1. Find the average power delivered to the 20 Ω resistor in the circuit shown in Fig. 1 if $v_s = 156\cos(\omega t)$ V. (20%)

Fig. 1

2. There is no energy stored in the circuit shown in Fig. 2 at the time the sources are energized. Find $v_1(t)$ for $t \geq 0$. (20%)

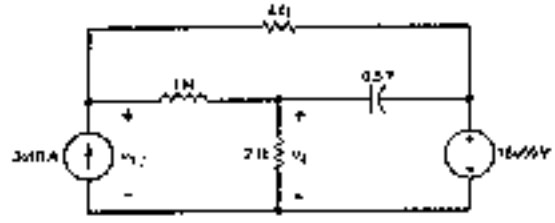

Fig. 2

3. Find the Thevenin equivalent of the network shown in Fig. 3. What is the maximum power that could be delivered in a resistor connected to terminals a and b? (15%)

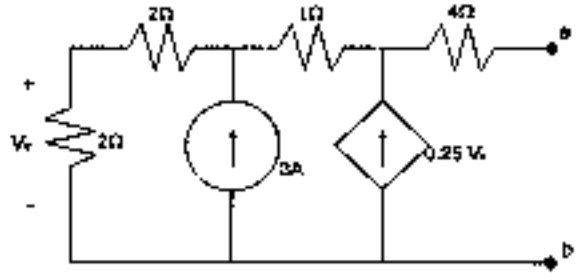

Fig. 3

4. The RC circuit in Fig.4 has an unknown capacitor C. When the resistance R is 1kΩ and $v_c(0) = 0$, it takes 0.2 sec for $v_c(t)$ to reach 50% of V_o. If it is desired to have $v_c(t)$ reach 50% of V_o at 0.05 sec, what should the resistance R be? (15%)

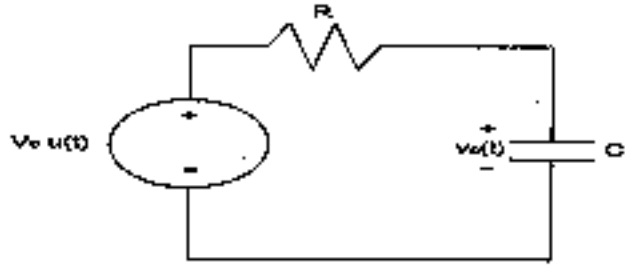

Fig. 4

5. Show that the instantaneous power p(t) of a three-phase, balanced, positive-sequence load is equal to its average power P. Assume the three-phase load is (a) Y-connected (b) Δ-connected. (10%)

6. Explain the following terms. (20%)
(a) duality (b) driving-point impedance (c) source-free response (d) single-phase three-wire system