Reg. No. :

Question Paper Code : 27205

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2015.

Second Semester

Electronics and Communication Engineering

EE 6201 — CIRCUIT THEORY

(Common to Electrical and Electronics Engineering, Electronics and Instrumentation Engineering, Instrumentation and Control Engineering, Biomedical Engineering and Medical Electronics Engineering)

(Regulations 2013)

Time : Three hours | Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. State Kirchoff's current law.

2. Find the equivalent resistance of the circuit shown in Fig. 1.

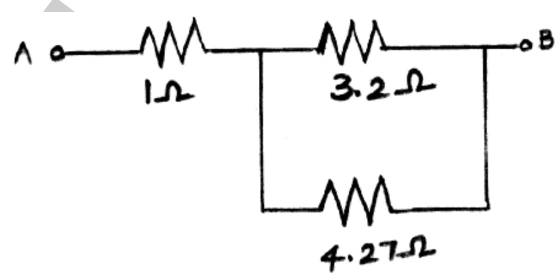

Fig.1

3. List the applications of Thevenin's theorem.

4. Two resistors of $4\,\Omega$ and $6\,\Omega$ are connected in parallel. If the total current is 30 A. Find the current through each resistor shown in Fig.2.

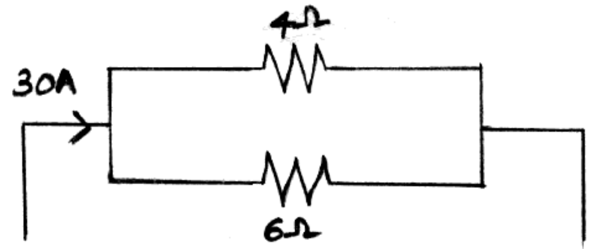

Fig. 2

5. Define selectivity.

6. What is co-efficient of coupling?

7. Distinguish steady state and transient state.

8. What is the time constant for RL and RC circuit?

9. What are the advantages of three phase system?

10. When a 3-phase supply system is called balanced supply system?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Determine the magnitude and direction of the current in the 2 V battery in the circuit shown in Fig. 3. (8)

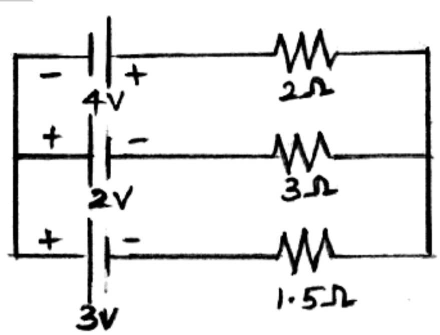

Fig. 3

(ii) Determine the power dissipation in the $4\,\Omega$ resistor of the given circuit shown in Fig. 4. (8)

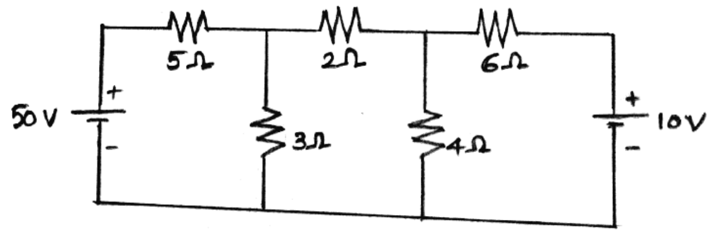

Fig. 4

Or

(b) Using node analysis, find the voltage V_x for the circuit shown in Fig. 5. (16)

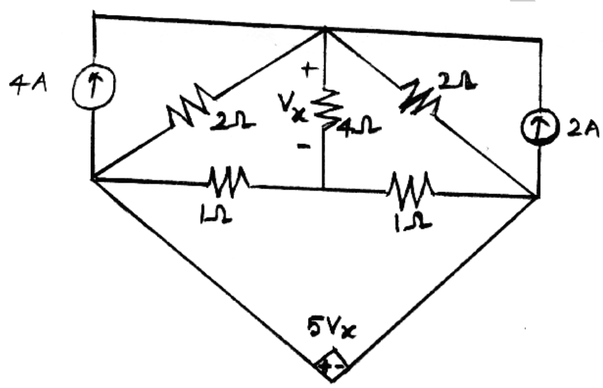

Fig. 5

12. (a) Find the Thevenin's equivalent of the network shown in Fig. 6. (16)

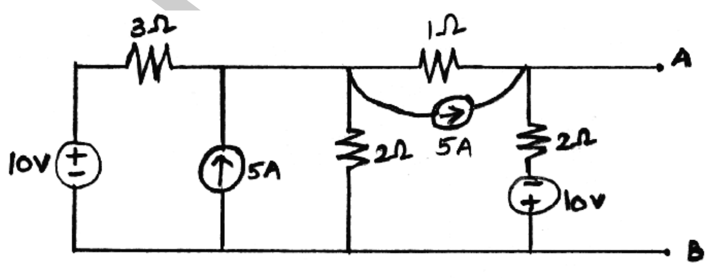

Fig. 6

Or

(b) Determine the value of resistance that may be connected across A and B so that maximum power is transferred from the circuit to the resistance. Also, estimate the maximum power transferred to the resistance shown in Fig. 7. (16)

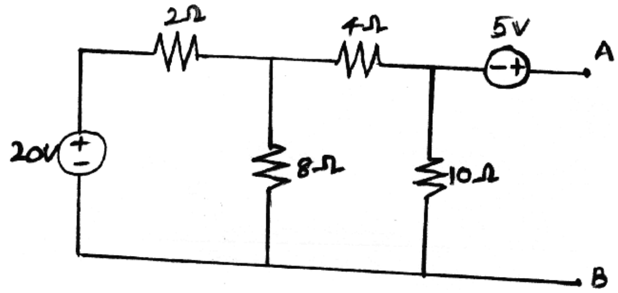

Fig. 7

13. (a) For the circuit shown in Fig. 8, determine the frequency at which the circuit resonates. Also find the quality factor, voltage across inductance and voltage across capacitance at resonance. (16)

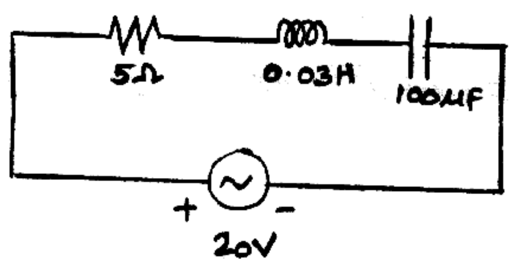

Fig. 8

Or

(b) Find the mutual reactance X_m in the coupled coils shown in Fig. 9. (16)

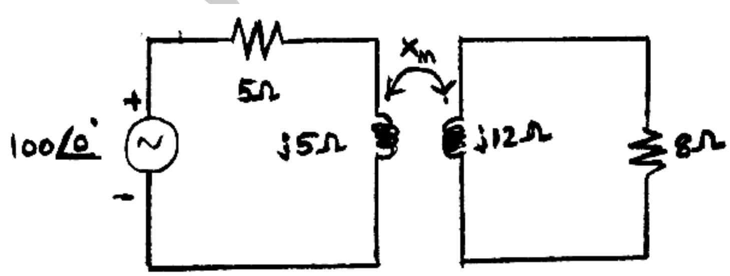

Fig. 9

14. (a) In the RL circuit shown in Fig. 10, the switch is closed to position-1 at $t = 0$. After t = 100 ms, the switch is changed to position-2. Find $i(t)$ and sketch the transient. (16)

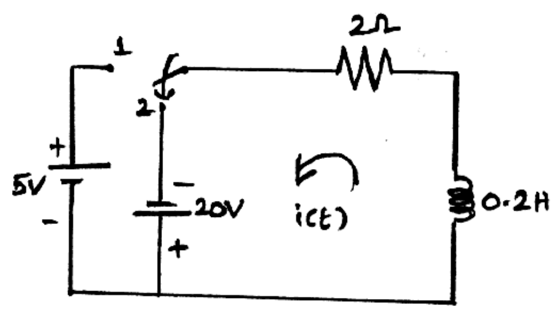

Fig. 10

Or

(b) (i) Determine the driving point impedance of the network shown in Fig. 11. (8)

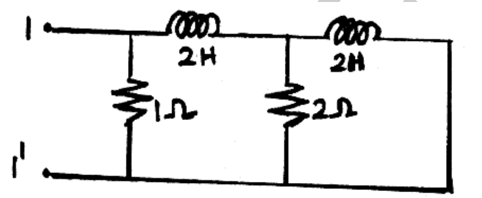

Fig. 11

(ii) Determine the h-parameters of the two port network shown in Fig. 12. (8)

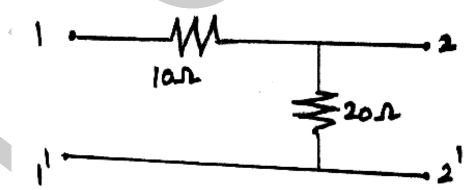

Fig. 12

15. (a) Show that three phase power can be measured by two wattmeters. Draw the phasor diagrams. Derive an expression for power factor interms of wattmeter readings. (16)

Or

(b) (i) Three equal impedances, each of $8 + j10\ \Omega$ are connected in star. This is further connected to a 440 V, 50 Hz, three phase supply. Calculate the active and reactive power and line and phase currents. (8)

(ii) Two wattmeter connected to measure the input to a balanced, three phase circuit indicate 2000 W and 500 W respectively. Find the power factor of the circuit.

(1) When both readings are positive and

(2) When the later is obtained after reversing the connections to the current coil of one instrument. (8)

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Reg. No. | | | | | | | | | | | | |

Question Paper Code : 57307

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2016

Second Semester

Electronics and Communication Engineering

EE 6201 – CIRCUIT THEORY

(Common to Electrical and Electronics Engineering, Electronics and Instrumentation Engineering, Instrumentation and Control Engineering, Biomedical Engineering and Medical Electronics Engineering)

(Regulations 2013)

Time : Three Hours **Maximum : 100 Marks**

Answer ALL questions.

PART – A (10 × 2 = 20 Marks)

1. The resistance of two wires is 25 Ω when connected in series and 6 Ω when connected in parallel. Calculate the resistance of each wire.
2. Distinguish between mesh and loop of a circuit.
3. State reciprocity theorem.
4. What is the condition for maximum power transfer in DC and AC circuits ?
5. Define co-efficient of coupling.
6. In a series RLC circuit, if the value of L and C are 100 mH and 0.1 μF, find the resonance frequency in Hz.
7. In a series RLC circuit, L = 2 H and C = 5 μF. Determine the value of R to give critical damping.
8. Define time constant of RL circuit.
9. A 3 phase 400 V is given to balanced star connected load of impedance 8 + 6j Ω. Calculate line current.
10. List out the advantages of three phase system over single phase system.

PART – B (5 × 16 = 80 Marks)

11. (a) (i) Determine the current I_L in the circuit shown in Fig. 11 (a) (i). **(8)**

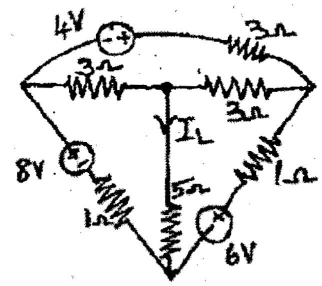


Fig. 11 (a) (i)

(ii) Calculate the voltage across A and B in the circuit shown in Fig. 11 (a) (ii). **(8)**

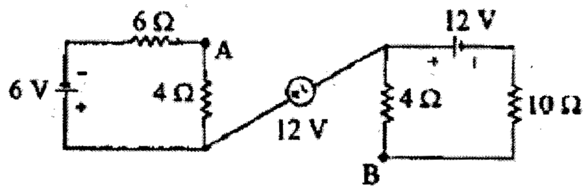


Fig. 11 (a) (ii)

OR

(b) (i) Three loads A, B, C are connected in parallel to a 240 V source. Load A takes 9.6 kW, load B takes 60 A, and load C has a resistance of 4.8 Ω. Calculate R_A and R_B, the total current, total power and equivalent resistance. **(8)**

(ii) For the circuit shown in Fig. 11 (b) (ii), determine the total current and power factor. **(8)**

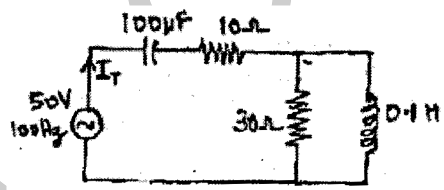


Fig. 11 (b) (ii)

12. (a) Find the voltage across 5 Ω resistor for the circuit shown in Fig. 12 (a) using source transformation technique and verify the results using mesh analysis. **(16)**

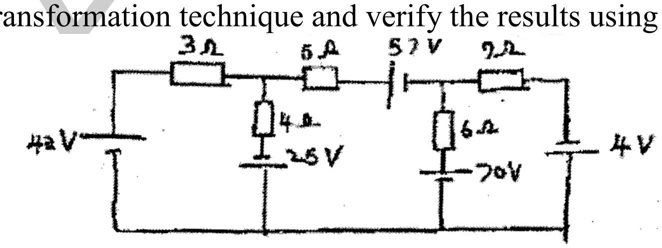


Fig. 12 (a)

OR

(b) Obtain the Norton's model and find the maximum power that can be transferred to the 100 Ω load resistance, in the circuit shown in Fig. 12 (b) . **(16)**

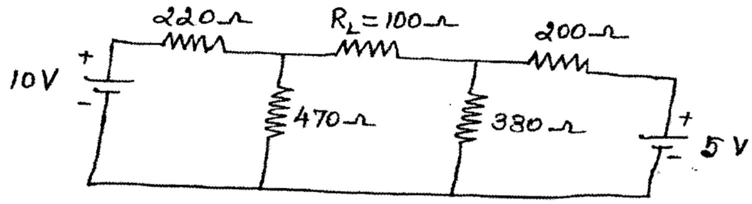


Fig. 12 (b)

13. (a) Determine the resonant frequency, bandwidth and quality factor of the coil for the series resonant circuit considering R = 10 Ω, L = 0.1H and C = 10 μF. Derive the formula used for bandwidth. **(16)**

OR

(b) (i) Derive the expression for equivalent inductance of the parallel resonant circuit as shown in Fig. 13 (b) (i). **(8)**

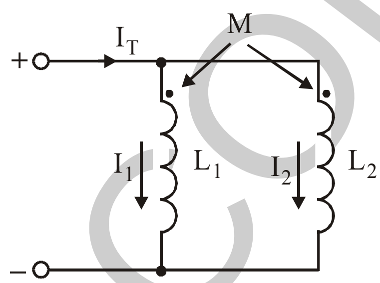


Fig. 13 (b) (i)

(ii) Write the mesh equations and obtain the conductively coupled equivalent circuit for the magnetically coupled circuit shown in Fig. 13 (b) (ii). **(8)**

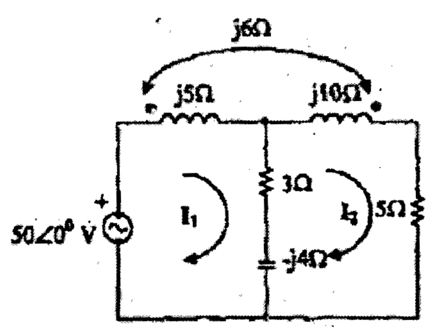


Fig. 13 (b) (ii)

14. (a) A sinusoidal voltage of 10 sin 100 is connected in series with a switch and R = 10 Ω & L = 0.1H. If the switch is closed at t=0, determine the transient current i(t). **(16)**

OR

(b) In the circuit shown in Fig. 14(b). Determine the transient current after switch is closed at time t = 0, given that an initial charge of 100 μC is stored in the capacitor. Derive the necessary equations. **(16)**

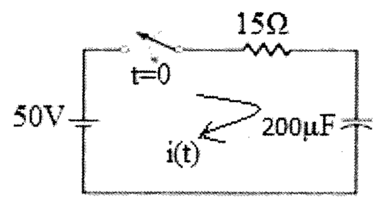


Fig. 14(b)

15. (a) Obtain the readings of two wattmeters connected to a three phase, 3 wire, 120V system feeding a balanced Δ connected load with a load impedance of $12\angle 30°$ Ω. Assume RYB phase sequence. Determine the phase power and compare the total power to the sum of wattmeter readings. **(16)**

OR

(b) (i) If W_1 & W_2 are the reading of two wattmeters which measures power in the three phase balanced system and if $W_1 / W_2 = a$, show that the power factor of the circuit is given by **(8)**

$$\cos \phi = \frac{a + 1}{2\sqrt{a^2 - a + 1}}$$

(ii) A symmetrical,three phase, three wire 440 V ABC system feeds a balanced Y-connected load with $Z_A = Z_B = Z_C = 10\angle 30°$ Ω obtain the line currents. **(8)**

Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 71763

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2017.

Second Semester

Electronics and Communication Engineering

EE 6201 – CIRCUIT THEORY

(Common to Biomedical Engineering, Electrical and Electronics Engineering, Electronics and Instrumentation Engineering, Instrumentation and Control Engineering, Medical Electronics Engineering)

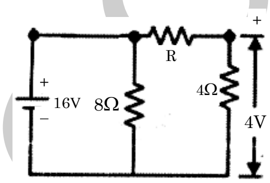
(Regulations 2013)

Time : Three hours Maximum : 100 marks

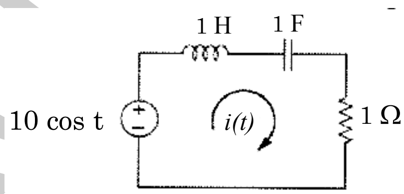
Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Find 'R' in the circuit shown below.



2. Determine the current i(t) for the given circuit

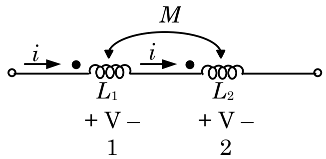


3. A star connected load of 5Ω each is to be converted in to an equivalent delta connected load. Find the resistance be used.

4. A load is connected to a network of the terminals to which load is connected, R_{th} = 10 ohms and V_{th} = 40V. Calculate the maximum power supplied to the load.

5. Define self inductance and mutual inductance of a coil.

6. Given the circuit, what is the equivalent inductance of the system shown below.



7. Define time constant for RL circuit. Draw the transient current characteristics

8. When a two port network is said to be reciprocal?

9. Draw the phasor diagram of line currents and line voltages of a balanced delta connected load.

10. Distinguish between unbalanced supply and unbalanced load.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Determine the potential difference between points A and B given in fig. 11 (a) (i) (8)

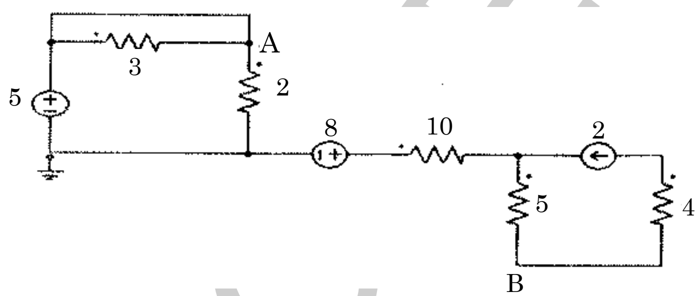


Fig. 11 (a) (i)

(ii) Using Mesh analysis, find the current I_on the circuit shown fig. 11 (a) (ii). (8)

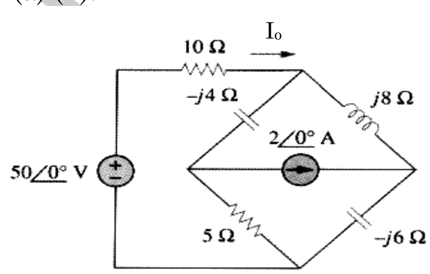


Fig. 11 (a) (ii)

Or

(b) (i) Determine v_x and i_x in the given fig 11 (b) (i). (10)

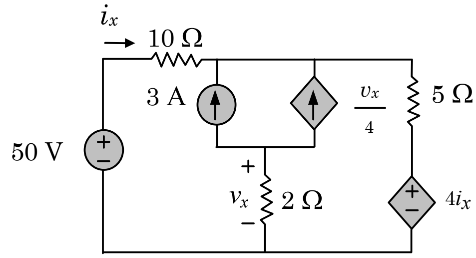


Fig 11 (b) (i).

(ii) Write the mesh equation and nodal equation for the network in fig. 11(b) (ii) by inspection method. (6)

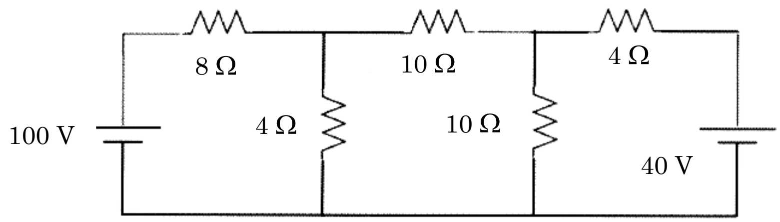


Fig. 11 (b) (ii)

12. (a) (i) Apply source transformation technique to determine current i_o in Fig. 12 (a) (i). (8)

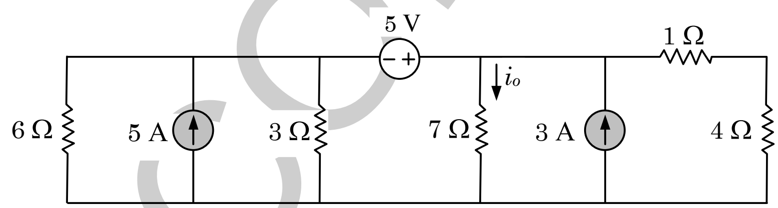


Fig. 12 (a) (i)

(ii) Find the power delivered by the 20V source using superposition theorem. (8)

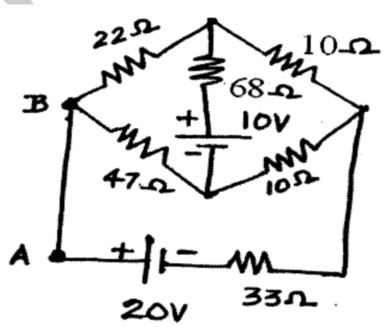


Fig. 12 (a) (ii)

Or

(b) Apply Norton theorem to determine current I_o for the given circuit in Fig. 12 (b). (16)

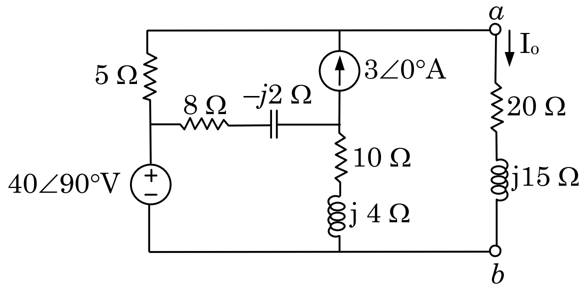


Fig. 12 (b)

13. (a) (i) Derive the expression for resonant frequency and bandwidth for a series RLC resonant circuit. (8)

(ii) In the parallel RLC circuit of Fig. 13 (a) (ii), let $R = 8k\Omega$, $L = 0.2, mH$ and $C = 8\,\mu F$.. Calculate $\omega_{0,}$ Q, half power frequencies and BW. (8)

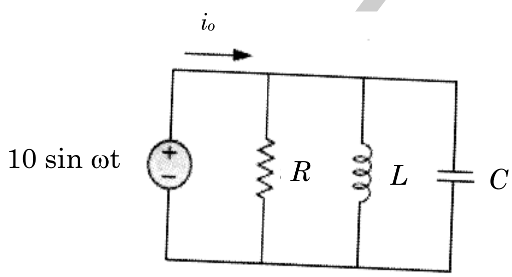


Fig. 13 (a) (ii)

Or

(b) (i) Find the voltage drop across 12Ω resistor for the given circuit in Fig. 13 (b) (i). Also, draw the conductively coupled equivalent circuit. (8)

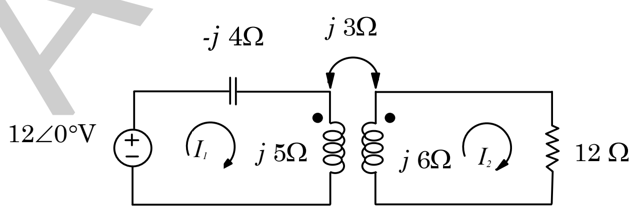


Fig. 13 (b) (i)

(ii) The number of turns in two Coupled coils are 500 turns and 1500 turns respectively When 5 A current flows in coil, the total flux in this coil is 0.6×10^{-3} wb and the flux linking in second coil is 0.3×10^{-3} wb. Determine L_1, L_2 M and K. (8)

14. (a) A series RL circuit with $R = 10\,\Omega$ and L = 0.1 H is supplied by an input Voltage v(t) 10 sin 100t Volts applied at t = 0 as shown in fig. 14 (a). Determine the current i, voltage across inductor. Derive the necessary expression and plot the respective curves. (16)

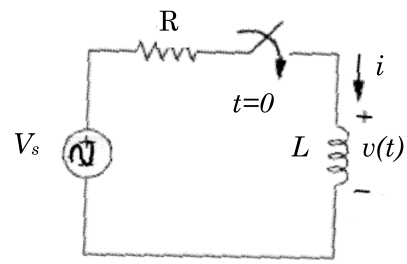


Fig. 14 (a)

Or

(b) Determine the impedance (Z) parameter and draw the T- equivalent circuit for the given two port network in Fig. 14 (b). Also, derive the transmission line (ABCD) parameters from Z parameter. (16)

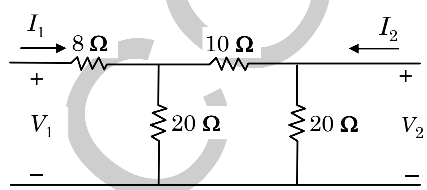


Fig. 14 (b)

15. (a) (i) A balanced Δ-connected load having an impedance $20 - j15\,\Omega$ is connected to a Δ-connected, positive sequence supply $V_{ab} = 330\angle0^\circ\,V$. Calculate the phase currents of the load and the line currents. (8)

(ii) The input power to a 3ϕ load is 10kw at 0.8 pf. Two wattmeters are connected to measure power, find the individual readings of the wattmeters. (8)

Or

(b) For the unbalanced circuit in Fig. 15 (b), determine the line currents and voltage across each load impedance Draw the phasor diagram. (16)

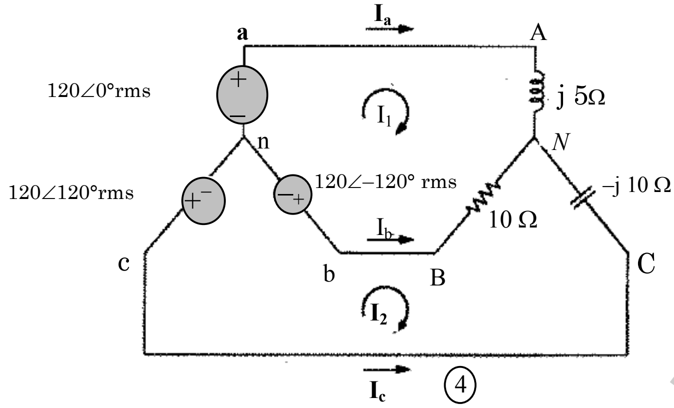


Fig. 15 (b)

Reg. No. : [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]

Question Paper Code : 77122

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2015.

Second Semester

Electronics and Communication Engineering

EE 6201 — CIRCUIT THEORY

(Common to Electrical and Electronics Engineering, Electronics and Instrumentation Engineering, Instrumentation and Control Engineering, Biomedical Engineering and Medical Electronics Engineering)

(Regulation 2013)

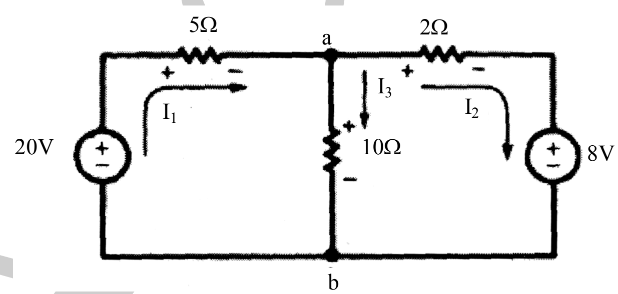
Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Write briefly about Resistance in a Circuit.

2. Obtain the current in each branch of the network shown below using Kirchhoff's Current Law.



3. State Maximum Power transfer theorem.

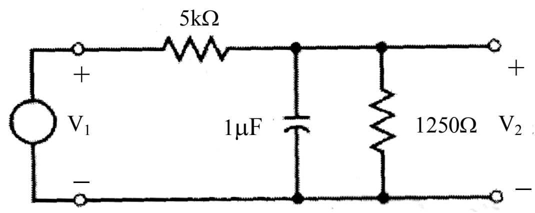
4. Write briefly about Network reduction technique.

5. Define Mutual Inductance.

6. Write the dot rule.

7. Define the frequency response of series RLC circuit.

8. Find the frequency response V_2 / V_1 for the two-port circuit shown below.

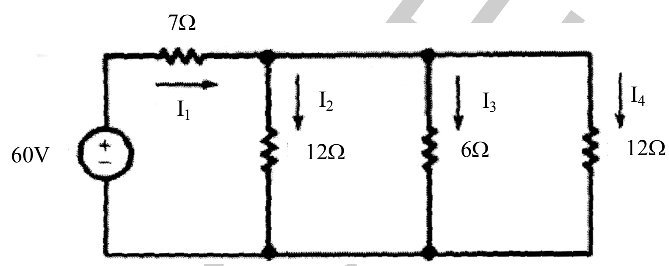


9. Write the distortion power factor equation of the three phase circuits.

10. Distinguish between unbalanced source and unbalanced load.

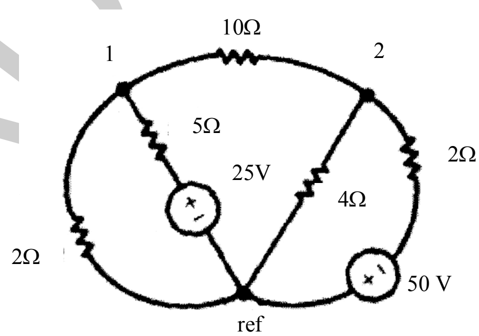
PART B — (5 × 16 = 80 marks)

11. (a) Use branch currents in the network shown below to find the current supplied by the 60-V Source. Solve the circuit by the mesh current method. (16)

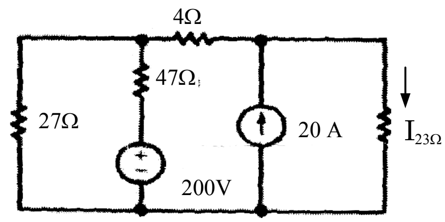


Or

(b) Solve the network given below by the node voltage method. (16)



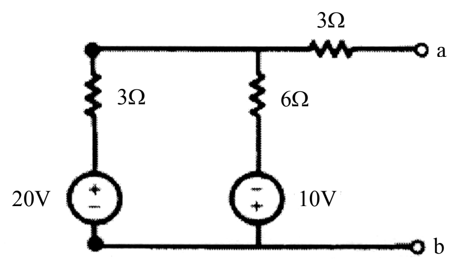
12. (a) (i) Compute the current in the 23 Ω resistor of the following figure shown below by applying the superposition principle. (8)



(ii) Derive the equation for transient response of RC and RL circuit for DC input. (8)

Or

(b) Obtain the Thevenin and Norton equivalent circuits for the active network shown below. (16)



13. (a) With neat illustration and necessary derivations, explain the Linear Transformer. (16)

Or

(b) Derive the Mutual inductance and the coupling coefficient of the transformer with necessary illustration. (16)

14. (a) Explain in detail with neat illustrations the High pass and Low pass networks and derive the necessary network parameters. (16)

Or

(b) Explain the characterization of two port networks in terms of *Z*, *Y* and *h* parameters. (16)

15. (a) Discuss in detail the three phase 3-wire circuits with star connected balanced loads. (16)

Or

(b) Explain in detail the phasor diagram of the voltages and currents of a three phase unbalanced circuits. (16)

Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 80365

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2016.

Second Semester

Electronics and Communication Engineering

EE 6201 — CIRCUIT THEORY

(Common to Electrical and Electronics Engineering, Electronics and Instrumentation Engineering, Instrumentation and Control Engineering, Biomedical Engineering and Medical Electronics Engineering)

(Regulations 2013)

Time : Three hours   Maximum : 100 marks

Answer ALL questions.

PART A — ($10 \times 2 = 20$ marks)

1. What are the limitations of Ohm's law?

2. The equivalent resistance of four resistors joined in parallel is 30 ohms. The current flowing through them are 0.5,0.4,0.6 and 0.1A. Find the value of each resistor.

3. Determine the value of current I_0 of the given figure. 3

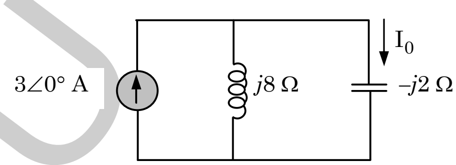


Fig. 3

4. State reciprocity theorem.

5. Draw the frequency response characteristics of parallel resonant circuit.

6. Determine the equivalent inductance of the circuit comprising two inductors in series opposing mode.

7. Determine the Laplace transform of unit step function u(t) and sinusoidal function sin(ωt).

8. A RLC series circuit has R = 10 ohms and L = 2H. What value of capacitance will make the circuit critically damped?

9. What is a phase sequence of 3 phase system?

10. List any two advantages of three phase system over single-phase system.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Calculate the node voltages of given circuit in fig. 11(a) (i). (8)

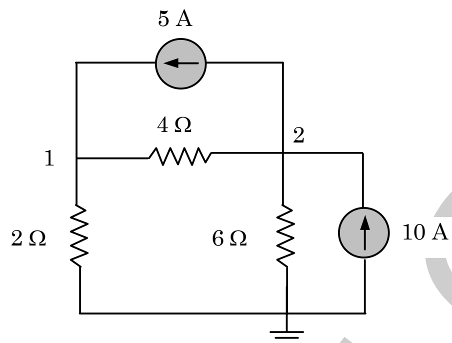


Fig. 11 (a) (i)

(ii) Determine current I_0 for the given circuit in Fig. 11(a) (ii) when $v_s = 12$ V. (8)

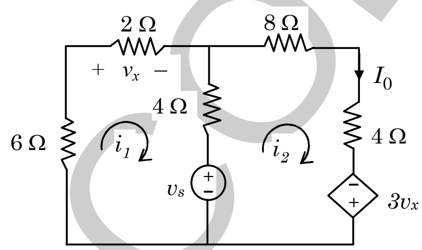


Fig. 11 (a) (ii)

Or

(b) (i) Using mesh analysis for the given fig. 11(b) (i), find the current I_2 and drop across 1Ω resistor. (12)

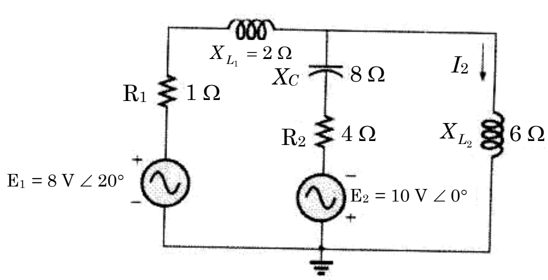


Fig. 11 (b) (i)

(ii) Find the equivalent capacitance C between terminals A and B of fig. 11(b) (ii). (4)

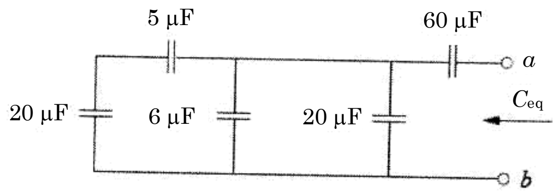


Fig. 11 (b) (ii)

12. (a) (i) Obtain the equivalent resistance R_{ab} of the circuit given in Fig. 12 (a) (i) and calculate the total current i. (8)

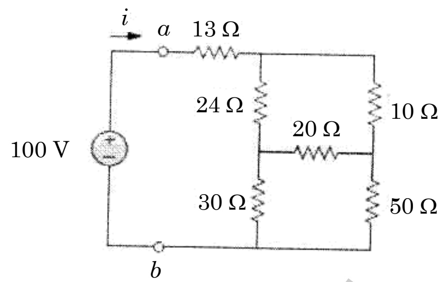


Figure 12 (a) (i)

(ii) Find the value of R_L in fig. 12 (a) (ii) for maximum power to R_L and calculate the maximum power. (8)

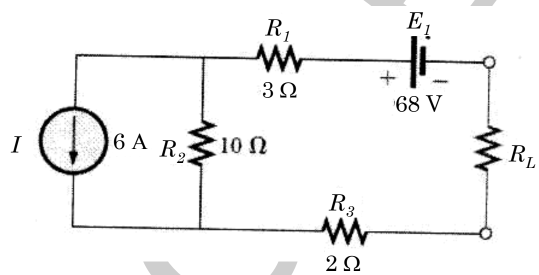


Figure 12 (a) (ii)

Or

(b) Apply superposition theorem to determine current i through 3Ω resistor for the given circuit in fig. 12(b). (16)

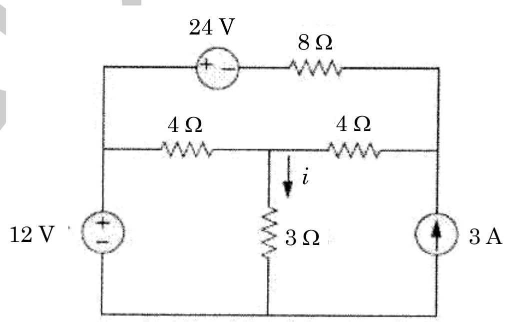


Figure 12 (b)

13. (a) For the series resonant circuit of Fig. 13 (a), find I, V_R, V_L, and V_C at resonance. Also, if resonant frequency is 5000Hz, determine bandwidth, Q factor, half power frequencies, and power dissipated in the circuit at resonance and at the half power frequencies. Derive the expression for resonant frequency. (16)

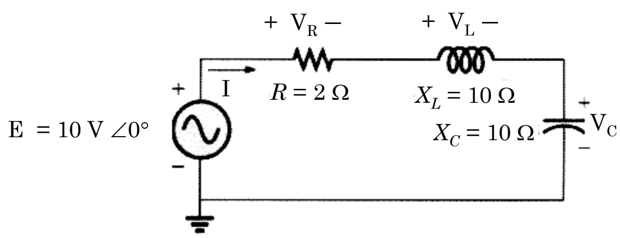


Fig. 13 (a)

Or

(b) (i) Obtain the conductively coupled equivalent circuit for the given circuit in Fig. 13 (b) (i) and Find the voltage drop across 12 Ω resistor. (8)

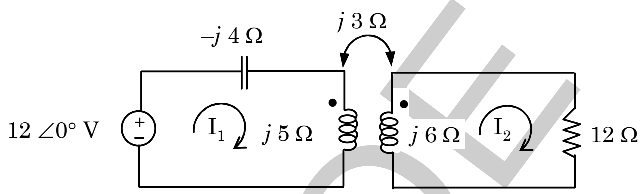


Fig. 13 (b) (i)

(ii) The number of turns in two coupled coils are 500 turns and 1500 turns respectively. When 5 A current flows in coil 1, the total flux in this coil is 0.6×10^{-3} wb and the flux linking in second coil is 0.3×10^{-3} wb. Determine L_1, L_2, M and K. (8)

14. (a) A series R_L circuit with R = 50 Ω and L = 30 H has a constant voltage V = 50 volts applied at t = 0 as shown in fig. 14 (a). Determine the current i, voltage across inductor. Derive the necessary expression and plot the respective curves. (16)

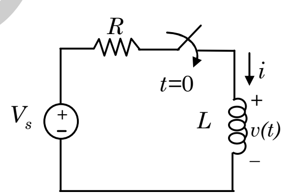


Fig. 14 (a)

Or

(b) (i) Determine the impedance (Z) parameter of the given two port network in Fig. 14(b) (i). (8)

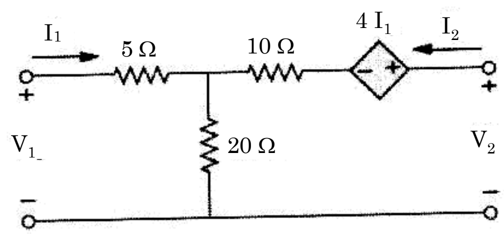


Fig. 14 (b) (i)

(ii) Find the hybrid (h) parameter of the two port network in Fig. 14 (b)(ii). (8)

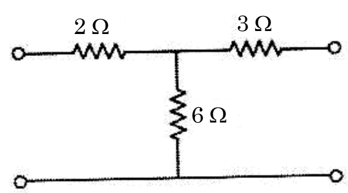


Fig. 14 (b) (ii)

15. (a) (i) For the Δ-Δ system shown in fig. 15 (a) (i), find the phase angles θ_2 and θ_3 for the specified phase sequence. Also, find the phase current and line current in each phase of the load. (8)

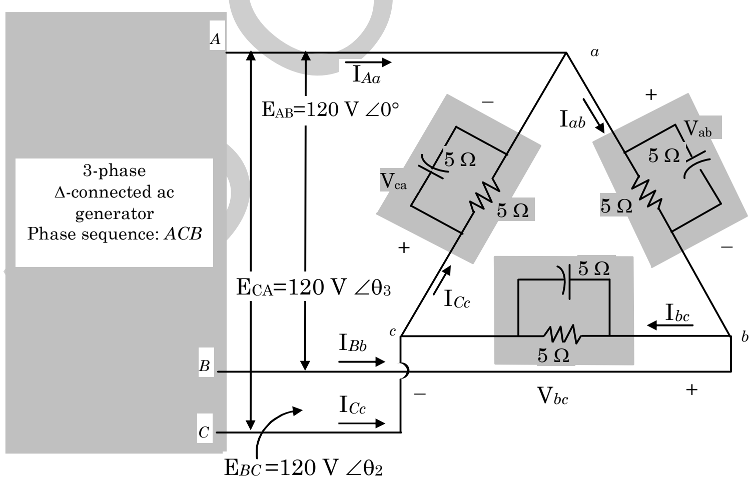


Fig. 15 (a) (i)

(ii) A 3 phase 400V supply is given to balanced star connected load of impedance (8 + 6j) ohms in each branch. Determine line current, power factor and total power. (8)

Or

(b) The two wattmeter produces wattmeter readings P_1 = 1560W and P_2 = 2100W when connected to a delta connected load. If the line voltage is 220V, calculate (i) the per phase average power (ii) total reactive power, (iii) power factor and (iv) the phase impedance. Is the impedance inductive or Capacitive? Justify. (16)
