Question 1  [15 points]

Let $V_{an} = 2300\sqrt{2}$ V rms in the balanced system shown in Fig. 1, and set $R_w = 2 \Omega$. Assume a positive phase sequence with the source supplying a total complex power of $S = 100+j30$ KVA. Find: (1) $I_{aA}$;  (2) $V_{AN}$;  (3) $Z_p$;  (4) the type of load (capacitive or inductive);  (5) percentage of average power delivered to the load to the average power produced by the source.

Question 2  [20 points]

For the circuit shown in Fig. 2:
(a) Draw the graph and label branch currents and voltages on this graph.
(b) List all the possible trees that can be used to analyze the circuit if you abide by the guidelines given in the lectures.
(c) Take b, c, d, e, and h as a tree and write the fundamental cutset equations for this tree.
(d) Use the node voltage method to find the average power associated with the $1.5i_1$ current source, is it generating or consuming power?

Question 3  [15 points]

The switch in Fig. 3 has been opened for a long time, at $t = 0$ it is closed. Find the following:
(a) $V_C(0^-)$
(b) $V_R(0^+)$
(c) $V_R(t)$ for $t \geq 0^+$
(d) sketch $V_R(t)$
(e) $t$ for $V_R(t) = 160$ V

Question 4  [15 points]

The switch in Fig. 4 has been opened for a long time, at $t = 0$ it is closed. Find $V_C(t)$ for $t \geq 0$.

Question 5  [15 points]

For the circuit shown in Fig. 5, find the average power dissipated in each resistor.

Question 6  [20 points]

For the circuit shown in Fig. 6, find: (1) $h_{12}$ (2) $z_{12}$ (3) $y_{12}$