

GUJARAT TECHNOLOGICAL UNIVERSITY

ELECTRICAL ENGINEERING

B. E. SEMESTER: VII

Subject Name: **Power System Protection**

Subject Code: **170903**

Teaching Scheme				Evaluation Scheme			
Theory	Tutorial	Practical	Total	University Exam (E)		Mid Sem Exam (Theory) (M)	Practical (Internal)
				Theory	Practical		
3	0	2	5	70	30	30	20

Sr. No.	Course Contents	Total Hrs
1.	Introduction: 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.	Different relays, its characteristics and application: 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.	08
3.	Carrier aided protection of transmission lines : Need for carrier aided protection of transmission lines- various option 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, transfer trip or inter trip, permissive inter trip, acceleration of zone II, preacceleration of zone II, phase comparison relaying (unit scheme)	08
4.	Apparatus protection scheme: 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

	loading, earth fault & under voltage comprehensive motor protection relay-feeder and bus zone protection	
5.	Numerical protection 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.	Relay testing methods and equipments Installation and commissioning tests – special tests – overshoot tests, accuracy tests, range tests and stability tests – test procedure – current injection jet – programmable testing equipments	08

Note: T.W. and Practicals will be based on the above syllabus.

Reference Books:

1. Fundamentals Of Power System Protection – Y. G. Parithankar & S. R. Bhide, 2nd edition, PHI
2. Switchgear And Protection – S. S. Rao, Khanna publication
3. Protection and switchgear ,By Bhavesh Bhalja, R.P.Maheshwari, Nilseh Chotani,1st edition,2011, Oxford Publication
4. Art And Science Of Protective Relaying – Masson
5. Power System Protection And Switchgear – B. Ravindranath And M. Chander
6. Power System Protection – B. Ram , TMH Publication
7. Power System Protection – Patra, Basu , Chaudhar
8. Modern Power System Protection – Divyesh Oza, TMH Publication