KING FAHD UNIVERSITY OF PETROLEUM & MINERALS

ELECTRICAL ENGINEERING DEPARTMENT

Dr. Ibrahim O. Habiballah

EE-306

Key Solution

Quiz 1 Sec.: 2 I.D.: Name:

A three-phase substation bus supplies two wye-connected loads that are connected in parallel. Load 1 draws 50 kW at 0.866 lagging power factor, and load 2 draws 36 kVA at 0.9 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 = 98.8 kW ; Q = 78.9 kVAR (inductive)
b. P = 98.8 kW ; Q = 78.9 kVAR (capacitive)
c. P = 82.2 kW ; Q = 13.17 kVAR (inductive)
d. P = 82.2 kW ; Q = 13.17 kVAR (capacitive)

$P_{total} = 50 + 36(0.9) = 82.8$ kW

$Q_{L1} = 50 *(\sin(\cos^{-1}(.866))/0.866) = 28.87$ kVAR (inductive)

$Q_{L2} = 36 \sin(\cos^{-1}(.9)) = 15.7$ (capacitive)

$Q_{total} = 28.87 – 15.7 = 13.17$ kVAR (inductive)