

Homework 1 - 100 points (20 points each)

A. INSTRUCTION

- (a) Due: by 8:00pm Mon Feb 6
- (b) Scoring rubric for each problem:
- 20 Correct answer with detailed calculation displayed
 - 10 Incorrect answer with detailed calculation displayed
 - 0 Correct/Incorrect answer without calculation displayed
- (c) Late submission: Max score is reduced by 10% for each day after the deadline.

B. PROBLEMS

1. A sinusoidal voltage is given by the expression

$$v(t) = 10 \cos(3769.91t - 53.13^\circ).$$

- Find
- (a) frequency in Hz,
 - (b) period T in milliseconds,
 - (c) Peak value V_m
 - (d) The value of voltage at time 0, $v(0)$, and
 - (e) The RMS value of v .

2. Find the phasor transform of the following trigonometric function:

$$v(t) = 300 \cos(20,000\pi t + 45^\circ) - 100 \sin(20,000\pi t + 30^\circ).$$

3. Find the time-domain expression corresponding to the following phasor for a 60-Hz system:

$$V = 20 \angle 45^\circ - 50 \angle -30^\circ$$

4. (a) Find the phasor current (\mathbf{I}) that will flow in a series circuit containing a 5-k Ω resistor, a 470-pF capacitor, a 150-mH inductor, if the exciting voltage is 110 V at 60 Hz. (b) Find the real and reactive power of the system. (c) Find the power factor (pf) of the system (leading or lagging)

5. (a) Find the phasor current (\mathbf{I}) that will flow in the 5-k Ω resistor of a circuit in which a 5-k Ω resistor is connected in series with a parallel connected 3 elements of 5-k Ω resistor and a 150-mH inductor and a 0.001- μ F capacitor, if the exciting voltage is 110 V at 60 Hz. (b) Find the real and reactive power of the system. (c) Find the power factor (pf) of the system (leading or lagging)