Course Syllabi: UEE841 Industrial Electronics (L : T : P :: 2 : 1 : 2)

1. **Course number and name:** UEE841; Industrial Electronics

2. **Credits and contact hours:** Credits: 3.5; Hours: 5

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

   - *Dubey, G.K., Power Semiconductor Controlled Drives, Prentice Hall inc. (1989).*
   - *Paul, B., Industrial Electronic and Control, Prentice–Hall of India Private Limited (2004).*
   - *Dubey, G.K., Fundamentals of Electric Drives, Narosa Publications (2001).*
   - *Sen, P.C., Thyristor DC Drives, John Wiley and Sons (1981).*

     a. Other supplemental materials
        - Nil

4. **Specific course information**
   a. Brief description of the content of the course (catalog description)

   Conventional DC and AC Traction: Electric traction services, Nature of traction load, Coefficient of adhesion, Load sharing between traction motors, Main line and suburban train configurations, Calculation of traction drive rating and energy consumption. Important features of traction drives, Conventional DC and AC traction drives, Diesel electric traction.
   Static converters for Traction: Semiconductor converter controlled drive for AC traction, Semiconductor chopper controlled DC traction.
   Illumination: Nature of light, Basic laws of illumination, Light sources and their characteristics, Light production by excitation and ionization, Incandescence and fluorescence, Different types of lamps, their construction, Operation and characteristics, Applications, Latest light sources, Design of illumination systems electric heating, Advantages of electric heating, Resistance heating, Temperature control of furnaces, Induction and dielectric heating.
   Power Supplies: Performance parameters of power supplies, Comparison of rectifier circuits, Filters, Regulated power supplies, Switching regulators, Switch mode converter, Power factor control, Static reactive power compensation, Shunt reactive power compensator, Application of static SCR controlled shunt compensators for load compensation, Power factor improvement and harmonic control of converter fed systems, Methods employing natural and forced commutation schemes, Methods of implementation of forced commutation.
   Motor Control: Voltage control at constant frequency, PWM control, Synchronous tap changer, Phase control of DC motor, Servomechanism, PLL control of a DC motor.
   Laboratory Work: Performance parameter of various power converters, Sequence control of AC-AC power converter, Comparison of AC-DC converters with and without filters, Four quadrant AC and DC drive, Project on illumination, Simulation of power converters using Matlab.

5. **Specific goals for the course**
   After the completion of the course, the students will be able to:
   - Simulate and analyse the semiconductor controlled AC and DC drive system.
   - Design and develop an illumination system for domestic, industry and commercial sites.
   - Design an electric heating system for industrial purposes.
   - Equip the skill to design and develop a regulated power supply.

- Simulate and analyse the series and shunt compensators for power factor improvement in drive system.

6. **Brief list of topics to be covered**
    - Conventional dc and ac Traction
    - Static converters for Traction
    - Power supplies
    - Motor control