CMR INSTITUTE OF TECHNOLOGY, BENGALURU
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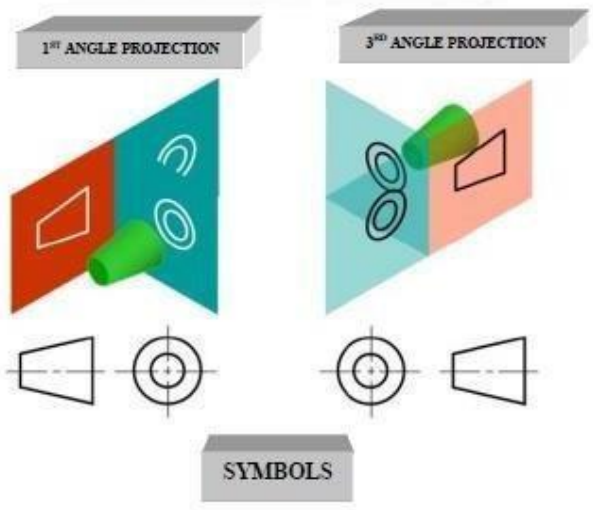
DEPARTMENT OF MECHANICAL ENGINEERING

COMPUTER AIDED ENGINEERING DRAWING

SUBJECT CODE: 1BCEDEC103/203
1BCEDS103/203

QUESTION BANK

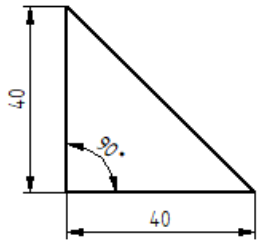


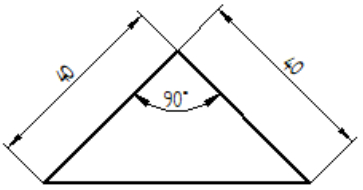
MODULE – 1

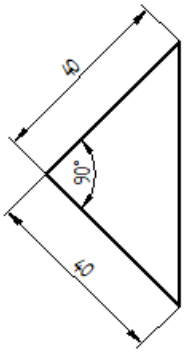
INTRODUCTION

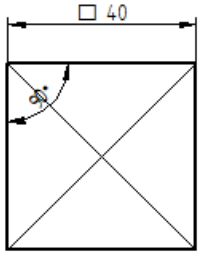
Introduction: for CIE only *Significance of Engineering drawing, BIS Conventions of Engineering Drawing, Free hand sketching of engineering drawing, Scales. Introduction to Computer Aided Drafting software, Co-ordinate system and reference planes HP, VP, RPP & LPP of 2D/3D environment. Selection of drawing sheet size and scale. Commands and creation of Lines, coordinate points, axes, polylines, square, rectangle, polygons, splines, circles, ellipse, text, move, copy, off-set, mirror, rotate, trim, extend, break, chamfer, fillet and curves.*

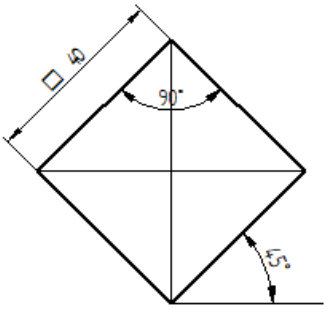
BASIC GEOMETRIC CONSTRUCTION

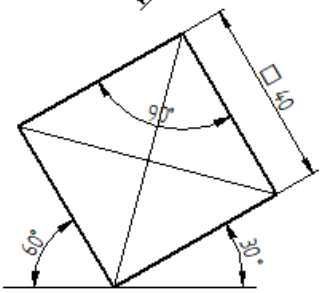


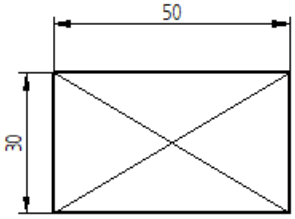


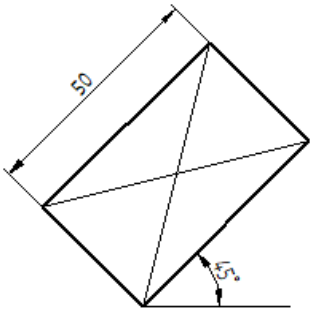


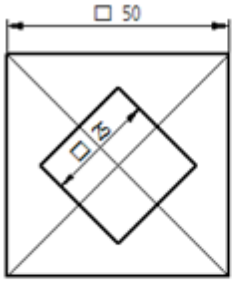








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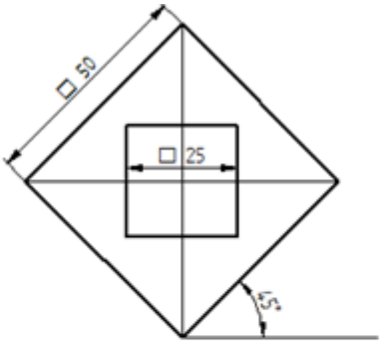
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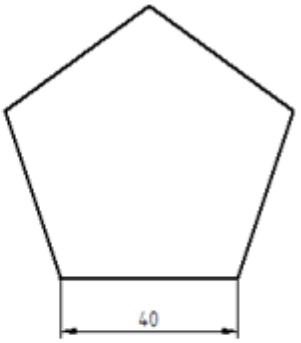
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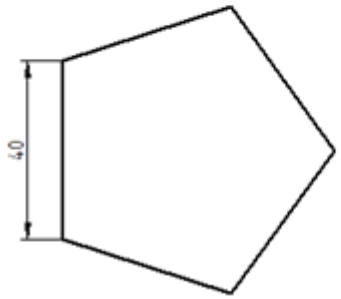
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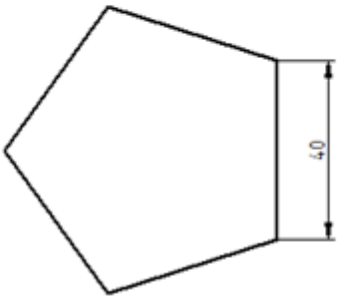
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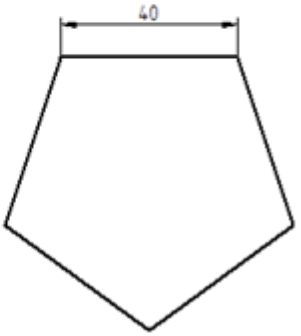
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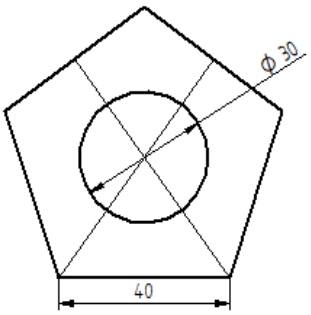
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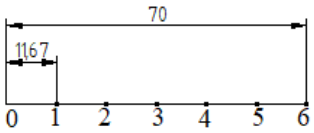
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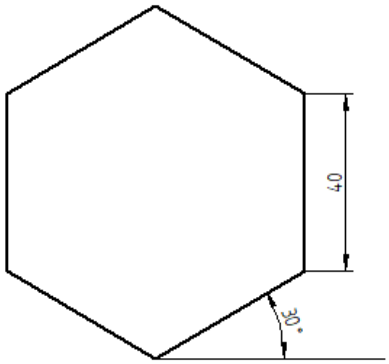
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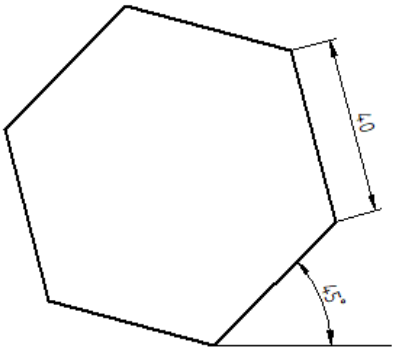
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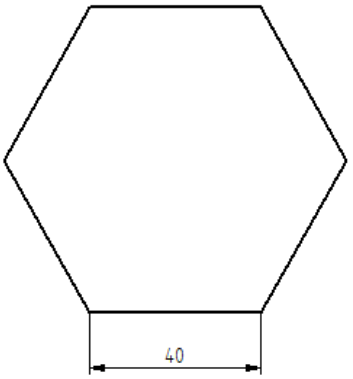
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ORTHOGRAPHIC PROJECTIONS OF POINTS, STRAIGHT LINES AND PLANES

PROJECTION OF POINTS (DRAWING NO. 2)

2.1.1/R49/D2 Draw the projections of the following points on the same XY line, keeping convenient distance between each projector. Also state the quadrants in which they lie. P - 25mm above HP & 35mm in front of VP. Q - 30mm above HP & 40mm behind VP. R - 40mm above HP & on VP. S - 35mm below HP & 30mm in front of VP.	D
2.1.2/R14/D2 A point P is on HP and 30mm in front of VP. Another point Q is on VP and 40mm above HP. The distance between their projectors parallel to XY line is 50mm. Find the distance between their front and top views of the points P and Q. **pq= 58.31mm** **p'q'= 64.03mm**	
2.1.3/R15/D2 A point P is 30mm in front of VP, 40mm above HP and 50mm from RPP. Draw its projections.	
2.1.4/R34/D2 A point A is 20mm above HP and in the first quadrant. Its shortest distance from the XY line is40mm. Draw the projections. Determine its distance from VP. **Distance of A from VP is 34.64mm**	D
2.1.5/R19/D2 A point is 40mm behind VP, 15mm above HP and 25mm in front /behind/from LPP. Draw its projections and name the side view.	

ASSIGNMENT-1 (DRAWING NO. 3)

2.1.4/R25/D3

Draw the projections of the following points on the same XY line, keeping convenient distance between each projector. Name the quadrants in which they lie.

M - 30mm below HP & 25mm behind VP
N - 35mm below HP & 30mm in front of VP P
– On HP & 30mm infront of VP
Q – On HP & 35mm behind VP.

2.1.5/R42/D3
A point is 30 mm in front of VP, 20mm above HP & 25mm infront/behind/ from LPP. Draw its projections and name the side view.

PROJECTION OF STRAIGHT LINES (DRAWING NO. 4)

Orthographic projections of lines (Placed in First quadrant only).

2.2.1/R4/D4 A line AB has its end A 20 mm above HP and 15 mm in front of VP. The other end B is 60 mm above HP & 45mm in front of VP. The distance between end projectors is 70 mm. Draw its projections. Determine the apparent lengths and true inclinations. **Ans: a'b'=80.62mm** **ab =76.16mm** **θ=28°** **Φ=20°**	D
2.2.2/R2/D4 A line AB 80mm long is inclined to HP at 30° and inclined to VP at 45°. The end A touches both HP & VP. Draw front and top views of line and determine their lengths. Also measure the perpendicular distance of end B from both HP and VP. **Distance of B from HP=40mm** **Distance of B from VP= 56.57mm**	D
2.2.3/R6/D4 A line PQ 85 mm long has its end P 10 mm above HP and 15 mm in front of VP. The top view and front view of line PQ are 75mm and 80mm respectively. Draw its projections. Also determine the true and apparent inclinations of the line. **Ans: θ=28°** **Φ=20°** **α=30°** **β=23°**	

2.2.4/R14/D4

The point B of a line AB is on the horizontal plane, the top view of the line makes an angle of 30° with XY line, being 80mm. The point A is on the vertical plane and 50mm above the horizontal plane. Draw the top and front views of the line and obtain the true length of the line. Also find the inclinations of the line with the two planes.

Ans: θ= 32°

Φ=25°

TL=94.34mm

2.2.5/R47/D4

A straight line PQ 80mm long appears to be a length of 50mm and inclined at 30° to XY line in its side view. Draw its projection when its end point P is 15mm above HP and 60mm in front of VP. Point Q is nearer to VP than P. Determine the true and apparent angles.

Ans: θ=18°

Φ=33°

α=22°

β=35°

ASSIGNMENT-2 (DRAWING NO. 5)

2.2.6/R41/D5

A line PQ measures 80mm in length. The point P is above HP and in front of VP by 10mm and 15mm respectively. The distance between the end projectors is 50mm. The line is inclined to HP by 30°. Draw the projections of the line and specify its true inclination with VP.

Ans: Φ=37°

α=39°

2.2.7/R34/D5

β=44°

One end of a line is 30mm in front of VP and 30mm above HP. The line is inclined at 40° to HP and its top view measuring 60mm, is inclined at 50° to XY. Draw the projections of the line and determine true length and inclination with VP.

Ans: Φ=36°

TL=78mm

2.2.8/R8/D5

The top view of a line 75 mm long measure 50 mm. The end P is 30 mm infront of VP and 15 mm above HP. The End Q is 15 mm infront of VP and above HP. Draw the Projections of the line and find its true inclinations with HP and VP.

Ans: θ=48°

Φ=12°

α=50°

β=17°

ORTHOGRAPHIC PROJECTIONS PLANES

Orthographic projections of planes viz triangle, square, rectangle, pentagon, hexagon, and circular laminae (Placed in First quadrant only using change of position method). Application on projections of Lines & Planes (For CIE only).

SP1 (DRAWING NO. 6)

2.3.1/R6/D6 A 30°-60° setsquare of 60mm longest side is so kept such that the longest side is in HP, making an angle of 30° with VP. The set square itself is inclined at 45° to HP. Draw the projections of the setsquare.	D
2.3.2/R11/D6 The top view of a square lamina of side 30mm is a rectangle of side 30mm x 20mm with the longer side of the rectangle being parallel to both HP and VP. Draw the top and front views of the square lamina. What is the inclination of the surface of the lamina with HP and VP? **Ans: θ=48°** **Φ=42°**	
2.3.3/R25/D6 A pentagonal lamina of sides 25mm is having a side both on HP and VP. The corner opposite to the side on which it rests is 15mm above HP. Draw the top and front views of the lamina. **Ans: θ=23°**	

SP2 (DRAWING NO. 7)

2.3.4/R9/D7 A square plate of 40mm sides rests on HP such that one of the diagonals is inclined at 30° to HP and 45° to VP. Draw its projections. **Ans: β=55°**	
2.3.5/R42/D7 A hexagonal lamina of sides 25mm rests on one of its corners on HP. The lamina makes 45° to HP and the diagonal passing through the corner on which it rests appears to be inclined at 30° to VP. Draw its projections.	
2.3.6/R48/D7 A circular lamina of 50mm diameter rests on HP such that one of its diameters is inclined at 30°to VP and 45° to HP. Draw its top and front views in this position. **Ans: β=45°**	D

SP3 (DRAWING NO. 8)

2.3.7/R44/D8 A hexagonal lamina of sides 25mm rests on one of its sides on VP. The side opposite to the side on which it rests is 30mm in front of VP & the side on which it rests makes 45° to HP. Draw the projections. Also determine the inclination of the lamina with the reference plane. **Ans: Φ=44°**	D
2.3.8/R17/D8 A mirror 30mm x 40mm is inclined to the wall such that its front view is a square of 30mm side. The longer sides of the mirror appear perpendicular to both HP and VP. Find the inclination of the mirror with the wall. **Ans: Φ=41°**	
2.3.9/R15/D8 A rectangular lamina of sides 20mm x 25mm has an edge in HP and adjoining edge in VP, is tilted such that the front view appears as a rectangle of 20mm x 15mm. The edge, which is in VP, is 30mm from the right profile plane. a) Draw the top, front and left profile view in this position. b) Find its inclinations with the corresponding principle planes. **Ans: Φ=53°**	

SP4 (DRAWING NO. 9)

2.3.10/R31/D9 A pentagonal lamina having edges 25mm is placed on one of its corners on VP such that the surface makes an angle 30° with VP and perpendicular bisector of the edge passing through the corner on which the lamina rests is inclined at 45° to HP. Draw the top and front views of the lamina. **Ans: α=55°**	D
2.3.11/R32/D9 A hexagonal lamina of 30mm sides rests on HP with one of its corner touching VP and surface inclined at 45° to it. One of its edges is inclined to HP at 30°. Draw the front and top views of the lamina in its final position.	
2.3.12/R49/D9 A circular lamina inclined to VP appears in the front view as an ellipse of major axis 30mm and minor axis 15mm. The major axis is parallel to both HP and VP. One end of the minor axis is in both the HP and VP. Draw the projections of the lamina and determine the inclination of the lamina with the VP. **Ans: Φ=60°**	

ASSIGNMENT-3 (DRAWING NO. 10)

2.3.13/R16/D10

The front view of a rectangular lamina of sides 30mm x 20mm is square of 20mm sides. Draw the projections and determine the inclinations of the surface of the lamina with HP and VP.

Ans: θ=42°

2.3.14/R28 /D10

Φ=48°

A regular pentagonal lamina of 25mm side is resting on one of its sides on HP while the corner opposite to this side touches VP. If the lamina makes an angle of 60° with HP and 30° with VP. Draw the projections of the lamina.

2.3.15/R33/D10

Draw the top and front views of a hexagonal lamina of 30mm sides having two of its edges parallel to both vertical and horizontal planes and one of its edges is 10mm from each of the planes of projection. The surface of the lamina is inclined at an angle of 60° to the HP.

2.3.16/R47/D10

A circular lamina of 50mm diameter is standing with one of its points on the rim on HP and the lamina inclined at 45° to HP. The diameter at right angles to the diameter which is passing through the point on which the lamina rests is parallel to VP. Draw the projections.

2.3.17/R32/D10

A hexagonal lamina of 30mm sides rests on HP with one of its corners touching VP and surface inclined at 45° to it. One of its edges is inclined to HP at 30°. Draw the top and front views of the lamina in its final position.

Ans: α=32°

2.3.18/R7/D10

An isosceles triangular plate of negligible thickness has a base 25mm long and altitude 35mm. It is so placed on HP such that in the front view it is seen as an equilateral triangle of 25mm sides with the side that is parallel to VP is inclined at 45° to HP. Draw its top and front views. Also determine the inclination of the plate with the reference plane.

Φ=52°

MODULE – II

PROJECTIONS OF SOLIDS

Introduction, definitions - projections of right regular tetrahedron, hexahedron (cube), prisms, pyramids, and cones with axis inclined to both the planes.

(Solids resting on HP only and no problems on octahedrons, and freely suspended solids.)

16 Hours

3. PROJECTION OF SOLIDS (PRISM) (DRAWING NO. 11)

3.1/R1/D11 A square prism 35mm sides of base and 60mm axis length rests on HP on one of its edges of the base which is inclined to VP at 30˚. Draw the projections of the prism when the axis is inclined to the HP at 45˚.	D
3.2/R12/D11 A hexagonal prism 25mm sides of base and 50mm axis length rests on HP on one of its corners of the base such that two base edges containing the corner on which it rests make equal inclination with HP. Draw the projections of the prism when the axis of the prism is inclined to HP at 40˚ and to VP 30˚. **Ans: β=41˚**	
3.3/R48/D11 A pentagonal prism of base side 25mm and height 50mm is resting on HP on one of its base corners such that the top most edge is at a distance of 60mm above HP. Draw its projections, when the top view of its axis is inclined at 45˚ to VP. Also, determine the inclination of the longer edge of the prism to HP which contains the resting corner. **Ans: θ=34˚**	

PROJECTION OF SOLIDS (PYRAMID) (DRAWING NO. 12)

3.4/R24/D12 A hexagonal pyramid 25mm sides of base and 50mm axis length rests on HP on one of its edges of the base, which is inclined to VP at 30˚. Draw the projections of the pyramid when the axis is inclined to HP at 40˚.	
3.5/R36/D12 A pentagonal pyramid 25mm sides of base & 50mm axis length rests on HP on one of its slant edges. Draw the projections of the pyramid when the axis is inclined to VP at 45 ˚. **Ans: β=50˚**	D
3.6/R33/D12 A square pyramid 35mm sides of base & 60mm axis length rests on HP on one of its slant triangular faces. Draw the projections of the pyramid when the axis appears to be inclined to VP at 45 ˚.	

PROJECTION OF SOLIDS (CUBE/ TETRAHEDRON/CONE) (DRAWING NO. 13)

3.7/R47/D13 A hexahedron of 30mm sides is resting on one of its corners on HP such that one of its solid diagonals is perpendicular to VP. Draw the projections of the solid.	D
3.8/R44/D13 A tetrahedron of 55mm sides rests on one of its corners such that the edge containing that corner is inclined to HP at 50˚ and VP at 30˚. Draw the projections. **Ans: β=51˚**	
3.9/R45/D13 A cone of 50mm base diameter and 60mm axis length rests on HP on one of its generators. Draw its projections when the axis is inclined to VP at 30˚. **Ans: β=33˚**	

ASSIGNMENT-4 (DRAWING NO. 14)

3.10/R43/D14
A cube of 40mm sides rests on HP on an edge which is inclined to VP at 30˚. Draw the projections when the lateral square face containing the edge on which it rests makes an angle of 50˚ to HP.

3.11/R8/D14
A pentagonal prism 25mm sides of base and 60mm axis length rests on HP on one of its corners of the base such that two base edges containing the corner on which it rests make equal inclination with HP. Draw the projections of the prism when the axis of the prism is inclined to HP at 40˚ and to VP 30˚.

Ans: β=41˚

3.12/R46/D14
A tetrahedron of sides 40mm is resting on one of its sides on HP. This side is parallel to VP and 40mm away from it. It is tilted about resting side such that the base containing this edge is inclined at 30˚ to HP. Draw the projections of the solid.

3.13/R50/D14
A cone of base diameter 40mm and axis length 50mm is resting on HP on a point on the circumference of its base such that its apex is at 40mm above the HP and its top view of the axis is inclined at 60˚ to VP. Draw the top and front views of the solid. Also, determine the inclinations of the axis when base is nearer to the observer.

Ans: θ=26˚

MODULE III

DEVELOPMENT OF LATERAL SURFACES OF SOLIDS

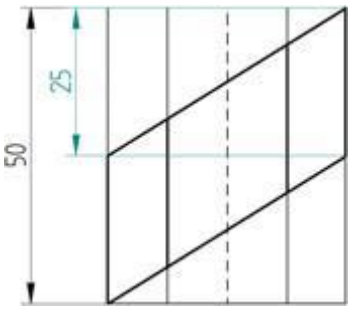
Introduction to section planes and sectional views.

Development of lateral surfaces of right regular prisms, cylinders, pyramids, and cones resting with base on HP only. Development of their frustums and truncations.

(No problems on lateral surfaces of trays, tetrahedrons, spheres and transition pieces). 12 Hours

4. DEVELOPMENT OF LATERAL SURFACES (PRISM) (DRAWING NO. 15)

4.1/R15/D15 A hexagonal prism of base side 20mm and height 50mm is resting on HP on its base, such that one of its base edge is parallel to VP. The prism is cut in this position as shown in following front view. Draw the development of lateral surface of prism.	D
4.2/R2/D15 A square prism of base side 30mm and axis length 60mm is resting on HP on its base with all the vertical faces being equally inclined to VP. It is cut by an inclined plane 60° to HP and perpendicular to VP and is passing through a point on the axis at a distance 15mm form its top face. Draw the development of the lower portion of the prism.	
4.3/R10/D15 Develop the truncated portion of the lateral faces of pentagonal prism 20 mm side of base and 50 mm high stands vertically with one of its rectangular faces parallel to VP and nearer to it so as to produce a one piece development . The truncated face of the truncated prism is inclined at 30° to its axis and passes through the right extreme corners of the top face of the prism.	



Orthographic Projections of Points, Lines and Planes:

Introduction to Orthographic projections, Orthographic projections of points in 1st and 3rd quadrants.

Orthographic projections of lines (Placed in First quadrant only as per BIS)

Orthographic projections of planes: triangular, square, rectangular, pentagonal, hexagonal and circular lamina (Placed in First quadrant only using change of position method).

Fig.4.1

DEVELOPMENT OF LATERAL SURFACES (PYRAMID) (DRAWING NO. 16)

4.4/R20/D16 A frustum of a square pyramid has its base 40mm sides, top 16mm sides and height 60mm, its axis is vertical and a side of its base is parallel to VP. Draw the projections of the frustum and show the development of lateral surfaces of it.	
4.5/R30/D16 A hexagonal pyramid of 30mm base sides with a side of base parallel to VP. Draw the development of the lateral surfaces of the retained portions of the pyramid cut by two perpendicular planes shown by dark lines in the figure 4.5.	D
4.6/R17/D16 The inside of a hopper of a flour mill is to be lined with thin sheet. The top and bottom of the hopper are regular pentagons with each side equal to 30mm and 22.5mm respectively. The height of hopper is 30mm. Draw the shape of the sheet to which it is to be cut so as to fit into the hopper.	

DEVELOPMENT OF LATERAL SURFACES (CONE & CYLINDER) (DRAWING NO.17)

4.7/R50/D17 A funnel is made of sheet metal. The funnel tapers from 60 mm to 30 mm diameter to a height of 25mm and then forms to a cylinder with a height of 50 mm. Bottom of funnel is beveled off completely at an angle of 45° to axis. Draw the development of funnel.	D
4.8/R45/D17 Draw the Development of the lateral surface of the cone, whose front view is as shown in the following figure 4.8.	

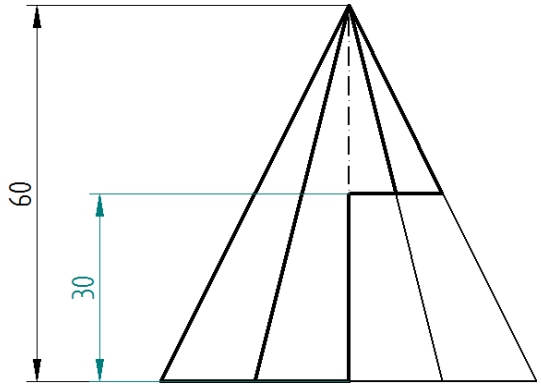


Fig 4.5

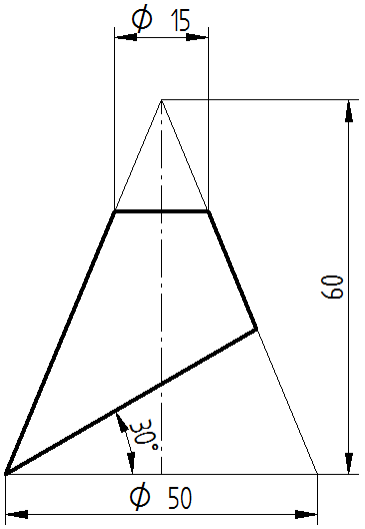


Fig 4.8

ASSIGNMENT-5 (DRAWING NO. 18)

4.9/R8/D18

A rectangular prism of base 30mm × 20 mm and height 60mm rests on HP on its base with the longer base side inclined at 40˚ to VP. It is cut by plane inclined at 45˚ to HP, perpendicular to VP and bisects the axis. Draw the development lateral surface of prism.

4.10/R28/D18

A hexagonal pyramid of sides 35mm and altitude 65mm is resting on HP on its base with two of the base sides perpendicular to VP. The pyramid is cut by a plane inclined at 30˚ to HP and perpendicular to VP and is intersecting the axis at 30mm above the base. Draw the development of the remaining portion of the pyramid.

4.11/R39/D18

Draw the Development of the lateral surface of a truncated vertical cylinder, 40mm diameter of base and height 50 mm, the truncated flat surface of the cylinder bisects the axis at 60˚ to it.

4.12/R38/D18

A cone of base diameter 60mm and height 70mm is resting on its base on HP. It is cut as shown in the following figure. Draw the development of the lateral surface of the remaining portion of the cone.

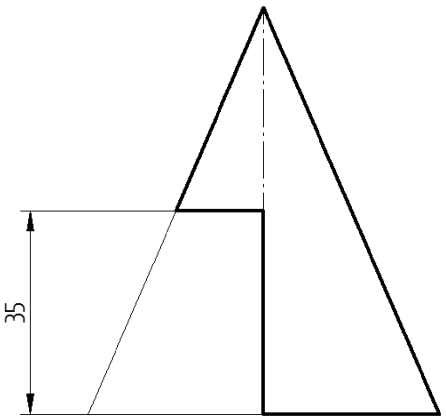


Fig 4.12

MODULE-IV

ISOMETRIC PROJECTION

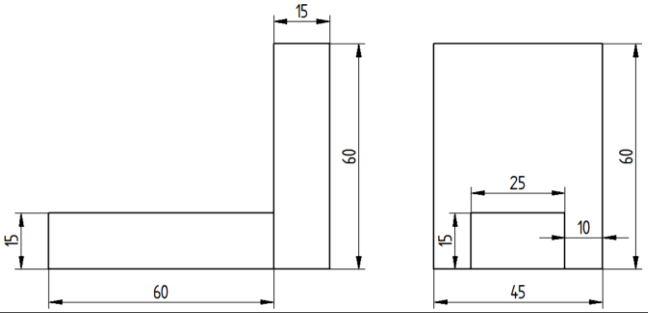
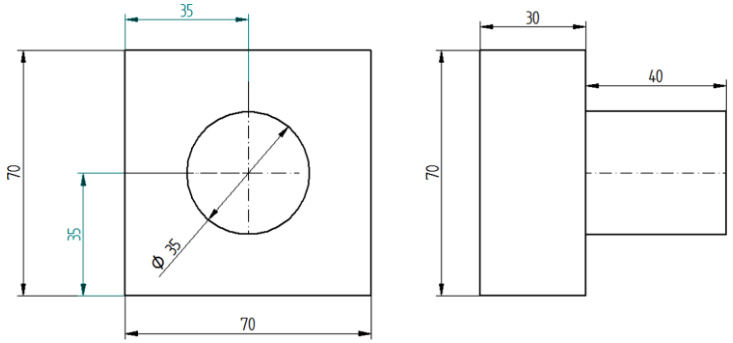
(USING ISOMETRIC SCALE ONLY)

Introduction, Isometric scale, Isometric projection of simple plane figures, Isometric projection of hexahedron(cube), right regular prisms, pyramids, cylinders, cones, and spheres. Isometric projection of combination of two simple solids.

Conversion of given isometric/ pictorial views to orthographic views of simple objects. 15 Hours

5. ISOMETRIC PROJECTION (DRAWING NO. 19)

5.1/R1/D19 A sphere of diameter 50mm rests centrally on top of a cube of sides 50mm. Draw the isometric projections of the combination of solids.	
5.2/D19 Draw the isometric projection of a circular lamina of 50 mm diameter when its surface is 1)Horizontal 2)Vertical	
5.3/D19 Draw the isometric projection of a Hexagonal prism of edge of base 25 mm and height 60 mm resting with its base on HP.	D
5.4/D19 A pentagonal pyramid of base edge 30 mm and axis length 60 mm resting on HP on its base with one of its base edges perpendicular to VP. Draw its isometric projections.	D
5.5/R37/D19 A sphere diameter 40mm is placed centrally on the flat face of a hemisphere diameter 60mm. Draw the isometric projection of the combination.	D
5.6/R2/D19 A hemisphere of 40mm diameter is supported co-axially on the vertex of a cone of base diameter 60mm and axis length 50mm. The flat circular face of the hemisphere is facing upside. Draw the isometric projection of the combination of solids.	
5.7/R44/D19 An equilateral triangular prism base side 30mm and axis length 70mm is resting on its rectangular face on top of a square slab side 70mm and 25mm thick. Draw the isometric projection of the combination.	
5.8/R20/D19 A square prism base side 40mm, height 50mm is placed centrally on a cylindrical slab of diameter 100mm and thickness 30mm. Draw the isometric projection of the combination.	

5.9/R3/D19 Draw the isometric projection of a rectangular prism of 60 x 80 x 20mm thick surmounting a tetrahedron of sides 45mm such that the axes of the solids are collinear and at least one of the edges of both the solids are parallel to VP.	
5.10/R50/D19 A rectangular slab base 100mm x 80mm and height 30mm has a full depth co- axial square hole side 40mm, such that one of the sides of the square is parallel to one of the sides of the rectangle. Draw the isometric projection of the hollow block.	
5.11/R32/D19 Following figure shows the front and side views of the solid. Draw the isometric projection of the solid. 	
5.12/R29/D19 Following figure shows the front and side views of the solid. Draw the isometric projection of the solid. 	D
5.13/VTU/D19 A pentagonal pyramid of base 25mm and height 65mm stands with its base on HP. An edge of the base is parallel to it. A horizontal section plane cuts the pyramid and passes through a point on the axis at a distance 40mm from the base. Draw the isometric projection of the frustum of the pyramid.	

5.14/R16/D29 A sphere of diameter 30mm rests on the frustum of a hexagonal pyramid base 30mm, topface 18mm side and height 50mm, such that their axes coincide. Draw the isometric projection of the combined solids.	**D**

ASSIGNMENT- 6 (DRAWING NO. 20)

5.15/R40/D20

An equilateral triangular pyramid base side 40mm and height 50mm is placed centrally on top of a square slab side 80mm and 20mm thick. Draw the isometric projection of the combination.

5.16/R42/D20

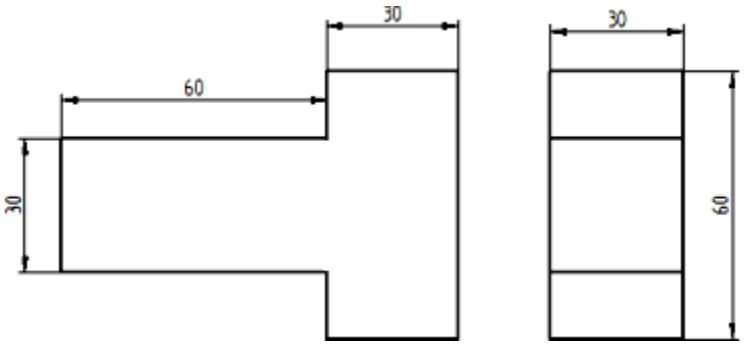
Two rectangular plates are placed one above the other co-axially with dimensions (l*b*h) 100mm x 60mm x 20mm and 100mm x 40mm x 20mm such that longer edges are parallel. Draw the isometric projection of the combination.

5.17/R49/D20

A square prism base side 40mm and height 70mm has a full depth co-axial square hole of base side 20mm, such that edges of both the squares are parallel. Draw the isometric projection of the hollow prism.

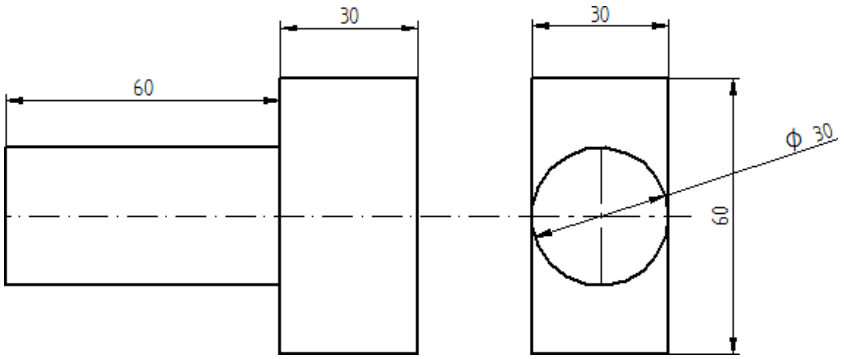
5.18/R27/D20

Following figure shows the front and side views of the solid. Draw the isometric projection of the solid.



5.19/R28/D20

Following figure shows the front and side views of the solid. Draw the isometric projection of the solid.



5.20/R25/D20

A hemisphere of diameter 50mm is resting on its curved surface centrally on the top of frustum of a rectangular pyramid base 80mm x 60mm and top 60mm x 40mm, height 55mm. Draw the isometric projection of the combination.

5.21/R48/D20

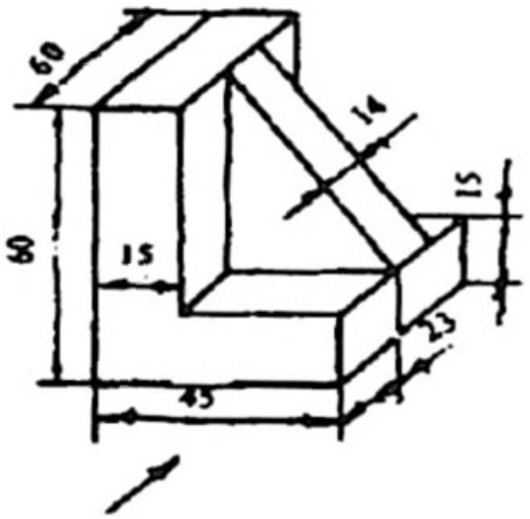
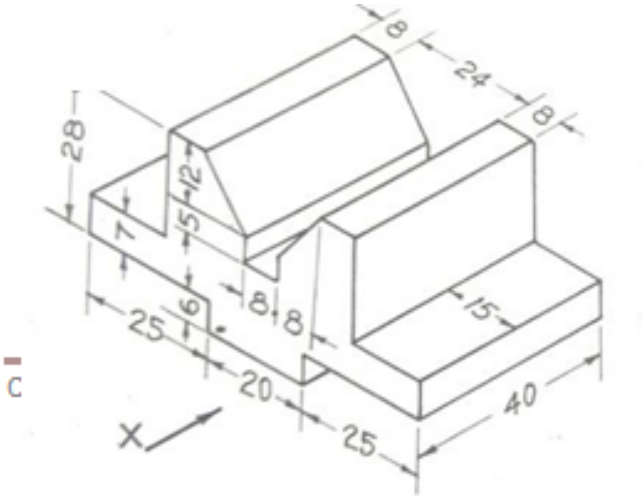
A cone of base diameter 50mm and height 50mm is placed centrally on an equilateral triangular prism of side 100mm and 20mm thick. Draw the isometric projection of the combination.

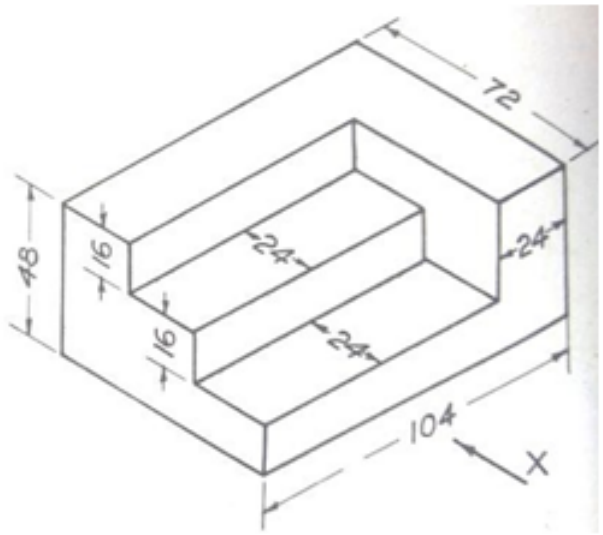
5.22/R39/D20

A frustum of a square pyramid base side 40mm, top face side 20mm and height 40mm is placed centrally on frustum of a cone base 80mm; top diameter 60mm and height 20mm. Draw the isometric projection of the combination.

5.3.1CONVERSION OF GIVEN ISOMETRIC/ PICTORIAL VIEWS TO ORTHOGRAPHIC VIEWS (DRAWING NO. 21)

Using **First-Angle Projection**, draw the **Front View** (looking in the direction of the arrow), **Top View**, and the **Right-Side View** of the given objects:

	**D**
	


72
48
16
16
24
24
24
104
X

Week	1	2	3	4	5	6	7	8	9	10	11
Demo Problem no.	ALL	2.1.1 2.1.3 2.2.1	2.2.2	2.3.3 2.3.6	2.3.7 2.3.10	3.1 3.5 3.7	4.3 4.6 4.7	5.5 5.11 5.12	5.9 5.11 5.12 5.14	5.3.1	IAT
Syllabus coverage	Basic Constructions	Projection of points / Lines	Projection of Lines	Projection of Planes	Projection of Planes	Projection of Solids	Projection of Solids	Development of lateral surface	Isometric Projection	Orthographic Projection	LAB INTERNALS