

# **SPHEROMETER**

## **AIM:**

To determine the radius of curvature of a given spherical surface by a spherometer.

## **MATERIALS REQUIRED:**

Spherometer, Given spherical surface, plane glass slab

## **THEORY:**

The radius of curvature(R) of given spherical surface can be measured using a spherometer. It can be calculated using the formula:

$$R = \frac{l^2}{6h} + \frac{h}{2}$$

l is the distance between any two legs of the spherometer.

h is the sagitta.

## **PROCEDURE:**

### Determination of radius of curvature of spherical surface

1. Note the value of one division on the circular scale of the spherometer
2. Note the number of divisions on the circular scale of the spherometer.
3. Now determine the LC and pitch of the spherometer.
4. Place the given spherical surface on a plane glass slab. Keep the spherometer in such a way that all three legs lie on the spherical glass surface. Now lower the central screw so that it touches the spherical surface.
5. Record the reading on the pitch scale and number of divisions on the circular scale coinciding with the main scale and let us call it as 'a'
6. Remove the spherical surface and keep the spherometer on the plane glass slab. Rotate the screw so that its tip once again touches the plane glass slab. Count the number of rotations while doing so. Record the reading 'b' on the circular scale coinciding with the main scale.

7. Repeat these steps for at least 5 times to arrive at mean value of  $h$
8. Calculate the value of  $R$  using the formula.

## **RESULT**

Radius of curvature of given spherical surface=.....cm

## **PRECAUTIONS**

1. To prevent backlash error rotate the screw in one direction only.
2. Thickness of the spherical slab should be measured at five different positions to find accurate mean value.
3. Record your readings carefully by avoiding parallax error

## **SOURCES OF ERROR**

1. Parallax error while reading the pitch scale
2. Backlash error of spherometer
3. The screw may have friction.



### OBSERVATIONS:

$$\text{Mean } l = \frac{AB+BC+AC}{3} = \dots\dots\dots$$

### LEAST COUNT OF SPHEROMETER

Pitch of the screw= 1mm

No of divisions on circular scale= 100

$$\text{Least Count} = \frac{1\text{mm}}{100} = 0.01\text{mm}$$

NO	CIRCULAR SCALE		NO OF COMPLETE ROTATIONS ( $n_1$ )	a-b or (100+a)-b (x)	Total reading $h=(n_1*P)+(x*LC)$ (mm)
	CONVEX SURFACE (a)	PLANE GLASS SHEET(b)			
					$h_1 =$
					$h_2 =$
					$h_3 =$

$$\text{Mean } h = \frac{h_1+h_2+h_3}{3} =$$

$$R = \frac{l^2}{6h} + \frac{h}{2}$$

=.....