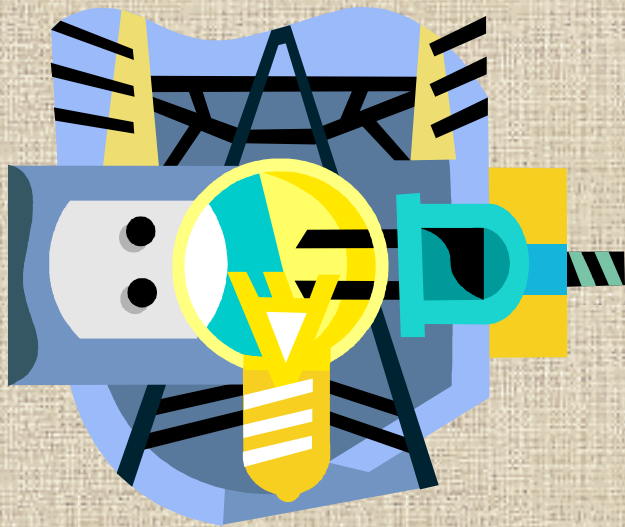


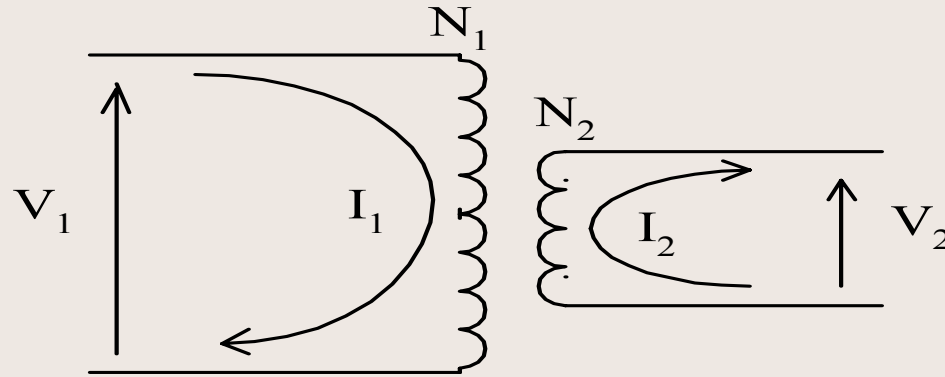
Transformers



Transformer Ratings

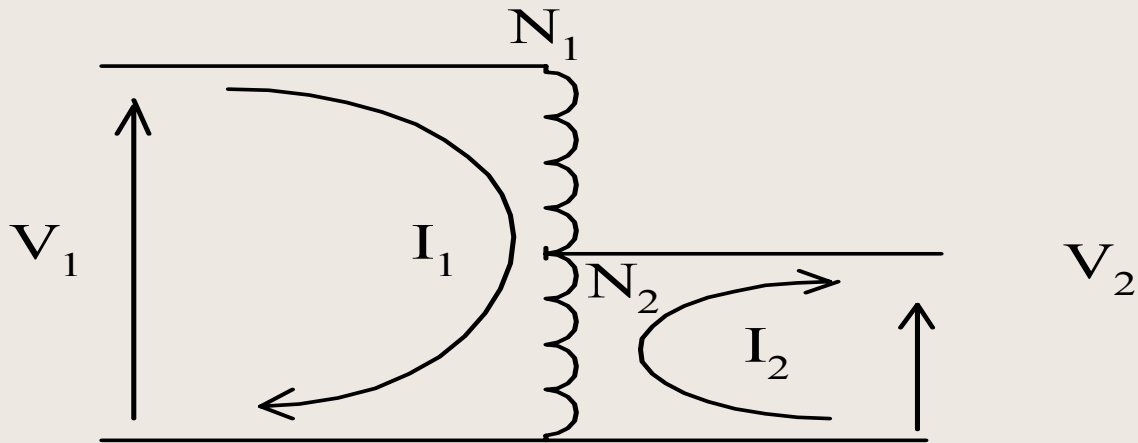
- VA rating
- Cooling
 - 1000 kVA 55°C ONAN
- Frequency
- Voltage
- Phase

Separate Windings



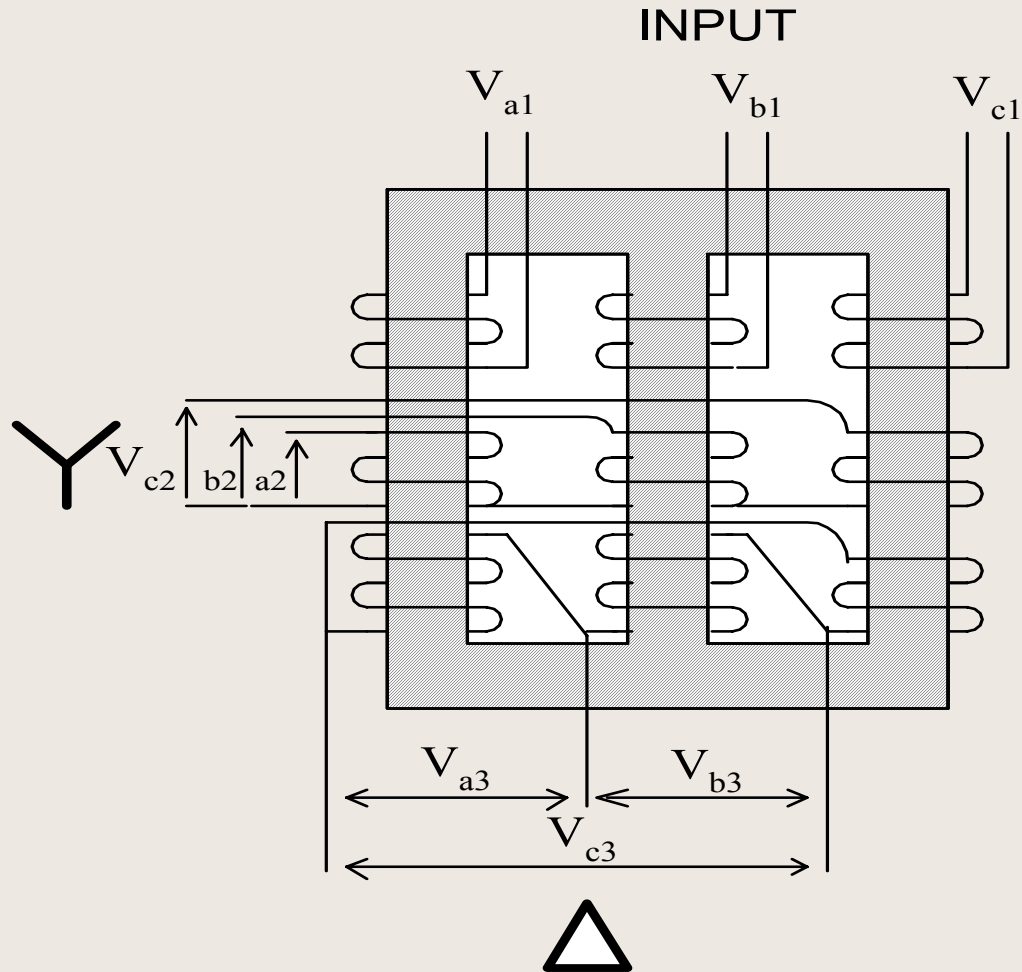
$$\frac{V_2}{V_1} = \frac{N_2}{N_1} = \frac{I_1}{I_2}$$

Autotransformer

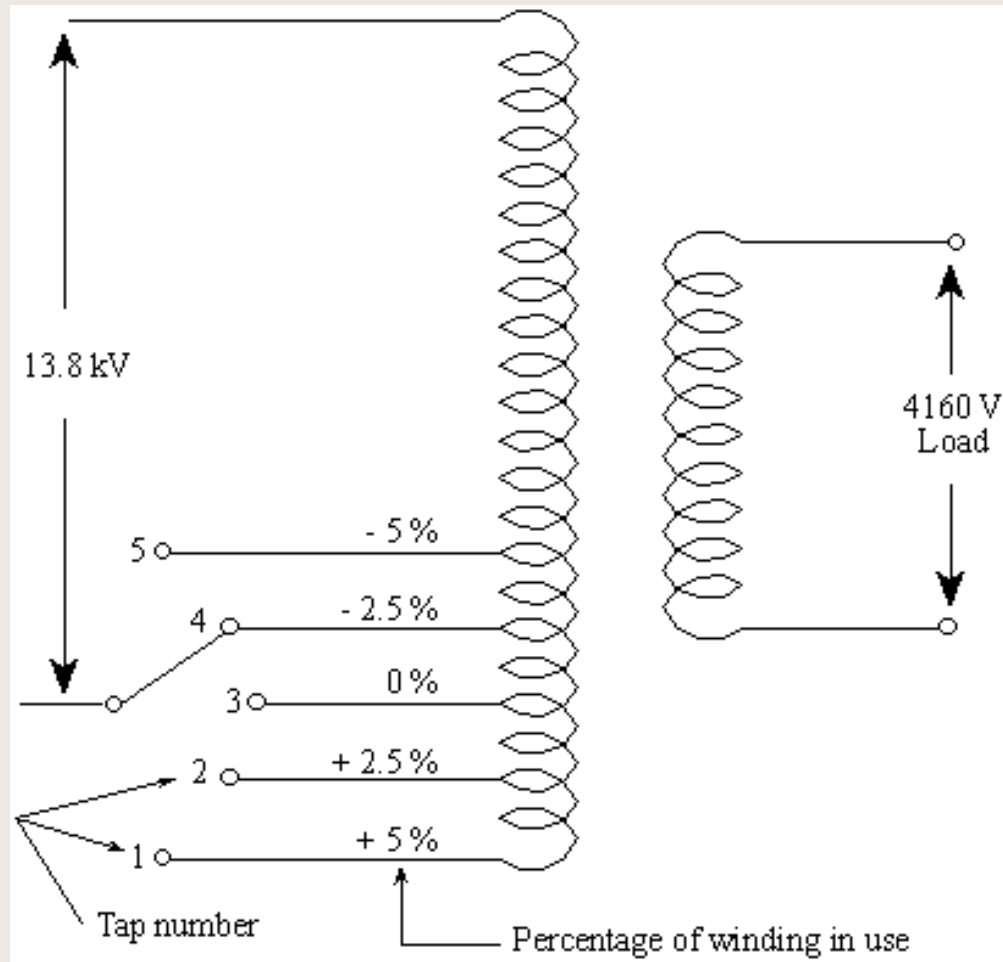


$$\frac{V_2}{V_1} = \frac{N_2}{N_1} = \frac{I_1}{I_2}$$

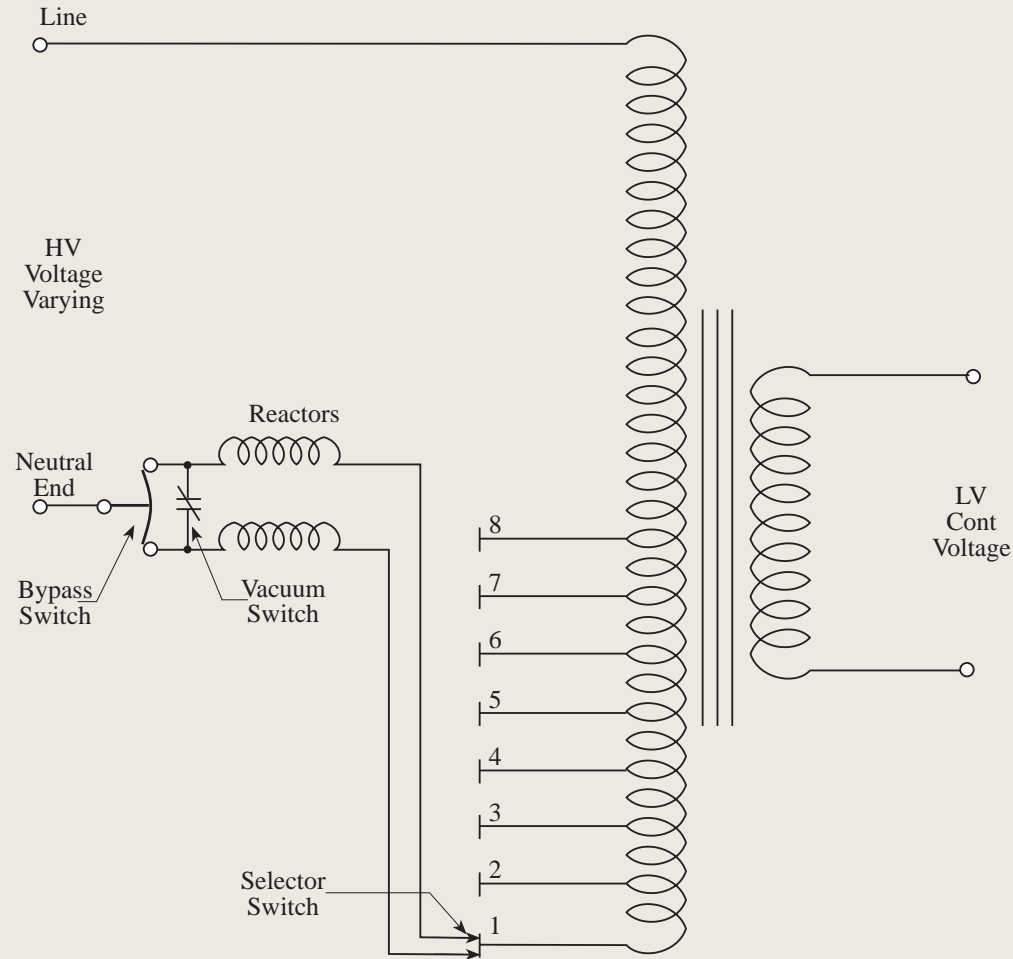
Connections

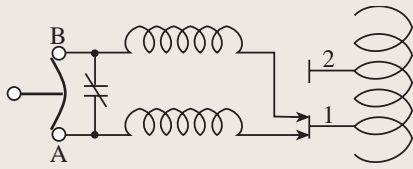


Off Load Tap Changers

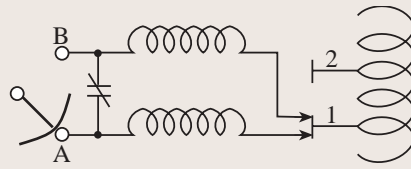


On Load Tap-Changers

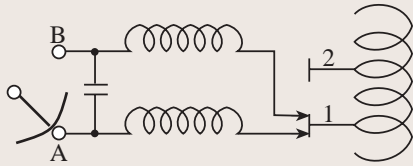




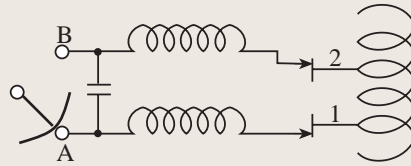
(1)



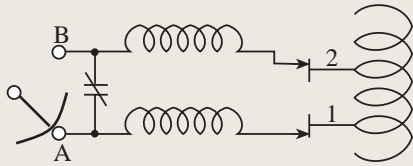
(2)



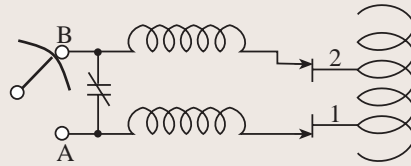
(3)



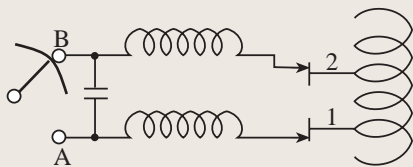
(4)



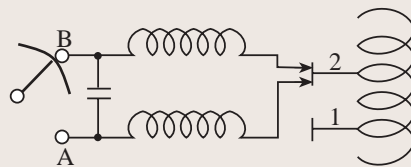
(5)



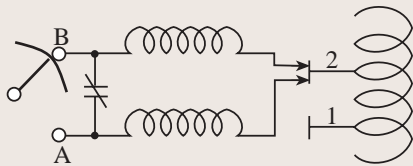
(6)



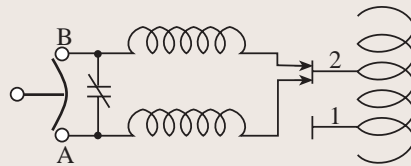
(7)



(8)



(9)



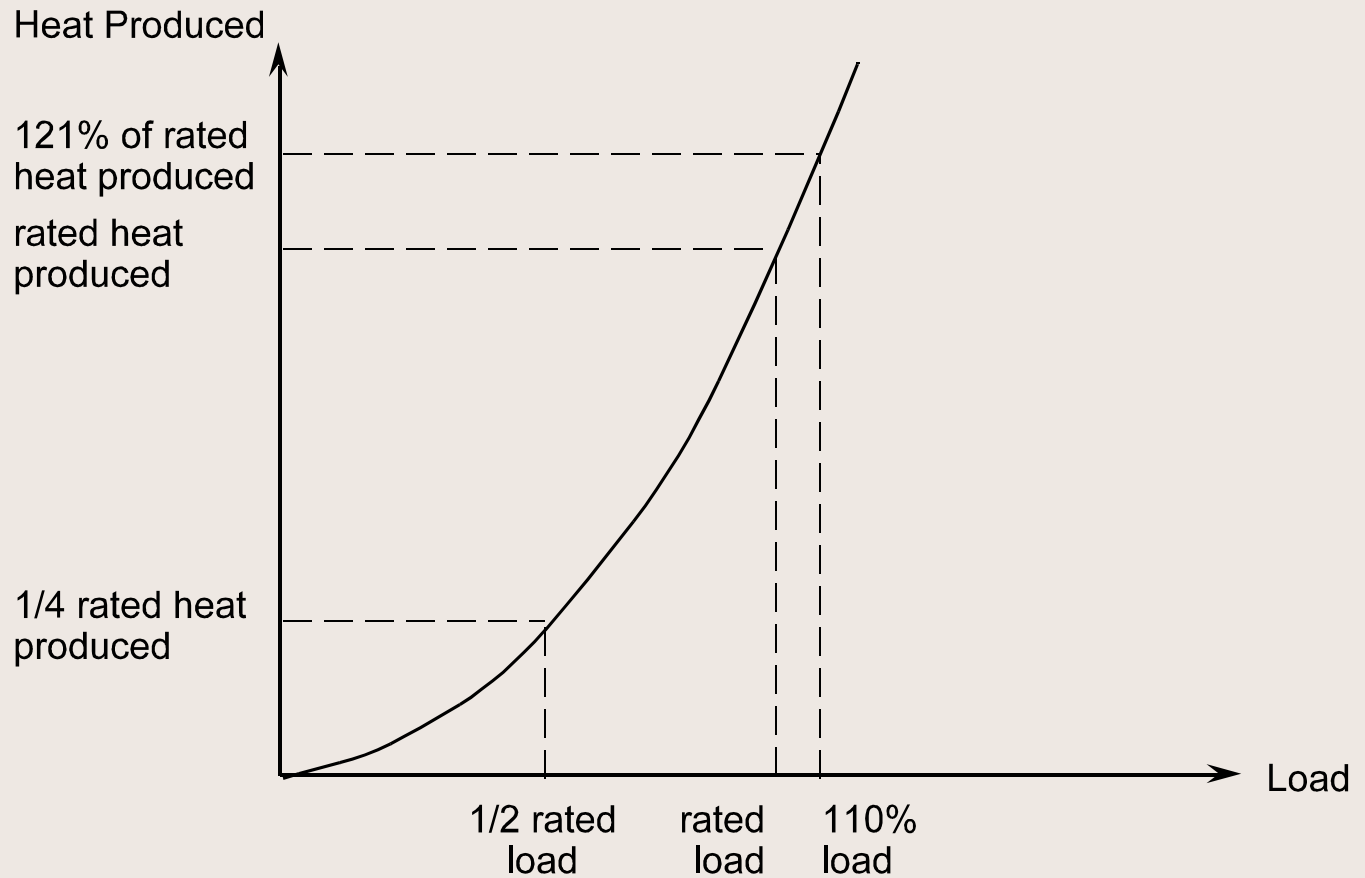
(10)

Tap-Changer Sequence of Operation

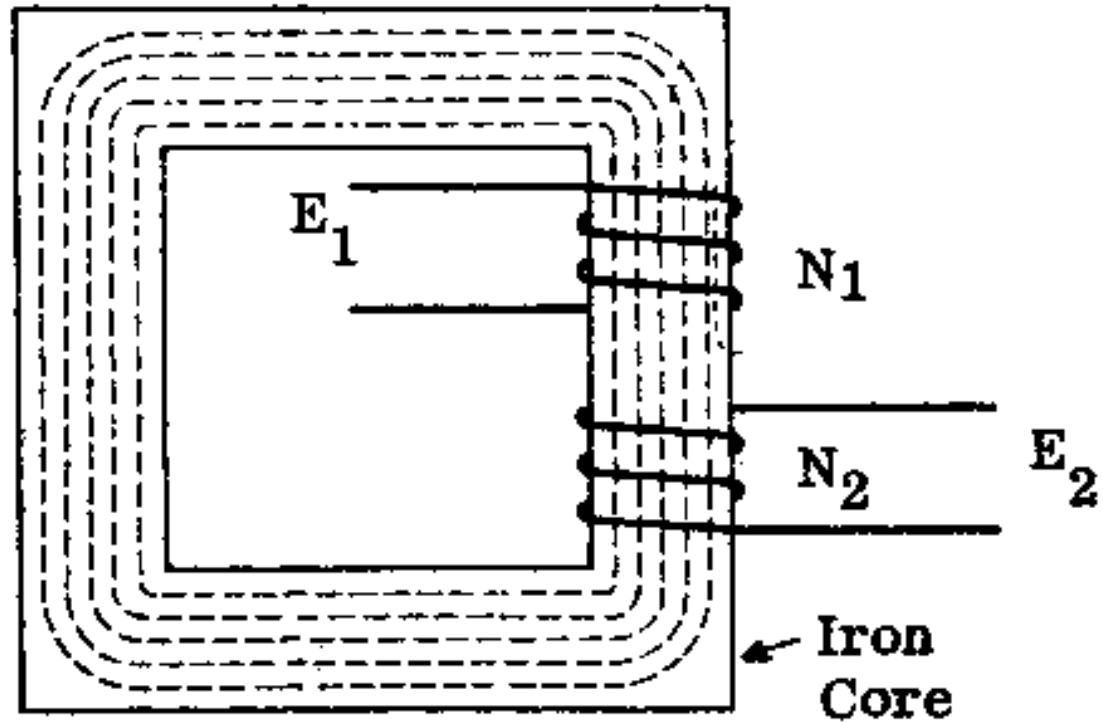
Transformer Losses

- No-Load
 - Hysteresis
 - Eddy Currents
 - A tiny winding loss due to exciting current
- Winding Losses
 - Vary with the square of the load

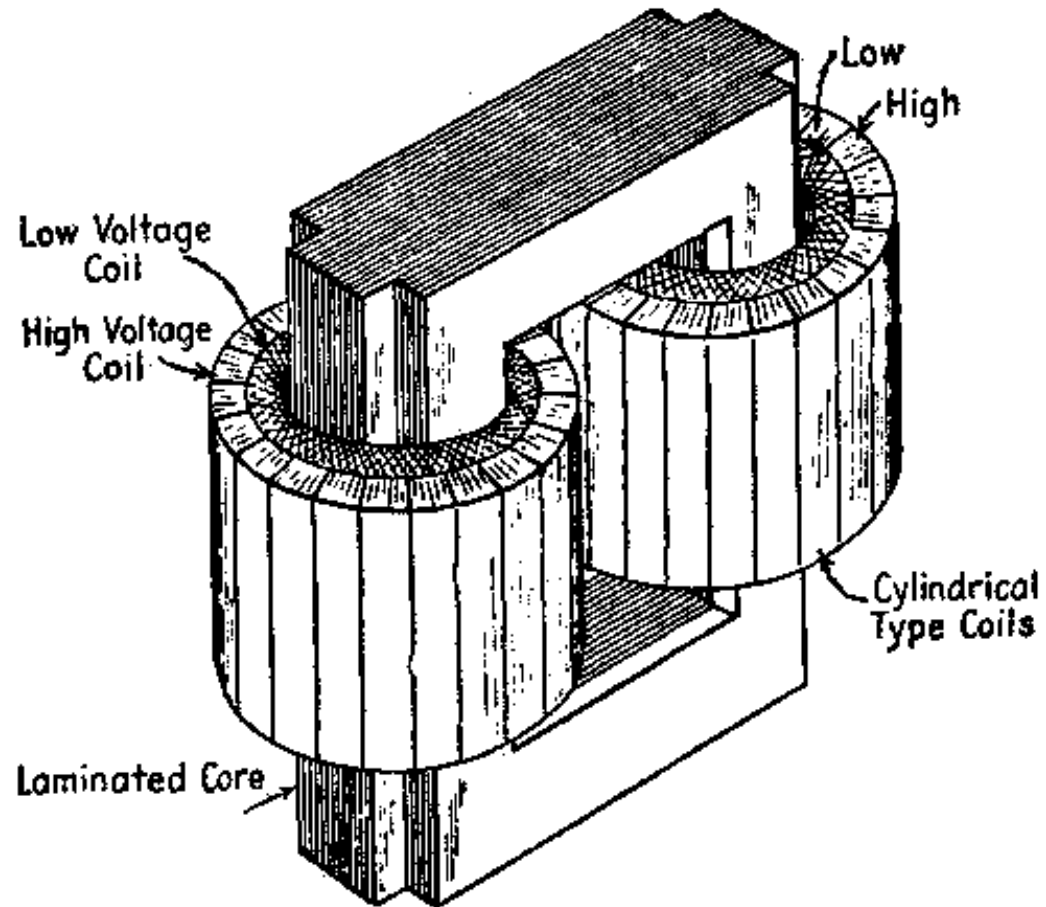
Copper Losses



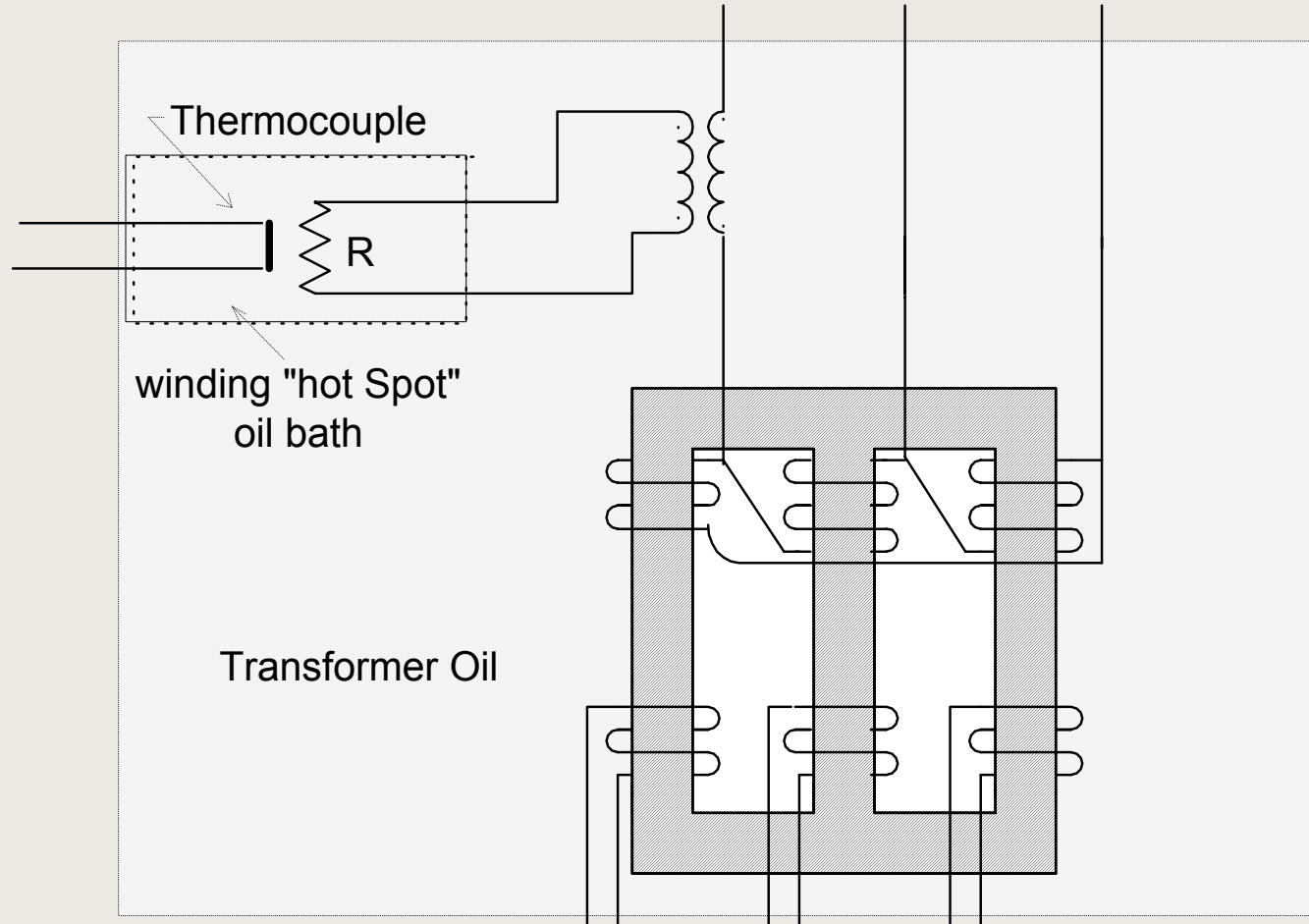
Core Losses



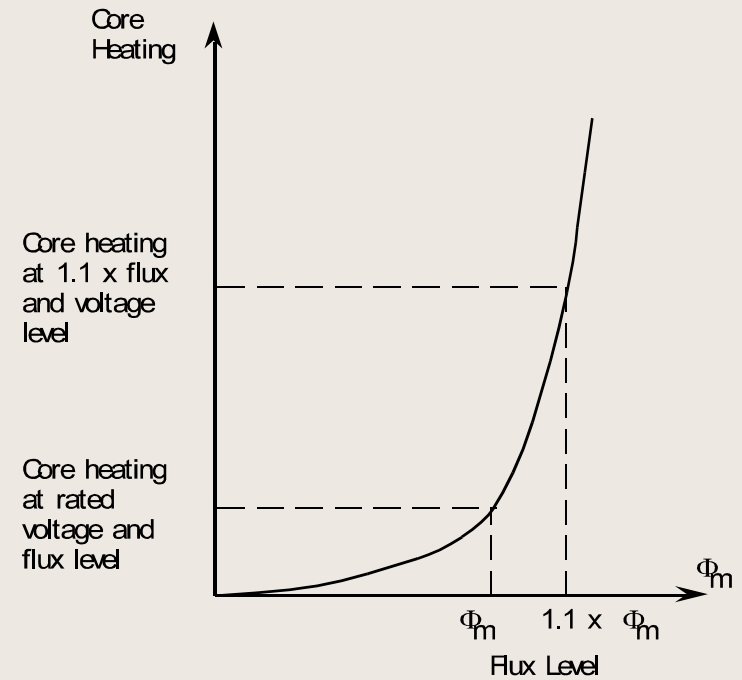
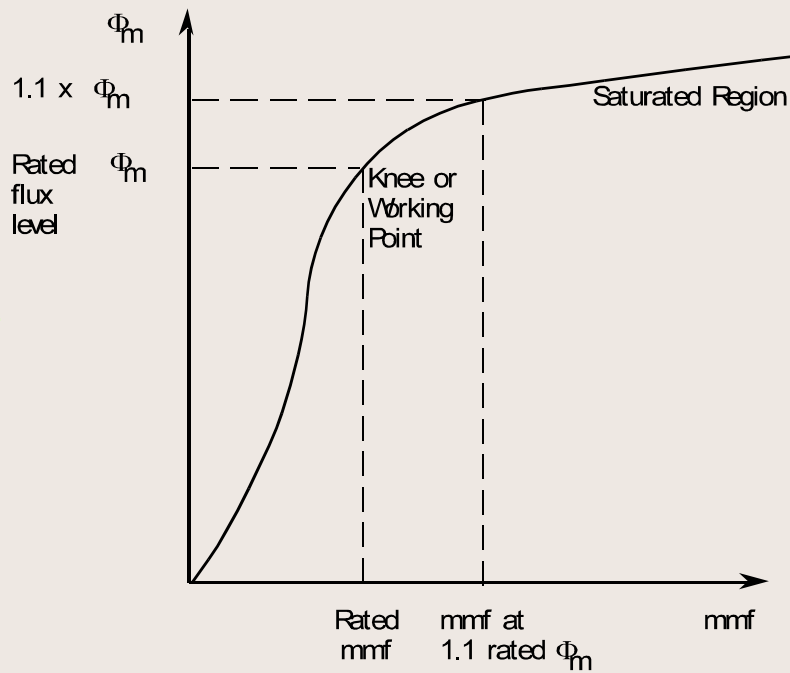
Laminated Core



Transformer Hot Spot



Core Heating



Instrument Transformers

- Step down values to safe levels for measurement
- Potential Transformers
 - Also called voltage transformers
 - Standard output 120V
- Current Transformers
 - Standard output of 1 or 5 amps
 - Metering and relaying standards
 - Can produce high voltages if open circuited

You do the Questions

