TECHNICAL DRAWING APPLICATIONS (65)

Aims:

1. To develop competence among the students to pursue technical courses like Engineering, Architecture, Draftsmanship Surveying and other professional courses.
2. To understand basic principles of instrumental drawing drawn to scale and to acquire basic skills in the use of traditional drafting methods which would also be helpful in understanding computer aided designs.
3. To acquire the basic knowledge in their applications in various fields.

CLASS IX

*There will be one written paper of **three** hours duration carrying 100 marks and Internal Assessment of 100 marks.*

THEORY – 100 Marks

1. Types of lines

(i) Border lines.
(ii) Outlines.
(iii) Dashed/ Dotted lines.
(iv) Centre lines.
(v) Extension lines or Projection lines.
(vi) Dimension lines.
(vii) Construction lines.
(viii) Cutting-Plane lines.
(ix) Section or Hatching lines.
(x) Short break lines.
(xi) Long break lines.

The names of different lines and their uses to be matched with the correct thickness and shade.

2. Dimensioning

(i) Aligned system.
(ii) Unidirectional System.

3. Lettering and Numbering

*Upright capitals and small, freehand, single stroke, as used in Engineering drawing, and between, the correct guide lin*es.

4. Sheet Layout

Basic – draw border lines, title block with name, sheet number, title etc.

5. Geometrical Constructions

(a) Bisector of line segment.
(b) Division of a line segment into required number of parts/ proportional parts.
(c) Perpendicular and parallel lines.
(d) Bisection of an angle, trisection of a right angle/ straight angle.
(e) Congruent angle.
(f) To find the centre of an arc.
(g) Regular polygons up to six sides with simple methods using T-square and setsquares.

***Point, Lines and Angles**: Definitions of the various terms used in relation to, a point, different types of lines and different types of angles to be used only in construction.*

- *Bisecting a line.*
- *Drawing a perpendicular to a line from a point, in/above / away from the end of, the line.*
- *Bisecting an angle when the lines meet.*
- *Trisecting a right angle.*
- *Making an angle equal to a given angle.*

- *Draw parallel line to a given line touching given point away from the line by using correct instruments such as set squares/compasses.*
- *Draw parallel line to a given line at a given distance.*
- *Locating a point equally distant from two points, away from the line*
- *Dividing a straight line into any required number of given parts.*
- *Draw two lines, from two points outside a given straight line, to meet at a point in the line, making equal angles with it.*
- *Constructing angles of 90, 45, 22½, 135, 67½, 60, 120, 30, 52½, 105, 75, 37½ degrees.*

***Triangles**: Definition of a triangle, the terms (with their definitions) relating to the different parts of a triangle, classifying the different kinds of triangles, according to their sides / angles.*

Construction of Triangles when the following is given:

- *the base, altitude and one side.*
- *all three sides.*
- *the base angles and the altitude.*
- *the base and the base angles.*
- *the perimeter and the proportion of the sides.*
- *the base and the ratio of the angles.*
- *the perimeter and the base angles.*

Construction of Isosceles Triangles when the following is given:

- *the altitude and the base.*
- *the base and one side.*
- *a base angle and an equal side.*
- *the altitude and an equal side.*

Construction of Right angled triangles when the following is given:

- *the hypotenuse and the base.*
- *the hypotenuse and an acute angle.*
- *The base and height.*

***Quadrilaterals**: Definitions of a quadrilateral / different kinds of quadrilaterals, e.g. a square, a rectangle, a rhombus and a trapezium to be used only in the construction of*

- *a rectangle: when the diagonal and one side is given or two sides are given.*
- *a square: when one side or the diagonal is given.*
- *a rhombus: when one side and one angle is given/when two diagonals are given.*
- *a trapezium: when the diagonal and the equal sides are given/when two parallel sides and distance between them is given.*

***Polygons**: Definition of a polygon (regular and irregular) and the terms relating to it only to be used in construction methods and Special construction methods of regular polygons (up to eight sides) when the following is given:*

- *the length of a side*
- *the length of sides and necessary angles are given.*

***Circles and tangents**: Definition of a circle / tangent, and the different parts contained in a circle, e.g. centre, circumference, diameter, radius, arc, chord, sector and segment. Concentric circles only to be used in construction methods for:*

- *finding the center of a circle.*
- *obtaining its circumference, radius given.*
- *obtaining the length of any given arc.*
- *drawing an arc /a circle to pass through 2/3 given points.*
- *drawing a tangent to an arc / a circle from a point in / outside the arc / circle.*
- *drawing two tangents, at a given inclination to each other, to a given circle.*
- *drawing a tangent to a circle, parallel to a given line.*
- *drawing a common exterior tangent to two circles of equal diameter.*
- *drawing a common exterior tangent to two circles of unequal diameter, when the circles touch / do not touch / cut one another.*

- *drawing a common interior tangent to two circles of equal / unequal diameter when the circles touch/do not touch one anoth*er.

6. Basic facility in Orthographic Projections

(a) Projection of points.

(b) Projection of lines (in 1st quadrant/ 3rd quadrant / contained by reference plane)

(i) line parallel to both the reference planes.

(ii) line parallel to one of the reference planes and perpendicular to the other plane.

(iii) line inclined to one of the reference planes and parallel to the other plane.

(iv) line inclined to both the reference planes.

(v) To find the true length of the line from the given projections.

(c) Projections of Surfaces/ Areas: such as regular polygons and circular lamina (1st angle and 3rd angle).

(i) surface perpendicular to both the reference planes.

(ii) surface perpendicular to one of the reference planes and parallel to the other.

(iii) Surface inclined to one of the surface planes and perpendicular to the other.

(iv) Conversion of simple pictorial views into orthographic views (1st angle / 3rd angle method) ELEVATION (F.V) PLAN (T.V.) END VIEW: LHS/RHS.

*Its definition. The complete explanation with demonstration of viewing objects, placed within the First and Third quadrant (the planes of projections), and obtaining the different views, i.e. the front elevation, visible end elevations and plan, and drawing them, accordingly, using the, First angle or the Third angle, method of projection. Hidden end elevation to be excluded. Layout of drawing sheet, i.e. the Orthographic views (First / Third angle method), inserting the required projection lines, center lines, leader lines, dimension lines, dimensioning from the Pictorial (Isometric / Oblique view) of the objec*t.

7. Isometric drawing

Copying the given isometric figure (simple and basic).

Their definition and their uses, the correct method of drawing them, along with the correct use of the appropriate, basic, drawing instruments.

The difference between the Isometric projection and the Isometric view.

- *drawing the Isometric view / projection, of straight lined objects, showing isometric planes.*
- *drawing the isometric view of cylindrically shaped objects, e.g. round bars / pipes / washers.*

8. Free hand sketching

Domestic items, appliances and tools, such as cup with a saucer, an electric bulb, a fountain pen with the cap removed, a tooth brush, a hammer (ball / claw pein), a woodsaw, a hacksaw, a screwdriver, a spanner, pliers, chisel, tri-square, calipers (internal and external) a pair of scissors, a pair of compasses, divider, knife, water tap etc.

Draw free hand sketches of these tools keeping the proportion of various parts.

PART II – INTERNAL ASSESSMENT

Minimum fifteen drawing assignments to be done during the year as assigned by the teacher.