

TECHNICAL DRAWING APPLICATIONS (65)

CLASS IX

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

The paper will be divided into two sections, Section I and Section II.

Section I (40 marks) shall consist of compulsory short answer questions chosen from the entire syllabus.

Section II (60 marks) shall contain questions which require longer answers. There will be a choice of questions.

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 lines.

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.*

- *Dividing a straight line into any required number of given parts.*

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:

- *all three sides.*
- *the base and the base angles.*
- *the perimeter and the proportion of the sides.*

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.*

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.*

Polygons: *Definition of a polygon (regular) 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 length of a side is 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 another.*

6. Basic facility in Orthographic Projections

- Projection of points.
- Projection of lines (in 1st quadrant/ 3rd quadrant / contained by reference plane)
 - line parallel to both the reference planes.
 - line parallel to one of the reference planes and perpendicular to the other plane.
 - line inclined to one of the reference planes and parallel to the other plane.
- Projections of Surfaces/ Areas: such as regular polygons and circular lamina (1st angle and 3rd angle).
 - surface perpendicular to one of the reference planes and parallel to the other.
 - Surface inclined to one of the surface planes and perpendicular to the other.
 - 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 object.

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.

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

PART II – INTERNAL ASSESSMENT

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