C.U.SHAH UNIVERSITY

FACULTY OF: Technology & Engineering
DEPARTMENT OF: Electrical Engineering
BRANCH: Electrical Engineering
SEMESTER: VI
COURSE: B.Tech
CODE: 4TE06PSA1
NAME – Power System Analysis

Teaching & Evaluation Scheme

Subject Code	Name of the Subject	Teaching Scheme (Hours)				Credits	Evaluation Scheme							
							Theory				Practical (Marks)			Total
		Th	Tu	Pr	Total		Sessional Exam		University Exam		Internal		University	
							Marks	Hrs	Marks	Hrs	Pr/Viva	TW	Pr	
4TE06PSA1	Power System Analysis	4	0	2	6	5	30	1.5	70	3	--	20	30	**150**

OBJECTIVES

1. To study various Electrical switching and power protective devices namely Synchronous machines, Transformers, Transmission lines, one line diagram, Impedance diagram and power transformer mathematical modelling of physical systems.
2. To study design and implementation of modelling circuits using Power Symmetrical and un-symmetrical components.
3. To study design and simulation of load flow diagram using in power systems.

PREREQUISITES

1. Basics and fundamental power system symmetrical and unsymmetrical components are find stability and load flow and analysis.

COURSE OUTLINES

Sr. No.	Course Contents	Hours
1	**Representation Of Power System Components:** Synchronous machines, Transformers, Transmission lines, one line diagram, Impedance diagram, per unit system. **Symmetrical Components:** Symmetrical components of unbalanced phasors, power in terms of symmetrical components, sequence impedances and sequence networks.	12

2	**Symmetrical Fault Analysis:** Transient in R-L series circuit, calculation of 3-phase short circuit current and reactance of synchronous machine, internal voltage of loaded machine under transient conditions, per-unit methods. **Unsymmetrical Fault Analysis:** Analysis of single line to ground fault, line to line fault and double line to ground fault on unloaded generators and power system network with and without fault impedance. Formation of Z-bus using singular transformation and algorithm, computer method for short circuit calculations, per-unit methods.	16
3	**Load Flow:** Introduction, bus classification, nodal admittance matrix(Y Bus), development of load flow equations, load flow solution using Gauss Siedel and Newton-Raphson method, approximation to N-R method, line flow equations and Fast decoupled method.	10
4	**Power System Stability:** Stability and stability limit, Steady state stability study, derivation of Swing equation, transient stability studies by equal area criterion and step-by-step method, Factors affecting steady state and transient stability and method of improvement. **Travelling Waves:** Wave equation for uniform Transmission lines, velocity of propagation, surge impedance, reflection and transmission of travelling waves under different line loadings, Bewlay's lattice diagram, protection of equipments and line against travelling wave.	16

Learning Outcomes

After the completion of this course the students would be able to**:**

1. Design and implement various industrial and mathematical electrical power system.
2. Understand mathematical analysis of switching and protective devices in advanced electrical power systems.
3. To understand advance power system analysis.

Books Recommended

1 W.D. Stevenson, "Elements of Power System Analysis", Mc Graw Hill.

2 C.L. Wadhwa, "Electrical Power Systems", New Age International.

3 T.K Nagsarkar and M.S. Sukhija, "Power System Analysis", Oxford University Press, 2007.

4 Hadi Sadat, "Power System Analysis", Tata McGraw Hill.

5 J.D. Glover, M.S. Sharma and T.J. Overbye, "Power System Analysis and Design", Thomson, 2008.

6 Stagg and El-Abiad, "Computer Methods in Power System Analysis", Tata Mc Graw Hill.

7 Kothari and Nagrath, “Modern Power System Analysis”, Tata Mc Graw Hill.