KING FAHD UNIVERSITY OF PETROLEUM & MINERALS

ELECTRICAL ENGINEERING DEPARTMENT

Dr. Ibrahim O. Habiballah

EE-306

Key Solution

Quiz 1   Sec.: 3   I.D.:   Ser#:   Name:

Q.1 A three-phase substation bus supplies two wye-connected loads that are connected in parallel. Load 1 draws 40 kW at 0.8 lagging power factor, and load 2 draws 50 kVA at 0.6 leading power factor. The line-to-line voltage at the loads is 460 V.

Total real and reactive power supplied by the substation bus is
  a.   P = 70.0 kW   ;   Q = 10.0 kVAR (inductive)
  b.   P = 70.0 kW   ;   Q = 10.0 kVAR (capacitive)
  c.   P = 62.0 kW   ;   Q = 90.0 kVAR (inductive)
  d.   P = 62.0 kW   ;   Q = 90.0 kVAR (capacitive)

P_{total} = 40 + 50(0.6) = 70 kW

Q_{L1} = 40 *(sin (cos^{-1}(.8))/0.8) = 30 kVAR (inductive)

Q_{L2} = 50 sin (cos^{-1}(.6)) = 40 (capacitive)

Q_{total} = 30 – 40 = -10 kVAR = 10 kVAR (capacitive)

Q.2 In a Wye-connected source feeding a Delta-connected load,

a. phase-voltage magnitude of the load is one-third the source line-voltage magnitude.

b. phase-voltage magnitude of the load is the source line-voltage magnitude.

c. phase-voltage magnitude of the load is the source line-voltage magnitude divided by $\sqrt{3}$.

d. phase-voltage magnitude of the load is the source line-voltage magnitude multiplied by $\sqrt{3}$.