	CENTRE OF EXCELLENCE IN MANUFACTURING NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI
	Electrical and Energy Saving Lab

LV Switch Gear products, Distribution & Panel (LVS-WPD)	32 Hours
PREREQUISITES	NIL
WHO SHOULD ATTEND	Students, Engineers

INTRODUCTION TO SWITCH GEAR	8 Hours

Introduction and basic principles of low-voltage switchgear, switching principles-Basic Concepts of fault level, current carrying capacity-Principle of selectivity and cascading

TYPES OF CIRCUIT BREAKERS	24 Hours

Function and operation of 3WL & 3WT circuit Breakers-Installation and de-installation of the standard Accessories-Introduction in protection settings of circuit breakers(characteristic curves)-Overview of communication regarding 3WL air circuit breakers(Only theory)-Maintenance Instructions-Function and operation of 3VA & 3VT MCCB-Installation and de-installation of the standard Accessories-Overview of communication regarding 3VA MCCB-Function and operation of HRC fuse and Switch Disconnect or Fuse-Function and operation of Contactors-SIRIUS Brand, features, Benefits-RLT Contactor, Vacuum Contactor product range, Features-Compactness DOL, RDOL-Overload Relays,

Motor Protection Circuit Breaker function and operation- why MPCB needs to be used-Type-2 Co-ordination and Co-ordination chart Reading-Introduction to Timers and Relays-Introduction of Soft-starter, working principle and range.

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Sentron PAC Meter (LV – PAC)	**Duration: 16 Hours**
PREREQUISITES	NIL
WHO SHOULD ATTEND	Students, Engineers

VARIOUS RANGE OF PAC METERS	**8 Hours**

Need of energy management- Basic concept of energy management – Active, reactive & apparent components, harmonics, power quality, Form factor, crest factor, introduction to industrial tariff, demand measurement, pollution degree, over voltage category, zero blind measurement-PAC Meter 3100- Range, features, benefits, installation guidelines, basic parameterization & communication via gateway-PAC Meter 3200- Range, features, benefits, installation guidelines, basic parameterization & communication via Ethernet

PAC 4200	**8 Hours**

PAC Meter 4200- Range, features, benefits, installation guidelines, basic parameterization & communication Ethernet, Profibus-PAC meter parameterization through Powerconfig software-Logic block function, power consumption (KWh and MD) and Sliding Window Demand in PAC4200-Introduction to report management- Daily reports, cost centre reports, allocation reports-Integration of PAC meter with S7 PLC

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SIMOCODE AC-MOTOR CONTROL(LVSM)	**Duration: 24 Hours**
PREREQUISITES	NIL
WHO SHOULD ATTEND	Students, Engineers

NEED OF SIMOCODE	**8 Hours**

Traditional panel concept-Advantages and disadvantages of traditional panel-Need of SIMOCODE-Expectations from SIMOCODE-Concept of intelligent MCC-Overview including Pro C, PRO S and Pro V versions.

SIMOCODE ES 2007	**16 Hours**

Overview and use of SIMOCODE ES 2007/TIA Portal including: - Configuration of a Reverse starter-Explanation of parameters- Basic unit operation-Operator panel configuration-Expansion modules connected to PRO V-Use of control station to choose suitable ON/OFF operations from various-Control stations-Use of logic modules including truth tables, signal conditioning, timers, counters,-flashing, flickering-Diagnostic functions in SIMOCODE ES 2007 software- Maintenance, service data and online trends-Use of graphic charts-How to use of memory module and addressing plug-Introduction of SIMOCODE into an automation system-Configuration of SIMOCODE ES via TIA Portal hardware configuration- PLC Communications with Cyclic data exchange-Hands on practice and application discussion

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Sinamics DC Master 6RA80 (DR – DCM)		**Duration: 24 Hours**
PREREQUISITES	NIL	
WHO SHOULD ATTEND	Students, Engineers	

BASICS OF DC DRIVE	**8 Hours**
Basics of DC Drive: - a) Basic DC Motor equations b) Three phase-controlled converter Thyristor accessories c) PI Controller d) Block diagram of DC Drive e) Braking & Reversal/ Single & Multi quadrant Drive f) Optimization g) Speed variation techniques	

SINAMICS DC MASTER DRIVE	**8 Hours**
Structure and functional principles of the SINAMICS DC MASTER converter: Control Unit CUD, Power Module, excitation circuit, interfaces- Commissioning and parameterization activities using the BOP20 and AOP30 operator panels as well as the STARTER PC program- BICO Technology, Binary Inputs & Outputs- Procedures for commissioning and functional checks- Optimizing current regulation and closed-loop speed control, automatic optimization	

Function Block Diagrams	**8 Hours**
Function block diagrams: Set point channel, inputs/outputs, free function blocks-Concept of CDS and DDS-Using Micro Memory Card: Structure and data backups-Information on Drive Control Charts (DCC)-Drive-end interface to PROFIBUS / PROFINET-Expansions with Terminal Modules and Sensor Modules via DRIVE-Clip-Parallel connections and peer-to-peer interfaces-Thyristor Checking-Operating states, alarms, and fault codes-Service functions: Trace, measurement functions, diagnostic memories-Practical exercises with AOP30 and STARTER on training equipment	

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Sinamics G120 with starter (DR-G120)	**Duration: 24 Hours**
PREREQUISITES	NIL
WHO SHOULD ATTEND	Students, Engineers

AC MOTOR AND DRIVE	**8 Hours**

Need of Variable Frequency Drive-Types of Motor, Basics of AC Motor, speed variation of AC motors, reversal & braking-Detailed Block diagram of AC Drive-Inverter principle, PWM technique and power switching devices

SINAMICS G - 120 DRIVE	**8 Hours**

Specifications, range, features and hardware details of Sinamics G120-Block diagram of the product, terminal details-Parameter structure and quick commissioning procedure- BICO technology, working with programmable binary and analog inputs and outputs- Control and status word-Using BOP-2, IOP-Set point channel-Signal flow

VARIOUS CONTROL MODES AND HANDS ON PRACTICE	**8 Hours**

Various control modes for Sinamics- G120 and principle of vector control-Using various .Data sets - CDS, DDS-Different types of Braking Methods-Special functions available in various control units of Sinamics G120 family-Positioning possibilities using Sinamics G120-Using Free Function Blocks-STARTER demonstration and practice-PLC Drive Communication over Profibus Diagnostics-Periodic maintenance steps-Cold testing of AC drive-Forming of Capacitors-Hands on practice

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SIRIUS Soft Starter (LV – SS)	Duration: 16 Hours

PREREQUISITES	Nil
WHO SHOULD ATTEND	Students, Engineers

Need of soft starter	8 Hours

Characteristics, speed and torque equation of 3 phase SQIM (Motor)-Different terminologies of the characteristics, DOL starting, S-D starting advantages, disadvantages & Need of soft starter

SIRIUS Soft Starter	8 Hours

Expectorations from electronic soft starter, Block diagram of electronic soft starter-Phase angle control using thyristors & Speed Torque characteristics after usage of soft starter-3RW30,3RW40 and 3RW44 Soft Starter-Direct connection and inside delta connection-Power and control Connections-Different settings required at the time of installation-Information about different starting classes-Motor Protections-Soft Starter ES Smart Software & Diagnostics and messages-Installation Guidelines, Wiring, Components selection for Soft starter feeders-Overview of new generation Soft-starter 3RW50 and 3RW52-Hands On practice