**[Que-29] - Write all the characteristics or Properties of the Normal Distribution Curve.**

The normal distribution curve, also known as the Gaussian curve, possesses several key characteristics or properties that make it widely applicable and useful in statistics and probability theory. Here are the main characteristics:

1. **Bell-shaped Curve:**
   * The normal distribution curve is bell-shaped, symmetric around its mean. This means that the left half of the curve mirrors the right half, and the peak of the curve occurs at the mean.
2. **Unimodal:**
   * There is only one peak (mode) in the distribution, corresponding to the mean. This indicates that there is a single most likely value around which the data cluster.
3. **Fixed Mean, Median, and Mode:**
   * The mean (μ), median, and mode of the normal distribution are all equal and located at the center of the distribution. This central tendency is a fundamental characteristic of the normal distribution.
4. **Symmetry Around the Mean:**
   * The normal distribution is symmetric around its mean μ. This symmetry means that for every value x on one side of the mean, there is a corresponding value -x on the opposite side, resulting in a mirror-image relationship.
5. **Total Area Under the Curve Equals 1:**
   * The area under the entire normal distribution curve equals 1. This represents the total probability of all possible outcomes occurring, ensuring that the distribution is properly normalized.
6. **Tails Extend Indefinitely:**
   * The tails of the normal distribution curve extend indefinitely in both directions along the x-axis. While the probability density decreases rapidly away from the mean, theoretically, there is no limit to how far the tails extend.
7. **Parameterized by Mean and Standard Deviation:**
   * The normal distribution is fully characterized by two parameters: the mean (μ) and the standard deviation (σ). The mean determines the center of the distribution, while the standard deviation determines the spread or dispersion of data points around the mean.
8. **Asymptotic to the x-axis:**
   * The normal distribution curve approaches, but never touches, the x-axis as it extends towards infinity and negative infinity. This characteristic reflects the decreasing probability density of extreme values.
9. **Empirical Rule (68-95-99.7 Rule):**
   * A large majority of the data (approximately 68%) falls within one standard deviation (±σ) of the mean, about 95% falls within two standard deviations (±2σ), and about 99.7% falls within three standard deviations (±3σ) of the mean. This empirical rule highlights the predictable nature of the normal distribution.
10. **Central Limit Theorem:**
    * The normal distribution is closely related to the Central Limit Theorem, which states that the distribution of the sample means approaches a normal distribution as the sample size increases, regardless of the shape of the population distribution. This makes the normal distribution fundamental in statistical inference.