Calculations

1. Two three-phase load are connected in parallel: 50 kVA at a power factor of 0.9, leading and125 kVA at a power factor of 0.85, lagging.

   Draw the power triangle and determine the combined power factor.

2. A balanced delta-connected load is supplied from a 460-V, 60-Hz, three-phase source. Each phase of the balanced delta-connected load consists of a coil whose resistance and inductive reactance are 6 ohms and 9 ohms, respectively. Determine

    (a) impedance of each phase;
    (b) phase voltage;
    (c) phase current;
    (d) line current.

3. Repeat the previous example for a balanced wye-connected load of the same impedance and the same 460V supply. Determine

    (a) impedance of each phase;
    (b) phase voltage;
    (c) phase current;
    (d) line current.

4. A 460-V, three-phase, 60-Hz source is supplying power to an induction motor. The motor, rated at 60 hp, and 890 rpm, and is operating at rated load with an efficiency of 92.7% and a power factor of 83.5% lagging. Determine

   (a) active power in;
   (b) apparent power in;
   (c) power factor angle
   (d) reactive power.

5. Part 1 A balanced three-phase load, draws 153 A from a 460-V, 60-Hz source, and has a power factor of 60%. Determine

   (a) the apparent power of the load;
   (b) active power of load;
   (c) reactive power of load;
   (d) power-factor angle of load.

Part 2: We want to install a three-phase capacitor bank to correct the system power factor of 95%. Determine:

   (e) new power-factor angle of system;
   (f) new system vars;
   (g) kvar rating of a three-phase capacitor bank required to make this correction;
   (h) capacitance of each branch of the bank if the capacitors are delta connected;
   (i) capacitance of each branch of the bank if the capacitors are wye connected.