

### Three Phase Problems:

1. Discuss what is meant by 3-phase power distribution. In your answer explain some advantages of 3-phase, over single phase.
2. For a 3 phase system with a phase voltage of 10kV determine the line currents, draw the resultant phasor diagram and calculate the total (real) power (W) for a balanced star (wye) connected load of  $10 + j20$ .
3. Each phase of a 3 phase delta connected load can be represented by a  $50\Omega$  resistor in series with a 60mH inductor. Determine the following for connection to a 440V/50Hz 3 phase supply:
  - a. Load Phase Currents  $I_{RY}$ ,  $I_{YB}$  and  $I_{BR}$
  - b. The phasor diagram.
  - c. The line currents  $I_R$ ,  $I_Y$  and  $I_B$
  - d. The Apparent Power (VA), Real Power (W) and Reactive Power (VAr) in each phase

( note: if not stated then ALWAYS assume that the given voltage is the LINE voltage  $V_L$  )

4. A star connected load has a wire connecting the star point to the neutral of a 400V/50Hz 3-phase supply. The load on the red phase is 10 Ohm, the load on the yellow phase is  $7 + j5$  Ohm and the load on the blue phase is  $15 - j3$  Ohm. Calculate:
  - a. the line currents ( $I_R$ ,  $I_Y$  and  $I_B$ ),
  - b. sketch the phasor diagram
  - c. the magnitude of the Star/Neutral current  $I_{SN}$ .
  - d. Suggest a suitable diameter of wire for the Star/Neutral connection.
5. The load in Q3 is now delta connected.
  - a. Calculate the load phase currents
  - b. Construct a phasor diagram.
  - c. Determine the line currents.
  - d. Calculate the total load power (W)
6. A large single phase load (represented by a resistance of  $0.3\Omega$ ) is to be connected to a three phase 415V/50Hz system.
  - a. Determine the necessary (delta connected) Capacitance and Inductive reactances to give balanced conditions.
  - b. Calculate the resultant load phase currents and the three line currents.
7. Explain, with proof, how a 2 wattmeter method can be used to find the total power loss for a star connected load in a 3-phase system.