

## Department of Electrical and Electronics Engineering

### Computer Aided Electrical Drawing

#### Module-1

##### **Winding Diagrams:**

- (a) Developed Winding Diagrams of D.C. Machines: Simplex Double Layer Lap and Wave Windings.
- (b) Developed Winding Diagrams of A.C. Machines:
- (c) Integral and Fractional Slot Double Layer Three Phase Lap and Wave Windings.
- (d) Single Layer Windings – Un-Bifurcated 2 and 3 Tier Windings, Mush Windings, Bifurcated 3 Tier Windings. Single line diagrams of generating stations and substations.

#### Module-2:

**Single Line Diagrams:** Single Line Diagrams of Generating Stations and Substations Covering Incoming Circuits, Outgoing Circuits, Busbar Arrangements (Single, Sectionalised Single, Main and Transfer, Double Bus Double Breaker, Sectionalised Double Bus, One and a Half Circuit Breaker Arrangement, Ring Main), Power Transformers, Circuit Breakers, Isolators, Earthing Switches, Instrument Transformers, Surge or Lightning Arresters, Communication Devices (Power-Line Carrier) and Line Trap

#### Module-3:

##### **Electrical Machine Assembly Drawings Using Design Data, Sketches or Both:**

Transformers - Sectional Views Of Single And Three Phase Core And Shell Type Transformers .

#### Module-4:

##### **Electrical Machine Assembly Drawings Using Design Data, Sketches or Both:**

D.C. Machine - Sectional Views of Yoke with Poles, Armature and Commutator dealt separately.

#### Module-5:

##### **Electrical Machine Assembly Drawings Using Design Data, Sketches or Both:**

Alternator – Sectional Views of Stator and Rotor dealt separately

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### Module-2

### **GENERATING STATIONS & SUBSTATIONS**

**Objective :** To draw the Single line diagrams of generating stations and substations.

**Steps to create substation diagram:**

#### **Substation:**

Before creating single line diagram of a generating station, we have to create the symbols and store them as blocks.

#### **To draw a line:**

The common sequence are as follows

1. **Command:** Type 'line' and press enter.
2. Specify the starting point of the line.
3. Specify the next point of the line.

#### **To create lightning Arrester:**

1. Type 'rec' in the command prompt.
2. Specify the first point p1.
3. Specify the second point p2.
4. Type 'line' in the command prompt.
5. Continue the same steps as for drawing a line.

#### **To create the ground symbol:**

1. Type trim command in the command prompt. Draw a polygon using the command polygon.
2. Select cutting edges.
3. Select the object that define the cutting edges or which we want to trim.
4. Press enter.

#### **To create potential transformer (P.T) :**

1. Type the command ARC.
2. Specify the starting and ending point.
3. Repeat the same procedure to get required number of turns.
4. The resultant will be

#### **To create current transformer:**

This is done using ARC command and the procedure as far as PT is repeated.

#### **To create circuit breaker (CB):**

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1. Type command circle .specify center of circle.
2. Expand the circle as required.
3. Create 2 more circles within the bigger circle in the same method.

### **To create Bus bar:**

1. Type the command rectangle.
2. Specify the starting and ending point.
3. To fill the required portion of the rectangle with solid use HATCH command.
4. Specify the boundary to be hatched.
5. Click Ok. The symbol will be filled with solid.

### **To create outgoing lines:**

1. Form a line as before.
2. Type 'polygon' in the command prompt. Specify number of sides as 3.
3. We get.
4. Fill the solid in the triangle using hatch command.

### **To create TEXT:**

1. Type text command.
2. Select the starting
3. Specify height of the text and press enter.
4. Then type the required text.

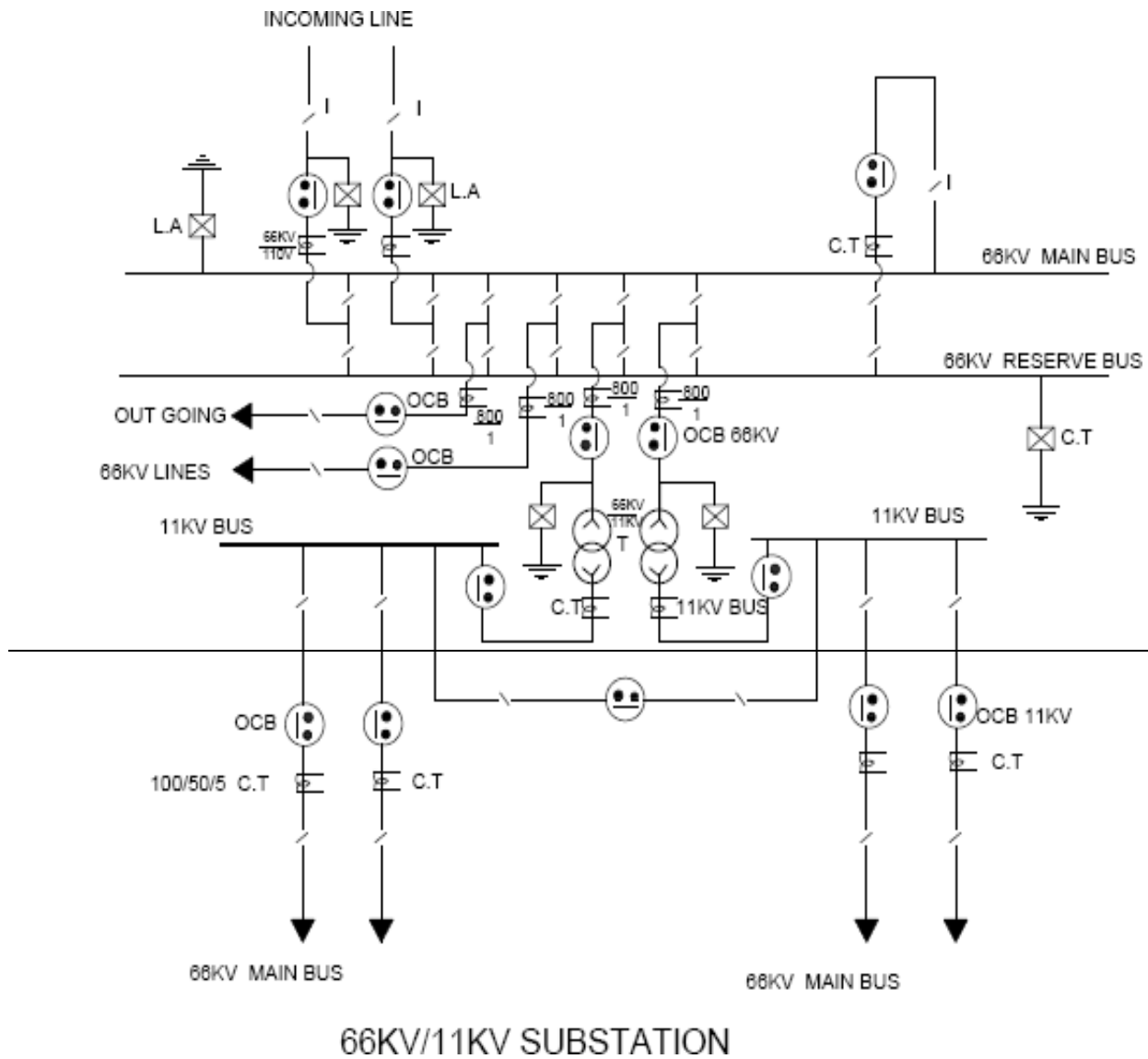
### **To store all the symbols in library:**

1. Go to Pull down menu
2. Select block, select make.
3. Give the name for the symbol.
4. Click on insert, select the block. click ok, symbol will be stored in library.

### **To insert block from the library:**

1. Click on insert, select the block.
2. Select the name box and type the name given to the required symbol.
3. Click ok.

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**Outcome:** students will be able to analyse the single line diagram of generating stations and substations