Reg. No. _____

Karunya University

(Karunya Institute of Technology and Sciences)

(Declared as Deemed to be University under Sec.3 of the UGC Act, 1956)

End Semester Examination – April/May 2011

Subject Title: ELECTRIC CIRCUIT ANALYSIS **Time: 3 hours**

Subject Code: EE201 **Maximum Marks: 100**

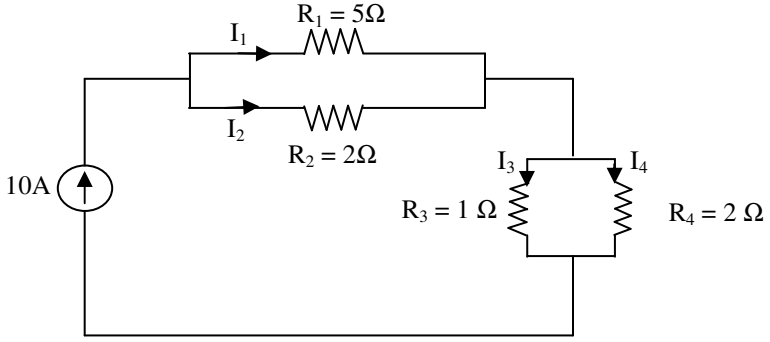
Answer ALL questions

PART – A (10 x 1 = 10 MARKS)

1. State Kirchoff's current law.
2. What is the equivalent resistance when 'n' resistors are connected in parallel?
3. Define Bandwidth.
4. Show that the resonant frequency of a series RLC circuit is $f_r = \frac{1}{2\pi\sqrt{LC}}$
5. What is mean by mutual inductance?
6. What is single tuned coupled circuit?
7. State reciprocity theorem.
8. State maximum power transfer theorem.
9. What is mean by free and forced response?
10. What is the time constant of RL circuit with R=10Ω and L = 20mH.

PART – B (5 x 3 = 15 MARKS)

11. Using current division method, find I_1, I_2, I_3 and I_4 in the given circuit

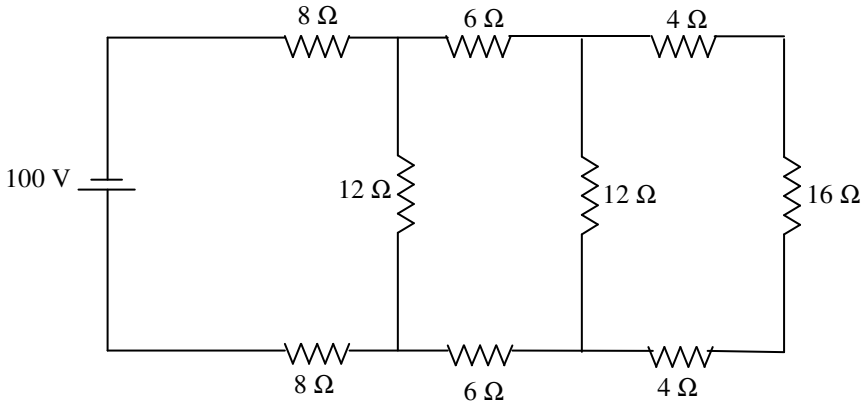


12. A balanced 3 phase star connected load of 150 kW takes a leading current of 100 A with a line voltage of 1100 V, 50 Hz. Find phase voltage, phase current, impedance, capacitive reactance.
13. A primary coil having an inductance of 100 μH is connected in series with a secondary coil having an inductance of 240 μH and the total inductance of the combination is measured as 146 μH. Determine the coefficient of coupling.
14. State Thevenin's theorem with an equivalent circuit.
15. Write the expression for critical resistance and damping ratio of RLC series circuit. Also state the condition for under damping and critical damping in RLC series circuit.

[P.T.O]

PART – C (5 x 15 = 75 MARKS)

16. For the circuit given in Figure, calculate
    a. The equivalent resistance across the terminals of the supply
    b. Total current supplied by the source
    c. Power delivered to 16Ω resistor



(OR)

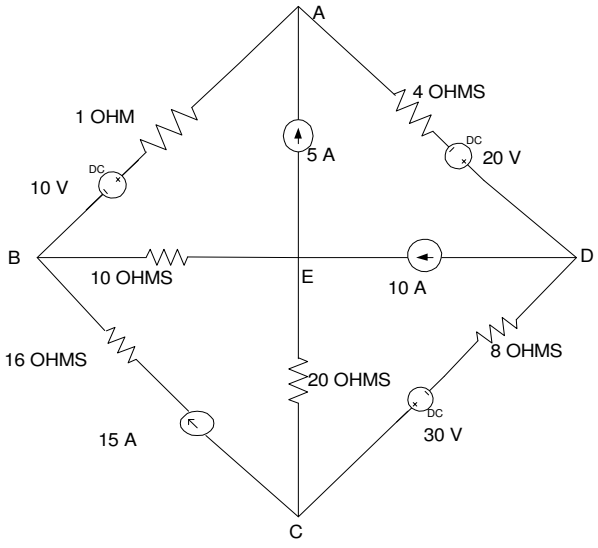
17. A Wheatstone bridge network has the following resistors in various arms. AB = 100Ω, BC=200Ω, CD = 90Ω, DA = 60Ω. A Galvanometer of internal resistance 40Ω is connected across BD and a 9V battery of negligible internal resistance is applied across AC. Find the current through the Galvanometer applying Kirchoff's laws.

18. Two coils A and B are connected in parallel and a voltage of 220V at 50 Hz is applied at their common terminals. The coils have resistances of 10Ω and 5Ω, inductances of 0.023H and 0.035H respectively. Find
    a. Current in each coil and total current b. Power factor of the combination

(OR)

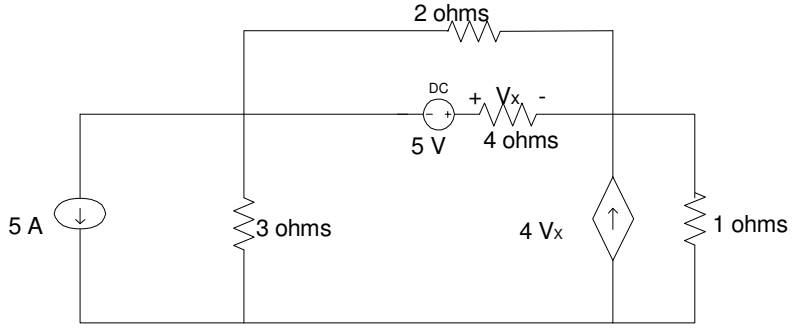
19. A coil of resistance 20Ω and inductance 200μH is in parallel with a variable capacitor. The combination is in series with a resistor of 8000Ω. The voltage of the supply is 200V at a frequency of 10^6 Hz. Calculate
    a. Value of C to give resonance b. Q of the coil
    c. Current in each branch of the circuit at resonance.

20. Determine the loop currents for the given circuit using Mesh Analysis.

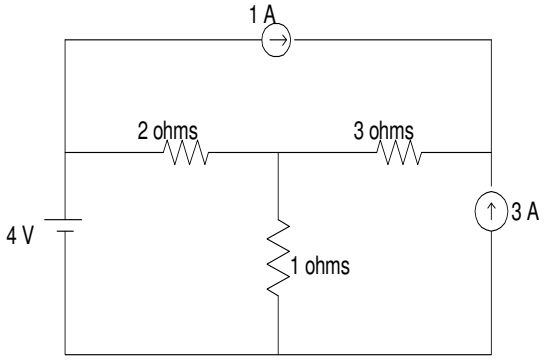


(OR)

21. In the circuit shown in Figure, find the voltage across the 4Ω resistor using Nodal Analysis.

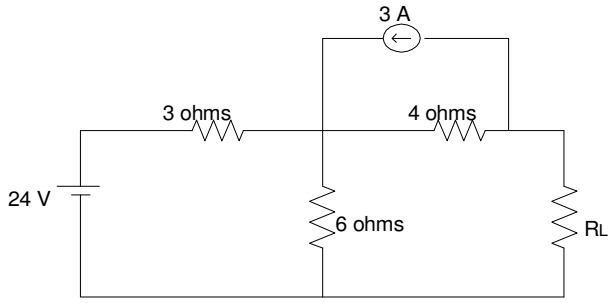


22. Find the current through 1Ω resistor for the circuit given in Figure using both Thevenin's theorem and Superposition theorem.



(OR)

23. Find the value of load resistance R_L in the circuit given in Figure which leads to the production of maximum power in R_L using Thevenin's theorem. Also find the value of this maximum power.



24. A RL series circuit excited by a sinusoidal source e(t) = 10 sin 100 t volts, by closing the switch at t=0. Take R=10Ω and L=0.1H. Determine the current i(t) flowing through the RL circuit.

(OR)

25. Consider the first order RL series circuit with the following parameters, R=5Ω, L=1H, I_0=0, V_s=48V. Determine
    a. The expression of i(t), $V_R(t)$, $V_L(t)$, $\frac{di}{dt}$ for $t \geq 0$
    b. $\frac{di}{dt}$ for $t = 0^+$
    c. Time at which $V_R = V_L$
    d. Resistance is decreased from 5Ω to 4Ω at t=0.5 seconds. Determine i(t).