1

ENGINEERING DRAWING, DRAWING INSTRUMENTS AND THEIR USE

1.1. INTRODUCTION

Engineering drawing is the most important subject in engineering. It is the language of engineers because with this language, the thoughts, ideas and designs regarding objects can be represented through lines. It not only saves the time and labour but also give complete information regarding shape and size of the object to be manufactured or produced.

1.2. DRAWING

Graphical representation of an object is called **drawing**. A drawing of object does not give the complete information about that object. No rule or scale is used in drawing. A child is able to draw a picture of apple, dog, cat etc. even at the age of three year.
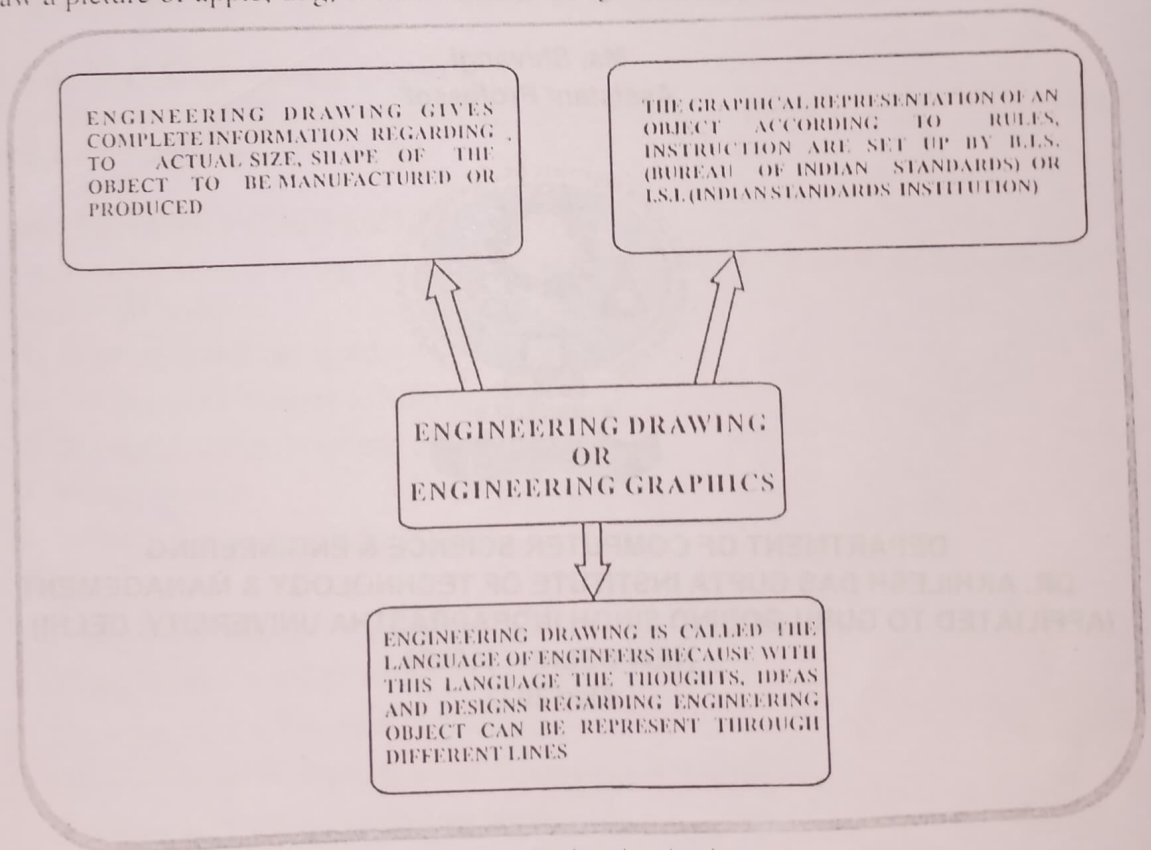
ENGINEERING DRAWING GIVES COMPLETE INFORMATION REGARDING TO ACTUAL SIZE, SHAPE OF THE OBJECT TO BE MANUFACTURED OR PRODUCED

THE GRAPHICAL REPRESENTATION OF AN OBJECT ACCORDING TO RULES, INSTRUCTION ARE SET UP BY B.I.S. (BUREAU OF INDIAN STANDARDS) OR I.S.I. (INDIAN STANDARDS INSTITUTION)

ENGINEERING DRAWING OR ENGINEERING GRAPHICS

ENGINEERING DRAWING IS CALLED THE LANGUAGE OF ENGINEERS BECAUSE WITH THIS LANGUAGE THE THOUGHTS, IDEAS AND DESIGNS REGARDING ENGINEERING OBJECT CAN BE REPRESENT THROUGH DIFFERENT LINES

Fig. 1.1. Engineering drawing.

Machine Learning [ETCS-454]

PRACTICAL LAB FILE

Submitted in partial fulfillment of the requirements for the award of the degree

of

BACHELOR OF TECHNOLOGY

in

COMPUTER SCIENCE & ENGINEERING

Submitted by

Yukti Nigam
Enrollment No. 03996202718
Submitted to

Ms. Shivangi
Assistant Professor

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
DR. AKHILESH DAS GUPTA INSTITUTE OF TECHNOLOGY & MANAGEMENT
(AFFILIATED TO GURU GOBIND SINGH INDRAPRASTHA UNIVERSITY, DELHI)
NEW DELHI – 110053
May 2022

1.3. ENGINEERING DRAWING

A drawing of an object that contains all information about that object like actual size, shape, manufacturing method etc. is called **engineering drawing**. Engineering drawing is further used in mechanical engineering drawing, civil engineering drawing, computer engineering drawing, electrical engineering drawing etc. as no construction/manufacturing of any engineering objects is possible without engineering drawing.

Engineering drawing is the language of engineers because with this language the thoughts, ideas and designs regarding engineering objects can be represented through different lines. It is also called **engineering graphics**.

1.3.1. Mechanical Engineering Drawing

Drawing related to the machine parts, machine accessories, machine mounting is called mechanical engineering drawing.

1.3.2. Electrical Engineering Drawing

Drawing related to the electrical engineering objects such as generators, electric motors, transformers etc. is called **electrical engineering drawing**.

1.3.3. Computer Engineering Drawing

Drawing related to the computer parts like RAM, hard disk, memory card, sound card, video card, keyboard, mouse etc. is called **computer engineering drawing**.

1.3.4. Civil Engineering Drawing

Drawing related to the civil engineering objects such as buildings, roads, dams, bridges etc. is called **civil engineering drawing**.

1.4. DRAWING EQUIPMENTS

A neat and correct drawing is prepared with the help of good drawing equipment, the list of which is given below :

1. Drawing board and stand.
2. Tee square (T-square) or Mini drafter.
3. Set-squares, protractor and clinograph.
4. Instrument box.
5. French curves or irregular curves.
6. Pencils.
7. Rubber or eraser and erasing shield.
8. Blade, pocket knife or pencil sharpener.
9. Drawing pins, adhesive tape or clips.
10. Drawing paper or drawing sheet, tracing paper, tracing cloth.
11. Handkerchief, duster or dusting brush.
12. Sand paper No. 0.
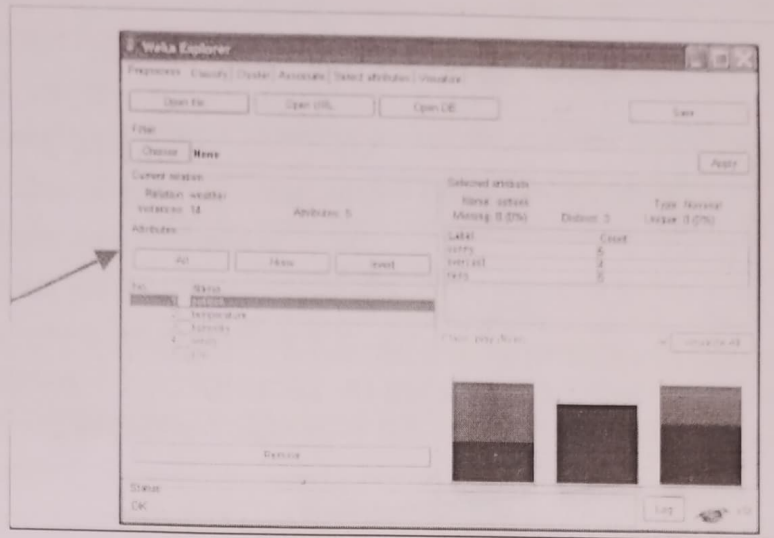13. Scales (Cardboard scales or Engineering scales).

Fig. 2: Loading data and various options in WEKA

Classify using classifier: Go to classifier tab Naïve Bayes Algorithm:

The Naive Bayes Classifier technique is based on the so-called Bayesian theorem and is particularly suited when the dimensionality of the inputs is high. Despite its simplicity, Naive Bayes can often outperform more sophisticated classification methods.
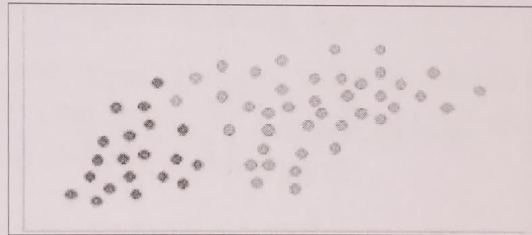

Fig. 3: Representation of data to be classified into two classes

To demonstrate the concept of Naïve Bayes Classification, consider the example displayed in Fig. 3 above. As indicated, the objects can be classified as either GREEN or RED. Our task is to classify new cases as they arrive, i.e., decide to which class label they belong, based on the currently exiting objects.

Since there are twice as many GREEN objects as RED, it is reasonable to believe that a new case (which hasn't been observed yet) is twice as likely to have membership GREEN rather than RED. In the Bayesian analysis, this belief is known as the prior probability.

Prior probabilities are based on previous experience, in this case, the percentage of GREEN and RED objects, and are often used to predict outcomes before they actually happen.

3

To record information on paper or another surface, instruments and equipments are needed. Engineering drawing is entirely a graphic language hence instruments are essentially needed. Even for freehand drawing, pencils, erasers and sometimes coordinate paper are used. To secure most satisfactory result in drawing, the instruments should be of high grade and correct to give accuracy and working efficiency. Drawing must be clear, neat and legible in order to serve its purpose well. Drawing is a means of communication to other industries, it must have a good appearance. Hence, it is extremely important for draftmen and engineers to have good speed, accuracy, legibility and neatness in the drawing work.

Every care should be taken to maintain the drawing instruments in good working conditions, and they should be used in correct way. A good speed in drawing work should be achieved because "time is money" in the industry. Accuracy, neatness and legibility are of great importance in the drawing work.

1.5. DRAWING BOARD

The drawing board is traditionally made of well seasoned and soft wood of yellow pine free from knots and other defects. Narrow strips of the wood are glued edge to edge to make a board which is fixed by screws to two battens. A straight ebony edge is fitted on the left side on the board against which the head of the tee-square moves. The top surface of the board is perfectly smooth and level. Standard sizes of the drawing boards are given in Table 1.1. Fig.1.2 shows a view of the drawing board and stand.

Fig. 1.2. A view of drawing board and stand.

Table 1.1. Sizes of Drawing Boards (IS : 962—1967).

Designation	Size (mm)
B0	1500 × 1000
B1	1000 × 700
B2	700 × 500
B3	500 × 350

Note. For drawing exceeding these sizes special drawing boards may be used but the width of the drawing boards shall not exceed 1000 mm.

The drawing sheet may be fastened to the board either by pins or tape. Clamps may also be used to fasten full size drawing sheet. Quarter or half size drawing sheet should be fastened as shown in Fig. 1.3. It is about 50 mm away from the left edge of the board.
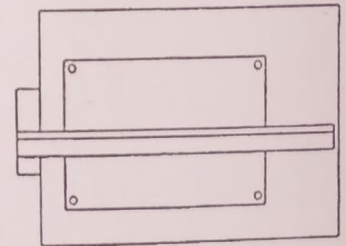

Fig. 1.3. Fastening paper on the board.

1.6. T–SQUARE

It is composed of a long strip called blade which is screwed rigidly at right angles to a shorter piece called head or stock. It is made of mahogany or pear wood, a harder wood than the board

KnowledgeFlow is a Java-Beans-based interface for setting up and running machine learning experiments.
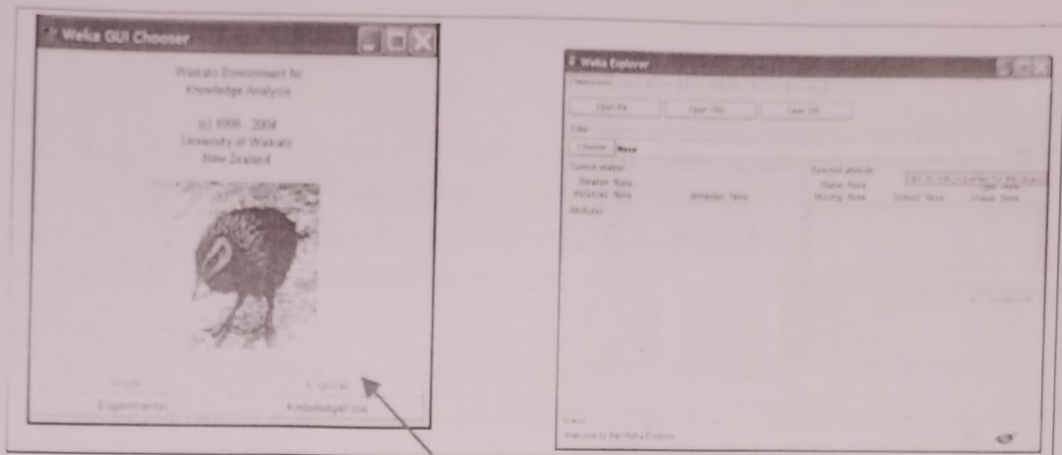

Fig. 1: The opening window of WEKA

Data Preprocessing

WEKA expects the data file to be in Attribute-Relation File Format (ARFF) file. Before you apply the algorithm to your data, you need to convert your data into a comma-separated file in ARFF format (into the file with the .arff extension).

To save your data in comma-separated format, select the 'Save As...' menu item from Excel 'File' pull-down menu. In the ensuing dialogue box select 'CSV (Comma Delimited)' from the file type pop-up menu, enter the name of the file and click the 'Save' button. Ignore all messages that appear by clicking 'OK'.

Open this file with Microsoft Word. Your screen will look like the screen below. We can create an arff file, load it from the system using the open file option or load a predefined database using the Open DB option. We can even upload data from a website using the open URL option.

Load Data

Let's load the data and look at what is happening in the 'Preprocess' window. The most common and easiest way of loading data into WEKA is from the ARFF file, using the 'Open file...' button as shown in Fig. 2. Click on the 'Open file...' button and choose the "weather. arff" file from your local filesystem. Note, that the data can be loaded from CSV.

are used. Proper use of french curves will require skill especially when the curves are to be drawn in ink (Fig.1.17).

Engineer's triangle and Draft square are also used in drawing work. They are made of plastic and have in them the circles, hexagons and other shapes of different dimensions, as shown in Figs. 1.18 and 1.19.
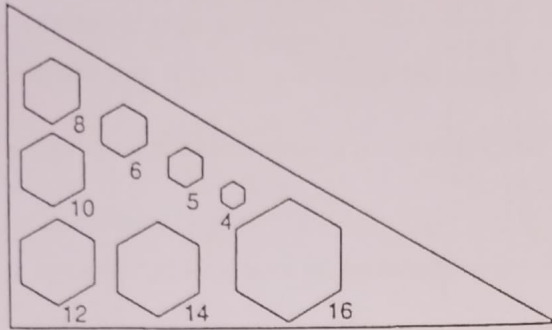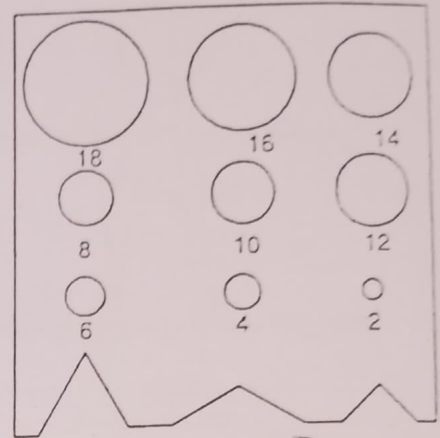
Fig. 1.18. Engineer's triangle.

Fig. 1.19. Draft square.

1.11. INSTRUMENT BOX

A drawing instrument box contains of the following instruments :

1. Compass (*i*) Large compass (*ii*) Small Lead Bow Compass (*iii*) Small Ink Bow Compass
2. Divider (*i*) Large divider (*ii*) Small divider
3. Bow pen, lining pen or drawing pen (fine and medium).
4. Lengthening bar (for both pencil and bow compass).
5. Spring divider.

Drawing instruments are generally made of nickel silver which has a silver luster on the surface and is corrosion resistant. Ruling pen, spring parts, divider points and various screws of these instruments are made of tool steel Fig. 1.20).
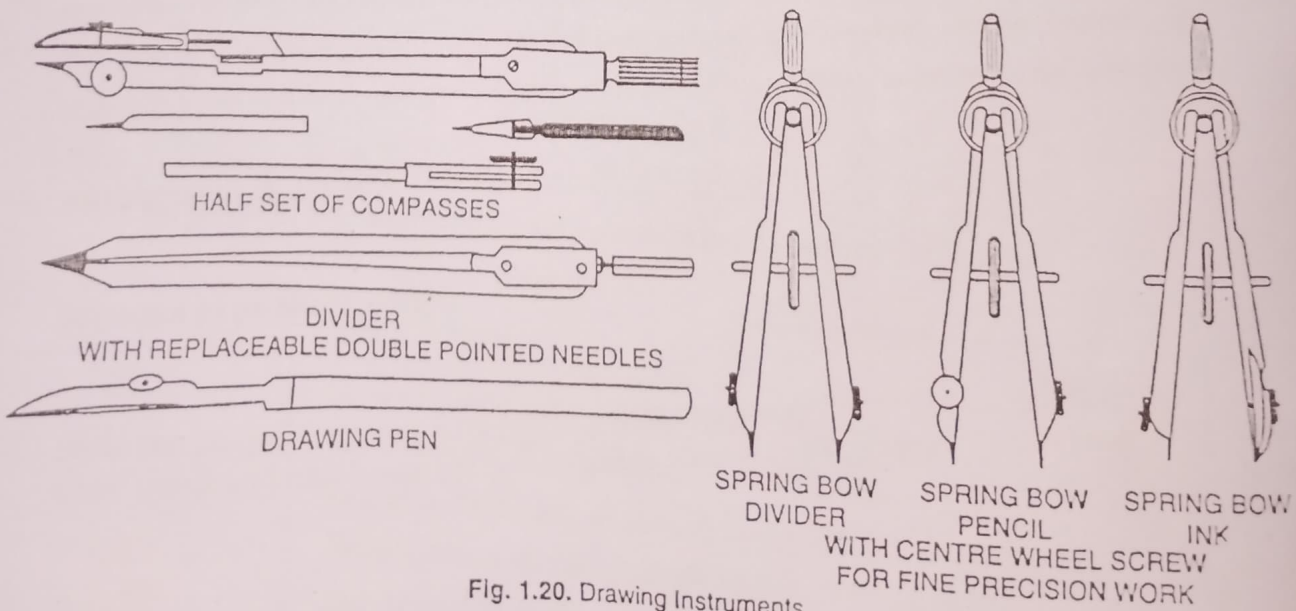
HALF SET OF COMPASSES

DIVIDER
WITH REPLACEABLE DOUBLE POINTED NEEDLES

DRAWING PEN

SPRING BOW
DIVIDER

SPRING BOW
PENCIL

SPRING BOW
INK

WITH CENTRE WHEEL SCREW
FOR FINE PRECISION WORK

Fig. 1.20. Drawing Instruments.

Experiment No. 1

Aim: Study and Implement the Naive Bayes learner using WEKA. (The datasets taken can be Breast Cancer data file or Reuters data set).

Software to be used: WEKA

Introduction to WEKA

WEKA is a data mining system developed by the University of Waikato in New Zealand that implements data mining algorithms. WEKA is a state-of-the-art facility for developing machine learning (ML) techniques and their application to real-world data mining problems. It is a collection of machine learning algorithms for data mining tasks.

The algorithms are applied directly to a dataset. WEKA implements algorithms for data preprocessing, classification, regression, clustering, and association rules; it also includes visualization tools. The new machine learning schemes can also be developed with this package. WEKA is open source software issued under the GNU General Public License.

Pedagogy/ Algorithm:

Launch WEKA: You can launch Weka from the C:\Program Files directory, from your desktop by selecting the icon, or from the Windows taskbar 'Start' Æ 'Programs' Æ 'Weka 3-4'. When the 'WEKA GUI Chooser' window appears on the screen, you can select one of the four options at the bottom of the window. Fig. 1 shows the opening window and various options inside the explorer tab.

- Simple CLI provides a simple command-line interface and allows direct execution of Weka commands

- Explorer is an environment for exploring data.

An experimenter is an environment for performing experiments and conducting statistical tests between learning schemes.

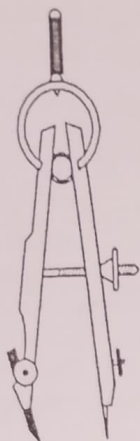(v) **Small Ink Bow.** (95 mm long) See Fig. 1.26. Small ink bow compass is used to draw small circles and arcs in ink.
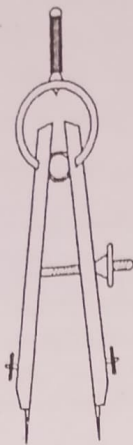

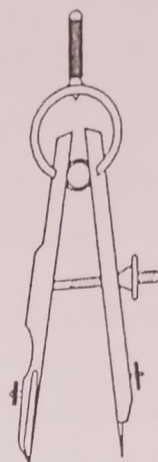Fig. 1.24. Small Bow Compass.   Fig. 1.25..Small Divider.   Fig. 1.26. Small Ink Bow.

1.13. PENCILS

Neatness, quality and accuracy of the drawing greatly depend upon the type and condition of the pencils used for drawing. Pencil leads are made of graphite with clay added in varying amounts to make 18 grades from 9H to 7B. These grades can be divided in three groups :

Table 1.2.

Grades of Pencils	Hardness/Softness
4H to 9H	Extremely Hard
3H	Very Hard
2H	Hard
H	Moderately Hard
F	Medium Hard
HB	Medium
B	Moderately Soft
2B	Soft
3B	Very Soft
4B to 7B	Extremely Soft

The following grades of pencils should be used for drawing work (See Table 1.3).

Table 1.3.

Grade	Types of Work
2H	Object Lines, Centre Lines, Break Lines, etc.
H	Dimensioning, Arrow Heads, Section Lines, Lettering, Sketching, Extension Lines, Circles, Arcs, etc.
HB	Writing Notes on Sketch Book or Rough Work etc.
B to 7B	For Artistic Sketching and Shading

INDEX

Sr. No.	Experiment
1	Study and Implement the Naive Bayes learner using WEKA. (The datasets taken can be: Breast Cancer data file or Reuters data set).
2	Study and Implement the Decision Tree learners using WEKA. (The datasets taken can be: Breast Cancer data file or Reuter's data set).
3	Estimate the accuracy of the decision classifier on the breast cancer dataset using 5-fold cross-validation. (You need to choose the appropriate options for missing values).
4	Estimate the precision, recall, accuracy, and F-measure of the decision tree classifier on the text classification task for each of the 10 categories using 10-fold cross-validation.
5	Develop a machine learning method to Predict stock prices based on past price variation.
6	Develop a machine learning method to predict how people would rate movies, books, etc.
7	Develop a machine learning method to Cluster gene expression data, and how to modify existing methods to solve the problem better.
8	Select two datasets. Each dataset should contain examples from multiple classes. For training, purposes assume that the class label of each example is unknown (if it is known, ignore it). Implement the Kmeans algorithm and apply it to the data you selected. Evaluate performance by measuring the sum of Euclidean distance of each example from its class centre. Test the performance of the algorithm as a function of the parameter k.

Pencil of 9H is the hardest and that of 7B is the softest. Harder pencils have leads of small diameters and softer pencils of larger diameters to give adequate strength. The choice of grade of pencil depends upon the type of work, texture of paper, atmosphere humidity, etc. Following pencils should be used for drawing work in class :

2H pencil—for drawing outlines, centre lines, break lines, etc.

H pencil—for dimensioning, arrowheads, hatching lines, lettering, sketching circles, arcs, etc.

After having some practice, 3H and 2H pencils should be used for the same work respectively. Pencils are made of different companies and named such as Venus, Shorthands, Kutub Minar, Artists, Kohinoor, Mars, Castell, Apsara, etc. A good type of the pencil must have the following five reasons :

1. It gives the most satisfying results in photo printing, technical, artistic and commercial work.

2. It carries a very high density and firmness of leads.

3. It has intense blackness and high covering power and gives blue prints.

4. It has compressed leads which resists breakage and wear.

5. It is available in many reliably standardised degrees, and is capable of producing any desired shade, from the highest grey to the deepest black.

Keep your pencil sharp. Only a sharp pencil is capable of preparing neat and accurate drawing. Conical point pencil is used for printing, dimensioning, sketching and drawing circles, arcs and curves. Straight lines should be drawn by chisel point pencil. It will draw the straight line of equal thickness and darkness. The drawing of line by pencils can be learned after a good practice. A perfect draftsman may be able to tell at once by inspection whether or not a line is correct in width and blackness..

1.14. HOW TO MEND THE PENCIL?

The Pencil used for drawing work should be well mended for accuracy, quality and neatness of a drawing.

There are two ways of mending pencil

1. Round or conical pointed pencil.

2. Chisel edge pencil

1. Round or Conical Point Pencil. The pencil is first mended with blade or knife and then the lead is given conical shape with the help of 0-grade sand paper (See Fig. 1.27).
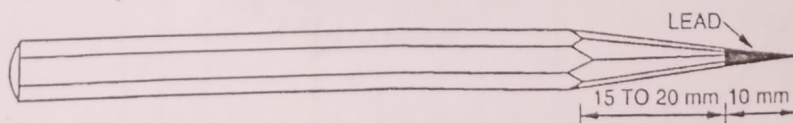

Fig. 1.27. Round or Conical Point Pencil.

2. Chisel Edge Point. The pencil is first mended with blade or knife and then lead is given a chisel shape by rubbing the lead on a sand paper (See Fig. 1.28).

Machine Learning Programming Lab File

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Submitted By

Ankit Bungla

Enrollment Number: 00496202718

CSE Sem VIII, Batch: F17

Submitted To

Mrs. Shivangi Rajput

(CSE Department)

ADGITM, Delhi

Table 1.4. Standard sizes of drawing sheets.

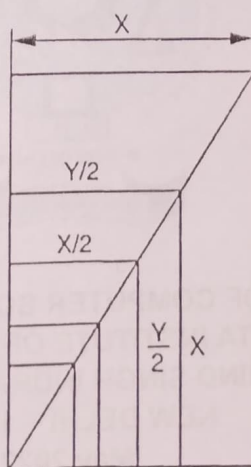| Sheet designation	Size (IS : 696-1972)	
	Trimmed, mm	Untrimmed, mm
A0	841 × 1189	880 × 1230
A1	594 × 841	625 × 880
A2	420 × 594	450 × 625
A3	297 × 420	330 × 450
A4	210 × 297	240 × 330
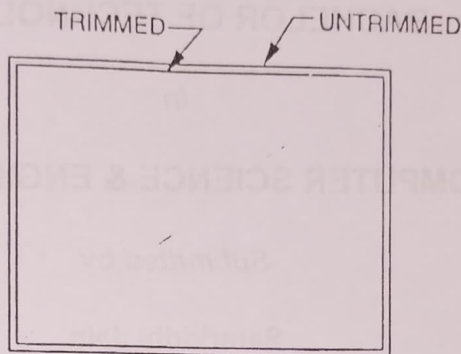
TRIMMED — — UNTRIMMED

Fig. 1.36. Trimmed and Untrimmed Drawing Sheet.

Note. In arriving at the trimmed size of drawing sheets, the following basic principles which have been dealt with the detail in IS:1064 – 1961, have been taken into consideration :
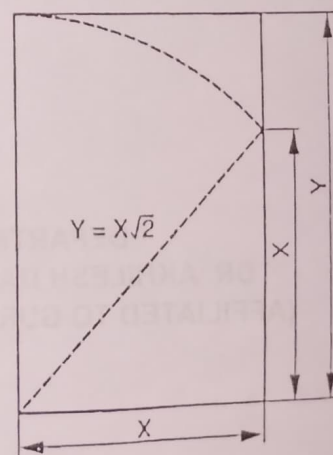
1. Two successive sizes of the series are obtained by halving or doubling. Consequently the surface area of two successive sizes are in the ratio of 1 : 2. [Fig. 1.37 (a)].

2. The formats or forms are geometrically similar to one another, the sides of each size being in the ratio of 1 : $\sqrt{2}$ [Fig. 1.37 (b) and (c)].

3. The surface area of the basic size A0 is one square metre.
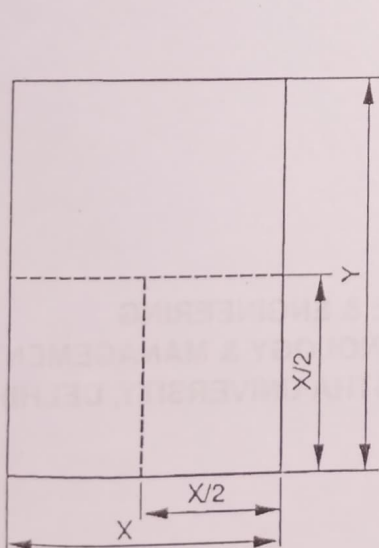
(a) Halving and Doubling.   (b) Similarity of Formats.   (c) Relationship Between Two Sides.

Fig. 1.37. Illustrations of basic principles of obtaining drawing sheets. (IS : 696 – 1972).

Machine Learning [ETCS-454]

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Submitted by

Samriddhi Jain
Enrollment No. 41196202718

Submitted to

Ms. Shivangi
Assistant Professor

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
DR. AKHILESH DAS GUPTA INSTITUTE OF TECHNOLOGY & MANAGEMENT
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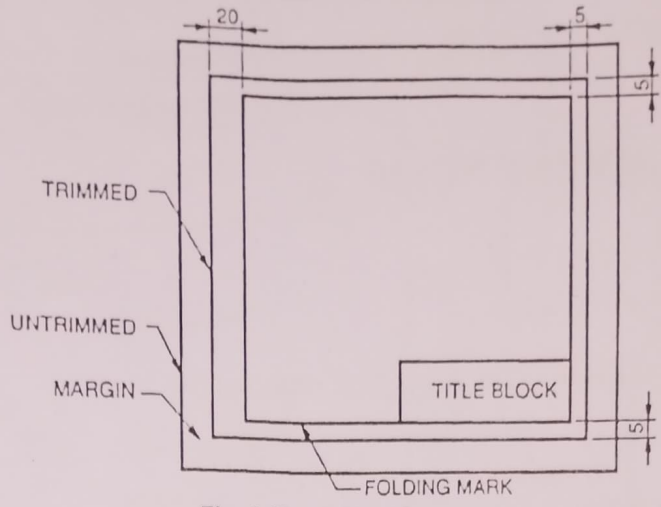NEW DELHI – 110053
May 2022

Fig. 1.40. A3 Sheet Layout.

1.20. TITLE BLOCK

The title block is an important feature in a drawing and should be placed at the bottom right hand corner of the sheet where it is readily seen when the prints are folded in the prescribed manner. It is recommended that space should be provided for the following basic informations in the title block :

1. Name of title of drawing.
2. Drawing and sheet number.
3. Scale.
4. Symbol denoting the method of projection.
5. Name of the firm.
6. Dated initials of staff designing, drawing, checking, standards and approving.

The size of the title block recommended is 185 mm × 65 mm. The size of the title block is uniform for all sizes. Typical layout of title block is shown in Fig. 1.41.
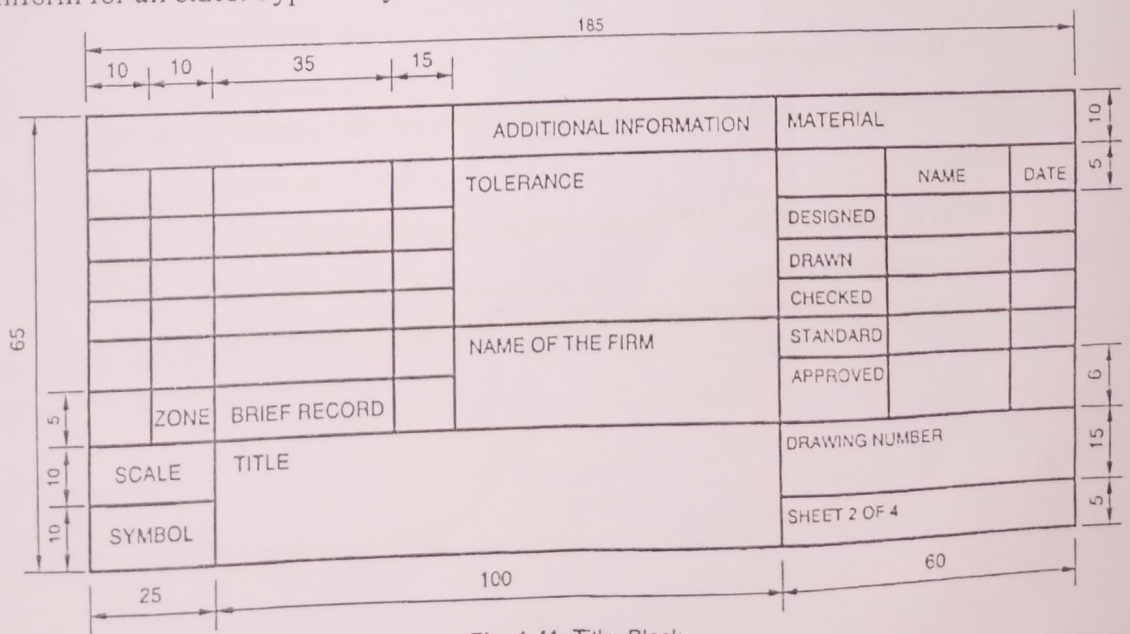

Fig. 1.41. Title Block.

EXPERIMENT NO: 10

TITLE:

To Study the Hive commands using HQL (DDL and DML).

OBJECTIVES:

On completion of this experiment students will be able to…

➢ know the concept of Hive Commands.

What is HQL?

Hive defines a simple SQL-like query language for querying and managing large datasets called Hive-QL (HQL). It's easy to use if you're familiar with SQL Language. Hive allows programmers who are familiar with the language to write the custom MapReduce framework to perform more sophisticated analysis.

Hive Commands:

Data Definition Language (DDL)

DDL statements are used to build and modify the tables and other objects in the database.

Example :

CREATE, DROP, TRUNCATE, ALTER, SHOW, DESCRIBE Statements.

Go to the Hive shell by giving the command sudo hive and enter the command **'create database< database name>'** to create the new database in the Hive.

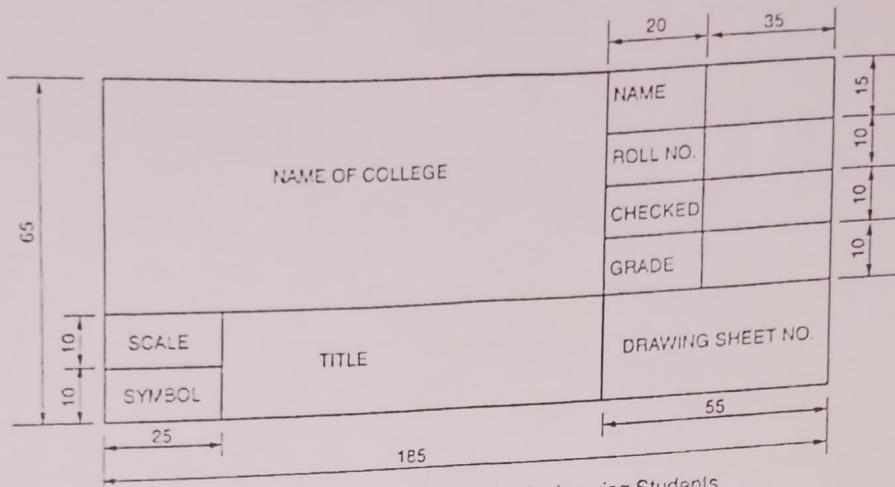The block suggested for engineering students to be used in class room drawing sheet is shown in Fig. 1.42.

Fig. 1.42. Title Block Suggested for Engineering Students.

1.21. SCALES

Scales are used to draw the figures to a full size, reduced size or enlarged size. The scales are indicated on the drawings as follows :

Scale	Indication
Full size	1 : 1
Half full size	1 : 2
1/2.5th full size	1 : 2.5
1/5th full size	1 : 5
1/10th full size	1 : 10
1/20th full size	1 : 20
1/50th full size	1 : 50
1/100th full size	1 : 100
Ten-times full size	10 : 1
Five-times full size	5 : 1
Two-times full size	2 : 1

General engineering drawings. The scales recommended for use in general engineering drawings are given below :

```
/_/

Using Scala version 2.10.4 (Java HotSpot(TM) 64-Bit Server VM, Java 1.7.0_71)
Type in expressions to have them evaluated.
Spark context available as sc
scala>
```

EVALUATION:

Involvement (4)	Understanding / Problem solving (3)	Timely Completion (3)	Total (10)