



Varuwan Vadivelan Institute of Technology

Dharmapuri – 636 703

LAB MANUAL

Regulation : 2013

Branch : *B.E. – Civil & Mechanical Engg.*

Year & Semester : I Year / II Semester

**GE6261-COMPUTER AIDED DRAFTING AND MODELING
LABORATORY**



ANNA UNIVERSITY: CHENNAI**Regulation – 2013****GE6261 - COMPUTER AIDED DRAFTING AND MODELING LAB****LIST OF EXERCISES:**

1. Study of capabilities of software for Drafting and Modeling – Coordinate systems (absolute, relative, polar, etc.) – Creation of simple figures like polygon and general multi-line figures.
2. Drawing of a Title Block with necessary text and projection symbol.
3. Drawing of curves like parabola, spiral, Involute using Bspline or cubic Spline.
4. Drawing of front view and top view of simple solids like prism, pyramid, cylinder, cone, etc, and dimensioning.
5. Drawing front view, top view and side view of objects from the given pictorial views (eg. Vblock, Base of a mixie, Simple stool, Objects with hole and curves).
6. Drawing of a plan of residential building (Two bed rooms, kitchen, hall, etc.)
7. Drawing of a simple steel truss.
8. Drawing sectional views of prism, pyramid, cylinder, cone, etc,
9. Drawing isometric projection of simple objects.
10. Creation of 3-D models of simple objects and obtaining 2-D multi-view drawings from 3-D model.

TOTAL: 45 PERIODS

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		Study of Capabilities of Software for Drafting and Modeling		
1		Creation of Simple Figures Like Polygon and General Multi-Line Figures		
2		Title Block with Necessary Text and Projection Symbol		
3		Creation of Curve Parabola using Spline		
4		Construction of Curves Spiral and Involute		
5		Orthographic views of Simple Solids		
6		Orthographic views of V- Block		
7		Front, Side & Top views of Mixie Base and Stool		
8		Drawing of a Simple Steel Truss		
9		Sectional views of Simple Solids		
10		Residential Building Plan		
11		Isometric Projections		
12		Creation of 3D Model and Conversion 2D Multi view Drawings		

INTRODUCTION TO AUTOCAD

DRAWING AND MODIFYING OBJECTS

AUTOCAD is drafting/modeling software used all over the world by almost all manufacturing companies. It is a variable software which can be used in all engineering divisions. It is a drafting version popularly known to everyone associated with mechanical engineering. The AUTOCAD drawing enables the designer to communicate his ideas to the outside of department easily.

The use of CAD process provides enhanced graphics capabilities which allows any designer to

- Conceptualize his ideas
- Modify the design very easily
- Perform animation
- Make design calculations
- Use colors, fonts and other aesthetic features

REASONS FOR IMPLEMENTING A CAD SYSTEM

1. **Increases the productivity of the designer:** CAD improves the productivity of the designer to visualize the product and its component, parts and reduces the time required in synthesizing, analyzing and documenting the design
2. **Improves the quality of the design:** CAD system improves the quality of the design. A CAD system permits a more detailed engineering analysis and a larger number of design alternatives can be investigated. The design errors are also reduced because of the greater accuracy provided by the system
3. **Improves communication:** It improves the communication in design. The use of a CAD system provides better engineering drawings, more standardization in the drawing, and better documentation of the design, few drawing errors and legibility.
4. **Create data base for manufacturing:** In the process of creating the documentation for these products, much of the required data base to manufacture the products is also created.

5. Improves the efficiency of the design: It improves the efficiency of the design process and the wastage at the design stage can be reduced

BENEFITS OF CAD:

The implementation of the CAD system provides variety of benefits to the industries in design and production as given below:

1. Improved productivity in drafting
2. Shorter preparation time for drawing
3. Reduced man power requirement
4. Customer modifications in drawing are easier
5. More efficient operation in drafting
6. Low wastage in drafting
7. Minimized transcription errors in drawing
8. Improved accuracy of drawing
9. Assistance in preparation of documentation
10. Better designs can be evolved
11. Revisions are possible
12. Colors can be used to customize the product
13. Production of orthographic projections with dimensions and tolerances
14. Hatching of all sections with different filling patterns
15. Preparation of assembly or sub assembly drawings
16. Preparation of part list
17. Machining and tolerance symbols at the required surfaces
18. Hydraulic and pneumatic circuit diagrams with symbols
19. Printing can be done to any scale

LIMITATIONS OF CAD

1. 32 – bit word computer is necessary because of large amount of computer memory and time
2. The size of the software package is large
3. Skill and judgment are required to prepare the drawing
4. Huge investment

CAD SOFTWARES

The software is an interpreter or translator which allows the user to perform specific type of application or job related to CAD. The following softwares are available for drafting

- AUTOCAD
- Pro – E
- CATIA
- ANSYS
- .MSc.NASTRAN
- IDEAS
- SOLID WORKS
- HYPERMESH
- FLUENT – GAMBIT

The above software's are used depending upon their application.

AUTO CAD

Auto CAD package is suitable for accurate and perfect drawings of engineering designs. The drawing of machine parts, isometric views and assembly drawings are possible in AutoCAD. The package is suitable for 2D and 3D drawings.

UNITS

Every object is measured in units. In AutoCAD we can determine the value of the units before we draw.

LIMITS

The drawing limits are two-dimensional points in the world coordinate that represent a lower-left limit and an upper right limit. You cannot impose limits on the Z direction.

ABSOLUTE COORDINATE SYSTEM

In Absolute Coordinate System, the dimensions X and Y of a point is specified with reference to the origin (0,0).

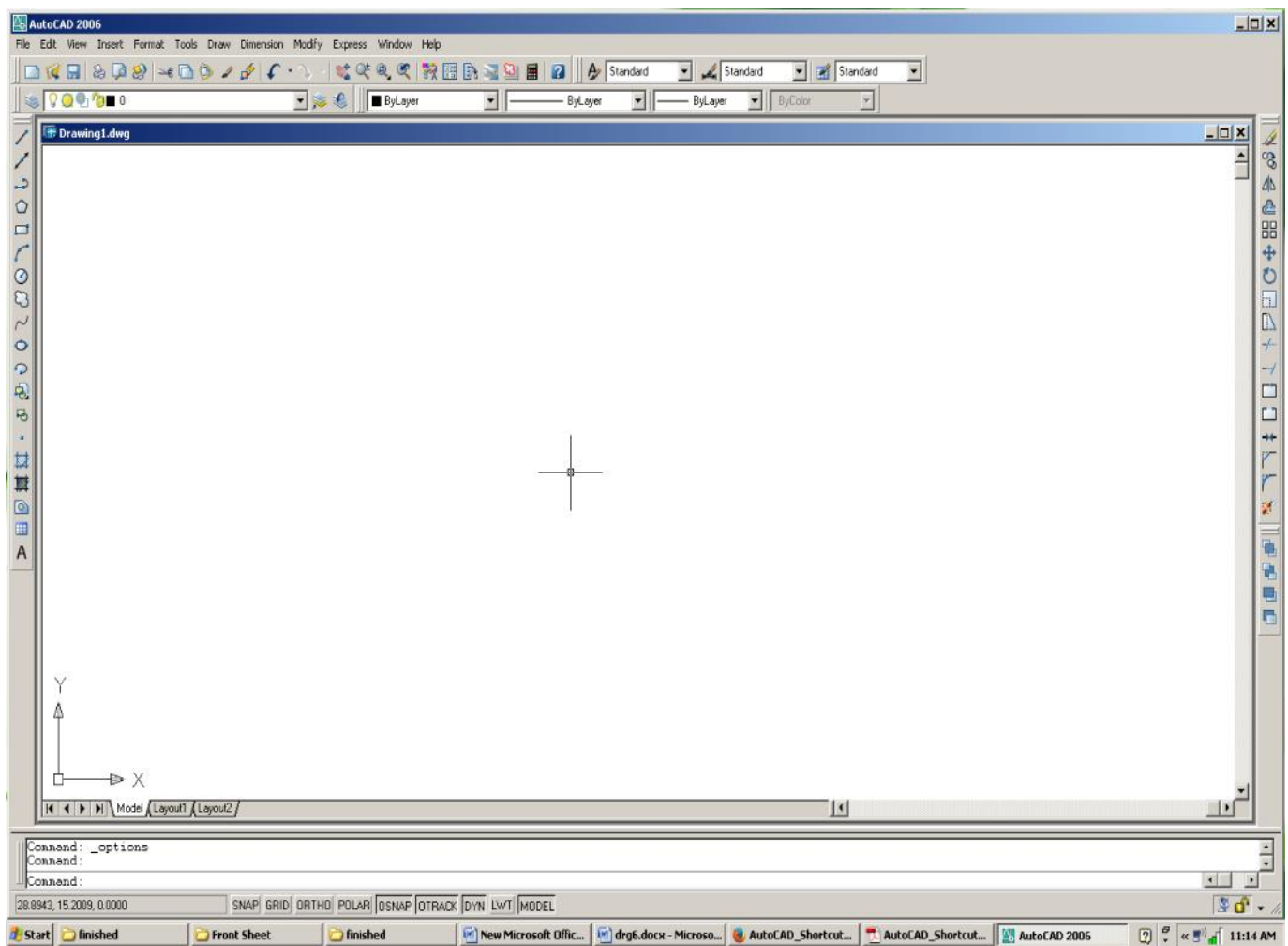
RELATIVE COORDINATE SYSTEM

In Relative Coordinate System, the dimensions X and Y of a point are specified with respect to the last entered point (ie) the last enter point is taken as origin.

POLAR COORDINATE SYSTEM

In Polar Coordinate System, the dimensions of a point are specified by using a distance and angle with reference to the previous point. Angles are measured in anticlockwise direction, taking 0 degrees towards right.

AUTO CAD MAIN SCREEN



Ex. No.: 1

Date :

CREATION OF SIMPLE FIGURES LIKE POLYGON AND GENERAL MULTI-LINE FIGURES

Aim:

To create simple objects like polygon and general multi-line figures using Auto CAD software.

Software Used:

Auto CAD 2007

Commands Used:

Limits, Zoom, Line, Arc, Circle, Rectangle, Mtext, co-ordinate systems & Dimension

Procedure:

1. Limits are set for standard drawing size.
2. Margins are drawn using line command
3. Using Line, Polygon and other drawing commands, appropriate co-ordinate system, the given figures are drawn and aligned
4. The drawn figures are dimensioned using respective DIM command.
5. Finished work sheet is saved and hard copy is taken.

Result:

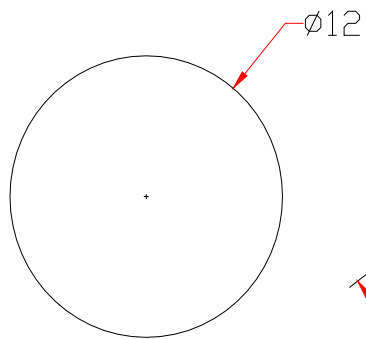
The given simple figures like polygon, circle, arc and general multi-line figures are drawn using Auto CAD software.

EX. No. : 01

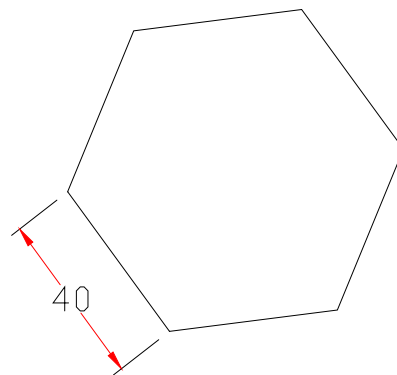
DATE :

CREATION OF SIMPLE FIGURES

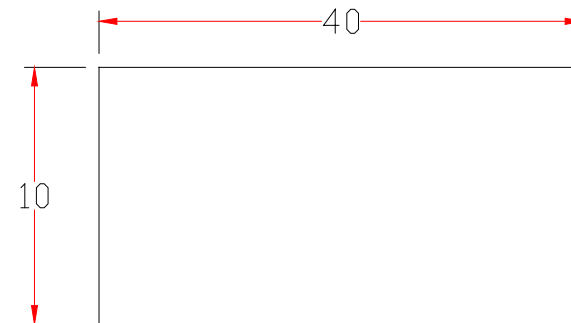
CIRCLE



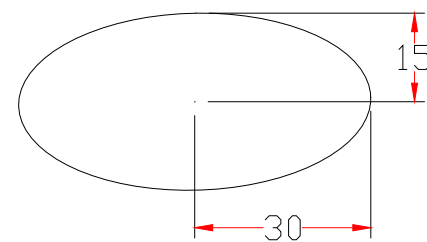
POLYGON



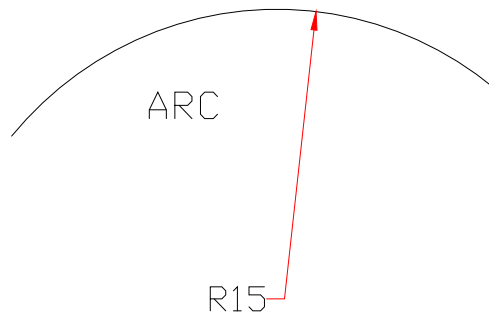
RECTANGLE



ELLIPSE



ARC



REG. No.: 612814XXXXXX
NAME : SDKGFHEDGHDHFD

Ex. No.: 2

Date :

TITLE BLOCK WITH NECESSARY TEXT AND
PROJECTION SYMBOL

Aim:

To draw a title block with necessary text and projection symbol using Auto CAD software.

Software Used:

Auto CAD 2007

Commands Used:

Limits, Zoom, Line, Circle, copy , trim ,Rectangle , Array Mtext, co-ordinate systems & Dimension

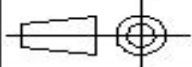
Procedure:

1. Limits are set for standard drawing size.
2. Margins are drawn using lines.
3. Using Line, Polygon and other drawing commands, appropriate co-ordinate system, the given title block is drawn and aligned
4. The drawn Title Block is dimensioned using respective DIM command.
5. Finished work sheet is saved and printout is taken.

Result:

Thus the title block with necessary text and projection symbol of a title block was drawn using AutoCAD and printout of the drawing is taken..

EX.NO: 2 TITLE BLOCK WITH NECESSARY TEXT AND PROJECTION SYMBOL

		170		
		50		
		65	10	10
		10	10	10
		10	10	10
612914114000		SENTHIL KUMAR .K.N		
BE II SEM-A SEC		VARUVAN VAIJAYELAN INSTITUTE OF TECHNOLOGY		
DRAWING NO.01		TITLE OF THE CHAPTER		
01/01/2015				

Ex. No.: 3

Date :

CREATION OF CURVE PARABOLA USING SPLINE

Aim:

To draw the curve Parabola using Auto CAD software.

Software Used:

Auto CAD 2007

Commands Used:

Limits, Zoom, Line, Arc, Pline, Pedit, Spline, Offset, copy, trim , Array Mtext, & Dimension

Procedure:

1. Limits are set for standard drawing size.
2. Margins are drawn using lines

Using spline command:

Command : spline

Specify first point : pick P1 using mouse

Specify next point : pick P2 using mouse

Specify next point : pick P3 using mouse

Specify next point : pick P4 using mouse

Specify next point : pick P5 using mouse

Specify next point : pick P6 using mouse

Specify next point : enter

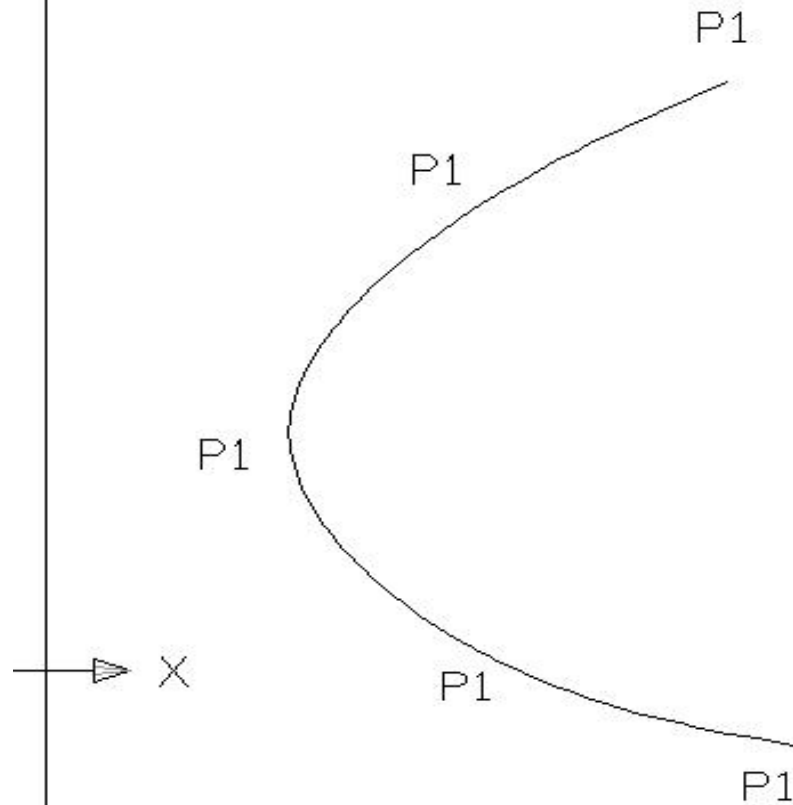
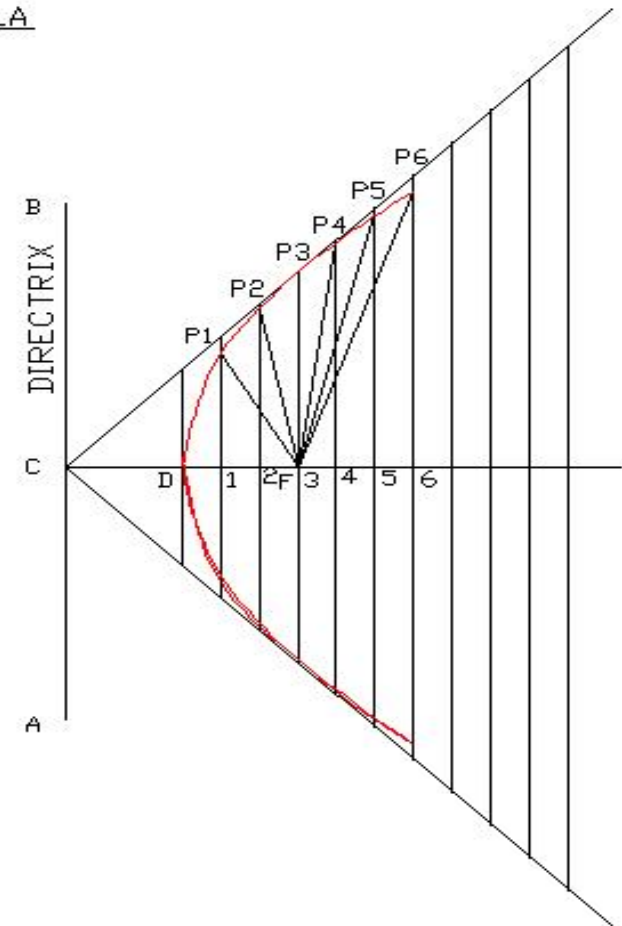
Using conventional method

1. Draw a line AB as **DIRECTRIX**, another line perpendicular to Directrix through any point C on it using line command.
2. Consider CF = 60 Units, mark the point F on the axis.
3. Divide the CF into 6 parts using divide command, after the third part mark the point D using point command.
4. Draw a line three units length perpendicular to the axis at the point D using line command.
5. Using offset, mirror, line & Mtext remaining part of the drawings are drawn as per Engineering Graphics procedure.

Result:

Thus curve Parabola is drawn using Auto CAD and printout of the drawing is taken..

EX. NO. 3

PARABOLA- USING SPLINE COMMANDPARABOLA

Ex. No.: 4

Date :

CONSTRUCTION OF CURVES SPIRAL AND INVOLUTE

Aim :

To draw the curves Spiral and Involute using Auto CAD software.

Software Used:

Auto CAD 2007

Commands Used:

Limits, Zoom, Line, Arc, Pline, Pedit, Spline, Offset, copy, trim , Array Mtext, & Dimension

Procedure:

1. Limits are set for standard drawing size.
2. Margins are drawn using lines

Spiral:

1. Using Pline command spiral is drawn.
2. With the help of Pedit command and spline option, the square spiral is converted in to spiral curve.

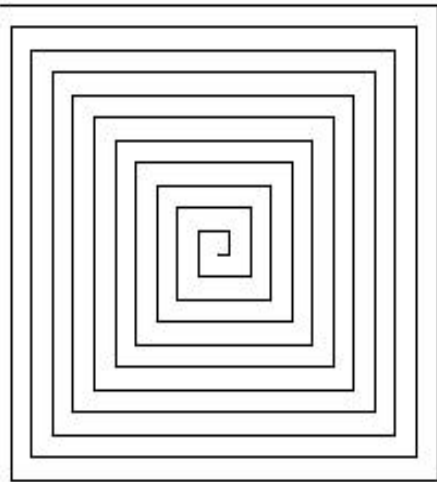
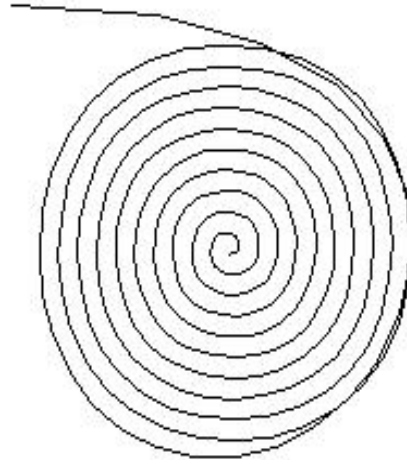
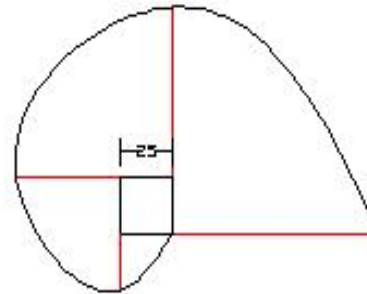
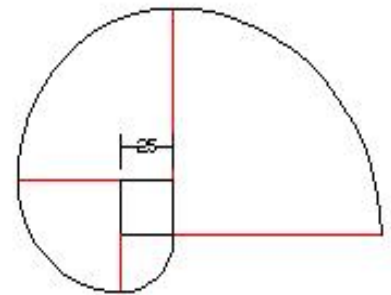
Involute:

1. Using line command square is drawn, from all the corner line is extended up to the required length.
2. Using spline command all the end points of the extended lines are joined to get the involute.

Result:

Thus curves Spiral and Involute are drawn using Auto CAD and printout of the drawing is taken..

EX. NO.4

SPIRAL USING PLINE COMMANDSPIRAL CURVE USING PEDIT COMMANDINVOLUTEINVOLUTE USING SPLINE COMMANDINVOLUTE USING ARC COMMAND

REG. NO. : 612814103000
NAME :

Ex. No.: 5

Date :

ORTHOGRAPHIC VIEWS OF SIMPLE SOLIDS

Aim:

To draw the front and side view of simple solids like Cylinder, Cone, Prism and Pyramid using Auto CAD software.

Software Used:

Auto CAD 2007

Commands Used:

Limits, Zoom, Line, circle, polygon, copy, trim, Mtext, & Dimension

Procedure:

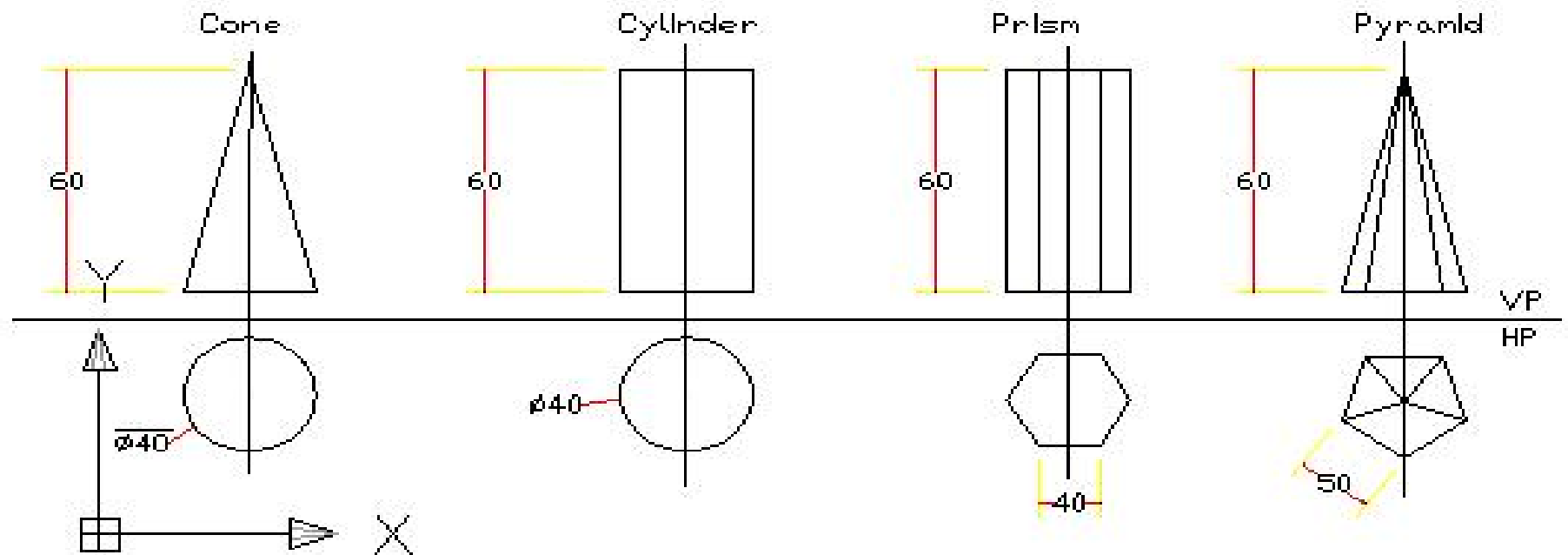
1. Limits are set as per requirement.
2. Margins are drawn using lines
3. Draw a Horizontal line using line command for reference line.
4. Draw the Circles, Polygons as top view using draw commands.
5. Using command Xray get the vertical projections line from the top views.
6. Using line, trim and erase command complete the front views.
7. Text is added using Mtext and dimension commands.
8. Hard copy of the drawing is obtained with help of plot command.

Result:

Thus the Front and Side view of simple solids like Cylinder, Cone, Prism and Pyramid are drawn using Auto CAD software and printout of the drawing is taken

EX. NO. : 5

DATE :

FRONT VIEW & TOP VIEW OF SIMPLE SOLIDS (Cone, Cylinder, Prism and Pyramid)

REG. NO. : 612814114000
 NAME : xxxxxxxxxxxx

Ex. No.: 6

Date :

ORTHOGRAPHIC VIEWS OF V - BLOCK

Aim:

To draw the front view, top view and side view of V-Block using Auto CAD software.

Software Used:

Auto CAD 2007

Commands Used:

Limits, Zoom, Line, trim, Mtext & Dimension.

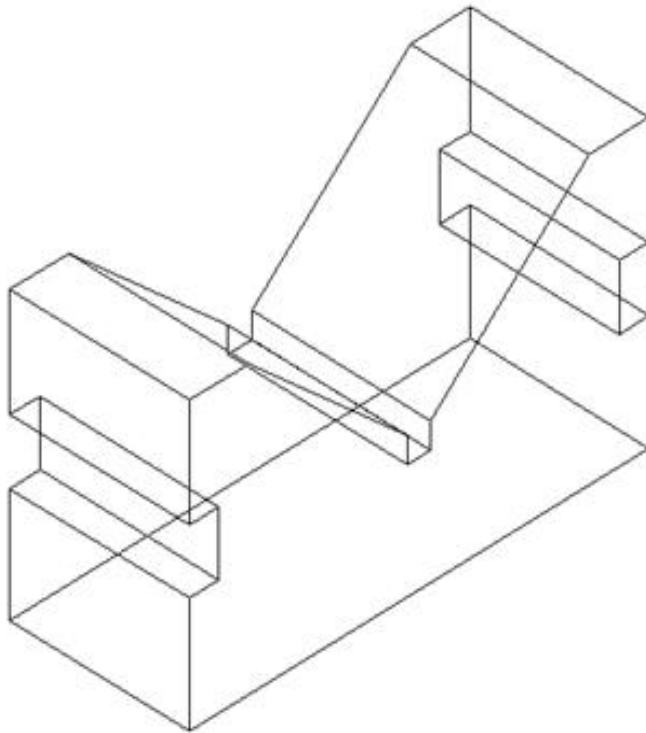
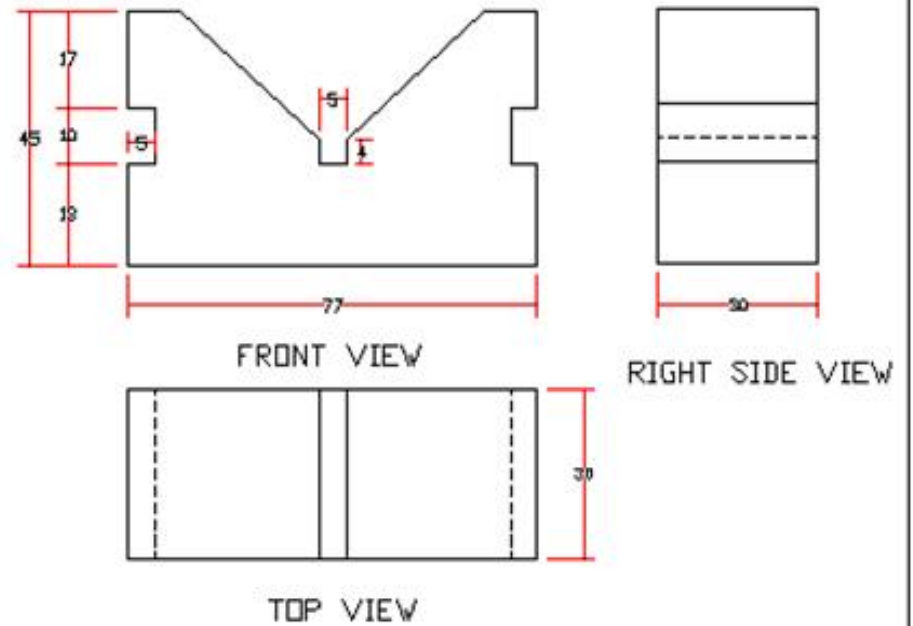
Procedure:

1. Limits are set as per the drawing size.
2. Draw a Horizontal line using line command for reference line.
3. Draw the front view above the reference line using line command.
4. Using command Xray get the vertical and horizontal projection line from the front view.
5. Using line, trim and erase command complete the top view and side view.
6. Text is added using Mtext and dimension commands.
7. Hard copy of the drawing is obtained with help of plot command.

Result:

Thus the front view, top view and side view of V-Block are drawn using Auto CAD software and printout of the drawing is taken.

EX . NO. : 6

CREATION OF ORTHOGRAPHIC VIEWS OF V-BLOCK

Ex. No.: 7

Date :

FRONT, SIDE & TOP VIEWS OF MIXIE BASE AND STOOL

Aim:

To draw the front view, top view and side view of Mixie Base and Stool using Auto CAD software.

Software Used:

Auto CAD 2007

Commands Used:

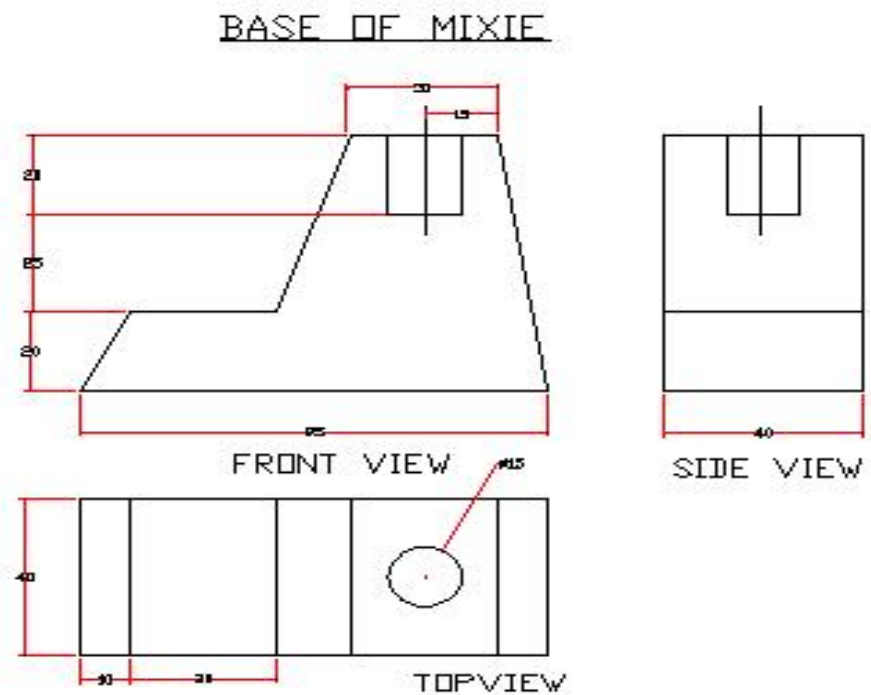
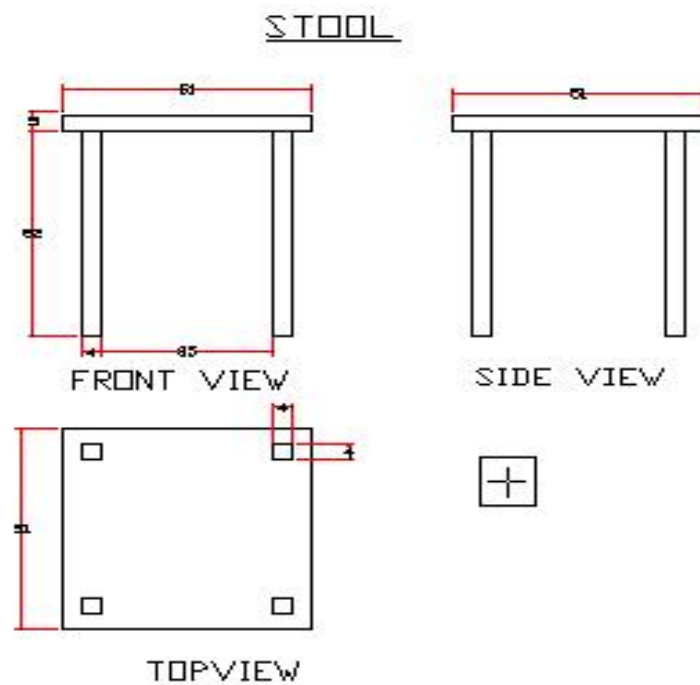
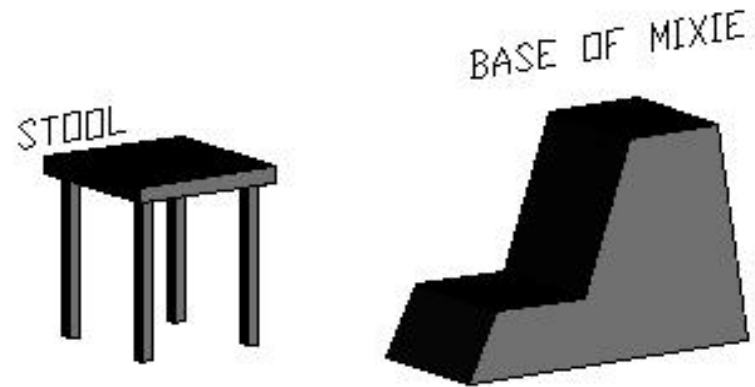
Limits, Zoom, Line, trim, Mtext & Dimension.

Procedure:

1. Limits are set as per the drawing size.
2. Draw a Horizontal line using line command for reference line.
3. Draw the front view of Mixie base and Stool above the reference line using line command.
4. Using command Xray get the vertical and horizontal projection line from the front views.
5. Using line, trim and erase command complete the top views and side views.
6. Text is added using Mtext and dimension commands.
7. Hard copy of the drawing is obtained with help of plot command.

Result:

Thus the front view, top view and side view of Mixie Base and Stool are drawn using Auto CAD software and hardcopy of the drawing is taken.

EX. NO : 7 FRONT, SIDE & TOP VIEWS OF MIXIE BASE AND STOOL

Ex. No.: 8

Date :

DRAWING OF A SIMPLE STEEL TRUSS

Aim:

To draw the simple steel truss given in the figure using Auto CAD software.

Software Used:

Auto CAD 2007

Commands Used:

Limits, Zoom, Line, Offset, Mirror, trim, Mtext & Dimension.

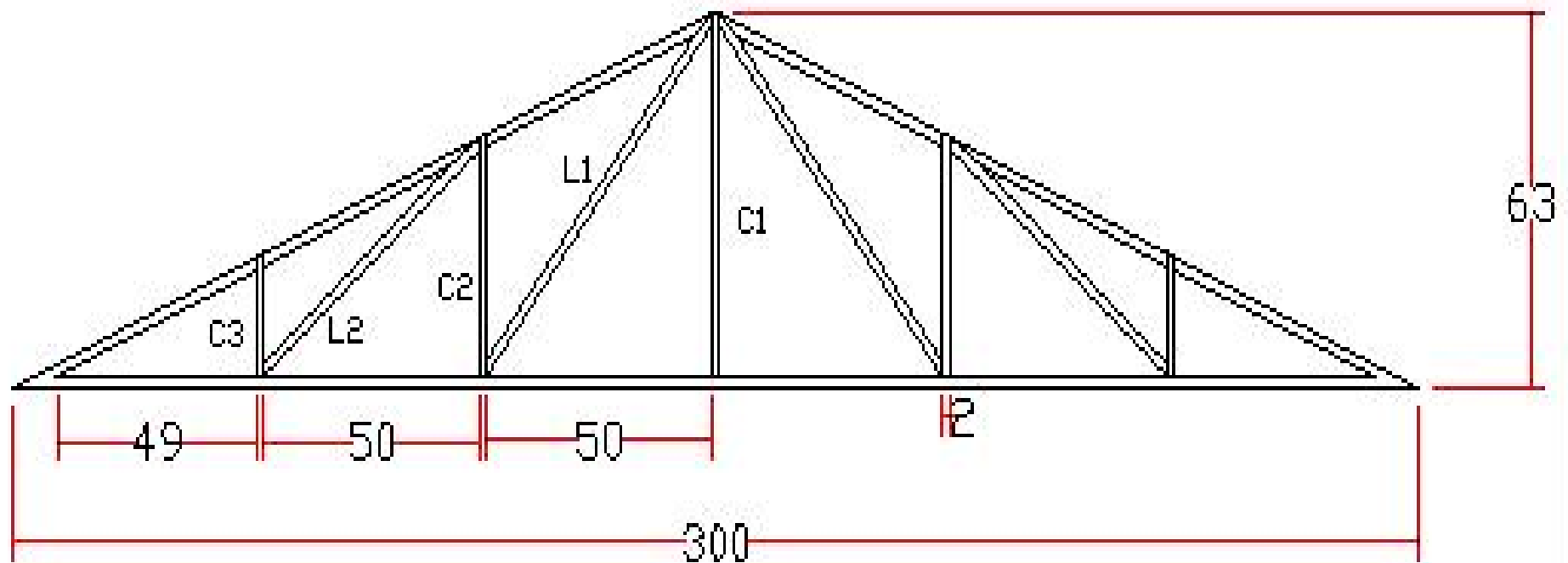
Procedure:

1. Limits are set as lower left corner 0,0 and upper right corner 350,100.
2. Zoom command is used after the limits command.
3. Any one portion of the Truss (left or right) are drawn using line, copy, offset commands.
4. Using mirror command opposite side of the truss is drawn.
5. Text is added using Mtext and dimension commands.
6. Hard copy of the drawing is obtained with help of plot command.

Result:

Thus the simple steel truss is drawn using Auto CAD software and printout of the

EX. NO. 18

SIMPLE STEEL TRUSS

Ex. No.: 9

Date :

SECTIONAL VIEWS OF SIMPLE SOLIDS

Aim:

To draw the Sectional views and True shape of simple solids using Auto CAD software.

Software Used:

Auto CAD 2007

Commands Used:

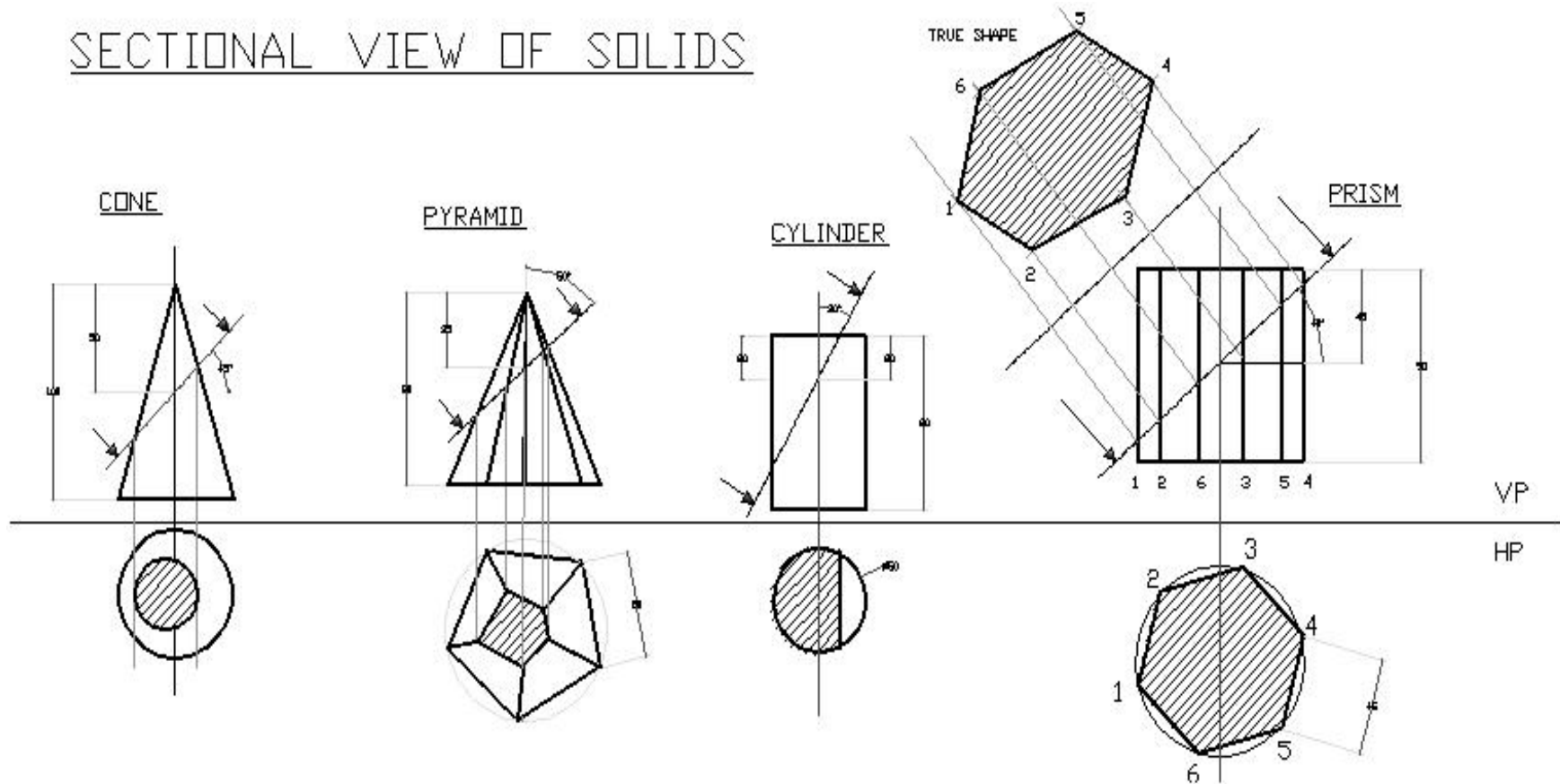
Limits, Zoom, Line, Polygon ,Offset, DD linetype,Mirror, trim, Hatch, Mtext & Dimension.

Procedure:

1. Limits are set as lower left corner 0,0 and upper right corner as required.
2. Zoom command is used after the limits command.
3. Draw the reference line using line commands.
4. Draw the top views using circle, polygon commands.
5. Draw the front views from the top view
6. Using Line and Hatch commands draw the sectional views and true shape of the solids.
7. Text is added using Mtext and dimension commands.
8. Hard copy of the drawing is obtained with help of plot command.

Result:

Thus the Sectional views and True shape of simple solids are drawn using Auto CAD software and printout of the drawing is taken.

EX. NO: 9 - SECTIONAL VIEWS OF SIMPLE SOLIDSSECTIONAL VIEW OF SOLIDS

Ex. No.: 10

Date :

RESIDENTIAL BUILDING PLAN

Aim:

To draw the Plan of Residential building with two bedrooms, kitchen, etc. using Auto CAD software.

Software Used:

Auto CAD 2007

Commands Used:

Limits, Zoom, Line, Block, Insert, Offset, DD linetype, Mirror, trim, Mtext & Dimension.

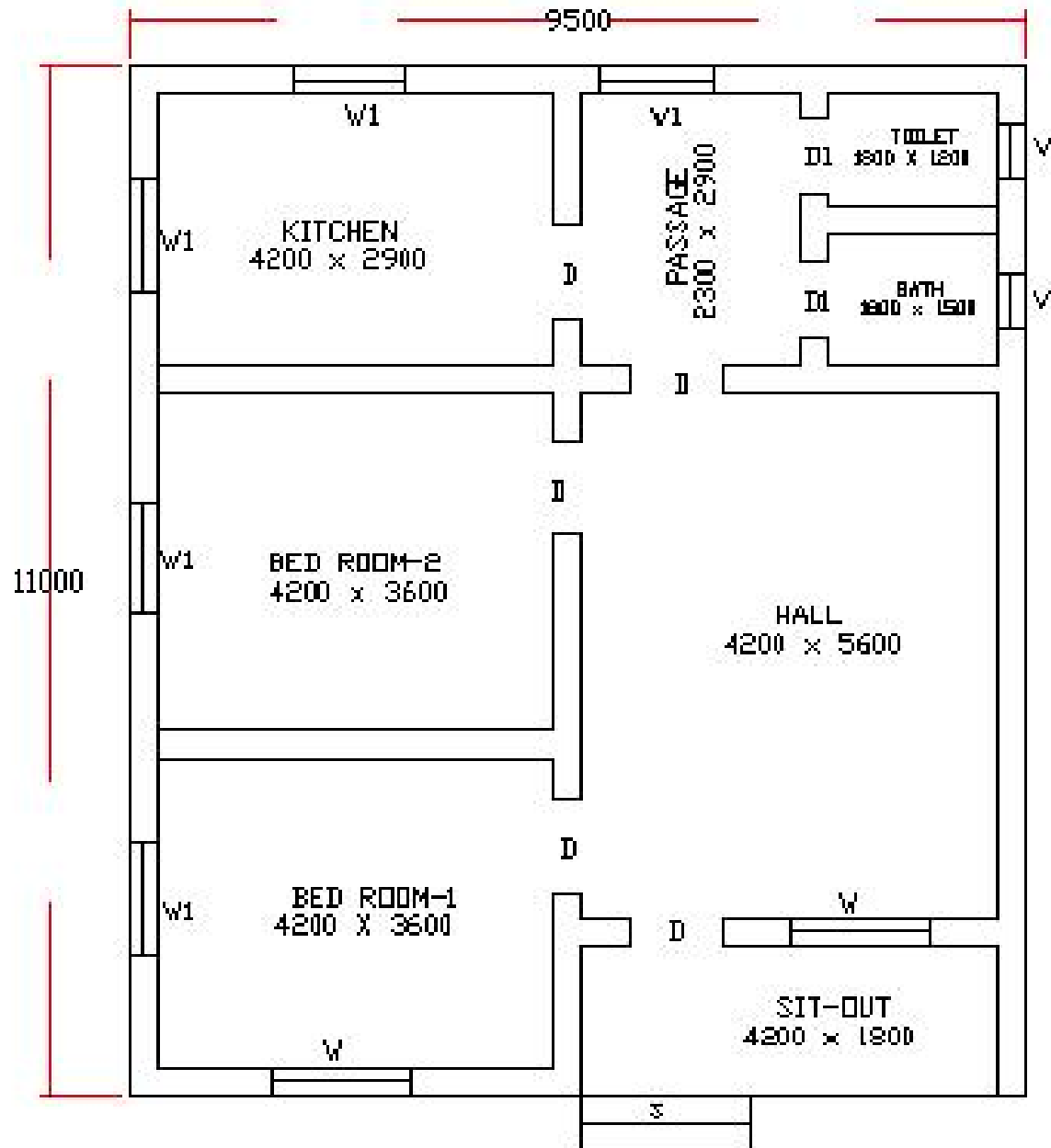
Procedure:

1. Limits are set as lower left corner 0,0 and upper right corner as required.
2. Zoom command is used after the limits command.
3. Draw the outline of the plan using line command.
4. Create the Blocks for window and door using Block command.
5. Using offset commands walls are created
6. Insert the Blocks for door and Windows at required place.
7. Text is added using Mtext and Dimension commands.
8. Hard copy of the drawing is obtained with help of plot command.

Result:

Thus the Plan of Residential building is drawn using Auto CAD software and printout of the drawing is taken.

EX. NO. : 10

PLAN OF RESIDENTIAL BUILDING

S - STEPS
 D - DOOR 1000 X 2100
 D1- DOOR 800 X 2100
 W - WINDOW 1500 X 1200
 W1- WINDOW 1200 X 1200
 V - VENTILATOR 600 X 450
 WALL THICKNESS- 300 MM

ALL DIMENSION ARE IN MM

Ex. No.: 11

Date :

ISOMETRIC PROJECTIONS

Aim:

To draw the Isometric view of the given figure using Auto CAD software.

Software Used:

Auto CAD 2007

Commands Used:

Limits, Zoom, Grid, Snap, Isoplane, line, Trim, Ellipse- isocircle, dimensions, Dimension oblique etc.

Procedure:

1. Limits are set as lower left corner 0,0 and upper right corner as required.
2. Zoom command is used after the limits command.
3. Set snap and grid mode on
4. Change the snap distance as required
5. Enable the ortho on , draw the figure using line command
6. Using ellipse command circle, arc are drawn
7. Using Dimension and oblique commands dimension are done
8. Hard copy of the drawing is obtained with help of plot command.

Result:

Thus the Isometric view of the given figure is drawn using Auto CAD software and printout of the drawing is taken.

ISOMETRIC PROJECTION

EX. No. : 11

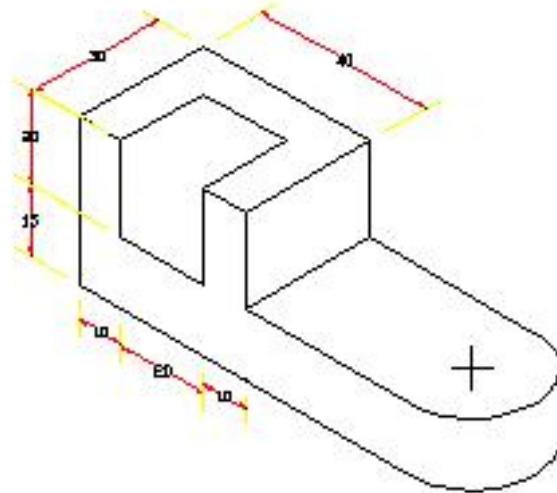


FIG. 1

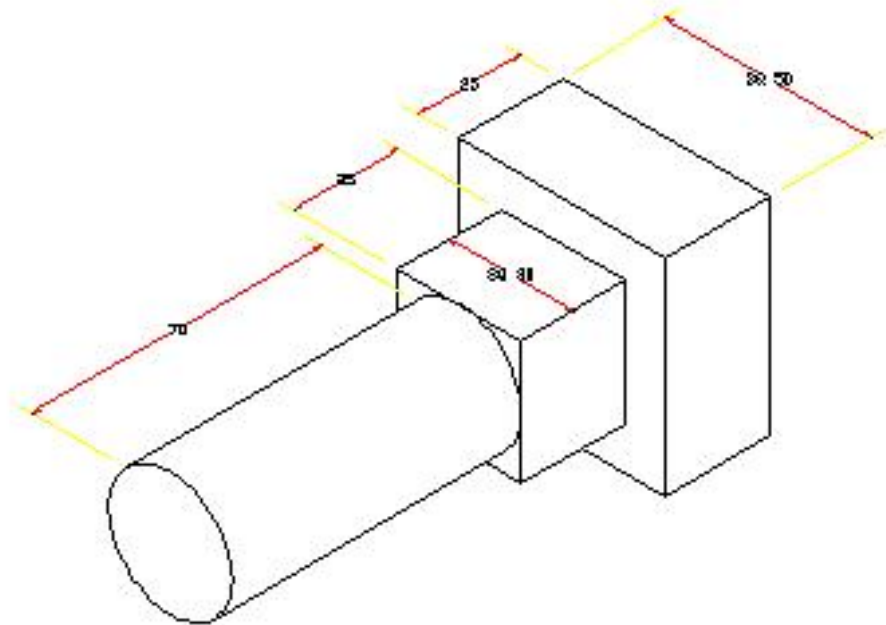


FIG. 2

Ex. No.: 12

Date :

CREATION OF 3D MODEL AND CONVERSION 2D MULTI VIEW DRAWINGS

Aim:

To create the 3D model of given object & obtain 2D multi view drawings from 3D model using Auto CAD software.

Software Used:

Auto CAD 2007

Commands Used:

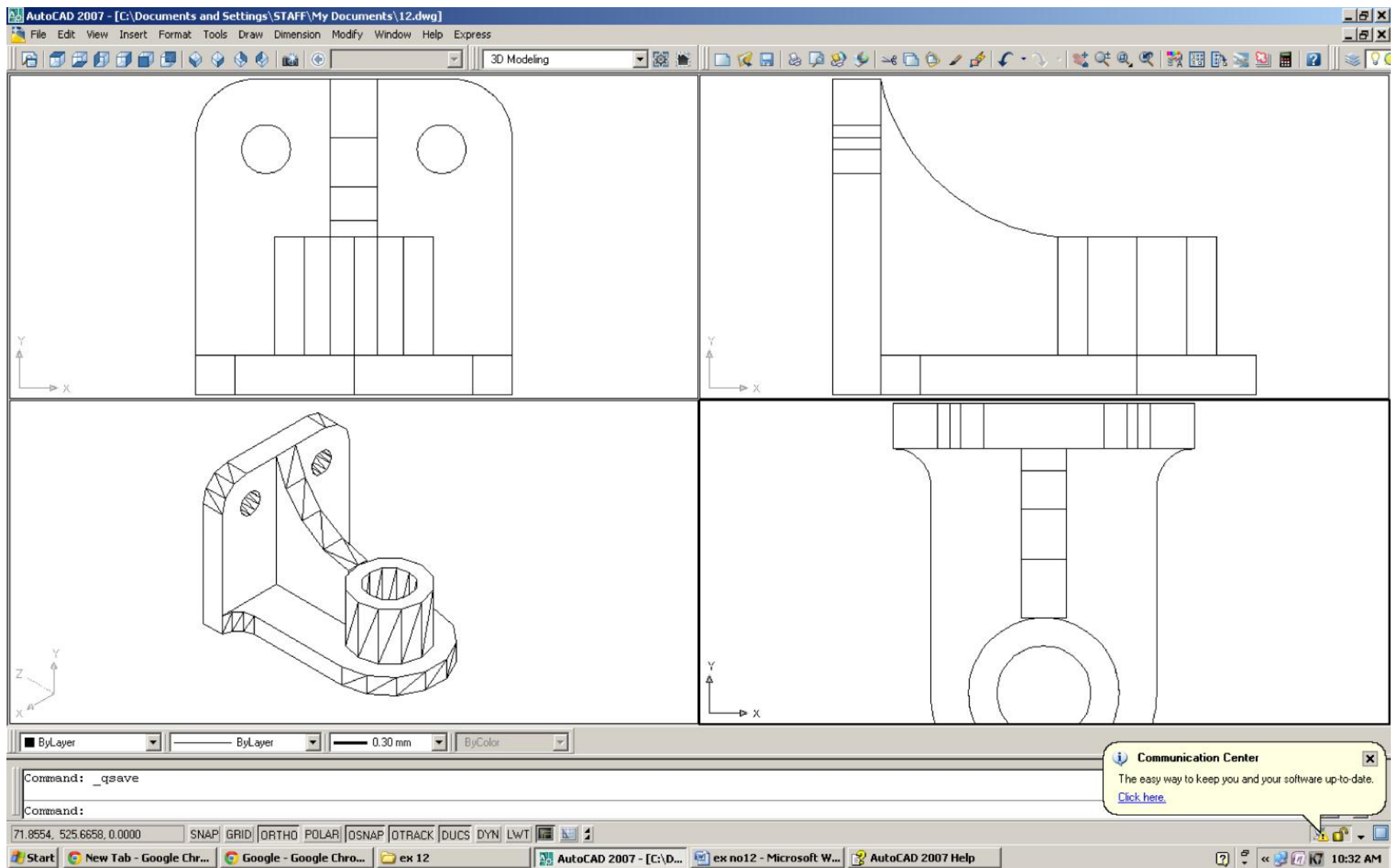
Limits, Zoom, Polyline, Circle, Trim, UCS, Region, Extrude, Union, Subtract, Hide, etc.

Procedure:

1. Limits are set as lower left corner 0,0 and upper right corner as required.
2. Zoom command is used after the limits command.
3. Split the 3D model into simple solids.
4. Create the simple solids separately using UCS.
5. Move the solids as required position & get the 3D model of the object.
6. Using Union command, all the simple solids are joined together.
7. Using Hide command the required 3D model is greater.
8. Create the multi window using view ports command.
9. Using view toolbar, 2D views are generated.
10. Hard copy of the drawing is obtained with help of plot command.

Result:

Thus the 3D model of given object is created & obtained 2D multi view drawings using Auto CAD software and printout of the drawing is taken.

Ex. No: 12 - CREATION OF 3D MODEL AND CONVERSION 2D MULTI VIEW DRAWINGS

AUTO CAD COMMANDS FOR REFERENCE

SHORTCUT	COMMAND	COMMENT
A	ARC	Draw an arc
AL	ALIGN	Align an object with another
AP	APPLOAD	Opens application load dialogue box
AR	ARRAY	Opens array dialogue box
AUDIT	AUDIT	Audit drawing for errors
AV	DSVIEWER	Opens ariel view of drawing
B	BLOCK	Opens block dialogue box
C	CIRCLE	Draw a circle
CO	COPY	Copy an object
CHA	CHAMFER	Chamfer between 2 non-parallel lines
COL	COLOR	Opens select color dialogue box
CUI		Opens customise user interface dialogue
D	DIMSTYLE	Opens dimstyle manager
DC	ADCENTER	Opens designcenter
DI	DIST	Check a distance
DIV	DIVIDE	Inserts point node a set division
DO	DONUT	Draw a solid donut shape

DV	DVIEW	Perspective view
E	ERASE	Erase a selection
EX	EXTEND	Extend a selection
F	FILLET	Draw an arc between 2 intersecting lines
FI	FILTER	Opens filter dialogue box
FLATTEN	FLATTEN	Converts 3D to 2D
G	GROUP	Launches the group dialogue box
H	HATCH	Opens hatch and gradient dialogue box
I	INSERT	Insert a block
IM	IMAGE	Launches image manager
J	JOIN	Joins 2 objects to form single object
JPGOUT	JPGOUT	Creates a JPEG file of current drawing
L	LINE	Draw a line
LA	LAYER	Opens layer manager
LE	QLEADER	Draw a leader line (may need to adjust settings)
LEAD	LEADER	Leader line with annotation
LI or LS	LIST	Display information about objects in a text window
LO	-LAYOUT	Creates a new layout tab
LTS	LTScale	Change the linetype scale
M	MOVE	Move a selection
MA	MATCHPROPERTIES	Match properties of an object
ME	MEASURE	Inserts point node at input distance

O	OFFSET	Offset a selection
OP	OPTIONS	Launches options dialogue box
P	PAN	Pan in drawing
PE	POLYEDIT	Edit a polyline
PL	PLINE	Draw a polyline
PLOT	PLOT	Opens plot/print dialogue box
PO	POINT	Point marker or node - DDPTYPE to change pointstyle
PR	PROPERTIES	Opens properties dialogue box
PRE	PREVIEW	Preview a plot
PU	PURGE	Opens purge dialogue box to remove unused elements
RE	REGEN	Regenerate the display
REC	RECTANG	Draw a rectangle
REN	RENAME	Opens rename dialogue box to rename blocks, layers, etc
RO	ROTATE	Rotate a selection
SP	SPELL	Spell check a selection - ALL to check entire drawing
T	MTEXT	Insert multiline text
TB	TABLE	Opens insert a table dialogue box
TP	TOOLPALETTES	Displays toolpalette

TR	TRIM	Trim a selection
U	UNDO	Undo last command
UN	UNITS	Opens units dialogue box
V	VIEW	Opens view dialogue box
W	WBLOCK	Write a block
WHOHAS	WHOHAS	Displays who has a drawing open
X	EXPLODE	Explode a selection
XR	XREF	Opens x-reference manager
Z	ZOOM	Zoom in display - A=All, E=EXTENTS, W=WINDOW

CONTROL KEYS

CTRL+0	CLEANSCREEN	Turns user interface elements on/off
CTRL+1	PROPERTIES	Turns properties on/off
CTRL+2	ADCENTER	Turns design center on/off
CTRL+3	TOOLPALETTES	Turns tool palettes window on/off
CTRL+8	QUICKCALC	Launches calculator window
CTRL+A		Select all
CTRL+C	COPYCLIP	Copies objects to clipboard
CTRL+H		Turns a group on or off
CTRL+J		Repeats last command

CTRL+N	NEW	Opens create new drawing dialogue box
CTRL+O	OPEN	Opens the select file dialogue box
CTRL+P	PLOT	Opens the plot dialogue box
CTRL+R	CVPORT	Switches between viewports
CTRL+S	QSAVE	Opens the save drawing as dialogue box
CTRL+SHIFT+S		Save as
CTRL+V	PASTECLIP	Pastes data from clipboard to drawing
CTRL+X	CUTCLIP	Removes select object from drawing to clipboard
CTRL+Y	REDO	Performs the operation cancelled by UNDO
CTRL+Z	UNDO	Undoes the last operation
CTRL+TAB		Switches between open drawings
CTRL+PAGE UP		Switch up between layout tabs
CTRL+PAGE DOWN		Switch down between layout tabs
ARROW UP/Down		Recall last command

DIMENSIONING

SHORTCUT	COMMAND	COMMENT
CTRL+8	QUICKCALC	Displays the calculator
D	DIMSTYLE	Opens dimension style manager dialogue box
DAL	DIMALIGNED	Aligned linear dimension line
DAN	DIMANGULAR	Angular dimension line
DAR	DIMARC	Arc length dimension
DBA	DIMBASELINE	Ordinate dimension from baseline of previous dimension
DCO	DIMCONTINUE	Ordinate dimension from 2 nd extension line of previous dimension
DDI	DIMDIAMETER	Diameter dimension for circles and arcs
DED	DIMEDIT	Edit dimension text on dimension objects
DI	DIST	Check a distance
DIMCENTER	DIMCENTER	Creates center mark
DLI	DIMLINEAR	Linear dimension
DOR	DIMORDINATE	Ordinate point dimension
DOV	DIMOVERRIDE	Override dimension style
DRA	DIMRADIUS	Radial dimension for circles and arcs
ID	ID	Display the co-ordinate values of a point
UN	UNITS	Opens drawing units dialogue box

FORMATTING

SHORTCUT	COMMAND	COMMENT
AP	APPLOAD	Opens application load dialogue box
BE	BEDIT	Opens the edit block definition dialogue box
BH	BHATCH	Opens hatch and gradient dialogue box
CUI		Opens customise user interface dialogue
D	DIMSTYLE	Opens dimension style manager dialogue box
DC	ADCENTER	Opens designcenter
DDPTYPE	DDPTYPE	Opens point style dialogue box
LA	LAYER	Opens layer manager
LT	DDLTYPE	Opens line type manager
LTS	LTSCALE	Change the linetype scale
LW	LWEIGHT	Opens line weight settings dialogue box
MA	MATCHPROPERTIES	Match properties of an object
OP	OPTIONS	Launches options dialogue box
OS	DDOSNAP	Opens drafting settings object snap dialogue
PR	DDCHPROP	Opens properties dialogue box
SSM	SHEETSET	Opens sheet set manager palette
ST	DDSTYLE	Opens text style dialogue box
TP	TOOLPALETTES	Displays toolpalette
TS	TABLESTYLE	Opens table style dialogue box

FUNCTION KEYS

SHORTCUT	COMMAND	COMMENT
F1	HELP	Opens Autocad help
F2	TEXTSCR GRAPHSCR	Switches between text screen and graphic area
F3	OSNAP	Switches osnap on/off
F5 or CTRL+E	ISOPLANE	Cycles through isoplanes
F6 or CTRL+D	COORDS	Turns coordinate display on/off
F7 or CTRL+G	GRID	Turns grid on/off
F8 or CTRL+L	ORTHO	Turns ortho on/off
F9 or CTRL+B	SNAP	Turns snap on/off
F10 or CTRL+U	POLAR	Turns polar on/off
F11 or CTRL+W	OSNAP TRACK	Turns object snap tracking on/off
F12	DYNMODE	Turns dynamic input on/off

INQUIRY

SHORTCUT	COMMAND	COMMENT
AA	AREA	Calculate the area
DI	DIST	Calculate a distance and angle
DDPTYPE	DDPTYPE	Opens point style dialogue box
ID	ID	Display the co-ordinate values of a point
LI or LS	LIST	Display information about objects in a text window
MASSPROP	MASSPROP	Calculate the region/mass properties of a solid
PR	PROPERTIES	Opens properties dialogue box
WHOHAS	WHOHAS	Displays who has a drawing open
XLIST	XLIST	Lists type/block name/layer name/color/linetype of a nested object in a block or an xref

MODIFYING OBJECTS

SHORTCUT	COMMAND	COMMENT
AL	ALIGN	Align an object with another
AR	ARRAY	Make multiple copies of an object
BR	BREAK	Break a line by defining 2 points
CO or CP	COPY	Copy object
COPYTOLAYER	COPYTOLAYER	Copy object from one layer to another
CHA	CHAMFER	Chamfer between 2 non-parallel lines
E	ERASE	Erase selection
EX	EXTEND	Extend a line to meet another
F	FILLET	Draw an arc between 2 intersecting lines
G	GROUP	Opens object grouping dialogue - use to copy or move
LEN	LENGTHEN	Lengthen or shorten a line
M	MOVE	Move an object
MI	MIRROR	Mirror an object
MOCORO	MOVE/COPY/ROTATE	Copy move and rotate an object with one command
O	OFFSET	Offset an object by distance
RO	ROTATE	Rotate an object
S	STRETCH	Stretch an object
SC	SCALE	Scale an object
TR	TRIM	Trim objects
X	EXPLODE	Explode single entity to component parts

OBJECT SELECTION (use with editing commands)

SHORTCUT	COMMAND	COMMENT
A	ADD	Adds each successive object, switches from remove
ALL	ALL	All objects on thawed layers
CP	CPOLYGON	Objects touching or enclosed by selection polygon
C	CROSSING	Objects touched or enclosed by window - Move right to left
F	FENCE	Objects touch by single selection fence
G	GROUP	Opens object grouping dialogue - use with copy/move/etc
L	LAST	Most recently created visible object
P	PREVIOUS	Most recent selection set
R	REMOVE	Objects to remove from selection set
SNAPANG	SNAPANGLE	Change the snap angle from default 0°
W	WINDOW	Objects enclosed by window - Move left to right
WP	WPOLYGON	Objects within a window polygon

THREE DIMENSIONAL - 3D

SHORTCUT	COMMAND	COMMENT
3D	3D	Command line 3D solid options
BOX	BOX	Draw a cube
CYLINDER	CYLINDER	Draw a cylinder
DDUCS	DDUCS	Opens ucs dialogue
DDUCSP	DDUCSP	Opens ucs dialogue at orthographic tab
EXT	EXTRUDE	Extrude a face
IN	INTERSECT	Intersect an object
REV	REVOLVE	Revolves an object about an axis
RR	RENDER	Open render dialogue box
SE	SECTION	Section
SL	SLICE	Slice a solid
SU	SUBTRACT	Subtract selection from solid
TOR	TORUS	Draw torus shape
UC	DDUCS	Displays UCS manager dialogue box
UCS	UCS	UCS command line options
UNI	UNION	Union solids
VPORTS	VPORTS	Opens viewport dialogue box
WE	WEDGE	Draw a wedge