

Mathematics → Final Exam

PART-A

Theory

1. Define Mean, Median, Mode with an example in the context of employee salaries.
- Mean, Median, Mode (with salary example)
- Mean : Average of all salaries
 $\text{Ex - salaries} = 20\text{k}, 30\text{k}, 40\text{k} \rightarrow \text{Mean} = (20 + 30 + 40)/3$
 $= 30\text{ k}$
 - Median : Middle salary after sorting.
 $\text{Ex : } 20\text{k}, 30\text{k}, 40\text{k} \rightarrow \text{median} = 30\text{k}$
 - Mode : Most frequent salary.
 $\text{Ex : } 25\text{k}, 30\text{k}, 30\text{k} \rightarrow \text{Mode} = 30\text{k}$

Q. 2. Range vs variance

- Range : Difference between max and min value
 $\text{Ex : Salaries} = 20\text{k}, 60\text{k} \rightarrow \text{Range} = 40\text{k}$
- Variance : Measures how spread data is from the mean.
 Higher variance = More fluctuation in salaries.

Q. 3 Difference between Normal and Poisson distribution

- Normal Distribution
- Continuous data
 Bell-shaped curve
 Ex - Salary, height
- Poisson Distribution
- Discrete events
 Right-skewed
 Ex - Mobile number

Q.4. Explain skewness and give one workplace-related ex.

- Skewness measures asymmetry of data.
- Positive skew: Few employees earn very high salaries.
- Negative skew: Most employees earn higher salaries.

Q.5. Define conditional Probability and explain how it applies in promotions.

- Probability of an event given another event occurred.
- Ex - $P(\text{Promotion} | \text{Performance} > 80)$
- chance of promotion if performance is high.

Q.6 Explain Independent vs Mutually Exclusive Event with example.

- Independent Event - Promotion does not depend on department.
Two events are independent if the occurrence of one event doesn't affect the probability of the other. Mathematically $\rightarrow P(A \cap B) = P(A) \times P(B)$
Ex - ~~Ex -~~ Department
- Mutually Exclusive Event - Two events are mutually exclusive if they cannot happen at the same time.
- Employees cannot be in two departments at once.
Mathematically $\rightarrow P(A \cap B) = 0$

Q.7. what does Bayes Theorem help us in real-world decision making?

→ Bayes Theorem can help us update probability when new information is available.

Ex - Probability of promotion increases after knowing performance score.

Q.8. Short Note on PCA (Principal Component Analysis)

→ PCA (Principal Component Analysis) reduces high-dimensional data into few new components while preserving maximum variance.

Used to improve speed and visualization.

Example → Employee salary, working hour, and performance scores can be reduced to two principal components for faster analysis and clearer visualization.