



**ELECTRICAL AND ENERGY SAVING LAB**

**NITW SIEMENS CENTRE OF EXCELLENCE, NIT WARANGAL**

**Course Name: LOW VOLTAGE SWITCHGEAR (Level - 2)**

**Course Duration: 40 Hrs.**

**Prerequisites: Polytechnic and B.Tech (Elementary)**

DAY	TOPICS	DESCRIPTION	HOUR DURATION		OUTCOME	DAY DURATION
Day 1	Starters (Direct Online Starter)	Introduction to Low Voltage Switch-gear & Functions, Ranges and Real time Applications in Industries	2 hrs.	Forenoon	After completing the session, Trainees able to do understand the Concept of Starters and Know how to Design the circuits of these Starters	8 Hrs.
		Brief on Starters and need of starters				
		Basic of Direct Online starters				
		Components and working of Direct online starters				
		Design power and control circuits				
		Starter line diagram and applications				
		Advantages and disadvantages				
	Starters (Reverse Direct Online Starter)	Basic of Reverse Direct Online starters	2 hrs			
		Components and working of Reverse Direct online starters				
		Design power and control circuits				
		Starter line diagram and applications				
		Advantages and disadvantages				
	Starters (Star Delta Starter)	Brief and purpose of Star delta starter	2hrs	Afternoon		
		Objectives of Star delta starter				
		Components and Working				
Terminals and star delta connections						
Power circuit and Control circuits						
Advantages and disadvantages & Applications						



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		Exercise	Practical on making of Control and Power wiring circuits of DOL, RDOL & Star-Delta starters	2 hrs					
<b>Day 2</b>	<b>Introduction to Induction motors</b>	Introduction of Induction motors & Starting effects	Causes of problems due to starting effects Brief and necessity of Soft starter Block diagrams and Starting principles Characteristics and features (Soft start, Soft stop, Current limiting & Kick start) Differences (Soft starter, DOL starter & Star-Delta starter) Classification of Soft starters Advantages, Disadvantages and Applications	2 hrs	Forenoon	After completing the session, Trainees able to understand the Working and Designing the Control & Power circuits for Soft starters.			
		Soft Starter (3RW44)					2hrs		
		Soft Starter (3RW40)						2hrs	
									Afternoon
							8 Hrs		



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	Exercise	Practical on commissioning of Soft starters (3RW44/40)	2 hrs				
Day 3	Soft Starter (3RW30)	Brief on 3RW44 soft starter & principle of operation	2 hrs	Forenoon	After completing the session, Trainees able to do hands on experience to connect Soft starter to Induction motor and How to connect Human Machine Interface (HMI) and PAC 4200	8 Hrs	
		Configuration and parameterization					
		Commissioning and Technical specifications					
		Advantages and Applications					
	Power Monitoring Device (PAC 4200)	Basics of Theory and Brief on PAC 4200 meter	2 hrs				
		Necessity of PAC 4200 meter					
		Monitoring functions and Communication modules					
		Measuring inputs and Measuring variables functions					
	Human Machine Interface (HMI)	Operation and Control functions	2 hrs				Afternoon
		Basics of HMI					
Wiring diagram of HMI							
Installation and Construction							
Exercise	Features & Specifications	2 hrs					
	Advantages and Applications						
Exercise	Practical on making and working of Soft starter (3RW30), PAC 4200 & Human Machine Interface (HMI)	2 hrs					
Day 4	SIMOCODE PRO V (Siemens Motor Control Device)	Brief on SIMOCODE	3 hrs	Forenoon	After completing the session, Trainees able to do hands on experience to Commissioning the SIMOCODE with TIA portal and able to do the basic control functions	8 hrs	
		Device configuration and parameters					
		Functions (Control, protection and monitoring)					
		Standard functions and Logic modules					
		Overview system components and Features					
		Accessories (Mounting, wiring, connecting)					
		Commissioning and Technical specifications					



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Day 5	Advantages and Areas of applications	3 hrs	Afternoon	8 hrs
	Brief on Control functions			
	Feedback ON function (necessity, benefits & applications)			
	Feedback OFF function (necessity, benefits & applications)			
	Executive ON function (necessity, benefits & applications)			
	Executive OFF function (necessity, benefits & applications)			
	Timers - Operating delay function (necessity, benefits & applications)			
	Timers - Closing delay function (necessity, benefits & applications)			
	Timers - Closing delay with memory function (necessity, benefits & applications)			
	Flickering function (necessity, benefits & applications)			
	Flashing function (necessity, benefits & applications)			
	Emergency start function (necessity, benefits & applications)			
	Test position Feedback function (necessity, benefits & applications)			
	Illumination (necessity, benefits & applications)			
	Changeover switch command function (necessity, benefits & applications)			
	Number of starts function (necessity, benefits & applications)			
	Maintained/Unmaintained functions (necessity, benefits & applications)			
	Overload function (necessity, benefits & applications)			
Cooling down period function (necessity, benefits & applications)				



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		Thermal cooling function (necessity, benefits & applications)			
		Pause time function (necessity, benefits & applications)			
		Lower limit/Upper limit function (necessity, benefits & applications)			
		Pre warning function (necessity, benefits & applications)			
	<b>Exercise</b>	Hands on Practice on SIMOCODE PRO V (Commissioning with TIA portal) and Practice on Basic functions	2 hrs		