

Indian Institute of Technology, Delhi
Department of Mechanical Engineering
Major (Graphics Science (MEL 110))

Max. Marks: 70

Time: 2Hrs. 30 Min.

Q1. A portion of a duct system in a process plant has a vertical duct that can be taken as a right square pyramid. This duct is intersected by a duct that can be taken as an inclined right square prism. A fluid enters from the base of the pyramid and leaves via right square prism duct.

The pyramid is vertical with vertex above the base and is positioned such that one of the diagonals of its base is parallel to the front plane. The length of the diagonal and the height of the pyramid are 80mm and 90mm respectively.

The right square prism duct is inclined at 35 degrees to the base of the pyramid and has its axis parallel to the front plane. The axis of the prism intersects the axis of the pyramid at a distance of 32mm from the base of the pyramid. Moreover, the point of intersection of the diagonals of the prism at its other end is at a distance of 67mm from the axis of the pyramid. The length of the diagonal of the prism cross section is 40mm and one of its diagonal is parallel to the front plane.

- a) Find the curves of the intersection of the two ducts in the front and the top view. (14)
- b) The two ducts in position are to be fabricated from metal sheets. Obtain the shape of the two metal sheets via development, and mark all the dimensions, so that the two metal sheets when properly folded and joined together would give the two ducts positioned as detailed above. (14)

Q2. Draw the sectional front view (section AA) in the direction of arrow X and the top view of the object shown in Figure 1. Also dimension the two views according to the aligned system of dimensioning. (14)

Q3. A cone of 55mm diameter and 75mm height is resting on the ground on one of its generators in such a way that, the generator is parallel to the front plane. It is cut by a plane parallel to the front plane and perpendicular to the top plane and passing through a point 15mm in front of the cone axis. Draw sectional front view and top view of the cone. (14)

Q4. A solid, whose top and front view is shown in Figure 2, has a hole with its axis vertical located at B. A hole is to be drilled at point A, lying on surface 1-3-4, such that the included angle between the axis of the hole at A and that at B is 50degrees. a) Find the position of the point where the axis at A would intersect the bottom surface of the solid. b) Find the depth of the hole at A, measured along its axis. c) It is now proposed to alter the position of the point A by permitting its movement on the surface 1-3-4 such that the axis of the hole at new position of A is normal to the surface 1-3-4 and the axis at new position of A continues to intersect the axis at B at the same point as before. Locate new position of A in the top and front view and also find the angle between the axis at B and that at the new position of A. (14)

Figure 1

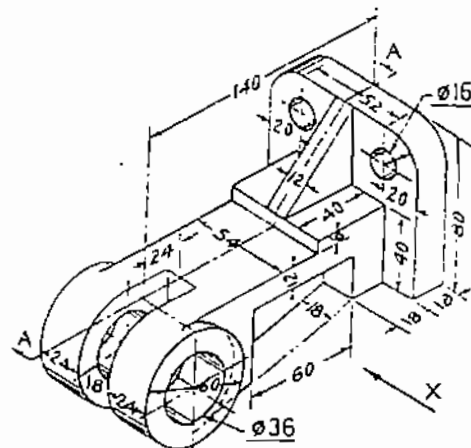


Figure 2

