



# ELECTRICAL MACHINES

**Prof. G. BHUVANESWARI**

Department of Electrical Engineering  
IIT Delhi

**TYPE OF COURSE** : Rerun | Core | UG

**COURSE DURATION** : 12 weeks (18 Jan'21 - 9 Apr'21)

**EXAM DATE** : 25 Apr 2021

**PRE-REQUISITES** : Basic Electrical Engineering, Circuit theory

**INTENDED AUDIENCE** : UG students and instructors

**INDUSTRIES APPLICABLE TO** : Machines manufacturing and drives manufacturing industries like Kirloskar, ABB and Siemens

## **COURSE OUTLINE :**

The course introduces Electrical Machines - namely Transformers, DC and AC rotating machines, which are, arguably, the most important components of energy and power conversion industry. Transformers, being static, are the easiest of electrical machines and hence they will be dealt with initially after introducing magnetic circuit fundamentals. DC and AC machines will be discussed after understanding the process of electromechanical energy conversion through a magnetic field. The efficiency, voltage regulation and characteristics of these machines will be discussed while they are functioning as generators. Further, their speed-torque characteristics, starting, braking, speed control and efficiency will be discussed while they function as motors. Every topic will include their applications in various power industries as well.

## **ABOUT INSTRUCTOR :**

Prof. Bhuvaneshwari has been working as a faculty member in the Department of Electrical Engineering IIT Delhi since 1997. She completed her University and obtained PhD from IIT Madras. She worked as a lecturer in College of Engineering, Madras after which she was working for the electric utility company ComEd in Chicago, IL, USA before joining as a faculty member in IIT Delhi. She has more than 150 international and National journal and conference papers to her credit. She is Fellow of IEEE-USA, IET-UK, IETE, IE(I) and a life member of ISTE. Her areas of interest are power electronics, electrical machines, drives, power quality, power conditioning and renewable energy.

## **COURSE PLAN :**

**Week 1** : Introduction to Electrical machines

**Week 2** : Magnetic circuits and flux calculations

**Week 3** : AC circuits & Magnetic Circuits

**Week 4** : Transformers

**Week 5** : Single-phase and Three-phase transformers

**Week 6** : Electromagnetic energy conversion principles

**Week 7** : DC machines: Generators and motors

**Week 8** : 3-phase induction machines

**Week 9** : Single-phase induction motor

**Week 10**: Problems on DC Generators and motors

**Week 11**: Single-phase induction motor

**Week 12**: Three-phase Synchronous Machine