ENGINEERING GRAPHICS (XI-XII) (Code No. 046)

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. Understanding of its fundamental principles and wider applications of the same in the above fields and many other daily life situations form the basis for the syllabus 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 form, proportion and application.
- develop the skill of expressing three-dimensional and two-dimensional objects into professional language and vice versa.
- acquire the ability to readily draw neat sketches, often needed in "On-job situations".
- develop a clear understanding of plane and solid Geometry and machine drawing so as to apply the same in relevant practical fields such as technology and industry.
- acquire speed and accuracy in use of drawing instruments.
- use technology (CAD) in developing isometric and orthographic projections of simple objects.

COURSE STRUCTURE
CLASS XI (2018-19)
(Theory)

One Paper: 3 Hours — 70 Marks

S. No.	Unit	Marks	Periods
Unit -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**
Unit - 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**
Unit -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) 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, circumscribing 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, lines. **20 Periods**

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

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 solids under the same conditions mentioned above made by the horizontal, vertical and inclined planes. **40 Periods**

III. MACHINE DRAWING — 50 Periods

Unit 6: Orthographic projections of simple machine blocks. **20 Periods**

Unit 7: 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 8: Development of the surfaces of following solids: **10 Periods**

1. Cube, cuboid, prisms-triangular, square, pentagonal and hexagonal.
2. Pyramids (triangular, square, pentagonal and hexagonal).
3. Right circular cylinder and cone.

PRACTICALS

One paper (Practical): 3 Hours **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: Involutes, 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.

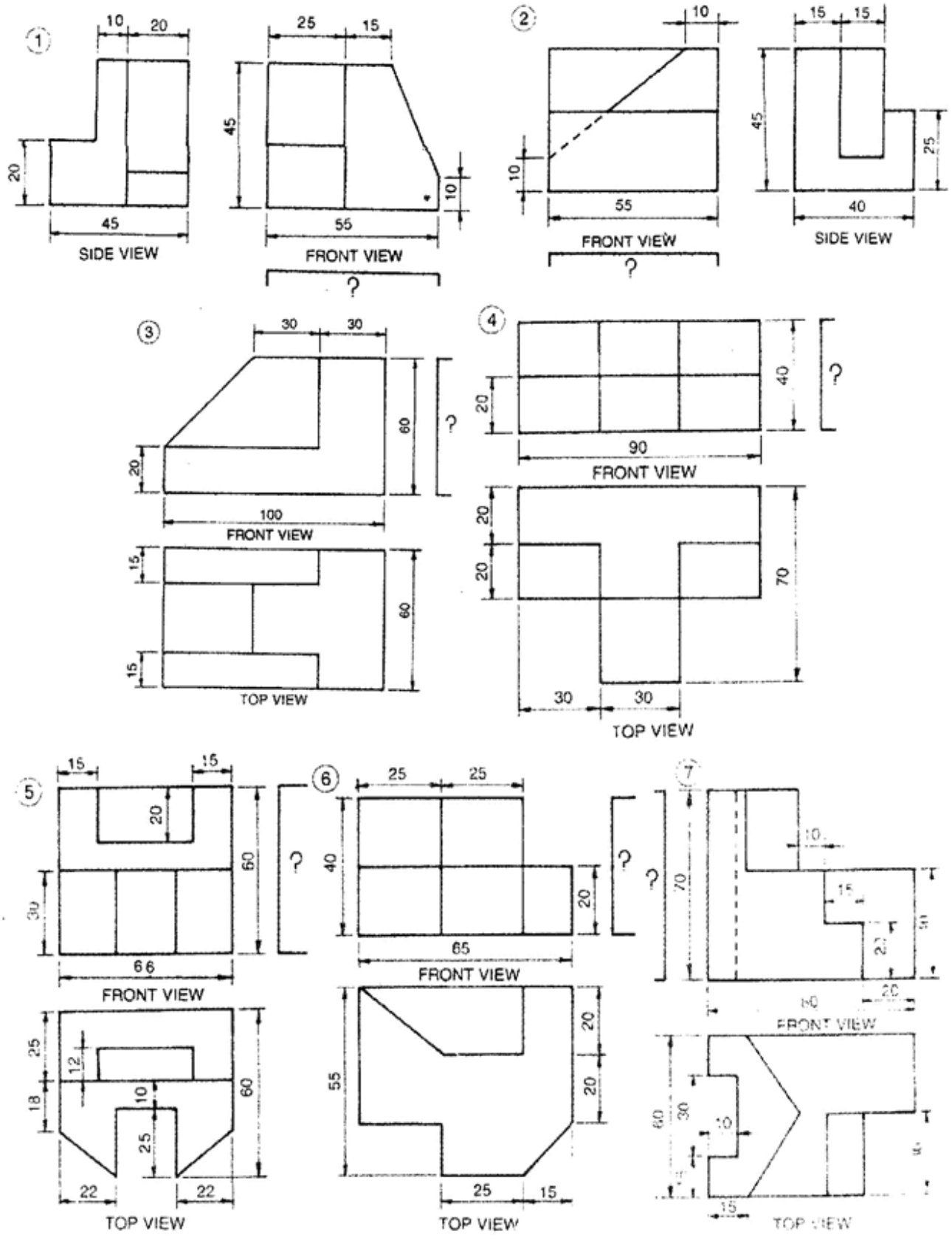
Note:

I 20 activities (minimum two each from aforementioned seven points) are to be assessed.

II. In all the practicals, drawing/sketching of the views should be incorporated and evaluated accordingly.

III. The scheme of evaluation is as follows:

(a)	Practicals (2)	15 Marks
(b)	Drawing/ Sketch	05 Marks
(c)	Viva-voce	05 Marks
(d)	Sessional Work	05 Marks
	Total	**30 Marks**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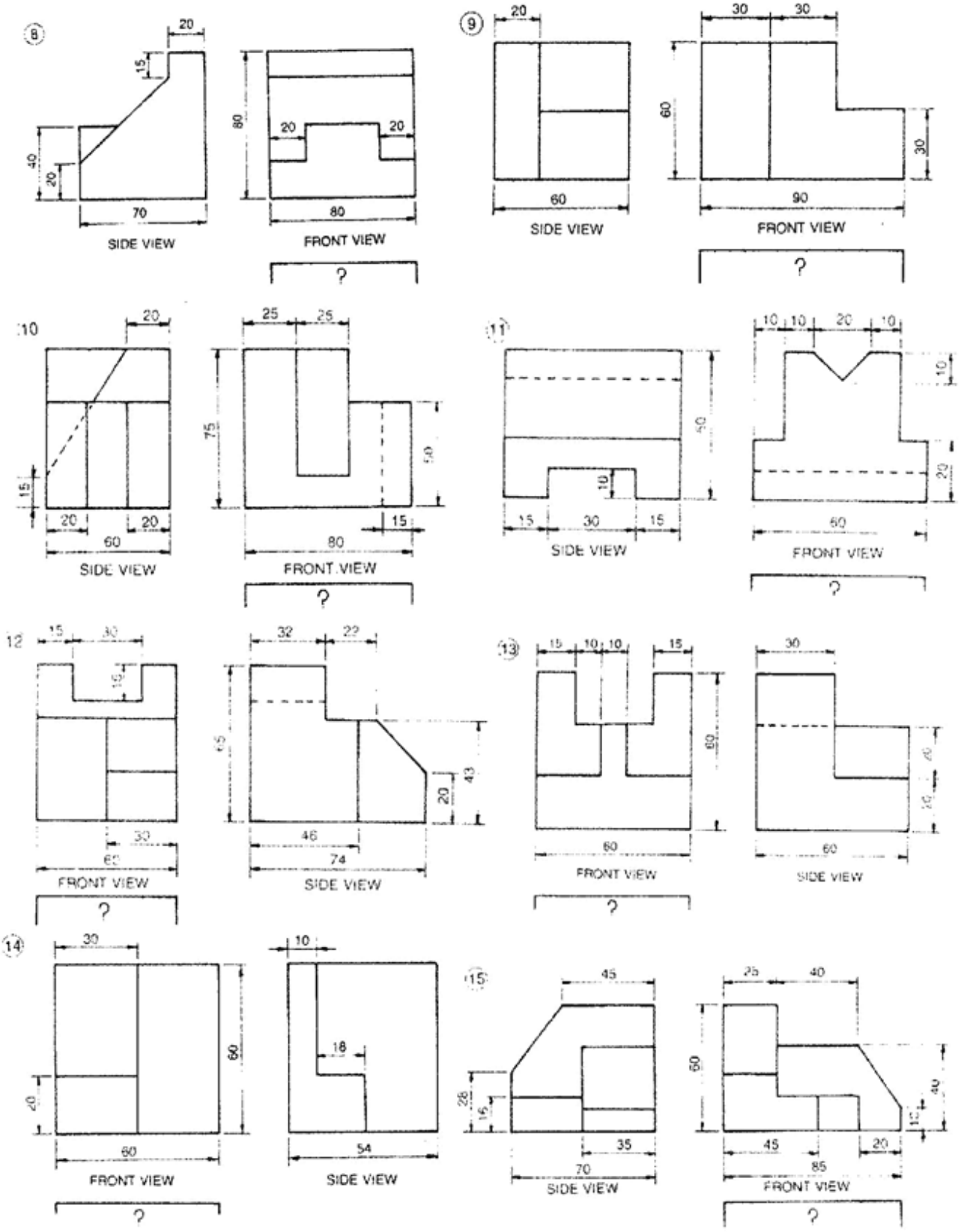
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