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21ME104 ENGINEERING GRAPHICS LABORATORY

Hours Per Week :

L	T	P	C
-	-	2	1

Total Hours :

L	T	P
-	-	30

COURSE DESCRIPTION AND OBJECTIVES:

Engineering graphics is the language of engineers and is the most effective way of communicating and sharing technical ideas in the form of pictures/drawings. The objective of this course is to familiarize the students with the conventional concepts of engineering drawing and computer aided drawing.

COURSE OUTCOMES:

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes
1	Communicate the technical ideas in the form of drawings.
2	Apply the drawing skills in representing various geometrical features.
3	Develop orthographic projections and isometric views of various objects.
4	Estimate the lateral surface area of regular geometrical solids.
5	Sketch simple objects and their pictorial views using AutoCAD.

SKILLS:

- ✓ *Convert isometric views of objects into orthographic views and vice versa.*
- ✓ *Visualize the shape of 3D components.*
- ✓ *Create pictorial views by using AutoCAD.*
- ✓ *Understand projections by visualization.*

LABORATORY EXPERIMENTS

LIST OF EXPERIMENTS — TOTAL HOURS : 30

TITLE: LINES, LETTERING AND DIMENSIONING — Work Sheet No–0

1. Use of instruments (practice the diagrams Fig 1-38, a, b, c, d, e and 1-40a) from the N. D. Bhatt Textbook.
2. Draw the table representing various types of lines used in general engineering drawing are shown in Fig 3 from the N.D. Bhatt Textbook.
3. Draw single-stroke vertical capital letters and numbers are shown in Fig. 3-4 from the N.D. Bhatt Textbook.
4. Draw the diagram (Fig 3-11b) representing dimensioning terms and notations

TITLE: GEOMETRIC CONSTRUCTIONS — Work Sheet No–1

1. Draw a bisector to a straight-line AB of 70 mm length
2. Divide a straight-line AB of 90 mm length into 7 equal parts.
3. Bisect an angle of 50^0
4. Construct an equilateral triangle of side 40 mm long (with the aid of set-square, compass)
5. Draw a regular hexagon / pentagon of side 30 mm long by setting angles
6. Draw a regular hexagon / pentagon of side 30 mm long followed by ARC method
7. Draw a regular hexagon / pentagon of side 30 mm long followed by general method.
8. Inscribe a hexagon / pentagon in a circle of 50 mm diameter.
9. Inscribe a regular octagon in a square of 40 mm side.

TITLE: CONICAL CURVES — Work Sheet No-2

1. Trace a conic section, when the distance of the focus from the directrix is 35 mm. eccentricity equal to 2/3, name the curve draw a normal and tangent to the curve from a point on the curve at 20 mm from the focus.
2. Trace a conic section, when the distance of focus from directrix is 35 mm and eccentricity equal to 1. Name the curve draw a normal and tangent to the curve from a point on it at 40mm from focus.
3. Trace a conic section, when the distance of the focus from the directrix is 35 mm. eccentricity equal to 3/2, name the curve draw a normal and tangent to the curve from a point on the curve at 40 mm from the focus.
4. Construct an ellipse whose major and minor axis is 100 mm and 80 mm respectively by oblong method.

TITLE: PROJECTION OF POINTS — Work Sheet No-3

1. Draw the projections of the following points on the same ground line, keeping the projectors 25 mm apart.

   A In the H.P. and 20 mm behind the V.P.

   B 40 mm above the H.P. and 25 mm in front of the V.P.

   C In the V.P. and 40 mm above the H.P.

   D 25 mm below the H.P. and 25 mm behind the V.P.

   E 15 mm above the H.P. and 50 mm behind the V.P.

   F 40 mm below the H.P. and 25 mm in front of the V.P.

   G In both the H.P. and V.P.

2. A point A is 50 mm from both the reference planes. Draw its projections in all possible positions.
3. A point P is 15 mm above the H.P. and 20 mm in front of the V.P. Another point Q is 25 mm behind the V.P. and 40 mm below the H.P. draw projections of P and Q keeping the distance between their projectors equal to 90 mm. Draw straight lines joining (i) their top views and (ii) their front views.
4. Two points A and B are in the H.P. The point A is 30 mm in front of the V.P., while B is behind the V.P. The distance between their projectors is 75 mm and the line joining their top views makes an angle of 45^0 with xy. Find the distance of the point B from the V.P.

TITLE: PROJECTION OF LINES -1 **Work Sheet No-4**

1. A line AB 75 mm long is parallel to both the HP and VP and 20 mm above HP and 30 mm in front of VP. Draw the projection.
2. A line CD 75 mm long lies on HP and 45 mm in front of VP. Draw the projections.
3. A line PQ 75 mm long is parallel to VP and inclined at an angle of 30^0 to HP. One end P is 15 mm above HP and 20 mm in front of VP. Draw the projections.
4. Draw the projections of a line EF 70 mm long is parallel to HP and inclined 30^0 to the VP, end E is 20 mm above HP and 15 mm in front of VP.
5. A line AB 70 mm long is in VP and inclined at an angle of 35^0 to HP. The end A is 10 mm above HP. draw the projections.
6. A line CD of 75 mm long is perpendicular to VP and parallel to HP. Its end C is 15 mm in front of VP and the line is 10 mm above HP. Draw the projections.

TITLE: PROJECTION OF LINES-2 **Work Sheet No-5**

1. A line AB, 75 mm long, is inclined at 45^0 to the HP, and 30^0 to the VP. It's one end 25 mm above HP, and 20 mm in front the VP. Draw the projections of the line.
2. A line AB, 65 mm long, has its end A 20 mm above the H.P. and 25 mm in front of the V.P. The end B is 40 mm above the H.P. and 65 mm in front of the V.P. Draw the projections of AB and shows its inclinations with the H.P. and the V.P.
3. The top view of a 75 mm long line AB measures 65 mm, while the length of its front view is 50 mm. It's one end A is in the H.P. and 12 mm in front of the V.P. Draw the projections of AB and determines its inclinations with the H.P and the V.P.
4. A line AB, 90 mm long, is inclined at 45^0 to the H.P. and its top view makes an angle of 60^0 with the V.P. The end A is in the H.P and 12 mm in front of the V.P. Draw its front view and finds its true inclination with V.P.

TITLE: PROJECTION OF PLANES **Work Sheet No-6**

1. Draw the projections of a regular hexagon of 25mm side, having one of its sides in the H.P, and its surface making an angle of 45^0 with the H.P.
2. Draw the projections of a regular pentagon of 25mm side, having one of its sides in the H.P, surface inclined at 30^0 to the H.P.
3. A square ABCD of 40mm side has its corner A in the H.P. its diagonal AC inclined at 30^0 to the H.P and parallel to the V.P. draw its projections.
4. Draw the projections of a circle of 50mm diameter resting in the H.P. on a point A on the circumference, plane inclined at 45^0 to the H.P.
5. A square ABCD of 40mm side resting on HP on one corner, all sides are equally inclined to HP, the plane is parallel to VP and 25 mm in front of it. Draw the projection.
6. A thin 30^0-60^0 set square has its longest edge 65 mm is in V.P. and 25 mm above the HP & also its surface makes an angle of 45^0 with the V.P. Draw its projections.

TITLE: PROJECTION OF SOLIDS (prisms and pyramids) **Work Sheet No- 7**

1. A square prism, base 40 mm side and height 65 mm has its axis inclined at 45^0 to the HP and has an edge of its base on the HP. Draw its projections.
2. A pentagonal prism, base 35 mm side and height of 60 mm is resting on one of the corners

of its base is on the HP. The longer edge containing that corner is inclined at 45^0 to the HP. Draw the projections of that solid.

3. Draw the projections of a hexagonal pyramid, base 30 mm side and axis 60 mm long, has an edge its base on the ground, its axis is inclined at 30^0 to the HP and parallel to VP.
4. A square pyramid, base 40 mm side and axis 65 mm long, lies on HP on its slant face, axis parallel to VP, draw the projections.

TITLE: PROJECTION OF SOLIDS (cylinder and cone) **Work Sheet No-8**

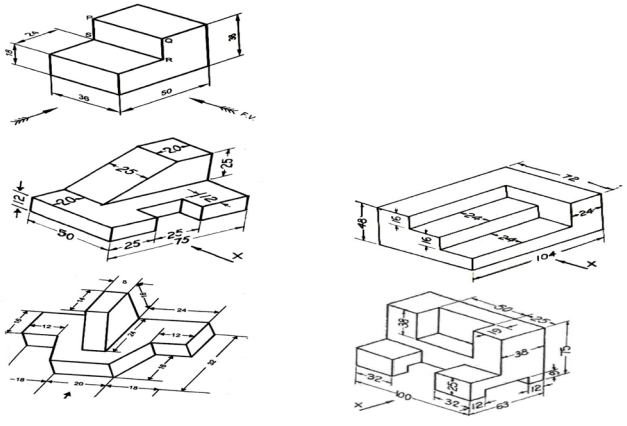
1. Draw the projections of a cylinder 50 mm diameter and 70 mm axis height lying on HP on a point on its circumference and axis inclined 45^0 HP.
2. Draw the projections of a cone; base 50 mm diameter and axis 65 mm long, axis inclined 30^0 HP draw the projections.
3. Draw the projections of a cone; base 50 mm diameter and axis 65 mm long, laying on the HP on one of its generators with axis parallel to the VP.

TITLE: DEVELOPMENT OF SURFACES **Work Sheet No-9**

1. Draw the complete development of a square prism of base 30 mm and axis 65 mm.
2. Draw the complete development of a hexagonal prism of base 30 mm and axis 65 mm.
3. Draw the complete development of a pentagonal pyramid of base 30 mm and axis 65 mm.
4. Draw the complete development of a cylinder of diameter 50 mm and axis 65 mm.
5. Draw the complete development of a cone of base 30 mm and axis 65 mm.

TITLE: ORTHOGRAPHIC VIEWS **Work Sheet No-10**

Conversion the following pictorial views into orthographic views



TITLE: ISOMETRIC VIEWS **Work Sheet No-11**

1. Draw the isometric view of a square prism of base 40 mm axis 65 mm
2. Draw the isometric view if a pentagonal pyramid base side 30 mm axis height 65 mm.
3. Draw the isometric view of hexagonal prism side 30 mm and axis height 65 mm.
4. Draw the isometric view of a cylinder base diameter 50 mm and axis height 65 mm.
5. Draw the isometric view of a cone base diameter 50 mm and axis height 65 mm.

TEXT BOOKS:

1. N D Bhatt, “Engineering Drawing”, 53rd edition, Charotar Publication, 2014.
2. Basant Agrawal and C.M.Agrawal “Engineering Drawing”, 2nd edition, Tata McGraw-Hill, 2014.

REFERENCE BOOKS:

1. J Hole, “Engineering Drawing”, 2nd edition, Tata McGraw-Hill, 2008.
2. K L Narayana, “Engineering Drawing”, 2nd edition, Scitech Publications, 2008.