

## PART A – THEORY (Short Questions)

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### 1. Define Mean, Median, and Mode with an example (Salary)

#### Mean:

Mean is the average of all values.

$$\text{Mean} = \frac{\text{Sum of all values}}{\text{Number of values}}$$

*Example:*

If employee salaries are ₹30,000, ₹40,000, ₹50,000

$$\text{Mean} = (30000 + 40000 + 50000) / 3 = ₹40,000$$

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#### Median:

Median is the middle value when data is arranged in ascending order.

*Example:*

Salaries: ₹30,000, ₹40,000, ₹50,000

$$\text{Median} = ₹40,000$$

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#### Mode:

Mode is the value that occurs most frequently.

*Example:*

Salaries: ₹30,000, ₹40,000, ₹40,000, ₹50,000

$$\text{Mode} = ₹40,000$$

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### 2. Difference between Range and Variance

#### Range

Difference between maximum and minimum value

Simple measure of spread

#### Variance

Average of squared deviations from mean

Detailed measure of dispersion

## Range

Affected by extreme values

## Variance

Uses all data points

### Formula:

- Range = Max – Min
  - Variance =  $\frac{\sum(x-\bar{x})^2}{n}$
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## 3. Difference between Normal Distribution and Poisson Distribution

Normal Distribution	Poisson Distribution
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Continuous

Discrete

Bell-shaped curve

Right-skewed

Used for salary, height

Used for number of events

Defined by mean & SD

Defined by  $\lambda$  (rate)

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## 4. Explain Skewness with workplace example

**Skewness** measures asymmetry of a distribution.

- **Positive Skewness:** Long tail on right  
*Example:* Few employees earn very high salaries.
  - **Negative Skewness:** Long tail on left  
*Example:* Most employees earn high salaries, few earn low.
  - **Zero Skewness:** Symmetrical distribution
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## 5. Define Conditional Probability and explain with example

Conditional probability is the probability of an event occurring **given that another event has occurred**.

### Formula:

$$P(A | B) = \frac{P(A \cap B)}{P(B)}$$

*Example:*

Probability that an employee is promoted **given** performance score > 80.

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## 6. What is Bayes' Theorem? Explain its use

Bayes' Theorem helps update probabilities based on new information.

**Formula:**

$$P(A | B) = \frac{P(B | A)P(A)}{P(B)}$$

**Use in real life:**

Used in promotion decisions, spam detection, medical diagnosis, and risk assessment.

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## 7. Write a short note on PCA (Principal Component Analysis)

PCA is a dimensionality reduction technique used to convert large datasets into fewer variables while retaining maximum information.

**Advantages:**

- Reduces complexity
- Removes multicollinearity
- Improves model performance

Used in data analysis and machine learning.