EE Department
Topics for Qualifying Exams in Power

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Text:
Power System Analysis and Design, Glover and Sarma, Third Edition, *Brooks/Cole,* 2002.

Objectives:

1- Solve problems involving phase angles, line-line or line-neutral voltages and line or phase currents for a three-phase power system.

2- Obtain single-phase and three-phase real and reactive power and the power factor.

3- Solve power factor correction problems.

4- Model power system transmission lines.

5- Model single phase and three-phase transformers.

6- Model synchronous machines.

Exam Topics:

1- Fundamental: Phasors, Instantaneous Power in Single-Phase ac Circuits, Complex Power, Network Equations, Balanced Three-Phase Circuits, Power in Balanced Three-Phase Circuits, Advantages of Balanced Three-Phase Versus Single-Phase Systems

2- Power Transformers: The Ideal Transformer, Equivalent Circuits for Practical Transformers, The Per-Unit System, Three-Phase Transformer Connections and Phase Shift, Per-Unit Model of Three-Phase Two-Winding Transformers, Three-Winding Transformers, Autotransformers

3- Fundamentals of Electrical Machines: DC, Synchronous, and AC machines

4- Transmission Lines Parameters: Transmission-Line Design Considerations, Resistance, Conductance, Inductance (Solid Cylindrical Conductor), Inductance (Single-Phase Two-Wire Line and Three-Phase Three Wire Line with Equal Phase Spacing), Inductance (Composite Conductors, Unequal Phase Spacing, Bundled Conductors), Series Impedances (Three-Phase Line with Neutral Conductors and Earth Return), Capacitance (Single-Phase Two-Wire Line and Three-Phase Three-Wire Line with Equal Phase Spacing), Capacitance (Stranded Conductors, Unequal Phase Spacing, Bundled Conductors), Parallel Circuit Three-Phase Lines.

5- Transmission Lines: Steady-State Operation: Medium and Short Line Approximations, Transmission-Line Differential Equations, Equivalent π Circuit, Maximum Power Flow, Line Loadability, Reactive Compensation Techniques

6- Power Flow Analysis: The Power-Flow Problem