GUJARAT TECHNOLOGICAL UNIVERSITY
DIPLOMA IN POWER ELECTRONICS
SEMESTER: V

Subject Name: **Power System Protection**

Sr. No.	Course content
1.	**Basics of Power System Protection:** • Dependence of modern society on electric supply • Faults and abnormal operating condition • Classification of faults • Evaluation of power systems • A protection system its attributes • System transducer • Various power system elements that need protection • Various principles of power system protection
2.	**Over Current Protection on Transmission Lines:** • Fuse • Thermal relays • Over current relay • Implementation of over current relay using induction disk • Application of definite time OC relays for protection of a distribution feeder • Application of inverse definite minimum time relay on a distribution feeder • Protection of a three phase feeder • Directional over current relay • Drawbacks of over current relay
3.	**Differential Protection:** • Dot markings • Simple differential protection • Zone of protection of the differential relay • Actual behaviour of a simple differential scheme • Percentage differential relay • Earth leakage protection
4.	**Transformer Protection:** • Types of transformers • Phasor diagram for a three phase transformer • Equivalent circuit of transformer • Types of faults in transformers • Over current protection • Percentage differential protection of transformers • Inrush phenomena • High resistance ground faults in transformers

	• Inter-turn faults in transformers • Incipient faults in transformers • Phenomenon of over fluxing in transformers • Transformer protection application chart
5.	**Distance Protection in Transmission Lines:** • Drawbacks of over current protection • Simple impedance relay • Reactance relay • Mho relay • Comparison between distance relays • Distance protection of a three phase line • Reasons for inaccuracy of distance relay reach • Three stepped distance protection • Trip contact configuration for the three stepped distance protection • Three stepped protection of three phase line against all shunt faults • Impedance seen from relay side • Three stepped protection of double end fed lines
6.	**Circuit Constants in Relation to Circuit Breaking:** • Circuit breaker rating • Circuit contestant and circuit conditions • Restriking voltage transient • Characteristics of restriking voltage • Interaction between the breaker and circuit • Current chopping • The duties of switchgear
7.	**Theory and Practice of Conventional Circuit Breaking:** • Automatic switch • Air break circuit breaker • Oil circuit breakers • Single and multi-break construction • Air blast circuit breaker • Performance of circuit breakers and system requirements • Modification of circuit breaker duty by shunt resistors • Power factor correction by series resistance • Comparative merits of different types of conventional circuit breaker
8.	**Recent Development in Circuit Breakers:** • Modern trends • Vacuum circuit breaker • Sulphur hexafluoride (SF_6) Circuit breakers • D. C. circuit breaker

Reference Books:

1. Fundamental of Power System Protection by Y. G. Paithankar, S. R. Bhide.
2. Power System Protection And Switchgear by B Ravindranath, M Chander.
3. Switch Gear And Protection by Sunil S. Rao.