INSTITUTE OF AERONAUTICAL ENGINEERING
(Autonomous)
Dundigal - 500 043, Hyderabad, Telangana

COURSE CONTENT

DESIGN OF ELECTRICAL SYSTEMS USING AUTOCAD								
III Semester: EEE								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
AEEE09	**Skill**	0	0	2	1	40	60	100
Contact Classes: Nil	**Tutorial Classes: Nil**	**Practical Classes: 30**				**Total Classes: 30**		
Prerequisite: Electrical Circuits								

I. COURSE OVERVIEW:

This course focuses on the application of AutoCAD in electrical engineering design and drafting. It covers electrical symbols, wiring layouts, single-line diagrams, panel and substation drawings, and control circuit schematics. Students gain practical experience in designing residential, commercial, and industrial electrical systems while adhering to standard electrical practices and documentation procedures. The course emphasizes professional CAD techniques, project documentation, and real-time electrical design applications through laboratory exercises and a mini-project.

II. COURSES OBJECTIVES:

The students will try to learn

I To provide hands-on training in using AutoCAD for electrical design and drafting.
II To understand the principles of preparing electrical wiring diagrams and panel layouts.
III To enable students to design residential, commercial, and industrial electrical systems.
IV To introduce students to symbols, standards, and practices in electrical CAD.

III. COURSE OUTCOMES:

At the end of the course students should be able to:

CO 1 Apply AutoCAD tools to create electrical schematics, layouts, and engineering drawings using standard drafting practices.
CO 2 Design residential electrical wiring systems, lighting layouts, and single-line diagrams in accordance with electrical standards and safety regulations.
CO 3 Develop commercial and industrial electrical layouts including distribution boards, panel boards, and power distribution systems using CAD tools.
CO 4 Construct substation single-line diagrams, control circuit schematics, and motor starter wiring diagrams for electrical installations.
CO 5 Design and document complete electrical systems incorporating cable routing, protection schemes, and professional drafting standards using AutoCAD.
CO 6 Demonstrate professional electrical design practices through project planning, preparation of title blocks, bill of materials, and documentation of real-time electrical design projects.

DO's

1. Once the operation is completed pull the plug itself rather chord attached to it.
2. To repair the equipment switch-off the supply and go on.
3. To operate the equipment on supply, see that hands are dry, if that is not possibly hide the hand in the pockets.
4. If a person comes in contact with current unexpectedly don't touch the person with hands but immediately use any insulator material and shut down the power (like leather belts, wood and plastic bars etc.).
5. If water is nozzles on the equipment, immediately shunt down the power using circuit breaker or pull out the plug.
6. Use the connecting wires of good continuity, short circuit of connecting wire leads damage of circuit parameters

DON'Ts

1. Do not wear loose clothing and do not hold any conducting materials in contact with skin when the power is on.
2. Do not pull out the connections until unless all the currents are dead.
3. Do not wait for switches to de-magnetize when there is a delay but pull out the plug.
4. Do not overload the circuit by plugging in too many appliances.
5. If you are mentally and physically stressed don't operate the power equipment.
6. Never operate the equipment under wet conditions.
7. Do not interconnect two or more wires, take appropriate length of wire.

SAFETY NORMS

1. The lab must be equipped with fire extinguisher.
2. See that the connections are made tight.
3. Use single plug for each equipment.
4. Cover the body completely to avoid arc effect.
5. To change the connections during the experiment, switch off the supply and carry on.
6. Used equipment may get heated, so take care handling the equipment after it is used.
7. Do the wiring, all set ups and check the circuit connections before the supply is on

IV. COURSE CONTENT:

EXERCISES ON DESIGN OF ELECTRICAL SYSTEMS USING AUTOCAD

Note: Students are encouraged to bring their own laptops for laboratory practice session

Getting Started Exercises

1. Introduction to AutoCAD for Electrical Design Overview of AutoCAD interface and tools

1.1 Introduction to AutoCAD

AutoCAD Electrical software extends the capabilities of AutoCAD so that you can quickly build and manage an electrical control drawing set this manual provides concepts and exercises to help you get started with AutoCAD Electric

About Standards: AutoCAD Electrical currently supports the following industry standards: JIC (US), IEC (Europe), JIS (Japan), GB (China) and AS (Australia). Although AutoCAD Electrical supports many standards, the Getting Started manual follows the JIC standard and sample drawing set.

Since the workflow for both JIC and IEC are nearly identical, you can perform the following exercises using the IEC demo drawing set, however your components and wire numbering will display differently.

Performing Exercises: All of the AutoCAD commands and features are available while working on AutoCAD Electrical drawings. All intelligence is carried directly on the drawing using AutoCAD blocks with attributes and XDATA. AutoCAD Electrical does not require any underlying database.
Backup exercise files are found at *Documents and Settings\{username}\My Documents \Acade{version}\Aedata\Tutorial\Aegs or Users\{username}\Documents\Acade {version} Aedata Tutorial Aegs* on a Windows Vista installation. If you make a mistake while working through the exercises in this manual, simply browse to and copy the demo file(s) to your project folder.
Identify the interface components, drawing tools, symbols, layers, and connections used in the AutoCAD environment for designing electrical systems.
AutoCAD is a powerful Computer-Aided Design (CAD) software widely used in engineering disciplines, including electrical engineering, for creating accurate drawings, schematics, layouts, and documentation. AutoCAD Electrical provides specialized tools and libraries that assist engineers in designing, analyzing, and documenting electrical systems efficiently. The following are some of the important features and tools available in AutoCAD for electrical design:

1. **AutoCAD Interface**
   The AutoCAD interface consists of essential components such as the Ribbon, Menu Bar, Toolbars, Command Line, Drawing Area, Status Bar, and Navigation Tools. These elements help users create, edit, and manage engineering drawings effectively.
2. **Drawing and Modification Tools**
   AutoCAD provides various drawing tools such as:
   - Line
   - Circle
   - Arc

- Rectangle
- Polyline

Modification tools include:

- Move
- Copy
- Rotate
- Mirror
- Scale
- Trim
- Extend
- Offset

These tools are essential for creating and modifying electrical layouts and schematics.

3. **Layers and Layer Management**

Layers help organize different elements of electrical drawings. Separate layers can be created for:

- Wiring
- Lighting circuits
- Power circuits
- Text annotations
- Dimensions

Layer properties such as color, line type, and visibility can be controlled for better drawing management.

4. **Blocks and Attributes**

Blocks are reusable drawing components that simplify repetitive drafting tasks. AutoCAD Electrical provides predefined blocks for:

- Switches
- Lamps
- Transformers
- Circuit breakers
- Relays

Attributes can be added to blocks to store information such as component ratings, tag numbers, and descriptions.

5. **Electrical Symbol Libraries**

AutoCAD Electrical includes standard electrical symbols based on:

- IEC Standards
- ANSI Standards
- IS Standards

These symbol libraries enable the preparation of professional electrical drawings and schematics.

6. **Single-Line Diagram (SLD) Tools**

AutoCAD allows users to create:

- Single-line diagrams
- Wiring diagrams
- Distribution system layouts

- Panel layouts

These tools are extensively used in residential, commercial, and industrial electrical design.

7. **Annotation and Dimensioning Tools**

AutoCAD provides annotation features such as:

- Text
- Multiline text
- Leaders
- Tables
- Dimensions

These tools improve the readability and documentation quality of engineering drawings.

8. **Plotting and Printing Tools**

AutoCAD supports:

- Plotting drawings to scale
- Printing layouts
- Exporting drawings to PDF and other formats

These features facilitate professional documentation and project submission.

9. **Custom Commands and Scripts**

Users can automate repetitive drafting operations using:

- Scripts
- Macros
- Auto LISP routines

Automation improves productivity and reduces design time.

1.2 Setting Up AutoCAD Electrical 2026 Workspace and Drawing Templates

To install, launch, and configure the AutoCAD Electrical 2026 workspace with proper project settings, drawing templates, and tool palettes required for electrical design workflows.

SOFTWARE REQUIRED:

S.No	Equipment / Software	Specification	Quantity
1	AutoCAD Electrical 2026	Student Version (Free – Autodesk Education)	1
2	Operating System	Windows 10 / 11	1
3	RAM / Processor	8 GB RAM, Core i3 or higher	1

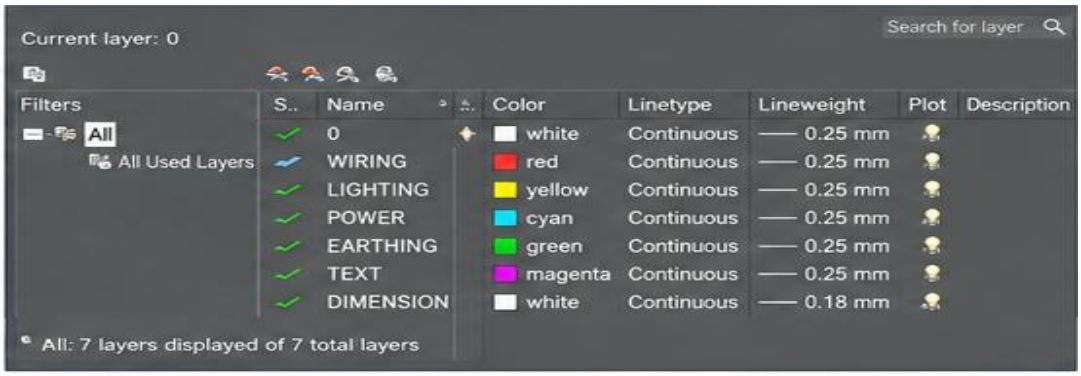
AutoCAD Electrical 2026 is a purpose-built CAD application for electrical system design. It extends standard AutoCAD features with a comprehensive library of IEC and NFPA electrical symbols, automated wire numbering, component tagging, and bill-of-materials generation. The workspace is centred on the Project Manager, which organizes related drawing files (.dwg) into a single project. Each project maintains consistent wire numbering, cross-referencing, and title-block data across all sheets.

A drawing template (.dwt) stores default settings such as units, limits, layers, text styles, and title-block information. AutoCAD Electrical ships with ready-made

templates (e.g., IEC_A3.dwt, NFPA_C.dwt). Selecting the correct template at project creation ensures global consistency. The Tool Palette provides drag-and-drop access to schematic symbols, panel symbols, and PLC I/O modules.

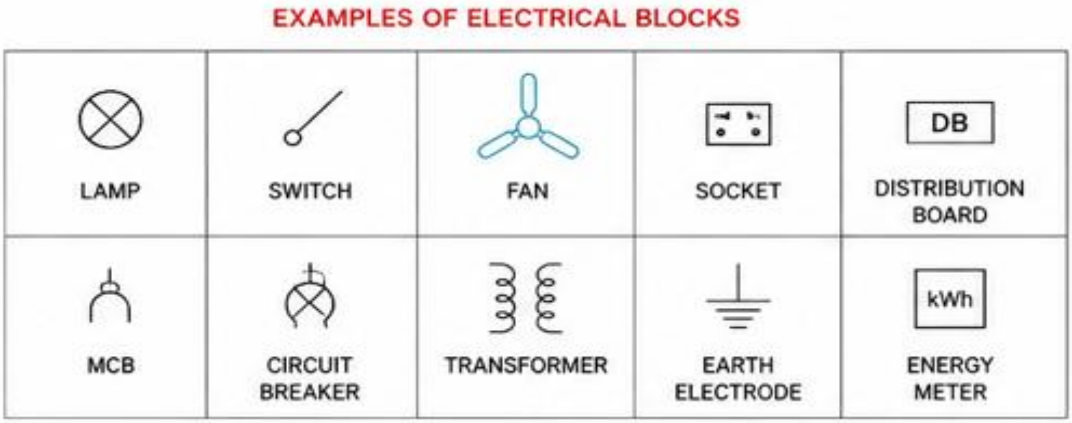
Layers in AutoCAD:

- ***Layers are used to organize drawing objects.***
- ***Each layer has properties like Color, Line type, Line weight, and Visibility.***
- ***Different objects can be placed on different layers for better control.***

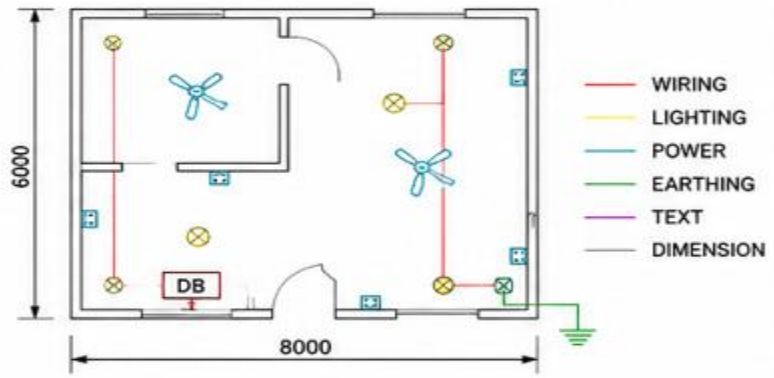


Blocks in AutoCAD:

- ***Blocks are groups of objects treated as a single unit.***
- ***They help in reusing standard components.***
- ***Blocks save time and ensure consistency in drawing.***

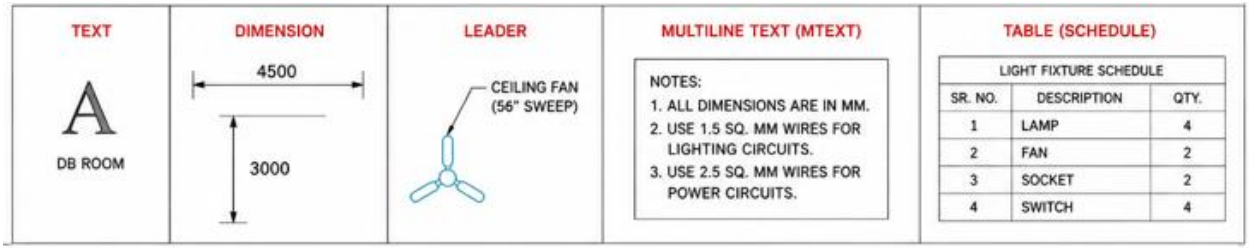


Example of layered electrical plan, Inserted blocks in drawing

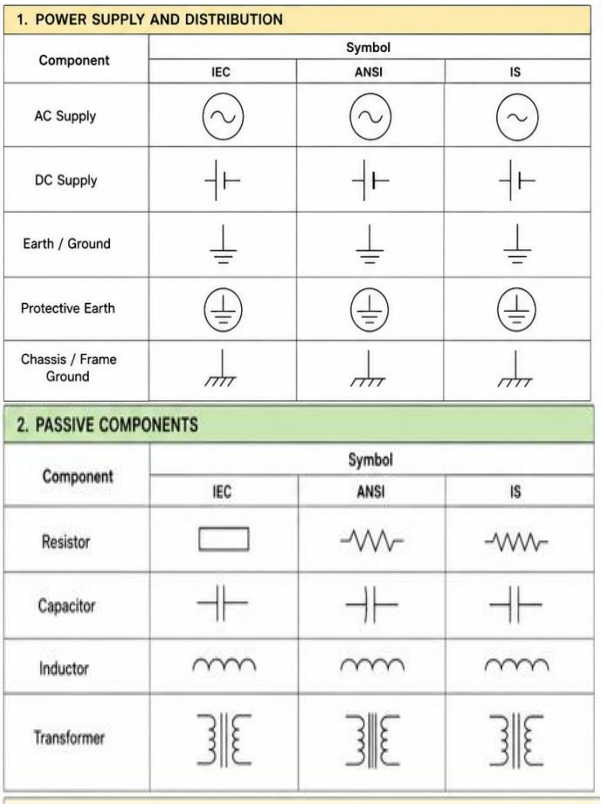


Annotation in AutoCAD:

- ***Annotation adds information to drawings.***
- ***Includes text, dimensions, leaders, tables, and notes.***
- ***Improves clarity and communicates design intent***

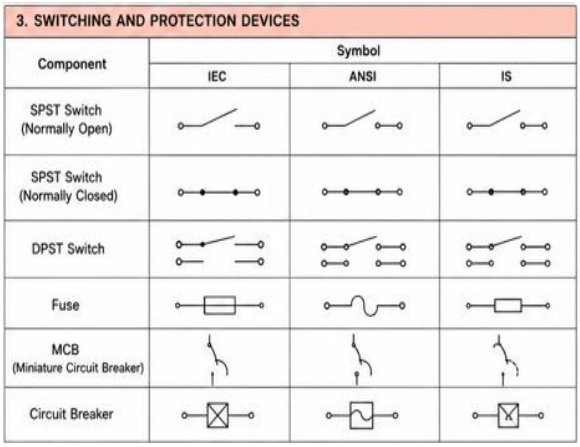


Electrical symbols: IEC/ANSI/IS standards:

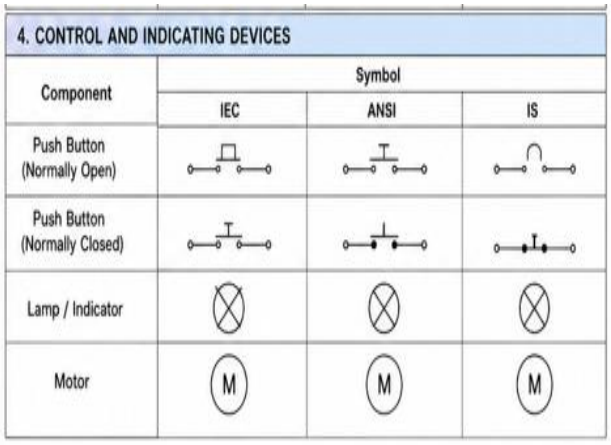


1. POWER SUPPLY AND DISTRIBUTION			
Component	Symbol		
	IEC	ANSI	IS
AC Supply			
DC Supply			
Earth / Ground			
Protective Earth			
Chassis / Frame Ground			

2. PASSIVE COMPONENTS			
Component	Symbol		
	IEC	ANSI	IS
Resistor			
Capacitor			
Inductor			
Transformer			



3. SWITCHING AND PROTECTION DEVICES			
Component	Symbol		
	IEC	ANSI	IS
SPST Switch (Normally Open)			
SPST Switch (Normally Closed)			
DPST Switch			
Fuse			
MCB (Miniature Circuit Breaker)			
Circuit Breaker			



4. CONTROL AND INDICATING DEVICES			
Component	Symbol		
	IEC	ANSI	IS
Push Button (Normally Open)			
Push Button (Normally Closed)			
Lamp / Indicator			
Motor	M	M	M

- *IEC* ***stands for*** *International Electro technical Commission****.- International standard widely used across the world.***
- *ANSI* ***stands for*** *American National Standards Institute****. - Standard used mainly in North America.***
- *IS* ***stands for*** *Indian Standard****-Standard used in India, based on IEC with some variations.***

1.3 Creating simple electrical circuit diagrams using AutoCAD

To create a simple electrical circuit diagram in AutoCAD Electrical using standard IEC/ANSI electrical symbols.

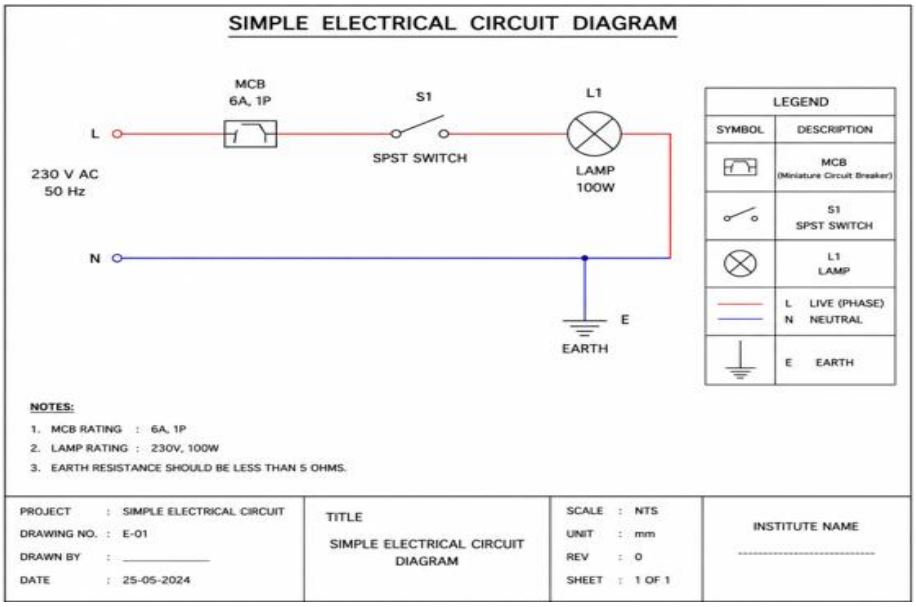
Problem Statement:

Draw a simple electrical circuit diagram in AutoCAD Electrical for a 230 V, 50 Hz AC supply consisting of the following components:

1. One 6 A,
2. single-pole Miniature Circuit Breaker (MCB).
3. One SPST (Single Pole Single Throw) switch.
4. One 100 W lamp.
5. Proper phase (L)
6. neutral (N)
7. earth (E) connections.

Hint

- Use standard **IEC/ANSI electrical symbols.**
- Represent the phase conductor using a separate layer.
- Represent the neutral conductor using a separate layer.
- Insert all components as AutoCAD blocks.
- Provide suitable annotations for all components.
- Prepare a legend indicating the symbols used.
- Add notes specifying component ratings.
- Include a standard title block with drawing title, drawing number, **scale, and date.**



Try

1. Create an AutoCAD Electrical drawing for a **230 V, 50 Hz AC supply** consisting of a **6 A MCB, one SPST switch, one 100 W lamp, and an earth connection**. Use standard IEC/ANSI symbols, separate layers for phase and neutral conductors, and provide appropriate annotations, legend, and title block.
2. Using AutoCAD Electrical, design and document a lighting circuit consisting of one MCB, two SPST switches, and two lamps connected in parallel operating from a 230 V AC supply. Include:
    - Standard electrical symbols
    - Proper wiring connections
    - Layer management for wiring and annotations
    - Component labels and ratings
    - Legend, notes, and title block

1.4 Creating Use of layers and blocks for electrical layouts

To create a residential electrical layout using AutoCAD by utilizing layers, standard electrical

blocks, annotations, and documentation techniques.

Problem Statement:

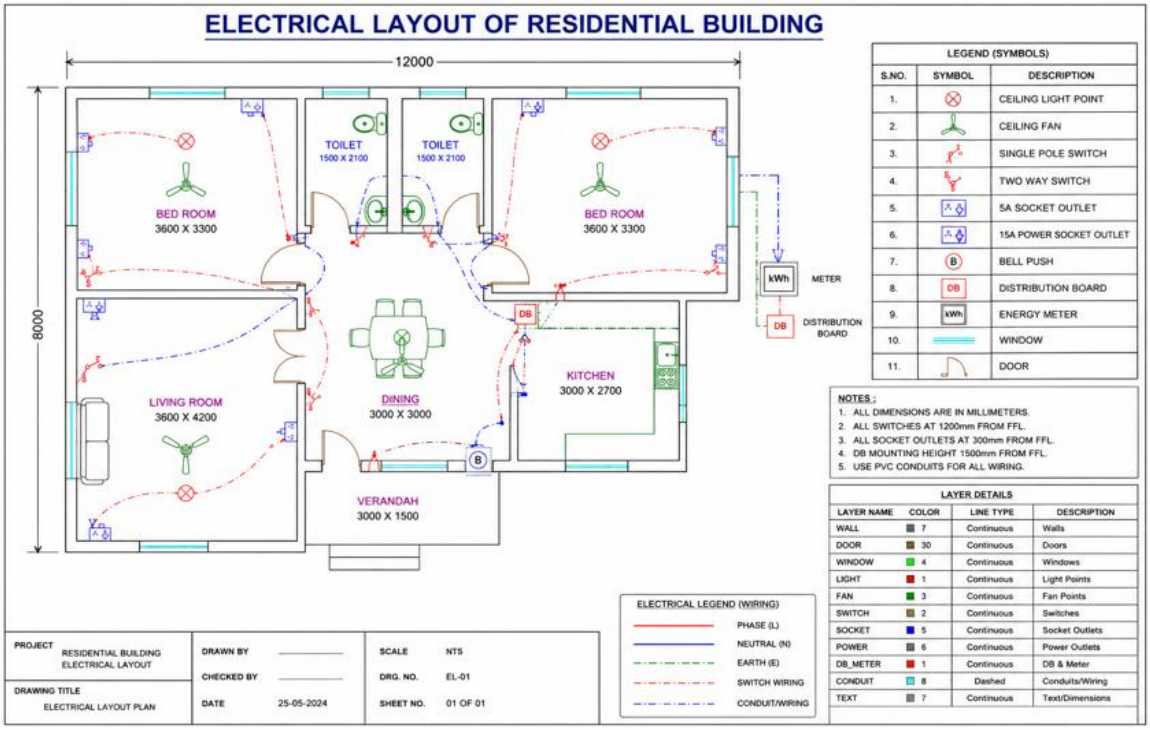
Draw the electrical layout of a residential building in AutoCAD for the floor plans shown, consisting of:

- Two Bedrooms
- One Living Room
- One Dining Room
- One Kitchen
- Two Toilets
- One Verandah

Hint

Requirements:

1. Create separate AutoCAD layers for:
    - Walls, Doors and Windows
    - Lighting Circuits, Fan Circuits
    - Switches, Socket Outlets
    - Power Wiring, Earth Wiring
    - Text and Dimensions
2. Insert standard electrical blocks/symbols for:
    - Ceiling light points, Ceiling fans
    - Single-pole switches, Two-way switches
    - 5A socket outlets,15A power socket outlets
    - Bell push, Distribution Board (DB)
    - Energy Meter
3. Provide wiring connections for:
    - Lighting circuits
    - Fan circuits
    - Power circuits
    - Earthing system
4. Add the following details:
    - Electrical legend
    - Layer details table
    - Notes and specifications
    - Room dimensions
    - Title block with drawing information
5. Use standard IEC/IS electrical symbols and drafting practices.



Try

1. Using AutoCAD Electrical, prepare the electrical layout of a **2-BHK residential building** consisting of two bedrooms, a living room, a kitchen, and a dining room. Use separate layers for walls, lighting, power circuits, switches, and annotations. Insert standard electrical blocks for lights, fans, socket outlets, switches, distribution board, and energy meter. Include legends, wiring details, notes, and a title block.
2. Create a complete electrical layout for a residential building in AutoCAD by demonstrating the effective use of **layers, blocks, and annotations**. The drawing shall include lighting circuits, fan circuits, power circuits, earthing arrangements, and a distribution board. Generate a layer details table, electrical legend, and bill of materials (BOM), and export the final drawing as a PDF.

2. House Wiring and Lighting System Design

House wiring and lighting system design in AutoCAD Electrical involves the preparation of electrical layouts for residential buildings using standard electrical symbols, wiring practices, and drafting techniques. The design includes the placement of lighting points, fans, switches, socket outlets, distribution boards, and wiring routes to ensure safe and efficient electrical installations.

AutoCAD Electrical provides specialized tools, symbol libraries, layers, and annotation features that help engineers create professional residential electrical drawings in accordance with IEC/IS standards.

2.1 House Wiring and Lighting System Design

Components Used in House Wiring Design:

To design the electrical wiring and lighting layout of a residential building using AutoCAD Electrical.

Problem Statement:

1. Draw the electrical layout for a residential building consisting of:
    - Two bedrooms
    - One living room
    - One kitchen
    - One dining hall
    - Two toilets
2. The drawing shall include:
    - Lighting points
    - Ceiling fans
    - Switches
    - Socket outlets
    - Distribution board
    - Energy meter
    - Wiring routes
    - Earthing arrangement

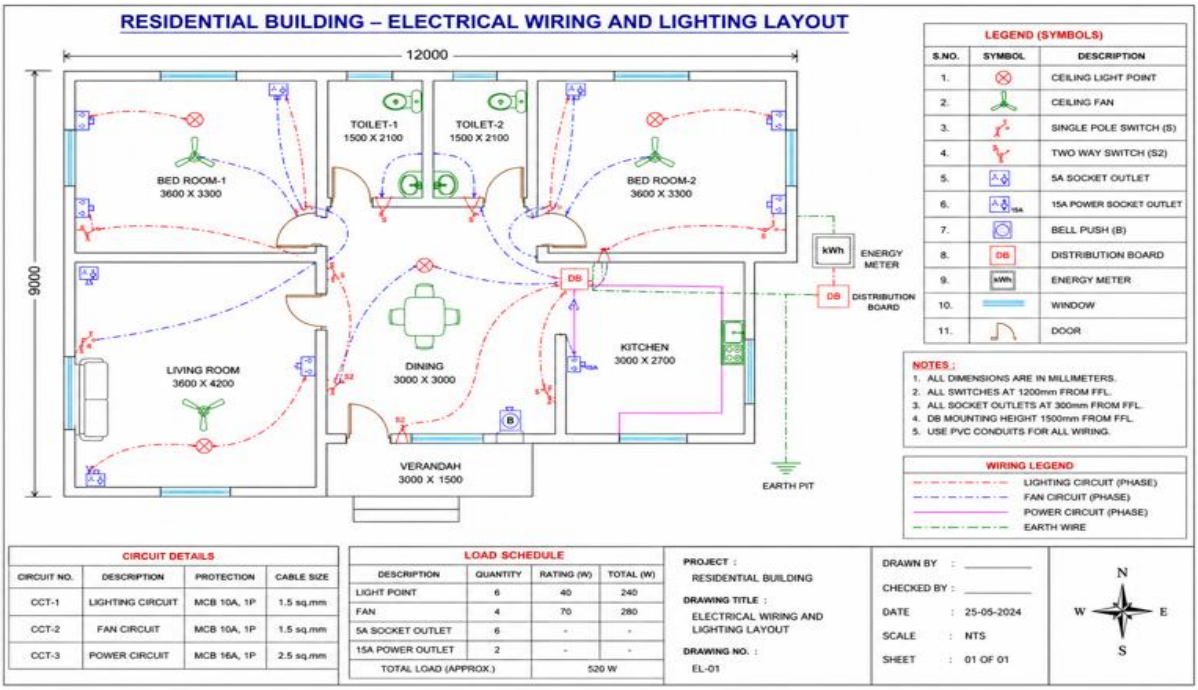
Use standard IEC/IS symbols and proper AutoCAD drafting practices.

HINT

Expected Outcome:

Students will be able to:

- Design residential electrical layouts.
- Prepare lighting and power wiring drawings.
- Apply standard electrical symbols.
- Use layers and blocks effectively in AutoCAD.
- Create professional electrical documentation.



Try

1. Design the electrical layout of a **2-BHK residential building** using AutoCAD Electrical showing lighting points, fans, switches, socket outlets, and distribution board. Use separate layers and standard electrical symbols.
2. Prepare a complete house wiring and lighting system design for a residential building in AutoCAD and include electrical legend, notes, title block, and bill of materials (BOM).

2.2 Design of Single-Line Diagram (SLD) Using AutoCAD Electrical

To design and draft the Single-Line Diagram (SLD) of a residential electrical distribution system using AutoCAD Electrical

Problem Statement:

Draw the Single-Line Diagram (SLD) of a residential building electrical distribution system in AutoCAD Electrical for the following specifications:

- Incoming Supply: 11 kV, 3-Phase, 50 Hz
- Distribution Transformer: 11 kV / 415 V, 100 kVA
- Main Incomer: ACB, 3P, 160 A
- Main Distribution Board (MDB): 415 V, 3-Phase, 4-Wire
- Outgoing Feeders: Lighting Load: 12 kW, Power Load: 8 kW, Kitchen Load: 10 kW, Air Conditioning Load: 15 kW, Water Pump Load: 5 kW, Lift Load: 7.5 kW

HINT

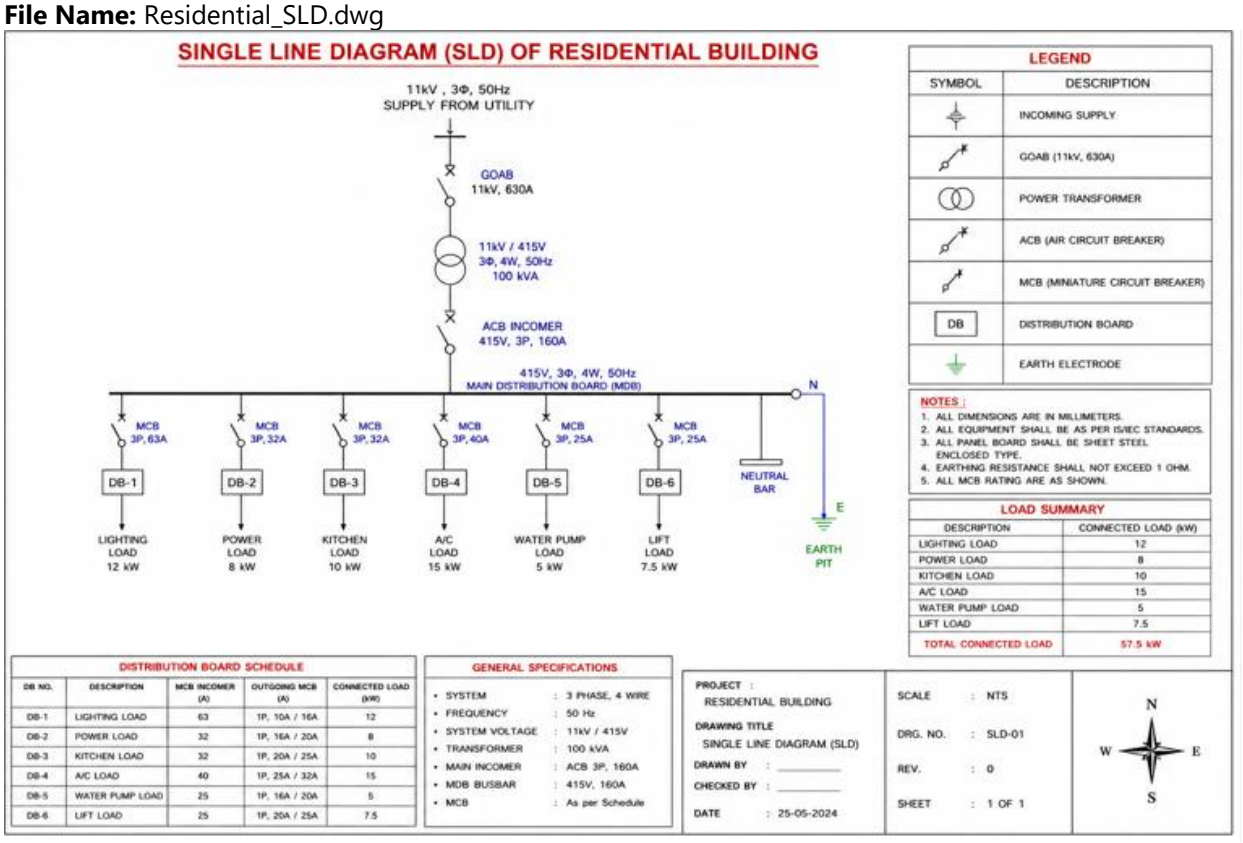
Requirements:

1. Use standard IEC/IS electrical symbols.
2. Include the following components in the SLD:
   - Incoming utility supply
   - GOAB switch
   - Power transformer
   - Air Circuit Breaker (ACB)
   - Main Distribution Board (MDB)
   - Miniature Circuit Breakers (MCBs)
   - Distribution Boards (DBs)
   - Neutral bus bar
   - Earthing system
3. Clearly indicate all voltage levels, ratings, and load details.
4. Prepare an electrical legend for all symbols used.
5. Add general specifications, notes, load summary, and distribution board schedule.
6. Include a standard title block with drawing information.
7.

Expected Output:

A professionally documented Single-Line Diagram (SLD) showing the complete electrical power distribution system of the residential building.

File Name: Residential_SLD.dwg



Try

1. Design the Single-Line Diagram (SLD) of a residential building in AutoCAD Electrical showing transformer, MDB, DBs, protective devices, and earthing

arrangements.

2. Prepare an AutoCAD SLD for a commercial building electrical distribution system and include load schedule, protection details, and standard electrical legends.

2.3 Layout of internal wiring for residential buildings

To prepare the internal electrical wiring layout of a residential building using AutoCAD Electrical.

Problem Statement:

Draw the internal electrical wiring layout for a residential building consisting of:

- Two Bedrooms
- One Living Room
- One Kitchen
- One Dining Hall
- One Toilet
- One Verandah

The layout shall include the following electrical installations:

1. Ceiling light points in all rooms.
2. Ceiling fan points in bedrooms and living room.
3. One 5A socket outlet in each room.
4. One 15A power socket in the kitchen.
5. Switchboards for controlling lights and fans.
6. One Distribution Board (DB) located near the entrance.
7. Proper phase, neutral, and earth wiring connections.

HINT

Requirements:

1. Use standard IEC/IS electrical symbols.
2. Create separate layers for:
   - Walls
   - Lighting circuit
   - Fan circuit
   - Power circuit
   - Switches
   - Socket outlets
   - Text and dimensions
3. Use AutoCAD blocks for electrical components.
4. Show wiring routes for lighting, fan, and power circuits.
5. Provide legends, notes, and title block.
6. Include earthing arrangement and distribution board details.

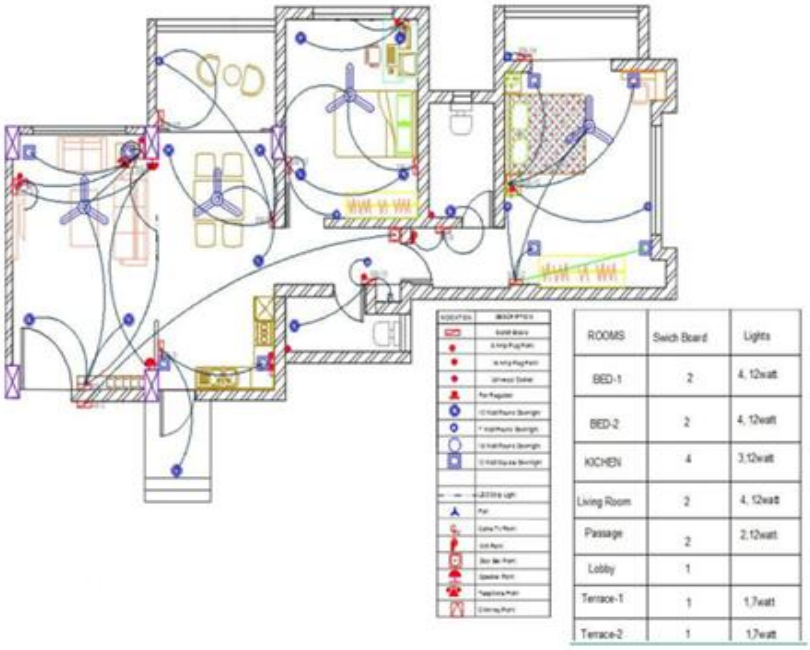
Expected Output:

A professionally documented internal wiring layout drawing showing all electrical installations, wiring routes, symbols, annotations, and title block.

File Name: Residential_Internal_Wiring_Layout.dwg

Try

1. Design the complete internal wiring layout of a 2-BHK residential building using AutoCAD Electrical showing lighting points, fan points, socket outlets, switchboards, and distribution board with proper wiring connections.
2. Prepare the internal electrical wiring layout for a residential building in AutoCAD Electrical using standard IEC/IS symbols. Include layer management, annotations, legends, title block, and bill of materials (BOM).



2.4 Load calculation and cable selection

To perform load calculation and select suitable cables for a residential electrical installation using AutoCAD Electrical.

Problem Statement:

A residential building consists of the following electrical loads:

Load Description	Quantity	Rating
Light Points	8	40 W each
Ceiling Fans	4	70 W each
5A Socket Outlets	6	100 W each
15A Power Sockets	2	1000 W each
Air Conditioner	1	1.5 kW
Water Heater	1	2 kW

Design the electrical distribution system in AutoCAD Electrical and perform the load calculations.

HINT

Assumptions:

- Supply Voltage: 230 V, Single Phase, 50 Hz
- Power Factor: 0.9
- Copper conductor PVC insulated cables shall be used.

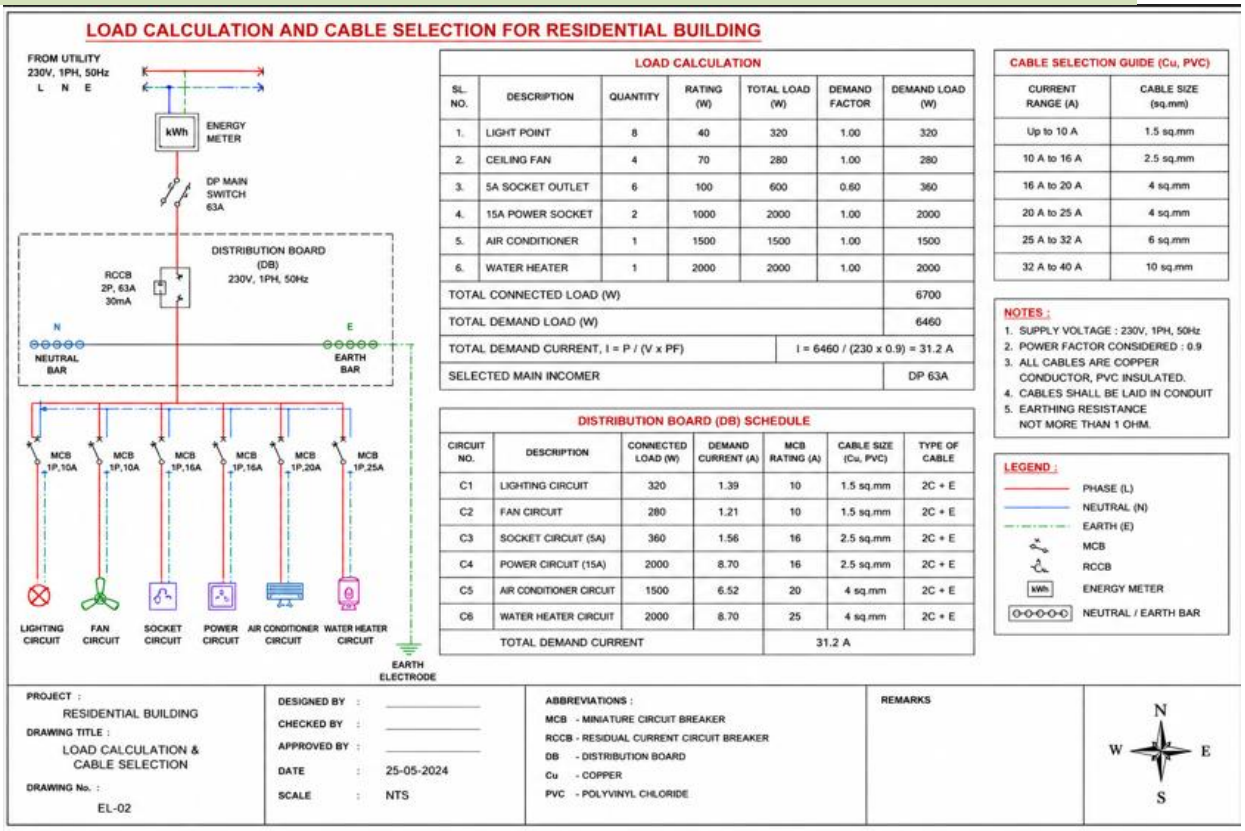
Expected Output:

A professionally documented AutoCAD drawing along with load schedule, cable selection table, and distribution board schedule.

File Name: Load_Calculation_Cable_Selection.dwg

Requirements:

1. Calculate the total connected load of the building.
2. Determine the design current for each circuit.
3. Select suitable cable sizes for: Lighting circuit, Fan circuit, Power circuit, Air conditioner circuit
4. Select suitable MCB ratings for each circuit.
5. Prepare a Distribution Board (DB) schedule showing: Circuit number, Load details, Current rating, Cable size, Protective device rating
6. Prepare the AutoCAD drawing showing: Energy meter, Distribution board, Load distribution, Cable routes, Earthing arrangement
7. Include legends, notes, and title block.



Typical Residential Cable Selection:

Circuit	Current Range	Recommended Cable
Lighting Circuit	Up to 10 A	1.5 sq.mm Cu
Fan Circuit	Up to 10 A	1.5 sq.mm Cu
Socket Circuit	Up to 16 A	2.5 sq.mm Cu
AC Circuit	Up to 20 A	4 sq.mm Cu
Water Heater	Up to 25 A	4 sq.mm Cu

Try

1. Calculate the total connected load and select suitable cables and protective devices for a residential building consisting of lighting, fan, socket, and air-conditioning loads. Prepare the corresponding AutoCAD electrical layout and DB schedule.
2. Using AutoCAD Electrical, design the electrical distribution system for a residential building, perform load calculations, select appropriate cable sizes, and prepare a complete load summary and cable schedule with standard annotations and legends.

2.4 Earthing and protection system basics

To design and draft the earthing and protection system for a residential electrical installation using AutoCAD Electrical.

Problem Statement:

Draw the earthing and protection system for a residential building in AutoCAD Electrical having a 230 V, single-phase supply.

The drawing shall include the following components:

1. Energy Meter
2. Main Switch (DP Switch)
3. Distribution Board (DB)
4. Miniature Circuit Breakers (MCBs)
5. Residual Current Circuit Breaker (RCCB)
6. Earthing Conductor
7. Earth Electrode
8. Neutral Bus Bar
9. Earth Bus Bar
10. Lighting and Power Circuits

HINT

Requirements:

1. Use standard IEC/IS electrical symbols.
2. Show the complete path of phase, neutral, and earth conductors.
3. Provide earthing connections to all metallic enclosures.
4. Indicate the ratings of MCBs and RCCB.
5. Show the earth electrode and earthing conductor size.
6. Create separate layers for:
    - Power Wiring
    - Earthing Wiring
    - Protection Devices
    - Text and Dimensions
7. Include electrical legend, notes, and title block.
8. Prepare the drawing in accordance with standard residential electrical practices.

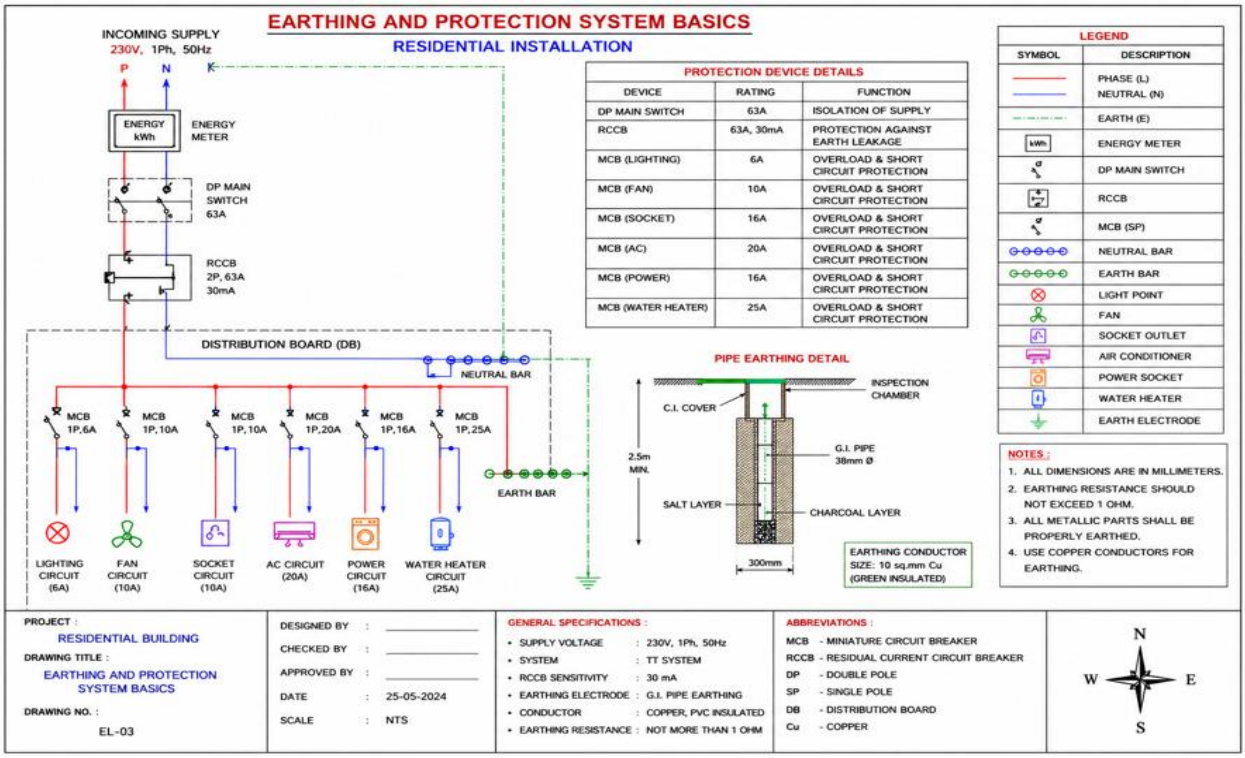
Assumptions:

- Supply Voltage: 230 V, Single Phase, 50 Hz
- Earthing System: Pipe Earthing
- RCCB Rating: 40 A, 30 mA
- Main MCB Rating: 63 A

Expected Output:

A professionally documented AutoCAD drawing showing the complete earthing and protection system with standard symbols, annotations, and earthing arrangement.

File Name: Earthing_Protection_System.dwg



Try

1. Using AutoCAD Electrical, design the earthing and protection system for a residential building showing energy meter, distribution board, MCBs, RCCB, earthing conductor, and earth electrode with proper annotations and legends.
2. Prepare an AutoCAD electrical drawing illustrating the complete protection scheme for a residential installation, including overload, short-circuit, and earth leakage protection devices along with the earthing arrangement and title block.

2.5 Preparation of Residential Wiring Layout Using AutoCAD Electrical

To prepare the electrical wiring layout of a residential building using AutoCAD Electrical.

Requirements:

1. Use standard IEC/IS electrical symbols.
2. Create separate layers for:
    - Walls
    - Lighting Circuit
    - Fan Circuit
    - Power Circuit
    - Switches and Sockets
    - Earthing
    - Text and Dimensions
3. Use AutoCAD blocks for all electrical components.
4. Show complete wiring routes from the Distribution Board to all load points.
5. Indicate circuit numbers and wire sizes.
6. Provide an electrical legend and general notes.
7. Include title block and drawing information.
8. Proper phase, neutral, and earth wiring connections

HINT

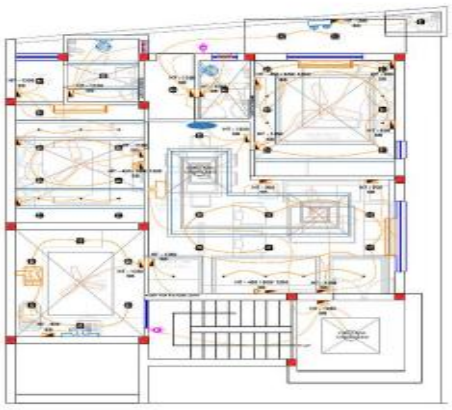
Assumptions:

- Supply Voltage: 230 V, Single Phase, 50 Hz
- Wiring System: Concealed Conduit Wiring
- Lighting Circuit Wire: 1.5 sq.mm Cu
- Power Circuit Wire: 2.5 sq.mm Cu

Expected Output:

A professionally documented residential wiring layout drawing showing all lighting points, fan points, socket outlets, switchboards, wiring routes, earthing arrangement, and distribution board details.

File Name: Residential_Wiring_Layout.dwg



	CEILING FAN
	WALL FAN
	EXHAUST FAN +2100
	SWITCH BOARD (+1500)
	WIRING
	15 AMP PT FOR HOOD CHIMNEY
T	T.V. CABLE
	CEILING MOUNTED LIGHT (CLF)
	TUBE LIGHT
	SPOT LIGHT
	CFL
	SWITCH
	AQUAGARD
	GYSER
DB	DISTRIBUTION BOARD
	SPLIT A.C.
	TELEPHONE PT.
	DOOR BELL
	MIXTURE 2SOCKET,1 SWITCH
	WASHING MACHINE
TWS	TWO WAY SWITCH
	STRIP LIGHT

DWG TITLE:	DWG NO.:	DRAWN BY:	DATE:	NORTH:	CLIENT:	SWAPNASHILP STUDIO
REVISION:	4	PRIDHA PRAVAGNE			JITENDRA GONDIA	
		CHECKED BY:	SCALE:		PROJECT TYPE:	
		KOMAL HEDAOO	N.T.S.		RESIDENTIAL	
☐ ADVANCE COPY	☐ PRESENTATION	■ WORKING				

2.6 Switchboard and lighting plan for 1BHK/2BHK house

Problem Statement:

Prepare the switchboard and lighting plan for a residential building (1BHK/2BHK) using AutoCAD Electrical.

The building shall consist of:

- Living Room
- Bedroom(s)
- Kitchen
- Dining Area
- Toilet/Bathroom
- Verandah/Balcony

The electrical layout shall include the following installations:

- Ceiling light points in all rooms.
- Ceiling fan points in the living room and bedrooms.
- One switchboard near the entrance of each room.
- One fan regulator for every ceiling fan.
- One 5A socket outlet in each room.
- One 15A power socket outlet in the kitchen.
- Distribution Board (DB) near the main entrance.
- Energy Meter and Main DP Switch.
- Proper phase, neutral, and earth wiring connections.
- Earthing arrangement for all electrical circuits.

To design the switchboard and lighting plan of a 1BHK/2BHK residential building using AutoCAD Electrical.

HINT

Assumptions

- Supply Voltage: 230 V, Single Phase, 50 Hz
- Wiring System: Concealed PVC Conduit Wiring
- Lighting Circuit Wire: 1.5 sq.mm Copper
- Power Circuit Wire: 2.5 sq.mm Copper
- Main DP Switch: 32 A
- Lighting MCB: 6 A
- Power MCB: 16 A

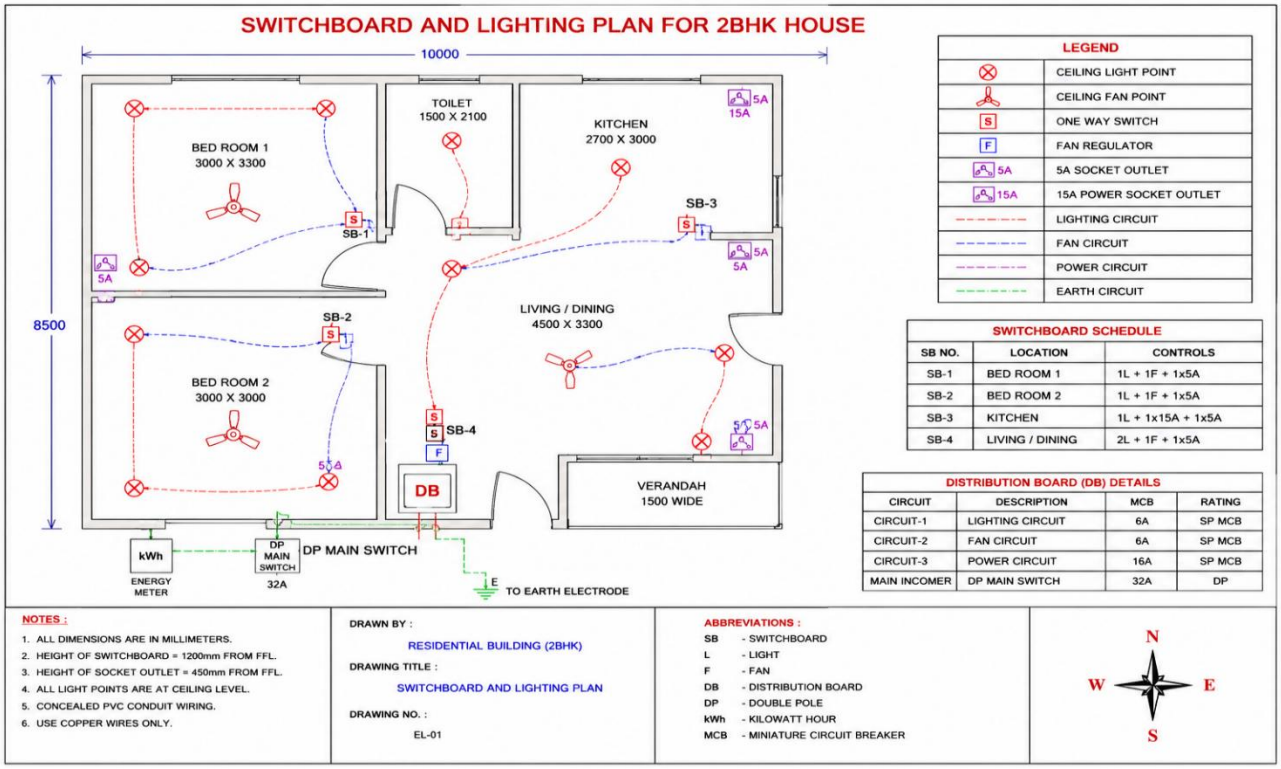
Expected Output:

Requirements:

1. Use standard IEC/IS electrical symbols.
2. Create separate AutoCAD layers for:
   - Walls
   - Lighting Circuit
   - Fan Circuit
   - Power Circuit
   - Switchboards
   - Socket Outlets
   - Earthing
   - Text and Dimensions
3. Use AutoCAD Electrical blocks for all electrical components.
4. Show complete wiring routes from the Distribution Board to all switchboards and load points.

professionally drafted AutoCAD Electrical drawing showing the complete switchboard and lighting plan for a 1BHK/2BHK residential building with standard symbols, switchboards, lighting circuits, wiring routes, legends, notes, switchboard schedule, and title block.

File Name: Switchboard_and_Lighting_Plan_1BHK_2BHK.dwg



Try

1. Using AutoCAD Electrical, prepare the switchboard and lighting plan for a 1BHK residential building showing all lighting points, ceiling fans, switchboards, socket outlets, distribution board, and wiring connections using standard IEC/IS symbols.

2. Design the complete switchboard and lighting layout for a 2BHK residential building in AutoCAD Electrical. Include lighting circuits, fan circuits, power circuits, switchboard schedule, electrical legend, wire sizes, protective devices, and title block.

3. Commercial and Industrial Electrical Layouts

AutoCAD Electrical is used to design power circuits, lighting layouts, distribution boards, and panel boards for commercial and industrial buildings. It helps create accurate electrical drawings using standard symbols and automated drafting tools. The software ensures proper placement of switches, protective devices, busbars, and wiring for safe and reliable power distribution. It improves design accuracy, reduces drafting time, and simplifies modifications. AutoCAD Electrical also ensures compliance with electrical standards and facilitates installation and maintenance.

3.1 Design of Power Circuits and Lighting for Commercial Buildings Using AutoCAD Electrical

To design the power circuit and lighting layout of a commercial building using AutoCAD Electrical.

Problem Statement:

Prepare the electrical layout for a commercial building using AutoCAD Electrical. The building consists of:

- Reception Area
- Office Rooms
- Conference Hall
- Manager Cabin
- Pantry
- Rest Rooms
- Corridor

The electrical layout shall include:

1. LED lighting points in all rooms.
2. Ceiling fan or air-conditioning points where applicable.
3. 6A socket outlets for office equipment.
4. 16A power socket outlets for heavy loads.
5. Switchboards for lighting and power control.
6. Distribution Board (DB) with separate lighting and power circuits.
7. Energy Meter and Main MCCB.
8. Earthing arrangement for all circuits.
9. Proper phase, neutral, and earth wiring.

HINT

Requirements:

1. Use standard IEC/IS electrical symbols.
2. Create separate AutoCAD layers for:
    - Walls
    - Lighting Circuit
    - Power Circuit
    - Switches
    - Socket Outlets
    - Earthing
    - Text and Dimensions
3. Insert AutoCAD Electrical blocks for all electrical components.
4. Show complete wiring routes for lighting and power circuits.
5. Label all switchboards, circuits, and distribution boards.
6. Prepare an electrical legend, load schedule, and general notes.
7. Include wire sizes, protective device ratings, and title block.

Assumptions:

- Supply Voltage: 415/230 V, 3-Phase, 50 Hz
- Wiring System: Concealed PVC Conduit Wiring
- Lighting Circuit Cable: 1.5 sq.mm Copper
- Power Circuit Cable: 2.5 sq.mm Copper
- Main MCCB: 100 A
- Lighting MCB: 10 A
- Power MCB: 20 A

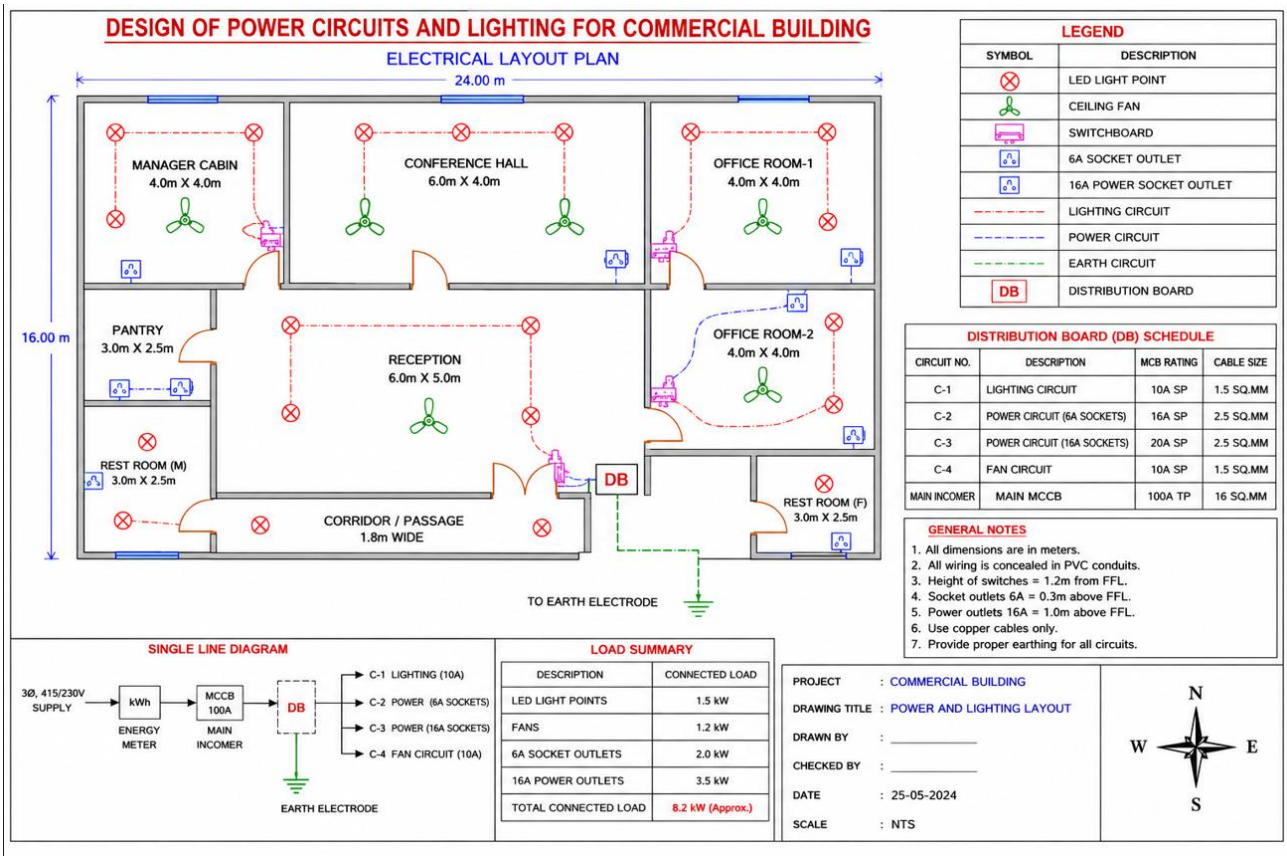
Expected Output

A professionally prepared AutoCAD Electrical drawing showing the complete lighting and power circuit layout of the commercial building, including distribution board, switchboards, socket outlets, lighting fixtures, wiring routes, earthing system, electrical legend, load schedule, and title block.

File Name: Commercial_Building_Lighting_and_Power_Layout.dwg.

Try

1. Using AutoCAD Electrical, design the lighting and power circuit layout for a commercial office building. Show lighting fixtures, power sockets, switchboards, distribution board, wiring routes, and earthing arrangement using standard IEC/IS symbols.
2. Prepare a complete AutoCAD Electrical drawing for a commercial building electrical installation, including separate lighting and power circuits, load distribution, cable routing, protective devices, electrical legend, load schedule, and title block.



3.2 Distribution Board Design and Component Placement Using AutoCAD Electrical

To design a Distribution Board (DB) layout and place electrical components using AutoCAD Electrical.

Problem Statement:

Design the Distribution Board (DB) for a commercial building using AutoCAD Electrical.

The Distribution Board shall consist of the following components:

- Energy Meter
- Main MCCB (100 A, TP)
- RCCB (63 A, 30 mA)
- Phase Bus Bar (R-Y-B)
- Neutral Bus Bar
- Earth Bus Bar
- MCB – Lighting Circuit (10 A)
- MCB – Power Circuit (20 A)
- MCB – Air Conditioning Circuit (32 A)
- MCB – Spare Circuit (20 A)
- Earthing Terminal
- Cable Entry and Exit Points.

HINT

Requirements:

1. Draw the Distribution Board enclosure.
2. Place all electrical components using standard IEC/IS symbols.
3. Arrange components in the correct sequence from incoming to outgoing circuits.
4. Label all components with ratings.
5. Show incoming and outgoing cable connections.
6. Provide phase, neutral, and earth bus bars.
7. Create separate AutoCAD layers for:
    - DB Enclosure
    - Protection Devices
    - Bus Bars
    - Wiring
    - Text and Dimensions
8. Add electrical legend, general notes, and title block.

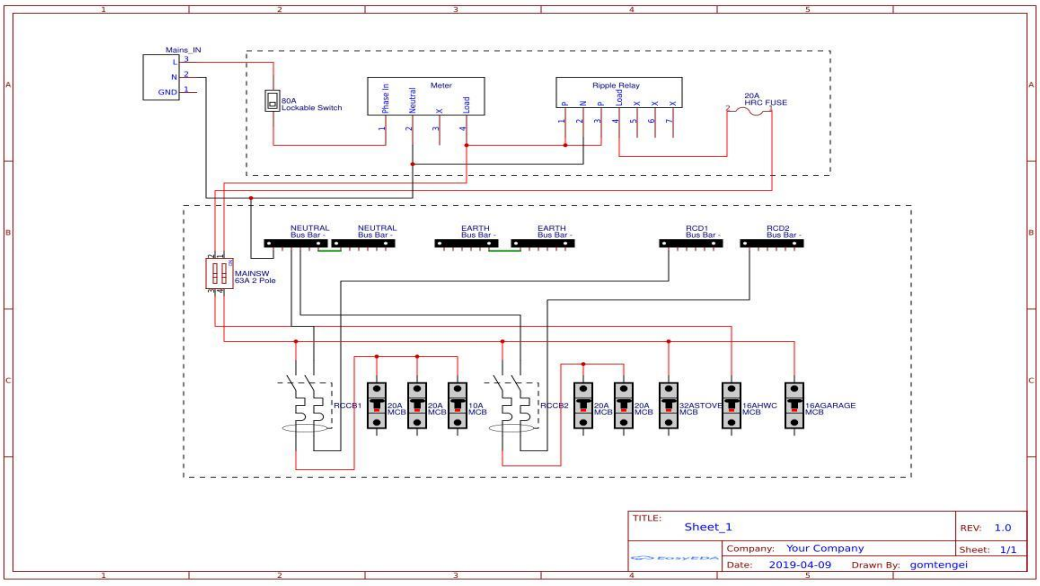
Assumptions

- Supply Voltage: 415/230 V, 3-Phase, 50 Hz
- Main MCCB: 100 A TP, RCCB: 63 A, 30 MA,
- Lighting MCB: 10 A
- Power MCB: 20 A
- AC MCB: 32 A
- Copper Bus Bars
- PVC Insulated Copper Cables

Expected Output

A professionally drafted AutoCAD Electrical drawing of the Distribution Board showing the enclosure, MCCB, RCCB, MCBs, phase bus bars, neutral bar, earth bar, cable routing, component labels, electrical legend, and title block.

File Name: Distribution_Board_Design_and_Component_Placement.dwg



Try

1. Design a **three-phase Distribution Board (DB)** for a commercial building using AutoCAD Electrical. Include the MCCB, RCCB, MCBs, bus bars, cable routing, and component labels according to IEC/IS standards.
2. Prepare a complete **Distribution Board layout** in AutoCAD Electrical showing incoming supply, outgoing feeders, neutral and earth bars, protective devices, cable entry/exit points, electrical legend, and title block.

3.3 Panel Board and Busbar Layout Using AutoCAD Electrical

To design the panel board and busbar layout for a commercial electrical distribution system using AutoCAD Electrical.

Problem Statement:

Design the layout of a low-voltage electrical panel board using AutoCAD Electrical for a commercial building. The panel board shall include the following components:

- Incoming 3-Phase, 415 V Supply.
- Main MCCB (160 A, TP)
- Copper Busbars (R, Y, B Phases)
- Neutral Busbar, Earth Busbar
- RCCB (100 A, 30 mA)
- Outgoing MCBs:
    - Lighting Circuit (10 A)
      Power Circuit (20 A)
    - Air Conditioning Circuit (32 A)
    - Spare Circuit (20 A)
- Cable Entry and Exit Points.
- Terminal Blocks, Panel Enclosure
- Earthing Connection

HINT

Requirements:

1. Draw the panel board enclosure with standard dimensions.
2. Place all electrical components using standard IEC/IS symbols.
3. Arrange the incoming supply, MCCB, busbars, RCCB, and MCBs in the correct sequence.
4. Draw the R, Y, B phase busbars along with neutral and earth busbars.
5. Show interconnections between all components.
6. Label each component with its name and rating.
7. Create separate AutoCAD layers for:
    - Panel Enclosure
    - Busbars
    - Protection Devices
    - Wiring
    - Text and Dimensions
8. Include an electrical legend, general notes, and title block.

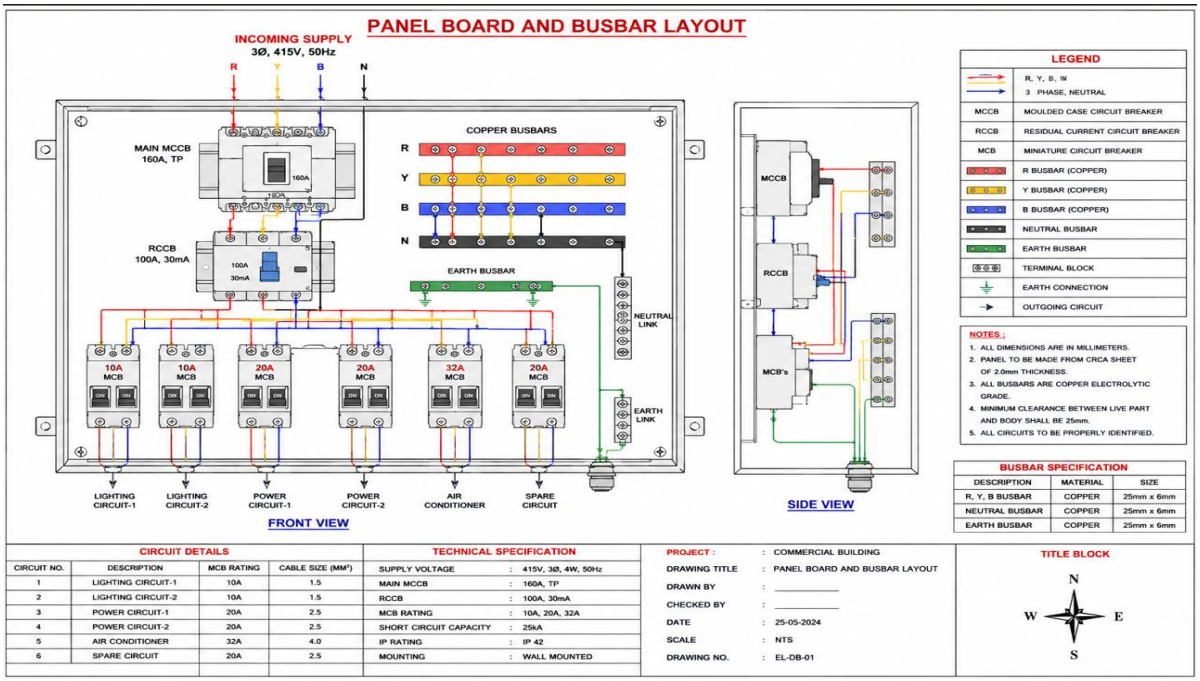
Assumptions:

- Supply Voltage: 415 V, 3-Phase, 50 Hz
- Main MCCB: 160 A, TP, RCCB: 100 A, 30 mA
- Copper Busbars: R-Y-B Phases
- Neutral and Earth Busbars: Copper
- Lighting MCB: 10 A, Power MCB: 20 A, AC MCB: 32 A
- Spare MCB: 20 A

Expected Output

A professional AutoCAD Electrical drawing of a panel board showing the enclosure, MCCB, RCCB, busbars, MCBs, terminal blocks, cable entry/exit points, wiring connections, electrical legend, general notes, and title block using standard IEC/IS electrical symbols.

File Name: Panel_Board_and_Busbar_Layout.dwg



Try

1. Design a **three-phase panel board** using AutoCAD Electrical. Include the MCCB, RCCB, copper busbars, neutral and earth busbars, outgoing MCBs, terminal blocks, cable routing, and component labels according to IEC/IS standards.
2. Prepare a complete **panel board and busbar layout** for a commercial electrical distribution system using AutoCAD Electrical. Show the incoming supply, protection devices, busbars, terminal blocks, earthing arrangement, electrical legend, and title block.

3.4 Design and Drafting of Distribution System for a Small Commercial Building Using AutoCAD Electrical

To design and draft the electrical distribution system for a small commercial building using AutoCAD Electrical.

Problem Statement:

Design the complete electrical distribution system for a small commercial building using AutoCAD Electrical.

The building consists of:

- Reception Area
- Office Room–1, Office Room–2
- Conference Room, Store Room, Rest Room
- Pantry

The electrical distribution system shall include:

- Utility Power Supply (415 V, 3-Phase, 50 Hz)
- Energy Meter, Main MCCB (100 A, TP)
- Main Distribution Board (MDB)
- Lighting Distribution Board (LDB), Power Distribution Board (PDB)
- Lighting Circuits, Power Circuits, Air Conditioning Circuit
- Earthing System, Neutral and Earth Busbars
- Cable Routing and Circuit Identification

HINT

Requirements:

1. Prepare the electrical distribution layout using standard IEC/IS electrical symbols.
2. Draw the complete power flow from the utility supply to all loads.
3. Provide separate lighting and power distribution circuits.
4. Show cable routing between the Energy Meter, MCCB, MDB, LDB, PDB, and loads.
5. Indicate MCB ratings, cable sizes, and circuit numbers.
6. Create separate AutoCAD layers for:
    - Building Layout, Distribution Boards
    - Lighting Circuits, Power Circuits
    - Earthing, Cable Routing
    - Text and Dimensions
7. Include an electrical legend, load schedule, general notes, and title block.

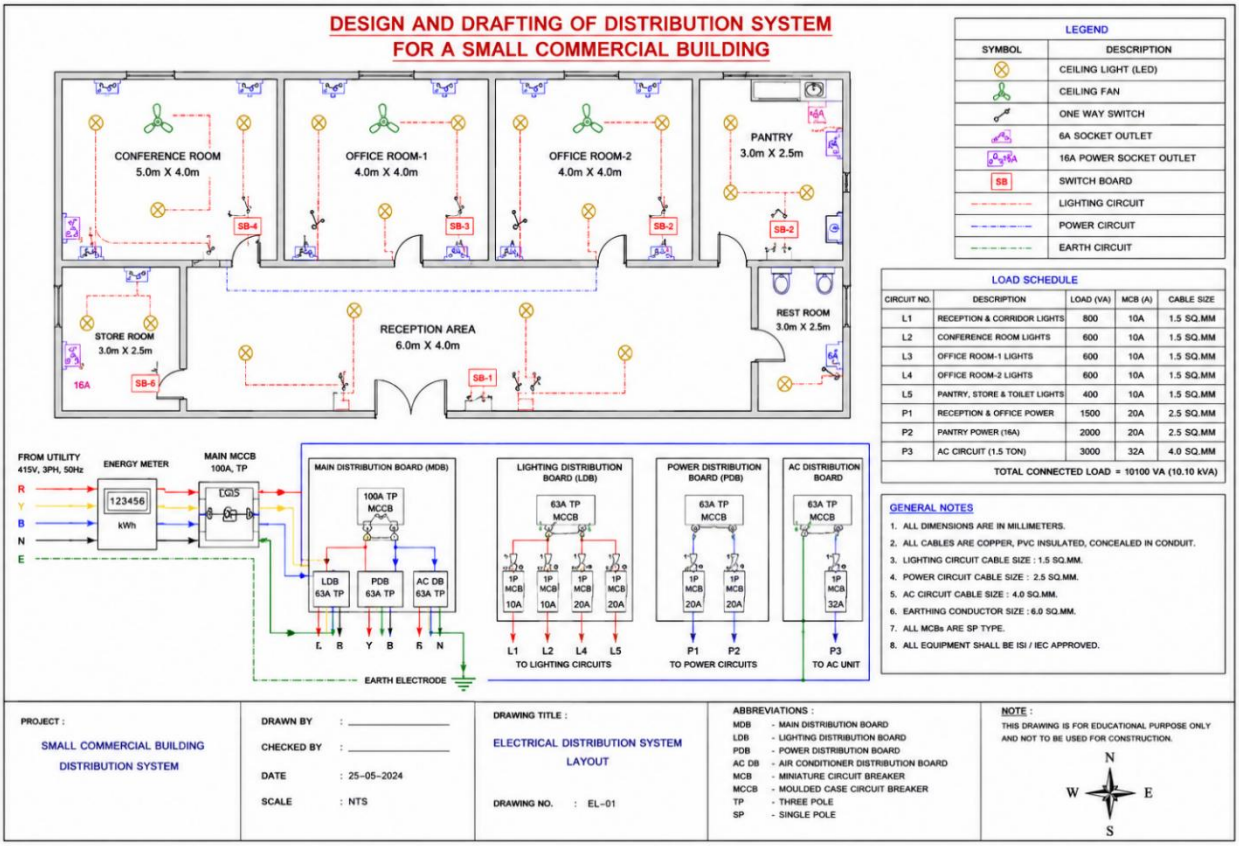
Assumptions:

- Supply Voltage: 415 V, 3-Phase 4-Wire, 50 Hz
- Main MCCB: 100 A, TP
- Lighting MCB: 10 A
- Power MCB: 20 A
- Air Conditioner MCB: 32 A
- Lighting Cable: 1.5 sq.mm Copper
- Power Cable: 2.5 sq.mm Copper
- Earthing Conductor: 6 sq.mm Copper

Expected Output

A professionally drafted AutoCAD Electrical drawing showing the complete electrical distribution system of a small commercial building, including the Energy Meter, MCCB, Main Distribution Board (MDB), Lighting Distribution Board (LDB), Power Distribution Board (PDB), lighting circuits, power circuits, cable routing, earthing arrangement, load schedule, electrical legend, and title block using standard IEC/IS symbols.

File Name: Small_Commercial_Building_Distribution_System.dwg



Try

1. Using AutoCAD Electrical, design the electrical distribution system for a small commercial building showing the Energy Meter, Main MCCB, Main Distribution Board, Lighting Distribution Board, Power Distribution Board, lighting circuits, power circuits, and earthing arrangement using standard IEC/IS symbols.
2. Prepare a complete AutoCAD Electrical drawing for a small commercial building illustrating the electrical distribution network with cable routing, distribution boards, protective devices, load schedule, electrical legend, title block, and general installation notes.

3.5 Electrical Room Layout with Control Panels Using AutoCAD Electrical

To design the electrical room layout with control panels for a commercial building using AutoCAD Electrical.

Problem Statement:

Design the layout of an electrical room for a commercial building using AutoCAD Electrical. The room shall include the following equipment:

- Main LT Panel
- Power Control Center (PCC)
- Motor Control Center (MCC)
- PLC Control Panel
- Automatic Power Factor Correction (APFC) Panel
- Distribution Board (DB)
- Transformer
- UPS Panel
- Battery Bank
- Cable Trench
- Cable Entry and Exit Points
- Earthing Bus Bar
- Fire Extinguisher
- Emergency Exit Door
- Exhaust Fan and Lighting Fixtures

HINT

Requirements:

1. Draw the electrical room with suitable dimensions.
2. Place all control panels using standard IEC/IS electrical symbols.
3. Show cable trenches and cable routing.
4. Provide minimum working clearance in front of all panels.
5. Indicate cable entry and exit locations.
6. Show earthing connections for all panels.
7. Create separate AutoCAD layers for:
    - Room Layout
    - Control Panels
    - Cable Trench
    - Cable Routing
    - Earthing
    - Lighting
    - Text and Dimensions
8. Include equipment labels, electrical legend, general notes, and title block.

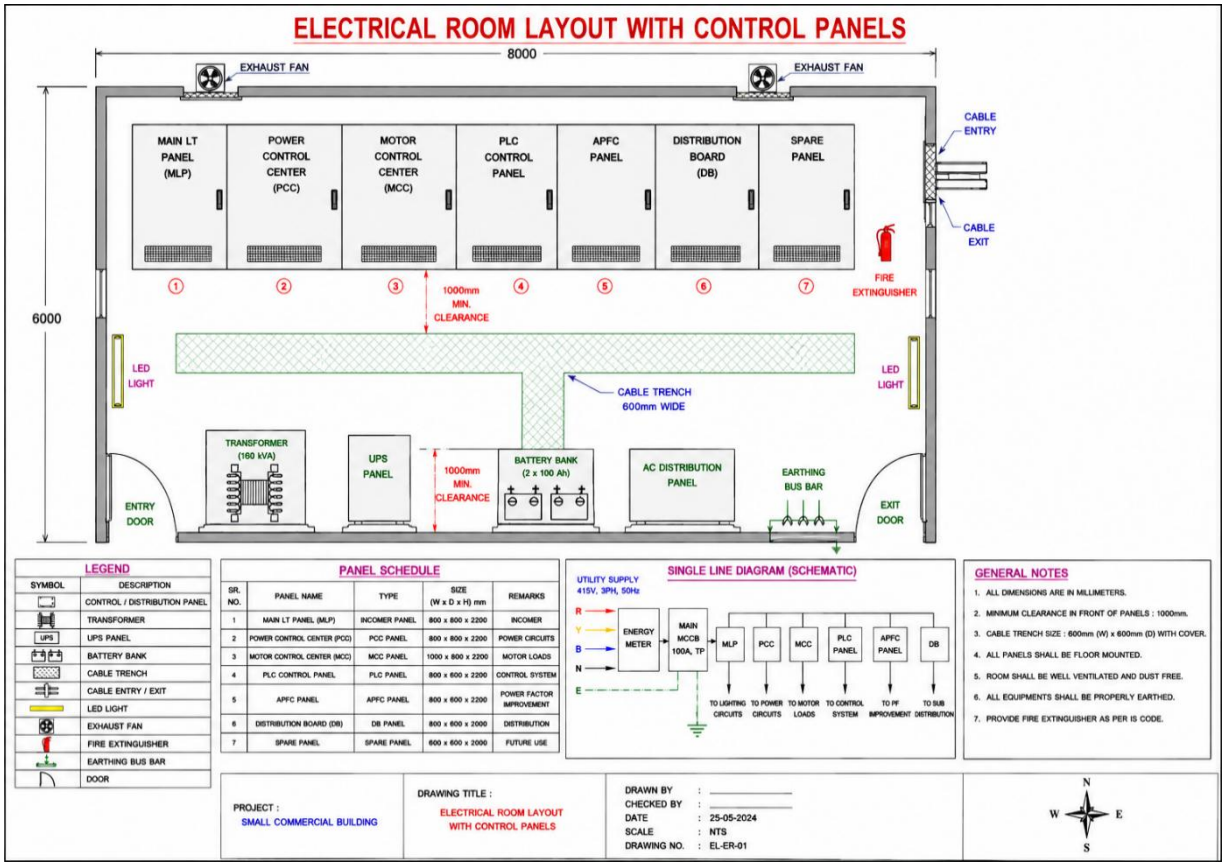
Assumptions:

- Supply Voltage: 415 V, 3-Phase, 50 Hz
- Room Size: 8 m × 6 m
- Minimum Working Clearance: 1000 mm
- Cable Trench Width: 600 mm
- Copper Earthing Bus Bar
- Indoor Floor-Mounted Panels

Expected Output

A professional AutoCAD Electrical drawing is prepared showing the electrical room layout with Main LT Panel, PCC, MCC, PLC Panel, APFC Panel, Distribution Board, Transformer, UPS, Battery Bank, cable trench, cable routing, earthing arrangement, lighting, ventilation, electrical legend, and title block using standard IEC/IS symbols.

File Name: Electrical_Room_Layout_With_Control_Panels.dwg



Try

1. Using AutoCAD Electrical, prepare the complete layout of an electrical room for a commercial building showing the LT panel, PCC, MCC, PLC panel, APFC panel, transformer, UPS, battery bank, cable trench, lighting, ventilation, and earthing arrangement.
2. Design an electrical room layout in AutoCAD Electrical with proper component placement, cable routing, working clearances, safety equipment, legends, and title block using standard IEC/IS electrical symbols.

4. Commercial and Industrial Electrical Layouts

This module introduces the design and drafting of electrical substations and control circuits using AutoCAD Electrical. It covers the preparation of Single-Line Diagrams (SLDs) for substations, illustrating transformers, circuit breakers, busbars, and feeders. Students learn to create control circuit schematics, relay and contactor wiring diagrams, and cable routing with cable tray layouts using standard IEC/IS symbols. The course emphasizes proper component placement, wire numbering, labeling, and documentation for safe, reliable, and professional electrical system design. It enables learners to develop industry-standard substation and control panel drawings suitable for installation and maintenance.

4.1 Commercial and Industrial Electrical Layouts

To prepare the Single-Line Diagram (SLD) of a substation using AutoCAD Electrical with standard IEC/IS electrical symbols.

Problem Statement:

Design the Single-Line Diagram (SLD) of a **33/11 kV electrical substation** using AutoCAD Electrical.

The SLD shall include the following components:

1. Incoming 33 kV Feeder
2. Lightning Arrester (LA)
3. Isolator (Disconnector)
4. Current Transformer (CT)
5. Potential Transformer (PT)
6. Vacuum Circuit Breaker (VCB)
7. 33 kV Busbar
8. 33/11 kV Power Transformer
9. 11 kV Busbar
10. Outgoing Feeders
11. Circuit Breakers
12. Earthing System

HINT

Requirements:

1. Draw the complete single-line diagram using standard IEC/IS symbols.
2. Show the power flow from the incoming feeder to the outgoing feeders.
3. Label all equipment with voltage ratings and equipment names.
4. Show transformer ratings and busbar connections.
5. Indicate the locations of CTs, PTs, isolators, and circuit breakers.
6. Create separate AutoCAD layers for:
    - Busbars
    - Power Equipment
    - Protection Devices
    - Earthing
    - Text and Dimensions
7. Add an electrical legend, general notes, and title block.

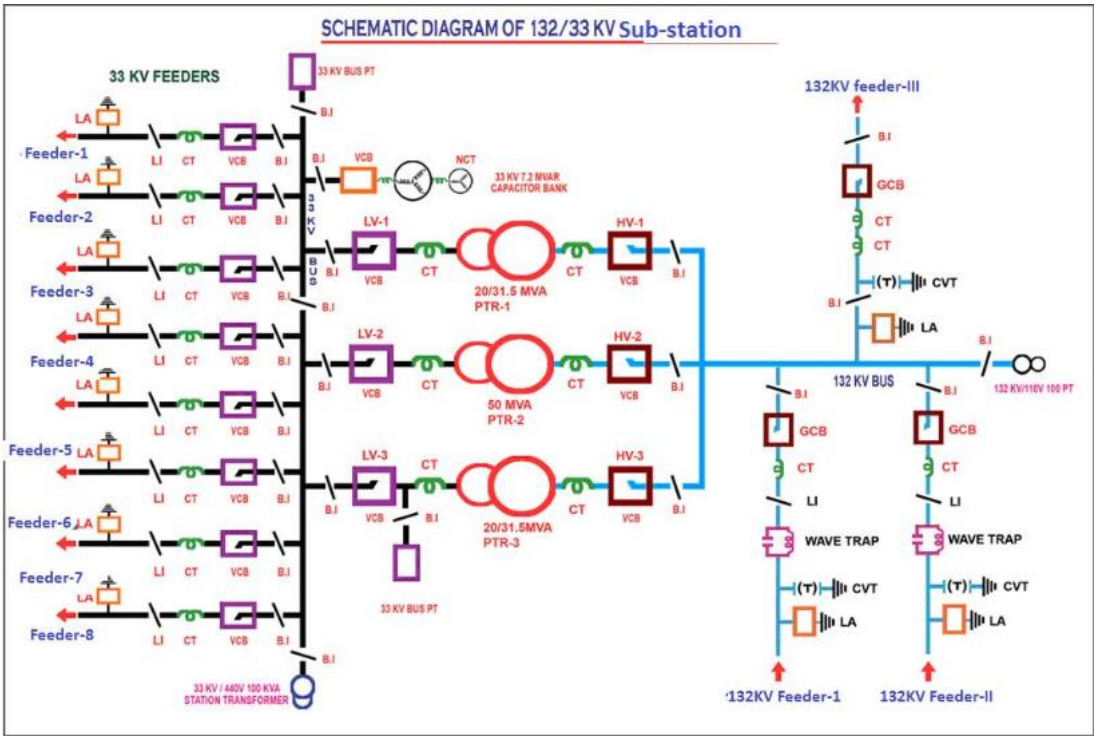
Assumptions:

- Incoming Supply: 33 kV, 3-Phase, 50 Hz
- Power Transformer: 33/11 kV, 5 MVA
- Circuit Breaker: Vacuum Circuit Breaker (VCB)
- Busbars: Copper Busbars
- Earthing: Double Earthing System

Expected Output

A professional AutoCAD Electrical drawing is prepared showing the complete Single-Line Diagram of a 33/11 kV substation, including the incoming feeder, lightning arrester, isolator, CT, PT, VCB, busbars, power transformer, outgoing feeders, and earthing system using standard IEC/IS electrical symbols.

File Name: Substation_Single_Line_Diagram.dwg



Try

1. Prepare the **Single-Line Diagram (SLD)** of a **33/11 kV substation** using AutoCAD Electrical. Include the incoming feeder, lightning arrester, isolator, CT, PT, VCB, power transformer, busbars, outgoing feeders, and earthing arrangement using standard IEC/IS symbols.
2. Design a complete **substation SLD** in AutoCAD Electrical showing all primary equipment, protection devices, transformer connections, busbar arrangement, outgoing feeders, equipment labels, electrical legend, and title block according to standard engineering practices.

4.2 Control Circuit Schematics Using AutoCAD Electrical

To prepare the control circuit schematic of a Direct-On-Line (DOL) motor starter

Problem Statement:

Design the control circuit schematic for a three-phase induction motor using a Direct-On-Line (DOL) starter in AutoCAD Electrical.

The control circuit shall include the following components:

- Single-phase Control Supply (230 V AC)
- Control Fuse (F1)
- STOP Push Button (Normally Closed)
- START Push Button (Normally Open)
- Overload Relay (Normally Closed Contact)
- Magnetic Contactor Coil (KM1)
- Auxiliary Holding Contact (KM1-NO)
- Indication Lamp (RUN)
- Neutral Connection
- Terminal Blocks

using AutoCAD Electrical.

Hint

Requirements:

1. Draw the complete ladder-type control circuit using AutoCAD Electrical.
2. Use standard IEC/IS electrical symbols.
3. Show proper wire numbering and component tagging.
4. Label all components with their ratings and identification numbers.
5. Create separate layers for:
    - Control Wiring
    - Electrical Components
    - Text
    - Wire Numbers
    - Title Block
6. Prepare the schematic with terminal numbers, legend, and general notes.

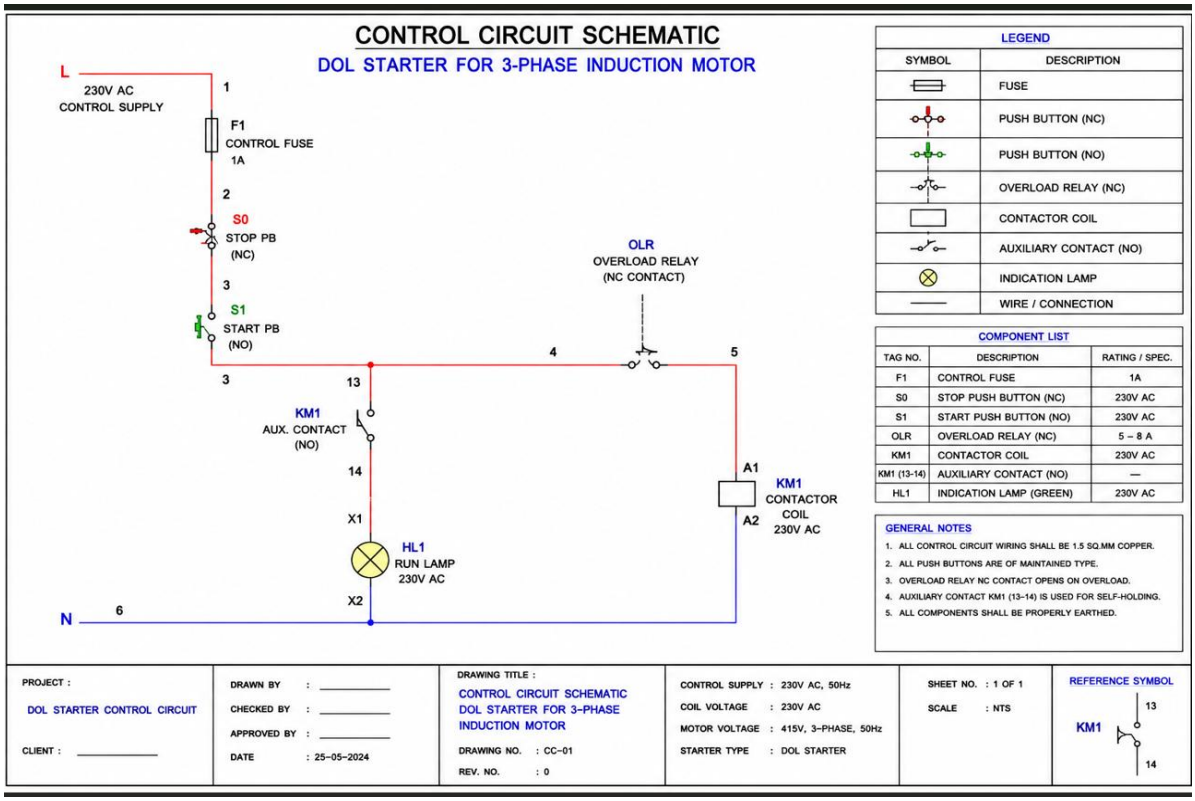
Assumptions:

- Control Voltage: 230 V AC
- Motor Voltage: 415 V, 3-Phase
- Contactor Coil: 230 V AC
- Push Buttons: Industrial Type
- Overload Relay: Thermal Type

Expected Output

A professional AutoCAD Electrical schematic is prepared showing the complete DOL motor starter control circuit with Start/Stop push buttons, overload relay, magnetic contactor coil, auxiliary holding contact, indication lamp, terminal blocks, wire numbers, component tags, legend, and title block using standard IEC/IS electrical symbols.

File Name: Control_Circuit_Schematic_DOL_Starter.dwg



Try

1. Prepare the complete **DOL motor starter control circuit schematic** using AutoCAD Electrical. Include the control fuse, STOP and START push buttons, overload relay, contactor coil, auxiliary holding contact, indication lamp, wire numbering, terminal blocks, and component tags using standard IEC/IS symbols.
2. Design and draft a **motor control circuit schematic** in AutoCAD Electrical with proper ladder diagram representation, wire numbering, cross-referencing, electrical legend, terminal numbering, and title block following standard engineering practices.

4.3 Control Relay control and contactor wiring diagrams

To prepare the relay control and contactor wiring diagram for a three-phase induction motor using AutoCAD Electrical.

Problem Statement:

Design the relay control and contactor wiring diagram for a three-phase induction motor operated through a Direct-On-Line (DOL) starter using AutoCAD Electrical.

The wiring diagram shall include the following components:

1. Three-Phase AC Supply (415 V)
2. Control Supply (230 V AC)
3. Main Isolator
4. Control Fuse
5. STOP Push Button (NC)
6. START Push Button (NO)
7. Magnetic Contactor (KM1)
8. Auxiliary Holding Contact (KM1-NO)
9. Thermal Overload Relay (OLR)
10. Relay Coil
11. Indication Lamp
12. Three-Phase Induction Motor
13. Terminal Blocks
14. Earthing Connection

Electrical.

Hint

Requirements:

1. Draw both the Power Circuit and Control Circuit using AutoCAD Electrical.
2. Use standard **IEC/IS electrical symbols**.
3. Show all wiring connections with wire numbering.
4. Label every component with tag numbers and ratings.
5. Create separate AutoCAD layers for:
    - Power Wiring
    - Control Wiring
    - Electrical Components
    - Text and Dimensions
    - Wire Numbers
6. Provide terminal numbering and cross-references.
7. Include an electrical legend, general notes, and title block.

Assumptions:

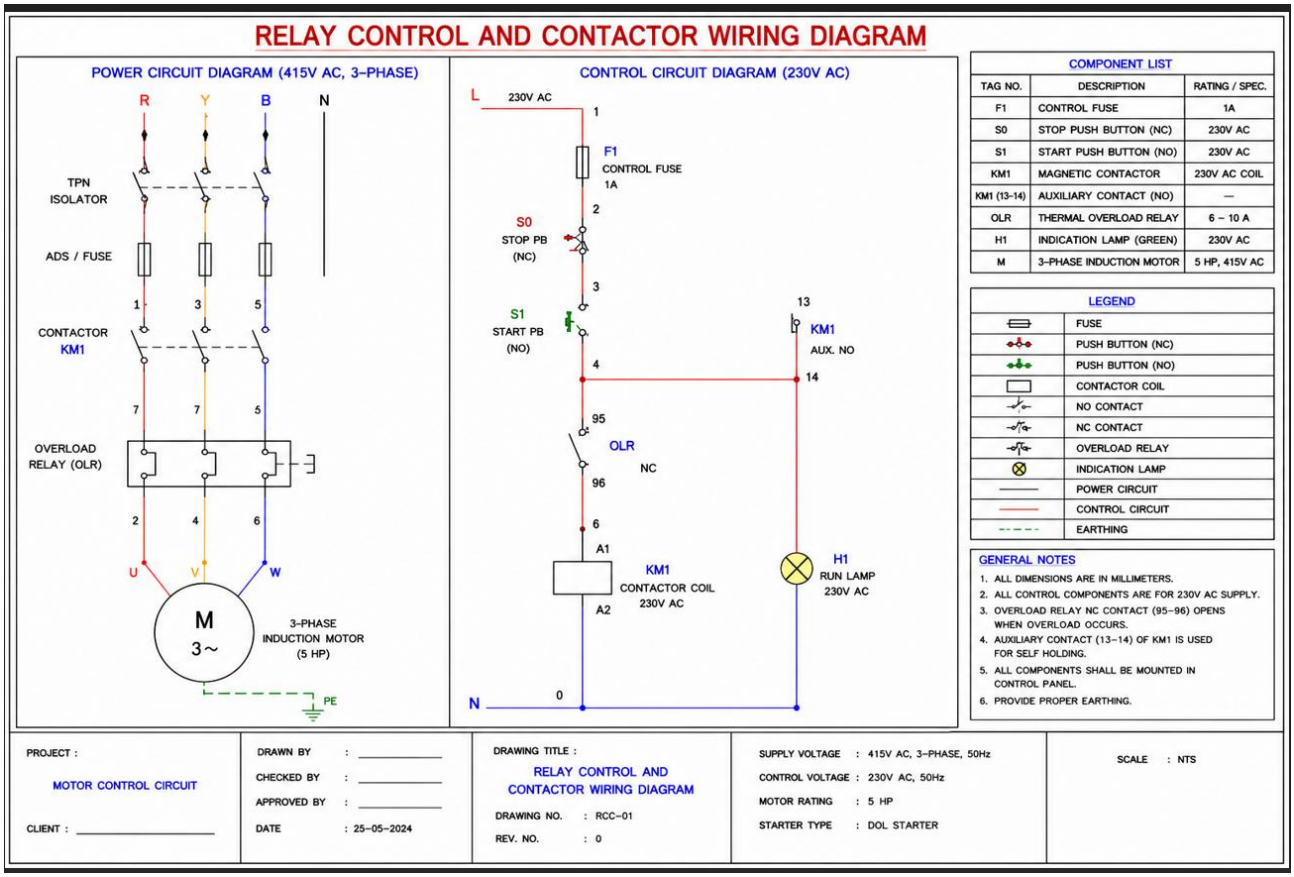
- Supply Voltage: 415 V, 3-Phase, 50 Hz
- Control Voltage: 230 V AC
- Motor Rating: 5 HP
- Contactor Coil: 230 V AC
- Overload Relay: 6–10 A

- Wiring: PVC Copper Conductors

Expected Output

A professional AutoCAD Electrical drawing is prepared showing the complete relay control and contactor wiring diagram, including the power circuit, control circuit, relay coil, magnetic contactor, overload relay, push buttons, indication lamp, terminal blocks, wire numbering, component tags, electrical legend, and title block using standard IEC/IS electrical symbols.

File Name: Relay_Control_and_Contactor_Wiring_Diagram.dwg



Try

1. Using AutoCAD Electrical, prepare the complete **relay control and contactor wiring diagram** for a three-phase induction motor. Include the control circuit, power circuit, overload relay, magnetic contactor, auxiliary contact, indication lamp, terminal blocks, and wire numbering using standard IEC/IS symbols.
2. Design and draft a **relay-based motor control circuit** in AutoCAD Electrical showing the complete power and control wiring, component tags, terminal numbering, electrical legend, title block, and general installation notes according to standard engineering practices.

4.4 Cable Routing and Tray Layout Using AutoCAD Electrical

To design the cable routing and cable tray layout for a commercial building using AutoCAD Electrical.

Problem Statement:

Design the cable routing and cable tray layout for a commercial building using AutoCAD Electrical.

Requirements:

1. Draw the building layout and equipment locations.
2. Design horizontal and vertical cable tray routing.
3. Show separate routing for power, control, and lighting cables.
4. Use standard IEC/IS electrical symbols.
5. Label all cable trays, cable numbers, and circuit names.
6. Create separate AutoCAD layers for:
    - Building Layout
    - Cable Trays
    - Power Cables
    - Control Cables
    - Lighting Cables
    - Electrical Equipment
    - Text and Dimensions
7. Include cable tray sizes, cable identification numbers, electrical legend, general notes, and title block.

Hint

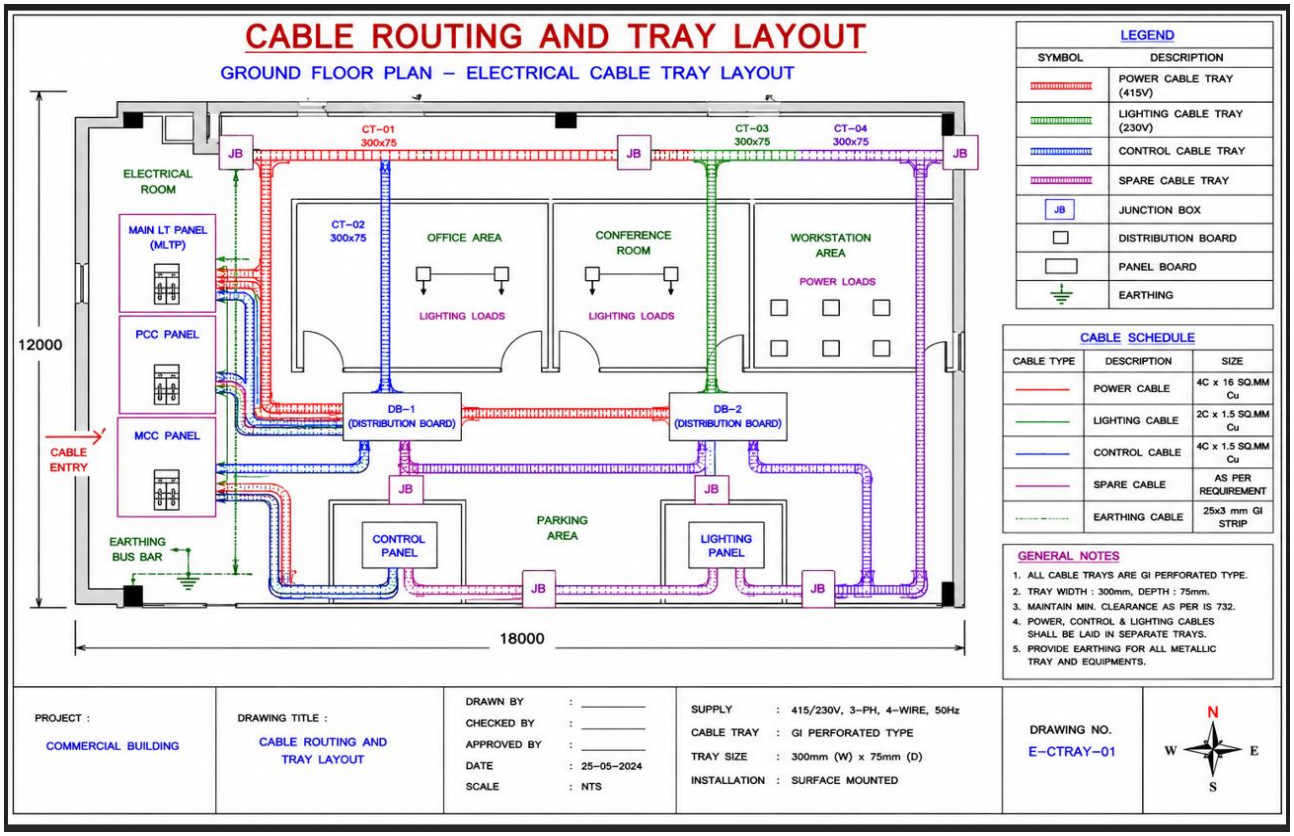
Assumptions:

- Supply Voltage: 415/230 V, 3-Phase, 50 Hz
- Cable Tray Type: Perforated GI Tray
- Tray Width: 300 mm
- Lighting Cable: 1.5 sq.mm Copper
- Power Cable: 4-Core 16 sq.mm Copper
- Control Cable: 1.5 sq.mm multi-core
- Earthing Conductor: 25 × 3 mm GI Strip

Expected Output

A professional AutoCAD Electrical drawing is prepared showing the complete relay control and contactor wiring diagram, including the power circuit, control circuit, relay coil, magnetic contactor, overload relay, push buttons, indication lamp, terminal blocks, wire numbering, component tags, electrical legend, and title block using standard IEC/IS electrical symbols.

File Name: Relay_Control_and_Contactor_Wiring_Diagram.dwg



Try

1. Design the complete **cable routing and cable tray layout** for a commercial building using AutoCAD Electrical. Show the LT panel, PCC, MCC, distribution boards, cable trays, lighting circuits, power circuits, control cables, cable numbering, and earthing arrangement using standard IEC/IS symbols.
2. Prepare an **AutoCAD Electrical cable tray layout** showing horizontal and vertical tray routing, cable entry and exit points, junction boxes, electrical panels, cable identification numbers, tray dimensions, electrical legend, general notes, and title block according to standard engineering practices.

4.5 Drawing of 11 kV/440 V Substation Single-Line Diagram (SLD) Using AutoCAD Electrical

To prepare the Single-Line Diagram (SLD) of an 11 kV/440 V distribution substation using AutoCAD Electrical.

Problem Statement:

Design the Single-Line Diagram (SLD) of an 11 kV/440 V distribution substation using AutoCAD Electrical.
The SLD shall include the following equipment:

1. 11 kV Incoming Feeder
2. Lightning Arrester (LA)
3. Isolator (Disconnect Switch)
4. Vacuum Circuit Breaker (VCB)
5. Current Transformer (CT)
6. Potential Transformer (PT)
7. 11 kV Busbar
8. 11 kV/440 V Distribution Transformer (500 kVA)
9. LT Main Panel
10. Air Circuit Breaker (ACB)
11. LT Busbar (440 V)
12. Outgoing Feeders to Load
13. Energy Meter
14. Earthing System

Hint

Requirements:

1. Draw the complete Single-Line Diagram using AutoCAD Electrical.
2. Use standard IEC/IS electrical symbols.
3. Show the power flow from the 11 kV incoming feeder to the 440 V outgoing feeders.
4. Label all equipment with names and ratings.
5. Show CT, PT, VCB, transformer, ACB, busbars, and outgoing feeders.
6. Create separate AutoCAD layers for:
    - High Voltage Equipment
    - Low Voltage Equipment
    - Busbars
    - Earthing
    - Text and Dimensions
7. Include an electrical legend, general notes, and title block.

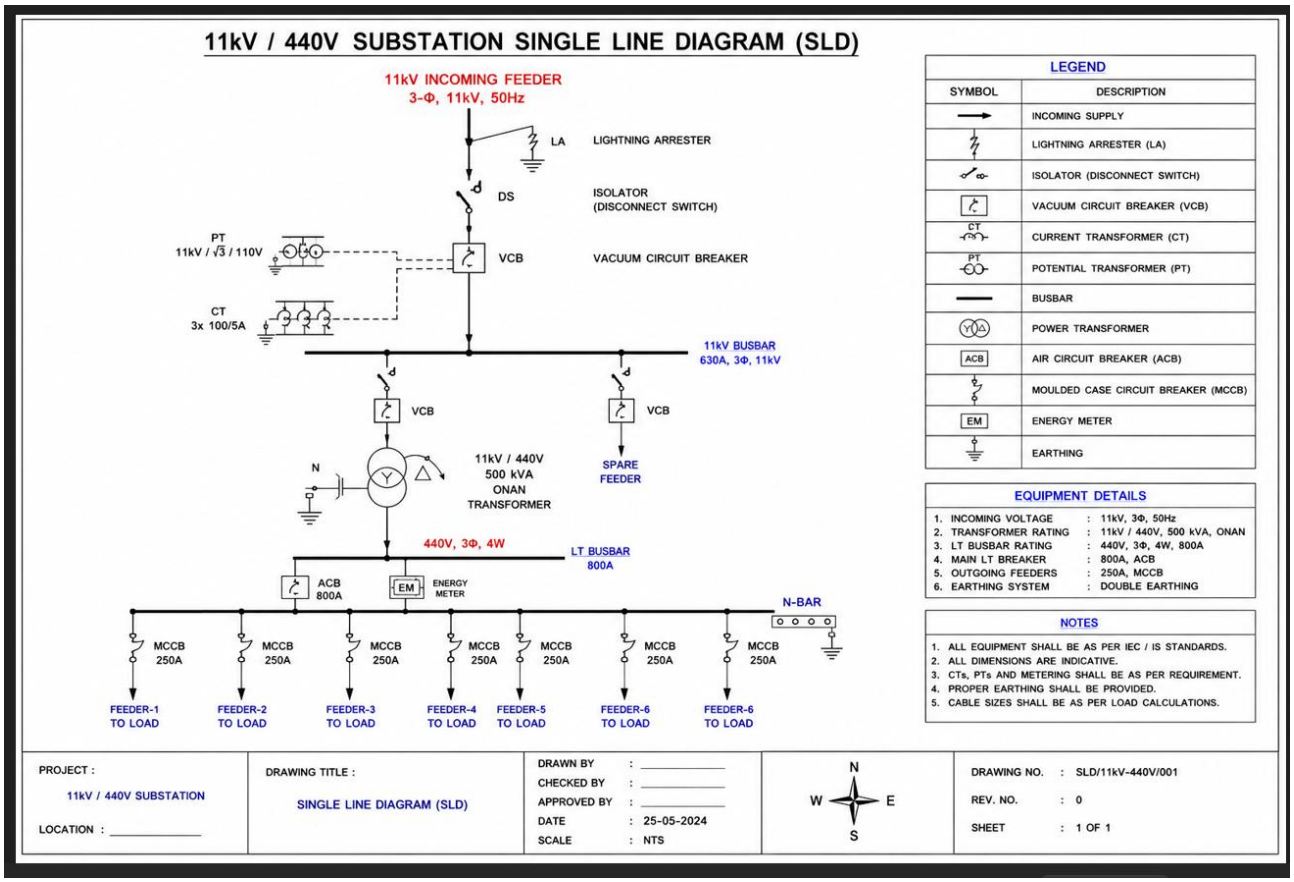
Assumptions

- Incoming Supply: 11 kV, 3-Phase, 50 Hz
- Distribution Transformer: 11 kV/440 V, 500 kVA
- Main LT Breaker: 800 A ACB
- Outgoing Feeders: 250 A MCCBs
- Earthing: Double Earthing
- Busbars: Copper

Expected Output

A professional AutoCAD Electrical drawing is prepared showing the complete 11 kV/440 V substation Single-Line Diagram, including the incoming feeder, lightning arrester, isolator, VCB, CT, PT, transformer, LT panel, ACB, busbars, outgoing feeders, energy meter, and earthing system using standard IEC/IS electrical symbols.

File Name: 11kV_440V_Substation_SLD.dwg



Try

1. Prepare the **Single-Line Diagram (SLD)** of an **11 kV/440 V distribution substation** using AutoCAD Electrical. Include the incoming feeder, lightning arrester, isolator, VCB, CT, PT, transformer, LT panel, busbars, outgoing feeders, and earthing system using standard IEC/IS electrical symbols.
2. Design a complete **11 kV/440 V substation SLD** in AutoCAD Electrical showing all primary equipment, protection devices, transformer connections, LT distribution panel, busbar arrangement, outgoing feeders, electrical legend, and title block according to standard engineering drawing practices.

4.6 Panel Wiring Diagram for DOL / Star-Delta Motor Starter Using AutoCAD Electrical

To design and draft the panel wiring diagram for a Direct-On-Line (DOL) and Star-Delta motor starter using AutoCAD Electrical.

Problem Statement:

Design the complete panel wiring diagram for a three-phase induction motor starter using **DOL (Direct-On-Line)** or **Star-Delta** starting method in AutoCAD Electrical.

The panel shall include the following components:

1. 415 V, 3-Phase Incoming Supply
2. Main Isolator Switch
3. MCCB (Main Circuit Breaker)
4. Magnetic Contactor(s)
    - DOL: One Main Contactor
    - Star-Delta: Main, Star, and Delta Contactors
5. Thermal Overload Relay (OLR)
6. Timer Relay (for Star-Delta Starter)
7. START Push Button (NO)
8. STOP Push Button (NC)
9. RUN Indication Lamp (Green)
10. TRIP Indication Lamp (Red)
11. Terminal Blocks
12. Neutral and Earth Busbars
13. Three-Phase Induction Motor
14. Control Wiring and Power Wiring

Hint

Requirements:

1. Draw the complete power and control wiring diagram using AutoCAD Electrical.
2. Use standard IEC/IS electrical symbols.
3. Show all wire numbers and component tag numbers.
4. Label all components with ratings and identification.
5. Create separate AutoCAD layers for:
    - Power Wiring
    - Control Wiring
    - Electrical Components
    - Terminal Blocks
    - Text and Dimensions
6. Provide terminal numbering and cross-references.
7. Include an electrical legend, bill of materials (BOM), general notes, and title block.

Assumptions:

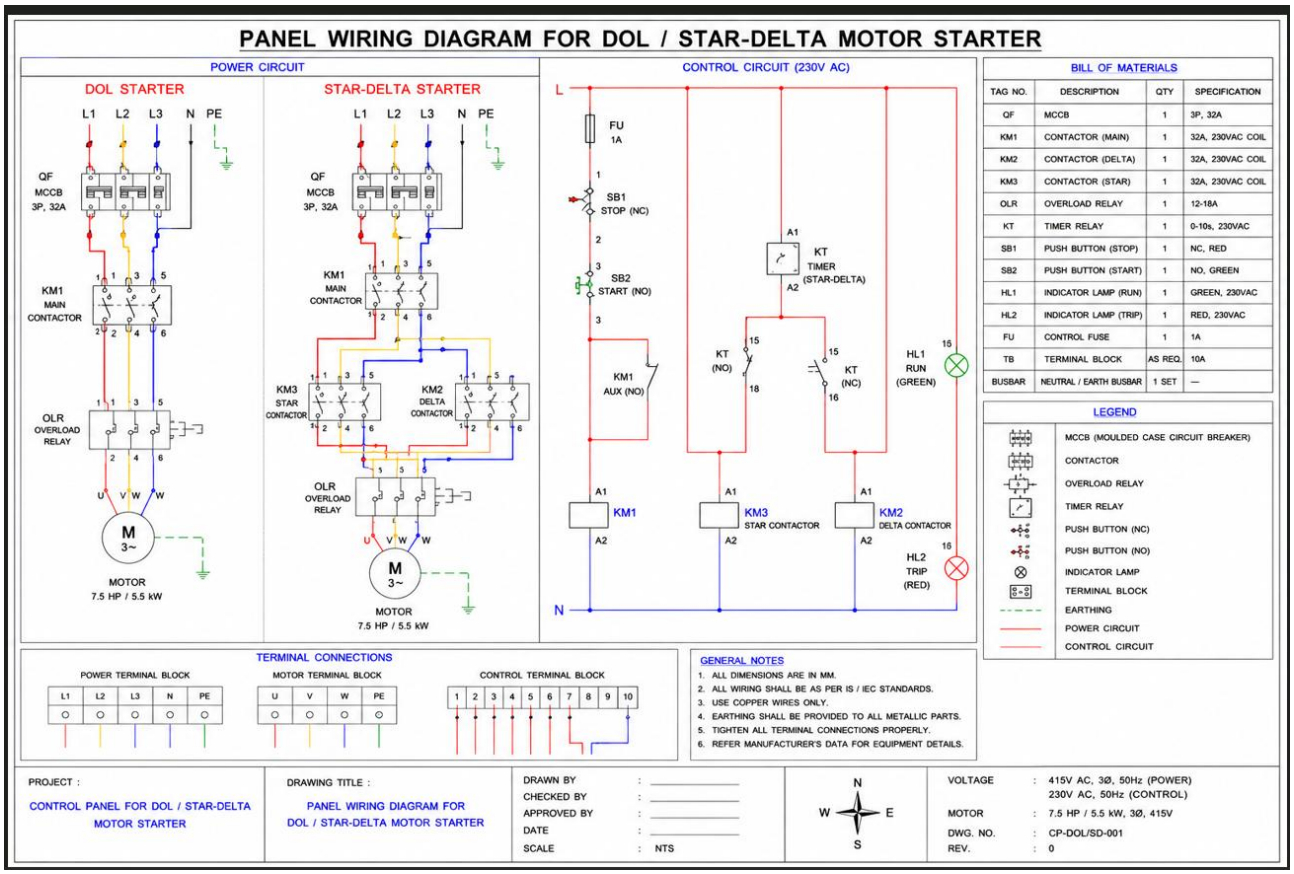
- Supply Voltage: 415 V AC, 3-Phase, 50 Hz
- Control Voltage: 230 V AC
- Motor Rating: 7.5 HP (5.5 kW)
- Main MCCB: 32 A
- Contactor Coil Voltage: 230 V AC

- Overload Relay: 12–18 A
- Timer Relay: 0–10 s (Star-Delta)
- Copper Control Wiring

Expected Output

A professional AutoCAD Electrical drawing is prepared showing the complete panel wiring diagram for a DOL or Star-Delta motor starter, including the MCCB, contactors, overload relay, timer relay, push buttons, indication lamps, terminal blocks, power and control wiring, wire numbering, bill of materials, electrical legend, and title block using standard IEC/IS electrical symbols.

File Name: Panel_Wiring_DOL_StarDelta_Motor_Starter.dwg



Try

1. Using AutoCAD Electrical, prepare the **panel wiring diagram of a DOL motor starter** showing the MCCB, contactor, overload relay, START/STOP push buttons, indication lamps, terminal blocks, motor connections, wire numbering, and component tags using standard IEC/IS symbols.
2. Design and draft the **panel wiring diagram of a Star-Delta motor starter** using AutoCAD Electrical. Include the main, star, and delta contactors, timer relay, overload relay, push buttons, indication lamps, terminal blocks, power wiring, control wiring, bill of materials, electrical legend, and title block according to standard engineering practices.

5 Mini Project: Design and Documentation of Electrical System for a Small Apartment / Laboratory / Factory Using AutoCAD Electrical

To design and document the complete electrical system for a small apartment, laboratory, or factory using AutoCAD Electrical.

Problem Statement:

Design the complete electrical system for a small factory setup using AutoCAD Electrical.

The layout shall include the following components:

1. Utility Power Supply (415/230 V)
2. Energy Meter
3. Main Distribution Board (MDB)
4. Distribution Board (DB)
5. Lighting Circuits
6. Power Socket Circuits
7. Motor Control Panel (MCC)
8. Three-Phase Induction Motor
9. Control Panel
10. Cable Tray and Cable Routing
11. Earthing Pits and Earth Bus
12. Emergency Lighting
13. Fire Alarm Panel
14. Exit Sign Boards

Electrical Equipment Labels and Circuit Numbers

Hint

Requirements:

1. Prepare the complete electrical layout using AutoCAD Electrical.
2. Draw lighting, power, and motor circuits using standard IEC/IS symbols.
3. Show the Main Distribution Board (MDB), Distribution Board (DB), and Motor Control Center (MCC).
4. Indicate cable routing through cable trays and conduit paths.
5. Provide earthing connections for all equipment.
6. Label all electrical equipment, cable numbers, and circuit numbers.
7. Create separate AutoCAD layers for:
   - Building Layout
   - Lighting
   - Power Circuits
   - Control Circuits
   - Cable Routing
   - Earthing
   - Text and Dimensions
8. Include an electrical legend, load schedule, bill of materials (BOM), general notes, and title block.

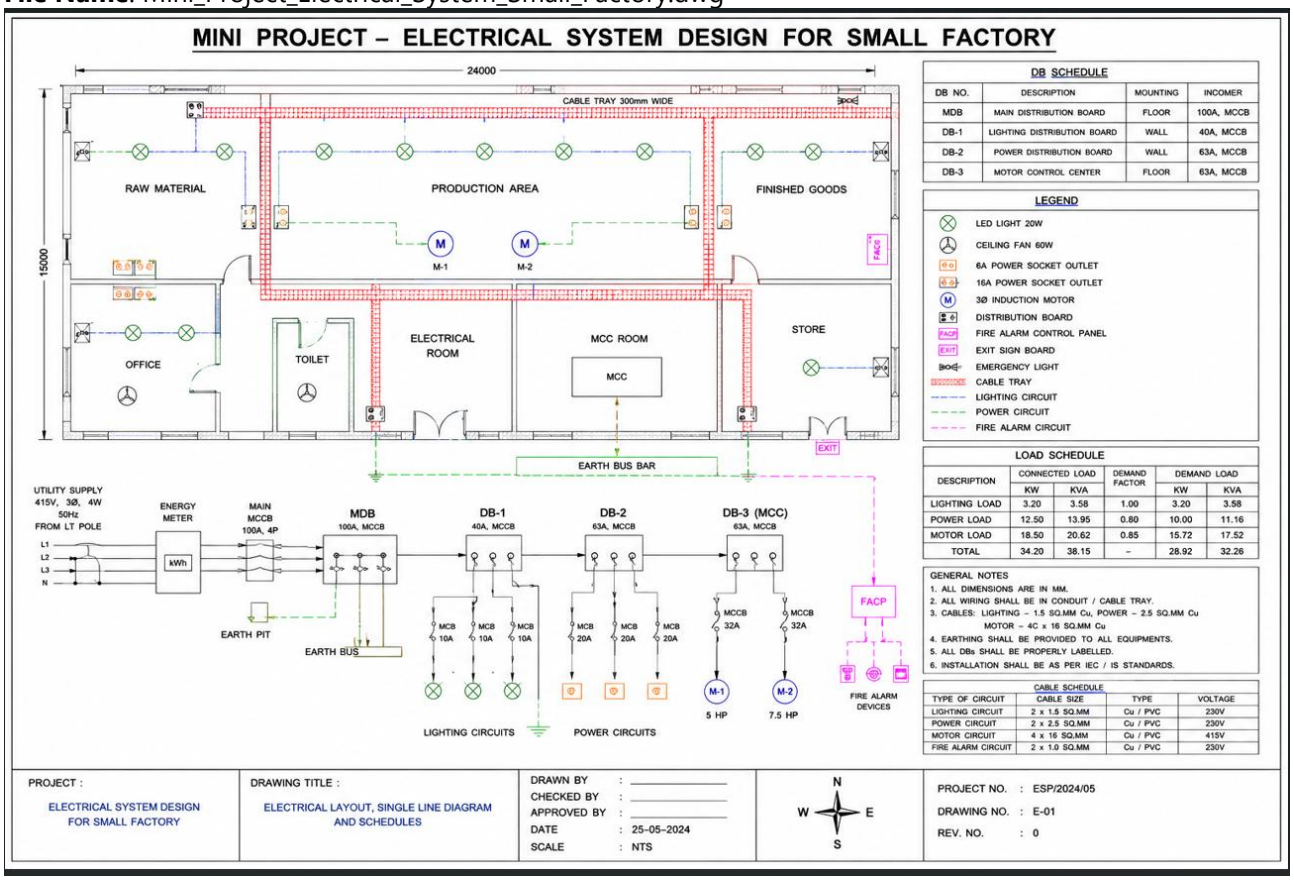
Assumptions:

- Supply Voltage: 415/230 V, 3-Phase, 50 Hz
- Main MCCB: 100 A
- Lighting Circuit MCB: 10 A
- Power Circuit MCB: 20 A
- Motor Circuit MCCB: 32 A
- Lighting Cable: 1.5 sq.mm Copper
- Power Cable: 2.5 sq.mm Copper
- Motor Cable: 4-Core 16 sq.mm Copper
- Earthing Conductor: 25 × 3 mm GI Strip

Expected Output

A complete AutoCAD Electrical project drawing is prepared showing the electrical layout of a small factory, including the utility supply, energy meter, MDB, DB, lighting circuits, power circuits, motor control panel, cable routing, cable trays, earthing system, emergency lighting, fire alarm panel, bill of materials, electrical legend, load schedule, and title block using standard IEC/IS electrical symbols.

File Name: Mini_Project_Electrical_System_Small_Factory.dwg



Try

1. Using AutoCAD Electrical, prepare the **complete electrical layout** for a small factory, laboratory, or apartment. Include the utility supply, energy meter, MDB, DB, lighting circuits, power outlets, motor control panel, cable routing, earthing system, and electrical legend using standard IEC/IS symbols.
2. Design and document the **electrical distribution system** of a small factory using AutoCAD Electrical. Prepare the complete layout with lighting and power circuits, motor control center (MCC), cable tray layout, bill of materials (BOM), load schedule, title block, and general installation notes following standard engineering practices.