

PEI310: POWER SYSTEM INSTRUMENTATION

L	T	P	Cr
3	0	0	3.5

Course Objectives: To understand the concepts of Power System Instrumentation, to enable design an selection of Power System Instrumentation sub-systems

Power System Introduction: Structures of power systems. Conventional and unconventional sources of electric energy, Representation of power system components, Per unit (PU) system. Representation of power system components, Per unit (PU) system.

Energy Storage: Energy storage methods, Secondary batteries, Fuel cells, Hydrogen energy system, Energy management systems, Electronics instrumentation schemes adopted for energy conservation and energy audit.

Transmission lines: Inductance and resistance of transmission lines, Capacitance of transmission lines, Characteristics and performance of power transmission lines, Instrumentation scheme used for HVDC and HVAC transmission systems.

Automatic Generation and Voltage Control: Load frequency control, Automatic voltage control, Digital LF controllers, Decentralized control, Load–flow studies, Automatic load dispatch using computers, Software used for optimum generator allocation, Instrumentation scheme for operation and maintenance of generation units.

Instrumentation schemes for monitoring and control: Instrumentation schemes for monitoring and control of various parameters of power plants through control panels, Computer based data acquisition system for power plant operation, Maintenance and protection, Use of SCADA in power systems.

Signal Transmission Techniques: Analog pulse and digital modulation, AM, FM, AM and FM Transmitter and receiver, Digital Transmission Technique, Error detection.

Power Plant Instrumentation: Hydroelectric Power Plant Instrumentation, Thermal Power Plant Instrumentation.

Course learning outcome (CLO): After the completion of the course the students will be able to

1. Identify energy storage methods
2. Work on transmission lines and instrumentation scheme used for HVDC
3. Handle automatic generation and voltage control in power generation station.
4. Identify instrumentation schemes for monitoring and control
5. Apply signal transmission techniques for sharing process information

Recommended Books:

1. Chakrabarti, A., Soni, M.L., Gupta, P.V. and Bhatnagar, U.S., *A Text Book on Power System Engineering*, Dhanpat Rai and Co. (P) Ltd. (2008).
2. Nath, R., and Chandra, M., *Power System Protection and Switchgear*, New Age International (P) Limited, Publishers (2003).
3. Liptak, B.G., *Instrument Engineers Handbook*, Butterworth, Heinemann (2002) 3rd ed.

Evaluation Scheme:

Evaluation Elements	Weightage (%)
MST	30
EST	50
Sessionals (May include Assignments/ Projects/ Tutorials/ Quizes/ Lab Evaluations)	20