EXPERIMENT NO: 1

DRAWING BASICS

1.1 INTRODUCTION

The art of representing technical structures with the aid of drawing instruments on paper is known as working drawing. A working drawing if properly drawn can convey the details such as shape, size, materials used, location, placing and planning of different services; in short it conveys the whole form of the structure on the paper before the materialization of the structure. So these drawings are most prior thing in any civil engineering projects.

The building drawing office practices followed are based on certain basic principles as laid down by ISI. These principles are called "Code of Practice" and the guidelines for engineering drawing are as per IS: 962-"Code of Practice for Architectural and Building drawings" and IS: 10711. They include size of papers, layout of drawings, conventional representations, sizes of letters and numerals on drawings, graphical symbols and abbreviations. Following paragraph deals with the same.

An engineering drawing traditionally is prepared using drawing instruments but the accuracy of this drawing is dependent on the individual skill of the person drawing them. The modifications and repetition work of this drawing are cumbersome and time consuming. Hence the popular alternative for manual preparation of engineering drawing is the Computer Aided Design and Drafting System. One such most widely used drafting tool is AutoCAD.

1.1 SIZE OF DRAWINGS

Drawing sheets are cut from rolls and are made into different sizes so that each size can be worked upon. The table below gives the standard size of drawing sheets.

Sl.No.	Size Designation	Trimmed size of the drawing sheet in mm
1	A_0	841x1189
2	A_1	584x841
3	A_2	420x594
4	A_3	297x420
5	A_4	210x297

1.2 LAYOUT AND TITLE BLOCK

Border lines should be drawn all-round the drawing sheet leaving a margin of 25 mm or 30 mm on the left hand side and 10 mm on all the other sides. Title box is drawn at the right bottom corner of the sheet and remaining space is utilized for drawing.

A title block normally carries the following information.

(i) Title of the drawing

(ii) Name of the organization

(iii) Drawing number with revision number

(iv) Scale

(v) Date of the drawing

(vi) Signature of the concerned authorities

1.3 SCALES

Drawings drawn to the scale enable dimensions to be "read-off" from the drawing. When the drawing is made to the same scale as that of actual object, t is called full scale (1:1). However the building drawings are too large to be drawn to full size. Therefore, they must be reduced scales to fit the normal drawing sheets. Thus the main function of scale is to enable the designer to draw a building to a convenient size to enable the builder to think in relation to the actual size of the structures.

Sl.No.	Drawing	Scale
1	Large plot plans	1:200
2	Small plot plans	1:100
3	Floor Plan	1:50
4	Detailed drawings	1:20,1:10,1:5

1.5 LINE WORK

All lines should be dense, clean and black to produce good prints. For details, reference shall be made to IS: 10714-1983.

1.6 LETTERING AND DIMENSIONING

The writing of details, references and naming of different views are done with the letters of uniform sizes.

Sl.No.	Purpose	Size of the letter's height in mm
1	Main title and Drawing No.	6,8,10 & 12
2	Sub-titles and Heading	3,4,5 & 6
3	Notes such as legends, schedules, materials and dimensioning	2,3,4 & 5

1.7 CONVENTIONAL SIZES AND SYMBOLS

Conventional signs are used on building drawings to represent various building materials and conventional symbols are the short notations which are used to represent the actual object in building drawings. These are also called as civil engineering symbols which give approximate shape of the object.

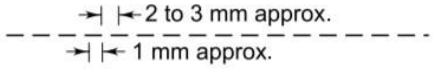
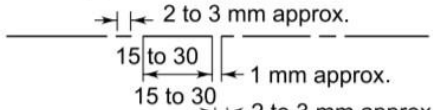
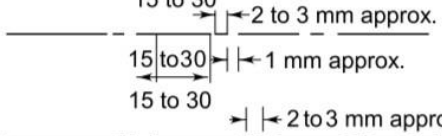
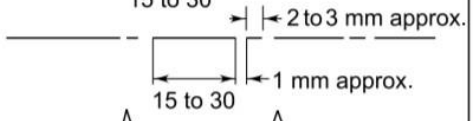
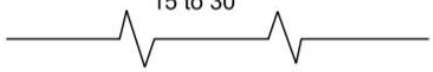
The conventional symbols represent the object at a particular location of sanitary fittings such as towel rail, water closet, sink, wash basin, shower, and electrical fittings such as switch, ceiling fan, exhaust fan and even furniture's like dining table, clothe cabinet, dressing table, etc. These are not drawn as per scale but drawn proportionately.

The Bureau of Indian Standards has recommended various types of conventional signs and symbols to fulfill the following objectives.

(i) To save time, labor, material and space on drawing sheet.
(ii) To avoid confusion and misunderstanding.
(iii) To achieve quick identification details.
(iv) To increase the speed in preparation of drawings.
(v) To save time in reading and understanding the drawing.
(vi) To avoid confusion in interpretation of details by the site-supervisor's etc.

1.8 THICKNESS OF LINES

The thickness of lines in engineering drawing has three groups such as thick, medium and thin. Thick line is 3 times thicker than a medium line and the medium line is 2 times thicker than the thin line. This is shown in the following table as per BIS SP: 46: 1988.

S. No.	Type of line	Illustration	Application
A	Continuous thick		Visible outlines
B	Continuous thin		Dimension lines, leader lines, extension lines, construction lines, outlines of adjacent parts, hatching and revolved section
C	Continuous thick wavy		Irregular boundary lines, short break lines
D	Short dashes medium		Hidden outlines and edges
E	Long chain thin		Centre lines, locus lines, extreme positions of the moveable parts, pitch circles and parts situated in front of the cutting planes
F	Long chain thick at ends & thin elsewhere		Cutting plane lines
G	Long chain thick		To indicate surfaces which are to receive additional treatment
H	Ruled line and short zigzag thick		Long break lines

1.9 DIMENSIONING, ABBREVATION AND CONVENTIONAL REPRESENTATION A S PER 962

Abbreviations are generally used in drawing for the sake of clarity. A systematic notation of architectural and building terms is necessary for uniformity, and for avoiding confusion and ambiguity. Abbreviations are the same in the singular and plural. Abbreviations and symbols are recommended for use in general building drawings.

1.9 STARTING of AutoCAD

We can start on Auto CAD session by double clicking the left mouse button on an Auto CAD icon or by clicking the start button choosing the program click on Auto CAD. Auto CAD opens loads the menu and display the start up dialogue box. Auto CAD creates a blank drawing sheet ready to use

Components of AUTO CAD editor screen:

Drawing Area:Center of Screen which is used for creating the drawing.

Command Lines: We can type command and execute it.

Menu Bar: Menu bar displays the basic command along with submenu to occur the general control and setting for the efficient handling of tools.

Standard tool Bar: Offer quick, single click occurs to the most commonly used Auto CAD features. Tool Bar tips: Appear just below the cursor which when the mouse point on the tool.

Draw tool Bar: Provides command for creating common object including line, arc, circle, text, etc.

Modify tool bar: Provides commands for editing object like trim, copy, move, etc….

Status Bar: Gives information or glance about drawing coordinates and status of grid, Ortho, osnap and model.

Object Properties:

Tool Bar: It displays commands for manipulating the properties of an object.

UCS Icon: User coordinate system Icon tells you orientation in drawing the error points to the positive direction X and Y axis. W indicates that you are in the world of coordinate system.

Working with Auto CAD commands:

Commands are important for execution. " Auto CAD" provides several ways to select and executing the commands using commands or command lines or command prompt type, the common name or short name and press enter or click right mouse button to execute.

Using Commands:

Using command with menu: Auto CAD's menus are parallel to those of other windows program commands can be selecting and executed from pull down menu.

Using dialogue box: It provides simple way to control Auto CAD without memorizing a lot of technical commands and options.

1.11 FUNCTION KEYS

AutoCAD provides function keys for quick access to certain setting commands.

Function Key	Function defined in AutoCAD
F1	Online help
F2	Command window on and off
F3	OSNAP on and off
F4	Tablet on and off
F5	Switches among isoplanes Top, Right and Left
F6	Co-ordinates on and off
F7	Grid on and off
F8	Ortho on and off
F9	SNAP on and off
F10	Polar Tracking on and off
F11	Object Snap Tracking on and off
F12	Dynamic Input on and off

1.12 COMMANDS

Auto CAD's menu are parallel to those of other windows programs, commands can be selected and executed from pull down menu.

Provides simple ways to control 'AutoCAD' without memorizing a lot of technical commands.

NEW COMMAND: It creates a new drawing file.

QUIT COMMAND: It access Auto Cad without saving.

SAVE COMMAND: It saves the drawing with current file name.

END COMMAND: It saves the drawing and exits Auto CAD

OPEN COMMAND: It opens on exiting drawing.

A. **UNITS COMMAND:** In Auto CAD drawing are down at full size the size is set at the time of printing but it is parable to select any unit system and precision "Auto CAD" by default uses decimal units. However unit style is to be changed if any other unit system if required.

COMMAND: UNITS (PRESS ENTER)

B. **LIMITS COMMAND:** It sets and constructs the drawing boundaries. It is the invisible boundary to fit the drawing. It should be large enough to contain the drawing and other related parts of it.

COMMAND: LIMITS (PRESS ENTER)

LOWER LEFT CORNER: Specify the lower left corner of the drawing limits. (Default lower limits is 0, 0)

UPPER RIGHT CORNER: Specify the upper right corner of the drawing limits. (Default upper limits is 420, 297)

C. **ZOOM COMMAND:** Used to enlarge and reduce the view of the object in different ways. Zooming does not change obsolete size of the view with in graphic data.

I. **ALL:** Zoom all displays the entire drawing even if they are outside the graphic area.

II. **CENTER:** Zoom displays a window by entering a center point then a magnification value or height.

III. **DYNAMIC:** The area for zooming can be selected dynamically by zoomed box.

IV. **EXTENTS:** Zoom to display the drawing extents.

V. **PREVIOUS:** Zoom to display the previous view and to previous views can be restarted.

VI. **SCALE:** Increase or decrease the size of the image by a given scale factor of the original size (1= full size) 1 enlarges the view (1 reduces view) ex: 2x, 5x.

COMMAND: ZOOM or Z. (press enter)