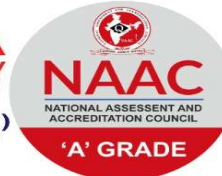




VISAKHA
INSTITUTE OF ENGINEERING & TECHNOLOGY
 Approved by AICTE NEW DELHI
 (Affiliated to JNTUGV, VIZIANAGARAM)
 88th Division, Narava, GVMC, Visakhapatnam-530027
DIPLOMA ENGINEERING | MANAGEMENT



COLLEGE CODE
VSPT

LECTURE SCHEDULE FOR POWER SYSTEM ANALYSIS

NAME OF THE FACULTY:

DESIGNATION: ASSISTANT PROFESSOR

BRANCH: EEE

DEPARTMENT: ELECTRICAL AND ELECTRONICS ENGINEERING

YEAR/SEM: III/II

ACADEMIC YEAR: 2023-24

REGULATION: R-20

SUBJECT CODE:

Course Objectives:

CO1. To develop the impedance diagram (p.u) and formation of Ybus

CO2. To learn the different load flow methods.

CO3. To learn the Zbus building algorithm.

CO3. To learn short circuit calculation for symmetrical faults

CO4. To learn the effect of unsymmetrical faults and their effects.

CO5. To learn the stability of power systems and method to improve stability.

Unit No	Proposed date of completion	Name of the Topic	Text books/ Reference books	No. of classes required	Actual date of completion	Mode of Teaching
Bridge Course						
Bridge course		Introduction to Power Generation and Transmission: Components of power systems		1		CHALK AND TALK
		Basic Definitions, Energy and Energy Relationships, Sources of energy		1		
		Electrical energy generation arrangement		1		
		Power generation fundamental problem, Basic power station design considerations		1		
		Basic Definition/Terminology: Why do we need new transmission?		1		
		Goals of Transmission Planning		1		
TOTAL				6		
Circuit Topology & Per Unit Representation						
I		Graph theory definition		1		CHALK AND TALK
		Formation of element node incidence matrices		2		
		Formation bus incidence matrices		2		
		Primitive network representation		1		
		Formation of Y-bus matrix by singular transformation methods.		1		
		Formation of Y-bus matrix by direct inspection methods.		1		
		Problems		1		
		INTRODUCTION: Per Unit Quantities		1		
		Single line diagram and Problems		1		
		Impedance diagram of a power system and Problems		1		
		Problems		1		
		REVISION		1		
		TEST		1		
TOTAL				15		

Power Flow Studies						
II		INTRODUCTION	T2/R2	1		CHALK AND TALK
		Necessity of power flow studies		1		
		Derivation of static power flow equations		1		
		Power flow solution using Gauss-Seidel Method		1		
		Problems		2		
		Newton Raphson Method (Rectangular and polar coordinates form)		1		
		Problems		2		
		Decoupled and Fast Decoupled methods (Algorithmic approach)		1		
		Problems on 3-bus system only.		3		
		REVISION		1		
	TEST	1				
TOTAL			15			
Z-Bus formulation and Symmetrical Fault Analysis						
III		INTRODUCTION	T2/R2	1		CHALK AND TALK
		Formation of Z-Bus: Partial network		1		
		Algorithm for the Modification of Zbus Matrix for addition element for the following cases: Addition of element from a new bus to reference		2		
		Addition of element from a new bus to an old bus reference		2		
		Addition of element between two old busses		2		
		Problems		1		
		Modification of Z-Bus for the changes in network (Problems).		2		
		INTRODUCTION		2		
		3-Phase short circuit currents of synchronous machine		1		
		Problems		1		
		3-Phase short circuit reactances of synchronous machine		1		
		Problems		1		
		Short circuit MVA calculations.		2		
		Problems		1		
		REVISION		1		
		TEST		1		
	TOTAL			23		
Symmetrical Components & Unsymmetrical Fault analysis						
		INTRODUCTION		1		
		Synthesis of unsymmetrical phasor from their symmetrical components		1		
		Symmetrical components of unsymmetrical phasor		1		
		Phase - shift of symmetrical components in Y- Δ		2		

IV		Power in terms of symmetrical components	T2/R2	1	CHALK AND TALK
		Sequence networks – Positive, negative and zero sequence networks		2	
		Various types of faults LG– LL– LLG and LLL on unloaded alternator		1	
		Unsymmetrical faults on power system.		2	
		Problems		1	
		REVISION		1	
		TEST		1	
TOTAL			14		
Power System Stability Analysis					
V		INTRODUCTION	T2/R2	1	CHALK AND TALK
		Elementary concepts of Steady state		1	
		Dynamic and Transient Stabilities		1	
		Description of Steady State Stability Power Limit		1	
		Transfer Reactance, Synchronizing Power Coefficient		2	
		Power Angle Curve and Determination of Steady State Stability		1	
		Derivation of Swing Equation		1	
		Determination of Transient Stability by Equal Area Criterion		1	
		Application of Equal Area Criterion		1	
		Methods to improve steady state stability.		1	
		Methods to improve transient stability.		1	
		Problems		1	
		REVISION		1	
	TEST	1			
TOTAL			15		
GRAND TOTAL			82		

Course Outcomes:

1. Draw impedance diagram for a power system network and calculate per unit quantities.
2. Apply the load flow solution to a power system using different methods.
3. Form Zbus for a power system networks and analyse the effect of symmetrical faults.
4. Find the sequence components for power system Components and analyse its effects of unsymmetrical faults.
5. Analyse the stability concepts of a power system.

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 - 1998.
4. Power System Analysis and Design by J.Duncan Glover - M.S.Sarma - T.J.Overbye – Cengage Learning publications - 5th edition - 2011.