# Advance Engineering Mathematics(AEM)

## Branch :Information Technology, Sem:III$^{rd}$

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# Vision of the Institute

To become a renowned centre of outcome based learning, and work towards academic, professional, cultural and social enrichment of the lives of individuals and communities

# Mission of the Institute

- Focus on evaluation of learning outcomes and motivate students to inculcate research aptitude by project based learning.
- Identify, based on informed perception of Indian, regional and global needs, the areas of focus and provide platform to gain knowledge and solutions.
- Offer opportunities for interaction between academia and industry.
- Develop human potential to its fullest extent so that intellectually capable and imaginatively gifted leaders may emerge.

# Course Outcomes

- **CO1:** To learn the concepts and principles of Random variables and Probability distribution.
- **CO2:** To learn the formulation of different mathematical problems into optimization problems.
- **CO3:** Apply the principles of optimization using differential calculus.
- **CO4:** To understand the concepts of Linear Programming.

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## Random Variables:

- A **random variable** is a variable hat assumes numerical values associated with the random outcome of an experiment, where one (and only one) numerical value is assigned to each sample point.

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A **discrete random variable** can assume a countable number of values.

- Number of steps to the top of the Eiffel Tower*

A **continuous random variable** can assume any value along a given interval of a number line.

- The time a tourist stays at the top once s/he gets there

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**Examples :**

## Discrete random variables

- Number of sales
- Number of calls
- Shares of stock
- People in line
- Mistakes per page

## Continuous random variables

- Length
- Depth
- Volume
- Time
- Weight

## Probability Distribution for Random Variables

The **probability distribution** of a discrete random variable is a graph, table or formula that specifies the probability associated with each possible outcome the random variable can assume.

- $p(x) \geq 0$ for all values of $x$
- $\Sigma p(x) = 1$

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# Expected values of Discrete Random Variable

The **mean**, or **expected value**, of a **discrete random variable** is

$$\mu = E(x) = \sum xp(x).$$

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The **variance** of a **discrete random variable** $x$ is

$$\sigma^2 = E[(x-\mu)^2] = \sum (x-\mu)^2 p(x).$$

The **standard deviation** of a **discrete random variable** $x$ is

$$\sqrt{\sigma^2} = \sqrt{E[(x-\mu)^2]} = \sqrt{\sum (x-\mu)^2 p(x)}.$$

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# References:


1. https://www.slideshare.net/lovemucheca/random-variable-and-distribution
2. https://www.youtube.com/watch?v=UftY0e2ilM4
3. https://www.digimat.in/nptel/courses/video/117104117/L01.html