



# **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**

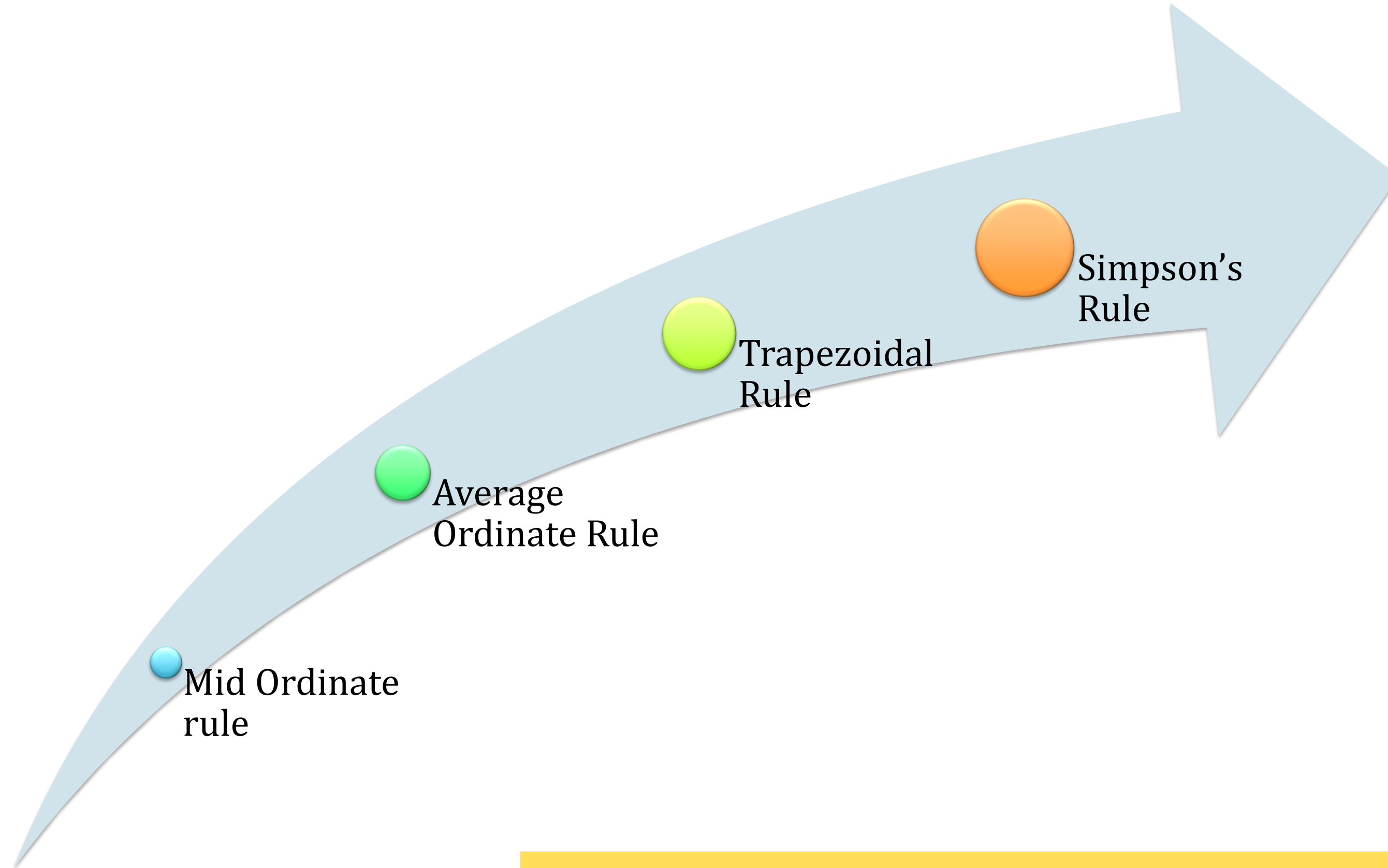
**II – YEAR III SEMESTER**

**UNIT 3 – COMPUTATION OF AREA AND VOLUME**

**TOPIC 6 – CALCULATION OF VOLUME**



# Last Class Review





# Computation of Volume

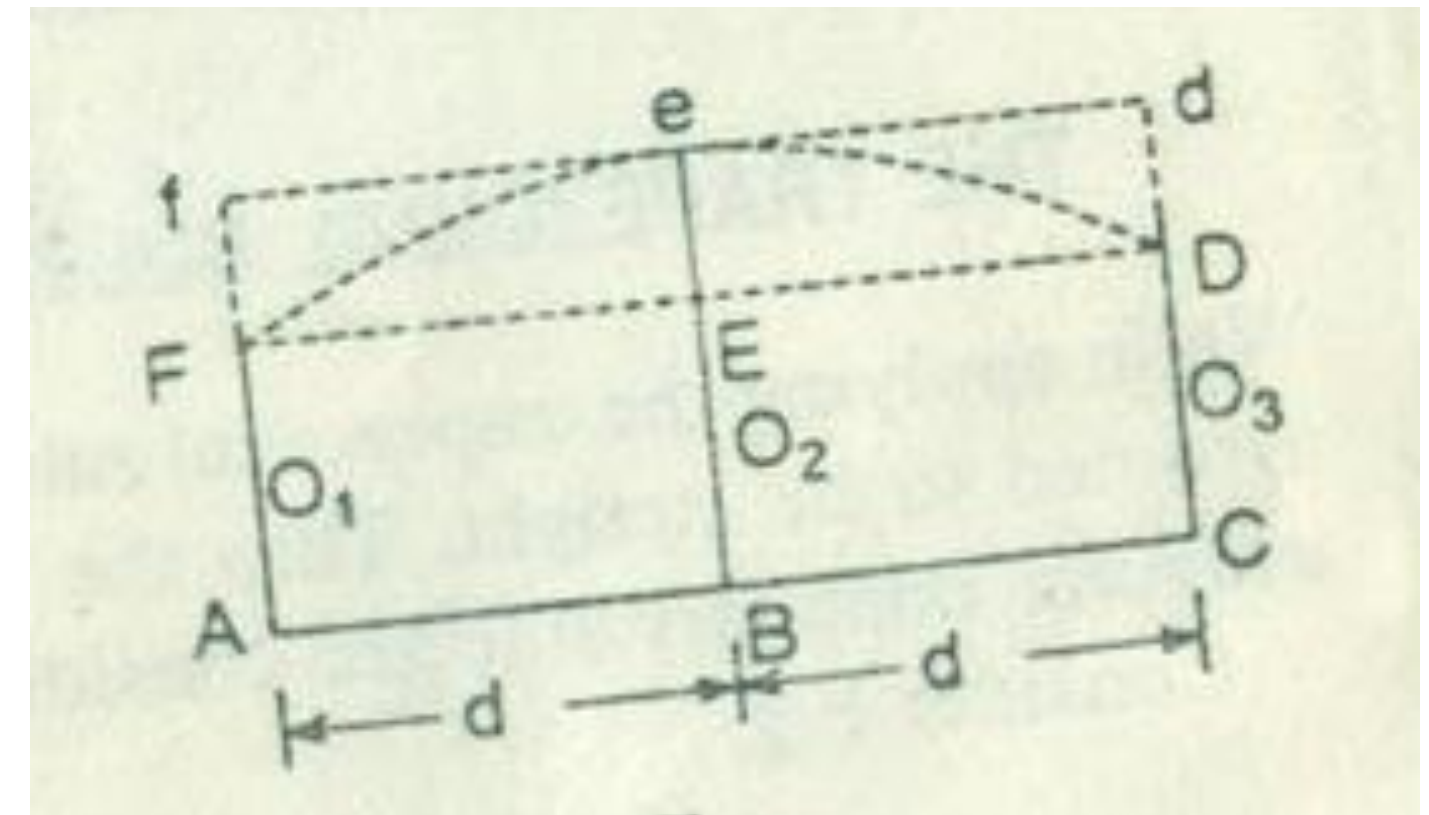
- ❖ The computation of volumes of various quantities from the measurements done in the field is required in the design and planning on many engineering works.
- ❖ The volume of earth work is required for suitable alignment of road works, canal and sewer lines, soil and water conservation works, farm pond and percolation pond consent.





# Computation of Volume

- ❖ For estimation of volume of earth work cross sections are taken at right angles to a fixed line, which runs continuously through the earth work.
- ❖ The spacing of the cross sections will depend upon the accuracy required.
- ❖ The volume of earth work is computed once the various cross-sections are known, adopting Prismoidal rule and trapezoidal rule.





# Rule

- ❖ Trapezoidal Rule
- ❖ Simpson Rule





# Trapezoidal Rule

- ❖ Volume(cutting or filling),  
 $V = D/2(A_1 + A_n + 2(A_2 + A_3 + \dots + A_{n-1}))$



i.e.  $\text{volume} = \frac{\text{common distance}}{2} \{ \text{area of first section} + \text{area of last section} + 2(\text{sum of area of other sections}) \}$



# Assessment



- **State Simpson rule**





# Prismoidal Rule

❖ Volume( cutting or filling),  
$$V = D/3 \{A_1 + A_n + 4(A_2 + A_4 + A_{n-1}) + 2(A_3 + A_5 + \dots + A_{n-1})\}$$

❖  $V = \text{common distance}/3 \{ \text{area of 1st section} + \text{area of last section} + 4(\text{sum of areas of even sections}) + 2(\text{sum of areas of odd sections}) \}$







# Problem



The following offsets were taken at 15 m intervals from a survey line to an irregular boundary line

3.50, 4.30, 6.75, 5.25, 7.50, 8.80, 7.90, 6.40, 4.40, 3.25 m

Calculate the area enclosed between the survey line, the irregular boundary line, and the offsets, by:

a) the trapezoidal rule

b) simpson's rule

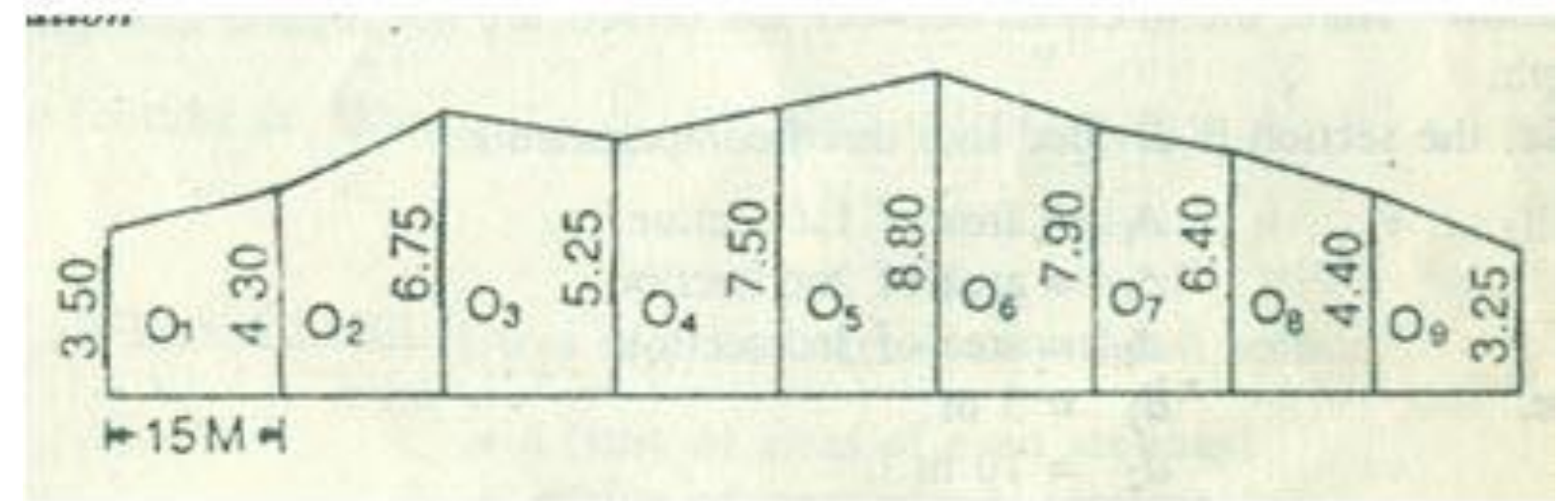


# Problem

a) the trapezoidal rule

required area

$$\begin{aligned} &= 15/2 \{ 3.50 + 3.25 + 2(4.30 + 6.75 + 5.25 + 7.50 + 8.80 + 7.90 + \\ &6.40 + 4.40) \} \\ &= 15/2 \{ 6.75 + 102.60 \} = 820.125 \text{ m}^2 \end{aligned}$$





# Problem

b) simpson's rule

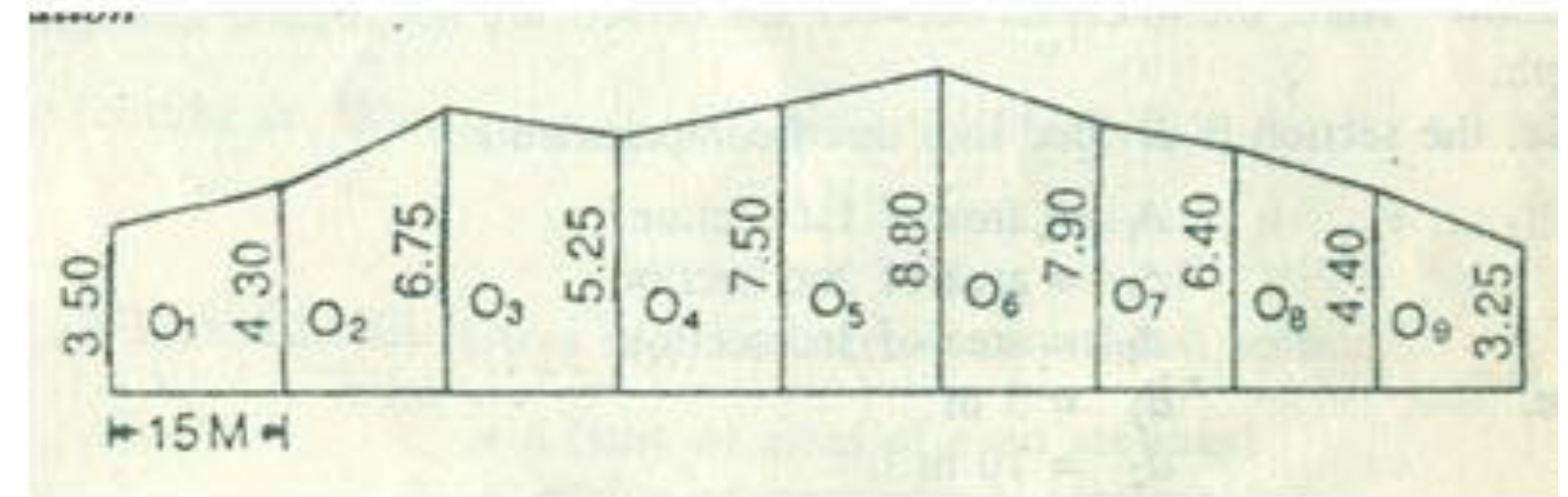
if this rule is to be applied, the number of ordinates must be odd. But here the number of ordinates must be odd. But here the number of ordinate is even(ten).

So, simpson's rule is applied from O1 to O9 and the area between O9 and O10 is found out by the trapezoidal rule.

$$\begin{aligned} A1 &= 15/3\{ 3.50+4.40+ 4( \\ &4.30+5.25+8.80+6.40)\}+2(6.75+7.50+7.90) \\ &= 15/3( 7.90+99.00+44.30)= 756.00 \text{ m}^2 \end{aligned}$$

$$A2= 15/2(4.40+3.25)= 57.38 \text{ m}^2$$

$$\text{Total area}= A1+ A2 =756.00+57.38 = 813.38 \text{ m}^2$$





# Reference Videos





**See You at Next Class!!!!**