GUJARAT TECHNOLOGICAL UNIVERSITY
ELECTRICAL & ELECTRONICS ENGINEERING
B. E. SEMESTER: VII

Subject Name: **Power System Analysis (Department Elective – I)**
Subject Code: **170807**

Teaching Scheme				Evaluation Scheme			
Theory	Tutorial	Practical	Total	University Exam (E)		Mid Sem Exam (Theory) (M)	Practical (Internal)
				Theory	Practical		
4	0	2	6	70	30	30	20

Sr. No	Course Content	Total Hrs.
1.	**Representation of Power System Components:** Introduction, single-phase solution of balanced three phase networks, the one line diagram and impedance or reactance diagram per unit system, complex power, synchronous machine, representation of loads.	6
2.	**Symmetrical Fault Analysis:** Introduction, transient on a transmission line, short circuit of a synchronous machine (on no load), short circuit of a synchronous machine (on load), selection of circuit breaker, algorithm for short circuit studies, Z-BUS formulation.	6
3.	**Symmetrical Component:** Introduction, symmetrical component transformation, phase shift in star delta transformer, sequence impedance of transmission line, sequence impedance and sequence network of power system, sequence impedance and sequence network of synchronous machine, sequence impedance of transmission line and network of transformer, construction of sequence network of a power system.	6
4.	**Unsymmetrical Fault Analysis:** Introduction, symmetrical component analysis of unsymmetrical faults, single line to ground (LG) fault, line-to- line (LL) fault, double line-to- ground (LLG) fault, open conductor fault bus impedance matrix method for analysis of unsymmetrical shunt fault.	6

5.	**Power System Stability:** Introduction, maximum steady state power, power angle diagram, steady state stability, transient steady stability, the swing equation, equal area criterion, application of equal area, criterion critical clearing angle, factor affecting and methods of its improvement.	5
6.	**Load Flow Studies:** Introduction, network model formulation, formation of Y-BUS by singular transformation, load flow problem, Gauss-seidel method, Newton-raphson method, decoupled load flow methods, control of voltage profile.	6
7.	**Interconnected system:** Introduction, parallel operation of alternator, condition necessary for successful parallel operation, synchronizing current, synchronizing power, synchronization torque, effect of the increasing the excitation of one of the alternator, effect of the increasing the torque of prime mover of one of the alternator, effect of change of speed of one of the alternator, effect of unequal voltage, load sharing of two of the alternator, synchronous machine of infinite bus bar, economic loading of alternator, condition for economic loading of alternator running in parallel, interconnected station, load sharing, power limit of interconnectors, load dispatching.	10

Laboratory & Assignments:

Simulation studies of power system analysis using MATLAB

Text Books:

1. Nagrath, I.J. and Kothari, D.P., "Power System Engineering", Tata McGraw Hill, New Delhi 1994.
2. Grainger John, J. and Stevenson, Jr. W.D., "Power System Analysis", McGraw Hill, 1994.

Reference Books:

1. Kundur, P., "Power System Stability and Control", McGraw Hill, 1994.
2. Kimbark, E.W., "Power System Stability, Vol. I: Elements of Stability Calculations", Johns Wiley & Sons, 1948.
3. Gupta, B.R., "Power System Analysis and Design", S. Chand & Company Limited, 2008.
4. Wadhva, C.L., "Electrical Power Systems", New Age International, 2005.
5. Mahalanabis, A.K., Kothari, D.P. and Ahson, S.I., "Computer Aided Power System analysis and Control", Tata McGraw Hill, New Delhi, 1988.
6. Chakrabarti, A., Kothari, D.P. and Mukhopadhyay, A.K., "Performance, Operation and Control of EHV Transmission System", Wheeler Publication, New Delhi, 1995.
7. Indulkar, C.S. and Kothari D.P., "Power System Transients: A Statistical Approach", Prentice Hall of India, New Delhi, 1996.