ROHINI

COLLEGE OF ENGINEERING AND TECHNOLOGY

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DEPARTMENT OF MECHANICAL ENGINEERING

24ME403 - METROLOGY & MEASUREMENTS

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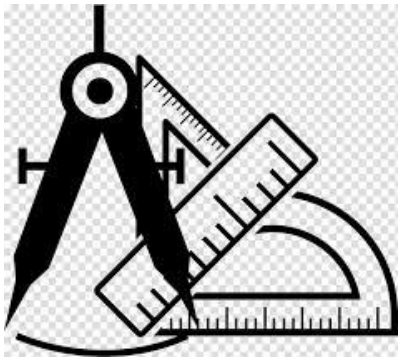


UNIT II: MEASUREMENT OF LINEAR AND ANGULAR DIMENSIONS

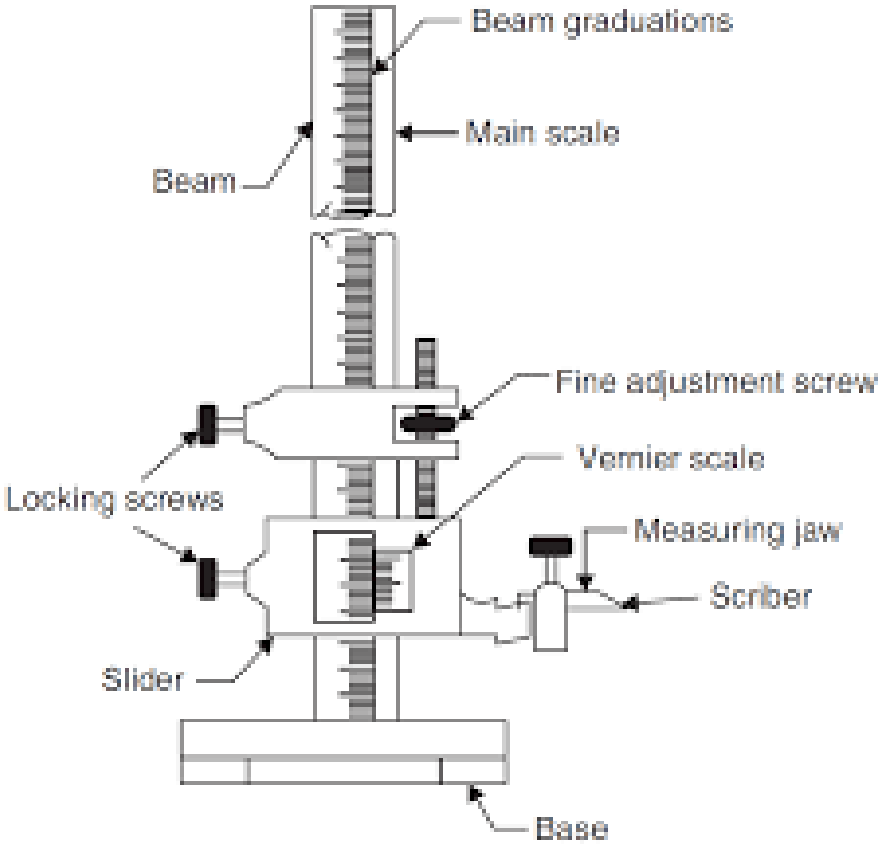
CO2: To make use of the principle; applications of linear and angular measuring instruments in the assembly and transmission elements.

Vernier Height Gauge

- Vernier height gauge is a precision measurement instrument used to accurately determine vertical dimensions and mark parallel lines from a flat reference surface.

Parts of a Vernier Height Gauge:

1) **Base**: The heavy, flat, ground foundation that provides stability and serves as the reference plane for all measurements.
2) **Vertical Beam / Column**: A rigid, graduated main scale mounted perpendicular to the base, along which the slider moves.
3) **Main scale**: The graduated scale on the vertical beam, marked in mm or inches, used for the primary height reading.
4) **Vernier scale**: A fine auxiliary scale on the slider that slides against the main scale to allow precise fractional readings.



5) **Sliding jaw / slider**: The movable assembly that carries the vernier scale and can be clamped at any height along the beam.
6) **Fine adjustment screw**: A mechanism on the slider for making small, precise vertical adjustments to the measuring point.
7) **Locking screws**: Screws used to secure the slider and the scriber attachment firmly in place to prevent movement during measurement.
8) Scriber / Measuring jaw: A sharp, pointed scriber for marking or a replaceable jaw for direct height measurement from the base.
9) **Clamp for Scriber**: A securing device that holds the scriber or measuring jaw firmly in the slider.

Measurement procedure:

1. Place the height gauge on a clean, flat surface plate and securely attach the required measuring tip (scriber or pointer) to the movable jaw.
2. Lower the measuring tip until it gently contacts the surface plate. Align the zero lines of the main and vernier scales. Lock the fine-adjustment clamp. Record any zero error for correction.
3. Position the workpiece on the surface plate under the gauge.

4. Upward reading preparation: An upward reading measures the height from the surface plate to the top surface of the object.
    a) Loosen the main slide's lock screw and move the slider to a position slightly higher than the top surface of the workpiece.
    b) Lock the main slide and use the fine adjustment knob to slowly bring the bottom measuring surface of the scriber down until it just makes delicate contact with the top surface of the object.
    c) A piece of paper slid between the scriber and the object can help detect the moment of contact: when the paper can no longer move freely, you've reached the correct height.
    d) Once contact is made, tighten the fine adjustment lock screw to secure the position.
    e) Look at the main scale and the vernier scale straight-on (to avoid parallax error) and record the measurement
5. Downward reading: A downward reading typically involves measuring the distance from a higher point (often the top surface of the object itself, or a reference block) to a lower feature
    a) Lower the measuring tip until it contacts the highest point of the feature to be measured from above (e.g., top of a step).
    b) Use the fine adjustment screw for precise contact, lock the clamp, and record the downward reading.
6. Calculate the average dimensions from the upward and downward readings.
    Vernier Scale Reading, VSR = Vernier Scale Coincidence (VSC) × Least Count (LC)
    Total Reading, TR = Main Scale Reading (MSR) + Vernier Scale Reading (VSR)