Subject Name: **NETWORK ANALYSIS &TRANSMISSION LINES**

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Year and Sem, Department: II/I ECE

Unit-I: (Title)

Important points / Definitions:

UNIT I

- **No. of tree branches or twigs = n — 1**
- **No. of link branches I = b — (n — 1)**
- A cut-set is a minimum set of branches of a connected graph such that when removed these branches from the graph, then the graph gets separated into 2 distinct parts called sub-graphs and the cut set matrix is the matrix which is obtained by row-wise taking one cut-set at a time. The **cutset matrix** is denoted by symbol [Q_f].

Orientation in Cut Set Matrix

Q_{ij} = 1; if branch J is in cut-set with orientation same as that of tree branch.
Q_{ij} = -1; if branch J is in cut-set with orientation opposite to that of branch of tree.
Q_{ij} = 0; if branch J is not in cut-set.

- **Tie Set Matrix** – For a given tree of a graph, addition of each link between any two nodes forms a loop called the fundamental loop. In a loop there exists a closed path and a circulating current, which is called the link current. The current in any branch of a graph can be found by using link currents.

The tie set matrix B is written in a compact form as B[b_{ij}]

The element b_{ij} of B is defined as

b_{ij} = 1 when branch b_j is in the f-loop I_i(loop current) and their reference directions coincide.

b_{ij} = —1 when branch b_j is in the f-loop $I_i$loop current) and their reference directions are opposite.

b_{ij} = 0 when branch b_j is not in the f-loop I_i.

- a **tree** is an undirected **graph** in which any two vertices are connected by exactly one path, or equivalently a connected acyclic undirected **graph**.

- ***Edge (Link).*** *An edge* e *is a link between two nodes. The link (*i , j*) is of initial extremity* i *and of terminal extremity* j*. A link is the abstraction of a transport infrastructure supporting movements between nodes. It has a direction that is commonly represented as an arrow. When an arrow is not used, it is assumed the link is bi-directional.*

- A magnetic circuit that has many parts of different dimensions and materials connected in series is called a series magnetic circuit.

- **Magnetic Flux Density (B):**The flux per unit area is defined as the *magnetic flux density*. It is measured in a plane perpendicular to flux.

  Magnetic Flux Density, **B = φ ÷ A**
  Units: Weber per meter square (**Wb/m^2**) or **tesla(T).**
- **Magnetic Field Intensit**y:The magnetic field strength or magnetic field intensity is given by MMF per unit length of the magnetic circuit.

  Magnetic Field Intensity, **H=(N*I*) ÷ l**

  Units: **AT/m.**
- Permeability:The ability of a material to carry the magnetic lines of flux is known as *permeability* of that material.

Absolute Permeability, **$\mu = \mu_o \mu_r$**
Units: Henry/meter **(H/m)**

Permeability of Free Space, **$\mu_o = 4\pi \times 10^{-7}$ H/m**

- The *magneto-motive force* is the driving force which produces the magnetic flux. The magnetic field intensity (H) is decided by MMF.

  Magneto-motive Force, **MMF = N*I***

  Units: Ampere Turns (**AT**)
- **Reluctance (S)**:It is opposition offered to the flow of magnetic flux by the magnetic material.

  Unit: **AT/Wb**

  Reluctance, S = l ÷ (μ x a)
- **Leakage Flux**:The part of the total magnetic flux which flows through the magnetic circuit is called useful magnetic flux. However, the magnetic flux which does not completely pass through the magnetic path, but partially passes through the air is called *leakage magnetic flux*.
- **Fringing**:The magnetic lines of force repel each other while passing through a non-magnetic material. Due to this when the flux lines cross the air gap, they tend to bulge outwards. This effect is known as *fringing*.

- Self Induced EMF:The EMF induced in a coil due to change of flux produced by it linking with its own turns is known as self-induced EMF.
- ***The property of the coil to oppose any change in current flowing through itself is known as self-inductance or inductance of the coil.***

  Self Inductance, $L = (N_2\mu_o\mu_r a) \div l$
- **The EMF induced in a coil due to the change of flux produced by another coil is called mutually induced EMF.**

  mutually induced EMF, $e_m \;\alpha\; - dI_1/dt$

The mutual inductance between the two coils may be defined as the property of the second coil due to which it opposes the change of current in the first coil. Expressions for mutual inductance are:

$M = (N_1N_2\mu_o\mu_{r1}a_1) \div l_1$

$M = (N_1N_2\mu_o\mu_{r2}a_2) \div l_2$

- **Coefficient of Coupling:The fraction of the magnetic flux produced by the current in the first coil that links with the second coil is called the coefficient of coupling (k) between the two coils.**

  Co-efficient of coupling, $k = M \div \sqrt{(L_1L_2)}$

- Dot convention is a technique, which gives the details about voltage polarity at the dotted terminal. This information is useful, while writing KVL equations.
  - If the current enters at the dotted terminal of one coil (or inductor), then it induces a voltage at another coil (or inductor), which is having **positive polarity** at the dotted terminal.
  - If the current leaves from the dotted terminal of one coil (or inductor), then it induces a voltage at another coil (or inductor), which is having **negative polarity** at the dotted terminal.
  - **equivalent inductance** of series combination of inductors are in aiddingLEq=L1+L2+2M
  - **equivalent inductance** of series combination of inductors are in oppose LEq=L1+L2−2M
  - **For parallel aidding** $LEq=L_1L_2-M^2/ L_1 +L_2 -2M$
  - **For parallel opposing** $LEq=L_1L_2-M^2/ L_1 +L_2 +2M$

I.SHORT ANSWER QUESTIONS[2M]

1) Define oriented graph and un oriented graph (May 11,14,Dec-18) 2M

2) Define Graph and a Tree for a planer graph network with example.(Dec-11,14,17,18) 3M
3) Define the Following i)planer Graph ii)non planer Graph iii)Co-Tree iv)Path (May-06,12)
4) Define the Following i)Twig ii)Links iii)loop iv)cut set (Dec-12)
5) Explain properties of a Tree (Dec-08,May-13) 3M
6) Define the Following i)Magnetic Flux (Aug-06,May-08) ii) Magnetic Flux Density(May-2004,Dec-09) iii)Magnetic field strength (May-08)iv) Permeability (May-09)
7) Define Reluctance and Fringing (May 04,Dec-04,07)
8) State Faraday's Laws of electromagnetic Induction (Dec-04,11,12,14) 3M.
9) Define Self Inductance & Mutual Inductance (May 06,12,Dec-3,10,13,18)2M
10) Define co efficient of coupling obtain the relation between Self Inductance , Mutual Inductance& co efficient of coupling. (May 07,Aug-18)2M
11) Explain dot convention(Dec-2018)
12) What is an ideal Transformer (Dec-2018)

II.LONG ANSWER QUESTIONS[5M]

1) Define cut set and Tie set and illustrate with example .(May-07,12,Dec-15,17,18) 5M
2) Explain the procedure to obtain Fundamental Tie set Matrix of a Given network.(May-12) 5M
3) Define and explain the following with example

a)Oriented graph b)Tree of a Graph c)Tie set and Basic Tie set d)Cut set and a basic cut set. (Dec-18) 10M

4) Clearly explain the following (Dec-18) 5M
a)Self Inductance b)Mutual inductance

5)What is an Electric circuit ? What is Magnetic circuit? Make a comparison between Electric circuit& Magnetic circuit. (Dec-17) 5M

6)Define composite magnetic circuit? Derive the Expression for Total Amp-Turns for a series Magnetic circuit. (Dec 15) 5M

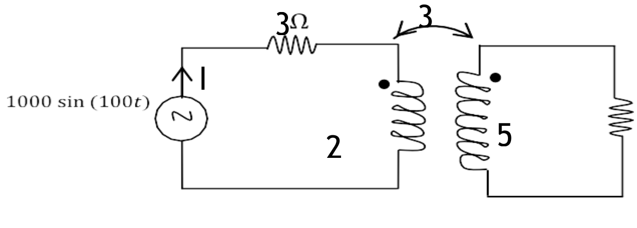
8) What is Ideal Transformer? Derive the expression for impedance. (May-12)5M

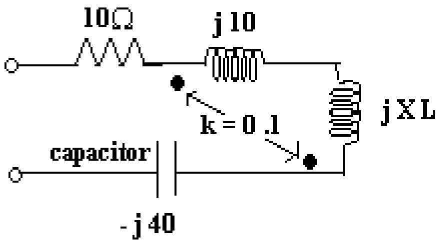
9)A) A Coil 1 of a pair of coupled coils has a continuous current of 5A, and the corresponding fluxes $\phi 11$ and $\phi 12$ are 0.2 and 0.4 mWb respectively. If the turns are N1 = 500 and N2 = 1500, find L1, L2, M and k. [Dec-17] 5M

B)An Iron ring of mean length 50 cms has an air gap of 1 mm and a winding of 200 turns. If the relative permeability of the Iron is 400, when a current of 1 Amp flows in the winding, determine the flux density Neglect leakage and fringing. [Dec-18] 5M

10a) In the following coupled circuit determine the current supplied by the source I. (June-16) 5M

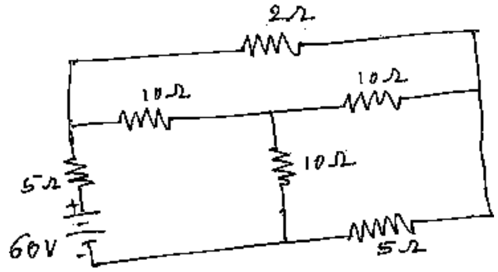
10 b) Find the value of XL in the coupled network shown in figure 1 for making it series resonant. (Dec-18) 5M



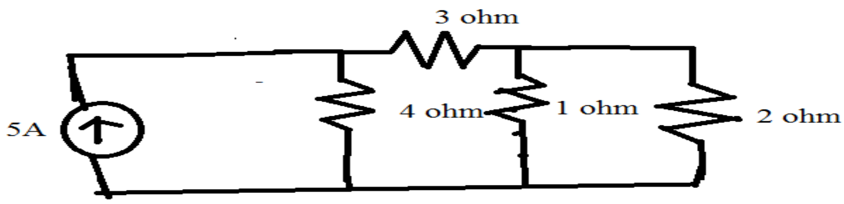


11a) Obtain tie-set schedule for the network shown in figure 2. (Dec-18) 5M

(b) b) For the network shown in Fig.3, obtain the fundamental cut-set matrix.



(Dec-15) 5M



12 a)Find the Tie set schedule for the given electrical network as shown in fig. units of resistances are ohms

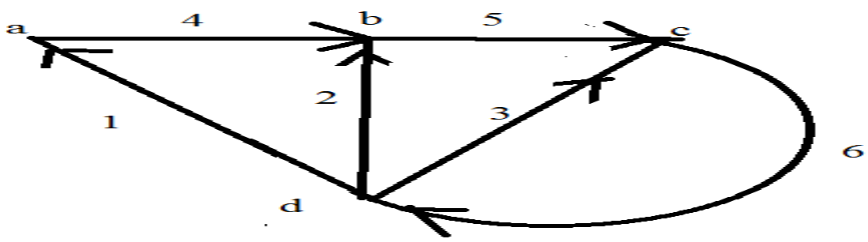
b)Two similar coils connected in series give a total inductance of 600mH and one of the coil is reversed, the total inductance is 300mH.Determine the mutual inductance between the coils and k. (May-12) 5M

13a) Two coupled coils with $L1=0.01H$,$L2=0.04H$ and $K=0.6$ can be connected in four Different ways such as series aiding, series opposing, parallel aiding and parallel opposing . Find its equivalent inductance in each case. (May-03,Dec-05) 5M

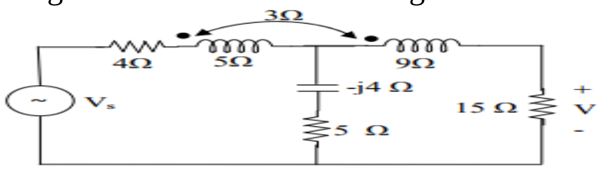
b) A coil of 500 turns is wound uniformly over a wooden ring having a meancircumference of 50 cm and a cross sectional area of 500 mm^2.If the current through the coil is 3A, calculate . (May-18) 5M

(i) The magnetic field strength(ii) The flux density and (iii) The total flux.

14a) For the graph shown in fig select a tree, obtain the tie-sets and cutest matrices.



b)Determine voltage V across a 15 ohms resistor in the magnetically coupled circuit shown in Figure 2. Take Vs = 30∠40 degrees.

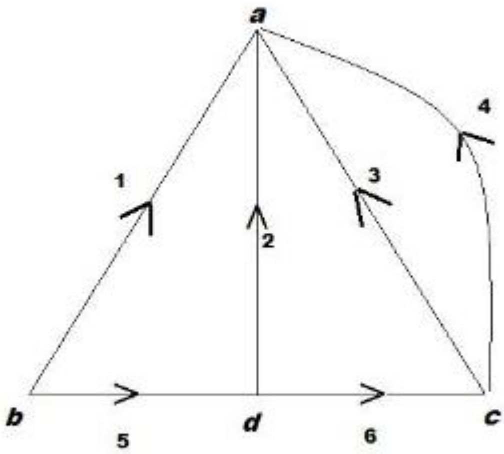


15) A magnetic circuit consists of an iron ring of mean circumference 80 cm with cross-sectional area of 12 cm2 throughout. A current of 2A in the magnetizing coil of 200 turns produce a total flux of 1.2 mwb in the iron. Calculate: i) the flux density in the iron ii) the absolute and relative permeability of iron. iii) the reluctance of the circuit. (Dec-16) 10M
16Two identical coupled coils have an equivalent inductance of 80 mH when connected series aiding and 35 mH in series opposing. Find L1, L2, M and K. (Aug-14) 5M
(b) Draw the oriented graph of a network with fundamental cut-set matrix as shown below: (Aug-14) 5M

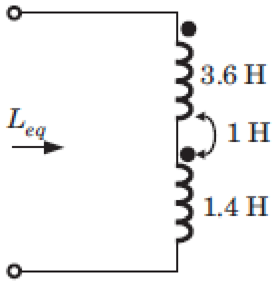
Twigs	Links
1 2 3 4	5 6 7
1 0 0 0	-1 0 0
0 1 0 0	1 0 1
0 0 1 0	0 1 1
0 0 0 1	0 1 0

CHOOSE THE CORRECT ANSWER

1. The current in a closed path in a loop is called?
a) loop current
b) branch current
c) link current
d) twig current
Answer: c
2. Tie-set is also called?
a) f loop
b) g loop
c) d loop
d) e loop
Answer: a
3. Consider the graph shown below. If a tree of the graph has branches 4, 5, 6, then one of the twigs will be?

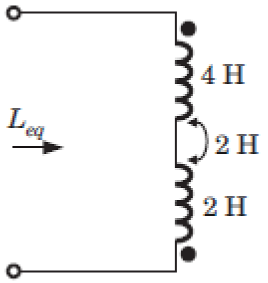


a) 1
b) 2
c) 3
d) 4
Answer: d
4. Consider the graph shown in the question 3 above. If a tree of the graph has branches 4, 5, 6, then one of the links will be?
a) 3
b) 4
c) 5
d) 6
Answer: a
5. The loop current direction of the basic loop formed from the tree of the graph is?
a) same as the direction of the branch current
b) opposite to the direction of the link current
c) same as the direction of the link current
d) opposite to the direction of the branch current
Answer: c
6. Leq = ?



a) 4 H
b) 6 H
c) 7 H
d) 0 H
Answer: c
Explanation: Leq = L1 + L2 – 2M.

7. Leq = ?



a) 2 H
b) 4 H
c) 6 H
d) 8 H
Answer: a
Explanation: Leq = L1 + L2 – 2M.

8. An air gap is usually inserted in a magnetic circuits to

A. Increase m.m.f.
B. Increase the flux
C. Prevent saturation
D. None of the above

Answer:C

9. Permeability in a magnetic circuit corresponds to ....in an electric circuit

A. Resistance
B. Resistivity
C. Conductivity
D. Conductance

Answer:C

10.The unit of Magnetic Flux…is ......weber…………..

UNIT 2
IMPORTANT POINTS

- **steady state response:**The behavior of voltage or current does not change with time is called steady state response
- **transient response:**The voltage or current are changed from one transient state to another transient state is called transient response.
- **natural response:**The response determined by the internal energy stored in the network is called natural response. It depends upon the type of elements, their size and the interconnection of elements. The response is independent of the source.
- **Transient**:The state (or condition) of the circuit from the transient of switching to attainment of steady state is called transient state or simply transient.

- **time constant of RL circuit.**:The time constant of RL circuit is defined as the ratio of inductance and resistance of the circuit.

(Or)

The time constant of RL circuit is defined as the time taken by the current through the inductance to reach 63.21%of its final steady state value.

- **Time constant of RC circuit:**The time constant of RC circuit is defined as the product of capacitance and resistance of the circuit.

(Or)

The time constant of RC circuit is defined as the time taken by the voltage across the capacitance to reach 63.21%of its final steady state value.

- **the final condition of the elements inductor and capacitor:**The capacitor acts as an open circuit and the inductor acts as a short circuit.
- **the initial condition of the elements capacitor and inductor :**The capacitor acts as a short circuit and the inductor acts as an open circuit.
- **damping ratio:**The ratio of resistance of the circuit and resistance for critical damping is called damping ratio.
- **Transient Response of RL series circuit :**

a)current through inductor $i(t)=\frac{V}{R}(1-e^{-\frac{R}{L}t})$ A

b)Voltage across inductor $V_L(t)=V e^{-\frac{R}{L}t}$ V

C) Voltage across Resister $V_R(t)=V(1-e^{-\frac{R}{L}t})$ V

D)Time constant $\tau=\frac{L}{R}$ sec

- **Transient Response of RL series circuit :**

a)current through capacitor $i(t)=\frac{V}{R}e^{-\frac{t}{RC}}$ A

B)Voltage across capacitor $V_C(t)=V(1- e^{-\frac{t}{RC}})$ V

C) Time constant $\tau=RC$ Sec

- **Series Resonance**

$f_0=\frac{1}{2\pi\sqrt{LC}}$ Hz

$w_0 =\frac{1}{\sqrt{LC}}$ Rad/sec

Z=R

I=V/Z

$Q_0= w_0L/R$

$f_1= f_0- \frac{R}{4\pi L}$

$f_2= f_0+ \frac{R}{4\pi L}$

BANDWIDTH= f_0/ Q_0

PARALLEL RESONANCE:

$f_0=\sqrt{\frac{1}{LC}-(\frac{R}{L})^2}$

$Q_0=\frac{1}{R}\sqrt{\frac{L}{C}}$

Dynamic Resistance $Z_r=1/(R_L C)$

Z= maximum.

I.SHORT ANSWER QUESTIONS[2M]

1. Define Steady state and Transient state response.
2. A)Define Impedance and reactance(Dec-10,18) b)power factor (Dec-10,14) 2M
3. Define Integrator and Differentiator for RC circuit 3M(dec-17)
4. What are the initial conditions of a network?(May-16).3M
5. Define Time constant and Quality Factor(Dec-14)2M
6. Define Damping factor and critical damping.(Dec-17)2M
7. What is resonance. Derive the condition for resonance in RLC series circuit.(Dec-18)3M
8. Define Band width and Half power Frequencies(Dec-13)2M
9. Define Dyanamic impedance (Dec-15)2M
10. What is S domain network (or)What is Transformed network.

II.LONG ANSWER QUESTIONS[5M]

1) Define Time constant. Derive the Expression for the response of current in RL series circuit with Dc excitation .
2) Define Time constant. Derive the Expression for the response of current in RL series circuit with Dc excitation .
3) Derive Transient response of series RLC circuit for DC excitation .Explain conditions for different types of roots of differential equation.
4) Deduce the formulae for the half power frequencies for a series RLC circuit under Resonance. Why are they called half power frequencies?
5) What is band width? Derive the expression for the band widthand its relation with quality factor and resonant frequency.
6) Derive the expression for the resonant frequency of a parallel RLC circuit.
7) Compare series and parallel resonant circuits.

8) Find the value of L so that the circuit shown in fig.2 resonates.

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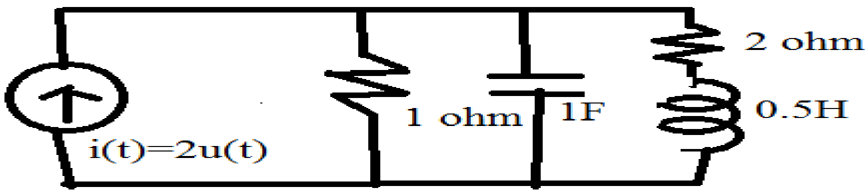
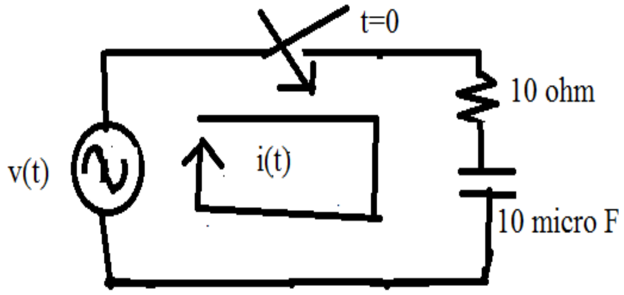
9)A series RLC circuit is connected across a variable frequency supply and has R=12 ohm,L=1mH&C=1000µF.Calculate i)Resonant Frequency ii)Quality Factor iii)f1 and f2 (Dec-18) 5M

10)An Impedance Z_1=10+10j Ω is connected in parallel with another Impedance of Resisstance 8.5 Ω and a variable Capacitance connected in series. Find C such that the circuit is in resonance at 5KHz. (Dec-17,Jan-10) 5M

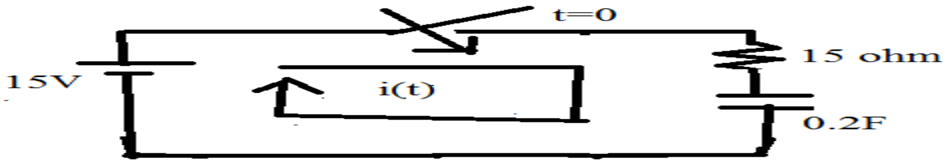
11)Determine $V_c(t)$ and $I_L(t)$ in the circuit shown in the Fig. Assume Zero initial conditions use Laplace Transform method (May-06) 8M



12)For the circuit shown in Fig, assuming Zero initial conditions Find i(t).The switch is closed at t=0.assume v(t)=30sine 400t. (May-12) 7M



13)A series RC circuit consists of R=15 Ω and C=0.2F as shown in fig. A constant voltage of 15V is applied at t=0.Obtain the current equation .determine voltage across R&C (Dec-12)8M



CHOOSE THE CORRECT ANSWER

1. The current in the R-L circuit at a time t = 0+ is?

a) V/R

b) R/V

c) V

d) R

Answer: a

Explanation: The capacitor never allows sudden changes in voltage, it will act as a short circuit at t = 0+. So the current in the circuit at t = 0+ is V/R.

2. The expression of current in R- C circuit is?

a) i=(V/R)exp(t/RC)

b) i=(V/R)exp(-t/RC)

c) i=(V/R)-exp(t/RC)

d) i=(V/R)-exp(-t/RC)

Answer: b

Explanation: The particular solution of the current equation is zero. So the expression of current in R- C circuit is i=(V/R)exp(-t/RC).

3. In an R-C circuit, when the switch is closed, the response ____________

a) do not vary with time

b) decays with time

c) rises with time

d) first increases and then decreases

Answer: b

Explanation: In a R-C circuit, when the switch is closed, the response decays with time that is the response V/R decreases with increase in time.

4. The time constant of an R-C circuit is?

a) RC

b) R/C

c) R

d) C

Answer: a

Explanation: The time constant of an R-C circuit is RC and it is denoted by τ and the value of τ in dc response of R-C circuit is RC sec.

5. After how many time constants, the transient part reaches more than 99 percent of its final value?

a) 2

b) 3

c) 4

d) 5

Answer: d

6. The expression of current in R- L circuit is?

a) i=(V/R)(1+exp((R/L)t))

b) i=-(V/R)(1-exp((R/L)t))

c) i=-(V/R)(1+exp((R/L)t))

d) i=(V/R)(1-exp((R/L)t))

View Answer

Answer: d

Explanation: The expression of current in R- L circuit is i = (V/R)-(V/R)exp((R/L)t). On solving we get i = (V/R)(1-exp((R/L)t)).

7. The steady state part in the expression of current in the R-L circuit is?

a) (V/R)(exp((R/L)t))

b) (V/R)(-exp((R/L)t))

c) V/R

d) R/V

View Answer

Answer: c

Explanation: The steady state part in the expression of current in the R-L circuit is steady state part = V/R. When the switch S is closed, the response reaches a steady state value after a time interval.

8 In the expression of current in the R-L circuit the transient part is?

a) R/V

b) (V/R)(-exp((R/L)t))

c) (V/R)(exp((R/L)t))

d) V/R

View Answer

Answer: b

Explanation: The expression of current in the R-L circuit has the transient part as (V/R)(-exp((R/L)t)). The transition period is defined as the time taken for the current to reach its final or steady state value from its initial value.

9 The value of the time constant in the R-L circuit is?

a) L/R

b) R/L

c) R

d) L

View Answer

Answer: a

Explanation: The time constant of a function $(V/R)e^{-(R/L)t}$ is the time at which the exponent of e is unity where e is the base of the natural logarithms. The term L / R is called the time constant and is denoted by 'τ'.

10. After how many time constants, the transient part reaches more than 99 percent of its final value?

a) 2

b) 3

c) 4

d) 5

View Answer

Answer: d

Explanation: After five time constants, the transient part of the response reaches more than 99 percent of its final value.

11 The driving point function is the ratio of polynomials in s. Polynomials are obtained from the __________ of the elements and their combinations.

a) transform voltage

b) transform current

c) transform impedance

d) transform admittance

View Answer

Answer: c

Explanation: The driving point function is the ratio of polynomials in s. Polynomials are obtained from the transform impedance of the elements and their combinations and if the zeros and poles are not repeated then the poles or zeros are said to be distinct or simple.

12. The pole is that finite value of S for which N (S) becomes __________

a) 0

b) 1

c) 2

d) ∞

View Answer

Answer: d

Explanation: The quantities P_1, P_2 … P_m are called poles of N (S) if N (S) = ∞ at those points. The pole is that finite value of S for which N (S) becomes infinity.

13. A function N (S) is said to have a pole (or zero) at infinity, if the function N (1/S) has a pole (or zero) at S = ?

a) ∞

b) 2

c) 0

d) 1

View Answer

Answer: c

Explanation: A function N (S) is said to have a pole (or zero) at infinity, if the function N (1/S) has a pole (or zero) at S = infinity. A zero or pole is said to be of multiplicity 'r' if $(S-Z)^r$ or $(S-P)^r$ is a factor of P(s) or Q(s).

14. The number of zeros including zeros at infinity is __________ the number of poles including poles at infinity.

a) greater than

b) equal to

c) less than

d) greater than or equal to

View Answer

Answer: b

Explanation: The number of zeros including zeros at infinity is equal to the number of poles including poles at infinity and it cannot be greater than or less than the number of poles including poles at infinity.

UNIT 3

IMPORTANT POINTS

ONE PORT NETWORK: it is a two terminal electrical network in which, current enters through one terminal and leaves through another terminal. Resistors, inductors and capacitors are the examples of one port network because each one has two terminals.

Two port network: it is a pair of two terminal electrical network in which, current enters through one terminal and leaves through another terminal of each port.

Driving point Impedance Function :$Z_{11}(S) = \frac{V1(S)}{I1(S)}$ $Z_{22}(S) = \frac{V2(S)}{I2(S)}$

Driving point AdmittanceFunction: $Y_{11}(S) = \frac{I1(S)}{V1(S)}$ $Y_{22}(S) = \frac{I2(S)}{V2(S)}$

Voltage Transfer Ratio :$G(S)= \frac{V2(S)}{V1(S)}$

Z parameters are also known as impedance parameters. When we use Z parameter for analyzing two part network, the voltages are represented as the function of currents

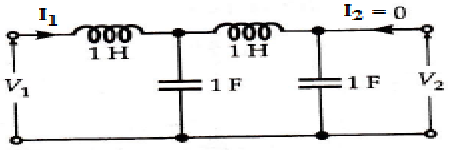
Y parameters are also called as short circuit parameters.

I.SHORT ANSWER QUESTIONS[2M]

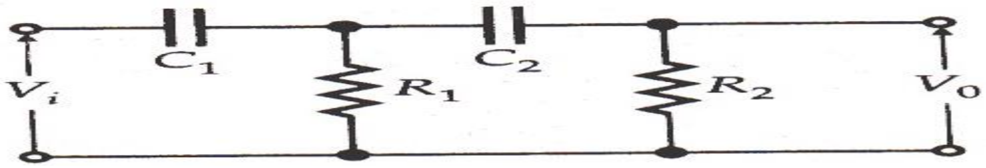
1)A function is given by$Z(S)=\frac{2S}{S2+16}$. Draw its pole –zero plot. [2M] (May-15)
2) List the conditions for location of poles and zeros of driving point functions. [3M] (May-15)
3)Define One Port and Two-port network. [2] (Dec-18)
4)Define characteristic impedance& Propagation constant? (Dec-17)
5) Why Z parameters are called open circuit parameters?
6) Why Y parameters are called open circuit parameters?
7)Define ABCD parameters.what are the applications of ABCD parameters.
8) Define image and iterative impedance (Dec-17)
9)Define attenuaters.write its types
10) Draw and explain T section network. (Dec-17)
11)What is a driving point in transfer function? Explain. (Dec-18)
12) Define poles and zeros in a transfer function. (Dec-18)

II.LONG ANSWER QUESTIONS

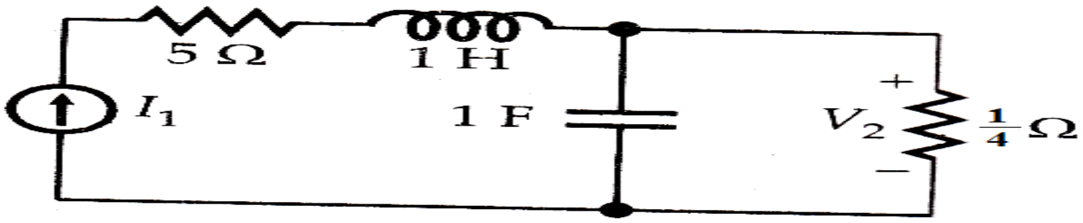
1)What is the driving point and transfer impedance of the network shown figure below? [10] (May-15,Dec-11)



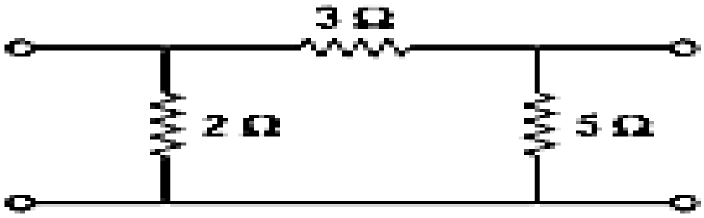
2)A)Find the expression for voltage transformation ratio for the network shown figure below. (May-15)



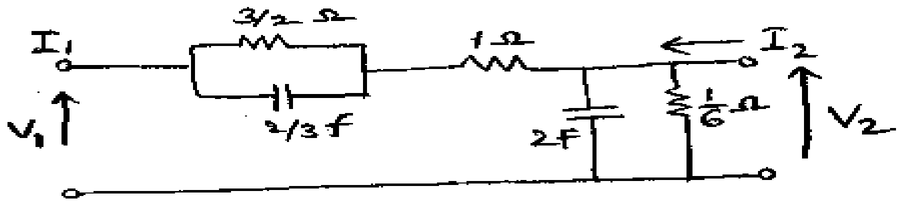
b)Find the pole- zero plots of the driving point and transfer impedances of the network shown figure 11 below. 5M (May-15)



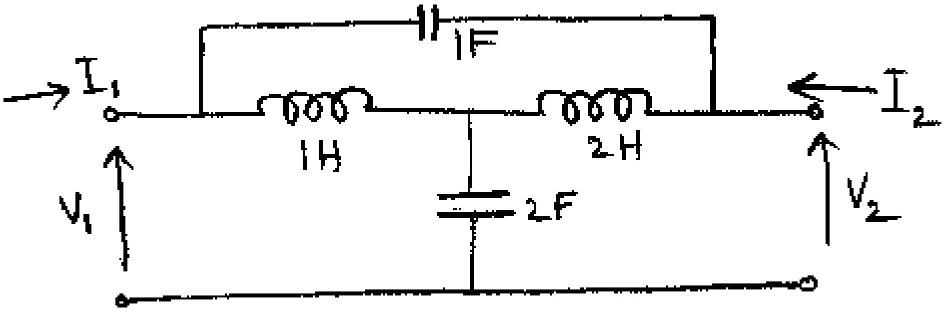
3 a)Determine the *h* parameters for the circuit shown figure below. 5M (May-15)



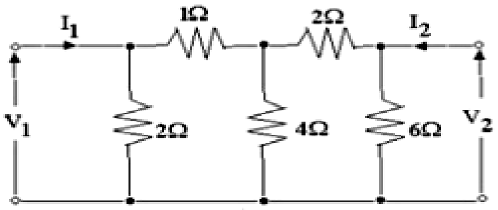
3b)Explain different types network functions as applied to single port and two port network. Obtain Y12 of the given network shown in figure (Dec-18) 5M



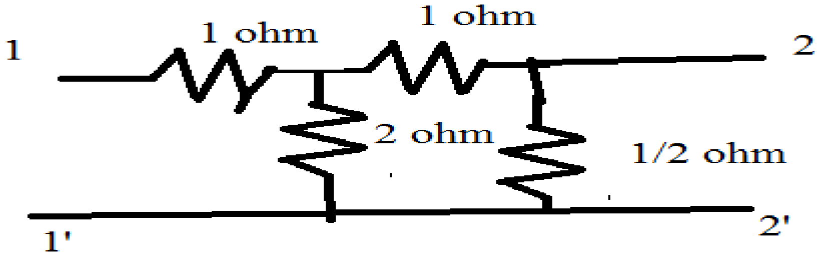
4 a)Find driving point impedances Z11 and Z22 transfer impedances Z21 and Z12 for the network shown in figure (Dec-18) 5M



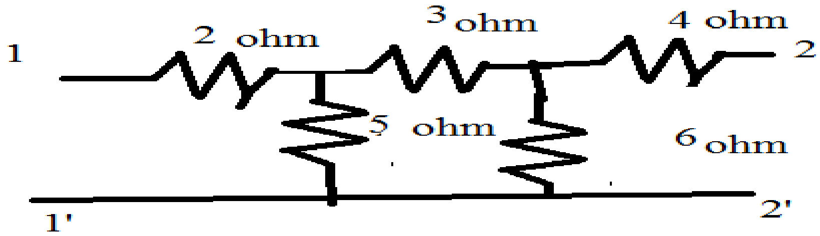
b)Find the Y-parameters for the circuit shown in figure [10] (Dec-17)



5 a)Find the Y and Z parameters of the following two port resistive network. Verify the relation between them. (June-16) 10M



b)Find ABCD Parameters for the network shown in fig (May-12,05,Dec-4,5,09) 8M



6a)Define various network functions of the two port network. What is mean by Driving point and Transfer functions.(May-04,06,13,Dec-3,7,18) 5M

b) List nessesory conditions for Driving point function (May-3,12,13,15,Dec-5,10,14) 5M

7a)Derive the characteristic impedance of symmetrical T network in terms of i)series and shunt impedances ii)open circuit and short circuit impedances. (Dec-11) 7M

b) Derive the characteristic impedance of symmetrical π network in terms of i)series and shunt impedances ii)open circuit and short circuit impedances. (May-07,13) 7M

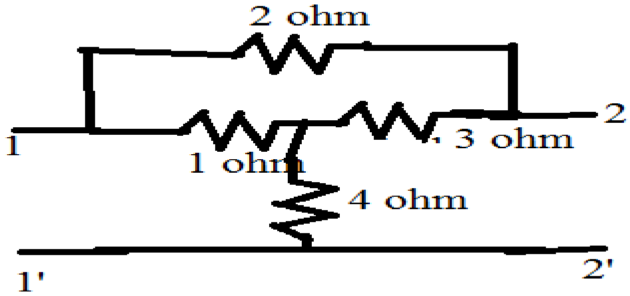
8a)Explain the concept of image and iterative impedances for L sections and define image transfer constant. (Dec-17,18) 5M

b)What is attenuator? Design T and π type attenuators..

9) a)Derive the z parameters and also draw equivalent circuit.

b)Derive the h parameters and also draw equivalent circuit.

10) a)Find the Z parameters for the given circuit.(May-04,05,12,Dec-05,07) 8M



10b)A symmetrical T-section has an inductance of 0.47H in each series arm and a 300 μF capacitor in the shunt arm. i) Find the characteristic impedance at frequencies of 50 Hz and

100 Hz. ii) If the T-section is terminated in the characteristic impedance, find the ratio of load current to input current at both the frequencies. (Dec-18) 5M

11a) Given a series RLC circuit with R = 100 ohms, L = 0.5 H and C = 40 μF, Calculate the resonant, lower and upper half – power frequencies. (Dec-18) 5M

b) Explain clearly the following terms: a) Propagation constant and characteristic impedance b) Attenuation constant.

CHOOSE THE CORRECT ANSWER

1) Which among the following represents the precise condition of reciprocity for transmission parameters?

a. AB - CD = 1

b. AD – BC = 1

c. AC – BD = 1

d. None of the above

ANSWER: AD – BC = 1

2) Which is the correct condition of symmetry observed in z-parameters?

a. $z_{11} = z_{22}$

b. $z_{11} = z_{12}$

c. $z_{12} = z_{22}$

d. $z_{12} = z_{21}$

ANSWER: $z_{11} = z_{22}$

3) An open circuit reverse voltage gain in h-parameters is a unitless quantity and generally equiva to _________

a. V_1 / I_1 (keeping $V_2 = 0$)

b. I_2 / I_1 (keeping $V_2 = 0$)

c. V_1 / V_2 (keeping $I_1 = 0$)

d. I_2 / V_2 (keeping $I_1 = 0$)

ANSWER: V_1 / V_2 (keeping $I_1 = 0$)

4) How is the short circuit reverse transfer admittance (y_{12}) calculated in terms of current and volt

a. V_2 / I_1 (keeping $I_2 = 0$)

b. I_2 / V_1 (keeping $V_2 = 0$)

c. I_1/V_2 (keeping $V_1 = 0$)

d. V_1/I_2 (keeping $I_1 = 0$)

ANSWER: I_1/V_2 (keeping $V_1 = 0$)

5) Which among the following is regarded as short circuit forward transfer admittance?

a. y_{11}

b. y_{12}

c. y_{21}

d. y_{22}

ANSWER: y_{21}

6) Which elements act as an independent variables in Y-parameters?

a. Current

b. Voltage

c. Both a and b

d. None of the above

ANSWER: Voltage

7)The expression of the characteristic impedance of a symmetrical T-section is?
a) $Z_{OT}=\sqrt{(Z_1^2/4-Z_1Z_2)}$
b) $Z_{OT}=\sqrt{(Z_1^2/4+Z_1)}$
c) $Z_{OT}=\sqrt{(Z_1^2/4+Z_2)}$
d) $Z_{OT}=\sqrt{(Z_1^2/4+Z_1Z_2)}$
Answer: d
Explanation: For a T-section, the value of input impedance when it is terminated in Z_o is $Z_{in}=(Z_1/2)+(Z_2((Z_1/2)+Z_o))/((Z_1/2)+Z_2+Z_o)$ and $Z_{in}=Z_o$. On solving, the expression of the characteristic impedance of a symmetrical T-section is $Z_{OT}=\sqrt{(Z_1^2/4+Z_1Z_2)}$.

8. The expression of the open circuit impedance Z_{oc} is?
a) $Z_{oc}=Z_1/2+Z_2$
b) $Z_{oc}=Z_2/2+Z_2$
c) $Z_{oc}=Z_1/2+Z_1$
d) $Z_{oc}=Z_1/2-Z_2$
Answer: a
Explanation: On open circuiting the port 2 of T-section, we get the expression of the open circuit impedance Z_{oc} as $Z_{oc}=Z_1/2+Z_2$.

9 The expression of short circuit impedance Z_{sc} is?
a) $Z_{sc}=(Z_1^2-4Z_1Z_2)/(2Z_1-4Z_2)$
b) $Z_{sc}=(Z_1^2+4Z_1Z_2)/(2Z_1+4Z_2)$
c) $Z_{sc}=(Z_1^2-4Z_1Z_2)/(2Z_1+4Z_2)$
d) $Z_{sc}=(Z_1^2+4Z_1Z_2)/(2Z_1-4Z_2)$
Answer: b
Explanation: On short circuiting the port 2 of T-section, we get the expression of short circuit impedance Z_{sc} as $Z_{sc}=(Z_1/2)+((Z_1/2)xZ_2)/((Z_1/2)+Z_2)$. On solving we get $Z_{sc}=(Z_1^2+4Z_1Z_2)/(2Z_1+4Z_2)$.

10. The relation between Z_{OT}, Z_{oc}, Z_{sc} is?
a) $Z_{OT}=\sqrt{Z_{oc}Z_{sc}}$
b) $Z_{oc}=\sqrt{(Z_{OT} Z_{sc})}$
c) $Z_{sc}=\sqrt{(Z_{OT} Z_{oc})}$
d) $Z_{oc}=\sqrt{(Z_{OT} Z_{oc})}$
Answer: a
Explanation: $Z_{oc}=Z_1/2+Z_2$ and $Z_{sc}=(Z_1^2+4Z_1Z_2)/(2Z_1+4Z_2)$ => $Z_{oc}xZ_{sc}=Z_1Z_2+Z_1^2/4 =Z_o^2T$.
The relation between Z_{OT}, Z_{oc}, Z_{sc} is $Z_{OT}=\sqrt{Z_{oc}Z_{sc}}$.

Unit 4(DIGITAL MODULATION TECHNIQUES)

IMPORTANT POINTS

I.SHORT ANSWER QUESTIONS[2M]

II.LONG ANSWER QUESTIONS[5M]

CHOOSE THE CORRECT ANSWER

UNIT 5

IMPORTANT POINTS

SHORT ANSWER QUESTIONS [2M]

LONG ANSWER QUESTIONS[5M]

CHOOSE THE CORRECT ANSWER