Register Number: …….

B.E. DEGREE EXAMINATIONS: APRIL/MAY 2010

Second Semester

U07EE201: ELECTRIC CIRCUIT ANALYSIS

(Common to B.E – Electrical and Electronics Engineering and B.E – Electronics & Instrumentation Engineering)

Time: Three hours **Maximum marks: 100**

Answer ALL Questions:-

PART A (10 x 1 = 10 Marks)

1. A 100 Ω resistor is connected across the terminals of a 2.5V battery. What is the power dissipation in the resistor?

   (a) 25W (b) 100W (c) 0.4W (d) 6.25W

2. If one of the resistor in a parallel circuit is removed, What happens to the total resistance?

   (a) Decreases (b) increases (c) Remain constant (d) exactly doubles

3. Inductor does not allow sudden changes

   (a) in currents (b) in voltages (c) in both (a) and (b) (d) in power

4. The function is said to be having simple poles and zeros and only if

   (a) the poles are not repeated (b) the zeros are not repeated

   (c) both poles and zeros are not repeated (d) the poles are repeated

5. What is the phase angle of a series RLC circuit at resonance?

   (a) Zero (b) 90 degree (c) 45 degree (d) 30 degrees

6. What is the impedance of an ideal parallel resonant circuit without resistance in either branch?

   (a) zero (b) inductive (c) Capacitive (d) infinite

7. Superposition theorem is not applicable to networks containing.

   (a) Non linear elements (b) dependent voltage sources

   (c) dependent current sources (d) transformers

8. Norton's equivalent circuit consists of

   (a) Voltage source in parallel with resistance (b) Voltage source in series with resistance

   (c) Current source in series with resistance (d) Current source in parallel with resistance

9. Wattmeter deflection in ac circuit is proportional to the

   (a) maximum power in the circuit (b) instantaneous power in the circuit

   (c) average power in the circuit (d) both (a) and (c)

10. Mutual inductance is a property associated with

    (a) only one coil (b) two or more coils

    (c) Two or more coils with magnetic coupling (d) two coils

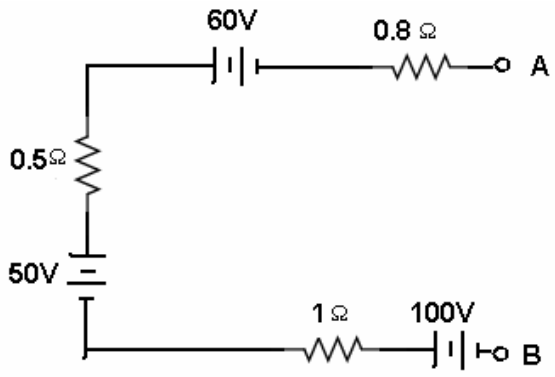
PART A (10 x 2 = 20 Marks)

11. A capacitor having a capacitance 2 μF is charged to a voltage of 1000V. Calculate the stored energy in joules.
12. Define effective value.
13. What is free and forced response?
14. A RL series circuit with R = 10 Ω is excited by a ac voltage source at t=0. Determine the current in the circuit at t = 2τ .
15. Define quality factor.
16. An inductive load consumes 1000w power and draw 10A current when connected to a 250V, 25 Hz supply. Determine the resistance and inductance of the load.
17. State superposition theorem.
18. What is the value of compensation source if the impedance 3+j5 Ω of a branch carrying a current of $2 \angle 30^0$ A is charged to 5+j2 Ω.
19. Define coefficient of coupling.
20. What is phase sequence?

PART C (5 x 14 = 70 Marks)

21. a) (i) Two batteries A and B with internal resistance R_A and R_B are properly connected in parallel to supply a current of 160A to a load resistance R_L. Given that E_A=120V, R_B=0.155Ω and I_B=60A. Calculate a) E_B and b) the load power (10)

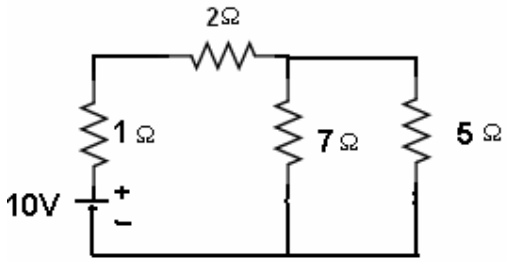
(ii) For the circuit shown below obtain a single voltage source between the terminals A and B (4)



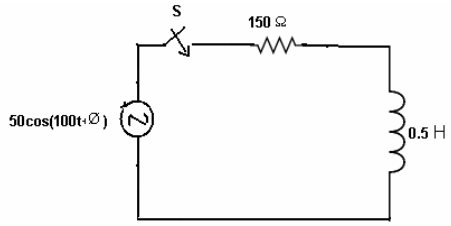
(OR)

b) (i) Derive the expression for converting delta to star resistance. (8)

(ii) In the circuit, find a) the total current drawn from the battery, (b)voltage across 2Ω resistor and c) current passing through the 5Ω (6)

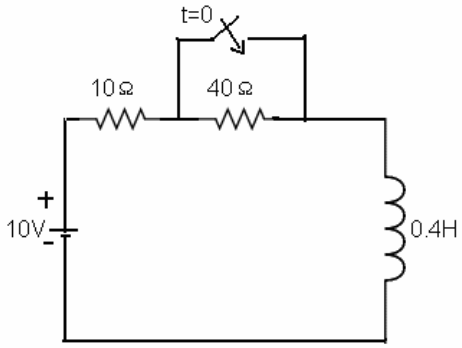


22. a) The circuit shown in figure consists of series RL elements with R=150Ω and L = 0.5H.The switch is closed when Ø = 30 degree. Determine the resultant current when voltage V=50cos(100t+ Ø) is applied to the circuit at Ø=30 degree.



(OR)

b) In the circuit, the switch is kept open for a long time. The switch is closed at t=0. Find i(t) and sketch the curve.

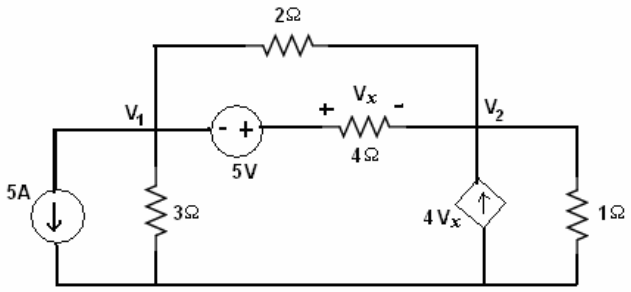


23. a) A RLC parallel circuit consists of R=50Ω, L= 150mH and C=100 μF. The circuit is excited by a current source of $5\angle 0^0$ A, 100Hz. Calculate the voltage and current in the active and reactive power delivered by the source. Draw the phasor diagram.

(OR)

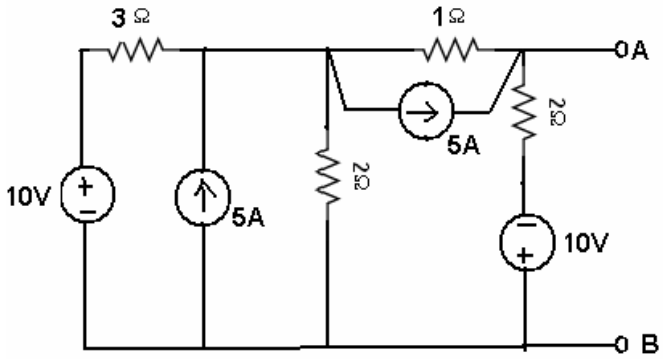
b) The parameters of a RLC parallel circuit excited by a current source are R = 40Ω, L = 2mH and C=3μF. Determine the resonant frequency, quality factor, bandwidth and cut off frequencies

24. a) For the circuit find the voltage across the 4 Ω resistor by using nodal analysis



(OR)

b) Find the thevenin's equivalent of the network



25. a) An iron ring 10cm diameter and 15 square meter in cross section is wound with 250 turns of wire for a flux density of 1.5wb/m^2 and permeability 500. Find the exciting current, the inductance and stored energy. Find corresponding Quantities when there is a 2mm air gap.

(OR)

b) (i) A 3 phase 3 wire unbalance load is star connected. the phase voltages of two of the arms are V_R=100∟-10^0,Vy = 150∟100^0.Calculate voltage between star point of the load and the supply neutral. (8)

(ii) Calculate the total power input and readings of the two watt meters connected to measure power in 3 phase balanced load, if the reactive power input is 15 KVAR, and the load Power factor is 0.8. (6)

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