

## Chapter 2- Theory of Measurement

frrom in Measurement:

1. Absolute Error > The difference beto true value and measured value of any quantity is known as absolute Error.

8A = T.V - M.V

2. Relative Error > It can be defined as ratio of absolute Error to true value of any quantity.

Er = T.V-M.V.

1 1100 militer= 17.1V - M-1V x 1001. it but it

helippe and share you a poblish a part,

Value as mentioned by manufacturer of equipment.

for circuit component like Resistor, Inductor and capacitor accuracy is express as percentage of

willing and property with a

er, Ammeter, accuray is express as a perstange of

full scale reading.

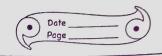
for fg, when a meter is said to be accurate to one percent of full scale reading

this means a reading taken anywhere along its scale will not have an error more than 1:1. of full

Scale reading.

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ii>	Environmental Error > All the error due to effect of
Market Control of the Control	surrounding such as error due to the variation in
. (	temperature, pressure bomidity, and external
	electrostatic and magnetic field are included in
	enviromental error.
. , (	Corrective measures of Environmental Error:
_	Perform the measurement of air-conditioned room to
	minimize the effect of variation in tempt.
-	use proper casing to minimized the effect of pressure
	and humidity.
	Use proper shielding to avoid the effect of extern-
	al field.
	11
3.	Random Error: This error are due to unknown
1 -	caused and occur even all gross and systematic
1 1	errormhave been accounted for men
,	Electronie, moise, in, a circuit, often electri-
; ; .	cal instrument. Id aus milight in the day
	Irregular changes in the heat loss rate
	from a solar collector due to change in wind
	speed. The secretary of the secretary
	Corrective measure of Random Error:
-	Apply statistical analysis conly after minimizing
	gross and systematic error.
-	a complete all map be : (1) and for in your t
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Statistical Analysis :-

It is mainly concerned with precision measurement and so it can't remove systematic

error for set of data. Terms used in statistical Analysis of data:

1. Arithimetic Mean (X):- let x1, x2, .... xn be the reading taken and n be the no. of reading the arthimetic mean is given by,  $\overline{X} = x_1 + y_1 + \dots + y_n$ 

 $\overline{X} = \sum_{i=1}^{N} \infty_{i} + \sum_{j=1}^{N} (j+1)^{j} + \sum_{i=1}^{N} (j+1)^{j} + \sum$ 

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2. Deviation from the mean (d): It shows the deviation of individual reading from the mean value i.e it shows how accurately and individual reading has been

taken. But algebric sum of all the deviation is alway zero.i.e \(\frac{1}{2}\) di = 0.

 $d_1 = \frac{1}{x_1 - x_1}$   $d_2 = x_2 - x_1$   $d_2 = x_2 - x_1$   $d_3 = x_4 - x_4$   $d_4 = x_4 - x_4$   $d_5 = x_5 - x_4$   $d_6 = x_6$   $d_7 = x_6$ 

Arthur Min of the man

3. Average deviation (b): It gives an indication of the precession of the instrument used in measurement. neasurement used in measurement used in measurement used for measurement.

Can be expressed,

D = \( \Sigma \) for measurement are highly precised. Average deviations



4. Standard deviation: - It shows how much variation or disperson from the average exist alow standard deviation indicate that the data points tends to be very close to mean. A high standard deviation indicate that the data points are spread out over a large range of value. So, reduction in standard deviation efficetively means improvement in measurement. It can be expressed as,

It can be expressed as,
$$6 = \frac{d_1^2 + d_2^2 + \dots + d_n^2}{n}, \text{ if } n > 20$$

$$S = \int \frac{d_1^2 + d_2^2 + \dots + d_n^2}{n-1}, \text{ if } n \leq 20$$

5. Variance (v): - It can be defined as square of standard deviation. It can be expressed as,
$$V = (6)^2 = (8)^2$$

6.