AE 421

Lecture 3

Statistics Formulae

- Some form of analysis must be performed on all experimental data.
- When a set of readings of an instrument is taken, the individual readings will vary somewhat from each other and the experiment is usually concerned with the mean of all readings.

Formulae

- Mean: (Arithmetic mean) x_m

$$x_m = \frac{1}{n}\sum_{i=1}^{n} x_i$$

- Median: It is the value that divides the data points in half, e.g., 10, 12, 13, 14, 15 m/sec air velocity; Median: 13 m/sec.
- Mode: It is the value (or values) at which the distribution peaks, e.g., 10, 1, 12, 14, 16, 13, 12.

Mode: 16

Median: 14

Mean: 12.57

Formulae (Contd.)

- Deviation (d_i)

$$d_i = x_i - x_m$$

- Average of Deviation ($\bar{d}_i$)

$$\bar{d}_i = \frac{i}{n}\sum_{i=1}^{n} d_i = \frac{1}{n}\sum_{i=1}^{n}(x_i - x_m)$$

- Average of Absolute Values of Deviation

$$\left|\bar{d}_i\right| = \frac{1}{n}\sum_{i=1}^{n}\left|d_i\right| = \frac{1}{n}\sum_{i=1}^{n}\left|x_i - x_m\right|$$

Formulae (Contd.)

- Standard Deviation (OR) Root Mean Square Deviation

$$\sigma = \left[\frac{1}{n} \sum_{i=1}^{n} (x_i - x_m)^2 \right]^{1/2}$$

- Variance

$$\sigma^2$$

- Geometric Mean

$$x_g = \left[x_1 . x_2 . x_3 . x_4 ..... x_n \right]^{1/n}$$