

## Practical No: 1

### Morphometry of a lake

#### 1) Location of a lake:

Study the given maps and find the location of the lakes given. Based on the values obtained, predict the features of the lakes.

#### 2) Scale:

Study the aerial photographs of the given lake and calculate the scale comment on the use of this scale in morphometric studies of lakes.

#### 3) Contour maps:

Study the given contour map and draw vertical profile diagrams of the basin at the widest part along the east west axis.

#### 4) Determination of surface area of a lake:

##### a) Grid enumeration method:

Determine the surface area of the map using calculations based on millimeter paper scale.

##### b) Cut and weight method:

Determine the surface area of the map by cut and weight method given below.

- Lightly trace the map outline with bottom contours on to a good grade paper.
- From an area outside the traced area, cut out a square of known area (a 10cm square is usable) and weight this piece of paper. Calculate weight per square cm. Calculate surface area of the lake using this value.
- Repeat step 3 for each successive bottom contour.

#### 5) Depth area curve :( Hypsographic curve)

- a) Plot depth versus area of the given lake.
- b) Using the above curve calculate the volume of the lake at each depth contour. Enter your data in a table.
- c) Plot depth versus volume curve.
- d) Comment on your graphs.

#### 6) Maximum depth:

What is the maximum depth of the lake/ lakes given?

#### 7) Mean depth:

Clearly indicate how mean depth of the lake/lakes could be calculated?

**8) Relative depth :**

Relative depth ( $Z_r$ ) is the ratio of the maximum depth ( $Z_m$ ) as a percentage of the mean diameter of the lake at the surface.  $Z_r = Z_m \times 100 / \text{mean diameter}$ . Most lakes have a  $Z_r$  of less than 2% whereas deep lakes with a small surface area usually have  $Z_r > 4\%$

**9) Shore line:****Cartometer method:**

- Set dial of cartometer by turning wheel to zero line. Draw a line of known length on the map proper and trace three times with the instrument to check it's accuracy of calibration.
- Set instrument to zero line and carefully to see if the dial revolves more than one time. Record number of inches or centimeters and convert to feet or meters per scale.
- Repeat for each of the submerged contours.
- Using the above method determine the shore line development of the given water bodies.

**10) Shore line development (S L D)**

SLD is an index to the regularity of the shore line. For a lake that is a perfect circle, the shore line development is equals to 1. As the value departs from unity, irregularity is indicated.

Shore line development (SLD) =  $\text{shore line} / 2\sqrt{a} \pi$

Where a = area of the lake.

**11) Volume development :**

The ratio of mean ( $Z$ ) to maximum depth ( $Z_m$ ) is an expression similar to the ratio of the volume of the lake to that of a cone of basal area A and Height  $Z_m$

$$AZ / (1/3 Z_m A) = 3 Z / Z_m$$

$$3 Z / Z_m$$

$$Z : Z_m$$

The ratio of  $Z : Z_m$  thus gives a comparative value of the form of the basin in terms of volume development. For most lakes  $Z : Z_m$  is  $> 0.33$ , which is the value that would be given by a perfect conical depression.

**Note: Comment on the values obtain for the given lakes.**

