MALLA REDDY ENGINEERING COLLEGE (Autonomous)

I B.Tech I Semester (MR15 Regulations) I Online Mid Examination
Subject: Electrical Circuits

Multiple choice Questions:

ANS.

1. A terminal where more than two branches met is called:**a**
a) Node
b) Terminus
c) Loop
d) None of the above

2. An ideal current source has:**a**
a) Infinite source resistance
b) Zero internal resistance
c) Zero voltage on no load
d) Zero ripple

3.An ideal voltage source should have:**a**
a) Zero source resistance
b) Infinite source resistance
c) Terminal voltage is proportional to current
d) Open-circuit voltage nearly equal to voltage of the load current

4. Mesh analysis is based on**b**
a) Kirchhoff's Current Law
b) Kirchhoff's Voltage Law
c) Both
d) None

5. In a four branch parallel circuit, 10mA of current flows in each branch. If one of the branch opens, whatis the current in each of the other branches**b**
(a) unaffected
(b) increases
(c) decreases
(d) doubles

6. Identify the passive element among the following**c**
a. Voltage source
b. current source
c. inductor
d. transistor

7. How much energy is stored by a 0.05μF capacitor with a voltage of 1000V?**a**

a. 0.025J

b. 0.05J

c. 5J

d. 100J

8. The unit of power is ……**a**

a. Watts

b. Volts

c. Current

d. None

9. The nodal method of circuit analysis is based on ……**b**

a. KVL + ohms law

b. KCL + ohms law

c. KVL + KCL

d. KVL + ohms law +KCL

10. In a four branch series circuit, 10mA of current flows in each branch. If one of the branch opens, what is the current in each of the other branches**d**
(a) unaffected
(b) increases
(c) decreases

(d) zero

11. State Kirchoff's current Law.**a**
(a) sum of all positive currents is equal to sum of all negative currents.
(b) sum of all positive emfs is equal to the sum of all negative emfs taken in order
(c) sum of all powers in a circuit
(d) sum of all emfs in a circuit

12. Define Kirchoff's voltage law **a**
(a) algebraic sum of emf's - algebraic sum of voltage drops = 0
(b) algebraic sum of emf's + algebraic sum of voltage drops = 0
(c) zero
(d) algebraic sum of currents

13. Ohm's Law states that current through a conductor, under ----------conditions is proportional topotential difference across the conductor.**b**
(a) constant pressure
(b) constant pressure, temperature and volume
(c) constant volume
(d) constant temperature

14. Find the voltage between A and B, for the figure 1 shown below **c**

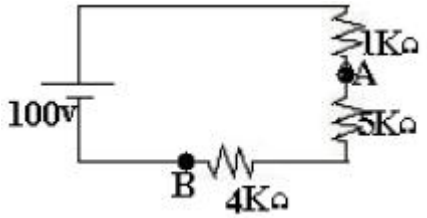


figure 1

(a) 100V
(b) 900V
(c) 90V
(d) 10V

15. In a parallel circuit, the relation between different currents is**d**
(a) Zero = $I_1 + I_2 + I_3 + I_4 + - - - --$
(b) $I_T = I_1 \text{ X } I_2 \text{X } I_3 - - - - - -$
(c) $I_1 + I_2 + I_3 + - - - -- =$ infinity

(d) $I_T = I_1 + I_2 + I_3 + - - - --$

16. What are the units of voltage, current and Resistance respectively?**d**
(a) Ohms, Volts, Amperes
(b) Volts, Farads, Amperes
(c) Henries, Volts, Amperes
(d) Volts, Amperes, Ohms

17. The following voltage drops are measured across each of three resistors in series: 5.2V, 8.5V, 12.3V. What is the value of the source voltage to which these resistors are connected?**a**
(a) 26V
(b) 5.2V
(c) 8.2V
(d) 12.3V

18. In the figure 2 shown below find the current in the resistor R1 **c**

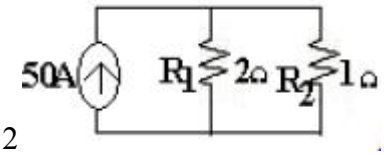


figure 2
(a) 15V
(b) 15A
(c) 16.6A

(d) 16.6V

19. The unit of energy is**a**

a. Watts

b. Volts

c. Current

d. None

20. What is the rule followed for kirchoff's voltage law?**a**
(a) mesh rule
(b) current rule
(c) loop rule

(d) wheat stone rule

21.In a parallel circuit, the total resistance of circuit----------as the number of resistors connected in parallel----------**d**
(a) increases, increases
(b) increases, decreases
(c) decreases, decreases
(d) decreases, increases

22. A battery of emf 12V is connected to an external resistance of 20 ohm. Find current flowing through resistor**b**
(a) 4
(b) 0.6
(c) 40

(d) None

23.In a series circuit, the total resistance of circuit----------as the number of resistors connected in series ----------**a**

(a) increases, increases
(b) increases, decreases
(c) decreases, decreases
(d) decreases, increases

24. An ammeter is used to measure the flow of---------- in a circuit**c**
(a) Energy
(b) Power
(c) Current
(d) Voltage

25. In the figure 3 shown, equivalent resistance is**b**

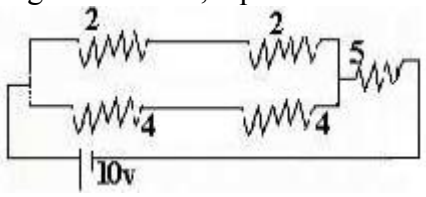


figure 3
(a) 1.512 ohms
(b) 7.667ohms
(c) 7.777ohms
(d) None

26. What is the relationship between the resistance and voltage when the current is kept constant?**d**
(a) equal to
(b) inversely proportional
(c) directly proportional
(d) constant

27. Sign convention used for potential is:**a**
(a) rise in potential is positive
(b) rise in potential is zero
(c) Rise in potential is negative
(d) rise in potential is equal to fall in potential

28. In a four branch series circuit, 100mA of current flows in each branch. If one of the branch opens, what is the current in each of the other branches**d**
(a) increases
(b) unaffected
(c) doubles
(d) zero

29. Ten cells, each of emf 1.5V are connected in series. What current willthey send through an external resistance of 4 ohm**c**
(a) 6.0 A
(b) 2.5 A

(c) 3.75 A
(d) None

30. A battery of emf 1.8 volts is connected to a pair of resistances 4 ohm and 6 ohm in parallel. Calculate the current supplied by the battery**d**
(a) 7.5 A
(b) 10 A
(c) 1.75 A
(d) 0.75 A

31. When n resistances of value x are connected in series, total resistance is **A**

(A) nx (B) rnx (C) x / n (D) n^2 x.

32. Which of the following is not the same as watt? **B**

(A) joule/sec (B) amperes/volt C) amperes x volts (D) (amperes)^2 x ohm.

33. A circuit contains two un-equal resistances in parallel **C**

(A) current is same in both (B) large current flows in larger resistor

(C) potential difference across each is same (D) smaller resistance has smaller conductance.

34.Four identical resistors are first connected in parallel and then in series. The resultant resistance of the first combination to the second will be **A**

(A) 1 / 16 times (B) 1 / 4 times (C) 4 times (D) 16 times.

35. The ratio of the resistance of a 100 W, 220 V lamp to that of a 100 W, 110 V lamp will be nearly **A**

(A) 4 (B)2 (C) 1 / 2 (D) 1 / 4

36. Three 3 ohm resistors are connected to form a triangle. What is the resistance between any two of the corners? **C**

(A) 3 / 4 ohms (B) 3 ohms (C) 2 ohms (D) 4/3 ohm.

37. A wire of 0.14 mm diameter and specific resistance 9.6 micro ohm-cm is 440 cm long. The resistance of the wire will be **D**

(A) 9.6 ohm (B) 11.3 ohm (C) 13.7 ohm (D) 27.4 ohm.

38. Ohm's law is not applicable to **D**

(A) DC circuits (B) high currents (C) small resistors (D) semi-conductors.

39. A wire of resistance R has it length and cross-section both doubled. Its resistance will become **C**

(A) 4 R (B)2 R (C) R (D) R / 4.

40. Ohm's law is not applicable in all the following cases Except **C**

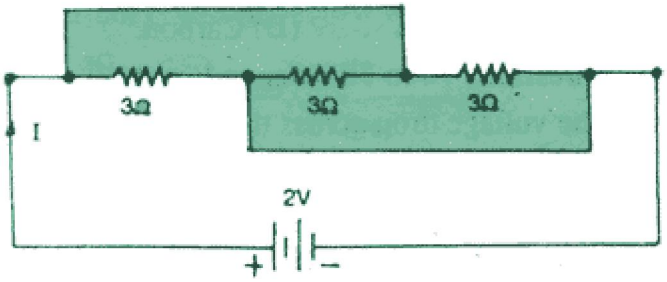
(A) Electrolytes (B) Arc lamps (C) Insulators (D) Vacuum ratio values.

41. Three elements having conductance G_1, G_2 and G_3 are connected in parallel. Their combined conductance will be **D**

(A) $1/(1/G_1 + 1/G_2 + 1/G_3)$ (B) $(G_1G_2 + G_2G_3 + G_3G_1)/(G_1 + G_2 + G_3)$

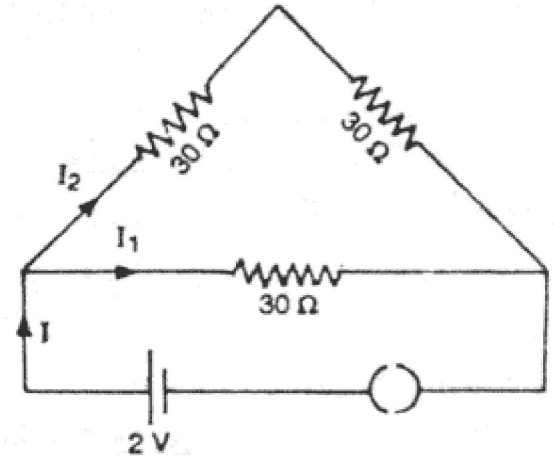
(C) $1/(G_1 + G_2+ G_3)$ (D) $G_1 + G_2 +G_3$

42. For the circuit shown below the current I flowing through the circuit will be **C**



(A)1 / 2 A (B) 1 A (C) 2 A (D) 4 A.

43. In the circuit shown below, the current I is **C**

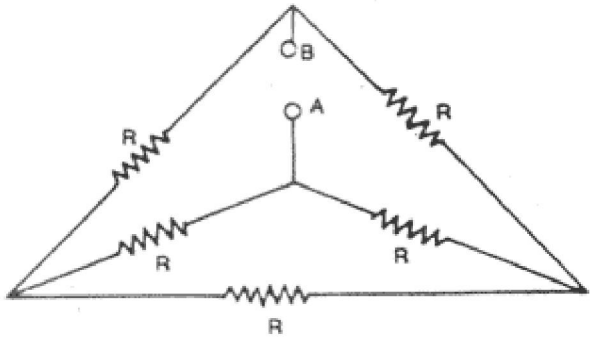


(A)1 / 45 A (B)1 / 15 A (C)1 / 10 A (D)1 / 5 A.

44. All good conductors have high **D**

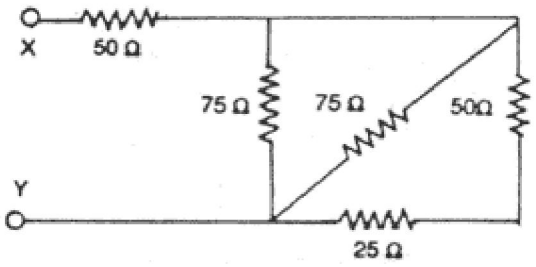
(A) resistance (B) electrical conductivity (C) electrical and thermal conductivity (D) conductance.

45. Resistance across A and B in the circuit shown below is **A**



(A) R (B) 3 R (C) 4 R (D) 5 R.

46. Equivalent Resistance between X and Y is **D**



(A)50 ohm (B) 75 ohm (C)275 ohm (D)none of the above.

Fill in the BlanksAns.

1. Give examples for active elements----------(voltage and current sources)
2. The relation between voltage and current in a capacitor is_____(v=(1/C)∫i.dt)
3. Energy stored in a capacitor is given as----------($(1/2)Cv^2$)
4. The relation between voltage and current in an inductor is_____(v=L(di/dt))
5. The opposition offered by capacitor to rate of change of voltage across it is called----------(capacitance)
6. The basis for nodal analysis is_____ law (KCL)
7. Ohm's Law is given by _____(I=V/R)
8. Give examples for passive elements----------(R, L & C)

9. Energy stored in a inductor is given as---------- ($(1/2)Li^2$)

10. The relation between voltage and current in a resistor is_____(V=IR)

11.The opposition offered by inductor to rate of change of current through it is called ---------- (inductance)

12. The basis for mesh analysis is_____ law (KVL)

13. The flow of electrons is called as …… (electric current)

14. The equivalent resistance of resistors R_1, R_2 &R_3 in parallel is ---------- (1/((1/R1)+(1/R2)+(1/R3)))

15. ---------- materials are examples for conductors (Copper &Aluminum)

16. The opposition offered by resistor to flow of electrons is called---------- (Resistance)

17. The algebraic sum of currents flowing towards a junction in an electric circuit is equal to---- ---------- (algebraic sum of currents leaving that junction)

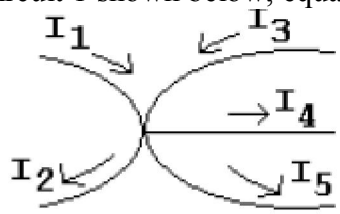
18. In a series circuit total ---------- is equal to sum of powers of each resistor in series. (power)

19. ----------Force will be there between oppositely charged bodies (attractive)

20. ----------Force will be there between positively charged bodies (repulsive)

21. A conductor have ----------number of free electrons than semi conductor. (more)

22. In the circuit 1 shown below, equation according to KCL is----------($I_1+I_3=I_2+I_4+I_5$)

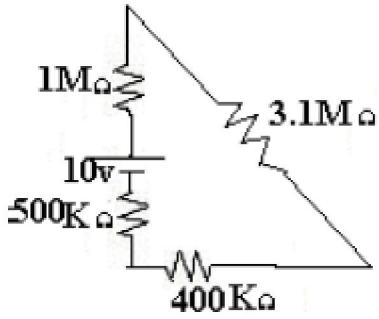


Circuit1

23. ---------- materials are examples for semi conductors (Germanium& Silicon)

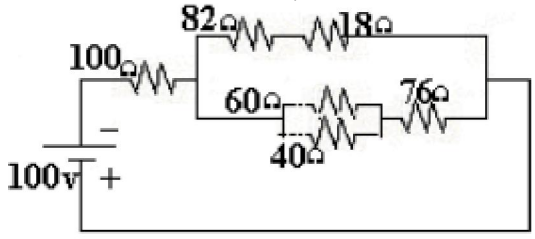
24. ---------- materials are examples for insulators (Paper & Mica)

25. ---------- is the current in the circuit 2 shown below? (2μA)



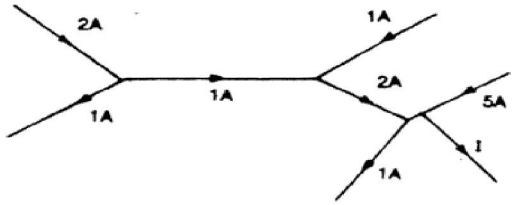
circuit 2

26. For the circuit 3 shown below, the total resistance is ----------. (150 Ohm)

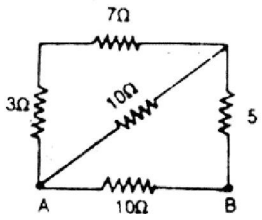


circuit 3

27.The unit of power is ---------- (Watts)
28. The unit of charge is ---------- (Coulomb)
29. The equivalent resistance of two resistors R_1& R_2 in parallel is ---------- (1/((1/R1)+(1/R2)))
30. The energy dissipated in Resistor is given by ---------- (i^2Rt Joules)
31. Define KVL----------(algebraic sum of voltages around any closed path in an electric circuit is equal to zero)
32. Define KCL----------(algebraic sum of currents flowing towards a junction in an electric circuit is equal toalgebraic sum of currents leaving that junction)
33. Current in a capacitor is given by----------(i=C(dv/dt))
34. Current in a inductor is given by----------(i=(1/L)∫v.dt)
35. Current in a resistor is given by---------- (I=V/R)
36.Resistivity of a wire depends on _____.(material)
37. Resistance of a wire is r ohms. The wire is stretched to double its length, then its resistance in ohms is_____.(4 r)
38. Kirchhoff's second law is based on law of conservation of _____. (energy)
39. The charge on an electron is known to be 1.6 x 10^{-19} coulomb. In a circuit the current flowing is 1 A. How many electrons will be flowing through the circuit in a second_____(0.625 x 10^{19})
40. Ampere second could be the unit of _____. (charge)
41. One kilowatt hour of electrical energy is the same as _____Joules. (36 x 10^5 joules)
42. An electric current of 5 A is same as_____ C/Sec.(5)
43. The value of the following is given by 100 (kilo ampere) x (micro ampere)x 100 milli ampere * 10 ampere is_____ A.(0.1 A)
44. A circuit contains two un-equal resistances in parallel The Potential across them_____.(same)
45.Conductance is expressed in terms of_____.(mho)
46.Two resistances R_1 and R_2 give combined resistance of 4.5 ohms when in series and 1 ohm when in parallel. The resistances are_____.(1.5ohms and 3ohms)
47. We have three resistances of values 2 Ω, 3 Ω and 6 Ω.Which of the following combination will give an effective resistance of 4 Ω. The Resistors are connected in_____.
(2Ω resistance in series with parallel combination of 3 Ω and 6 Ω resistance)
48.Current I in the figure is_____.(6A)



49.The unit of electrical conductivity is _____. (mho / metre)
50.The resistance of a 100 W, 200 V lamp is_____.(400 ohm)
51.Five resistances are connected as shown in figure below. The equivalent resistance between the points A and B will be_____.(5 ohms)



52.How many different combinations may be obtained with three resistors, each having the resistance R _____.(4)

53.Ohm's law is applicable to _____.(DC Circuits only)

54.A resistance of 5 ohms is further drawn so that its length becomes double. Its resistance will now be _____.(20 ohms)

55.Specific resistance of a substance is measured in _____.(ohm-cm)

56. Resistivity is usually expressed in terms of _____.(ohms/cm-cube)

57. Inductoropposes sudden change in _____.(Current)

58. Capacitor opposes sudden change in _____.(Voltage)

59. 2F and 4F are connected in series. What is resultant value_____.(1.33F)

60. 3H and 6H are connected in parallel. What resultant value_____.(2H)

61. What is Voltage value in KCL_____.(Constant)

62. Units of potential is_____.(Volts)

63. What is current flowing through the open cicuit_____.(Zero)

TRUE/FALSE QUESTIONS **Answer**

1) Sign convention used for potential is rise in potential is positive is -------- (T/F) T
2) An ammeter is used to measure the flow of voltage in a circuit is---------- (T/F) F
3) A battery has an emf of 12.9 volts and supplies a current of 3.5 A. The resistance of the circuit is 3.69 A is ---------- (T/F) T
4) If one of the resistors in parallel circuit is removed, then the total resistance remains Constant is ---------- (T/F) F
5) In the Figure 1 the current direction is

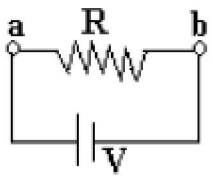


Figure 1

from b to a is ---------- (T/F) F

6) In the Figure 1 the according to Kirchhoff's Voltage Law V=aRb is ---------- (T/F) F

7) The Voltmeter is used to measure the current in a circuit is ---------- (T/F) F

8) In any closed circuit, the algebraic sum of all the electromotive forces and the voltage drops is equal to zero is ---------- (T/F) T

9) For a parallel circuit I1 + I2 + I3 = 0 is ---------- (T/F) T

10) An ammeter is connected in series with the load ---------- (T/F) T

11) In a series circuit, the total power = sum of powers of each resistor in series---(T/F)T

12) A voltmeter is connected in series with the load ---------- (T/F) F

13) Kirchoff's current Law is stated as sum of all powers in a circuit ---------- (T/F) F

14) For a parallel circuit, VT = V1 + V2 + − − − − −Vm ---------- (T/F) F

15) One cycle of 360degrees is corresponds to 2π radians---------- (T/F) T

16) The voltage between A and B, for the Figure 2 shown below is 0 Volts is------(T/F) F

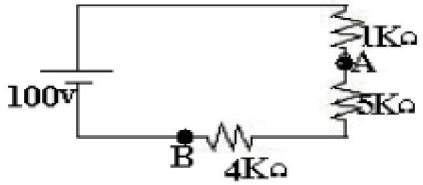


Figure 2

17) Kirchoff's voltage law is written as E-V1-V2 =0 ---------- (T/F) T

18) In the Figure 3 shown below the current in the resistor R1=3 is ---------- (T/F) F

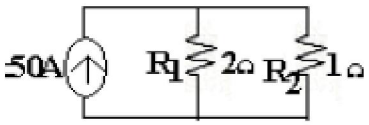


Figure 3

19) A terminal where more than two branches met is called Node is ---------- (T/F) T

20) In the circuit 1 given below, V1 = 7.5V; V2 = 12.5V then E=0 is ---------- (T/F) F

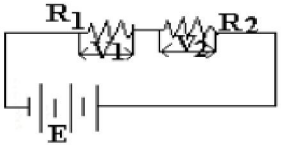


Figure 2

21) An ideal current source has Zero internal capacitance is ---------- (T/F) F

22) An ideal voltage source should have Zero source resistance---------- (T/F) T

23) Mesh analysis is based on Kirchhoff's Current Law ---------- (T/F) F

24) An ideal voltage source is passive element is ---------- (T/F) F

25) A current source is active element is ---------- (T/F) T

26) The energy stored by a 0.05μH inductor with a voltage of 1000V is 0.025J----------(T/F) T

27) The nodal method of circuit analysis is based on KCL + ohms law is ---------- (T/F) T

28) Volts is the unit of Resistance ---------- (T/F) F
29) Farads is the unit of inductor ---------- (T/F) F
30) Amperes is the unit of voltage ---------- (T/F) F

Match the following

A.

a. Resistance	1. Magnetic field
b. Inductor	2. Dielectric charge
c. Capacitor	3. Energy dissipating element
d. Energy in a inductor	4. $i= c\, dv/dt$
e. Current in a capacitor	5. $(½)Li^2$

B.

a. voltage proportional formula	1. Kirchhoff's law
b. current division rule	2. $I_1=IR_2/(R_1+R_2)$
c. star delta transformation	3. $V_1=VR_1/(R_1+R_2)$
d. delta star transformation	4. $R_{CA}\, R_{AB}\, /(R_{AB}+R_{BC}+R_{CA})$
e. kcl,kvl	5. ans has neutral connection

C.

a. kcl	1. direct calculation of current
b. kvl	2. emf drop+sum(IR) of drops =0
c. nodal analysis	3. algebraic sum of currents=0
d. mesh analysis	4. direct calculation of voltage

e. charge of electron 5. $1.602*10^{-19}c$

D.

a. Active element 1. Battery

b. passive element 2. Diode

c. unilateral element 3. Inductor

d. voltage source 4. Amperes

e. current 5. Source

E.

a. unit of voltage 1. Henry

b. unit of charge 2. Farad

c. unit of power 3. Coulomb

d. unit of capacitance 4. Volts

e. unit of inductor 5. Watts

F.

a. combination of elements 1. Resistance

b. active elements 2. Electric circuit

c. time variant 3. Produces energy

d. non linear element 4. Changes with time

e. opposes the flow of current 5. Does not obey ohms law

Questions

1) Explain KVL and KCL?
2) Derive Voltage-Current relations for R, L & C?
3) Write short notes on types of Voltage and Current sources and represent them?
4) The resistance of two wires in series is 20 ohm and in parallel is 4.8 ohm. Find the value of each resistance?
5) Derive formulae for conversion from delta connection to star connection?
6) What is the equivalent capacitance value in case of series and parallel connected capacitors?

7) Explain the following terms:

a) Charge

b) Electric potential

c) Potential difference

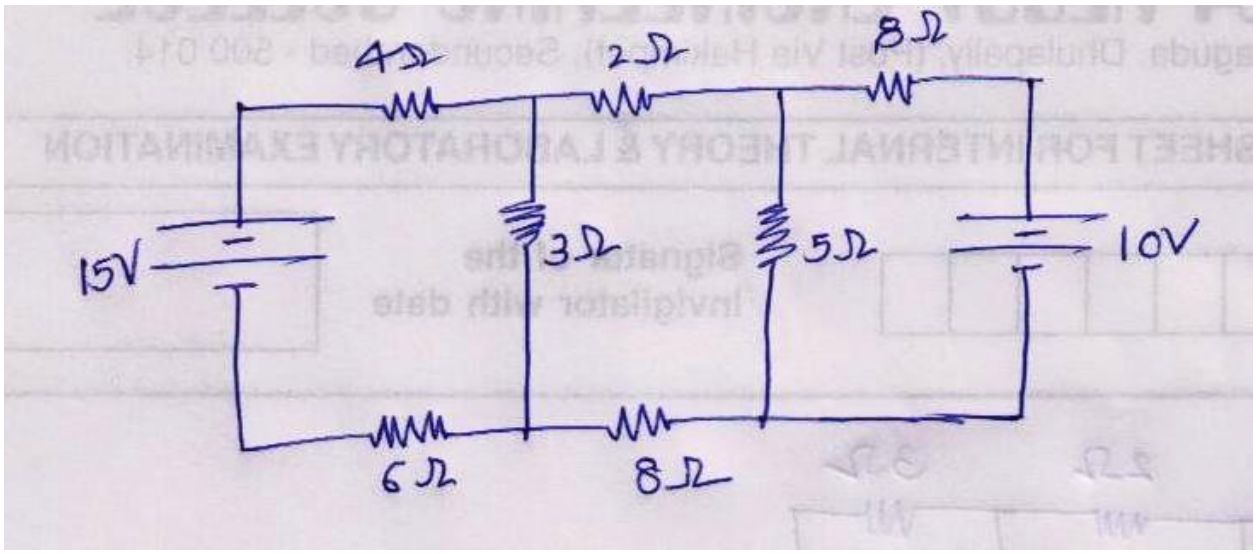
d) Electric current

e) Power

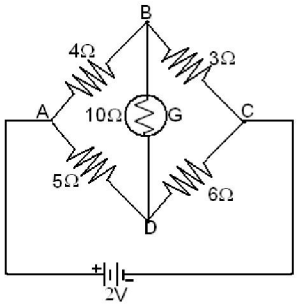
f) Electrical energy.

8) What is the equivalent inductance value in case of series and parallel connected inductors?

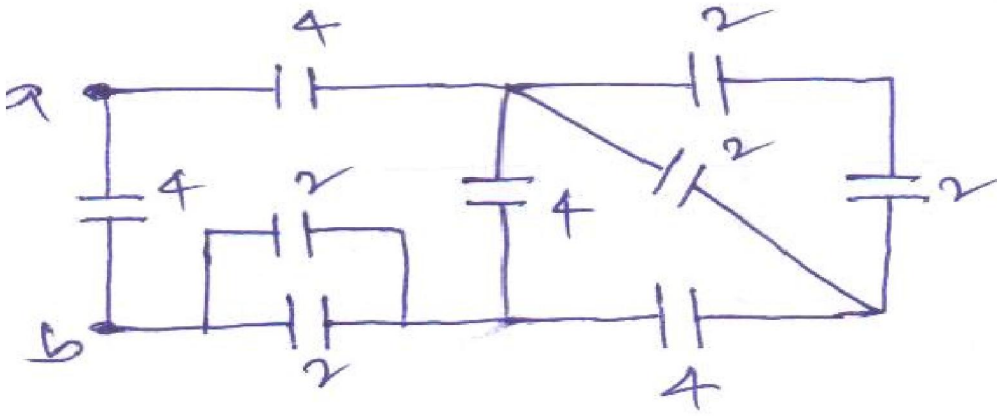
9) Calculate the equivalent resistance, voltage at the load and power dissipated at the load



10) A Wheat stone Bridge consists of AB=4 ohms, BC=3 ohms, CD=6 ohms and DA=5ohms. A 2V cell is connected between A and C. Find the current through galvanometer connected between B and D.



11. a. Derive expression for Energy stored in Inductor?
    b. Find the Equivalent Capacitance in between A and B terminals of below circuit. All capacitances are in μF?



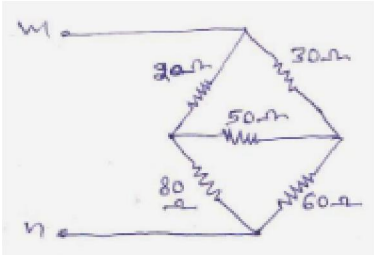
12) Explain KCL and KVL with example problems?

13) a. Explain Ideal and Practical sources?

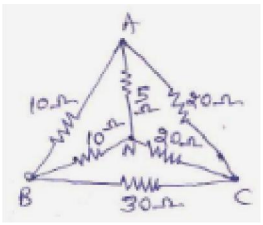
b. Write about different types of dependent sources?

Assignment

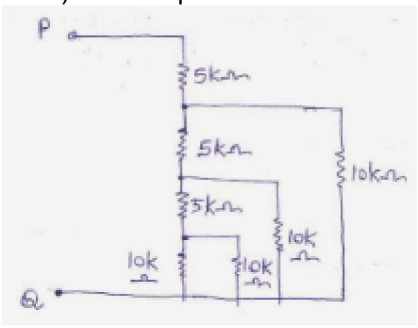
1) Find equivalent resistance across terminals m & n in following circuit a) with Delta to Star transformation b) Star to Delta transformation?



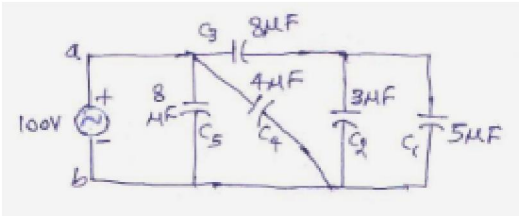
2) Transform following network to equivalent Star connected network?



3) Find equivalent resistance seen across terminals P & Q in following circuit?

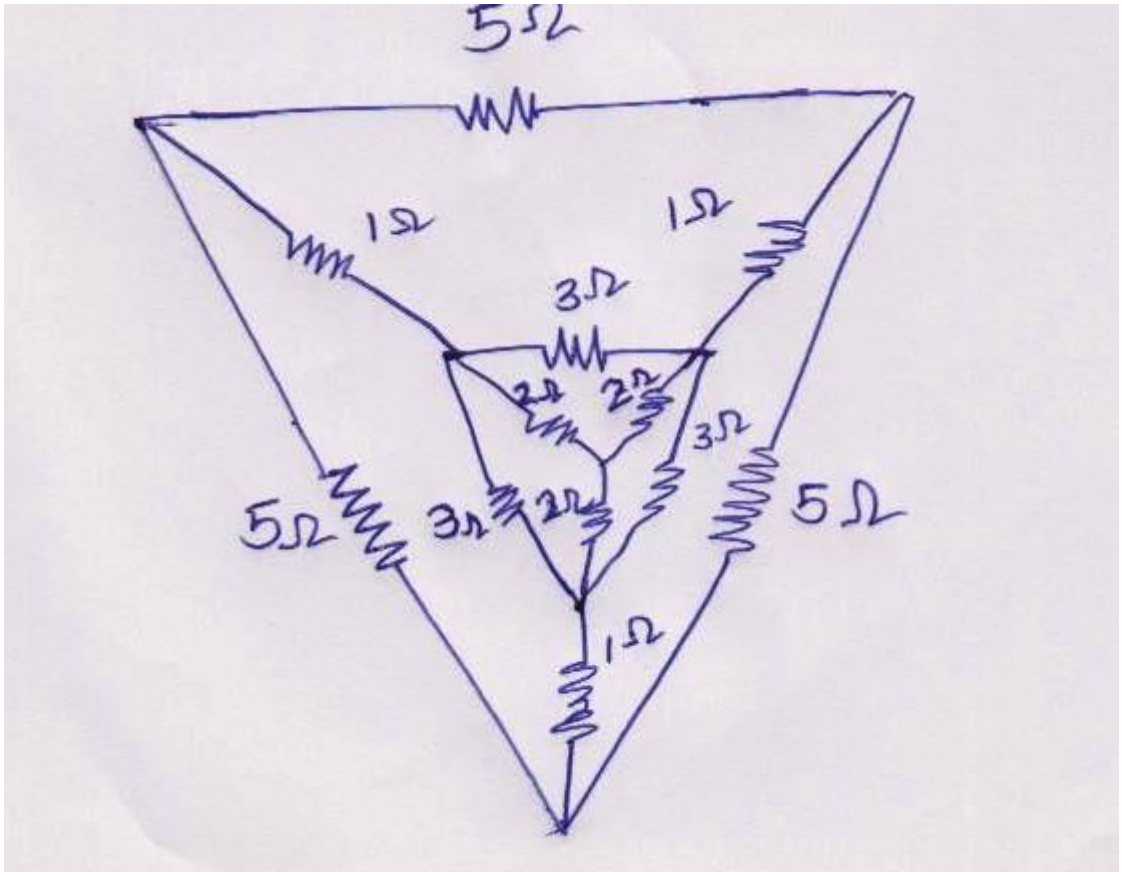


4) Determine equivalent capacitance across a & b terminals in following circuit?



5) Define i)circuit element ii) active and passive elements iii) linear and non-linear elements iv) unilateral and bilateral elements v) network and circuit vi) node and branch vii) mesh and loop viii) lumped and distributed elements?

6) Calculate the equivalent resistance for the following circuit?



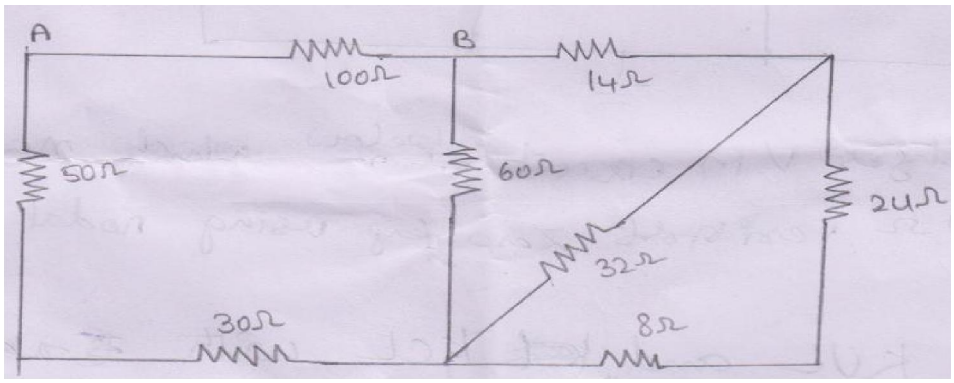
7) How do you convert star to delta and delta to star? Derive the equations?

8) Write about sourcetransformation. Convert a 10V voltage source with a internal resistance 5ohms into current source?

9) Write about the inductance and capacitance?

10) A circuit consisting of three resistances of 12Ω, 18Ω and 36Ω respectively joined in parallel is connected in series with a fourth resistance. The whole circuit is applied with 60V and it is found that the power dissipated in the 12Ω resistor is 36W. Determine the value of the fourth resistance and the total power dissipated in the circuit?

11. Find the Equivalent resistance between terminals A and B of the network shown?



12. Determine the current delivered by the source in the circuit shown?