

ENGINEERING GRAPHICS (Code No. 046)

CLASS XI-XII

The subject of 'Engineering Graphics' has become an indispensable tool for Engineers, Technocrats, Architects, Draftsmen, Surveyors, Designers and many other professionals in the recent times. It is used to convey the ideas and information necessary for the construction or analysis of machines, structures and system, graphically. It is expected that the knowledge gained through the study of different topics and the Skills acquired through the prescribed practical work will make the learners to meet the challenges of academic, professional courses and daily life situations after studying the subject at Senior Secondary Stage.

Objectives:

The study of the subject of Engineering Graphics at Senior School Level aims at helping the learner to:

- develop clear concept and perception of different objects.
- develop a clear understanding of plane geometry, solid geometry and machine drawing so as to apply the same in relevant practical fields such as technology and industry.
- develop the skill of expressing two-dimensional and three-dimensional objects into professional language and vice versa.
- acquire speed and accuracy in use of drawing instruments.
- acquire the ability to readily draw neat sketches, often needed in "On-job situations".
- use technology (CAD) in developing isometric and orthographic projections of simple objects.

COURSE STRUCTURE
CLASS XI (2019-20)

One Paper (Theory) : 3 Hours

70 Marks

One paper (Practical) : 3 Hours

30 Marks

S.No.	Unit	Marks	Periods
I	PLANE GEOMETRY 1. Lines, angles and rectilinear figures 2. Circles and tangents 3. Special Curves: ellipse, parabola, involute, cycloid, helix and sine curve	16	38
II	SOLID-GEOMETRY 4. Orthographic-projections of points and line 5. Orthographic projection of regular plane figures. 6. Orthographic projections of right regular solids. 7. Section of solid-figures	27	86
III	MACHINE DRAWING 8. Orthographic projections of simple machine-blocks 9. Isometric-projection of laminae (plane figures) 10. Development of surfaces	27	50
	Practical	30	66
	Total Marks	100	240

THEORY**I. PLANE GEOMETRY****38 Periods**

Printing English alphabets (capital and small) and numerals in standard proportions. Unidirectional/aligned system of dimensioning as per SP: 46-2003 (Revised)

Unit 1: Construction of lines, angles and their divisions. Simple questions based on triangles, square, rhombus, trapeziums, regular polygons-pentagon, hexagon and octagon.

08 Periods

Unit 2: Construction of circles, external and internal tangents of circles, inscribing and circumscribing of circles in equilateral triangle, square, rhombus, regular polygons-pentagon, hexagon and octagon. 10 Periods

Unit 3: Construction of Engineering curves:

(a) Ellipse by concentric circles, intersecting arcs and intersecting lines.

(b) Parabola by intersecting lines and intersecting arcs.

(c) Involute of a circle, cycloid, helix and sine curve. 20 Periods

II. SOLID GEOMETRY

86 Periods

Unit 4: Methods of orthographic projections and dimensioning strictly as per SP: 46-2003 revised conventions. Projection of points and lines. 20 Periods

Unit 5: Orthographic projections of Regular Plane figures - triangle, square, pentagon, hexagon, circle and semi-circle. 12 Periods

Unit 6: Orthographic projections of right regular solids such as cubes, prisms and pyramid (square, triangular, pentagonal and hexagonal), cones, cylinders, spheres, hemi-spheres and frustum of pyramids and cone when they are kept with their axis (a) perpendicular, to HP/VP (b) parallel to one plane and inclined to the other (c) parallel to HP and VP both. 14 Periods

Unit 7: Section of right regular solids such as cubes, prisms and pyramids (square, triangular, pentagonal, and hexagonal), cones, cylinders and spheres, kept with their axis perpendicular to HP/VP, made by the
(a) Horizontal cutting plane (b) Vertical cutting plane (c) Inclined cutting plane. 40 Periods

III. MACHINE DRAWING

50 Periods

Unit 8: Orthographic projections of simple machine blocks. 20 Periods

Unit 9: Construction of isometric scale showing main divisions of 10 mm and smaller divisions of 1 mm each. Isometric projection (drawn to isometric scale) of figures such as triangles, squares, pentagons, hexagons, circles and semi-circles with their surface parallel to HP or VP and its one side or diagonal or diameter should be either parallel or perpendicular to HP/VP.

20 Periods

Unit 10: Development of the surfaces of following solids:

10 Periods

- a) Cube, cuboid, prisms-triangular, square, pentagonal and hexagonal.
- b) Pyramids (triangular, square, pentagonal and hexagonal).
- c) Right circular cylinder and cone.

PRACTICALS

66 Periods

1. Developing "Prisms" and "Pyramids" with the help of card board (thick paper).
2. Developing different types of packaging boxes (cartons).
3. Making different types of graphic designs/ murals for interior/ exterior decorations in colour using the knowledge of geometrical figures with the use of any Computer Software such as Collab-CAD and/or any equivalent pertinent software.
4. Drawing ellipse by Trammel and Thread method on the ground / drawing sheet / plywood / cardboard, etc.
5. Preparing top-view (plan) of a class room, Home: Drawing room / Bedroom / Study room / Kitchen, Engineering Graphics room drawing different objects therein.
6. Drawing through activities: Involute, cycloid, helix and sine curves listing their uses in daily life.
7. Preparing the following sections of solids (prisms, pyramids, spheres, etc.) with clay, soap, thermocol, plasticine, wax or any other material easily and economically available. When the cutting plane is: parallel to the base, perpendicular to the base and inclined to the base. Also creating different objects with combination of above solids.

ACTIVITY

Industrial Visits (Two) to any industry/ manufacturing plant to acquaint the students with the present - day methods & technology for better conceptual understanding.