B.E. FULL TIME END SEMESTER EXAMINATIONS, NOV / DEC 2012
II SEMESTER REGULATIONS R 2008
EC 9152 CIRCUIT ANALYSIS

Time: 3 Hours **Max Mark : 100**

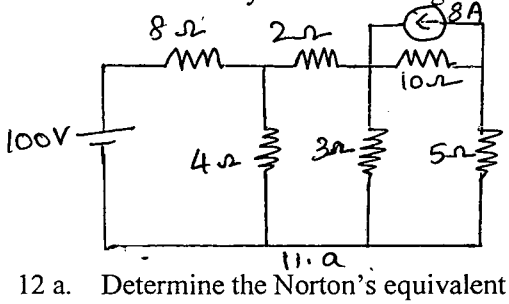
ANSWER ALL QUESTIONS

PART-A **(10X2=20 marks)**

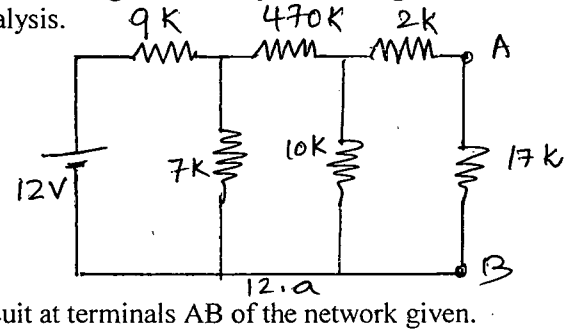
1. A 10 Ω resistor is in series with a parallel combination of two resistors of 15 Ω and 5 Ω. If the constant current in the 5 Ω resistor is 6 amperes, what total power is dissipated in the three resistors.
2. A total voltage of 5 volts drops across two resistors in series. If the resistor values are R1 = 10 Ω and R2 = 40 Ω, determine the voltage drop across each resistor.
3. Define duality and draw dual of series resonant circuit.
4. Three 90 Ω resistors are connected in a delta connection. Determine wye equivalent.
5. Define power factor.
6. Determine the value of resistance and capacitive reactance of two element series circuit which has the applied voltage of 70 30° V and current of 19 75° A.
7. Define quality factor.
8. Draw the variation of current with respect to frequency of a series RLC circuit.
9. Define coefficient of coupling.
10. What is tie-set?

PART-B **(5X16=80 marks)**

11a. Determine voltage drop across 10 Ω resistor using Nodal analysis for the given circuit. Verify the result using mesh analysis.



11.a



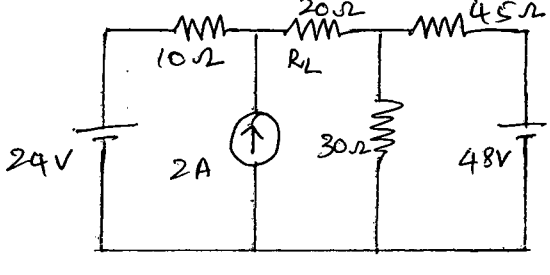
12.a

12 a. Determine the Norton's equivalent circuit at terminals AB of the network given. Verify the equivalent circuit using Thevenin's theorem.

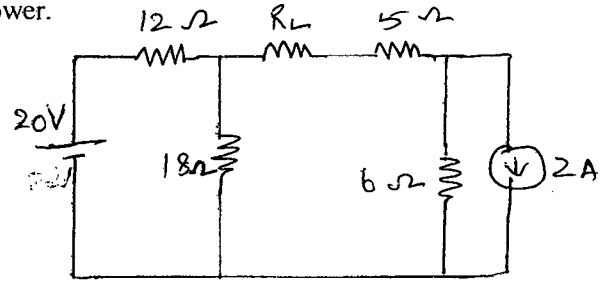
OR

b.i) Use Superposition theorem to find the power dissipated by the R_L resistor in the given circuit.

ii) Find the value of R_L for which the source delivers maximum power to the load and determine the value of the maximum power.



12.b.(i)



12.b.(ii)

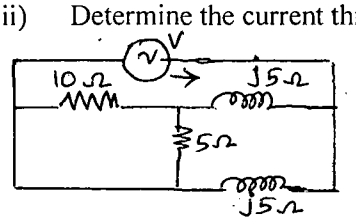
13a.i) A series circuit of R = 25 ohms and L = 0.01 H is to be used at frequencies of 100, 500 and 1000 hertz. Find the impedance at each of these frequencies.

ii) Determine the power triangle for a given circuit with applied voltage of v = 150 sin(ωt + 10°) volts and a resulting current i= 5 sin (ωt – 50°) amperes.

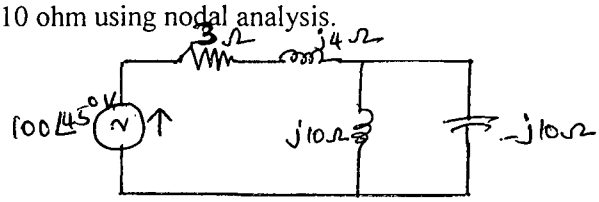
OR

b.i) Determine the effective voltage of the source which results in a power of 100 watts in the 5 ohms resistor using mesh analysis.

ii) Determine the current through j10 ohm using nodal analysis.



13.b.(i)



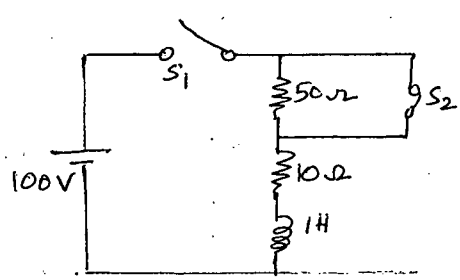
13.b.(ii)

14a. A voltage v(t) = 10 sin ωt is applied to a series RLC circuit. At the resonant frequency, the maximum voltage across the capacitor is found to be 500V. The bandwidth is 400 rad/sec and the impedance at resonance is 100 ohm. Derive and determine the resonant frequency, upper and lower limits of the bandwidth and the values of L and C of the circuit.

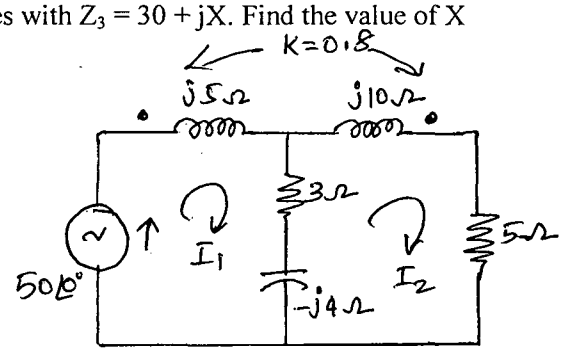
OR

b.i) In the circuit shown, the switch S_1 is closed at t = 0 and switch S_2 is opened at t= 0.2 seconds. Find the transient current expressions for the two intervals.

ii) Two impedances $Z_1 = 20 + j10$ and $Z_2 = 10 - j30$ are connected in parallel and this combination is connected in series with $Z_3 = 30 + jX$. Find the value of X which will produce resonance



14.b.(i)



15.a

15a. Determine the voltage across 5 ohm resistor of the coupled circuit shown.

OR

b. Explain how incidence matrix is derived from a graph with suitable example and express the branch current in terms of loop current using tie-set matrix.
