King Fahd University of Petroleum & Minerals

Electrical Engineering Department

EE 360: Home Work #7

(Transmission Lines)

Due Dates (Dec. 29th for SMW Classes & Dec. 30th for UT Classes)

Q1. A three-phase, 34.5kV, 60 Hz, 40-km transmission line has a series impedance $z = 0.2 + j0.5$ Ω/km. The load at the receiving end absorbs 10 MVA at 33 kV. Calculate the following:

  a. ABCD parameters.
  b. Sending-end voltage at a power factor 0.9 lagging.
  c. Sending-end voltage at a power factor 0.9 leading.

Q2. A three-phase, 60 Hz completely transposed transmission line has the following total parameters:

$$Z_{series} = 10 + j50\,\Omega$$

$$Y_{shunt} = j30 \times 10^{-5}\ S$$

The transmission line is 80 mi long, and the line to line voltage at the receiving end is 230 kV. The load connected to the receiving end of the line may be represented by the load impedance $Z_L = 150 \angle 36.9^o\ \Omega$.

  a. Determine the current and line-to-line voltage at the sending end.
  b. Find the voltage regulation.
  c. Calculate the real power and reactive power at the sending end.
  d. Find the efficiency of the transmission line.