EE 551: POWER & ENERGY SYSTEMS LAB (0-0-6: 3)

Group A - POWER SYSTEM LABORATORY

Suggested List of Experiments

1. P-Q Control of Synchronous machine.
2. Reactive power control of artificial transmission line.
3. Sequence reactances and fault studies on synchronous machine.
4. Reactive control by tap changing transformers.
5. Testing of Static relays, 3 - zone distance Protection scheme.
6. Digital Mapping of distribution Networks.
7. Measurement of High AC voltages using sphere gap.
8. Determination of breakdown strength of oil.
9. Generation of different impulse waveforms.
10. To plot the time current characteristics of an induction type over current relay.

Group B - POWER ELECTRONICS & DRIVES LABORATORY

Suggested List of Experiments

1. Study of three-phase full and half controlled converter with R-L and R-L-E loads.
2. Study of DC to DC switched mode converter.
3. Study of single-phase SPWM based voltage source inverter.
4. Study of three-phase SPWM based voltage source inverter.
5. Study of resonant converter.
6. Torque-speed characteristic of a separately excited DC motor drive fed by 6-pulse fully controlled rectifier.
7. Study of PC based DC drive for two-quadrant operation.
8. Study of a four-quadrant separately excited DC motor drive.
9. Implementation of space vector modulation with DSP for V/f control of induction motor drive.
10. Implementation of space vector modulation with FPGA/DSP for V/f control of induction motor drive.

Group C – INSTRUMENTATION & CONTROL LABORATORY

Suggested List of Experiments

1. **Measurement of liquid level:** Automatic water level detection using float and resistive pot. And it will be calibrated with a manual level measurement.
2. **Measurement of velocity:** Measurement of rotational speed will be done using hall sensor and its assembly.
3. **Bridge Linearity technique using Op-AMP:** Not linear device response will be linearized by using different linearization technique specially using inverse function with the help of operational amplifier.
4. **Measurement of Phase Difference Using X-OR and SR Flip-Flop Methods:** To measure the phase difference of two signals different phase measurement technique has to be studied. For 360 degree phase different measurement X-OR and SR Flip-flop technique generally use in industry.
5. **Two Position digital controller with dead-Zone:** On-off control with a dead zone (or hysteresis band) is generally use for its simplicity. When controlled variable have some noise then simple on-off control does not work. It that situation a certain band is incorporated to avoid flicker in the controller action.

6. **RS485 communications:** RS485 protocol for data communication is very important for short distance communication.
7. **Sample and Hold Circuit:** The first step of Digital signal processing is analog to digital conversion. The sample and hold operation is the important step in analog to digital conversion. Here we will study different sampling criteria and it's linked with data lose and storage requirement.
8. **Clipping circuit:** To limit the voltage or current electronics clipper circuit is used. Here we will study half wave and full wave clipper circuits and controlling of limit point.
9. **Opto-coupler:** Opto-coupler also called opto-isolator. It is use for isolating electrical high voltage from electrical control signal.
10. **Photo Interrupter sensor:** Photo interrupter sensor generally use to sense the obstruction. By using photo interruption sensor we will measure the rotational speed.
11. **Voltage to frequency converter:** Voltage transmission is erroneous for long distance communication. To send a voltage signal it is often require converting it to frequency. And in the receiver end it will again converted to voltage signal using frequency to voltage converter.