Register Number.....

B.E. DEGREE EXAMINATIONS:OCTOBER / NOVEMBER- 2008

Second Semester

U07EE201: Electric Circuit Analysis

(Common to Electrical and Electronics Engineering & Electronics and Instrumentation Engineering)

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

Answer ALL Questions: -

PART A (20 x 2 = 40 Marks)

1. The voltage across the short circuit is always _____

A. Zero B. Infinite C. Half of the supply voltage D. Supply voltage

2. What is the RMS value of e = 200sinωt quantity?

A. 141.4V B. 14.14V C. 1.414V D. 1414V

3. Calculate the power factor of the coil having a resistance of 6ohm and an inductance of 0.03H is connected across 100V, 50Hz supply.

A. Unity B.0.537 (lag) C. 0.8(lead) D. 0.637(lag)

4. Calculate the value of current I for the fig 1.

A. -5A B. 5A C. 3A D. 4A

5. If a 10V battery is connected across the parallel resistors of 3Ω, 5Ω and 10Ω, how much current is flowing through 5Ω resistor.

A. 5A B. 10A C. 2A D. 4A

6. The number of independent loops for a network with n nodes and b branches is

A. n-1 B. b-n C. b-n+1 D. Independent of number of nodes

7. Determine the current I for the circuit shown in fig 2.

A. 2.5A B. 1A C. 4.5A D. 3.5A

8. Norton's equivalent circuit consists of

A. Voltage source in parallel with impedance B. Voltage source in series with impedance
C. Current source in parallel with impedance D. Current source in series with impedance

9. A sinusoidal current has peak value of 12A. What is its average value?

A. 7.64 A B.24A C.8.48A D.12A

10. The Current in the pure inductor is

A. lags behind the voltage by 90^0 B. leads the voltage by 90^0
C. is in phase with voltage D. lags behind the voltage by 45^0

11. When R = 10Ω, X_C= 18Ω and X_L=12Ω, the current

A. leads the applied voltage B. lags behind the applied voltage
C. is in phase with the voltage D. zero

12. What values of L and C should be used in a tank circuit to obtain a resonant frequency of 8 kHz? The bandwidth must be 800 Hz. The winding resistance of the coil is 10Ω

A. 2 mH, 1μF B. 10H, 0.2μF C. 1.99mH,0.2 μF D. 1.99mH, 10μF

13. The reading of the wattmeter connected to measure the reactive power in a 3φ circuit is given by zero, the line voltage is 400 V and line current is 15A, then the power factor of the circuit is

A. zero B. unity C.0.8 D. 0.6

14. Two coils connected in series have an equivalent inductance of 3H when connected in aiding. If the self inductance of first coil is 1H, what is the self inductance of second coil. (Assume M=0.5H)

A. 1H B. 2H C. 3H D. 4H

15. The maximum value of coefficient of coupling is

A. 100% B. more than 100% C.90% D. 50%

16. The time constant of a series RL circuit is

A. LR B. L/R C. R/L D. $e^{-R/L}$

17. The initial current in the circuit shown in fig 3, when switch is opened for t>0 is

A. 1.67A B. 3A C.0A D.2A

18. The initial value of $20\text{-}10t\text{-}e^{25t}$ is

A. 20 B. 19 C. 10 D.25

19. The driving point impedance is defined as

A. ratio of transform voltage to transform current at the same point
B. ratio of transform voltage at one point to the current transform at other point
C. ratio of transform current to transform voltage at the same point
D. both A and B

20. Mutual inductance is a property associated with

A. only one coil B. two coil
C. two or more coil D. two or more coils with magnetic coupling

PART B (5 x 12 = 60 Marks)

21. (a)(i)Determine the equivalent resistance between A and B for the circuit shown in fig 4. (6)

(ii) Explain current division rule and voltage division rule (6)

(OR)

21. (b) (i) What is the voltage across A and B in the circuit shown in the fig 5 (6)

(ii) Derive RMS value of sinusoidal quantity. (6)

22. (a) Consider RLC series circuit of fig 6 with R=2Ω, L=0.5H and C=0.1F. The circuit is initially relaxed. When the switch is closed at t=0. Calculate transient current and voltage across capacitor. (12)

(OR)

22. (b) Steady state conditions exist in the circuit of following fig 7 at t=0. The switch is opened at t=0. Determine the expression for i(t), for t≥0 (12)

23. (a) (i) A coil when connected to 200V, 50Hz supply takes a current of 10A and dissipates 1200W. Find the resistance and inductance of the coil. (6)

(ii) Show that current through capacitor leads applied voltage by 90^0. (6)

(OR)

23. (b) (i) In the circuit shown in fig 8 , a maximum current of 0.1A flows through the circuit when the capacitor is 5μF with a fixed frequency and voltage of 5V. Determine the frequency at which circuit resonates, the bandwidth, the quality factor and the value of resistance at resonant frequency. (6)

(ii) Draw and explain the phasor diagram of RC series circuit when excited by a sinusoidal voltage. (6)

24. (a) Determine the load resistance to receive more power from the source, also find the maximum power delivered to the load in the circuit shown in the fig 9. (12)

(OR)

24. (b) (i) Using mesh analysis, find current through 4 Ω resistor for the circuit shown in fig 10. (6)

(ii) Find Thevenin's equivalent for the circuit in fig 11. (6)

25. (a) (i) Two identical coils with L= 0.03H have a coupling coefficient of k=0.8. Find mutual inductance and equivalent inductance with the coils connected in series opposition mode (6)

(ii) A 3φ balanced delta connected load of (4+j8)Ω is connected across a 400V, 3φ balanced supply. Determine the phase currents and the line currents. Assume the RYB phase sequence. Also calculate power drawn by the load. (6)

(OR)

25,(b) (i) Explain how the power factor can be calculated by two wattmeter method. (6)

(ii) Derive the expression for coupling coefficient. (6)

Fig 1

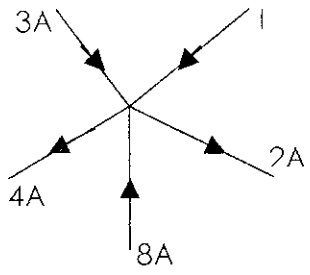
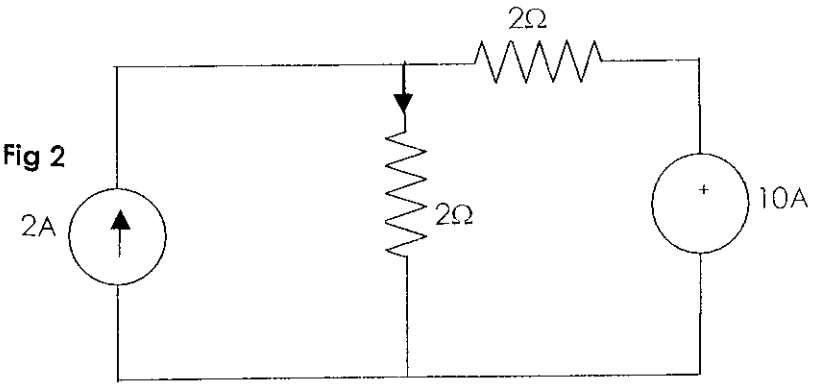


Fig 2



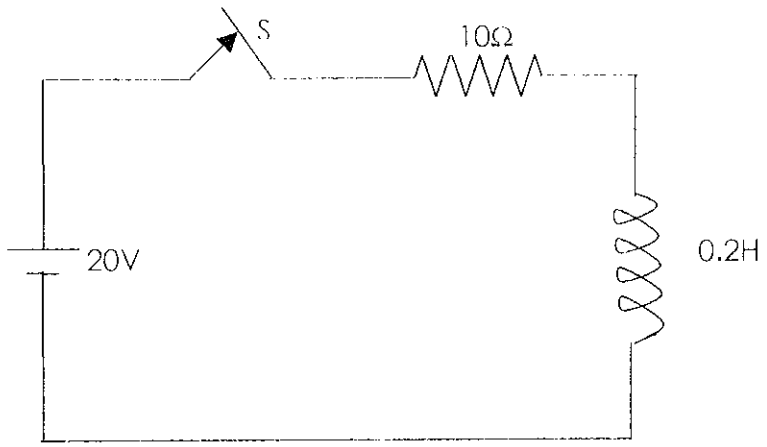


Fig 3

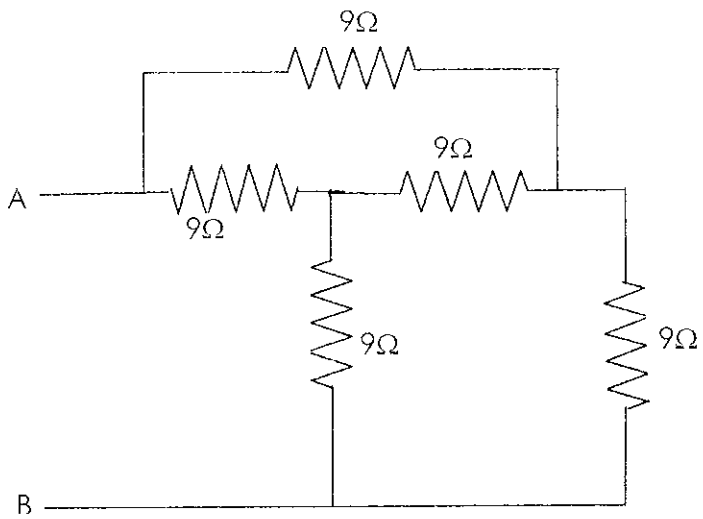


Fig 4

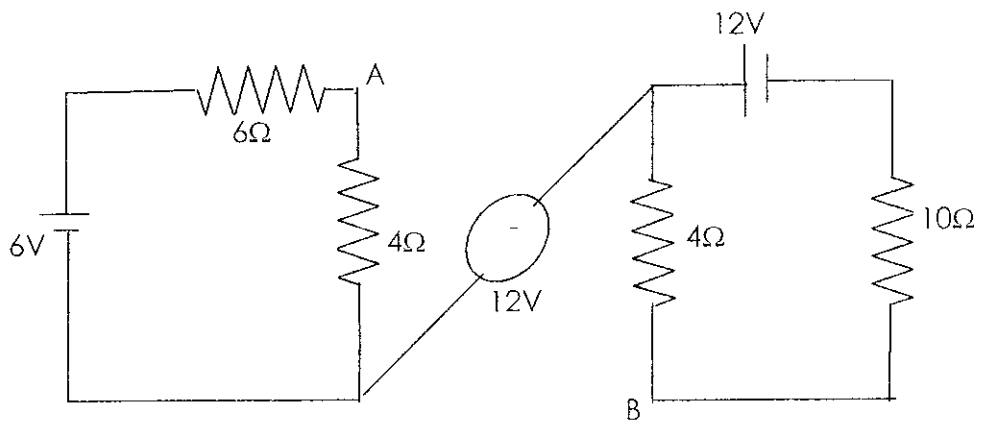


Fig 5

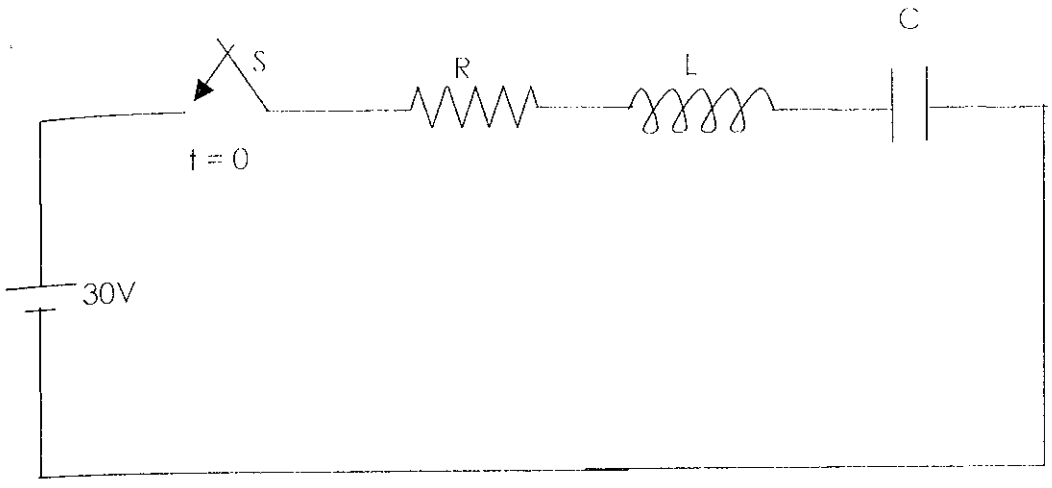


Fig 6

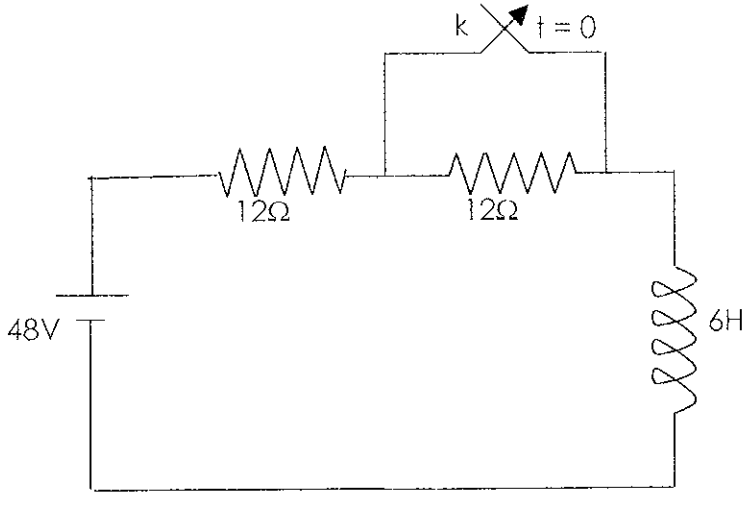


Fig 7

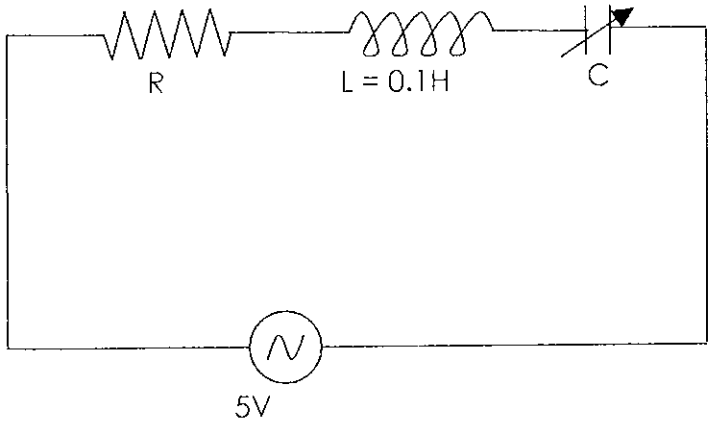


Fig 8

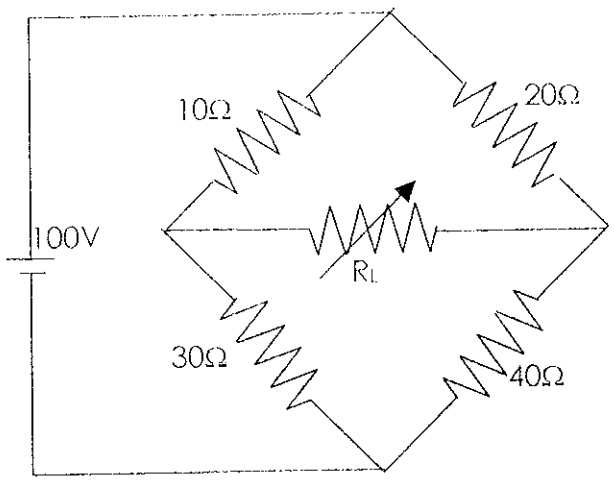


Fig 9

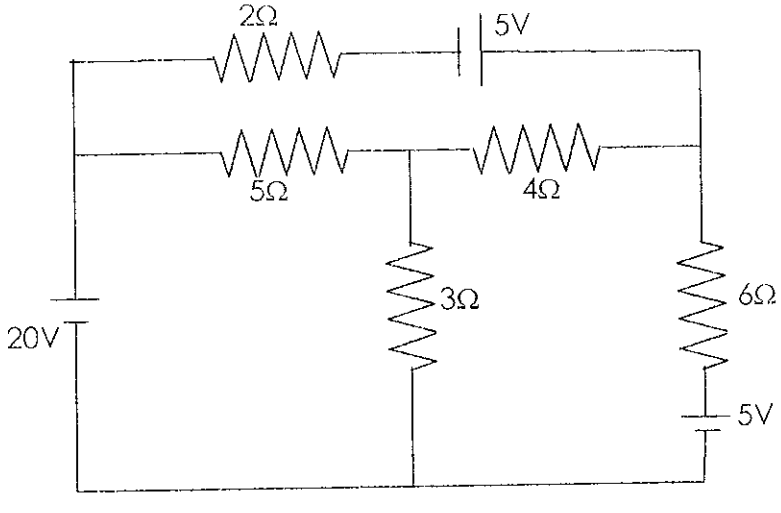


Fig 10

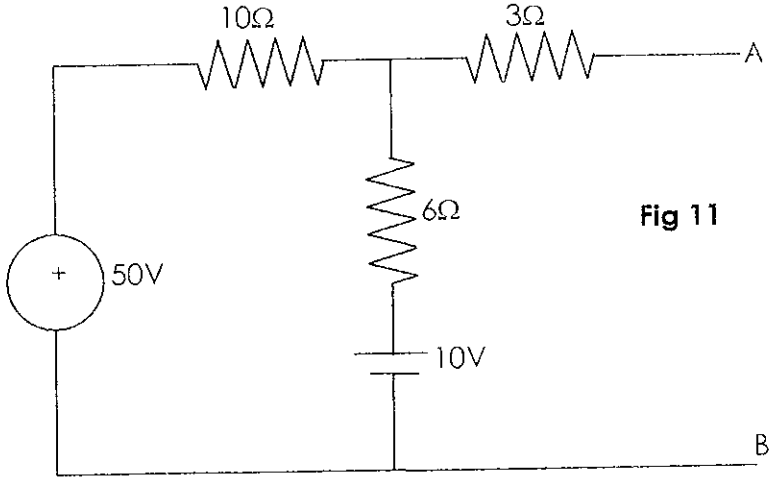


Fig 11

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