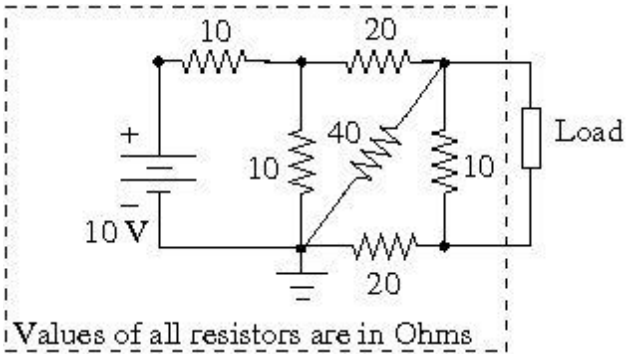
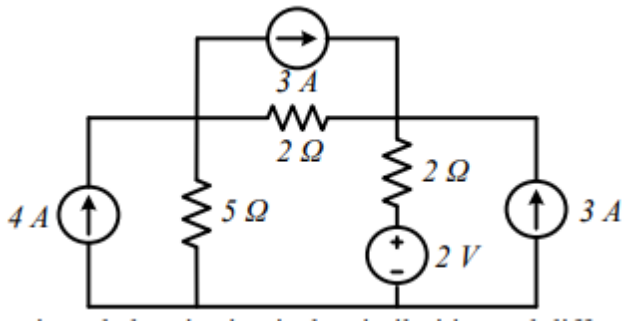
CHAPTER – DC CIRCUITS

1. Define the following terns: (a) Current (b) Electric Potential (c) Potential Difference (e) Energy (f) Power (g) temperature coefficient of resistance.
2. What is Resistance and specific Resistance? Explain the factors affecting the Resistance.
3. Derive the expression for the equivalent resistance of a number of resistance connected in series and parallel. What are the advantages and disadvantages of series and parallel circuit?
4. Write a short note on Ohm's law ? State and Explain Kirchhoff's laws.
5. Explain the method of transforming a delta connected network in a star network and vice versa.
6. Derive the expression for the voltage across the capacitors at any instant the application of dc voltage V to a circuit having a capacitance C in series with resistance R.
7. With reference to electrostatics and capacitance: (1) State Coulomb‟s law (2) Define: (a) Electric filed intensity, (b) electric potential, (c) potential gradient, (d) Permittivity, (e) capacitance.
8. Obtain the values of Norton Equivalent current and Norton's equivalent resistance for the following network:



9. Find the current flowing through 5Ω resistor of the following figure using Mesh analysis.



CHAPTER – AC CIRCUITS

Theory:-

1. Define (a) form factor (b) peak factor. Obtain the rms value and average of half wave rectified sinusoidal voltage wave.
2. Discuss resonance in R-L-C series circuit. Explain how power factor, X_L and R vary with frequency.
3. Define power factor. What is the power factor of a pure inductor of a pure inductor? Give the difference between active and reactive power.
4. Define the following (a) Frequency (b) Phase and Phase difference (c) Time period (d) form factor (e) R.M.S. value (f) Average value.
5. Prove that in a purely capacitive circuit power consumed is zero when a.c. voltage is applied. Draw relevant phasor diagram and waveforms.
6. An inductive coil of resistance R and inductance L is connected in parallel with a capacitor of C. Derive an expression for resonant frequency and Q factor.
7. Explain the phenomenon of generation of Alternating voltages and currents and derive the expression for it with suitable diagrams.
8. Prove that power consumed by purely inductive or capacitive circuit is zero.
9. Prove that current in purely capacitive circuit leads its voltage by 90˚ and average power consumption in pure capacitor is zero.
10. Derive the relation between phase and line values of voltage and currents in case of 3-phase (a) star (b) delta connection.
11. Explain the method of measuring 3-Ø power by two watt meters.
12. Prove that power in a 3-phase balanced circuit can be deduced from the readings of two watt meters. Draw the relevant connection and phasor diagrams. Discuss the nature of power factor (a) when two readings are equal and positive (b) when two readings are equal but opposite in sign (c) when one wattmeter reads zero.

13. A balanced three phase supply is given to a star connected to load. Give proof of two wattmeter method for this system. State demerits of these methods.
14. Derive an expression for total power for a balanced 3 phase star OR delta connected load in terms of line voltage, line current and power factor.

Examples:-

1. Three currents are represented by I1 = 10 sin ωt; I2 = 20 sin (ωt-π/6); I3 = 30 sin (ωt + π/4). Find magnitude and phase angle of resultant current.
2. A certain waveform has a form factor of 1.2 and a peak factor of 1.5. If the maximum value is 100, find rms value and average value.
3. Two branches numbered '1' and '2' having impedances of 3+j4Ω and 3-j4Ω respectively are connected to a 230 volt, 50 Hz rms source. Find out:

   (a) The total current drawn from the source.
   (b) Power factor of that current.
   (c) Draw the phasor diagram for I1, I2 and total current and supply voltage.
4. A series RLC circuit is having resistance of 8, inductance of 80 mH and capacitance of 100 F is connected across 150 V, 50 Hz supply (as shown in figure). Calculate (a) the current, (b) the power factor and (c) the voltage drops in the coil and capacitance.

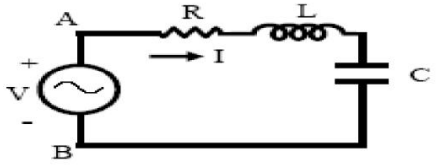


FIG 2

5. The circuit having two impedances Z1 = 8 + j15 and Z2 = 6 – j8 in parallel, is connected to a single phase as supply and current drawn is 10 A. Find each branch current, both in magnitude and phase also the supply voltage.

CHAPTER – TRANSFORMER AND ELECTRICAL MACHINES

1. Explain working principle of transformer in detail and also derive E.M.F. equation of transformer.
2. What do you mean by an ideal transformer and derive emf equation of a single phase transformer. Also define Transformation Ratio.
3. Explain the various losses taking place in a transformer & Derive the equation for its maximum efficiency. Also define All Day Efficiency.
4. Write & Explain the condition of parallel operation of 3-phase transformer.
5. Describe an auto transformer including its points such as definition, comparision with two winding transformer, saving of copper and its applications.
6. Write advantages and applications of auto transformer.
7. Explain how rotating magnetic field is produced in 3-phase induction motor.
8. What is slip of a 3-phase induction motor? Discuss its slip-torque characteristics.
9. Discuss types of 3-phase induction motor based on rotor construction and explain its working.
10. Explain the working principle of synchronous machine and derive the relation between electrical and mechanical angle.
11. Define and state the expressions for (i) Pitch factor (ii) Distribution factor
12. Explain the Various types of cooling method in rotating machine.
13. Derive equation of emf for an alternator.
14. Give Comparison between Synchronous and Induction Motors.
15. Define salient pole and non-salient pole machines. Why is armature winding of a synchronous machine stationary?
16. State the different types of d.c. generators and state the applications of each type.
17. Explain construction and working principle of d.c machine.

18. Differentiate between self-excited and separately-excited dc machines. Draw the load characteristic of dc shunt and series generator.
19. Explain working principle of d.c. motor. Derive the condition for maximum Power.
20. Draw schematic diagram of a dc machine with labels. State the functions of (i) pole shoe, (ii) commutator and (iii) yoke.

CHAPTER – Electrical Installations

1. What is the function of fuse in an electrical circuit? State the desirable properties of fuse element.
2. Give the circuit diagram of ELCB. Explain its working in brief.
3. What is earthing? Explain requirement of earthing for any electrical equipment.
4. List various protective devices used in the electric circuits and compare working of ELCB with MCB.
5. Explain the working of a miniature circuit breaker.
6. Give the comparison between fuse and MCB with regard to protection in wiring installation.
7. What is the importance of earthing in electrical laboratory?
8. Explain working of ELCB & MCB.
9. What is an electric shock? Why grounding is required?
10. State and Explain plate and pipe earthing with neat diagram.
11. What is protective relay? How does it provide protection to faulty equipment?
12. Write a short note on Electromagnetic Attraction Relay.
13. Explain the following methods of charging a battery (a) Constant current method (b) Constant voltage method.
14. What is battery? Explain the construction and working of any one.
15. Explain with neat sketch general construction of cable.
16. Explain various types of grouping of cells, also discuss rating of battery