B.E. / B. TECH (PART TIME) REGULAR EXAMINATIONS APRIL / MAY 2014
ANNA UNIVERSITY CHENNAI
PTEC8101 CIRCUIT THEORY
DEPT. OF ECE
SEMESTER I, REGULATIONS 2013

Time: 3hours **Max Marks: 100**

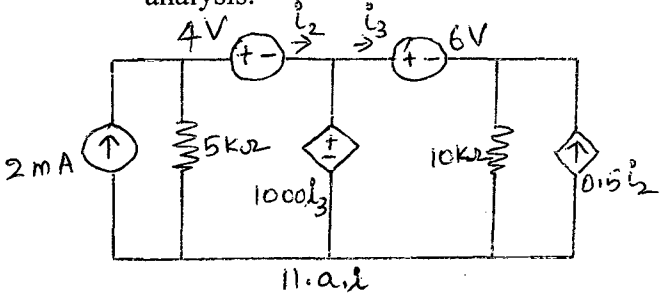
ANSWER ALL QUESTIONS

PART-A **(10x2=20 marks)**

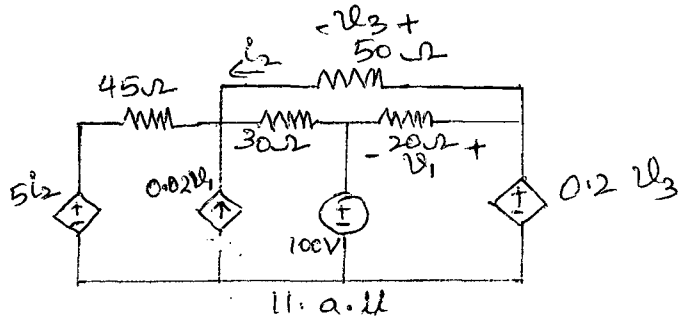
1. For the current $i = 3te^{-100t}$ mA and $v = (0.006 - 0.6t)\, e^{-100t}$ V, determine the power absorbed by the circuit element at t= 5 ms and energy delivered to the element in the interval $0 < t < \infty$.
2. A 100 W light bulb, a 60 W light bulb and a 40 W light bulb are connected in parallel to each other and to a 230 V supply. Compute the current flowing through each light bulb and the total current delivered by the voltage supply..
3. Three 30 Ω resistors are connected in a delta connection, determine the wye equivalent circuit.
4. Define duality with an example.
5. A voltage of $8 \angle -50^\circ$ is applied to a 4H inductor. Determine the phasor current and time domain current.
6. Find the average power and an expression for the instantaneous power that result when the corresponding phasor voltage $V = 4 \angle 0^\circ$ V is applied across an impedance $Z = 2 \angle 60^\circ \Omega$.
7. Determine the quality factor for resonant circuit containing components 20 Ω, 50 mH and 10μF connected in parallel.
8. Write the expression for half power frequencies of a series resonant circuit.
9. Define the coefficient of coupling for the coupled circuit.
10. Define cotree with an example.

PART-B **(5x16 = 80 marks)**

11 i). Determine the power generated by each of the sources in the circuit shown using mesh analysis.



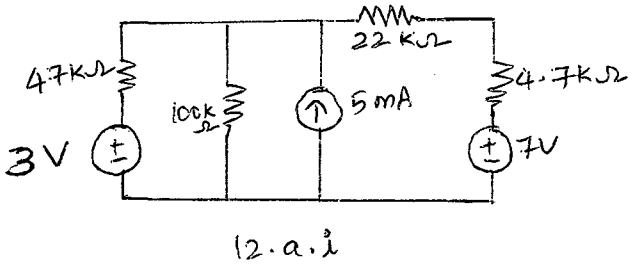
11.a.i



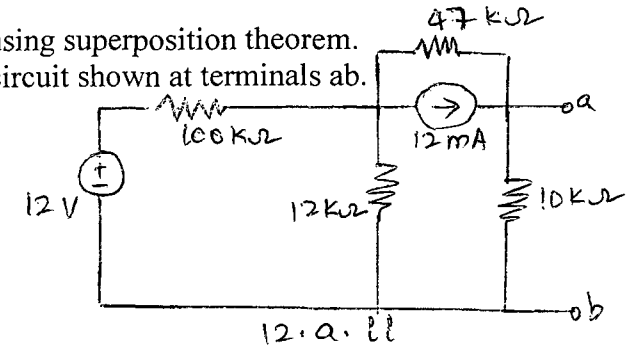
11.a.ii

ii). Find v_1 and i_2 using nodal analysis in the circuit shown.

12a i). Find the voltage across the current source using superposition theorem.
a ii). Determine the Thevenin equivalent of the circuit shown at terminals ab.



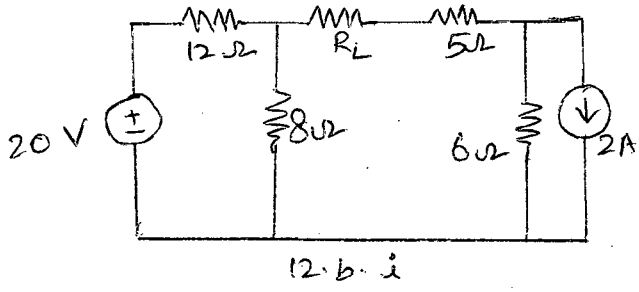
12.a.i



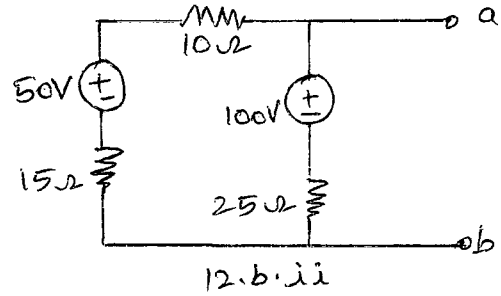
12.a.ii

OR

12.b.(i) Determine the maximum power that could be dissipated in R_L in the circuit shown.



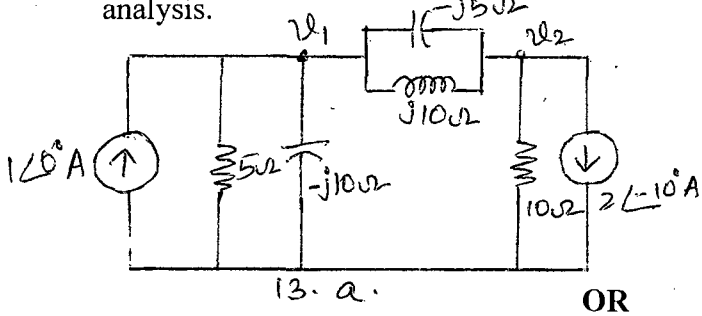
12.b.i



12.b.ii

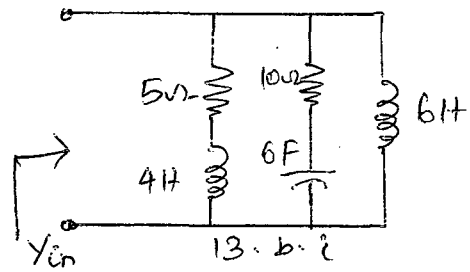
b.ii). Determine the power delivered to a 50 Ω resistor connected to terminals a and b of the circuit shown.

13.a. Determine the nodal voltages in the circuit shown and verify the answer using mesh analysis.



13.a.

OR



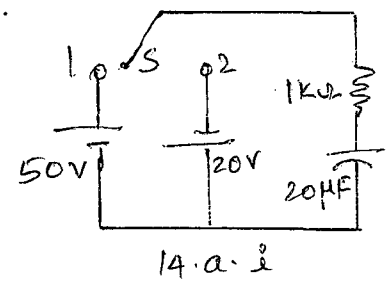
13.b.i

b.i). Determine the input admittance for ω = 60 rad/seconds in the circuit shown.

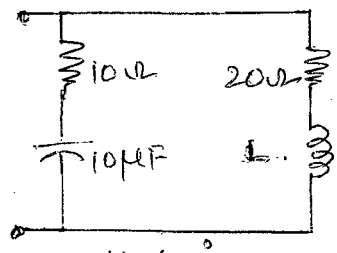
ii). Determine the average power, reactive and complex power when a 60 V rms is applied to a load of 1 + j5 Ω. Akso, draw the power triangle.

14.a.(i) The switch is closed on position 1 at t = 0 and after one time constant , it is moved to position 2 in the circuit shown. Determine the complete expression for the current.

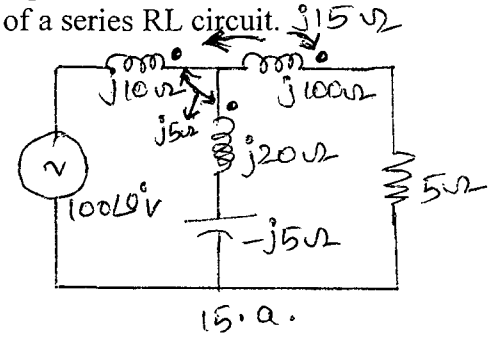
(ii) Derive and plot the voltage across resistor and capacitor of a series RL circuit.



14.a.i



14.b.i



15.a.

OR

b. (i) Determine the value of L for which the circuit shown is resonant at 200Hz..

(ii) A series RLC circuit with R = 3000 ohms, L = 10 H and C = 200 μF has a constant voltage V = 50 volts applied at t = 0. Find the current transient.

15a. Determine the voltage across the 5 Ω for 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.