ENGINEERING GRAPHICS (Code No. 046)
CLASS XI (2021-22)

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 (2021-22)

TERM – 1

S.No.	Unit	Marks	Periods
I	**PLANE GEOMETRY** 1. Lines, angles and rectilinear figures 2. Circles, inscribing and circumscribing of circles	10	15
II	**SOLID GEOMETRY** 4. Orthographic projection of points and lines 5. Orthographic projection of regular plane figures 6. Orthographic projection of right regular solids	25	45
	Practicals	15	20
	Total Marks	**50**	**80**

THEORY

I. PLANE GEOMETRY **15 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, regular polygons-pentagon, and hexagon. 8 Periods

Unit 2: Construction of circles, inscribing and circumscribing of circles in equilateral triangle, square, rhombus, regular polygons-pentagon and hexagon. 7 Periods

II. **SOLID GEOMETRY** **45 Periods**

Unit 4: Orthographic projection: dimensioning and conventions strictly as per SP 46:2003 (Revised). Orthographic projection of points and lines. 10 Periods

Unit 5: Orthographic projection of regular plane figures - triangle, square, pentagon, hexagon, circle and semi-circle. 10 Periods

Unit 6: Orthographic projection of right regular solids such as cubes; prisms and pyramids (square, triangular, pentagonal and hexagonal); cones; cylinders; spheres; hemi-spheres; frustum of pyramids and cone; when they are kept with their axis (a) perpendicular to HP/VP (c) parallel to HP and VP both. 25 Periods

PRACTICALS **20 Periods**

5 practicals (minimum one from each point) with drawing/sketching of the views.

1. 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.

2. Drawing the following engineering curve through activities - ellipse (by trammel & thread method) on the ground/ drawing sheet/ plywood/ cardboard etc.
3. Developing the following solids with the help of cardboard/ thick paper.
    a) cube, cuboid

Note: The scheme of evaluation of practicals is as follows:

(a)	One practical with Drawing/ Sketch	10 Marks
(b)	Sessional Work	3 Marks
(c)	Viva-voce	2 Marks
	Total	**15 Marks**

ACTIVITY

Industrial Visits (one) to any industry/ manufacturing plant to acquaint the students with the present - day methods & technology for better conceptual understanding can be done by virtual tour of the factory/plant due to present situation. The following links are given as an example for same:

Jindal Industrial visit

Manufacturing process of glass bottle

Power Plant/ Virtually Reality Tour (360^0)

Machine Tools and Manufacturing Systems

COURSE STRUCTURE

CLASS XI (2021-22)

TERM – 2

S.No.	Unit	Marks	Periods
III	**SOLID GEOMETRY** 7. Orthographic projection of section of solids	05	10
IV	**MACHINE DRAWING** 8. Orthographic projections of simple machine blocks	18	25
V	**ISOMETRIC PROJECTION** 9. Isometric projection of laminae (plane figures)	12	25
	Practicals	15	20
	Total Marks	**50**	**80**

III. SOLID GEOMETRY **10 Periods**

Unit 7: Section of right regular solids such as cubes; prisms and pyramids (square, triangular, pentagonal, and hexagonal); cones; cylinders; spheres, kept with their axis perpendicular to HP/VP, made by a vertical cutting plane.

IV. **MACHINE DRAWING** **25 Periods**

Unit 8: Orthographic projection of simple machine blocks.

V. **ISOMETRIC PROJECTION** **25 Periods**

Unit 9: Construction of isometric scale showing main divisions of 10mm and smaller divisions of 1mm, also showing the leading angles. Isometric projection (drawn to isometric scale) of regular plane figures - triangle, square, pentagon, hexagon, circle and semi-circle with their surface parallel to HP or VP (keeping one side either parallel or perpendicular to HP/VP).

PRACTICALS **20 Periods**

5 practicals (minimum two from each point) with drawing/sketching of the views.

1. Developing the following solids with the help of cardboard/ thick paper.
    a) prisms & pyramids (triangular, square, pentagonal and hexagonal)
    b) right circular cylinder and cone
2. Preparing the section of solids (prisms, pyramids, sphere, 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 or inclined to the base.

Note: The scheme of evaluation of practicals is as follows:

(a)	One practical with Drawing/ Sketch	10 Marks
(b)	Sessional Work	3 Marks
(c)	Viva-voce	2 Marks
	Total	**15 Marks**

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