SNS COLLEGE OF TECHNOLOGY

An Autonomous Institution
Coimbatore – 35

Accredited by NBA – AICTE and Accredited by NACC – UGC with 'A+ Grade
Approved by AICTE , New Delhi and Affiliated to Anna University , Chennai.

DEPARTMENT OF AGRICULTURE ENGINEERING

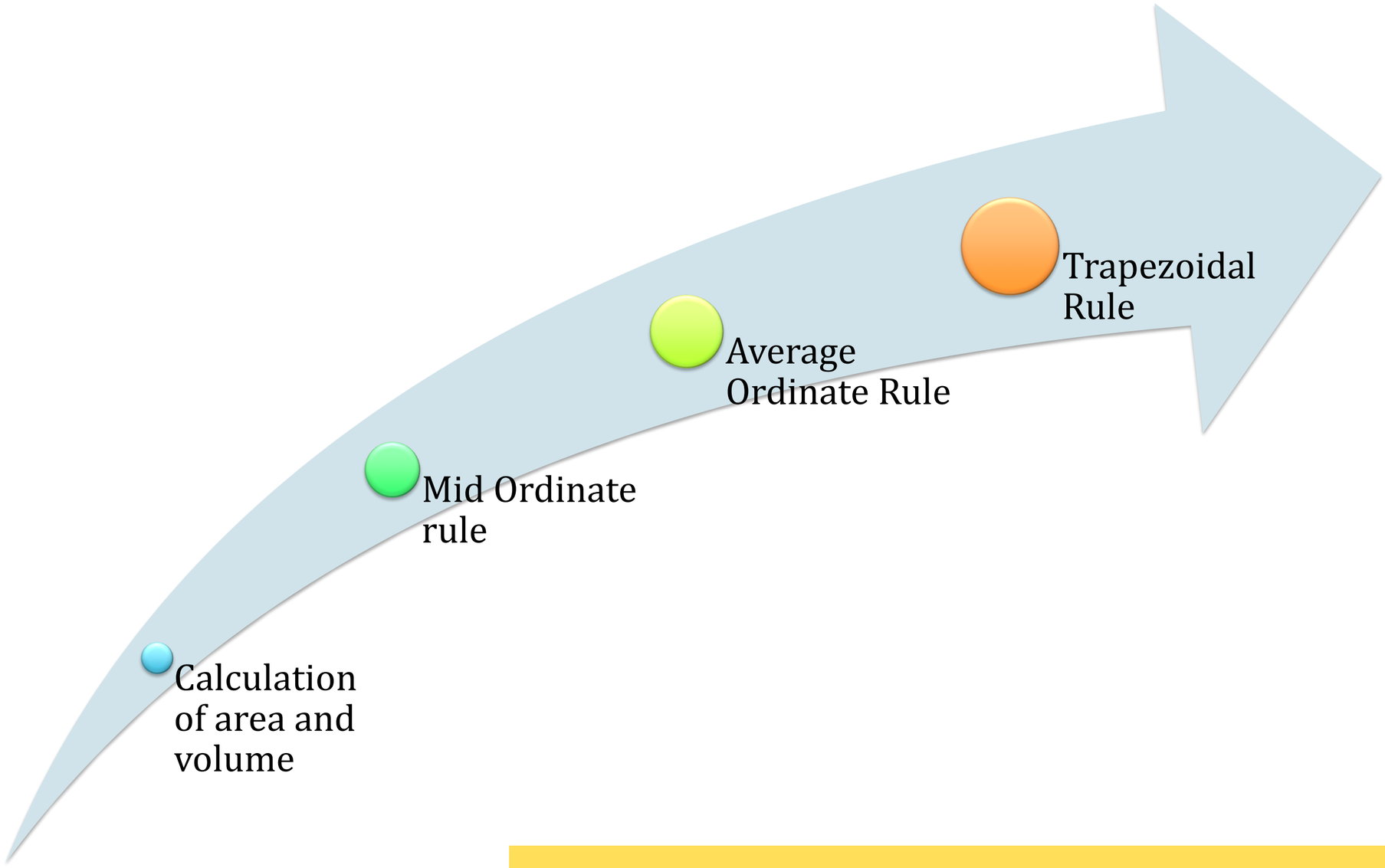
19AGT201 – SURVEYING AND LEVELING

II – YEAR III SEMESTER

UNIT 3 – COMPUTATION OF AREA AND VOLUME

TOPIC 5 – SIMPSON RULE

Last Class Review

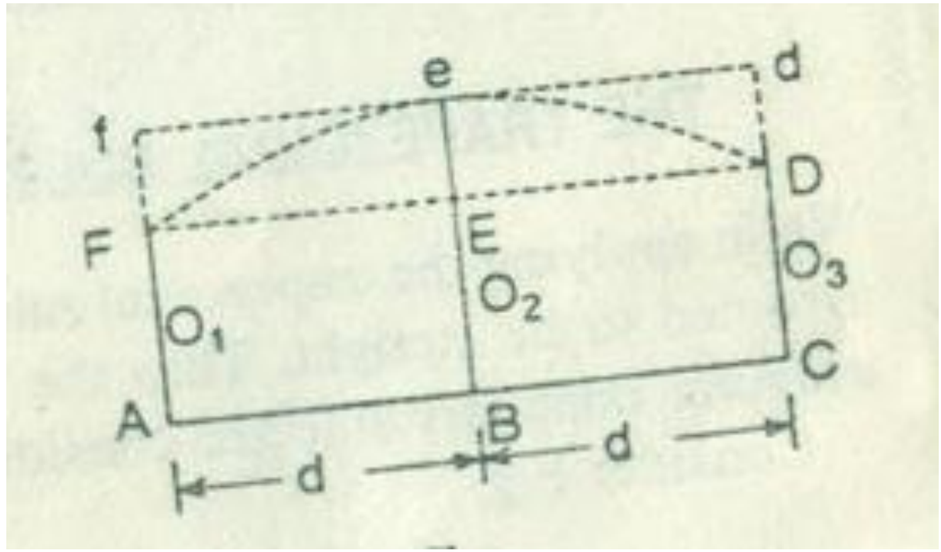


States!!!

- sum of first and last ordinates has to be done. Add twice the sum of remaining odd ordinates and four times the sum of remaining even ordinates. Multiply to this total sum by 1/3rd of the common distance between the ordinates which gives the required area

Simpson's Rule

- In this rule, the boundaries between the ends of ordinates are assumed to form an arc of parabola. Hence simpson's rule is some times called as parabolic rule



Simpson's Rule

- Let O1, O2, O3= three consecutive ordinates
- d= common distance between the ordinates
- area AFeDC= area of trapezium AFDC+ area of segment FeDEF

Simpson's Rule

$$\text{Area of trapezium} = \frac{O_1+O_3}{2} * 2d$$

Area of segment= 2/3* area of parallelogram FfdD

= 2/3* eE*2d

= 2/3 *{ O_2- O_1+O_3 /2 }*2d

Assessment

- **State Trapezoidal rule**

Simpson's Rule

So, the area between the first two divisions,

$$\Delta_1 = \frac{O_1+O_3}{2} * 2d + 2/3 * \{ O_2 - O_1+O_3 /2 \} * 2d$$

$$= d/3(O_1+4O_2+O_3)$$

Similarly, the area of next two divisions

$\Delta_2 = d/3(O_1+4O_2+O_3)$ and so on

Simpson's Rule

Total area = $d/3[O_1+O_n+4(O_2+O_{4+.....}) + 2(O_3+O_5)]$

$$= \frac{\text{Common distance}}{3}\{(\text{1st ordinate} + \text{last ordinate}) + 4(\text{sum of even ordinates}) + 2(\text{sum of remaining odd ordinate})\}$$

Limitation

Trapezoidal rule

- The boundary between the ordinates is considered to be straight
- There is no limitation. It can be applied for any number of ordinates
- It gives an approximate result

Simpson's rule

- The boundary between the ordinates is considered to be an arc of a parabola
- To apply this rule, the number of ordinates must be odd
- It gives a more accurate result.

Problem

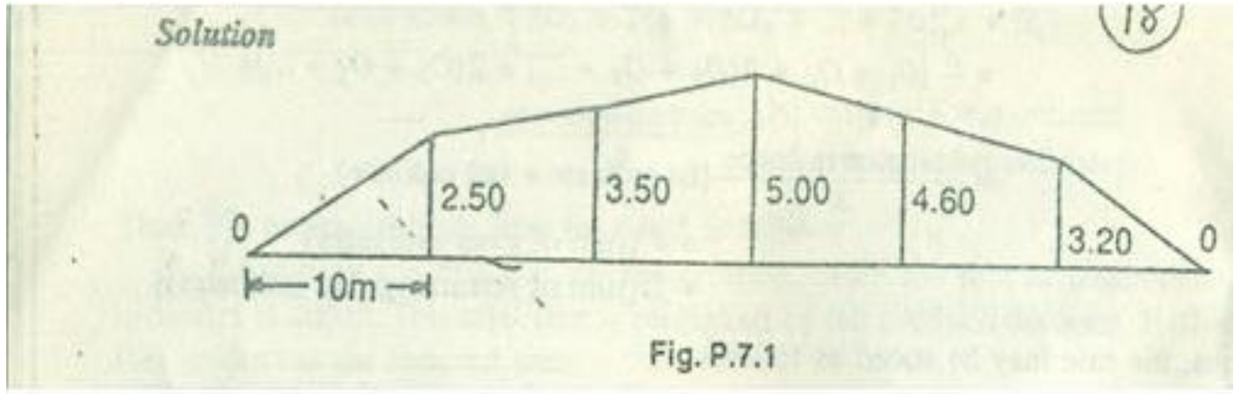
The following offsets were taken from a chain line to an irregular boundary line at an interval of 10 m:

0, 2.50, 3.50, 5.00, 4.60, 3.20, 0 m

Compute the area between the chain line, the irregular boundary line and the end of offsets by:

a) Simpson’s rule

Problem



d=10m

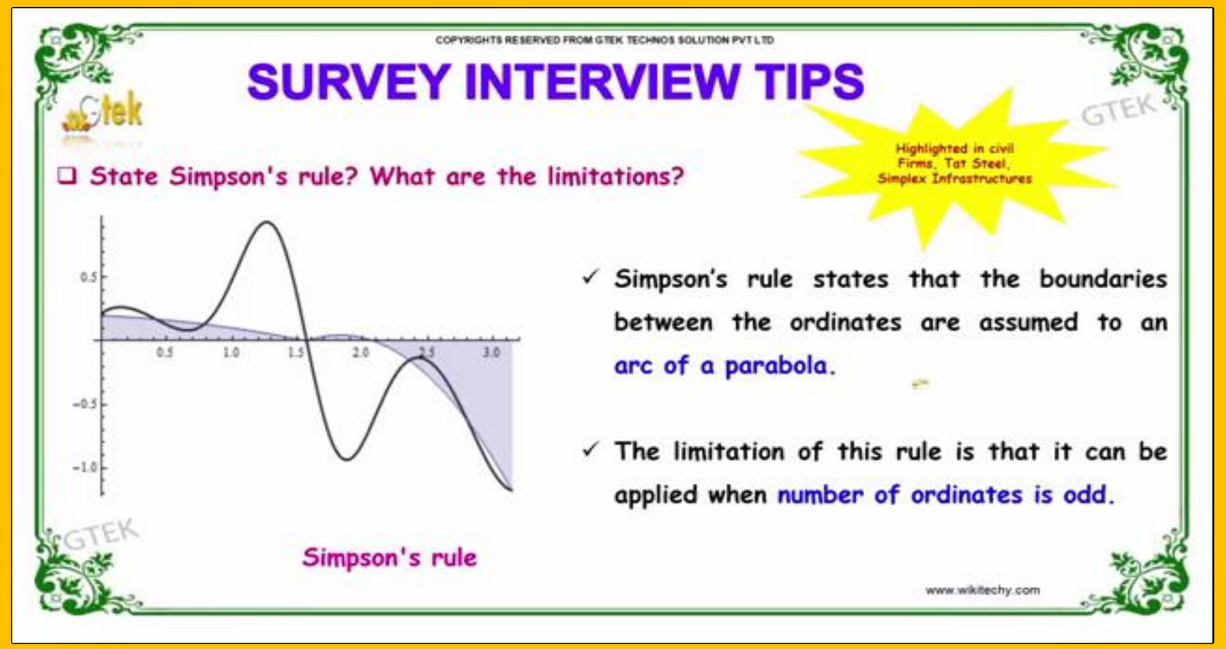
Required area

$=10/3\{0+0+4(2.50+5.00+3.20)+2(3.50+4.60)\}$

$= 10/3\{ 42.80+16.20\}=10/3*59.00$

$= 196.66m^2$

Reference Videos



See You at Next Class!!!!