

COURSE NAME : DIPLOMA IN ELECTRICAL POWER SYSTEM

COURSE CODE : EP

SEMESTER : FIFTH

SUBJECT TITLE : ELECTRICAL POWER SYSTEM ANALYSIS

SUBJECT CODE : 9093

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme						
TH	TU	PR	PAPER HRS.	TH	TEST	PR	OR	TW	TOTAL
04	-	-	03	80	20	-	-	-	100

RATIONALE:

Power utilities need Power System Engineer with thorough knowledge in power system for its operation and control. This requires analysis of its performance under various working conditions.

For learning this subject knowledge of Electrical Power Generation and Transmission & distribution System is necessary. This subject deals with the representation of the power system network, analyse its components and determine its performance by analytical as well as graphical methods. This subject provides the basic knowledge required for studying power system operation & control. These also help in learning Power Quality & deregulation System.

Though this subject is theory oriented, practical visualization is possible through small project.

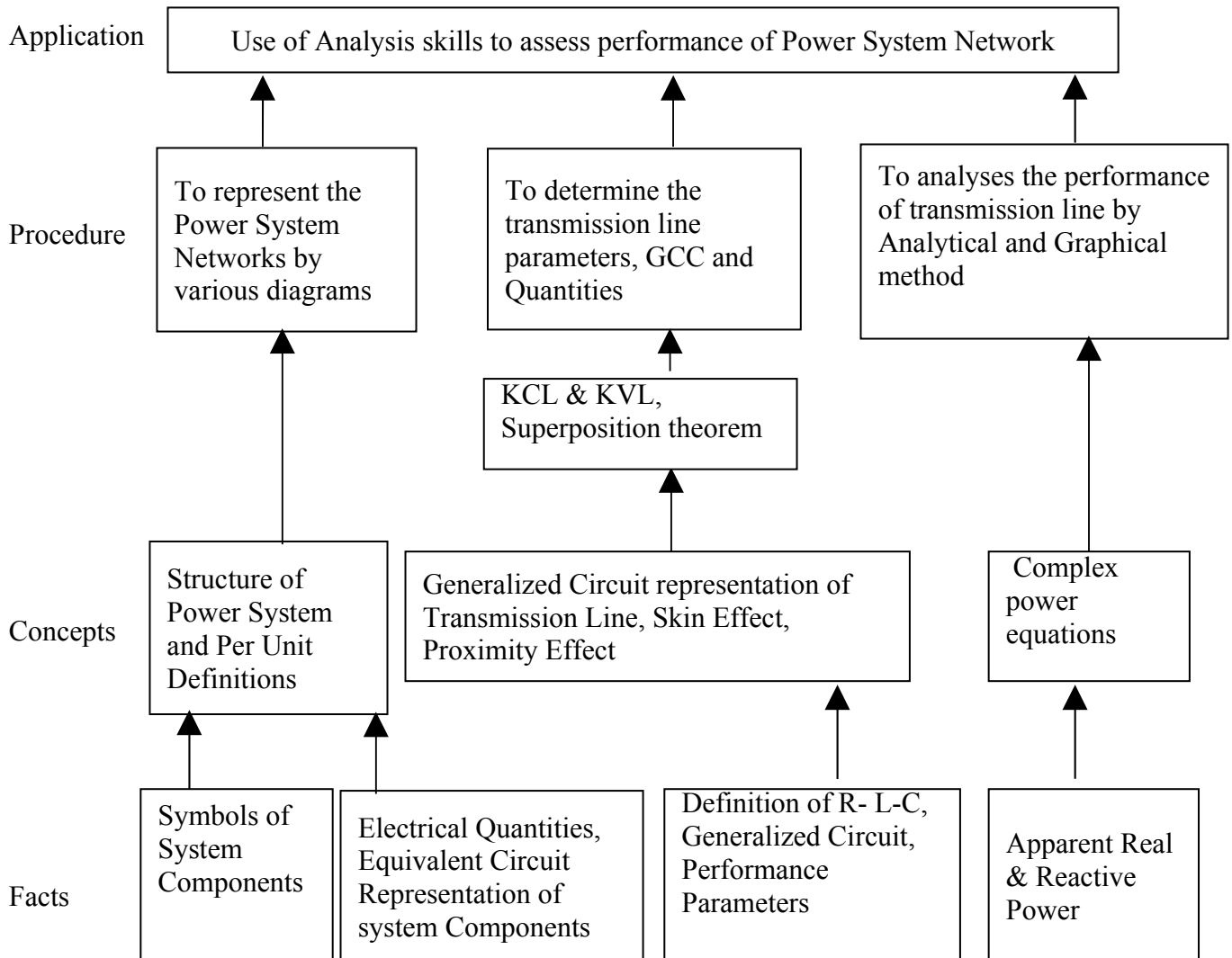
By learning this subject student will be able to develop intellectual skills such as interpretation of single line diagrams, and analysis skill.

OBJECTIVES:

Students will be able to

- Identify Power System Components
- Draw the different diagrams of given Power System.
- Calculate values of line parameters.
- Determine the complex power value of power system.
- Analyse the system performance analytically & graphically

Learning Structure:



Contents: Theory

Chapter	Name of the Topic	Hours	Marks
01	Representation of Power System 1.1 Basic Structure of Power System. 1.2 Equivalent Circuit representation of the System components. 1.3 Single line diagram. 1.4 Impedance diagram. 1.5 Reactance diagram. 1.6 Per unit Calculations. 1.7 Aspects of Power System analysis. 1.8 Role of power system Engineer.(Numerical on above topics)	08	12
02	Transmission Line Parameter 2.1 Resistance 2.1.1 Concept of transmission line resistance. 2.1.2 Difference between A.C. resistance & D.C. resistance. 2.1.3 Influence of skin effect and proximity effect on Line conductors. 2.1.4 Effect of temperature on Transmission line resistance.(No derivation) 2.1.5 Effect of resistance on line performance. 2.2 Inductance 2.2.1 Concept of Transmission Line Inductance. 2.2.2 Significance of inductance. 2.2.3 Flux linkage of isolated current carrying conductor due to internal and external flux .(Derivation only) 2.2.4 Inductance of single-phase line composed of solid conductors & bundled conductors. (No Numerical) 2.2.5 Concept of self G.M.D. and mutual G.M.D. (Numerical) 2.2.6 Inductance of single phase line composed of composite conductors. (No derivation) Numerical 2.2.7 Inductance of three phase line (single circuit) composed of solid conductors with symmetrical and asymmetrical spacing. 2.2.8 Inductance of double circuit line (influence of G.M.D. and G.M.R on inductance) (No derivation and No numerical)	20	24

	<p>2.3 Capacitance</p> <p>2.3.1 Concept of Line capacitance.</p> <p>2.3.2 Significance of capacitance.</p> <p>2.3.3 Potential difference between two points due to charged conductors (Gauss's Law.)</p> <p>2.3.4 Potential difference between two conductors in a group of charged conductors.</p> <p>2.3.5 Capacitance of single phase line composed of solid Conductors and duplex bundled conductors. (Numerical)</p> <p>2.3.6 Capacitance of three phase line(single circuit) with symmetrical spacing. (Numerical)</p> <p>2.3.7 Effect of earth field on transmission line capacitance.</p> <p>2.3.8 Capacitance of single phase line with solid conductors considering earth.</p> <p>2.3.9 Capacitance of three phase line with solid conductors considering earth field. (No derivation and numerical)</p>		
03	<p>Generalized Circuit</p> <p>3.1 Concept of generalized circuit constants.</p> <p>3.2 Generalized circuit constants of short, medium & long transmission line. (No derivation) Numerical</p> <p>3.3 Generalized circuit constants of two networks connected in series & connected in parallel. (only derivation)</p> <p>3.4 Measurement of Generalized circuit constant.</p> <p>3.5 Advantages of Generalized circuit representation.</p>	14	20
04	<p>Power Flow</p> <p>4.1 Concept of Complex Power ($S=V I^*$), Real Power and reactive Power.</p> <p>4.2 Derivation of complex power, real power, reactive power for sending end as well as receiving end of the tr.line using GCE(Numerical)</p> <p>4.3 Condition for maximum power (Numerical)</p> <p>4.4 Concept of reactive power compensation and equipments used.</p>	12	12

05	Circle Diagram	10	12
	5.1 Concept of circle diagram.		
	5.2 Receiving end circle diagram.(procedure and numerical)		
	5.3 Determination of ratings of reactive power compensating equipments. (procedure and numerical)		
	5.4 Sending end circle diagram. (procedure and numerical)		
5.5 Advantages of circle diagram.			
Total		64	80

Proposed Mini projects:

Design a Simulated model of transmission line (base on it's equivalent circuit) and conduct the tests to determine it's GCC.

Learning Resources:

Books:

Sr. No.	Author	Title	Publisher
1.	B.R. Gupta	Power system Analysis and Design	Wheeler Publication
2.	I. J. Nagrath & D. P. Kothari	Power system Analysis	Tata McGraw Hill Publication
3.	John J. Graninger & Wiliam D. Stevenson J.R.	Power system Analysis	Tata McGraw Hill Publication
4.	J.B. Gupta	Electrical Power	S. K. Kataria & sons, Delhi-06
5.	S. S. Vadhera	Power system Analysis & Stability	Khanna Publication, Delhi
6.	C. N. Navalekar	Power Quality Enhancement Technology	Tata Liebert Ltd.