FINAL EEE 117 Date 05/19/2022 (12:45 - 2:45 p.m.)

SOLUTION MUST BE HAND WRITTEN AND SUBMIT THEM BEFORE 3:00 P.M.

5 Questions Each 20 points

Q-1: True or False

a) A relative motion of magnetic field and a conductor outside the field induced emf.

b) Sinusoidal signal is represented only by Sine function.

c) Phasor is a complex number that represents the only the amplitude at t=0 of a sinusoidal function.

d) RMS voltage can be calculated as: $V_{rms} = V_m/2$

e) In a purely capacitive circuit, voltage lags the current by 90 degrees.

f) The phenomenon of mutual inductance occurs when one circuit is physically connected with other circuit.

g) An ideal transformer gives output power exactly equal to the input power.

h) Complex power is the complex sum of real and reactive power measured in watts.

i) Power factor is the fraction of system capability that can be actually utilized.

j) An ideal capacitor does not dissipate real power.

k) The roots of the denominator of a polynomial are called the poles and the roots of the numerator are called the zeros of F(s).

l) Complex poles and zeros always appear in conjugate pairs.

m) A straight line Bode diagrams consists of two separate plots. One for amplitude and other for phase.

n) The Bode plots are drawn on semi log paper so that a wide range of amplitude values may be plotted.

o) 1 dB = 20 log $[\frac{P1}{P2}]$ where P represents power

p) First order Zeros will have a slope = 20 dB / decade and Poles will have a slope = -20 dB / decade.

q) The phase angle associated with the constant "K" is zero.

r) Phase angle of an active low pass filter is -45 degree.

s) In delta connection, phase voltage = Line voltage.

t) Center frequency is the geometric mean of two corner frequencies.

Q-2: Design a series RLC bandpass filter. The center frequency of the filter is 12 kHz, and the quality factor is 4. Use a 7 uF capacitor. (Show your circuit)

a) Specify the values of R and L.

b) What is the lower cutoff frequency in kilohertz?

c) What is the upper cutoff frequency in kilohertz?

d) What is the bandwidth of the filter in kilohertz?

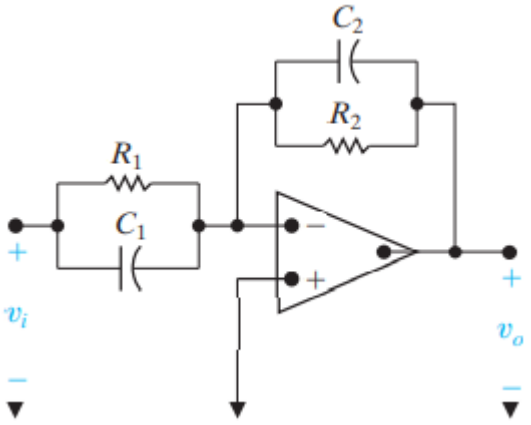
Q-3: For the circuit shown below:

a) Find the transfer function of the circuit.

b) What is the H(jω) of the circuit as ω ➔ 0?

c) What is the H(jω) of the circuit as ω ➔ ∞?

d) Find the expression of corner frequency.



Q-4: A balanced three-phase Y-connected generator with negative sequence has an impedance of 0.3 + j0.7 Ω/ϕ and an internal voltage of 140 V/ϕ. The generator feeds a balanced three-phase Y-connected load having an impedance of 48 + j32 Ω/ϕ. The impedance of the line connecting the generator to the load is 1.1 + j1.8 Ω/ϕ. The a-phase internal voltage of the generator is specified as the reference phasor.

a) Construct the a-phase equivalent circuit of the system.

b) Find the three-line currents I_{aA}, I_{bB} and I_{cC}

c) Find the three phase voltages at the load V_{AN}, V_{BN} and V_{CN}

d) Find the line voltages V_{AB}, V_{BC} and V_{CA} at the terminals of the load.

e) Find the phase voltages at the terminals of the generator V_{an}, V_{bn} and V_{cn}.

f) Find the line voltages V_{ab}, V_{bc} and V_{ca} at the terminals of the generator.

Q-5: The **b**-phase voltage of a balanced three-phase Y-Y connected system is 350 ***L*** -35°. If the phase sequence is positive, what is the value of V_{CA}?