Reg. No. : | | | | | | | | | | |

Question Paper Code: 31043

B.E. / B.Tech. DEGREE EXAMINATION, OCTOBER 2014.

Third Semester

Electronics and Communication Engineering

01UEC303 - CIRCUIT THEORY

(Regulation 2013)

Duration: Three hours Maximum: 100 Marks

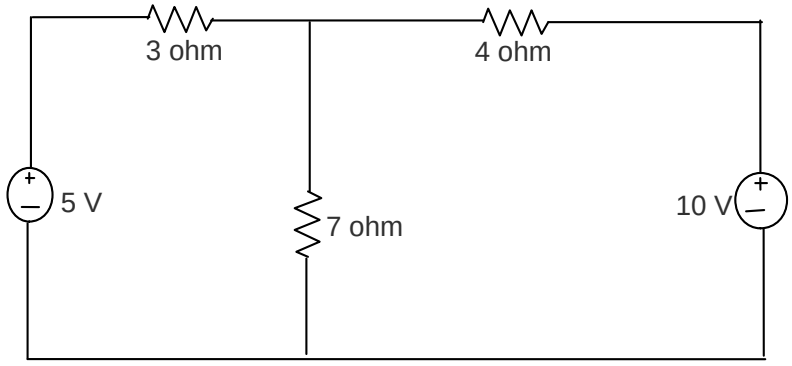
Answer ALL Questions.

PART A - (10 x 2 = 20 Marks)

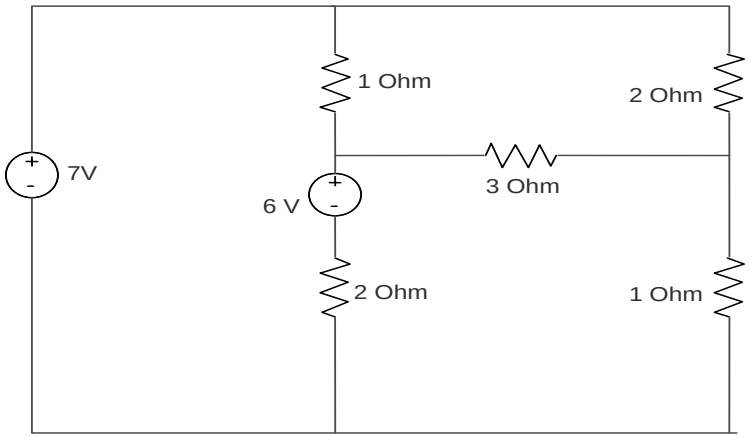
1. State Kirchoff's voltage and current law.
2. When do we go for supermesh and supernode analysis?
3. State Tellegen's theorem.
4. Give the condition for maximum power transfer theorem.
5. When the current is maximum in the series resonance circuit? Why?
6. Obtain the natural frequency and time constant of an RLC series circuit with R = 1kΩ, L=100 H and C=0.1 μF
7. Identify the applications of coupled tuned circuits?
8. Give the conditions for balanced star connected load.
9. Define driving point and transfer point impedance.
10. What is impedance matching?

PART - B (5 x 16 = 80 Marks)

11. (a) (i) Draw the dual network of the given circuit. (6)

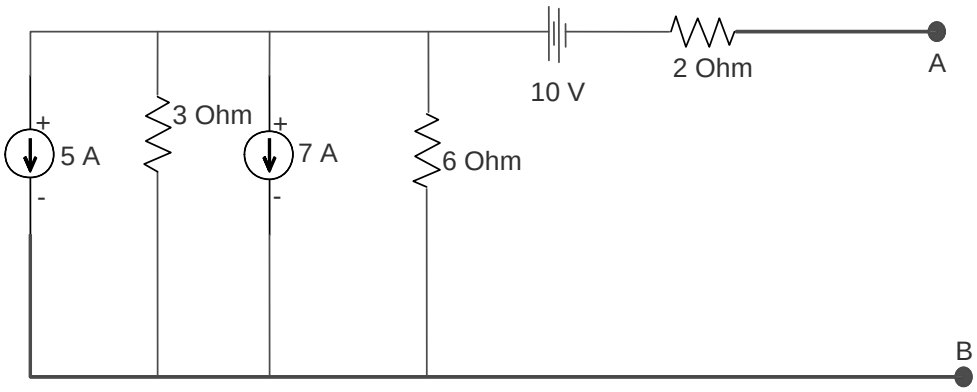


(ii) Determine the mesh currents of the given network using mesh analysis. (10)

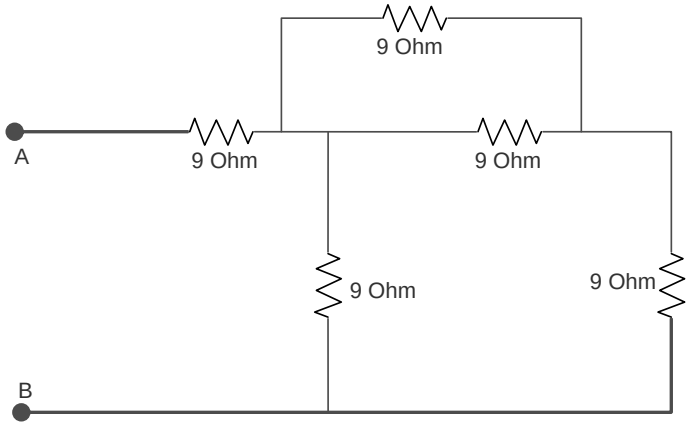


Or

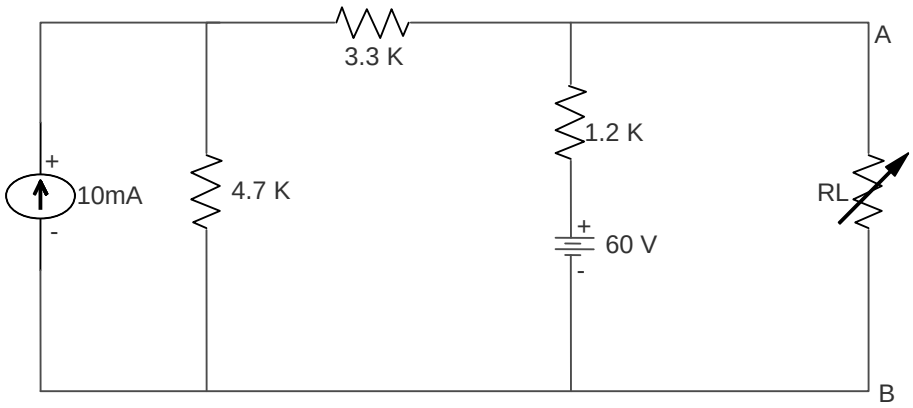
(b) (i) Reduce the following to a single source equivalent. (8)



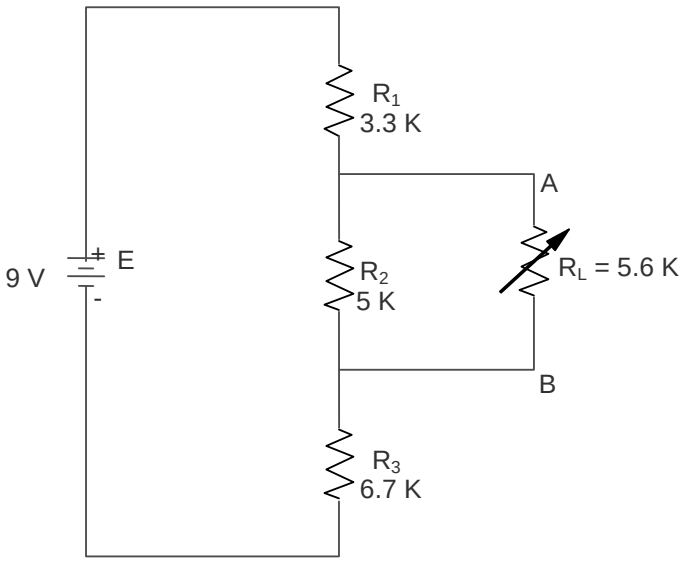
(ii) Determine the equivalent resistance between A & B. (8)



12. (a) (i) Derive the Thevenin equivalent circuit for the networks shown in figure and calculate the output voltage for (i) R_L = 12 kΩ and (ii) R_L = 5.6 kΩ. (8)

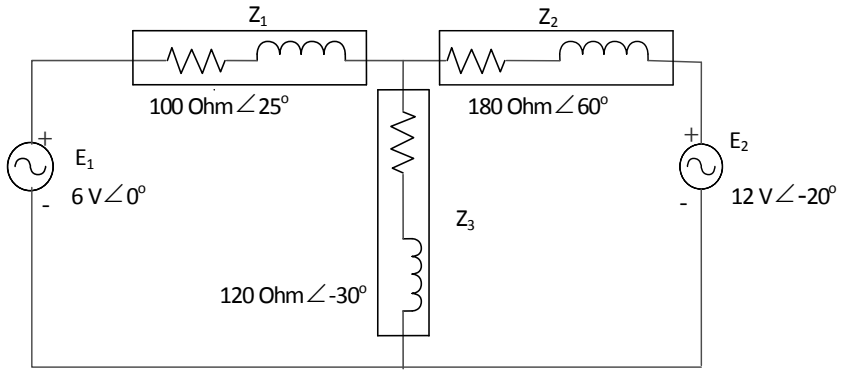


(ii) Determine the load current using Norton's Theorem for the given circuit. (8)

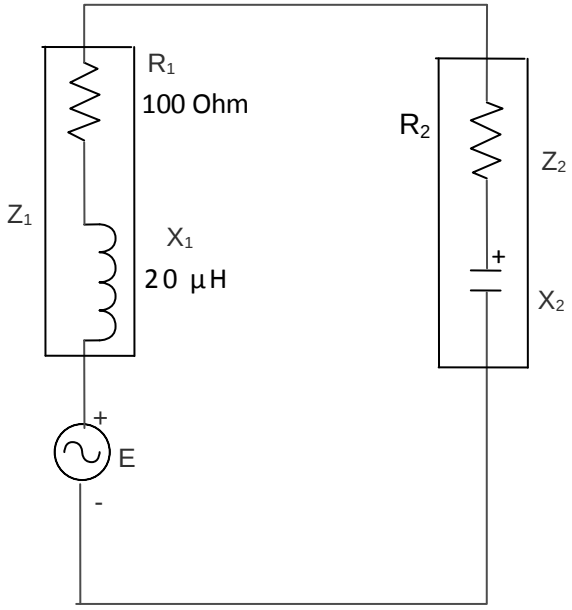


Or

(b) (i) Using superposition theorem, Analyze the impedance network in the given figure and derive an equation for the current through Z_3. (10)

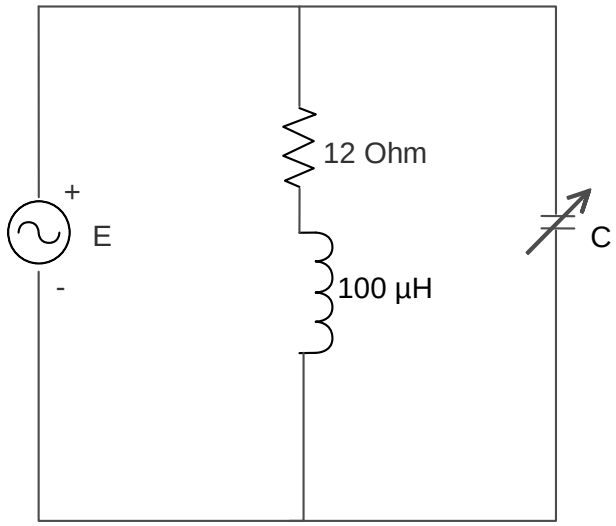


(ii) A voltage source has an equivalent circuit consisting of $R_1 = 100\Omega$ in series with $L_1 = 20\mu H$ as shown in figure. Calculate the optimum load for maximum output power at a frequency of 500 kHz. (6)



13. (a) (i) Derive the expression for the resonance frequency of a RLC series circuit. (6)

(ii) Determine the maximum and minimum resonance for the given circuit if the capacitor is adjustable over the range of 200pf to 300pf. Also calculate the Q factor and bandwidth of the circuit at the two resonance frequency extremes. (10)



Or

(b) A step voltage v (t) = 100 u(t) is applied to a series RLC circuit with L = 10H, R = 2Ω and C = 5F. The Initial current in the circuit is zero but there is a initial voltage of 50V on the capacitor in a direction which opposes the applied source. Find the expression for the current in the circuit. (16)

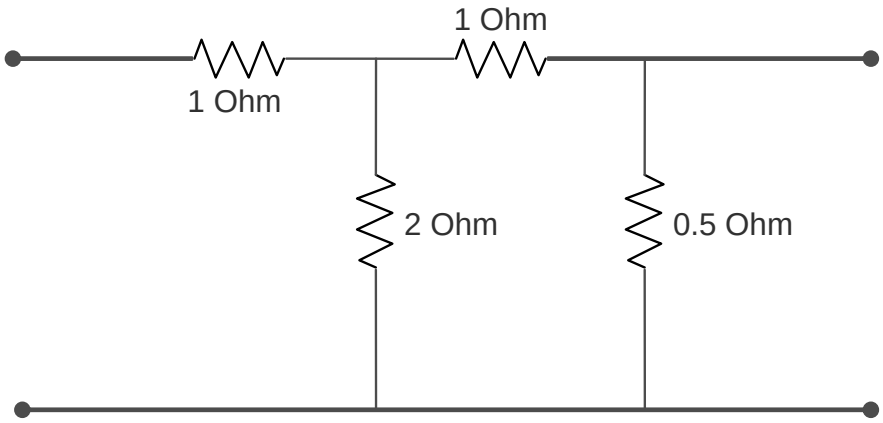
14. (a) (i) Explain self and mutual inductances in brief. (6)

(ii) Two coupled coils with self inductances $L_1 = 0.2H$ and $L_2 = 0.6H$ have a coupling coefficient K = 0.6. The number of turns in coil 2 is 1000. If the current in coil is $i_1 = 10\sin 400t$ amperes, determine the voltage at coil 2 and the maximum flux set up by coil 1. (10)

Or

(b) Explain briefly about power measurement by using two wattmeter method. (16)

15. (a) Find Y- Parameters for the network shown in Figure. (16)



Or

(b) Find transmission parameters for the low pass filter network shown in figure. (16)