

Competency Certificate  
in  
Electrical Design & Drafting  
Course Outline

## 1. Introduction to Electrical Design

- ✓ Basics of Electrical power system
- ✓ Overview of Generation Transmission and distribution System
- ✓ Power transmission fundamentals
- ✓ Why electrical in MEP Design?
- ✓ Standards – NBC,IEC,IS,NEC,DEWA,ADEWA, NEMA.
- ✓ Selection of luminaries
- ✓ Calculating number of luminaries using RELUX software
- ✓ Exporting from RELUX to Autocad 2D
- ✓ Exporting from RELUX to excel
- ✓ Practical example on RELUX interior lighting design

## 2.Understanding Building Orientation

- ✓ Introduction to architectural Layouts
- ✓ Different types of false ceiling
- ✓ Work plane
- ✓ Brief introduction to elevation view

## 3.Luminare Calculation

- ✓ Introduction to lighting system
- ✓ Lamps and luminaries types
- ✓ Concepts of lighting design
- ✓ Selection of lux for lighting design
- ✓ Room index calculation
- ✓ Calculating COU for lighting design
- ✓ Manual calculation for interior lighting
- ✓ Manual calculation for exterior lighting
- ✓ Manual calculation for emergency lighting
- ✓ Practical example on lighting design

## 4.RELUX software for interior lighting

- ✓ Introduction to RELUX software
- ✓ Step by step Importing AutoCAD file to RELUX
- ✓ Creating scenes for interior lighting design
- ✓ Editing project scenes in RELUX software
- ✓ Diversity factor calculation
- ✓ Applying for approval to service provider(BES)
- ✓ COM,TNEB,BRPL & more)
- ✓ Thumb rule calculation

## 5.RELUX software for exterior lighting

- ✓ Introduction to exterior lighting
- ✓ Selection of luminaire for exterior lighting
- ✓ Basics of street lighting design

## 6. DIALUX software for interior lighting design

- ✓ Introduction to DIALUX software
- ✓ Difference between RELUX and DIALUX
- ✓ First lighting system design
- ✓ Second lighting system design
- ✓ DIALUX bathroom design
- ✓ Emergency lighting design
- ✓ Interior lighting design using blue icon in DIALUX
- ✓ Practical example on DIALUX software

## 7. DIALUX software for exterior lighting design

- ✓ Selection of luminaire for exterior lighting in DIALUX
- ✓ Basics of street light design
- ✓ Basics of playground lighting
- ✓ Playground lighting design

## 8. Approval for power supply from service provider

- ✓ To estimate the total connected load (w or kw)
- ✓ To calculate the total demand (w or kw)
- ✓ Selection of cables
- ✓ De-rating current calculation
- ✓ Cable sizing
- ✓ Bus bar sizing
- ✓ Selection of cable insulation
- ✓ Voltage drop calculation (VD)

## 9. Power Network design

- ✓ Power flow from distribution to appliances
- ✓ Importance of circuits
- ✓ Circuit types
- ✓ Light circuit design
- ✓ Power circuit design

## 10. Power network Distribution

- ✓ Importance of phase distribution
- ✓ When to select single phase and three phase system
- ✓ Load distribution to each phase
- ✓ Balancing 3 phases

## 11. Power network protection

- ✓ Introduction to Circuit Breakers
- ✓ Properties and Types of Circuit Breakers
- ✓ Difference between circuit breakers and isolators
- ✓ Circuit breaker selection
- ✓ Power system design with ELCB
- ✓ Short circuit current calculation

## 12. Panel board design

- ✓ Introduction to panel boards
- ✓ Panel board wiring
- ✓ Selection of panel board
- ✓ Types of panel boards
- ✓ Panel board sizing

## 13. Wires and Cables

- ✓ Introduction to wires and cables
- ✓ Types of cables
- ✓ Difference between cables and wires
- ✓ Need for earthing in power system
- ✓ Types of earthing
- ✓ Earthing pit designing
- ✓ Earthing system design
- ✓ Earthing cable sizing

## 14. Conduits and cable tray

- ✓ Conduit types
- ✓ Conduit sizing
- ✓ Calculating with spacing factor
- ✓ Different types of cable tray
- ✓ Cable tray sizing
- ✓ Trench design

## 15. Transformer selection

- ✓ Brief introduction to transformers
- ✓ Types of transformers
- ✓ Types of transformer connection
- ✓ Transformer sizing (kva)
- ✓ HT yard design

## 16. DG design

- ✓ Need for a DG
- ✓ Working of DG
- ✓ Synchronizing DG to Power System
- ✓ DG Sizing methods
- ✓ Calculating diesel requirement
- ✓ Diesel tank sizing

## 17. Power factor improvement

- ✓ Why power factor to be improved?
- ✓ Difference between reactive power and real power
- ✓ Need for reactive power
- ✓ Capacitor bank sizing
- ✓ Implementation of capacitor bank

## 18. Electrical secondary protection systems

- ✓ Sizing the PV modules
- ✓ Inverter sizing
- ✓ Battery sizing using DOD values
- ✓ Solar charger controller sizing

## 19. Lightning protection

- ✓ To calculate the total coverage area
- ✓ Materials used for lightning protection
- ✓ Lightning protection design
- ✓ Lightning arrestor calculation
- ✓ Termination of lightning protection

## 20. Solar energy

- ✓ Introduction to solar Energy
- ✓ Advantages and disadvantages of PV cells
- ✓ Can I install solar panels by myself?
- ✓ Off-grid solar system
- ✓ Determine power consumption demand load

## 21. Basics of Etap medium voltage network design

- ✓ Short circuit current calculation
- ✓ Voltage drop calculation

## 22. UPS System

- ✓ Need for an UPS
- ✓ Synchronizing UPS with power system
- ✓ Inverter sizing
- ✓ Battery sizing

## 23. Power system control and operation

- ✓ ATS system
- ✓ MTS System
- ✓ Tap changers

# Electrical drafting using AutoCAD

## 1. Understanding civil layouts

- ✓ Introduction and area calculation
- ✓ Main walls and Partition walls
- ✓ Stair case
- ✓ Doors and Hinges
- ✓ Dimensions
- ✓ Elevation view and section views
- ✓ Plotting

## 2. 2d Electrical Schematic

- ✓ Introduction
- ✓ Legends creation – part 1
- ✓ Legends creation – part 2
- ✓ Legends creation – part 3
- ✓ Legends creation – exercise
- ✓ Panel creation
- ✓ Enclosures and name plates
- ✓ Inserting panel boards to project

## 3. Implementing legends in project

- ✓ Light sockets
- ✓ Power sockets
- ✓ Ceiling fans
- ✓ Exhaust fans
- ✓ Air Conditioner points

## 4. Buses representation in 2D

- ✓ Drafting light circuit layouts
- ✓ Drafting power circuit layouts
- ✓ Light and power circuit routing
- ✓ Cable tray routing
- ✓ Conduits routing
- ✓ Supports for conduits and cable tray

## 5. Electrical panels

- ✓ Join
- ✓ Panel creation
- ✓ Enclosures and name plates
- ✓ Inserting panel boards to project

## 6. AutoCAD lightning design

- ✓ Creation of horizontal conductors
- ✓ Creation of vertical conductors
- ✓ Creating grids
- ✓ Down comers

## 7. Earthing design

- ✓ Earthing pit design
- ✓ Creating pipes
- ✓ Creating the arc offsets
- ✓ Filletting
- ✓ Trimming

## 8. Plotting

- ✓ Scaling the project
- ✓ Plot method 1
- ✓ Plot method 2
- ✓ Exporting project to different formats

## 9. Electrical template creation

- ✓ Editing the title block
- ✓ Adding tables
- ✓ Adding legends

Software's used in training: RELUX, DIALUX, AutoCAD, ETAP and Excel