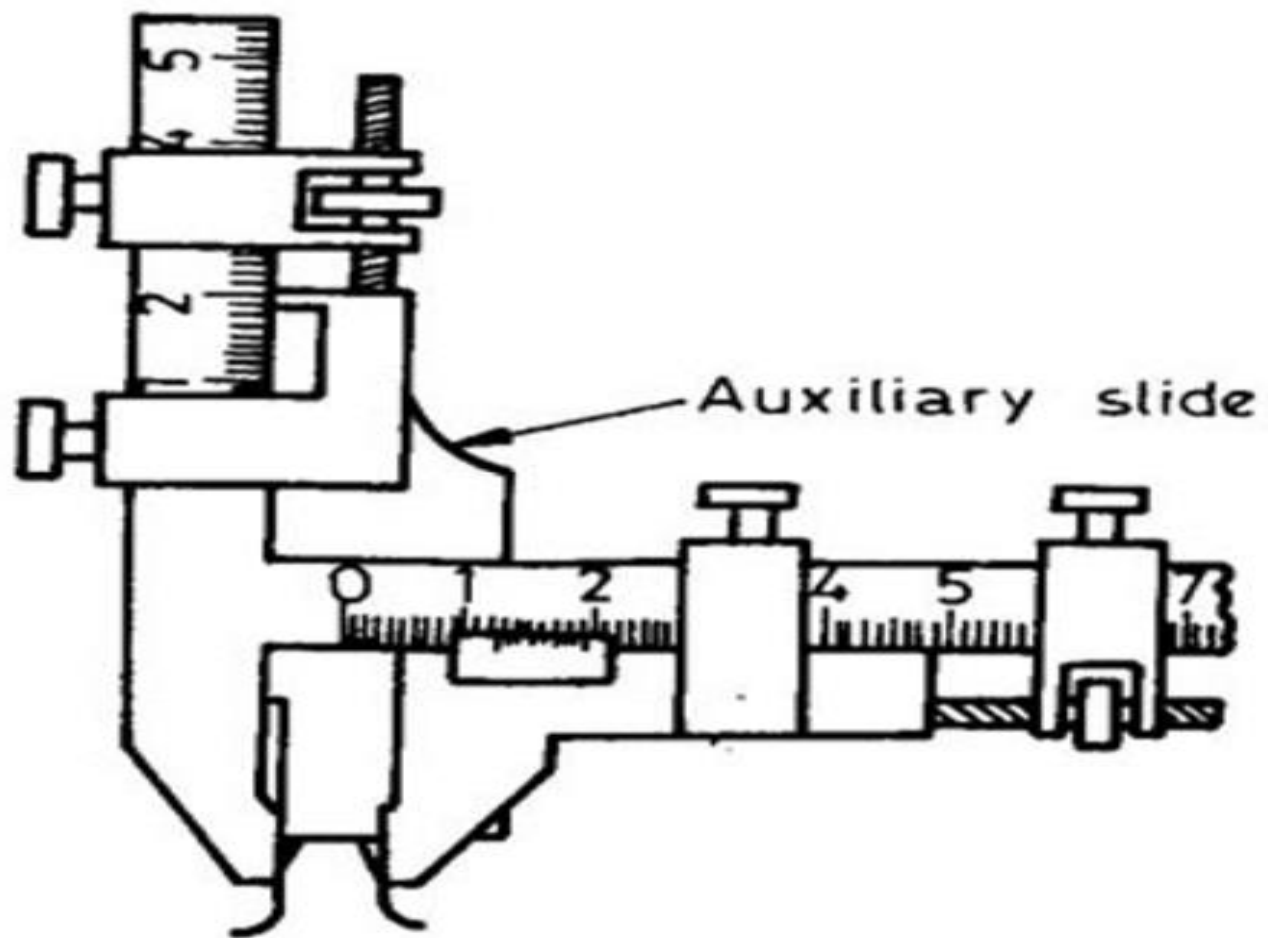# Experiment No: 8

- **Title**: Gear Teeth Measurement

- **Objectives:**

- 1. Understand working and use of Gear tooth Vernier caliper,

-  2. Understand the importance of gear measurement,

**Title:** Gear Teeth Measurement

- **Apparatus:** (a) Spur Gear  (b) Gear tooth Vernier Caliper

-  **Theory:** The main parameters determining the profile of a spur gears are pressure angle, circular pitch, tooth thickness, crest circle diameter and root circle diameter.

- The measuring principle is based upon the determination of the exact depth from the crest of the tooth at which the chordal thickness should be measured. The correct depth must ensure that the chordal tooth thickness is measured at the pitch circle. For spur gears, it can be shown that:

$$hm = m + \frac{dp}{2} \left(1 - \cos\left(\frac{90}{z}\right)\right) \quad \ldots\ldots \text{eqn (1)}$$

- Where m = module, dp = pitch circle diameter, z = no. of teeth

- **Procedure**
- (1) Count number of teeth (z) on the gear.
- (2) Measure outside diameter (do) of the gear.
- (3) Calculate module m = do/(z+2)
- (4) Calculate pitch circle diameter dp = mz.
- (5) Calculate value of h from equation (1).
- (6) Set the gear tooth vernier caliper from depth and measure width w of gear teeth
- (7) Repeat the measurements on other teeth and determine the average value.

**Observation Table:**

Number of teeth on gear, z = _____ and outside gear dia do = _____

| Sr. No | Width (w) | Height (h) | Sr. No | Width (w) | Height (h) |
|--------|-----------|------------|--------|-----------|------------|
| 1 | | | 9 | | |
| 2 | | | 10 | | |
| 3 | | | 11 | | |
| 4 | | | 12 | | |
| 5 | | | 13 | | |
| 6 | | | 14 | | |
| 7 | | | 15 | | |
| 8 | | | | | |

**Calculation:**

$$hm = m + \frac{dp}{2} \left(1 - \cos\frac{(90)}{z}\right)$$

$$w = dp \sin\frac{(90)}{z}$$