1. (a) The voltage from B to N in a balanced three phase load
   is $120\underline{/60^\circ}$ V(rms).If the phase sequence is positive,
   find the phasor of V_{BC} in polar form.

   (b) Given $Z=60\underline{/30^\circ}$ Ω, find the complex power of the three
   phase load in polar form.

   (c) What is the power factor of the load？
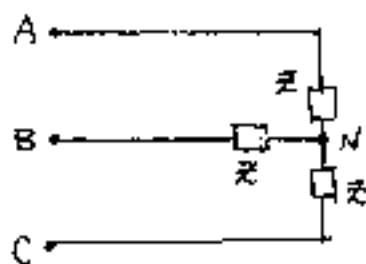
15%

2. The line to neutral voltage magnitude $|V_{AN}|$ is
   2500V(rms). The three phase load is absorbing 750kVA
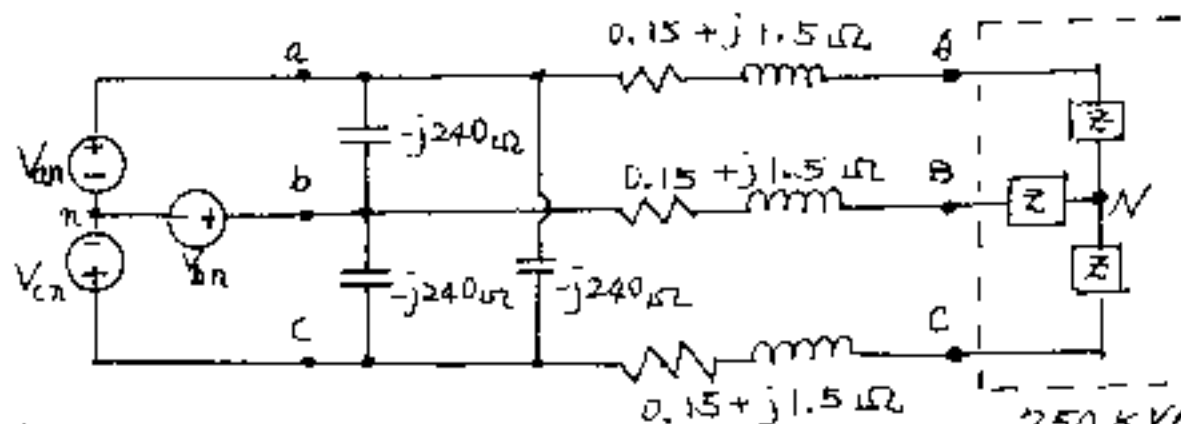   at 0.96 lagging power factor.

   (a) Draw the per phase equivalent circuit for "a" phase.

   (b) Find the voltage phasor of Van in rectangular form. use
   V_{AN} as the reference i.e., $V_{AN}=2500\underline{/0^\circ}$ V
   Given $\cos\theta=0.96$, $\sin\theta=0.28$

   15%

V_{an}, V_{bn}, V_{cn} are balanced sources

750 KVA
0.96 lagging

3. The sinusoidal voltage source in a series RLC circuit delivers
   a voltage of 100 cos wt V to a 50-ohm resistor, a 5-mH
   inductor, and a 0.5 micro Farad capacitor.
   (a) Calculate the resonant frequency.
   (b) What is the peak amplitude across the capacitor at resonant
       frequency?
   (c) At what frequency will the peak amplitude be maximum?
   (d) Repeat parts (a) through (c) given that R is decreased to
       10 ohms.

   15%

4. Given a low-pass RC filter with R=10K ohms, and C=10 micro
   Farads, the input voltage to the circuit is v(t)=15 exp(-5t)U(t)V.
   What percentage of the 1-ohm energy available in the input
   signal is available in the voltage across the capacitor?

   U(t) is the unit step function.   20%

5.

   Assume that at the instant the two sources are turned on, the initial current in the inductor

   is 1 A and the initial voltage on the capacitor is 1 V. Find the expression for v when t > 0
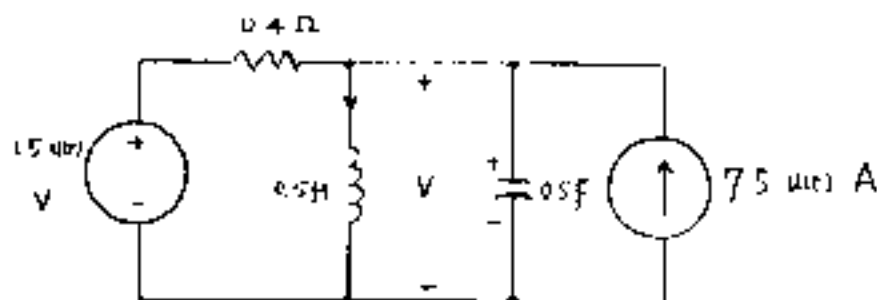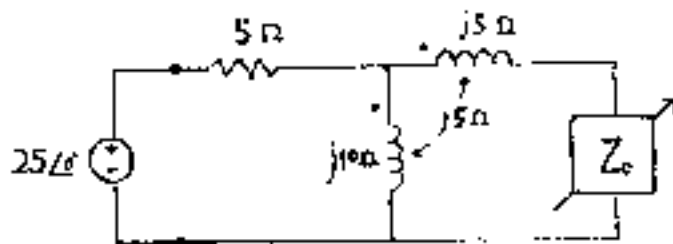

   10%

   u(t) is the unit step function.

6. Analyze the following filter circuit. (a) What are the filter type, bandwidth, center frequency, and quality factor Q of the circuit? (b) If all capacitors in the circuit are 1 μF, what should R and σ be for a center frequency of 5000 rad/s and a bandwidth of 1000 rad/s?
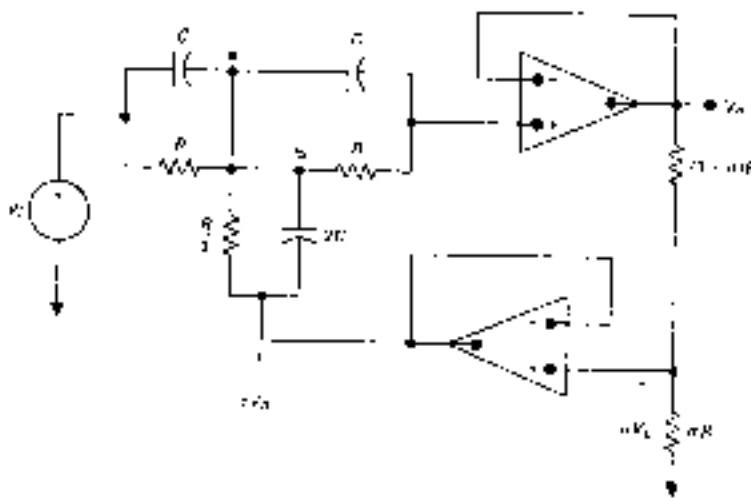
15 %

7. Find the impedance seen by the ideal voltage source in the circuit shown below when Z_0 is adjusted for maximum average power transfer to Z_0.

10%