

Sheet 8: Development of Surfaces

Note:

- *Practice all problems roughly before coming to the Drawing Session. For more details of the exercises in this sheet, refer Chapter 14 of the textbook (N. D. Bhatt, Engineering Drawing, 50th Ed.).*

Refer to the figure given at the last page for problems 1 to 8. Assume each square to be of 10 mm side.

1. Draw the development of the surfaces of the portions of the following prisms, front views of which are shown in the top row:
 - (i) A hexagonal prism having a face parallel to the V.P. [Fig. (a)]
 - (ii) A hexagonal prism having two faces perpendicular to the V.P. plane. [Fig. (e)]
2. Draw the development of the surfaces of the portions of the following pyramids, front views of which are shown in the second row:
 - (i) A hexagonal pyramid having a side of base parallel to the V.P. [Fig. (b)]
 - (ii) A square pyramid having all sides of the base equally inclined to the V.P. [Fig. (e)]
3. Draw the development of the surfaces of the portions of the cylinder shown in Fig. (c) and Fig. (e), in the third row.
4. Draw the development of the surfaces of the portions of the cones shown in Fig. (c) and Fig. (e), in the fourth row.
5. Refer to the fifth row, and
 - (i) Draw the development of the pipes forming a Tee shown in Fig. (a).
 - (ii) Draw the development of the cylindrical chimney kept on the roof in Fig. (b).
6. Refer fifth row. Draw the three parts of the funnel shown at Fig. (c).
7. Refer to the sixth row. Draw the shape of the tin sheet required to prepare the can shown at (b).
8. Refer to the sixth row.
 - (i) The development of a cylinder is given at (c). Draw the front view of the cylinder showing the line AB in it.
 - (ii) The development of the surface of a cone is shown at (d). Draw the projections of the cone showing the lines AB, BC, CA in each view.

9. A pentagonal pyramid is kept on the ground on its base, with a base edge parallel to the vertical plane. Height of pyramid is 40 mm and side of base is 20 mm. Draw the development for the two cases (for each case, the cutting plane is wide enough to cut the entire width at all points it crosses in the front view): (i) The cutting plane is vertical starting from the base and passing through the centre of the edge parallel to VP, cutting up to a height of 10 mm from the base after which it changes direction perpendicularly and moves to the right till it comes out of the pyramid. (ii) The cutting plane is at an angle of 60 degrees to the base and passes through the left end of the edge parallel to the VP. The top part is removed.

10. A pipe 40 mm in diameter and 120 mm long (along the axis) is welded to the vertical side of a tank. Show the development of the pipe, if it makes an angle of 60 degrees with the side to which it is welded, the other end of the pipe makes an angle of 30 degrees with its own axis. Neglect thickness of the pipe.

11. The inside of a hopper of a floor mill is to be lined with a tin sheet. The top and bottom of the hopper are regular pentagons with each side equal to 450 mm (top side) and 300mm (bottom side). The height of the hopper is 450 mm. One of the slant faces of the hopper will have a circular hole of 100 mm diameter at its center to accommodate a pipe. Draw the shape to which the tin sheet is to be cut so as to fit the hopper **(Scale 1:10)**. What are the lengths of the slant edges of the hopper?

12. A 50 mm diameter cylindrical pipe branches off at 90 degrees from a 75 mm dia cylindrical pipe. The side branch is such that its lower edge is tangential to the bottom edge of the main pipe if seen from the front (in the front view, the main pipe is just a circle of 75 mm diameter). Draw the top and front view and then draw the developments of both the pipes. Assume the length of the bigger pipe to be 100 mm with the joint at the center. The branch can be drawn of a suitable length.

13. A cone of 90 mm diameter of base and 90 mm height stands on its base on the ground. A semi-circular hole of 50 mm diameter is cut through the cone. The axis of the hole is horizontal and intersects the axis of the cone. It is 30 mm above the base of the cone. The flat surface of the hole contains the axis of the cone and is perpendicular to the VP. Draw three views of the cone and also develop the surface of the cone.

14. A cylinder is standing on its base on the HP. A pentagonal hole is cut through the cylinder. A flat face of the hole is perpendicular to HP. The axis of the hole is perpendicular to the VP and bisects the axis of the cylinder. The base diameter and height of the cylinder are 70 mm and 90 mm respectively. The hole has a face width of 30 mm. Draw the development of the cylinder.

15. Draw a square pyramid resting with base on HP and one of the base edges making a 30 degrees angle with VP. Base side is 50 mm and height is 90 mm. The pyramid is cut by 2 planes, of which one plane passes through the rightmost base vertex and makes an angle of 20 degree with the base (HP). The lower portion is removed. The second cutting plane is a circular cut as seen in the front view. The apex of the pyramid is the center of the cut and its radius is 50 mm; which removes the entire top portion. Draw the top and front views of the pyramid and the development of the surface.

16. A circus tent is in the form of an octagonal pyramid resting on an octagonal prism. The height of the tent is 15 m, of which the prism height is 5 m. The base of the tent has to be inscribed in a circle of 120 m diameter. Two of the octagonal faces of the prism have entrances, which are rectangular in shape (width 1.5 m, height 2 m) with a semi-circular top. Draw the views of the tent (with two octagonal faces parallel to VP). Develop the lateral surface of the tent. **Take a scale of 1:100.**

