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Computer Aided Electrical Drafting (CAED)(20EE44P)

WEEK- 01
INTRODUCTION to CAD

INTRODUCTION to CAD

- The method of preparing engineering drawing by using the computer software is known as Computer Aided Drafting (CAD). The CADD stands for Computer Aided Design and Drafting.
- The preparation of engineering drawing with the help of a drawing board, a minidrafter, set squares, dividers, compasses and other instruments is a laborious process.
- Computer-aided drafting helps in preparing drawing without the use of the usual drawing instruments.

- The CAD software is based on interactive computer graphic (ICG). In ICG, the user enters the data in to the computer in the form of commands using input devices and the data is used by the software to create or modify graphics.
- ICG enables enlargement, reduction, copying and rotation of graphic and offered a lot of other flexibilities as per the need of the designer. This way far less time is required to prepare a drawing. The output can also be printed.

ADVANTAGES OF USING CAD

1. **Accuracy:** CAD helps to achieve very high degree of accuracy that is impossible to achieve manually. For example, a line 18.532mm long or an angle of 53.270 can be precisely drawn in CAD software.

2. **Speed:** With sufficient practice, a user can create drawing speedily. Similar objects can be copied or mirrored or arrayed which saves time required from duplication. Automatic hatching, texting and dimensioning save time.

3. **Easy Editing:** Drawing once constructed can be easily edited or modified as and when needed. Components drawing forms one drawing file can be inserted in another drawing file.

4. **Space effectiveness:** A computer can store several thousand drawing over long period of time. Equal number of drawing sheets drawing sheets drawn manually will need a big go down to store!
5. **Scaling:** A drawing can enlarged or reduced by any scale factor. Dimensions changed automatically further, printing can be made to any scale.
6. **Better visualization:** Use different colours helps avoiding confusion . A 3D view of the object can be easily created to boost imagination.
7. **Freedom from using Drawing instruments:** A simple CAD system needs a computer with a mouse and keyboard to draw. The draftsman need not use bulky drawing instruments like drawing board, drafter, set square, ect.

APPLICATION OF CAD

1. Preparing Architectural drawing
2. Interior design and modeling
3. Tool and fixture design.
4. Production planning and control.
5. Preparing of assembly list and bill of material.
6. Computer aided inspection.
7. Preparation of programs for CNC machine.
8. Circuit layout and panel drawing.
9. Mapping, Building, Drawing.
10. Communication network.
11. Piping and instrumentation designing.
12. Computer aided manufacturing

CAD PACKAGES

- **Some of the commonly used packages are:**

1. Auto Cad
2. Electrical Cad
3. 3DS-max
4. STADD
5. PRO-Engineer
6. IDEAS.
7. Mechanical desktop.

SOFTWARE FOR CAD

Auto cad is one of the following CAD system software introduced in DEC 1982 July by Autodesk Ltd. Sausalito, California of USA. The latest one is auto cad 2021.The entire auto cad drawing created by using the old version can be read by the subsequent version.

AutoCAD Window

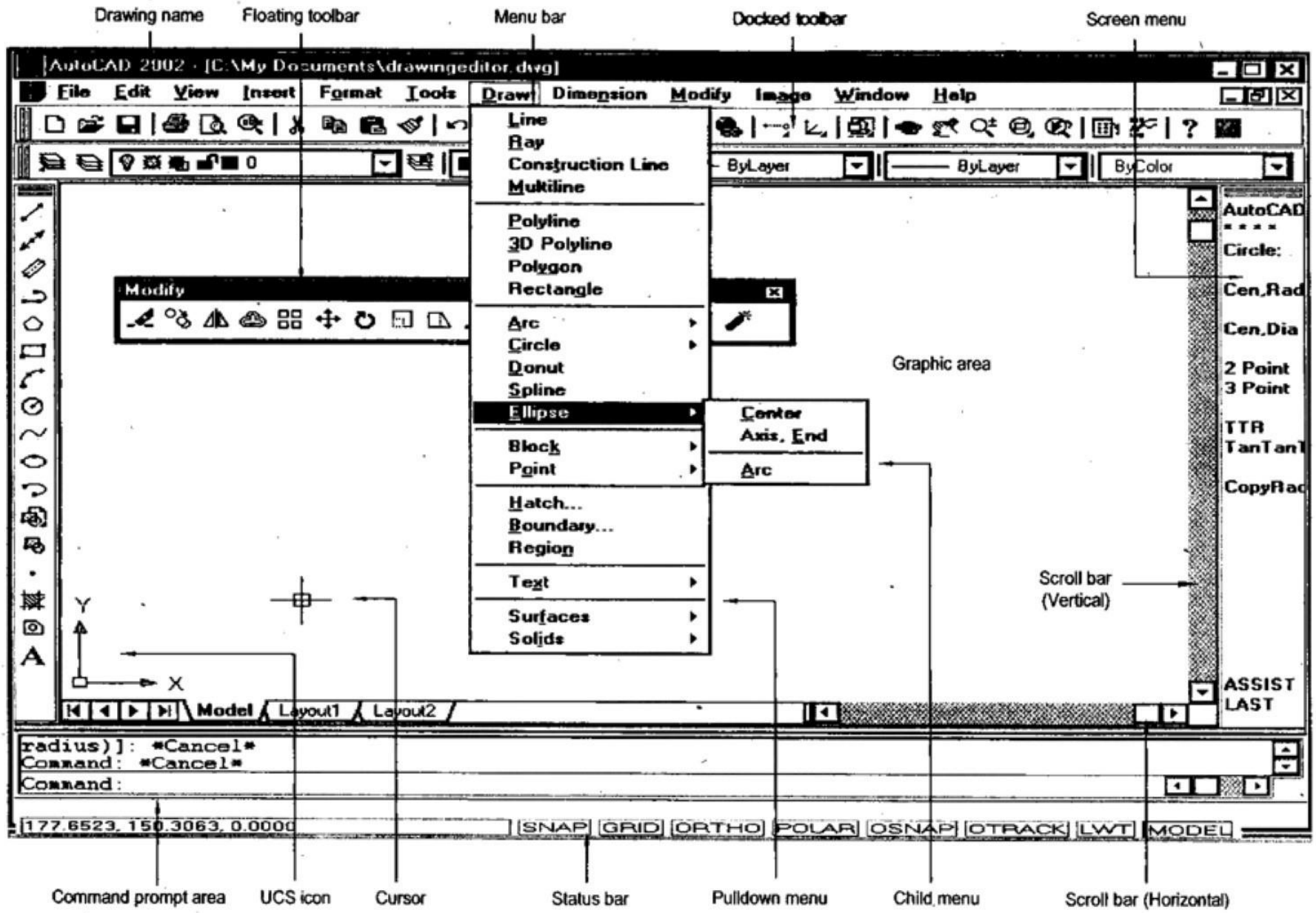
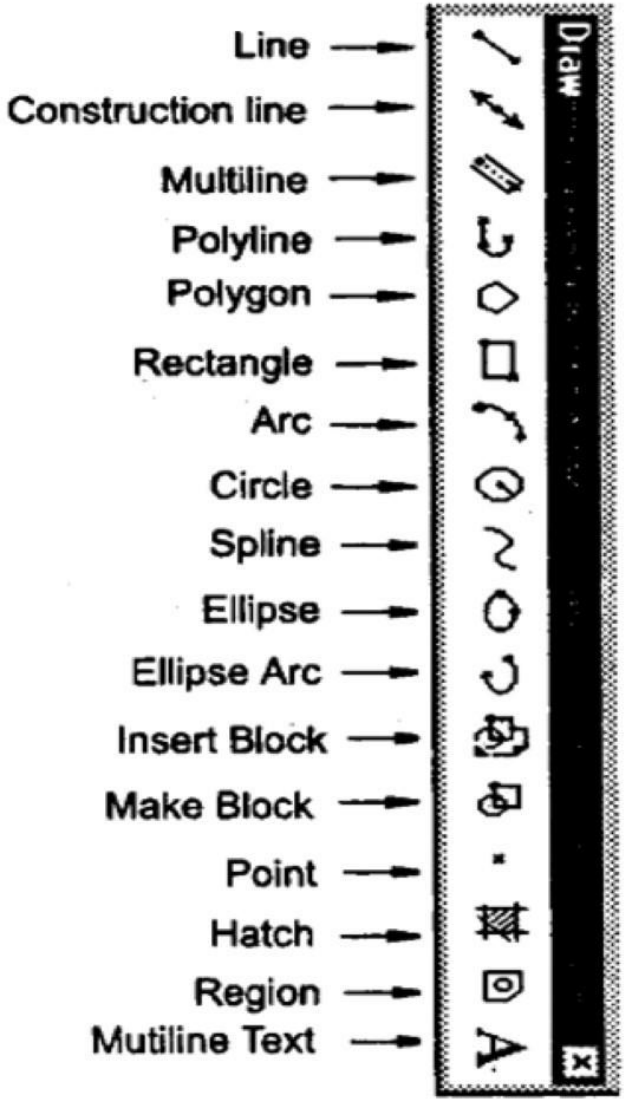


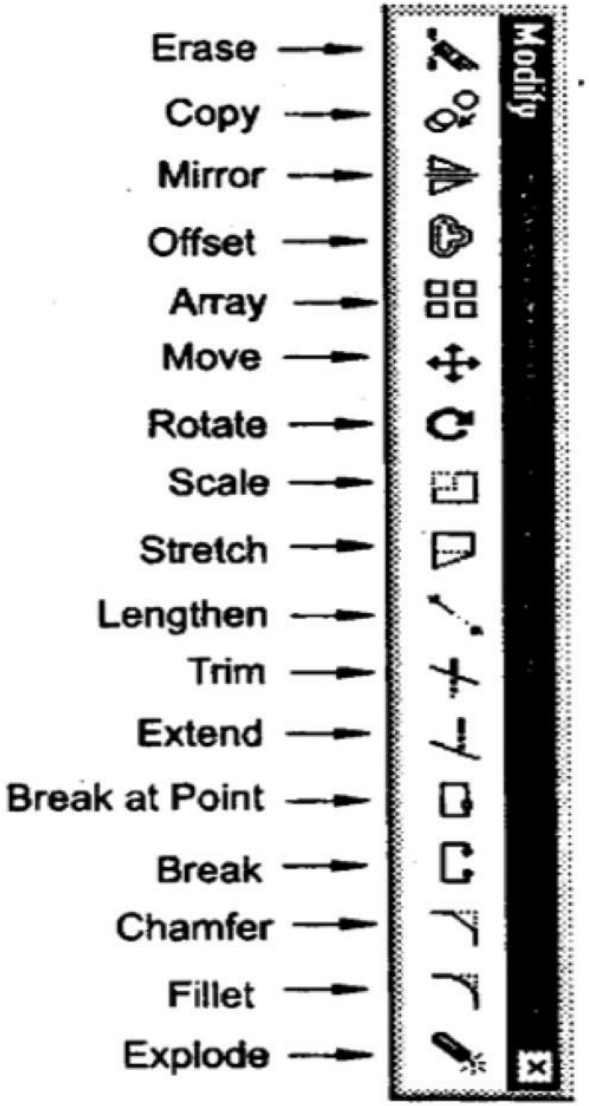
Fig.F1.2 Drawing Editor

TOOL BARS

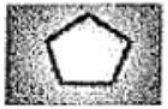
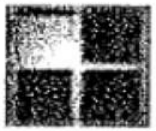
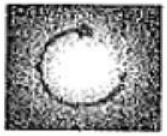
DRAW TOOL BAR

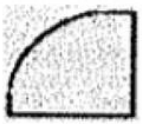
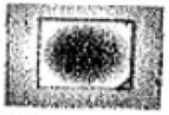


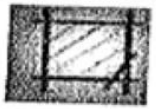
MODIFY TOOL BAR



Basic Tools used in CAD with description

S.No.	Icon	Description	Command	Use
1		Line	LINE or L	To draw a line
2		Line with centre	XLINE or XL	Creates a line of infinite length
3		Poly line	PLINE or PL	Creates a multiple line depending on the points selected
4		Polygon	POLYGON	Creates a polygon. Number of sides to be specified
5		Array	ARRAY	Creates a multiple objects. Either linear or circular
6		Rotate	ROTATE or R	Rotates an object
7		Ellipse	ELLIPSE	To draw an ellipse
8		Arc	ARC	To draw an arc

9		Circle	CIRCLE	To draw a circle of definite radius
10		Revision cloud	REVCLOUD	Highlights the part of drawing
11		Copy	COPY	Copies the selected object
12		Chamfer	CHAMFER	Bevels the edges of objects
13		Spline	SPLINE	Creates smooth curve
14		Fillet	FILLET	Rounds and fillets the edges of objects
15		Mirror	MIRROR	Creates a mirrored object of selected the object
16		Square	SQUARE	To draw a square
17		Gradient	GRADIENT or H	Fills the object with selected colour
18		Stretch	STRETCH or S	Stretches the selected object

19		Scale	SCALE	Increases the size of the object
20		Erase	ERASE or E	To delete the selected object
21		Explode	EXPLODE	To break the single object to a multiple points
22		Extend	EXTEND	Extends the line/arc/object to reach the end point
23		Trim	TRIM	To trim the edges of an object
24		Move	MOVE or M	To move an object to definite place/ point
25		Hatch	HATCH or H	Hatches the selected area
26		Rectangle .	RECTANGLE	To draw a rectangle

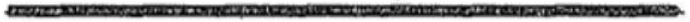
ORTHO: It is used to obtain straight lines. If ORTHO is kept on, only straight lines can be drawn. The angle of projection is only in the angles 0°, 90°, 180° and 270°.

OSNAP: It refers to object snap. If OSNAP is kept on, it helps to identify the end points of lines and objects.

LWT: It refers to line weight. It shows the thickness of the line when it is kept on.

OTRACK: It refers to object snap tracking.

Line types

S. No.	Types of line	Representation
1	Thin line	
2	Thick line	
3	Dotted line	
4	Long dash-small dash	

1 Line

1. From menu, select line icon or type L/LINE in command window.
2. Specify the start point.
3. Complete the first line segment by specifying on the endpoint.
4. Specify the endpoints of any additional line segments.
5. Press ENTER to end or C to close a series of line segments.

Line weight (LWT)

It refers to line weight. It shows the thickness of the line when it is kept ON.

Scale (SCALE)

Increase the size of the Object.

Unit

The units are used to represent the dimensions in AutoCAD. The units are categorized into length, angle, insertion scale, and lighting.

layer (LA)

- The **layer** command is used to control and manage the drawings in AutoCAD for different purposes.
- It increases the display performance of the AutoCAD by hiding the portion of our drawing when needed. It also improves the visual complexity of the drawing.
- We are required to create a set of layers having different properties. For example, in a floor plan or house plan, we can create separate layers for doors, walls, etc

Block (B)

- A block is simply a collection of objects (it could be one object) that has a name. Blocks have several advantages:
- You can insert them again and again, saving time. In fact, you can insert them into other drawings as well.
- A block uses less electronic space than individual objects, so your drawing file is smaller.

Insert (I)

This command is used to insert a block , any other drawing file or items in any other format into the current file.

Explode

The Explode command allows breaking **an object into its component objects**

Purge

Unused named objects can be removed from the current drawing. These include block definitions, dimension styles, groups, layers, line types, and text styles. Zero-length geometry, empty text objects, and orphaned DGN line style data can also be removed.

Table

Table command to specify the number of rows and columns, stretch and resize the columns, rows, or the entire table. If you use layout tabs for annotation, create your table directly on a layout tab. The scaling is automatic. If you use model space for annotation, you will need to scale the table. Tables do not support annotative scaling.

Attribute

An attribute is a label or tag that attaches data to a block. Attribute information extracted from a drawing can be used in a spreadsheet or database to produce a parts list or a bill of materials.

Quick select

The Quick Select dialog box is a simple filtering device that helps you select the objects you want. For more advanced filters and for when you want to save filters, use the **FILTER** command.

View

A drawing view is a 2D representation of a 3D digital prototype that is placed on a drawing sheet.

Multi-View

Multiview drawing is a technique used by drafters and designers to depict a three-dimensional object (an object having height, width and depth) as a group of related two-dimensional (having only width and height, or width and depth) views.

Break

BREAK is often used to create space for a block or text. To split an object in two without erasing a portion, enter the same point for both the first and second points.

Join

The Join command in AutoCAD is used to join the objects end to end to create a single object. The objects can be curved or linear, depending on the requirements.

Filter

The FILTER command allows you to create a selection set according to a specific list of property criteria.

Find

The FIND command is used to find specified text. Users could replace certain text according to needs.

Pan

Changes your view of your drawing the view while keeping the viewing direction and magnification the same

Match properties

There is a tool that called 'Match Properties' in AutoCAD and this tool is very useful when you want to transfer all the properties of an objects, to an another object, such as line weight, color, line type etc