



**C. U. SHAH UNIVERSITY**  
**Wadhwan City**

**FACULTY OF:** - Technology & Engineering

**DEPARTMENT OF:** -Electrical Engineering

**SEMESTER:** - VII

**CODE:** - 4TE07PSP1

**NAME** –Power System Protection

**Teaching & Evaluation Scheme**

Subject Code	Name of the Subject	Teaching Scheme (Hours)				Credits	Evaluation Scheme							
		Th	Tu	Pr	Total		Theory				Practical (Marks)			Total
							Sessional Exam		University Exam		External		University	
							Marks	Hrs	Marks	Hrs	Pr/Viva	TW	Pr	
4TE07PSP1	Power System Protection	3	0	2	5	4	30	1.5	70	3	--	20	30	150

**Objectives**

- To study various types of Relay for the protection along with their design and working.
- To Study various advance protection techniques for transmission lines and testing of same apparatus.

**Prerequisites**

- Basic of Protection Strategies and Switch gears.

**Course Outlines**

Sr. No.	Course Contents	Hours
1	<b>Introduction:</b> Requirements of protective systems- primary and auxiliary protection, types of backup, essential requirements of protective systems basic terminology- method of discrimination, instrument transformer.	02
2	<b>Different Relays, it's Characteristics And Application:</b> Operating principles and constructional features of electromagnetic relays classification of relays, principle, types of electromagnetic relays- theory of induction relay torque- various types of induction relays- general equations of electromagnetic relays, over current relays, instantaneous over current relay plug setting and time multiplying setting in induction disc relays- directional relays, differential relays, distances relays etc. applications.	14
3	<b>Carrier Aided Protection Of Transmission Lines:</b> Need for carrier aided protection of transmission lines- various options for carrier. Coupling and trapping the carrier into the desired line section, single line to ground coupling, line to line coupling, unit type carrier aided directional comparison relaying, carrier aided distance scheme for acceleration of zone II,	08

	transfer trip or inter trip, permissive inter trip, acceleration of zone II, reacceleration of zone II, phase comparison relaying (unit scheme)	
4	<b>Apparatus Protection Scheme:</b> Generator protection, transformer protection, Gas operated relay, over current, earth fault, restricted earth fault protection, differential protection, other problems and their remedies, overall generator, transformer protection, protection of small motors, protection of large motor against overload, short circuit, unbalanced	08
5	<b>Numerical Protection:</b> Introduction- block diagram of numerical relay, sampling theorem, correlation with reference wave, Fourier analysis of analog signals, least error squared (LE) technique, digital filtering, simple low pass filter, simple high pass filter, finite impulse response filters, infinite impulse filters, comparison between FIR & IIR filters- block diagram in details for few relays.	08
6	<b>Relay Testing Methods and Equipments:</b> Installation and commissioning tests, special tests, overshoot tests, accuracy tests, range tests and stability tests, test procedure, current injection jet, programmable testing equipments	06

### Learning Outcomes

The students would be able to design and implement various Introduction to Advance power electrical protection devices introduction and principles and applications. Solved software base power analysis and modelling analysis of power system protection devices and real time operation system.

### Books Recommended

1. “Fundamentals Of Power System Protection” by Y. G. Parithankar & S. R. Bhide, 2<sup>n</sup> edition, PHI
2. “Switchgear And Protection” by S. S. Rao, Khanna publication
3. “Protection and Switchgear” ,by Bhavesh Bhalja, R.P.Maheshwari, Nilseh Chotani, 1<sup>st</sup> edition, 2011, Oxford Publication
4. “Art And Science Of Protective Relaying” Masson, PHI Publication
5. “Power System Protection And Switchgear” by B. Ravindranath And M. Chander
6. “Power System Protection” B. Ram , TMH Publication
7. “Modern Power System Protection” by Divyesh Oza, TMH Publication.