MUTHAYAMMAL ENGINEERING COLLEGE

(An Autonomous Institution)

(Approved by AICTE, New Delhi, Accredited by NAAC & Affiliated to Anna University)
Rasipuram - 637 408, Namakkal Dist., Tamil Nadu.

Department of Electronics and Communication Engineering
Question Bank - Academic Year (2021-22)

Course Code & Course Name : 19ECC01& Electric Network Analysis And Machines

Name of the Faculty : Ms.K.Shenbagadevi,AP/ECE

Year/Sem/Sec : II/III/A,B,C

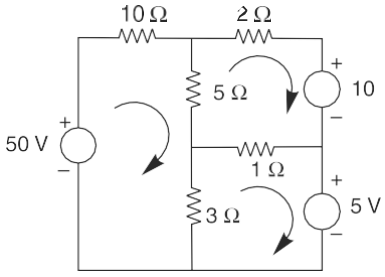
Unit-I: THEOREMS AND DC TRANSIENT ANALYSIS

Part-A (2 Marks)

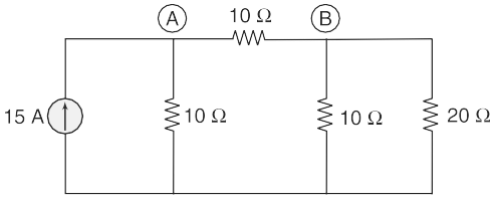
1. State and explain Kirchhoff's laws.
2. State the voltage division principle for two resistors in series and the current division principle for two resistors in parallel
3. State Thevenin's theorem..
4. State the superposition theorem.
5. State Norton's theorem
6. What is the reciprocity theorem?
7. What is the time constant of an RL circuit with R = 10 ohms and L = 20 mH?
8. What is the time constant for RL and RC circuit?
9. What IS mean by forced response?
10. What is natural response?

Part-B (16 Marks)

1.(i) Using mesh analysis, determine the current through the 1ohm resistor in the circuit shown in Fig (8)



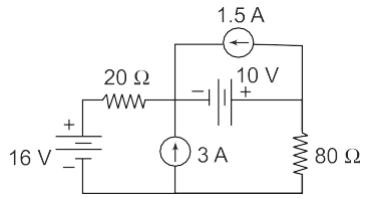
(ii) Determine the voltage at each node of the circuit shown in Fig (8)



2.(i) Write down the condition for critically damped response of a series RLC circuit excited by a dc source. (8)

(ii) Derive the step responses of RL and RC circuit. Compare their performances. (8)

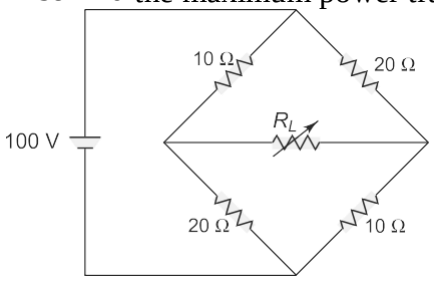
3.(i). Determine the voltage across the 20ohm resistance in the circuit shown in Fig, using the superposition theorem. (8)



(ii). Derive the transient response of a series R-L circuit with dc input. Sketch the variation of current and of the voltage across the inductor. (8)

4. State and prove Thevenin's theorem and norton's theorem. Show with an example how theorem can be usefully employed in circuit analysis. (16)

5. For the circuit shown in Fig. determine the value of R_L to get the maximum power. Also find the maximum power transferred to the load. (16)



Unit-II : SINUSOIDAL AND STEADY STATE POWER ANALYSIS

Part-A (2 Marks)

1. What is mean by sinusoidal function?
2. Define steady state analysis.
3. Define Power Factor.
4. Define Average Power.
5. What is RMS value?
6. Define mutual inductance.
7. Define self inductance
8. What is dot convention in coupled circuit?
9. What is mean by Coefficient of Coupling?
10. What is mean by phasor?

Part-B (16 Marks)

1.(i) Derive the Characteristic Equation of Steady State Analysis (8)

(ii) Derive the expression for the complete solution of the current response of Sinusoidal RC series circuit with an excitation of V cos(t + f). Briefly explain the significance of phase angle in the solution. (8)

2.(i) Write down the condition for critically damped response of a series RLC circuit excited by a sinusoidal ac source. (8)

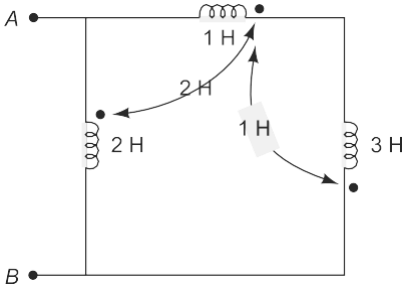
(ii) An alternating current varying sinusoidally, with a frequency of 50 Hz has an rms value of 20A. Write down the equation for the instantaneous value and find this value at (a) 0.0025 s, and (b) 0.0125 s after passing through a positive maximum value. At what time, measured from a positive maximum value, will the instantaneous current be 14.14 A? (8)

3.(i) A sine wave of v(t) 5 200 sin 50 t is applied to a 10 V resistor in series with a coil. The reading of a voltmeter across the resistor is 120 V and across the coil, 75 V. Calculate the power and reactive volt-amperes in the coil and the power factor of the circuit. (8)

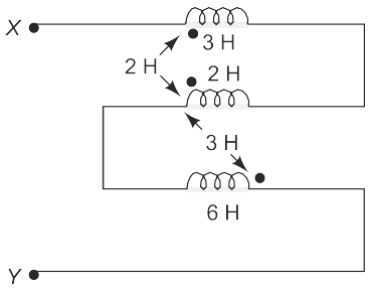
(ii) Application of network theorems. (8)

4.(i) Derive the expression of phase relation in a pure inductor and pure capacitor (8)

(ii) Calculate the effective inductance of the circuit shown in Fig. (8)



5.(i) Calculate the effective inductance of the circuit shown in Fig. Across XY. (8)



(ii) Derive the expression for coefficient of coupling in terms of mutual and self inductance of the coils. (8)

Unit-III : APPLICATION OF LAPLACE TRANSFORM TO CIRCUIT ANALYSIS

Part-A (2 Marks)

1. Draw the pole zero diagram for the given network function.

$$V(s) = \frac{4s}{(s+2)(s+3)}$$

2. Why do we use Laplace transform in circuit analysis?
3. Define initial and final value theorem.
4. Define Transfer function.
5. What are the applications of Laplace Transforms?
6. Define the following of S- Domain.

   a) Impedance. b) Admittance
7. What is Inverse Laplace Transform?

8. What is the application of Mesh Analysis?

9. What is the Application of Nodal Analysis?

10. Define Poles and Zeroes.

Part-B (16 Marks)

1. Determine the inverse transform of the following. (16)

$(a) \quad \frac{5s+4}{(s-1)(s^2+2s+5)} \quad (b) \quad \frac{4s+2}{s^2+2s+5}$

2.(i) Explain the Laplace transformation method. Find Laplace transforms of unit step. (8)

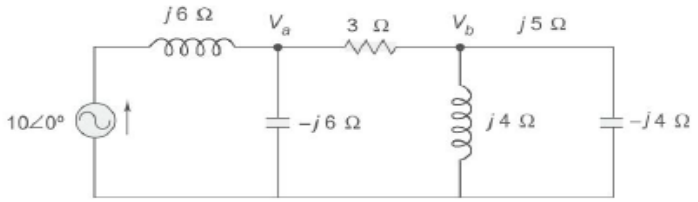
(ii) Find the Laplace transform of the function. (8)

$$f(t) = \frac{2-2e^{-2t}}{t}$$

3. Concept of Poles,Zeros of networks function. (16)

4. Obtain the S – Domain equivqlent circuit diagram of an inductor and capacitor with initial conditions. (16)

5.(i) Using nodal analysis find voltage V1 and V2 for the circuit shown in Fig. (8)



(ii) Concept of Transfer function of networks (8)

Unit-IV : NETWORK TOPOLOGY AND TWO PORT NETWORK

Part-A (2 Marks)

1. Characteristics of Parallel Resonance and its applications.

2. Define Q-factor.

3. What is an incidence matrix?

4. Define Resonant frequency.

5. Define Bandwidth.

6. What are advantages and disadvantages of serial resonance?

7. What are advantages and disadvantages of parallel resonance?

8. What is Q-Factor of parallel resonance?

9. Define

(a)h- parameter (b) g- parameter

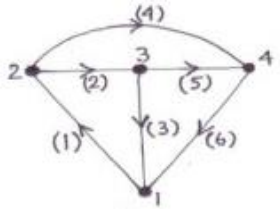
10. What are the transmission parameters in terms of Z-parameters?

Part-B (16 Marks)

1. Discuss the condition of resonance for parallel resonance. (16)

2.(i) The impedance parameters of a two-port network is Z11=4Ω; Z22=5Ω; Z12= 6Ω; Z21=6Ω. Compute the Y-parameters and ABCD- parameters and write the describing equations. (8)

(ii) Determine the tie-set and cut-set matrices for the directed graph as in fig. (8)



3.(i) Derive the expression for bandwidth of a series resonant circuit. (8)

(ii) Discuss the applications and characteristics of Series Resonance (8)

4. Drive Z and Y parameter of a two port network and also draw equivalent circuit. (16)

5. A Series RLC circuit with R=5ohm,L=0.03H and C=100 microfarads is excited by a 20V AC source. Find the Resonant frequency, Half-Power frequencies, Bandwidth, Q-factor, Impedance at resonance, voltage across L&C at resonance, Frequency at which voltage across I&C are more. (16)

Unit-V : ELECTRIC MACHINES

Part-A (2 Marks)

1. What is transformer?
2. List of the applications of synchronous machine.
3. A transformer has a primary coil with 1700 loops and s secondary coil with 1900 loops. If the current in the primary coil is 7 Ampere, the what is the current in the secondary coil
4. What is application of Induction Motor?
5. Characteristics of DC motor.
6. What are advantages of Transformer?
7. Characteristics of Induction Motor.
8. What is the EMF equation of transformer?
9. Characteristics of synchronous machine.
10. Define ideal transformer.

Part-B (16 Marks)

1. Construction and operational features of DC machines. (16)
2. Describe the construction and working principle of induction motor. (16)
3. Explain the principal of operation of a transformer. What are its applications? (16)
4. Describe the construction and working principle of synchronous machine. (16)

5.(i). EMF equations of Ideal Transformer. (8)

(ii) Advantages and application of DC machines (8)

Course Faculty **HoD**