

**ENGINEERING DRAWING  
BEG146ME**

**Year: I**

**semester: I**

Teaching Schedule Hours/week			Examination Scheme				Internal Assessment		Total Marks	Re ma
			Final				Theory Marks	Practical Marks		
L	P	T	Duration	marks	duration	marks				
1	3	0	-	-	3	40	10	50	100	

**Course objectives:** To develop the basic understanding and the skills of Engineering graphic technology to the students.

**1.0 Instrumental Drawing: Practices & Techniques (2 hrs)**

- 1.1 Equipment and Materials; Description of drawing instruments, auxiliary equipment and drawing materials
- 1.2 Techniques of Instrumental Drawing, Pencil sharpening, securing paper, proper use of T-squares, triangles, scales, dividers, and compasses, erasing shields, French curves, inking pens

**2.0 Freehand Technical lettering (2 hrs)**

- 2.1 Lettering strokes, letter proportions, use of pencils and pens, uniformity and appearance of letters, freehand techniques, inclined and vertical letters and numerals, upper and lower Cases, Standard English lettering forms.
- 2.2 Sketching and Decision; Value of Sketching as part of design.
- 2.3 Techniques of Sketching; Pencil hardness, squired paper, line densities Techniques for horizontal, Vertical and Circular lines.
- 2.4 Multiview Sketches; Choice of views, adding detail, dimensioning, title, notes proportioning and comparative sizing, Sketching Pictorial views.

**3.0 Applied Geometry (5 hrs)**

- 3.1 Plane Geometrical construction; Bisecting and trisecting lines and angles, proportional division of lines. Construction of angles, triangles, squares, polygons, ellipses, Parabolas, hyperbolas, involutes, spirals, cycloid, helices.
- 3.2 Solid Geometrical Construction: Classification and pictorial representation of solid regular objects such as;
  - Prisms: square, cubical, triangular and oblique
  - Cylinders: right and oblique
  - Cones : right and oblique
  - Pyramid: square, triangular, oblique, truncated

**4.0 Theory of Projection (4 hrs)**

- 4.1 Common types of projections – Pictorial (Perspective, Isometric, Oblique) and Orthographic Projection

4.2 System of orthographic projection 1<sup>st</sup> angle projection and 3<sup>rd</sup> angle projection.

**5.0 Multiview (Orthographic Projection Drawings) (6 hrs)**

- 5.1 Principal Views; Methods for obtaining orthographic views, Projection of lines, angles and plane surfaces; analysis in three views, Projection of curved lines and surfaces. Object orientation and selection of views for best representation, Full and hidden lines.
- 5.2 Orthographic Drawings; Making an orthographic drawing, Visualising objects from the given views, Interpretation of adjacent areas, True-length lines, Representation of holes- Conventional practices

**6.0 Pictorial Projections (6 Hrs)**

- 6.1 Introduction; Characteristics, advantages and disadvantages
- 6.2 Axonometric Projection; Isometric drawing, Dimetric and trimetric drawing
- 6.3 Oblique Projection
- 6.4 Perspective Projection

**7.0 Sectional Views (3 hrs)**

- 7.1 Full Section
- 7.2 Half Section
- 7.3 Broken Section
- 7.4 Specifying Cutting Planes for Section
- 7.5 Conventions for hidden lines, holes, ribs, spokes

**8.0 Design and Production Drawings - Machine Drawing (Simple Types Problems) (4 hrs)**

- 8.1 Introduction; Production of complete design and assembly Drawings
- 8.2 Fundamental Techniques; Size and location dimensioning; Placement of lines and general procedures standard dimensioning Practice (SI system)
- 8.3 Limit Dimensioning; Nominal and basic size, allowance, Tolerance, limits of size, clearance fit, interference fit, Basic hole system and shaft systems
- 8.4 Threads and Standard Machine Assembly Elements; Screw threads; ISO standards, Representation and dimensioning Fasteners; Types and drawing representation Keys, Collars, Joints, springs, bearings

**9.0 Assembly & Disassembly drawings of machine components - machine drawing (4 hrs)**

- 9.1 Assembly Drawings; Drawing layout, bill of materials (BOM), drawing numbers
- 9.2 Disassembly Drawings, Drawing layout, BOM, product structure tree (PST)

**10.0 Welding and Riveting (3 hrs)**

- 10.1 Representing Joints and Welds for Gas, Arc and Resistance Welding; Types: Spot, Seam, Flash, Fillet, Back-back, surface and upset welds.
- 10.2 Drawing Symbols for Welds
- 10.3 Rivets and Riveted Joints; Types and drawing representation

**11.0 Other Engineering Drawings (4 hrs)**

- 11.1 Electrical and Electronic Diagrams Standards Types of Diagrams; Line diagram, schematics and pictorials Symbols for Components, Printed Circuits, Integrated circuits
- 11.2 Duplicating and Reproduction of Engineering Drawings Blue prints, Brown Prints and Blue line prints Duplicate Tracings, Photocopies.
- 11.3 Piping, Tubing and Types of Joints
- 11.4 Specification of Threads, Fittings and Valves

**12.0 Developments, Intersections and Interpenetration (4 hrs)**

Development General Concepts and practical considerations Developments of a right prism, cylinder, pyramid, and cone.

**13.0 Computer Software used in Drawings (with lab) (13 hrs)**

- 13.1 An introduction to AutoCAD (Computer Aided Design)
- 13.2 An introduction about drawing tools i.e. ortho, osnap, mirror, trim, erase etc.
- 13.3 Introduction about line and angle drawing, dimensioning and definition of point and location.
- 13.4 Drawing of different geometrical shape i.e. triangle, circle, semicircle square etc in two dimension.
- 13.5 Drawing of different view of a solid object i.e. top, front and side view in two dimensions. (The drawing done in previous drawing class is recommended)
- 13.6 Electrical and Electronics Diagrams

**LABORATORY**

**2 hr / week, 10 weeks**

- 1. Freehand Technical Lettering and Use of Drawing Instruments
- 2. Freehand Technical Lettering and Use of Drawing Instruments (cont)
- 3. Dimensioning
- 4. Geometrical and Projection Drawing
- 5. Descriptive Geometry
- 6. Descriptive geometry (contd.)
- 7. Projection and Multiview Drawing
- 8. Projection and Multiview Drawing (contd.)
- 9. Isometric and Oblique Drawings
- 10. Perspective Drawing
- 11. Machine Drawings; Sizing and dimensioning
- 12. Threads and Fasteners, Welding, Joining and Piping
- 13. Electrical and Electronics Diagram
- 14. Sectional views

**CAD LABORATORY**

**20 hrs**

Note:

- 1. The time allotted for the theory of this subject is less than the previous syllabus, it is done to concise the syllabus to meet the requirement of the electronics and computer engineering student.
- 2. Some components is eliminated or introductory level because that component was not very important for electronic and computer engg. student.

3. The CAD basic tools introduction and drawing is included to innovate the knowledge of student to full fill the needs and trends in contemporary engineering environment.
4. Visual adds during the real shape and the projection and it also reduce the time for theory class.

**References Books:**

1. "Fundamentals of Engineering Drawing ", W.J. .Luzadder, prentice Hall, 8<sup>th</sup> Edition,1981
2. "Engineering Drawing and Graphic Technology" T.E.French, C.J.Vierck and R.J. Foster, Mc Graw Hill, 1981
3. "Technical Drawing", F..E.Giesecke, A. Mitchell, H.C.Spencer and J.T. Dygdone, Macmillan,8<sup>th</sup> Edition,1986
4. Machine Drawing
5. "Engineering Drawing", S. Chand , R.K. Dhawan.
6. "Engineering Drawing", P.S. Gill Katsons publication, Delhi, India