

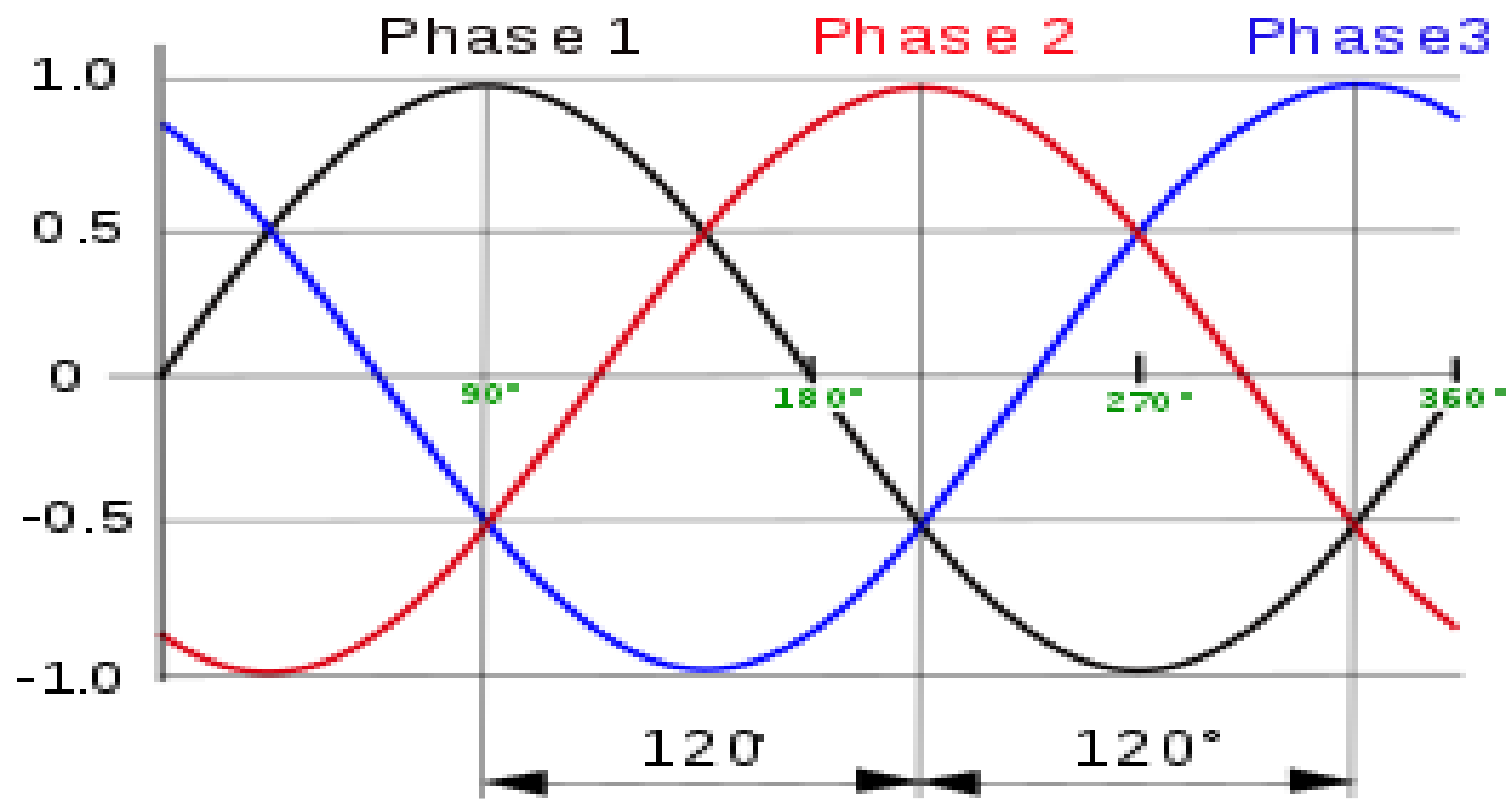
Chapter:8

(Understand the concepts of Expressing Poly phase Power System)

Lecture-1

Definition of Expressing Poly phase System:

- Two-phase systems can also be implemented using three wires (two "hot" plus a common neutral). However this introduces asymmetry; the voltage drop in the neutral makes the phases not exactly 90 degrees apart.
- Two-phase systems have been replaced with three-phase systems. A two-phase supply with 90 degrees between phases can be derived from a three-phase system using a Scott-connected transformer.
- A polyphase system must provide a defined direction of phase rotation, so that mirror image voltages do not count towards the phase order. A 3-wire system with two phase conductors 180 degrees apart is still only single phase. Such systems are sometimes described as split-phase of the same magnitude and frequency.



The methods of checking phase-sequence:

- Method 1
- Verify the phase sequence at your bench using the circuit of Fig. 3.
- Connect your three phases and neutral from the Variac to the phase-sequence detector.
- Connect the output of the phase sequence detector (BNC) to the oscilloscope.
- Set the scope to trigger on the AC line.
- Adjust the Variac to 20 VLN.
- You should be able to see a waveform similar to Fig. 3 on the scope by adjusting the potentiometers to different levels.
- Save the waveform for this phase sequence and for other possibilities by swapping any two of the wires at a time. Make sure you turn off power every time you swap the wires.

- Method 2

- Arrange to set up a circuit like the one of Figures 5 to determine the impedance of each part of the circuit. (Note that the resistance of a lamp measured by an ohm meter is significantly different than the resistance while operating. This is because of the change in resistivity with temperature.) Remember, you will have to measure and record the voltages and currents across the three load elements (the lamps and the reactive element) in the following steps for use in your calculations.
- Apply 208 VLL from the 3-phase Variac to your circuit without capacitor. Which lamp is brightest?
- Apply 5 different values of capacitance to the circuit. Record and measure the voltages and currents across the elements in each step. Turn off the power to circuit.
- Swap any two of the power wires of your circuit. Apply power and repeat step (3).

- Method 3

- Arrange to set up the circuits in Figure 6 with capacitor.
- Connect circuit using $R = |X_c|$.
- Apply 208 VLL from the 3-phase Variac to your circuit.
- Record and measure V_{an} , V_{bn} , V_{cn} , I_{ac} , and the powers (S, Q, and P) flowing into your circuit between terminals A-n and C-n.
- Turn off the power and reverse phases A and C. Measure V_{an} , V_{bn} , V_{cn} , I_{ac} , and the powers (S, Q, and P) for this phase sequence into terminals A-n and C-n.
- Repeat steps 3 to 5 with new values of $R = |X_c| / 2$ and $R = 2 |X_c|$ in circuit.