BONAM VENKATA CHALAMAYYA INSTITUTE OF TECHNOLOGY & SCIENCE
(An Autonomous Institution)
Amalapuram–533201,Dr. B.R.Ambedkar Konaseema DT,Andhra Pradesh.
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
(Accredited by NBA)

III Year II Semester Course Code: 23EE6T12	POWER SYSTEM ANALYSIS (PROFESSIONAL CORE)	L	T	P	C
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Pre-requisite:

Concepts of electrical circuits and power systems-II

Course Objectives:

- To develop the impedance diagram (p.u) and formation of Y_{bus}
- To learn the different load flow methods.
- To learn the Z_{bus} building algorithm.
- To learn short circuit calculation for symmetrical faults
- To learn the effect of unsymmetrical faults and their effects.
- To learn the stability of power systems and method to improve stability.

Course Outcomes:

After the completion of the course the student should be able to:

CO1: Draw impedance diagram for a power system network and calculate per unit quantities.

CO2: Apply the load flow solution to a power system using different methods.

CO3: Form Z_{bus} for a power system networks and analyse the effect of symmetrical faults.

CO4: Find the sequence components for power system Components and analyse its effects of unsymmetrical faults.

CO5: Analyse the stability concepts of a power system.

UNIT - I

Circuit Topology

Graph theory definitions – Formation of element node incidence and bus incidence matrices – Primitive network representation – Formation of Y_{bus} matrix by singular transformation and direct inspection methods.

Per Unit Representation

Per Unit Quantities–Single line diagram – Impedance diagram of a power system – Numerical Problems.

UNIT - II

Power Flow Studies

Necessity of power flow studies – Derivation of static power flow equations – Power flow solution using Gauss-Seidel Method – Newton Raphson Method (Rectangular and polar coordinates form) – Decoupled and Fast Decoupled methods – Algorithmic approach – Numerical Problems on 3–bus system only.

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UNIT - III

Z-Bus Algorithm

Formation of Z_{bus}: Algorithm for the Modification of Z_{bus} Matrix (without mutual impedance) – Numerical Problems.

Symmetrical Fault Analysis

Reactance's of Synchronous Machine – Three Phase Short Circuit Currents -Short circuit MVA calculations for Power Systems – Numerical Problems.

UNIT - IV

Symmetrical Components

Definition of symmetrical components – symmetrical components of unbalanced three phase systems – Power in symmetrical components – Sequence impedances and Sequence networks of Synchronous generator , Transformers and Transmission line-Numerical Problems.

Unsymmetrical Fault analysis

Various types of faults: LG– LL– LLG and LLL on unloaded alternator- Numerical problems.

UNIT - V

Power System Stability Analysis

Elementary concepts of Steady state – Dynamic and Transient Stabilities – Swing equation – Steady state stability – Equal area criterion of stability – Applications of Equal area criterion – Factors affecting transient stability – Methods to improve steady state and transient stability – Numerical problems.

Text Books:

1. Power System Analysis by Grainger and Stevenson - Tata McGraw Hill.2003
2. Modern Power system Analysis – by I.J.Nagrath & D .P.Kothari: Tata McGraw–Hill Publishing Company - 3rd edition - 2007.

Reference Books:

1. Power System Analysis – by A.R.Bergen - Prentice Hall - 2nd edition - 2009.
2. Power System Analysis by HadiSaadat – Tata McGraw–Hill 3rd edition - 2010.
3. Power System Analysis by B.R.Gupta - A H Wheeler Publishing Company Limited - 2007.
4. Power System Analysis and Design by J.Duncan Glover - M.S.Sarma - T.J.Overbye – Cengage Learning publications - 6th Edition - 2015.

Online Learning Resources:

1. https://archive.nptel.ac.in/courses/117/105/117105140
2. https://archive.nptel.ac.in/courses/108/105/108105104