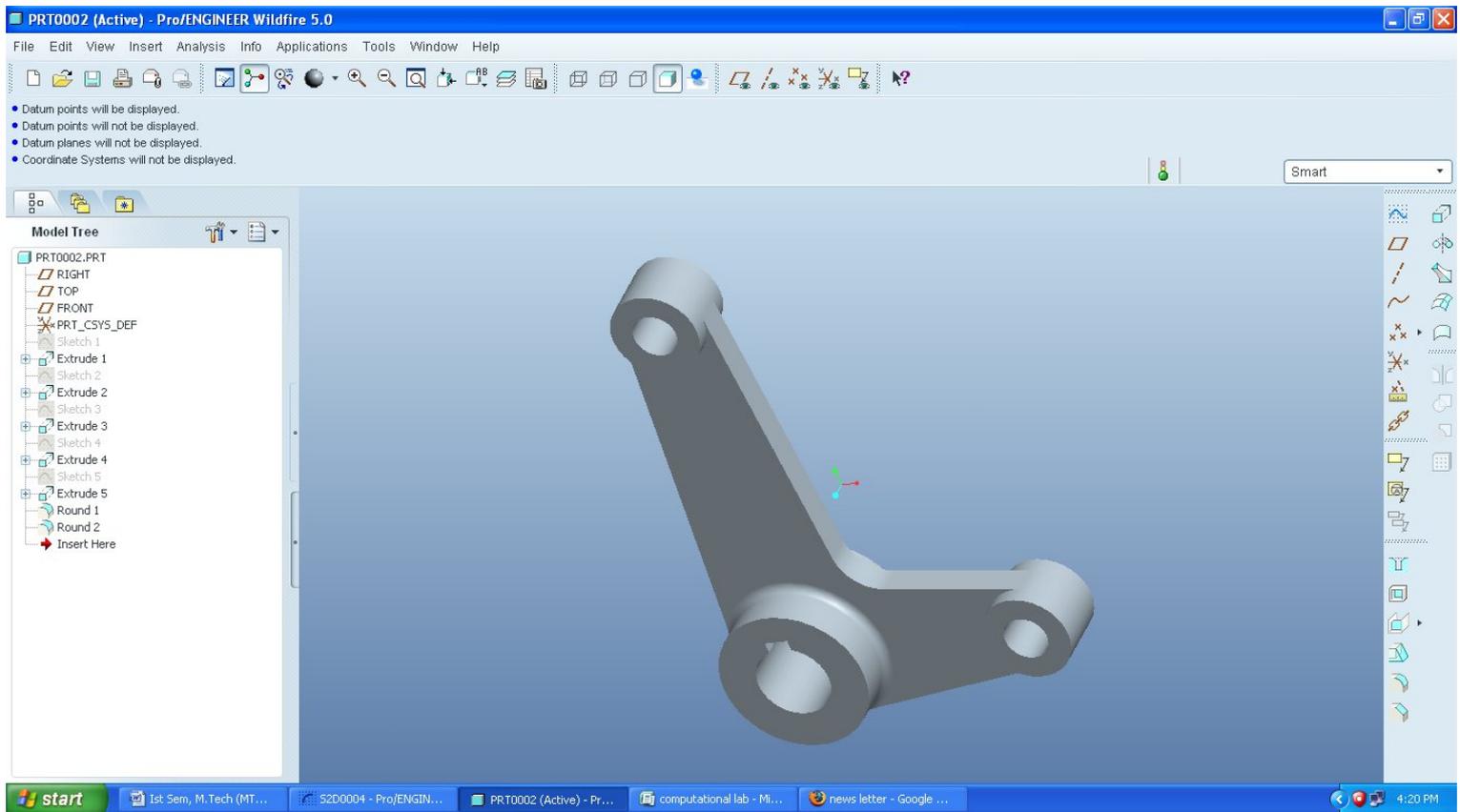
# Experiment No. 5

Draw 3D models by extruding simple 2D objects, dimension and name the objects (Pro –E)

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Draw 3D models by extruding simple 2D objects, dimension and name the objects (Pro –E)
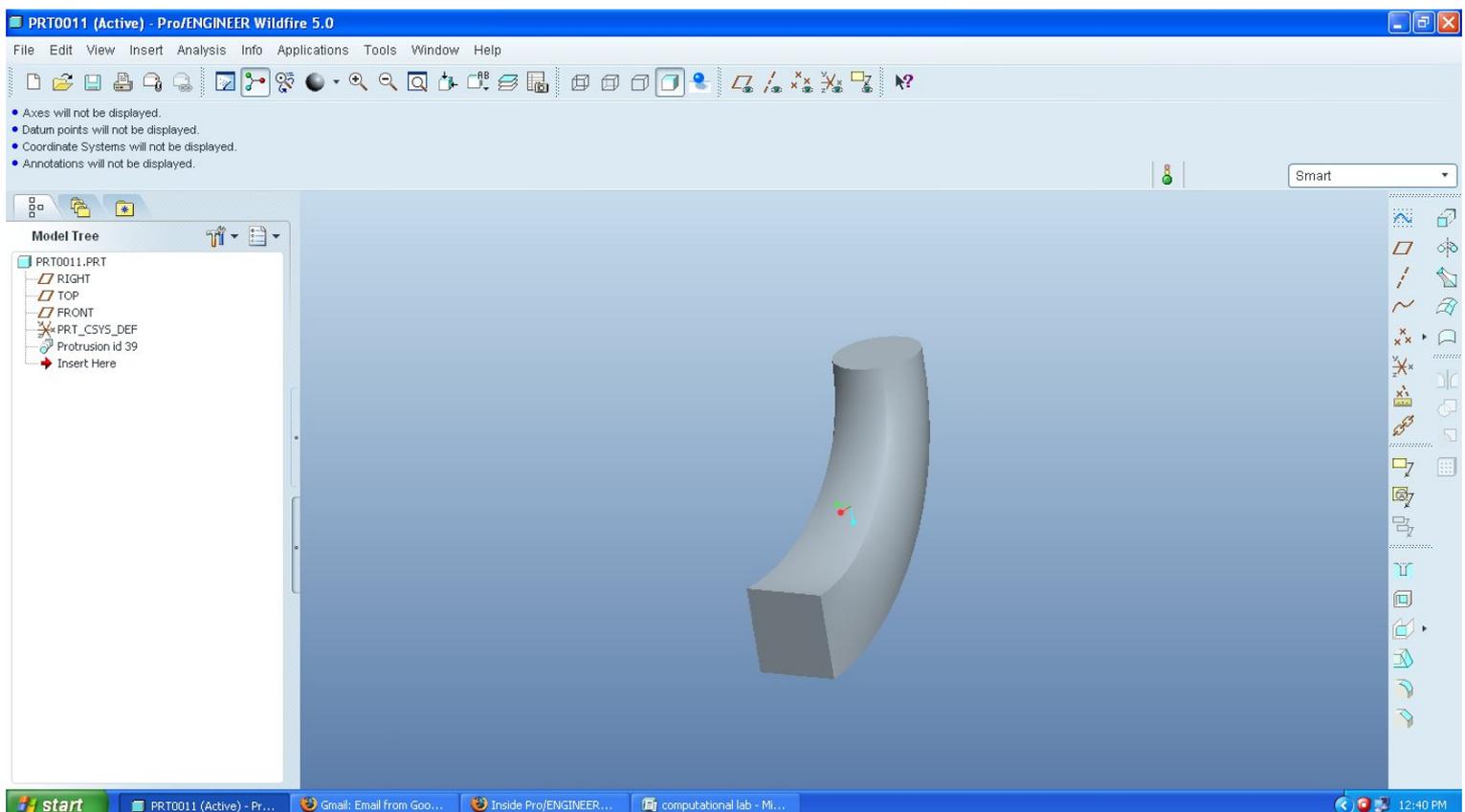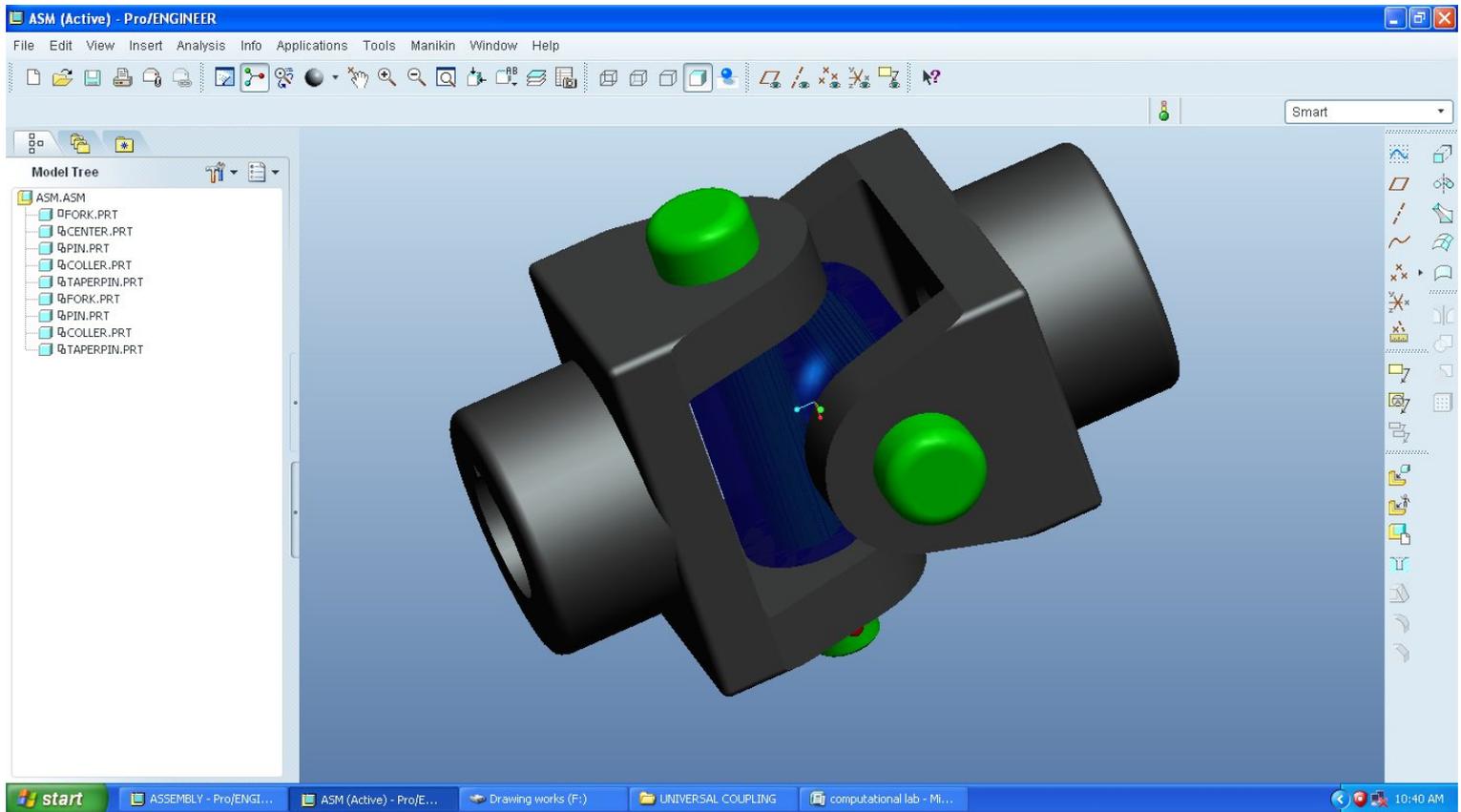
# Experiment No. 6

Draw a spiral by extruding a circle.
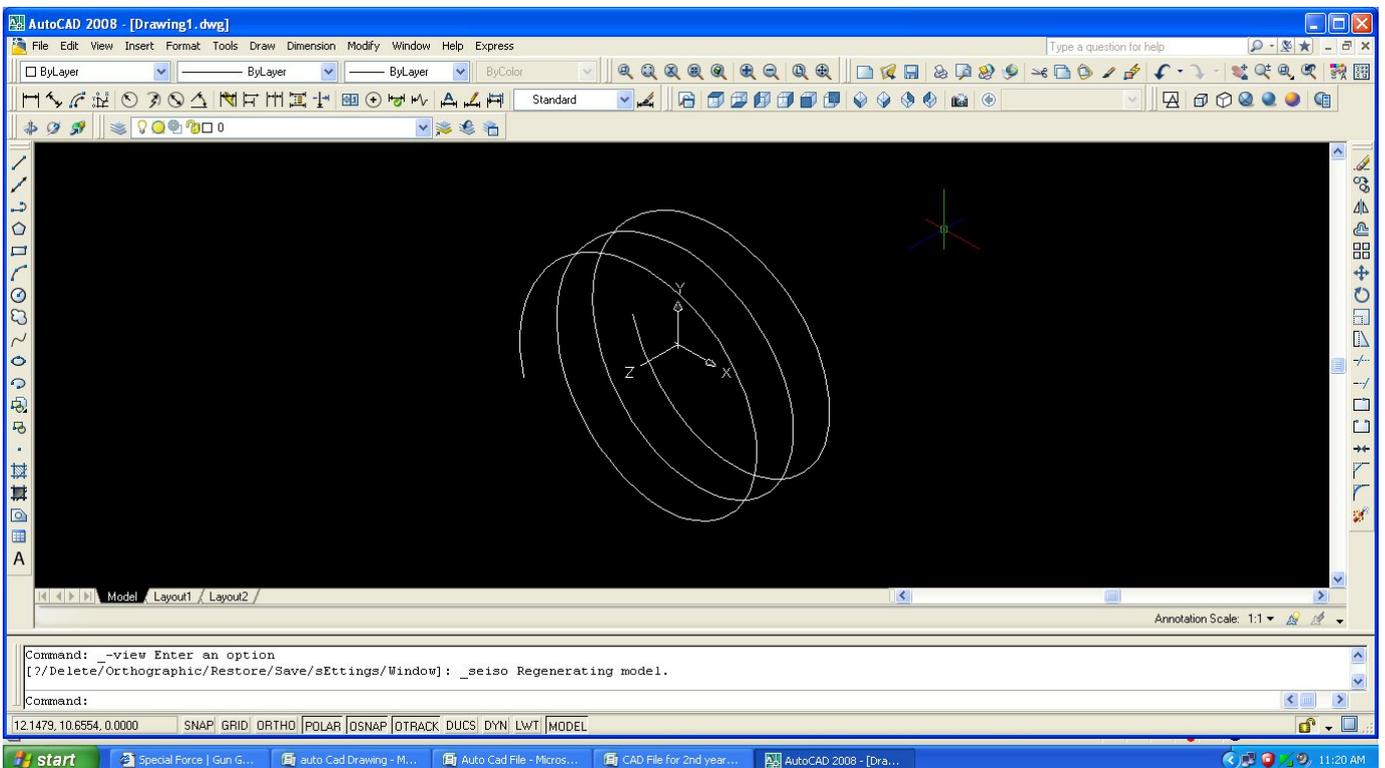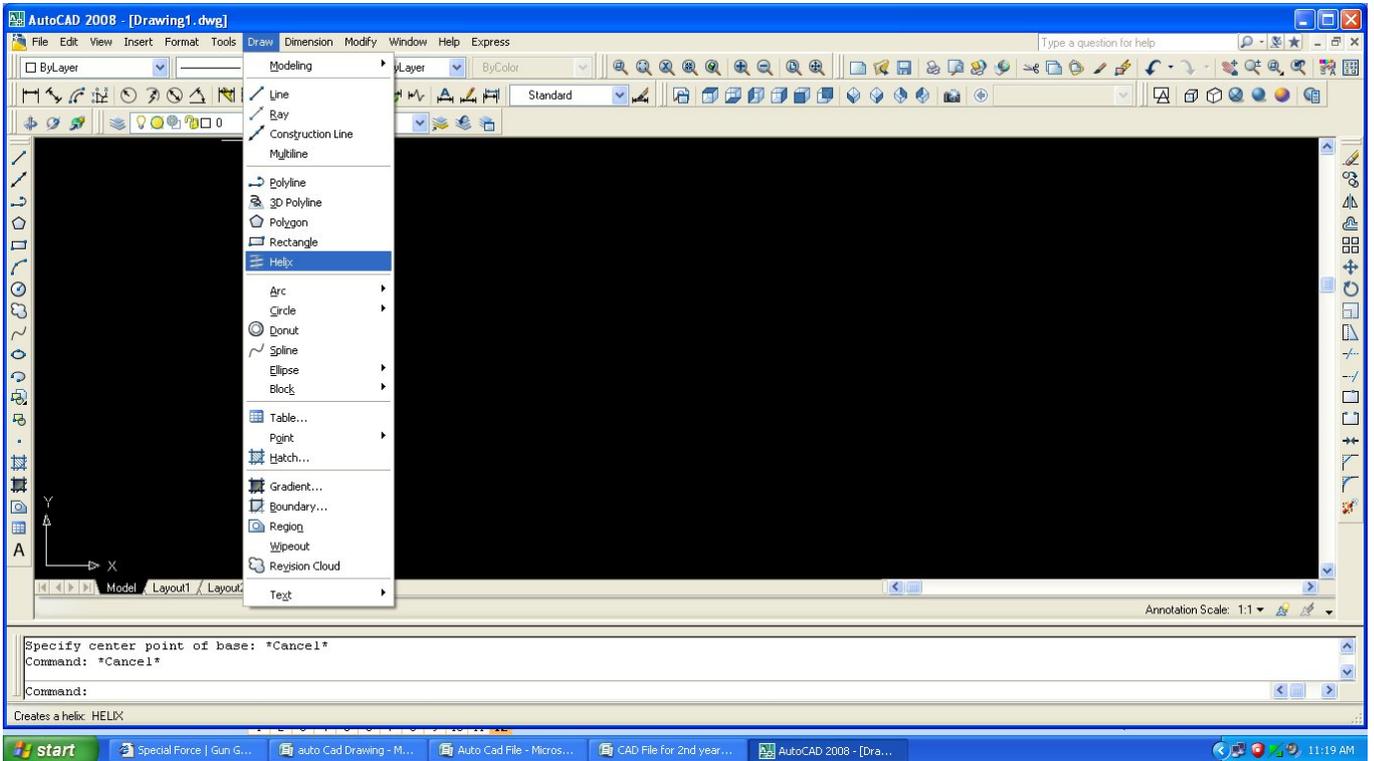
# Experiment No. 6
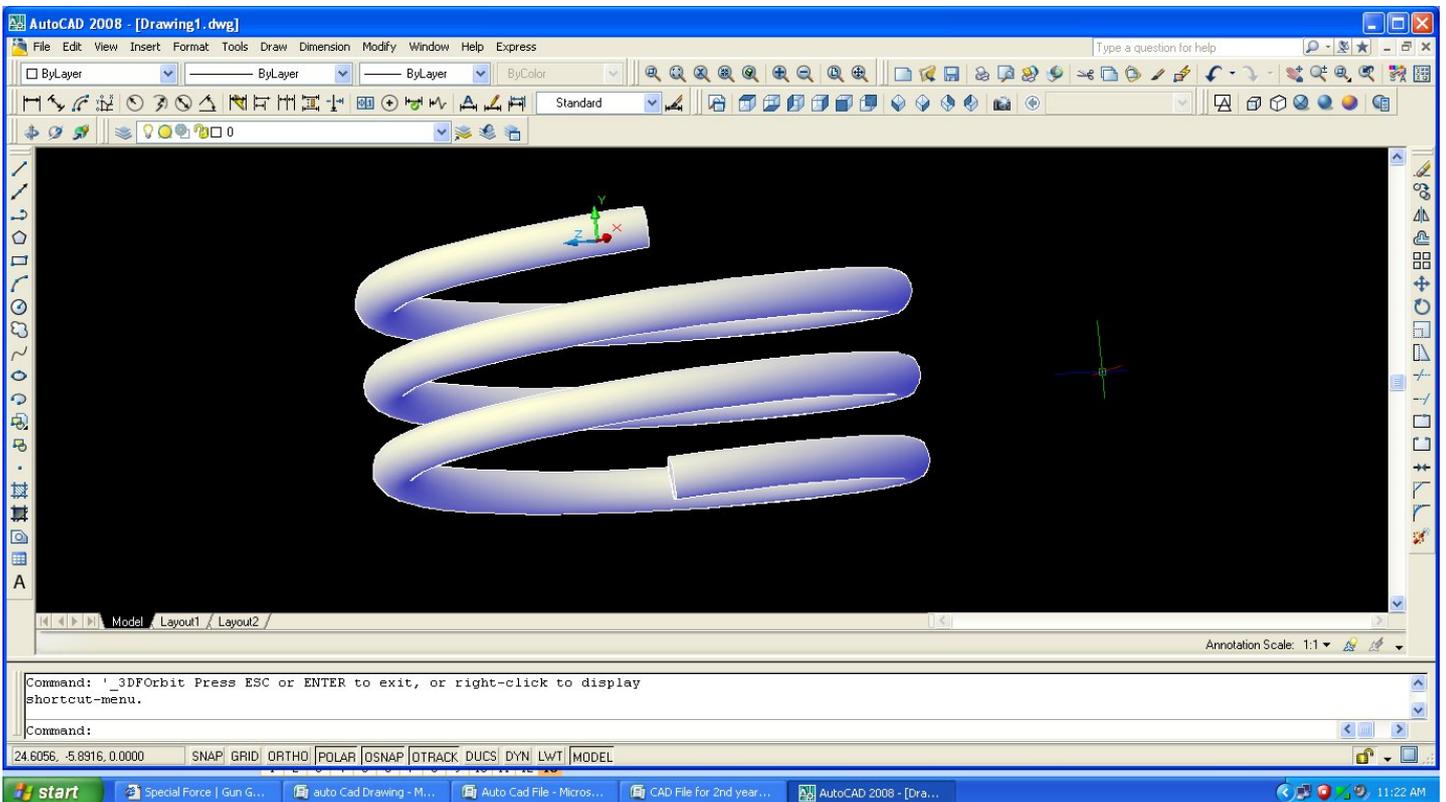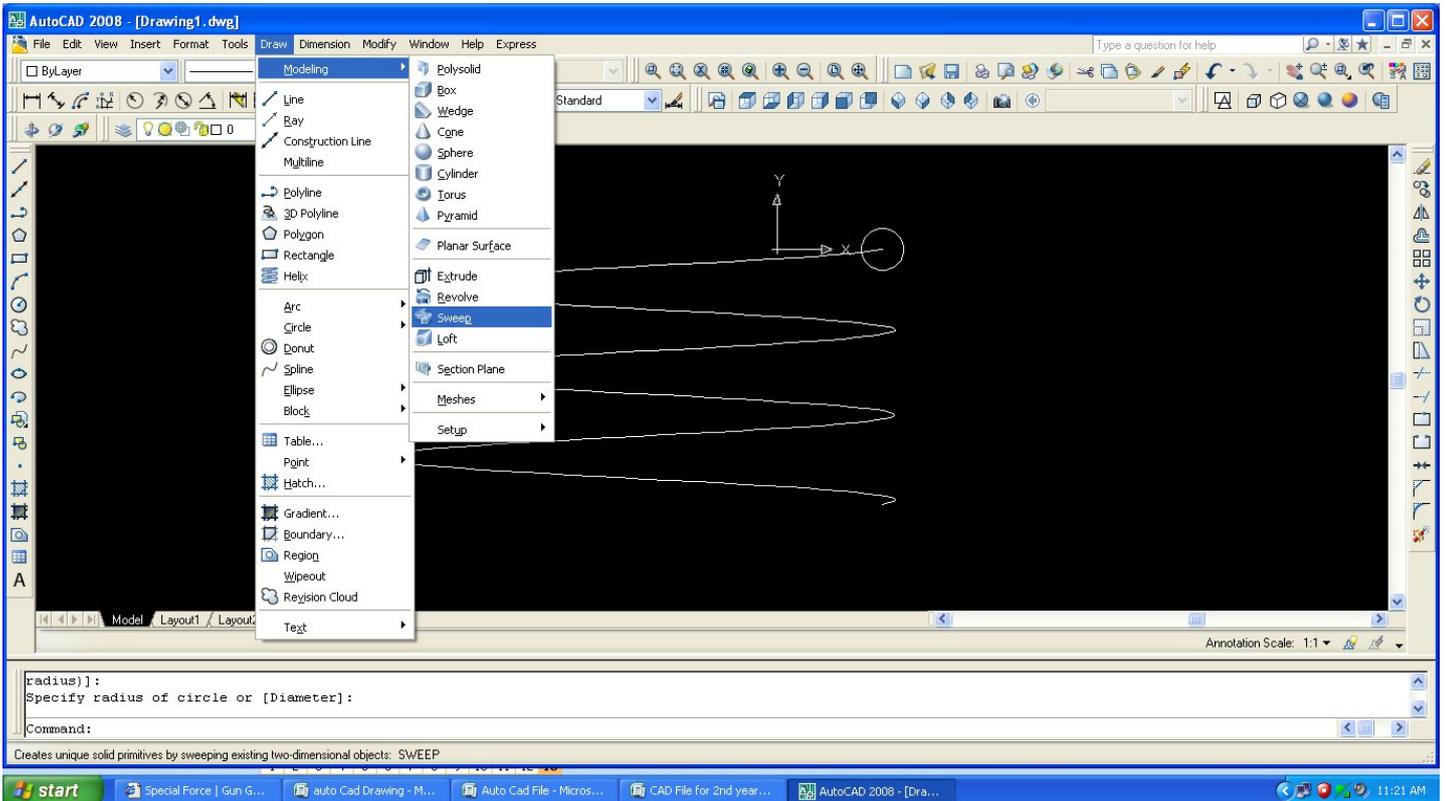
# Experiment No. 7

Draw an Expansion Joint



6-HOLES, Φ15, EQUALLY SPACED,
ON 156 P.C.D., OFF CENTRE LINES

4-HOLES, Φ16, EQUALLY SPACED,
ON 236 P.C.D.

Φ220 Φ100 Φ130 Φ150 H7 Φ185 Φ170 H7 Φ200 Φ275

15 15
22 50 70 100 20
[262]

① BODY C.I. 1-OFF

Φ150 g6 Φ125 H7 Φ170 g6
40 10
② NECK BUSH BRASS 4-OFF

Φ170 g6 Φ125 H7 Φ150 g6
10 90
③ GLAND BUSH BRASS 1-OFF

6-HOLES, Φ15, EQUALLY SPACED, ON
156 P.C.D. OFF CENTRE LINES

4-HOLES, Φ16, EQUALLY SPACED,
ON 236 P.C.D.

Φ125 g6 Φ100 Φ120 Φ220

300
50 22

⑤ PIPE C.I. 1-OFF

Φ170 g6 Φ150 H7 Φ275
70 20
④ GLAND BRASS 1-OFF
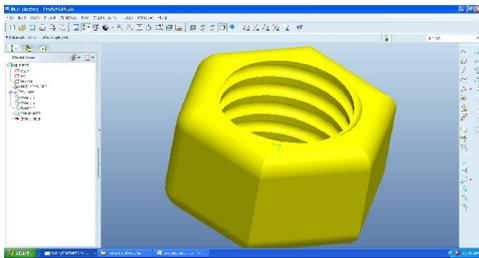
⑥ M16 NUT M.S. 4-OFF
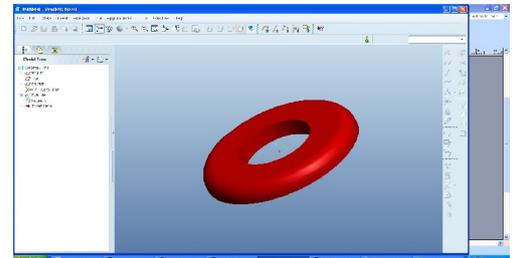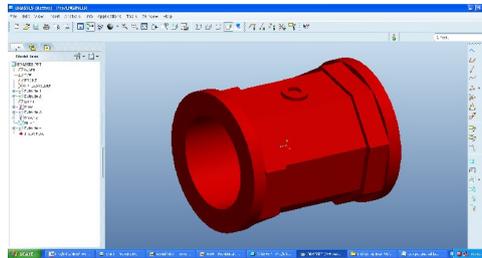
90 145 M16
⑦ BOLT M.S. 4-OFF
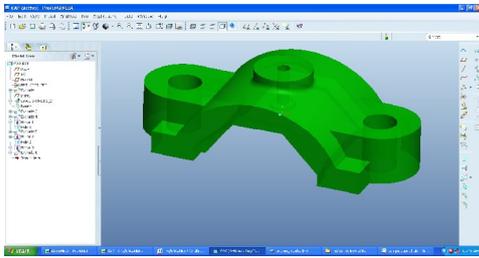
# Experiment No. 7

# Experiment No. 8

Draw different types of bolts and nuts with internal and external threading in Acme and square threading standards. Save the bolts and nuts as blocks suitable for insertion.
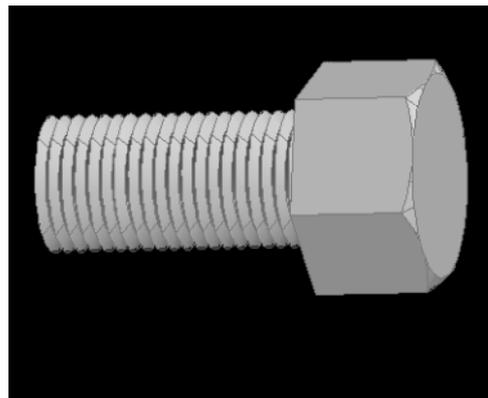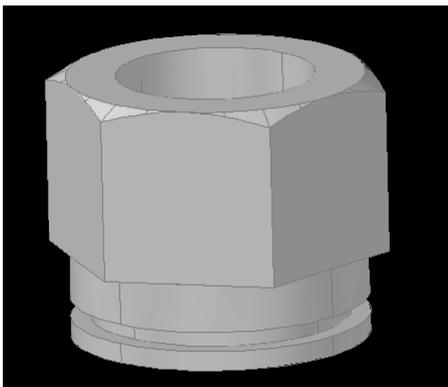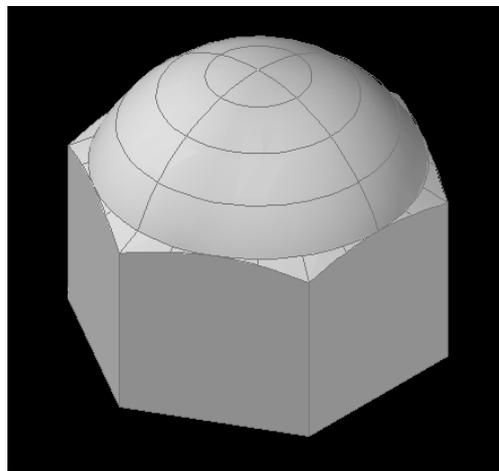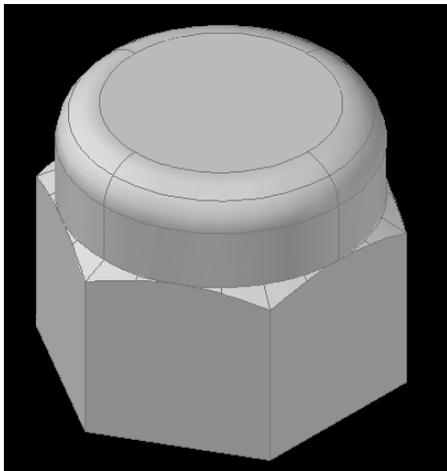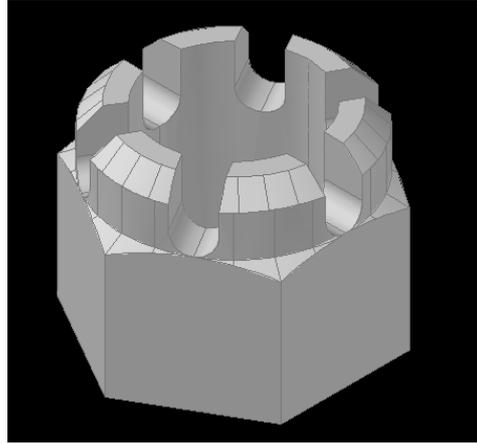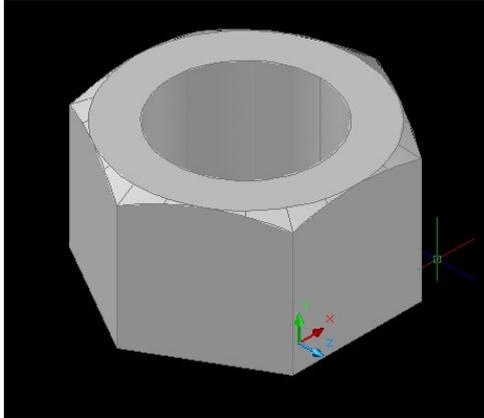
# Experiment No. 9

Draw 3D models by Assembly, using Pro-E
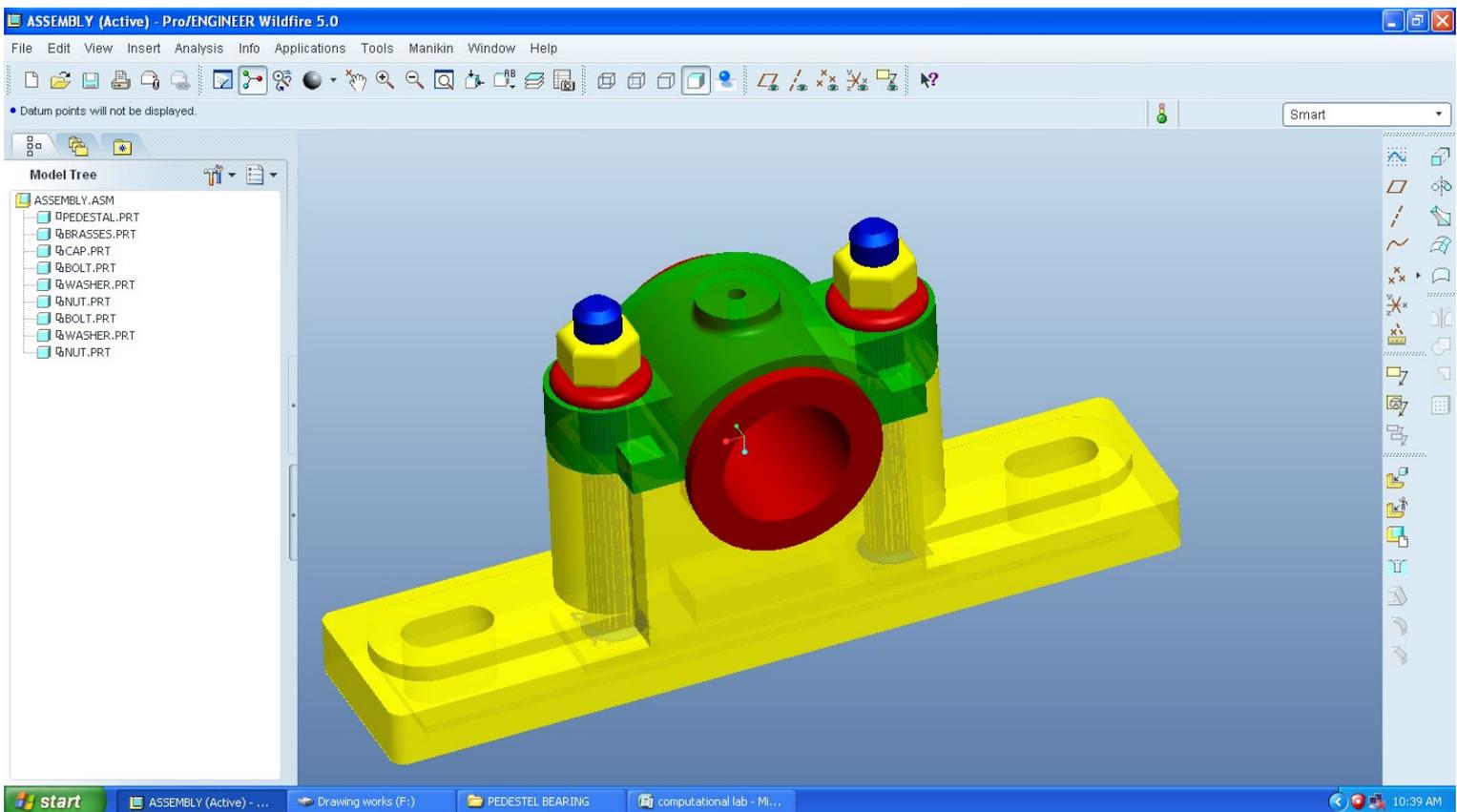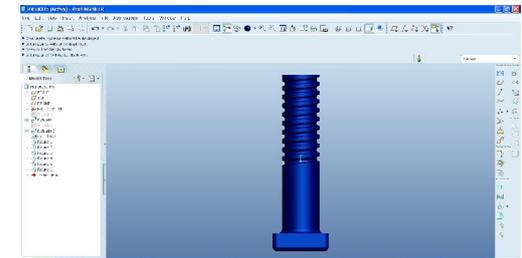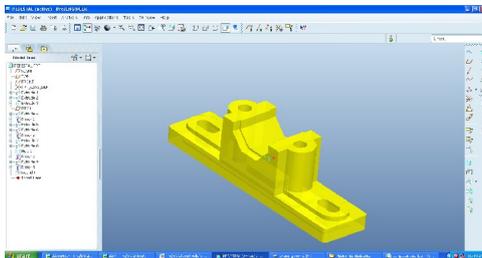
# Experiment No. 10

Draw 3D models by Assembly, using auto CAD