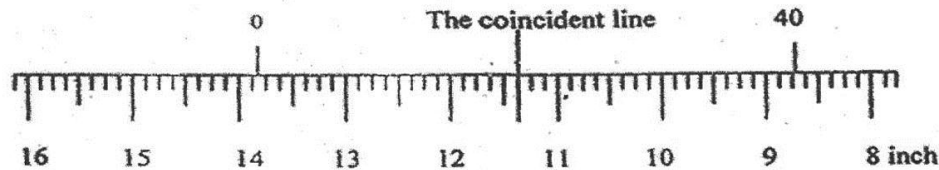




**Question (1) (25%)**

- a) Design the Retrograde vernire scale with accuracy 0.01 inch, if the minor division of main scales 0.2 inch and show on it with draw and math the reading 18.45 inch?
- b) In the following figure, a scale with vernier as shown, calculate:
- 1) Accuracy and type of vernier.
  - 2) Reading of vernier and final reading.
  - 3) The length of vernier in mm and inch.
  - 4) Show with drawing and calculating the coincident on a scale for reading 11.71875 inch?



- c) To setting out point Y from point X with horizontal distance equal 385 m. if the inclined line XY with gradient 2.5 %. Determine the inclined distance XY If the true length of tape is equal 30.06 m and the sag in middle of tape is 0.45 m. assumes that the coefficient of expansion of the tape was  $12 \times 10^{-6} \text{ m/ } 1^\circ \text{ C}$ .

**Question (2) (30%)**

- a) The following coordinates were calculated in closed traverse

Stations	X-coordinates	Y-coordinates
A	7200.054	7640.842
B	7204.601	8103.036
C	7369.177	8001.383
D	7356.207	7759.292

Compute the area of traverse by two methods.

- b) A series of offsets were taken from a chain line to a curved boundary line at interval of 15 m in the following order:

0, 2.65, 3.80, 3.75, 4.65, 3.60, 4.95, 5.85 m

Compute the area between the chain line, the curved boundary and the end offsets by

- 1- Trapezoidal rule
- 2- Simpson's rule

**Question (3) (45%)**

- a) The accompanying longitudinal and cross sections show that the ground level at 100 m interval , is as follows : Level 15.40 17.50 16.30 17.20 18.00 . If the formation level for first point =18.0 m and gradient of formation line is 0.5 % falling.
- 1) Calculate the depth of cut and height of fill for every point
  - 2) Calculate the area of cut and fill.
- b) In ordinary level , the data for profile levels in order taken in the field as follows (points were taken at 50 m intervals ): 2.28 , 1.76, 1.18, 2.87, 3.17, 1.19, 3.15, 2.29, 1.38, 2.54, 2.38, 1.98, 2.24, 3.48, 2.94, 1.78, 3.42, 2.38, 1.23, where      underlined readings on staff represent foresight reading . Calculate reduced level for all points , where the collimation level of third setup survey is 128.34 m . Make all necessary checks .If you want to set three points after the last reading and at the same distance of the level line, Determine the readings staff at three points , if the slop line from them =1: 100 fall ?

*Good luck with my best wishes.*