**Course Syllabi: UEE633: Generalized Theory of Electrical Machines (L : T : P :: 3 : 0 : 0)**

1. **Course number and name**: UEE633: Generalized Theory of Electrical Machines

2. **Credits and contact hours**: 3.0 and 3

3. **Text book, title, author, and year**

   **Text Books / Reference Books**
   - *Kraus, P.C., Analysis of Electric Machine, McGrawHill (2000).*
   - *Bimbhra, P.S., Generalized Theory of Electric Machines, Khanna Publishers (2006).*

   a. Other supplemental materials
      - Nil

4. **Specific course information**

   a. Brief description of the content of the course (catalog description)

   **Introduction:** Common essential constructional and operational features of electrical machines, basic two pole machine representation of different types of electrical machines, Kron's primitive machine, Voltage equations in matrix form for Kron's primitive machine, Impedance matrix.
   **Linear Transformations in Machines:** Reference frame theory, 3-phase to 2-phase transformation, Transformation from rotating axes to stationary axes, Physical concept of park's transformation, Volt-ampere and torque equations, Space vector concept.
   **DC Machine:** Transfer function for DC machine (Shunt, Series and compound), Linearization technique, Analysis under motoring and generating made, Dynamic analysis.
   **Synchronous Machine:** General machine equation in different frame, Dynamic analysis, Power angle characteristics, Phases diagram for cylindrical rotor and salient pole machine, Electromagnetic and reluctance torque, Electric braking of synchronous machine.
   **3-phase Induction Machine:** Performance equations in different rotating frames, Equivalent circuit, Different inductance, Effect of voltage and frequency on the performance, Braking, Unbalance operations.
   **Advanced Machines:** 1-phase synchronous motor, 2-phase servomotor, AC tachometers, Switched reluctance motor, Brushless DC machine.

5. **Specific goals for the course**

   After the completion of the course, the students will be able to:
   - Express the revolving field and reference frame theory.
   - Develop mathematical model of three-phase AC machines and parameters in different reference frame.
   - Simulate the transient performance of three-phase ac machines in different reference frames.
   - Investigate the transient performance of different DC machines.
   - Select special purpose small machines for different applications.

6. **Brief list of topics to be covered**
   - Linear Transformations in Machines
   - DC Machine

- Synchronous Machine
- 3-phase Induction Machine
- Advanced Machines