SNS COLLEGE OF TECHNOLOGY

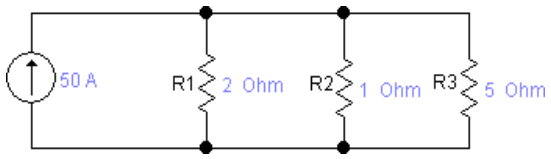
DEPARTMENT OF BIOMEDICAL ENGINEERING

23BMT201 - CIRCUIT ANALYSIS QUESTION BANK

PART A

UNIT-1:

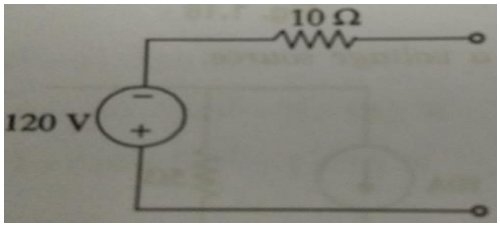
1. State Ohm's law.
2. State Kirchoff's voltage law and current law.
3. Examine the current drawn by a lamp rated at 250V,40W connected to a supply of 230V.
4. Evaluate the current through the resistor R_3 in the circuitgiven below:



5. 20 lamps are connected in series and has a resistance of 25Ω. Determine the total resistance of the set of lamps andhence the current taken from a supply of 230V.
6. Estimate the power delivered and the current I, if a 25Ω resistance has a voltage of 150V.
7. The resistances 1.5Ω and 3.5Ω are connected in parallel and this parallel combination is connected in series with a resistance of 1.95Ω . Calculate the equivalent resistance value.
8. Two resistors 3Ω and 6Ω are connected in parallel. If total current is 12A. Find the current through each resistor.
9. Distinguish between mesh and loop of a circuit.
10. Write the formula to find the equivalent resistance offered by 'N' number of arbitrary valued resistors connected in series.
11. Define linear and bilateral networks.
12. Define peak factor and form factor of an alternating waveform.
13. Illustrate the power triangle with a Phasor diagram.
14. Define power factor.
15. Define Power and Energy.
16. Differentiate ideal and practical voltage source.
17. Define active and passive elements.

UNIT 2:

1. State current division and voltage division rule.
2. Define Superposition theorem.
3. State Thevenin's and Nortan's theorem.
4. Show that how to find the V_{oc} and R_{th} in Thevenin's theorem?
5. Infer the Maximum power transfer theorem.
6. How will you convert the current source to voltage source?
7. Convert the voltage source into current source.



8. Compose the expression for star to delta transformation.
9. How will you transform a set of identical resistors connected in Δ to Y.
10. Define Reciprocity theorem and give its limitations.

UNIT 3:

1. What are the Advantages of 3 phase system?
2. Write the relationship of line values and phase values in star connection system.
3. Write the relationship of line values and phase values in delta connection system.
4. Draw the Phasor diagram of delta connection system.
5. Differentiate balanced and unbalanced load in a three phase system.
6. Define phase sequence of a three phase system.
7. Define apparent power, real power and reactive power.
8. Draw the power triangle of a three phase system.
9. Write the expression for three phase power.
10. Mention the types of unbalanced load.

UNIT 4:

1. Differentiate forced and natural response.
2. What is a transient and when it occurs in electric circuits.
3. Define time constant of RL circuit.
4. Define time constant of RC circuit.
5. Sketch the transient current and voltage of RL circuit.
6. Voltage across capacitor cannot change instantaneously. Justify.
7. Determine the time constant of RL circuit having R=10 Ω and L=0.1mH.
8. How does a capacitor act at t=0+ and t=∞?
9. How does a inductor act at t=0+ and t=∞?
10. Define steady state response of a system.

UNIT 5:

1. Define Quality factor.
2. Show the variation of impedance with frequency in a series RLC circuit.

3. Determine the resonant frequency of the RLC circuit with R=10O, L=0.5 mH and C = 10uF.
4. Define resonance. What is the condition for resonance for an RLC series circuit?
5. Derive the expression for resonant frequency.
6. Define resonant frequency.
7. Define bandwidth.
8. A RLC circuit has R=100Ω, L=100mH and C=10μF. The Q factor of the circuit is?

PART B

UNIT 1:

1. Explain the Kirchhoff's voltage law and current law in detail with necessary example.
2. Explain the concept of average power and apparent power with suitable equations.
3. Determine the average value and RMS value of sine wave with necessary equations.
4. Problems in mesh and nodal analysis.
5. Explain the series and parallel connection of resistors with suitable equations.

UNIT 2:

1. Explain the procedure to convert star connected network to delta network.
2. Explain with necessary equations the source conversion techniques in electric networks.
3. Describe current division and voltage division rule with suitable examples.
4. Simple problems in all network theorems.
5. Simple problems in star to delta and delta to star conversion.

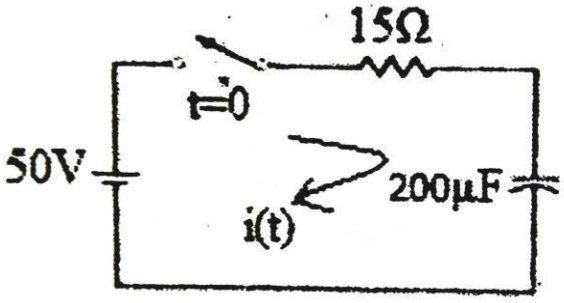
UNIT 3:

1. For a three phase balanced, star connected source obtain
    - Current relationship
    - Voltage relationship
    - Power relationship
    - Phasor diagram
2. Derive the voltage and current relations for a balanced star connected load and balanced delta connected load.
3. With a help of Phasor diagrams, explain the analysis of 3-phase 4 wire star and delta connected loads.
4. Discuss the power measurement of three phase circuit using two wattmeter method.
5. Simple problems in three phase circuits.

UNIT 4:

1. Formulate the expression for the current responses of RLC series circuit with sinusoidal excitation. Assume that the circuits are working in critical damping condition.

2. A series RL circuit with R=100Ω and L=20H has a DC voltage of 200V applied through a switch at t=0. Find (a) The equation for the current and voltage across different elements. (b) The current at t= 0.5sec and 1sec.
3. In a series RLC circuit R=300Ω, L=1H and C=100μF has a constant voltage of 50V applied at t=0. Find the maximum current value. Assume zero initial conditions.
4. In the circuit shown, point out the transient current after switch is closed at time t=0, given that an initial charge of 100μC is stored in the capacitor. Examine the necessary equations



5. Develop an expression for transient current, voltages and energy stored in a capacitor of a RC transient circuit excited by a DC source.
6. Develop an expression for transient current and voltages of a RLC transient circuit excited by a DC source.

UNIT 5:

1. Explain and derive the relationships for bandwidth and half power frequencies of a series RLC circuit.
2. Derive the expression to obtain the frequency of parallel resonance.
3. A resistance of 10 ohms, 10mH and 1 microfarad capacitor are in series and connected to a supply voltage of 200V. Calculate the resonance frequency, voltage across the elements at resonance, Q factor and bandwidth.
4. Discuss in details regarding the tank circuit and its applications.
5. Simple problems in resonance.