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in

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SoftTech Engineers Pvt. Ltd. have developed Multimedia based eLearning Software Solutions for the Electrical Engineering subjects.

- Electrical Circuits and Networks (EE01)
- Electrical Machines (EE02)
- Electrical Measurement and Instrumentation (EE03)
- Electrical Engineering Materials (EE04)
- Numerical Methods and Computational Techniques (EE05)
- Electrical Power System (EE06)
- Electrical Conservation System (EE07)
- Modern Control System (EE08)
- Switch Gear & Protection (EE09)
- Electrical & Illumination Design (EE10)
- Energy Convertion Systems (EE11)
- Repair of Electrical Machines (EE12)
- Industrial Electronics (EE13)
- Power Plant Engineering (ME13)
- Microprocessor & Microcontroller (ET11)
- Power Electronics (ET12)
- Renewable Energy Sources (ME15)
- NDT- Non Destructive Testing (CE20)

Electrical Circuits and Networks (EE01)

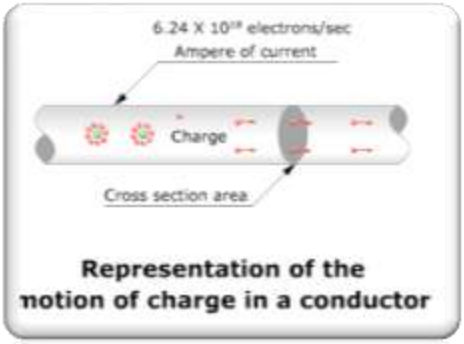
Audience: *Students of Second Year Electrical Engineering*

Objective: At the end of the course the student will learn about circuit concepts, conventions, network and differential equations, transforms, resonance, networks, etc.

Contents

Development of the Circuit Concept

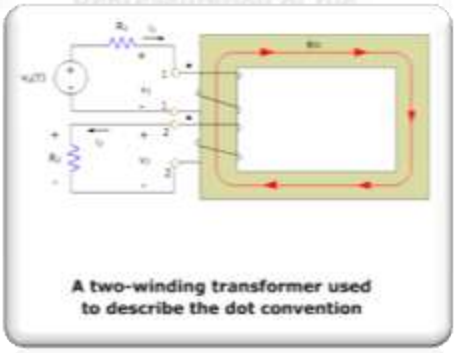
1. Introduction
2. Charge and Energy
3. The Relationship of Field and Circuit Concepts
4. The Capacitance Parameter
5. The Inductance Parameter
6. The Resistance Parameter



Representation of the notion of charge in a conductor

Conventions for Describing Networks

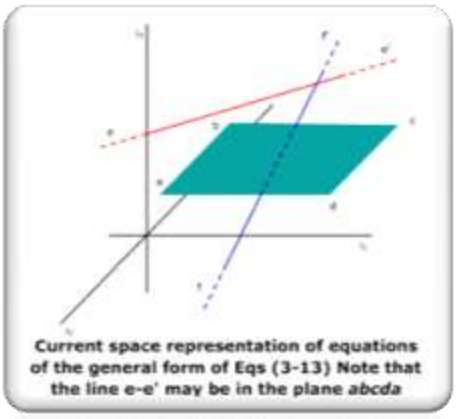
1. Reference Directions for Current & Voltage
2. Active Element Conventions
3. The Dot Convention for Coupled Circuits
4. Topological Description of Networks



A two-winding transformer used to describe the dot convention

Network Equations

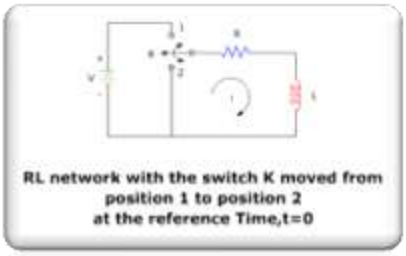
1. Kirchhoff's Laws
2. The Number of Network Equations
3. Source Transformations
4. Examples of the formulation of Network Equations
5. Loop Variable Analysis
6. Node Variable Analysis
7. Determinants
8. Duality
9. State Variable Analysis



Current space representation of equations of the general form of Eqs (3-13) Note that the line e-e' may be in the plane *abcda*

First-Order Differential Equations

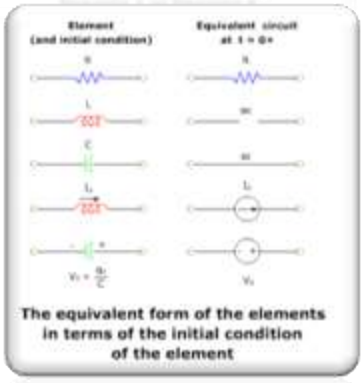
1. General and Particular Solutions
2. Time Constants
3. The Integrating Factor
4. More Complicated Networks



RL network with the switch K moved from position 1 to position 2 at the reference Time,t=0

Initial Conditions in Networks

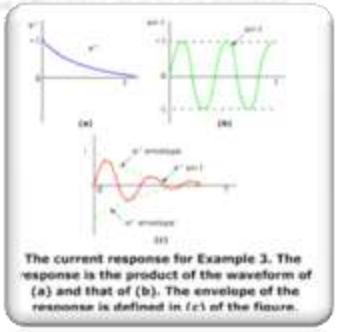
1. Why Study Initial Conditions?
2. Initial Conditions In Elements
3. Geometrical Interpretation of Derivatives
4. A Procedure for Evaluating Initial Conditions
5. Initial State of a Network



The equivalent form of the elements in terms of the initial condition of the element

Differential Equations Continued

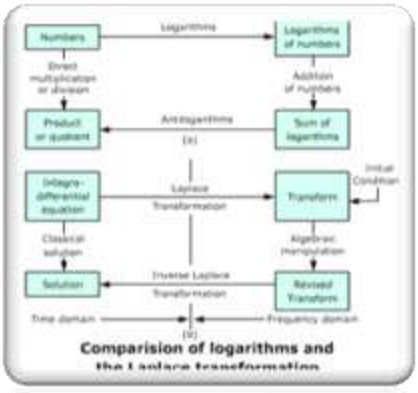
1. Second-Order Equation; Internal Excitation
2. Higher-Order Equations; Internal Excitation
3. Networks Excited By External Energy Sources
4. Response as Related to the S-Plane Location of Roots
5. General Solutions In Terms of ζ, Q, and ω_n



The current response for Example 3. The response is the product of the waveform of (a) and that of (b). The envelope of the response is defined in (c) of the figure.

The Laplace Transformation

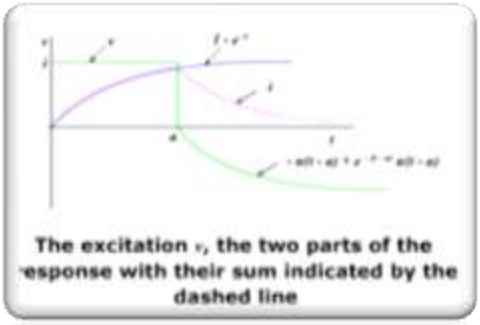
1. Introduction
2. The Laplace Transformation
3. Some Basic Theorems for the Laplace Transformation
4. Examples
5. Partial Fraction Expansion
6. Heaviside's Expansion Theorem
7. Examples



Comparision of logarithms and the Laplace transformation

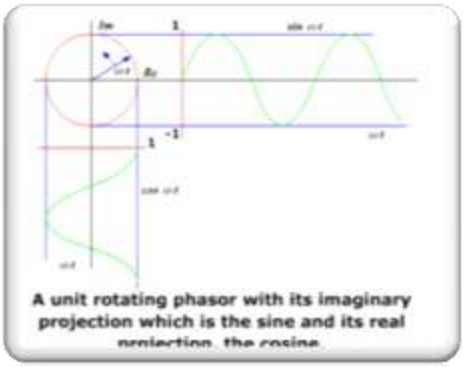
Transforms of Other Signal Waveforms

1. The Shifted Unit Step Function
2. The Ramp and Impulse Functions
3. Waveform Synthesis
4. The Initial and Final Value of f (T) From F (S)
5. The Convolution Integral
6. Convolution as a Summation


The excitation , the two parts of the esponse with their sum indicated by the dashed line

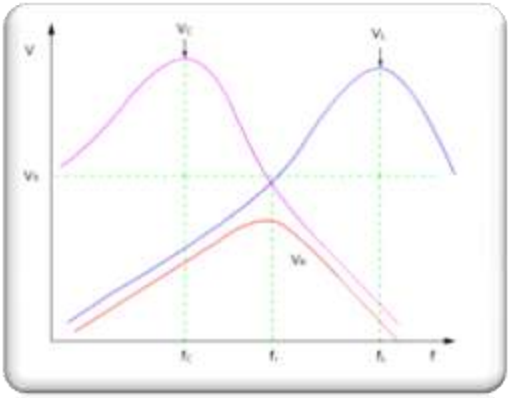
Impedance Functions and Network Theorems

1. The Concept of Complex Frequency
2. Transform Impedance and Transform Circuits
3. Series & Parallel Combinations of Elements
4. Superposition And Reciprocity
5. Thevenin's Theorem & Norton's Theorem

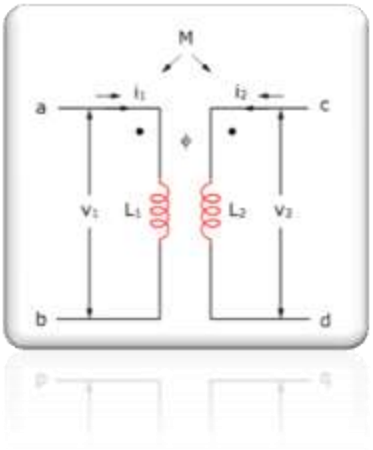

A unit rotating phasor with its imaginary projection which is the sine and its real projection, the cosine

Resonance

1. Series Resonance
2. Impedance and phase angle
3. Voltages & Current in a Series Resonant Circuit
4. Band Width of a RLC Circuit
5. The quality factor (Q) and its effect on Bandwidth
6. Magnification i Resonance
7. Parallel Resonance
8. Resonant Frequency for a Tank Circuit
9. Variation of Impedance with Frequency
10. Q Factor of Parallel Resonance
11. Magnification
12. Reactance Curves in Parallel Resonance



Polyphase Circuits

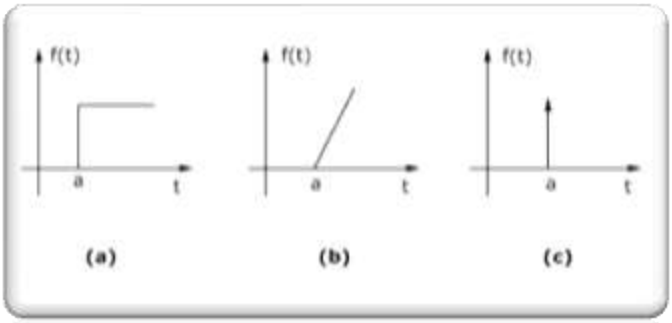


1. Polyphase System
2. Advantages of Three-Phase System
3. Generation of Three-Phase Voltages
4. Phase Sequence
5. Inter Connection of Three-Phase Sources and Loads
6. Star to Delta and Delta to Star Transformation
7. Voltage, Current and Power in a Star Connected System
8. Voltage, Current and Power in a Delta Connected System
9. Three-Phase Balanced Circuits
10. Three-Phase Unbalanced Circuits
11. Power Measurement in Three-Phase Circuits

Coupled Circuits

1. Mutual Inductance
2. Coefficient of Coupling
3. Ideal Transformer
4. Analysis of Multi-Winding Coupled Circuits
5. Series Connection of Coupled Inductors
6. Tuned Circuits
7. Double Tuned Coupled Circuits

Network Functions

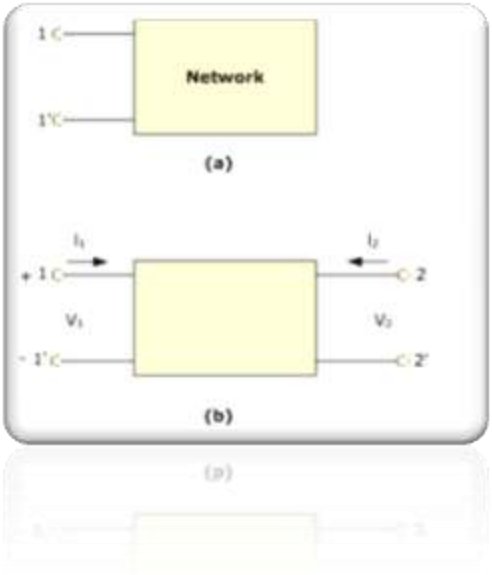


1. Singularity Functions
2. Unit Functions
3. Shifter Functions
4. Gate Function
5. Network Functions
6. Transfer Functions of Two-Port Network
7. Poles and Zeros
8. Necessary Conditions For Driving Point Function
9. Necessary Conditions For Transfer Functions
10. Time Domain Response From Pole Zero Plot

11. Amplitude & Phase Response from Pole Zero Plot
12. Stability criterion for Active Network
13. Routh Criteria

Two Port Networks

1. Two-Port Network
2. Open Circuit Impedance (Z) Parameters
3. Short Circuit Admittance (Y) Parameters
4. Transmission (ABCD) Parameters
5. Inverse Transmission (A'B'C'D') Parameters
6. Hybrid (H) Parameters
7. Inverse Hybrid (g) Parameters
8. Inter Relationships of Different Parameters
9. Inter Connection of Two-Port Networks
10. Terminated Two-Port Network
11. Lattice Networks
12. Image Parameters



Filters & Attenuators

1. Classification of Filters
2. Filter Networks
3. Equations of Filter Networks
4. Constant - K Low Pass Filter
5. Constant K-High Pass Filter
6. Band Pass Filter
7. Band Elimination Filter
8. Attenuators
9. T-Type Attenuator
10. π - Type Attenuator
11. Lattice Attenuator
12. Bridged-T Attenuator
13. L-Type Attenuator

Electrical Machines (EE02)

Audience: *Students of Second Year Electrical Engineering*

Objective: At the end of the course the student will learn about various electrical machines like D.C. Generators, D.C. Motor, transformer, alternators, etc.

Contents

Electromechanical Energy Conversion

1. Introduction
2. Salient Aspects of Conversions
3. Energy – Balance
4. Magnetic - field System
5. A Simple Electromechanical System
6. Rotary Motion
7. Description of Simple System
8. Energy stored in the coils
9. Different Categories
10. Vital Role of Air-gap
11. Dynamic Equations and System-model of a Simple System
12. Statically induced emf and Dynamically Induced emf

D. C. Generators

1. Learning Objectives
2. Generator Principle
3. Simple Loop Generator
4. Practical Generator
5. Types of Generator
6. Brush Contact Drop
7. Generated E.M.F
8. Iron Loss in Armature
9. Total Loss in a D.C. Generator
10. Stray Losses

11. Power Stages
12. Condition for Maximum Efficiency

Armature Reaction and Commutation

1. Learning Objectives
2. Armature Reaction
3. Demagnetising & Cross-magnetising Conductors
4. Demagnetising AT per Pole
5. Cross-magnetising AT per pole
6. Compensating Windings
7. Number of Compensating Windings
8. Commutation
9. Value of Reactance Voltage
10. Methods of Improving Commutation
11. Resistance Commutation
12. E.M.F. Commutation
13. Interpoles of Compoles
14. Equalizing Connection
15. Parallel Operation of Shunt Generators
16. Paralleling DC Generator
17. Load Sharing
18. Procedure for Paralleling D.C. Generators
19. Compound Generators in Parallel
20. Series Generators in Parallel


Armature reaction is the change in the neutral plane and the reaction of the magnetic field

Generator Characteristics

1. Learning Objectives
2. Characteristics of D.C. Generators
3. Separately-excited Generator
4. No-load Curve for Self-excited Generator
5. Critical Resistance for Shunt Generator


Self excited generator

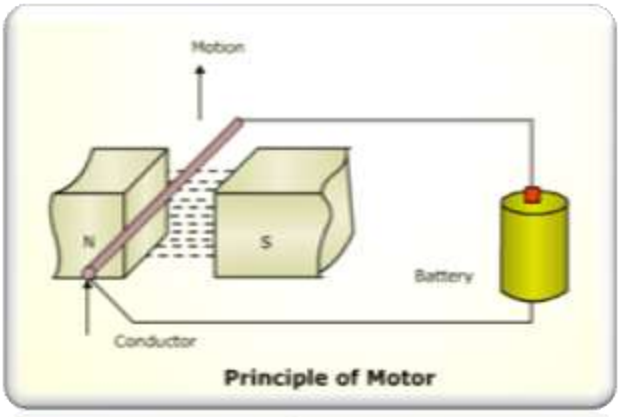
6. How to Find Critical Resistance R_c?
7. Critical Speed NC
8. Conditions for Build-up of a Shunt Generator
9. Factors Affecting Voltage Building
10. External Characteristic
11. Voltage Regulation
12. Internal or Total Characteristic
13. Series Generator
14. Compound-wound Generator
15. How to Calculate Required Series Turns?
16. Uses of D.C. Generators

Electric Motors

1. Electric Motors
2. Linear Motors

D. C. Motor

1. Motor Principle
2. Comparison of Generator and Motor Action
3. Significance of the Back e.m.f.
4. Voltage Equation of a Motor
5. Condition for Maximum Power
6. Torque
7. Armature Torque of a Motor
8. Shaft Torque
9. Speed of a D.C. Motor
10. Motor Characteristics
11. Characteristics of Series Motors
12. Characteristics of Shunt Motors
13. Compound Motors



14. Performance Curves
15. Comparison of Shunt and Series Motors
16. Losses and Efficiency
17. Power Stages

Speed Control of D. C. Motors

DC motor speed controller

1. Factors Controlling Motor Speed
2. Speed Control of Shunt motors
3. Speed Control of Series Motors
4. Merits & Demerit of Rheostatic Control Method
5. Series-parallel Control
6. Electric Braking
7. Electric Braking of Shunt Motors
8. Electric Braking of Series Motor
9. Electronic Speed Control Method for DC Motors
10. Uncontrolled Rectifiers
11. Controlled Rectifiers
12. Thyristor Choppers
13. Thyristor Inverters
14. Thyristor Speed Control of Separately-excited D.C. Motor

Testing of DC Machines

1. Brake Test
2. Swinburne's Test
3. Advantages of Swinburne's Test
4. Regenerative or Hopkinson's Test
5. Alternative Connections for Hopkinson's Test
6. Merits of Hopkinson's Test
7. Retardation or Running down Test
8. Field's Test for Series Motor

Transformer

1. Working Principle of a Transformer
2. Transformer Construction
3. Elementary Theory of an Ideal Transformer
4. E.M.F. Equation of a Transformer
5. Voltage Transformation Ratio
6. Transformer with Losses but no Magnetic Leakage
7. Transformer on Load
8. Equivalent Circuit
9. Transformer Tests
10. Open-circuit or No-load Test
11. Short-Circuit or Impedance Test
12. Regulation of Transformer
13. Losses in a Transformer
14. Efficiency of a Transformer
15. Condition for Maximum Efficiency


Single phase transformer

Three-Phase Transformer

1. Three-phase Transformer Connections
2. Star/Star or Y/Y Connection
3. Delta-Delta or D-D Connection
4. Wye/Delta or Y/D Connection
5. Delta/Wye or D /Y Connection
6. Open-Delta or V - V connection
7. Power Supplied by V - V Bank
8. Scott Connection or T - T Connection
9. Three-phase to Two-phase Conversion and vice-versa
10. Parallel Operation of 3-phase Transformers

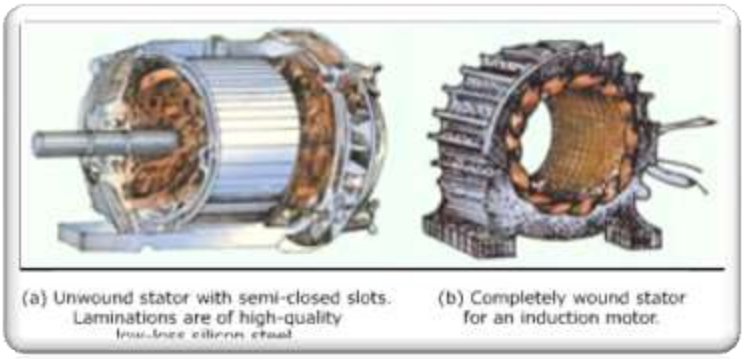

Three phase transformer

Stepper Motor

1. Types of stepper motors
2. Working of stepper motor
3. Construction of stepper motor

Induction Motor

1. Classification of A.C. Motors
2. Induction Motor: General principle
3. Squirrel-cage Rotor
4. Phase-wound Rotor
5. Production of Rotating Field
6. Three-phase Supply
7. Why Does the Rotor Rotate?
8. Slip
9. Frequency of Rotor Current
10. Relation Between Torque and Rotor Power Factor
11. Starting Torque
12. Starting Torque of a Slip-ring Motor
13. Rotor E.M.F. and Reactance Under Running Conditions
14. Torque Under Running Conditions
15. Condition for Maximum Torque Under Running Conditions
16. Rotor Torque and Breakdown Torque
17. Relation Between Torque and Slip
18. Effect of Change in Supply Voltage on Torque and Speed
19. Effect of Changes in supply Frequency on Torque and Speed
20. Full-load Torque and Maximum Torque
21. Starting Torque and Maximum Torque
22. Torque/Speed Curve
23. Shape of Torque/Speed Curve
24. Current/Speed Curve of an Induction Motor
25. Torque/Speed Characteristic Under Load
26. Plugging of an Induction Motor



27. Induction Motor Operating as a Generator
28. Complete Torque/Speed Curve of a Three-Phase Machine
29. Measurement of Slip
30. Power Stages in an Induction Motor
31. Torque Developed by an Induction Motor
32. Torque, Mechanical Power and Rotor Output
33. Induction Motor Torque Equation
34. Synchronous Watt
35. Variations in Rotor Current
36. Testing of Induction Motors
37. Testing for bearing troubles

Single Phase Motors

1. Universal Motor
2. Single-phase Induction Motor
3. Double-field Revolving Theory
4. Making Single-phase Induction Motor Self-starting
5. Equivalent Circuit Without Core Loss
6. Equivalent Circuit-With Core Loss
7. Types of Capacitor-start Motors
8. Capacitor Start-and-Run Motor
9. Shaded-pole Single-phase Motor
10. Repulsion Type Motors
11. A.C. Series Motors
12. Universal Motor

Altornators

1. Basic Principle
2. Stationary Armature
3. Rotor
4. Damper Windings

5. Speed and Frequency
6. Armature Windings
7. Single-layer Winding
8. Concentric or Chain Windings
9. Two-Layer Winding
10. Wye and Delta Connections
11. Short-pitch Winding: Pitch factor/chording factor
12. Distribution or Breadth/Winding/Spread Factor
13. Factors Affecting Alternator Size
14. Alternator on Load
15. Synchronous Reactance
16. Vector Diagrams of a Loaded Alternator
17. Voltage Regulation
18. Synchronous Impedance Method
19. Rothert's M.M.F. or Ampere-turn Method
20. Zero Power Factor Method or Potier Method
21. Procedural Steps for Potier Method 1
22. Operation of a Salient Pole Synchronous Machine
23. Phasor Diagram for a Salient Pole Synchronous Machine
24. Calculations from Phasor Diagram
25. Power Developed by a synchronous Generator
26. Parallel Operation of Alternators
27. Synchronizing of Alternators
28. Synchronizing Current
29. Synchronizing Power
30. Alternators Connected to Infinite Bus-bars
31. Synchronizing Torque TSY
32. Effect of Load on Synchronizing Power
33. Alternative Expression for Synchronizing Power
34. Parallel Operation of Two Alternators
35. Effect of Unequal Voltages

36. Distribution of Load
37. Time-period of Oscillation
38. Maximum Power Output

Synchronous Motor

1. Synchronous Motor–General
2. Principle of Operation
3. Method of Starting
4. Motor on Load with Constant Excitation
5. Power Flow within a Synchronous Motor
6. Equivalent Circuit of a Synchronous Motor
7. Power Developed by a Synchronous Motor
8. Synchronous Motor with Different Excitations
9. Effect of Increased Load with Constant Excitation
10. Effect of Changing Excitation on Constant Load
11. Different Torques of a Synchronous Motor
12. Power Developed by a Synchronous Motor
13. Alternative Expression For Power Developed
14. Various Conditions of Maxima
15. Salient Pole Synchronous Motor
16. Power Developed by a Salient Pole Synchronous Motor
17. Effect of Excitation on Armature Current and Power Factor
18. Constant-power Lines
19. Construction of V-curves
20. Hunting or Surging or Phase Swinging
21. Methods of Starting
22. Procedure for Starting a Synchronous Motor
23. Comparison Between Synchronous and Induction Motors
24. Synchronous Motor Applications

Servo Motors

1. Introduction
2. Classification of Servo Motors
3. AC Servo motors
4. DC Servo motors
5. Field-Controlled DC Servo motor
6. Armature-Controlled DC Servomotor
7. Series Split - Field DC servomotors
8. Servo -Vs- Stepper
9. Servo Motor Applications
10. Probable causes of Motor Troubles

Electrical Measurement and Instrumentation (EE03)

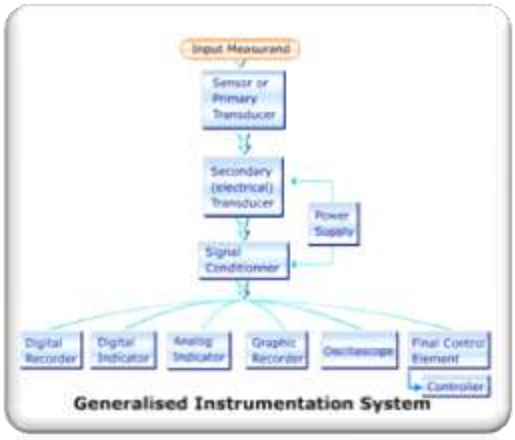
Audience: *Students of Second Year Electrical Engineering*

Objective: At the end of the course the student will learn about fundamentals of instrumentation, units of measurement, various instruments, fault finding tests, etc.

Contents

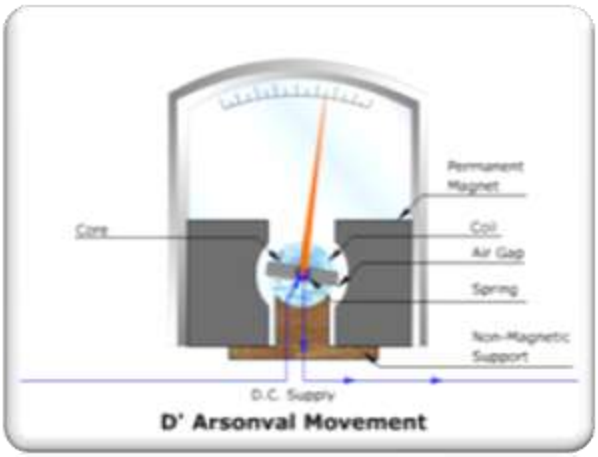
Fundamentals

1. Introduction
2. Instrumentation Systems
3. Performance Characteristics
4. The three most common variations are
5. The dynamic characteristics of an instrument
6. Methods of Measurements
7. Types of Errors
8. Standards
9. Example



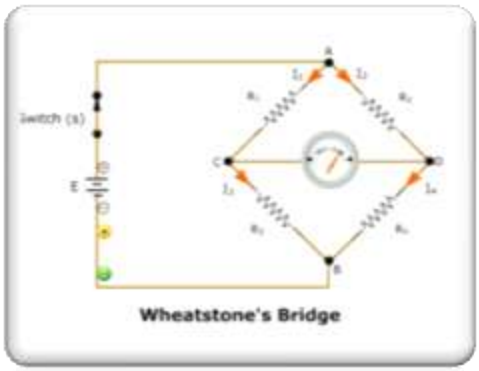
Units of Measurement & Instruments

1. Introduction
2. Fundamental, Supplementary, and Derived Units
3. The most commonly used System of Units are
4. Dimensions of a Physical Quantity
5. Permanent Magnet Moving Coil Type
6. D.C Ammeter
7. Extending of Ammeter Ranges
8. Basic Meter as a D.C Voltmeter
9. A.C Voltmeter Using Half Wave Rectifier
10. Calibration of DC Instruments
11. Calibration of the Series Type Ohm Meter
12. Multimeter Operating Instructions
13. Wattmeter (Output Power Meter)



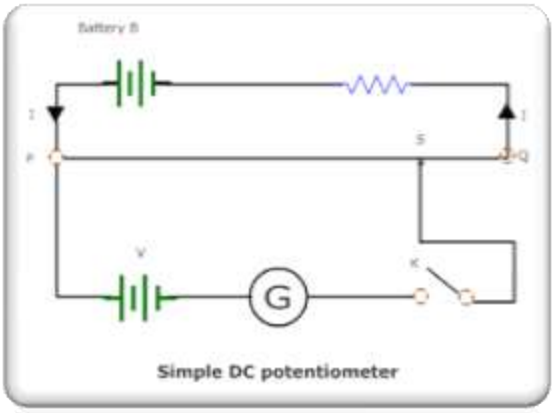
Measuring Parameters

1. Bridge
2. Wheatstones Bridge (Measurement of resistance)
3. Guarded Wheatstone Bridge
4. Three Terminal Resistances
5. Capacitance Comparison Bridge
6. Hay's Bridge
7. Wien's Bridge
8. Harmonic Distortion Analysis
9. Phase Measurement by using Vector Voltmeter
10. Phase Meter



Potentiometer

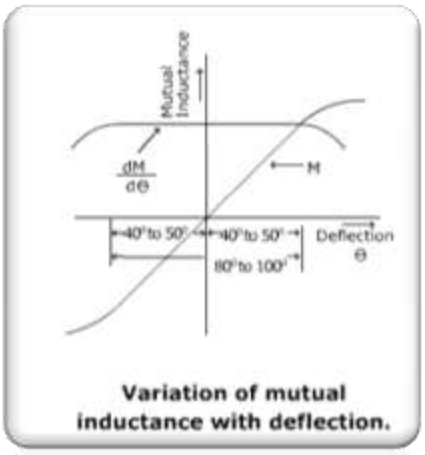
1. Introduction
2. Simple Potentiometer for use with Direct Current
3. Precision Potentiometer
4. Procedure for Using the Potentiometer
5. Brooke's Deflection Potentiometer
6. Potentiometer and its use
7. Calibration of Voltmeter By The Potentiometer
8. Calibration of Ammeter by the Potentiometer
9. Calibration of Resistance
10. Alternating Current Potentiometer
11. Drysdale Potentiometer
12. Obtaining the Balance
13. Wattmeter Testing



Measurement of Power & Wattmeters

1. Introduction
2. Power in A.C. Circuits

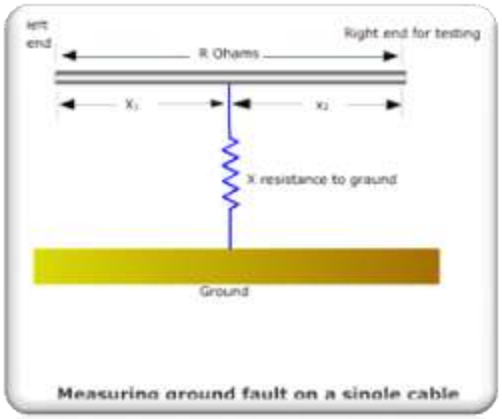
3. Electrodynamometer Wattmeters
4. Construction of Electrodynamometer Wattmeter
5. Theory of Electrodynamometer Wattmeters
6. Shape of Scale of Electrodynamometer Wattmeters
7. Errors in Electrodynamometer Wattmeter
8. Compensation for Inductance of Pressure Coil
9. Ferrodynamic Wattmeters
10. Low Power Factor Wattmeters
11. Thermocouple Wattmeter
12. Hall Effect Multiplier
13. Measurement of Power using Instrument Transformers
14. Correction factors
15. Measurement of Power in Three Phase Circuits
16. Three Phase Wattmeters



Variation of mutual inductance with deflection.

Location of Faults

1. Methods of Locating Faults
2. Blavier Test
3. Earth Overlap Test
4. Voltage Drop Tests
5. Precaution
6. Loop Tests
7. Murray Loop Test
8. Varley Loop Test
9. Tests for Open Circuit Fault in Cables



Measuring ground fault on a single cable

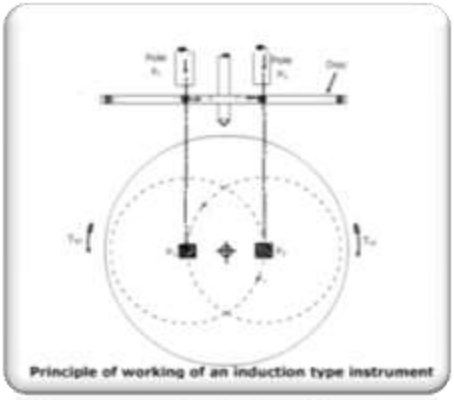
Magnetic Measurement

1. Ballistic Galvanometer
2. Moving Coil Ballistic Galvanometer
3. Method of Calculating the Charge
4. Damping Corrections

5. Measurement of Flux by Ballistic Galvanometer
6. Grassot Flux Meter
7. Permeameter
8. NPL Permeammeter
9. Measurements on a Ring Specimen
10. Iron Loss Measurement
11. Epstein Core-Loss Test
12. Lloyd Fischer Square
13. Separation of Eddy Current and Hysteresis Losses

Measurement of Energy

1. Energy
2. Motor Meters
3. Theory of Induction Type Meters
4. Single Phase Induction type Meters
5. Registering (counting) Mechanism
6. Errors in Single Phase Energy Meters
7. Adjustments in Single Phase Energy Meters
8. Polyphase Energy Meters
9. Two Element Energy Meter



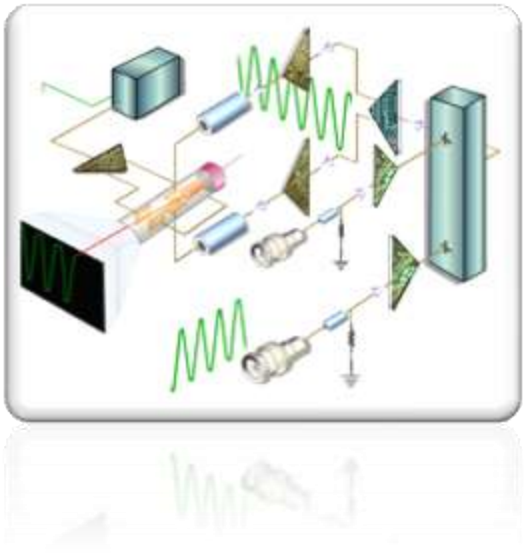
Transducers

1. Electrical Transducer
2. Electrical Transducers can be broadly classified
3. Selecting a Transducer
4. Transducers Used For Temperature Measurement
5. The Disadvantages are as follows
6. Bimetallic Thermometer
7. Thermocouples
8. Advantages of Thermocouples
9. Pressure Measurement

10. Measurement of Level
11. Capacitive Method
12. Measurement of Displacement
13. Advantages of LVDT
14. Pneumatic Flapper Nozzle Assembly

Oscilloscope

1. Introduction
2. Screens for CRTs
3. Deflection Sensitivity
4. Basic Principle
5. Block Diagram of Oscilloscope
6. CRT Connections
7. Applications of CRO
8. Vertical Amplifier
9. Horizontal Deflecting System
10. Triggered Sweep CRO
11. Trigger Pulse Circuit
12. Delay Line in Triggered Sweep
13. Measurement Using CRO
14. Measurement of Frequency
15. Measurement of Phase Shift
16. Triggered Sweep (Mode of Trigger)



Electrical Engineering Materials (EE04)

Audience: *Students of Second Year Electrical Engineering*

Objective: At the end of the course the student will learn about conducting, insulating, magnetic, gaseous and special materials used in electrical engineering.

Contents

Electrical Engineering Materials

1. Introduction
2. Technological Properties of Materials
3. Physical Properties
4. Mechanical Properties
5. Electrical Properties
6. Magnetic Properties
7. Chemical Properties
8. Trade Names
9. Code of Practice
10. Conducting Materials
11. Insulating Materials
12. Magnetic Materials

Conducting Materials Properties

1. Introduction
2. Temperature-Coefficient of Resistance
3. Variation of Resistivity with temperature
4. Superconductivity
5. Super-conducting Materials
6. Properties of superconducting Materials
7. Change in Thermal conductivity
8. Practical Applications of superconductivity

Conducting Materials

1. Introduction
2. High conducting (i.e. Low Resistivity) Materials
3. Copper
4. Reinforced Copper Conductors
5. Alloys of Aluminum
6. Advantages of Aluminum over copper
7. Galvanized Iron and Steel
8. Solders
9. Electrical contact Materials
10. Common Low conductivity Materials
11. Electrical Carbon Materials
12. Manufacture of electrical carbon products

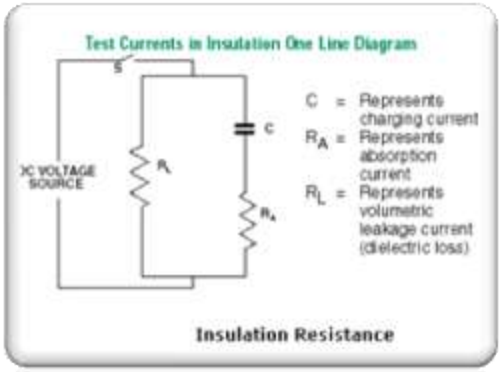

Copper

Characteristics of Semiconductor Materials

1. Resistivity
2. Chemical Bonds in Si and Ge
3. Extrinsic Semi-Conductor Materials
4. Hall Effect
5. Applications of Semi-Conductors
6. Type of silicon carbide semi-conductors
7. The Hall Effect Amplifier
8. Applications of Semi-conductor
9. Effect of Temperature and Frequency
10. Single Crystal Performance

Insulating Materials: Properties

1. Introduction
2. Properties of insulating materials
3. Mechanical Properties



Insulation Resistance

4. Thermal Properties
5. Chemical Properties
6. Desirable Properties of Insulating Materials
7. Classification of Insulating Materials
8. Dielectric as an Electric Field Medium
9. Polarisation
10. Effect of Application of Field on Atom
11. Polarization in Polar Dielectric Materials
12. Electrical conductivity of Gases/Liquid/solid dielectrics
13. Breakdown of Gaseous dielectrics
14. Breakdown of liquid dielectric

Insulating Materials

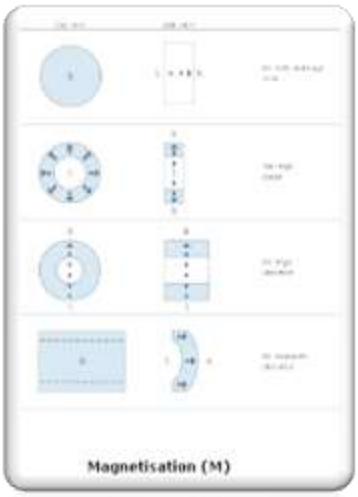
1. Introduction
2. Liquid insulating Materials
3. Petroleum or Mineral Insulating Oils
4. Properties
5. Miscellaneous Insulating Oils
6. Solid Insulating Materials
7. Fibrous Insulating Materials
8. Impregnated Fibrous Insulating Materials
9. Thermosetting Resins
10. Insulating Films
11. Mica-Base Materials
12. Ceramic Insulating Materials
13. Glass Insulating Materials


Petroleum or Mineral Insulating Oils

Magnetic Materials: Properties

1. Introduction
2. Magnetic Parameters
3. Concept of Magnetization

4. Magnetization of Iron and Steel
5. Diamagnetic Materials
6. Spontaneous Magnetization
7. Principal Ferromagnetic Materials
8. Soft and Hard Magnetic Materials
9. Steel Alloys
10. Sheet Steels

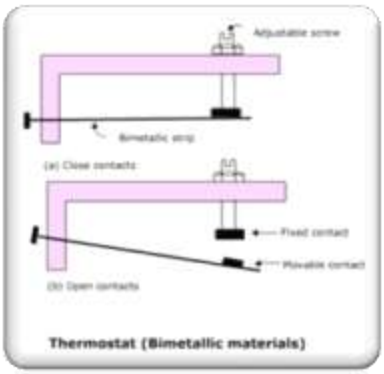


Gaseous Materials

1. Introduction
2. Creeping Discharge
3. Gaseous Conductors
4. Gaseous Materials as Insulator
5. Ionization of Gaseous Materials
6. Breakdown of Gaseous Materials
7. Townsend's particular theory

Materials for Special Purpose

1. Introduction
2. Types of Thermocouples
3. Bimetallic (or Thermostats) Materials
4. Metals and Alloys used for Fuse Wire
5. Advantages
6. Varistors (or Non - linear resistors)



Principle & Procedure of Selection of Materials

1. Introduction
2. Factors determining selection of material
3. Properties of materials
4. Constructional Features of Electrical Equipment

5. Desirable properties of some Types of Materials
6. Typical Applications and suitable available materials
7. Electrical contacts
8. Thermo-couple Materials
9. High Resistivity Materials
10. Applications and suitable materials
11. Materials and Their Typical Application

Numerical Methods and Computational Techniques (EE05)

Audience: *Students of Second Year Electrical Engineering*

Objective: At the end of the course the student will learn about various types of numerical methods and computational techniques.

Contents

Linear Systems of Equations & Matrix Computations

1. Introduction
2. Direct Methods for Solving Linear Systems of EQUATIONS

Gauss Elimination Method with Partial Pivoting

1. Introduction
2. Gauss Elimination method

Determinant Evaluation

1. Introduction
2. Gauss Jordan Method
3. LU Decompositions

Doolittle's LU Decomposition

1. Introduction

Doolittile's Method with Row Interchanges

1. Introduction
2. Stage 1: Rows of U

Iterative Methods for S. L. S. of Equations

1. Introduction
2. Jacobi Iteration
3. Introduction
4. Examples

Gauss - Seidel Method

1. Introduction
2. Examples

Successive Overrelaxation (SOR) Method

1. Introduction
2. SOR scheme
3. Examples

Review of Properties of Eigenvalues & Eigenvectors

1. Introduction
2. Eigen value
3. Properties

Similar Matrices

1. Introduction
2. Examples

Hermitian Matrices

1. Introduction
2. Examples

Gramm – Schmidt Orthonormalization

1. Introduction
2. Examples
3. Characteristic Polynomial

Vector and Matrix Norms

1. Introduction
2. Examples

3. Definition
4. Matrix norms

Eigen Value Computations

1. Introduction
2. Examples
3. Computation

Eigenvalues of a Real Symmetric Tridiagonal Matrix

1. Introduction

Tridiagonalization of a Real Symmetric Matrix

1. Introduction
2. Examples

Jacobi Iteration for Finding E. of a R. S. M.

1. Introduction
2. Examples

The Q R decomposition

1. Introduction
2. Examples

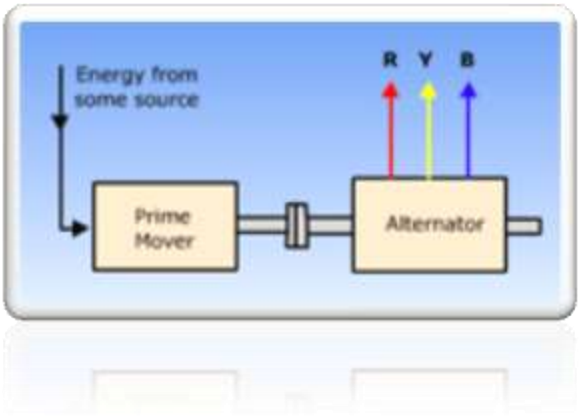
Electrical Power System (EE06)

Audience: *Students of Second Year Electrical Engineering*

Objective: At the end of the course the student will learn about fundamentals of electrical power generation, tariff, supply system and mechanical design of power generation.

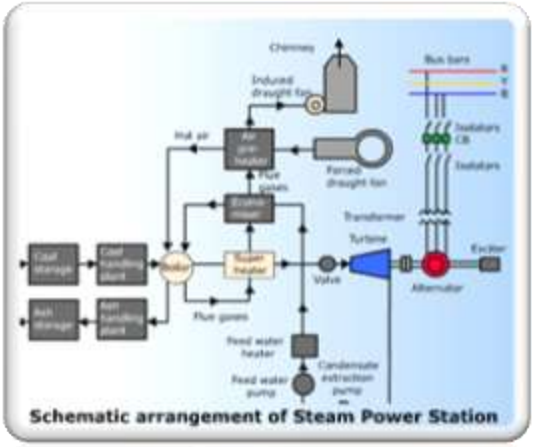
Contents

Introduction



1. Importance of Electrical Energy
2. Generation of Electrical Energy
3. Sources of Energy
4. Comparison of Energy Sources
5. Efficiency
6. Calorific Value of Fuels
7. Advantages of Liquid Fuels over Solid Fuels
8. Advantages of Solid Fuels over Liquid Fuels

Generating Stations



1. Generating Stations
2. Schematic Arrangement of Steam Power Station
3. Choice of Site for Steam Power Stations
4. Efficiency of Steam Power Station
5. Equipment of Steam Power Station
6. Hydro- electric Power Station
7. Schematic Arrangement of Hydro-electric P. S.
8. Choice of Site for Hydro-electric Power Stations
9. Constituents of Hydro-electric Plant
10. Diesel Power Station
11. Schematic Arrangement of Diesel Power Station
12. Nuclear Power Station
13. Schematic Arrangement of Nuclear P. S.
14. Schematic Arrangement of Gas Turbine Power Plant

Variable Load on Power Station

1. Structure of Electric Power System
2. Variable Load on Power Station
3. Importance
4. Important Terms and Factors
5. Load Duration Curve
6. Types of Loads
7. Typical Demand and Diversity Factors
8. Illustration
9. Load Curves and Selection of Generating Units
10. Important Points in the Selection of Units
11. Base Load and Peak Load on Power Station
12. Inter Interconnected connected Grid System

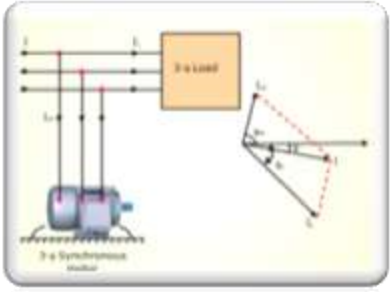
Economics of Power Generation

1. Economics of Power Generation
2. Cost of Electrical Energy
3. Methods of Determining Depreciation
4. Diminishing value method
5. Sinking fund method
6. Importance of High Load Factor

Tariff

1. Introduction
2. Desirable Characteristics of a Tariff
3. Types of Tariff

Power Factor Improvement



1. Power Factor
2. Disadvantages of Low Power Factor

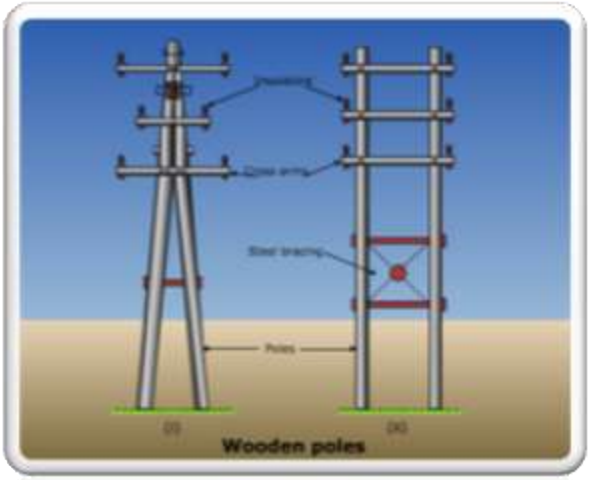
3. Causes of Low Power Factor
4. Power Factor Improvement Equipment
5. Calculations of Power Factor Correction
6. Power triangle
7. Importance of Power Factor Improvement
8. Most Economical Power Factor
9. Meeting the Increased kW Demand

Supply System

1. Electric Supply System
2. Typical A.C. Power Supply Scheme
3. Comparison of D.C. and A.C. Transmission
4. Disadvantages
5. Advantages of High Transmission Voltage
6. Limitations of high transmission voltage
7. Elements of a Transmission Line
8. Economics of Power Transmission
9. Economic Choice of Transmission Voltage
10. Requirements of Satisfactory Electrical Supply

Mechanical Design of Overhead Lines

1. Main Components of Overhead Lines
2. Conductor Materials
3. Line Supports
4. Insulators
5. Types of Insulators
6. Advantages
7. Potential Distribution over Suspension I. S.
8. String Efficiency
9. Methods of Improving String Efficiency



10. Important Points
11. Factors Affecting Corona
12. Advantages and Disadvantages of Corona
13. Effect of wind and ice loading
14. Some Mechanical Principles

Energy Conservation System (EE07)

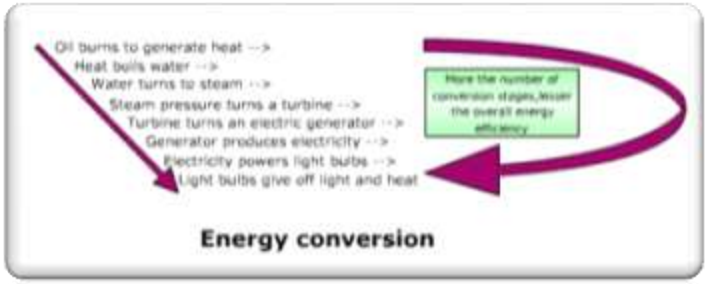
Audience: *Students of Third Year Electrical Engineering*

Objective: At the end of the course the student will learn about various forms of energy, electrical system, lighting system, energy efficient technologies, performance assessment of motors and speed drives.

Contents

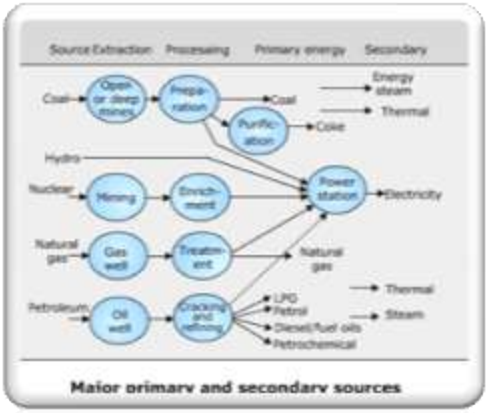
Basics of Energy and Its Various Forms

1. Definition
2. Energy Conversion
3. Grades of Energy
4. Electricity Tariff
5. Time of Day (TOD) Tariff
6. Thermal Energy Basics
7. Specific Heat
8. Conduction
9. Thermal Radiation



Energy Scenario

1. Introduction
2. Primary and Secondary Energy
3. Commercial Energy and Non Commercial Energy
4. Renewable and Non-Renewable Energy
5. Global Primary Energy Reserves
6. Indian Energy Scenario
7. Final Energy Consumption
8. Long Term Energy Scenario for India
9. Energy and Environment
10. Heavy Metals and Lead
11. Energy Conservation and its Importance
12. What is Energy Conservation?
13. Energy Strategy for the Future
14. Long-term strategy



15. The Energy Conservation Act

Electrical System

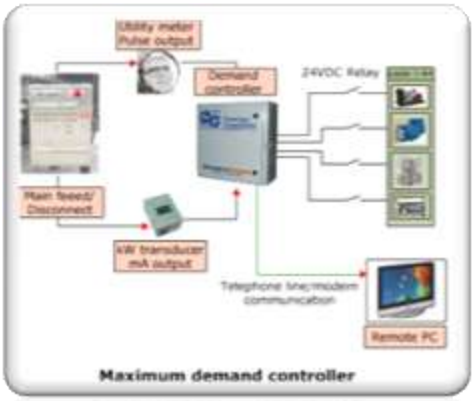
1. Introduction to Electric Power Supply Systems
2. Power Generation Plant
3. Transmission and Distribution Lines
4. Cascade Efficiency
5. Electricity Billing
6. Electrical Load Management
7. Location of Capacitors
8. Transformers
9. Voltage Fluctuation Control
10. System Distribution Losses
11. Electronic Switching Power Converters

Lighting System

1. Introduction
2. Basic Terms in Lighting System and Features
3. Recommended Illuminance Levels
4. Methodology of Lighting System
5. Case Examples
6. Energy Saving Potential in Street Lighting
7. Some Good Practices in Lighting
8. Light distribution

Electric Motors

1. Introduction
2. Motor Types
3. Motor Characteristics
4. Motor Efficiency
5. Field Tests for Determining Efficiency
6. Motor Selection
7. Energy-Efficient Motors



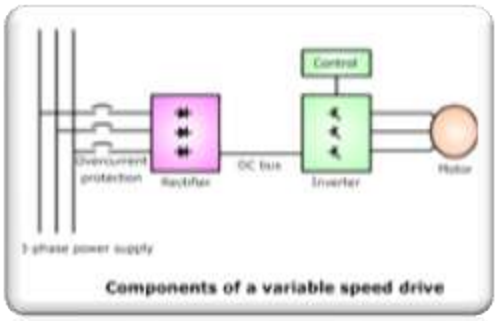
8. Stray Load-Losses
9. Motor Loading
10. Sizing to Variable Load
11. Rewinding Effects on Energy Efficiency
12. Speed Control of AC Induction Motors
13. Motor Speed Control Systems

Energy Efficient Technologies in Electrical Systems

1. Maximum Demand Controllers
2. Maximum Demand
3. Automatic Power Factor Controllers
4. Automatic Power Factor Control Relay
5. Minimising Watts Loss in Motors
6. Technical aspects of Energy Efficient Motors
7. Eddy Current Drives
8. Energy Efficient Transformers
9. Electronic Ballast
10. Energy Efficient Lighting Controls
11. Timed Based Control
12. Types and Features

Performance Assessment of Motors & Speed Drives

1. Introduction
2. Performance Terms and Definitions
3. Efficiency Testing
4. Determining Motor Loading
5. Performance Evaluation of Rewound Motors
6. Factors for Successful Implementation
7. Information needed to Evaluate Energy Savings



Components of a variable speed drive

Modern Control System (EE08)

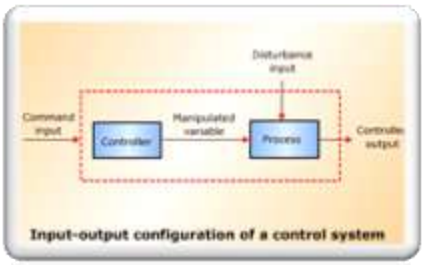
Audience: *Students of Third Year Electrical Engineering*

Objective: At the end of the course the student will learn about fundamentals of control system.

Contents

Introduction to the Control Problem

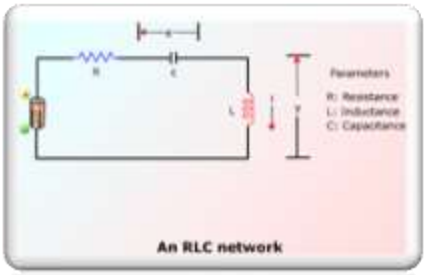
1. Control Systems
2. A bathroom toilet tank
3. Automobile driving system
4. Basic Structure of a Feedback Control System
5. Feedforward-Feedback Control Structure
6. Heat exchanger



Input-output configuration of a control system

Dynamic Models and Dynamic Response

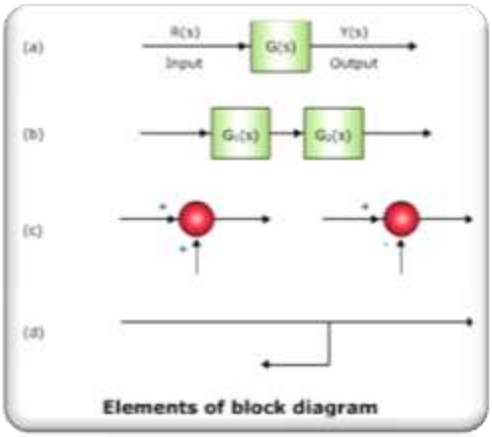
1. Introduction
2. Nonlinear and Linear Models
3. State Variable Models
4. Impulse Response Models
5. Transfer Function Models
6. Models of Disturbances
7. Dynamic Response
8. First-Order Models
9. Second-Order Models
10. Mechanics of Translation
11. Models Op Thermal Systems
12. Systems with Dead-Time Elements



An RLC network

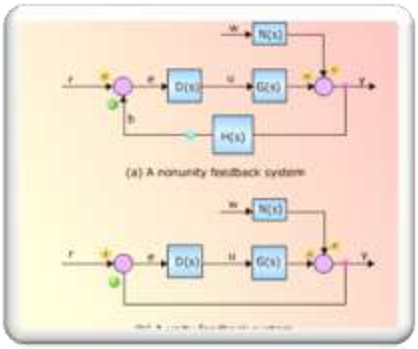
Models of Industrial Control Devices & Systems

1. Introduction
2. Block Diagram Manipulations
3. Signal Flow Graphs and the Mason's Gain Rule
4. Signal Flow Graph Terminology
5. Block Diagram Reduction Using the Mason's Gain Rule
6. DC and AC Motors in Control Systems
7. DC Servomotors
8. Armature-Controlled dc Motor
9. AC Servomotors
10. Motion Control Systems
11. Electronic Amplifiers
12. Hydraulic Devices for Motion Control
13. Hydraulic Actuators
14. Pneumatic Devices for Process Control
15. Signals and Standards
16. Flow Control Valve



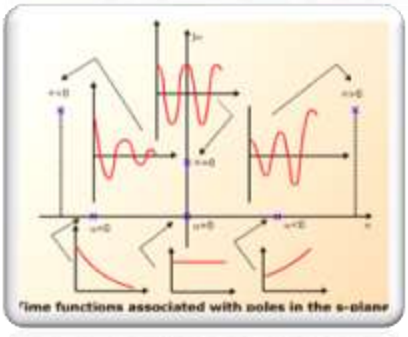
Basic Principles of Feedback Control

1. Introduction
2. The Control Objectives
3. Feedback Control System Characteristics
4. Integral Mode of Feedback Control
5. Alternative Control Configurations



Concepts of Stability & Routh Stability Criterion

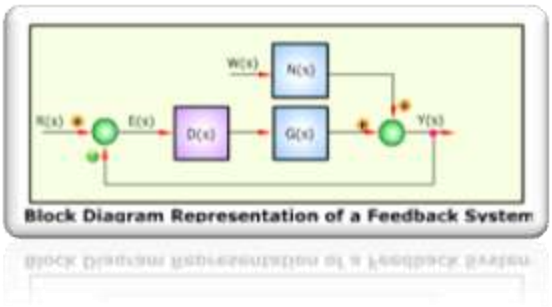
1. Introduction
2. Bounded-Input Bounded-Output Stability
3. Zero-Input Stability
4. The Routh Stability Criterion



5. Relative Stability (Shifting the Origin)
6. Stability Range for a Parameter

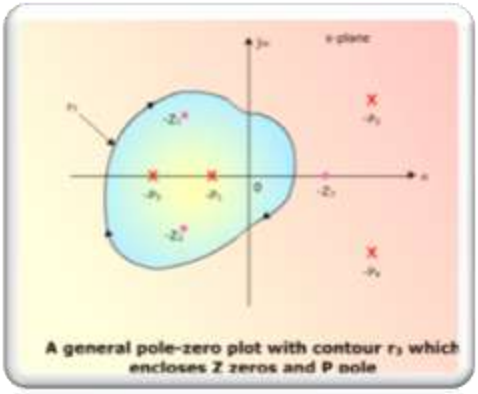
The Performance of Feedback Systems

1. Introduction
2. The Performance Specifications
3. Transient Response
4. Steady-State Response
5. Response of a Standard Second-Order System
6. Effects of an Additional zero
7. Introduction to Design and Compensation
8. Derivative Error Compensation
9. Integral Error Compensation



The Nyquist Stability Criterion & Stability Margins

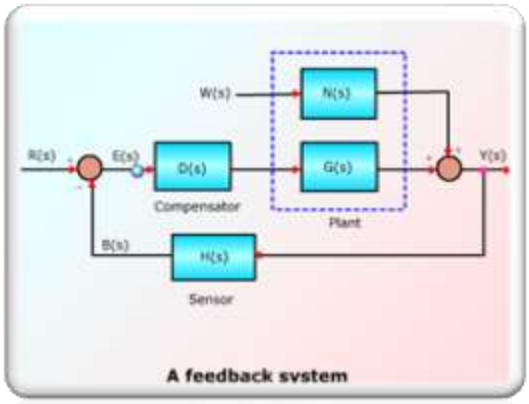
1. Introduction
2. Development of the Nyquist Criterion
3. The Principle of Argument
4. The Nyquist Plot
5. The Nyquist Criterion
6. Stability Margins
7. Some Constraints and Cautions
8. The Bode Plots
9. Magnitude Plot: Straight-Line Approximation
10. Stability Margins On The Bode Plots



Feedback System Performance Based on the Frequency Response

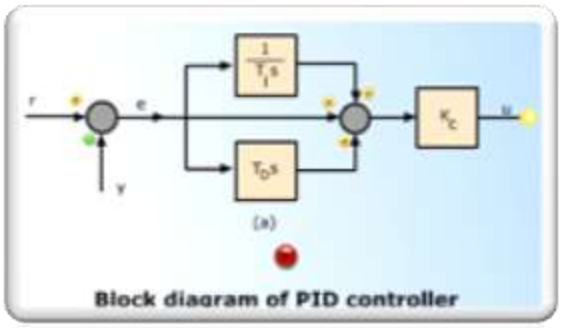
1. Introduction
2. Performance Specifications in Frequency Domain
3. Correlation between Frequency
4. Damping Ratio and Phase Margin

5. Response Speed and Gain Crossover Frequency
6. Damping Ratio and Resonance Peak
7. Response Speed and Resonance Frequency
8. Response Speed and Bandwidth
9. Return difference
10. Sensitivity function



Controller Tuning

1. Introduction
2. A Brief Review of Analog PID Controllers
3. Tuning the proportional, integral and derivative
4. Adjustment Features in Industrial Controllers
5. Practical Controller Tuning Tips
6. Self-regulating Processes
7. Integrating Processes
8. Digital PID Controllers
9. Non-interacting Position PID Algorithm
10. Tuning Rules for Digital Controllers



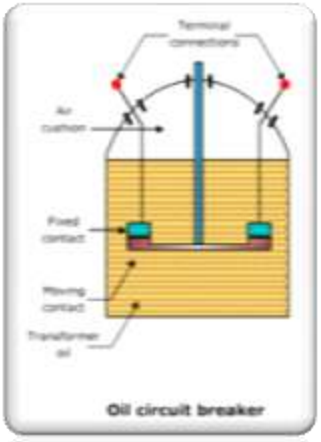
Switch Gear & Protection (EE09)

Audience: *Students of Third Year Electrical Engineering*

Objective: At the end of the course the student will learn about various types of switchgears and protection systems.

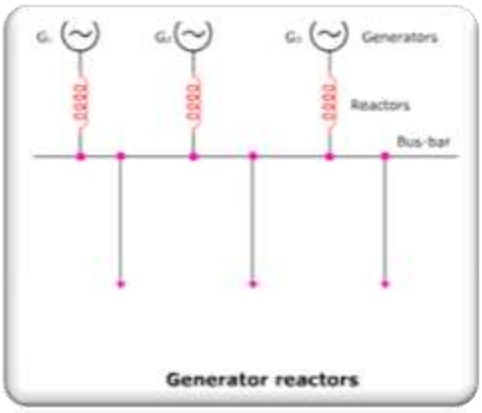
Contents

Introduction to Switchgear



1. Switchgear
2. Essential Features of Switchgear
3. Switchgear Equipment
4. Bus-Bar Arrangements
5. Advantages
6. Switchgear Accommodation
7. Causes of short-circuit
8. Faults in a Power System

Symmetrical Fault Calculations

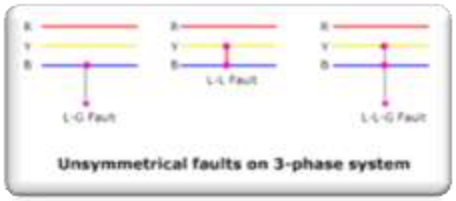


1. Introduction
2. Symmetrical Faults on 3 phase System
3. Limitation of Fault Current
4. Percentage Reactance
5. Percentage Reactance and Base kVA
6. Reactor Control of Short-Circuit Currents
7. Location of Reactors
8. Disadvantages
9. Steps for Symmetrical Fault Calculations

Unsymmetrical Fault Calculations

1. Introduction
2. Unsymmetrical Faults on 3-Phase System
3. Symmetrical Components Method

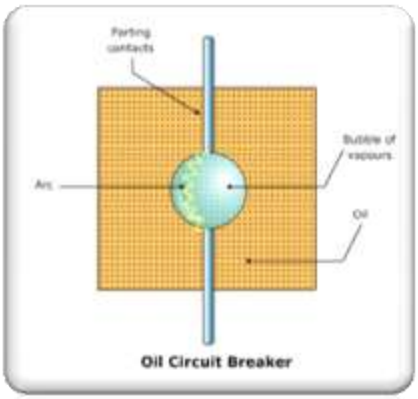
4. S. C. in Terms of Phase Currents
5. Some Facts about Sequence Currents
6. Sequence Impedances of Power System Elements
7. Analysis of Unsymmetrical Faults
8. Phase voltages at fault
9. Double Line-to-Ground Fault
10. Sequence Networks



Unsymmetrical faults on 3-phase system

Circuit Breakers

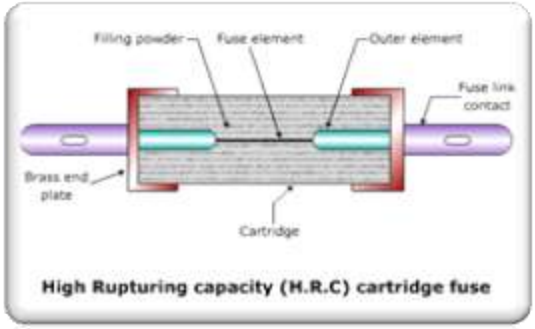
1. Introduction
2. Circuit Breakers
3. Principles of Arc Extinction
4. Important Terms
5. Classification of Circuit Breakers
6. Types of Oil Circuit Breakers
7. Self-compensated explosion pot
8. Operation
9. Maintenance of Oil Circuit Breakers
10. Sulphur Hexaflouride (SF6) Circuit Breakers
11. Switchgear Components
12. Problems of Circuit Interruption
13. Capacitive current breaking
14. Circuit Breaker Ratings
15. Making capacity



Oil Circuit Breaker

Fuses

1. Introduction
2. Fuses
3. Desirable Characteristics of Fuse Element
4. Important Terms

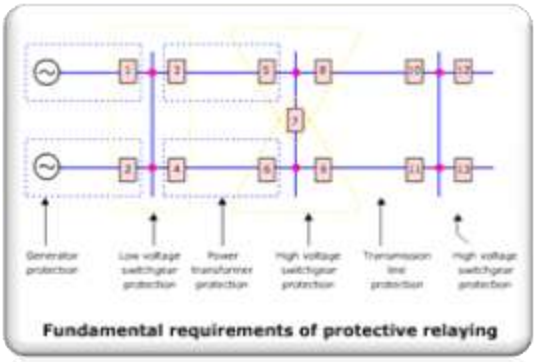


High Rupturing capacity (H.R.C) cartridge fuse

5. Prospective Current
6. High-Rupturing capacity (H.R.C.) cartridge fuse
7. H.R.C. fuse with tripping device
8. High Voltage Fuses
9. Current Carrying Capacity of Fuse Element

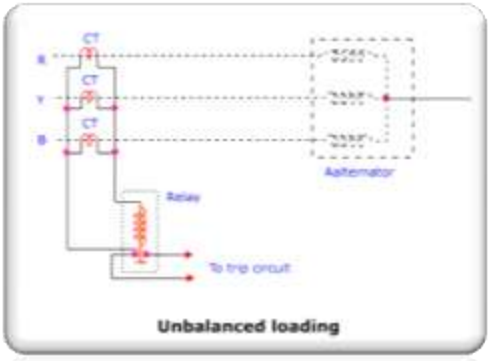
Protective Relays

1. Introduction
2. Fundamental Requirements Protective Relaying
3. Attracted armature type relay
4. Solenoid type relay
5. Relay Timing
6. Important Terms
7. Time-setting multiplier
8. Calculation of Relay Operating Time
9. Functional Relay Types
10. Induction Type Directional Power Relay
11. Induction Type Directional Overcurrent Relay
12. Constructional details
13. Disadvantages
14. Voltage Balance Differential Relay



Protection of Alternators and Transformers

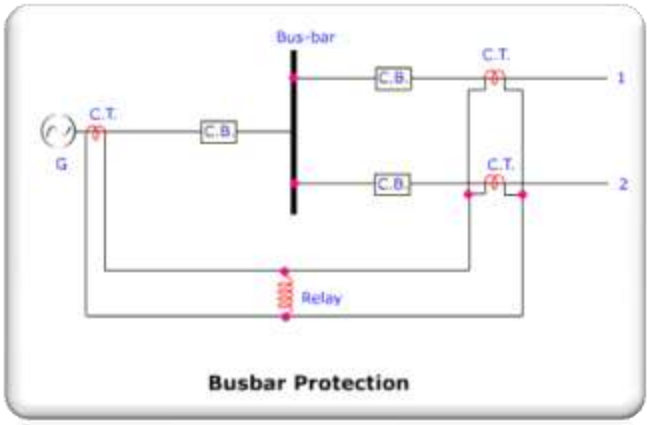
1. Introduction
2. Protection of Alternators
3. Stator winding faults
4. Modified Differential Protection for Alternators
5. Balanced Earth-fault Protection
6. Buchholz Relay
7. Earth-Fault or Leakage Protection



8. Combined Leakage and Overload Protection
9. Applying Circulating current System
10. Circulating-Current Scheme

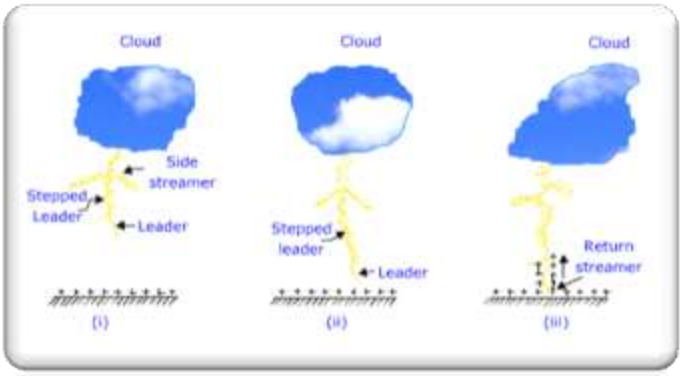
Protection of Busbars and Lines

1. Introduction
2. Busbar Protection
3. Fault Bus protection
4. Protection of Lines
5. Time-Graded Overcurrent Protection
6. Parallel feeders
7. Ring main system
8. Differential Pilot-Wire Protection
9. Merz-Price voltage balance system
10. Schematic arrangement
11. Distance Protection

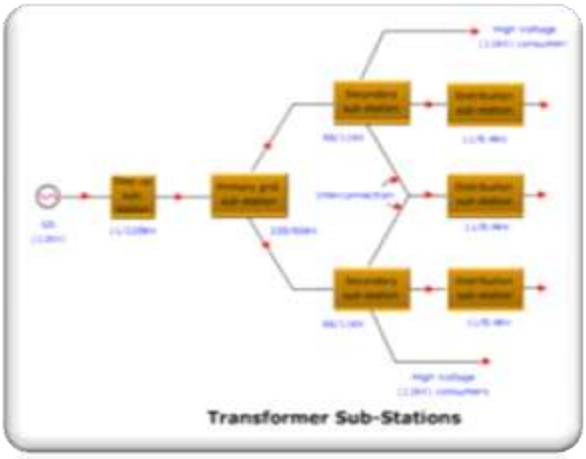


Protection Against Overvoltages

1. Introduction
2. Voltage Surge
3. Causes of Overvoltages
4. Insulation failure
5. Mechanism of Lightning Discharge
6. Types of Lightning Strokes
7. Indirect stroke
8. Protection Against Lightning
9. Types of Lightning Arresters
10. Horn Gap Arrester
11. Multigap arrester
12. Expulsion type arrester
13. Surge Absorber

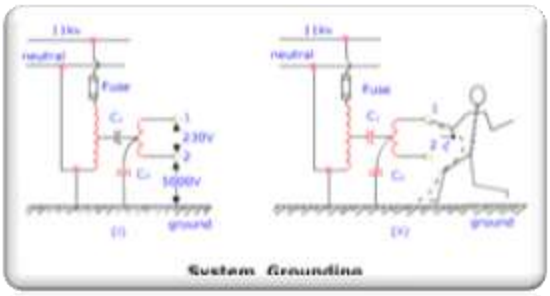


Sub-Stations



1. Introduction
2. Sub-Station
3. Transformer Sub-Stations
4. Pole-Mounted Sub-Station
5. Equipment in a Transformer Sub-Station
6. Insulators
7. Instrument transformers
8. Bus-Bar Arrangements in Sub-Stations
9. Terminal and Through Sub-Stations
10. Key Diagram of 11kV/400V Indoor Sub-Station

Neutral Grounding



1. Introduction
2. Equipment Grounding
3. Enclosure connected to neutral wire
4. System Grounding
5. Ungrounded Neutral System
6. Circuit behaviour under single line to ground-fault
7. Neutral Grounding
8. Advantages of Neutral Grounding
9. Solid Grounding
10. Reactance Grounding
11. Arc Suppression Coil Grounding
12. Voltage Transformer Earthing

Electrical & Illumination Design (EE10)

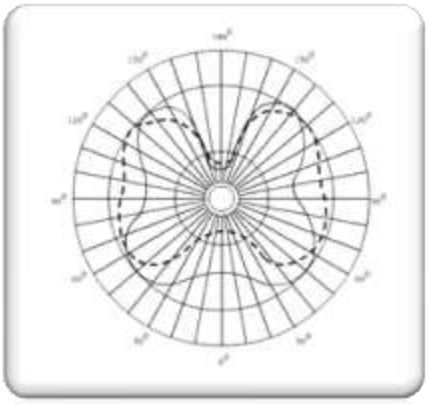
Audience: *Students of Second Year Electrical Engineering*

Objective: At the end of the course the student will learn about fundamentals of illumination, design considerations and installation of electrical system.

Contents

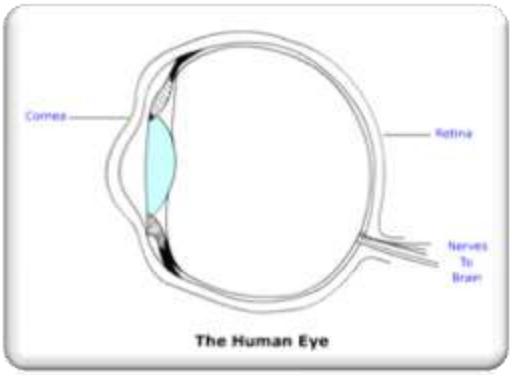
Illumination

1. Radiations from a Hot Body
2. Definitions
3. Calculation of Luminance
4. Laws of Illumination or Illuminance
5. Laws Governing Illumination of Different Sources
6. Polar Curves of C.P. Distribution
7. Determination of M.S.C.P.
8. Integrating Sphere or Photometer
9. Diffusing and Reflecting Surfaces
10. Lighting Schemes
11. Illumination Required for Different Purposes
12. Flood lighting
13. Incandescent Lamp Characteristics
14. Clear and Inside-frosted Gas-filled Lamps
15. Fluorescent Lamp Circuit with Thermal Switch
16. Comparison of Different Light Sources



Illumination Engineering

1. Introduction
2. Units of Wave-length
3. Practical Examples of 'Light' UNITS
4. Luminous Efficiency and the Eye
5. The Purkinge Effect
6. Excitation and Ionisation



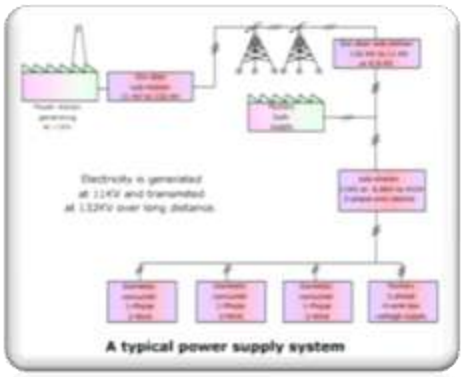
7. Gases and Vapours Available
8. Hot- and Cold-cathode Lamps
9. Black-body Radiation
10. Effect of Voltage Variation
11. Applications of Directionally Controlled Lighting
12. Subtractive Coloured-light Production
13. Solid Angle in Terms of Plane Angle
14. Light Sources and Industrial Lighting
15. Concentrating Reflector
16. Location and Mounting of Projectors
17. The Diffusion Principle
18. Photometric Definitions & Formulae

Design and Drawing of Panel Boards

1. Introduction
2. Design Conditions
3. Standard Sizes of Boards
4. Solved Examples
5. Solution

Design Considerations of Electrical Installations

1. Electric Supply System
2. Three-Phase Four Wire Distribution System
3. Voltage Tolerances
4. Protection Of Electric Installation Against Overload
5. Fuses and Circuit Breakers
6. Rewirable fuses
7. Protection against Electric Shock
8. General Requirements of Electrical Installations
9. Reception and Distribution of Main Supply



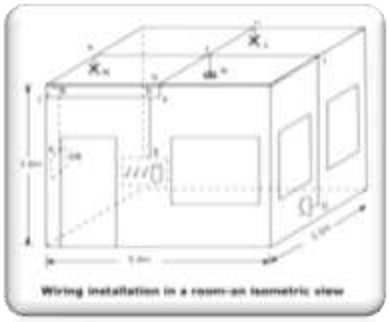
10. Diversity Factor for Sub-Circuits
11. Testing Of Installations
12. Testing Polarity of Single-Pole Switches
13. Indian Electricity Rules
14. Syetems of Wiring
15. Service Connections
16. Light and Fan Sub-Circuit
17. Guidelines for Installation of Fittings
18. Estimating and Costing Of Electrical Installations

Electrical Installation

1. Electrical Installations for Residential Buildings
2. Schematic and Wiring Diagram
3. Calculation of Length of Wire Required
4. Electrical Installation For Commercial Building
5. Busbar and busbar chamber
6. Mounting arrangement of switchboards
7. Costing of Electrical Wiring Installation for C.B.
8. Motor Circuit Wiring
9. Design Considerations of Electrical Installation
10. Determination of the size of conduit
11. Costing of Electrical Wiring Installations

Design of Illumination Schemes

1. Introduction
2. Terminology In Illumination
3. Laws of Illumination
4. Various Types Of Light Sources
5. Practical Lighting Schemes
6. Different Types of Lighting Arrangements



7. Lighting System Consideration for Different Occupancies
8. Design Considerations of a Good Lighting Scheme
9. Mounting height and spacing of fittings

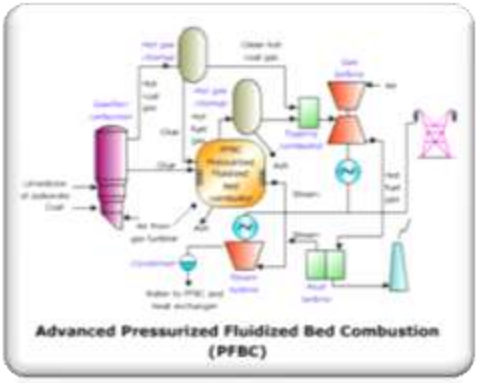
Energy Convertion System (EE11)

Audience: *Students of Electrical Engineering*

Objective: At the end of the course the student will learn about various types of energy conversion systems.

Contents

Introduction to Energy Conversion Systems

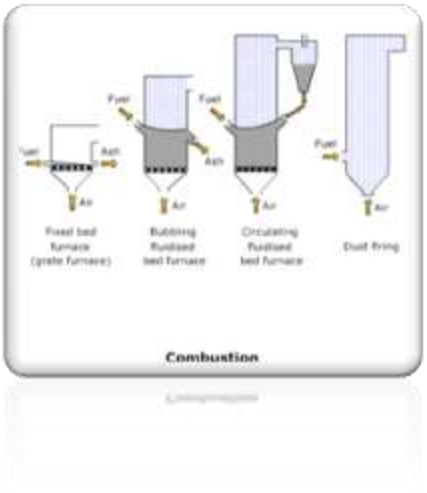


1. Introduction
2. Pressurized Fluidized-Bed Combustion
3. Integrated Gasification Combined Cycle
4. Indirectly Fired Cycle
5. Basic Concepts
6. Equation of State
7. Forms of Irreversibility in Heat Transfer Processes

Non Conventional Energy Sources

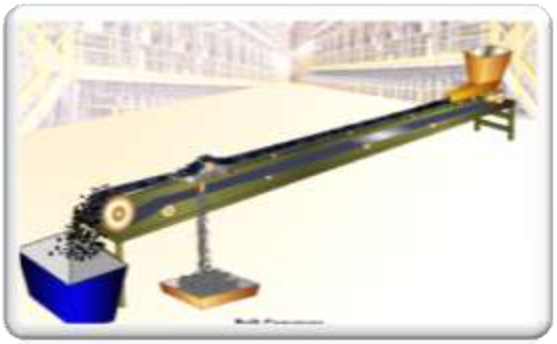
1. Introduction
2. Wind Power Plants
3. Types of Wind Mills
4. Wind-electric Generating Power Plant
5. Wind Electricity in Small Independent Grids
6. Tidal Power Plants
7. Advantages and Limitations of Tidal Power
8. Collectors in Various Ranges and Applications
9. Flat Plate Collectors
10. Focusing
11. Low Temperature Thermal Power Generation
12. Geothermal Power Plants
13. Janata Model Gobar Gas Plant
14. Thermionic Conversion System
15. Magnetohydrodynamics (MHD) System
16. Electrostatic Mechanical Generators

Bio Energy Conversion System



1. Introduction
2. Definition of Biomass
3. Fast Pyrolysis
4. Types of Gasifier
5. Liquid Biofuels
6. Secondary Energy Conversion Technology
7. Biomass Implementation
8. Heat production from biomass
9. Composting
10. Fuel production from biomass
11. Methanol from biomass

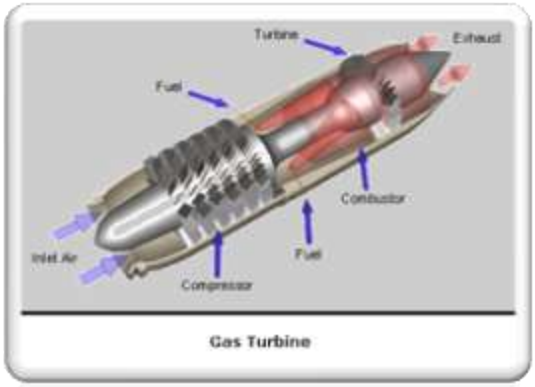
Steam Power Plant System



1. Introduction
2. Classification of Steam Power Plants
3. Capacity Of Steam Power Plant
4. Fuel Handling
5. Storage of Coal
6. Inplant Handling
7. Combustion Equipment for Steam Boilers
8. Stoker Firing
9. Types of Overfeed Stokers
10. Multi-retort Underfeed Stokers
11. Pulveriser
12. Cyclone Burners
13. Classification of Oil Burners
14. Fluidised Bed Combustion (FBC)
15. Ash Handling Systems
16. Dust Collection
17. Removal of Dust and Dust Collectors

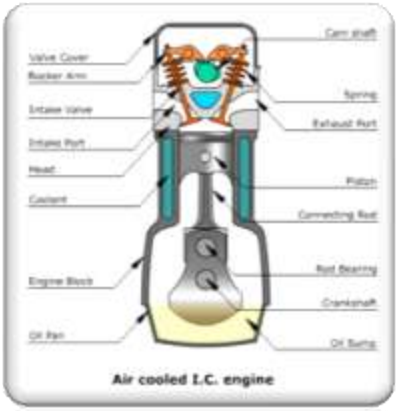
18. Chimney Draught
19. Boilers
20. Selection of a Boiler
21. Fire Tube Boilers
22. Babcock and Wilcox Water Tube Boiler
23. High Pressure Boilers

Gas Turbine Power Plant System



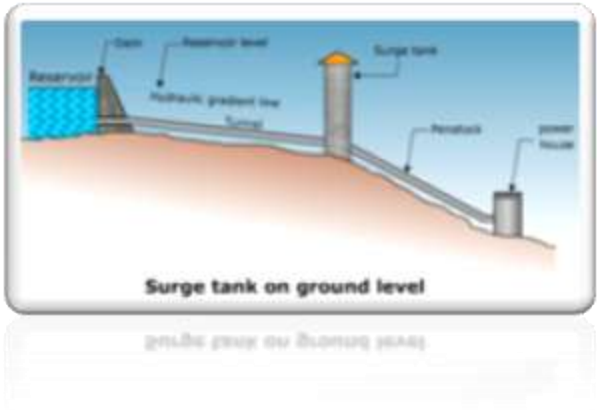
1. Gas Turbines - General Aspects
2. Applications of Gas Turbine Plants
3. Energy Cycle for a Simple-Cycle Gas Turbine
4. Classification of Gas Turbine Power Plants
5. Merits of Gas Turbines
6. Constant Pressure Combustion Gas Turbines
7. Merits and Demerits of Closed Cycle Turbine
8. Gas Turbine Fuels
9. Effect of Operating Variables on Thermal Efficiency
10. Combination Gas Turbine Cycles
11. Operation of a Gas Turbine
12. Components of a Gas Turbine Power Plant
13. Intercoolers and Regenerators

Diesel Engine Power Plant System



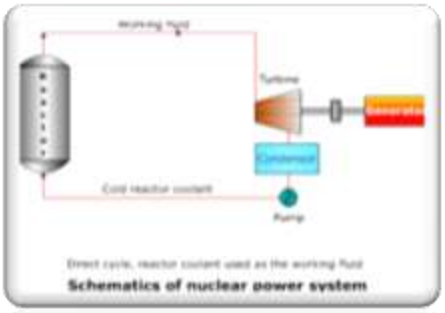
1. Introduction
2. Site Selection
3. Different Parts of I.C. Engines
4. Terms Connected with I.C. Engines
5. Four Stroke Cycle Diesel Engines
6. Two Stroke Cycle Diesel Engines
7. Layout of A Diesel Engine Power Plant

Hydro - Electric Power Plant System



1. Introduction
2. Advantages and Disadvantages
3. Surge Tanks
4. Draft Tubes
5. Power House and Equipment
6. High Head Power Plants
7. Hydraulic Turbines
8. Description of Various Types of Turbines
9. Electrical And Mechanical Equipment In A H-P
10. Underground Hydro-Plants
11. Automatic and Remote Control of Hydro-Station

Nuclear Power System

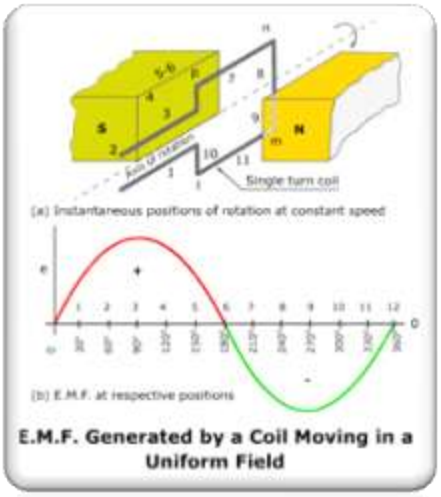


1. Introduction
2. Nuclear Reactors
3. Classification of Nuclear Reactors
4. Essential Components of a Nuclear Reactor
5. Power of a Nuclear Reactor
6. Main Components of a Nuclear Power Plant
7. Description of Reactors
8. Description of CANDU reactor
9. Liquid Metal Cooled Reactors
10. Total Energy Costs

Electrical Equipments in Power Plants

1. Introduction
2. Generating Equipment
3. Conversion of Alternating
4. Construction of D.C. Machines
5. Description of Parts of D.C. Machines

6. Field Poles
7. Commutator
8. Characteristics of D.C. Generators
9. Separately Excited Generator
10. Shunt Generator Characteristics
11. Compound Wound Generator
12. Applications of D.C. Generators
13. Alternator-Current Generators
14. Constructional Details
15. Parallel Operation of Alternators
16. Cooling of Alternators
17. Transformer Ratings
18. Transformer Windings, Terminals
19. Three Phase Transformer
20. Three-phase shell type transformer
21. Fuses
22. Classification of Circuit Breakers
23. Protection of Electrical Systems
24. Different Types of Relays
25. Description of Commonly used Relays
26. Alternator Protection
27. Effects of Short Circuits
28. Methods of earthing system neutral
29. Electrical Equipment-Layout
30. Voltage Regulation
31. Conductor Material
32. Classification of Substations
33. Indian Electricity Act



E.M.F. Generated by a Coil Moving in a Uniform Field

Inverters

1. Learning Objectives
2. Introduction
3. RLC underdamped load
4. The McMurray Inverter
5. McMurray-Bedford Half-bridge Inverter
6. Three-Phase 180o Conduction Mode
7. Three-Phase 120o Conduction Mode
8. Voltage Control of Single-Phase Inverters
9. Harmonic Reduction by Multiple Commutation
10. Single-Phase Capacitor-Commutated
11. Induction motor voltage waveforms
12. Commutating circuit analysis

Repair of Electrical Machines (EE12)

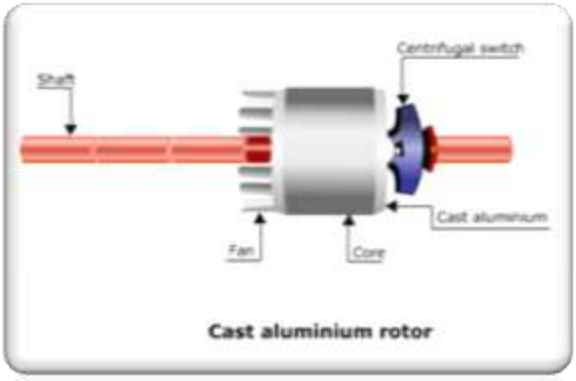
Audience: *Students of Electrical Engineering*

Objective: At the end of the course the student will learn about basics of split phase motor, capacitor motor, motor winding, rewinding processes for A.C. and D.C. motors, etc.

Contents

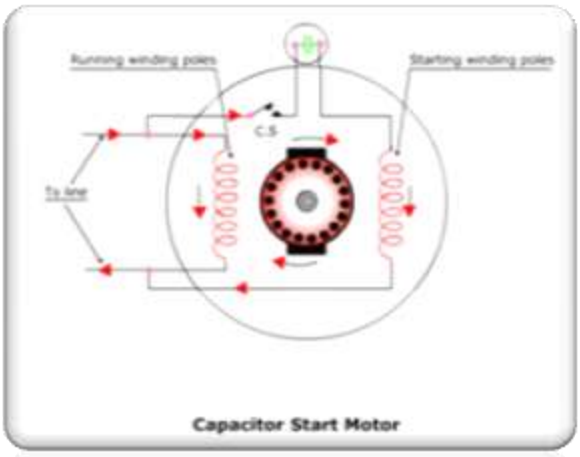
Split Phase Motor

1. Introduction
2. Parts of a split-phase motor
3. Different types of bearings
4. Operation of a split-phase motor
5. Steps of the end-plates
6. Electrical and mechanical degrees
7. A wire gauge and a micrometer
8. Insulation used in slots and Types
9. In regard to polarity
10. Straight line diagram of four pole series
11. Synchronous and Induction
12. Method of determining which pole is open
13. A voltage Drop test
14. Construction and use of internal growler



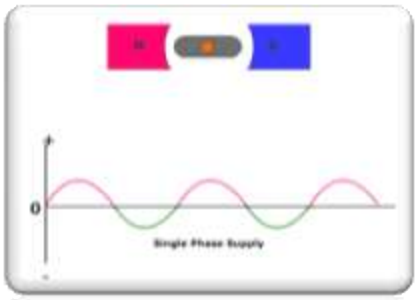
Capacitor Motor

1. Types of Capacitor Motor
2. Description of a capacitor motor
3. Eletrolytic capacitor
4. Capacitors rating
5. Operation of a capacitor-start motor
6. Operations in the repair and rewinding
7. Troubles in capacitor start motor
8. Methods of winding a two-voltage capacitor
9. The causes of the motor



Commercial and Industrial Motor Winding

1. Introduction
2. Multi Phase System
3. Rewinding of Single Phase Motor
4. Method of Rewinding
5. Making Set Winding

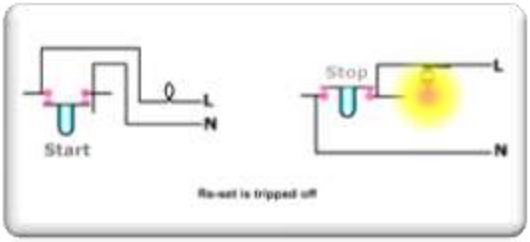


Three Phase Motor Winding

1. Introduction
2. Why Rotor Rotates
3. Addition of field poles decreases speed
4. Three phase, 4-pole synchronous motor
5. Type of Non-Synchronous Motor
6. Characteristics
7. Variable reluctance stepper
8. Permanent magnet stepper
9. Stepper motor wiring diagrams
10. Half step drive
11. Construction

Faults of Starter

1. Faults of Starter
2. Fault Produced in Star - Delta Starter
3. General Fault of Starter
4. Removing Burnt Winding from Stator of AC Motor
5. Method
6. Making Coil
7. Making and drying Varnish in Winding of Motor



AC Motor Rewind Process

DC Motor Rewind Process

Industrial Electronics (EE13)

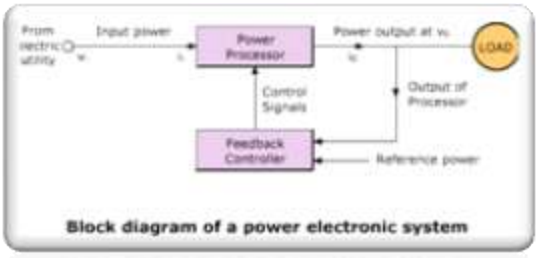
Audience: *Students of Electrical Engineering*

Objective: At the end of the course the student will learn about various electron devices and transducers which are used in industrial electronic systems, Electric circuit, industrial electronic systems, various high power electronic devices, working and control of high power supply systems, etc.

Contents

Introduction

1. Scope of Industrial Electronics
2. Power Electronics
3. Power Electronics V Communication Electronics
4. Scope & Application of Power Electronics
5. Classification of Power Processors
6. Classification of Power Converters
7. Merits & Demerits of Power Electronics
8. Interdisciplinary Nature of Power Electronics
9. Power Semiconductor Devices



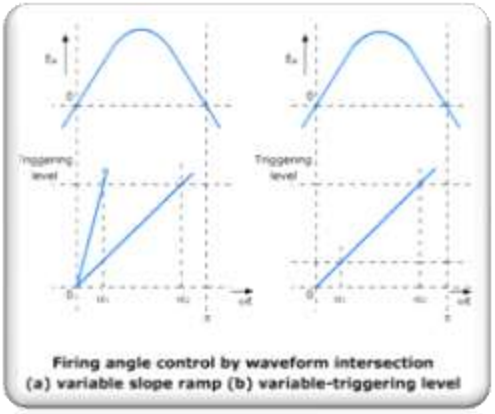
Block diagram of a power electronic system

Thyristor Principles and Characteristics

1. Introduction
2. Thyristor Family
3. Principle of Operations of SCR
4. Static Anode - Cathode Characteristics of SCR
5. The Two Transistor Model of SCR
6. Thyristor Construction
7. Gate Characteristics of SCR
8. Turn-on Methods of a Thyristor
9. Dynamic Turn-on Switching Characteristics
10. Turn-off Mechanism
11. Turn-off Methods
12. Thyristor ratings

13. Measurement of Thyristor Parameters
14. Comparison between Gas Tubes and Thyristors
15. Comparison between Transistors and Thyristors

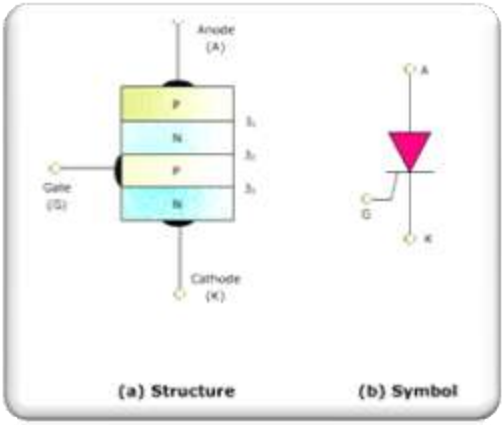
Gate Triggering Circuits



Firing angle control by waveform intersection
(a) variable slope ramp (b) variable-triggering level

1. Introduction
2. Firing of Thyristors
3. Pulse Transformers
4. Optical Isolators Optoisolators
5. Gate Trigger Circuits
6. Unijunction Transistor
7. Programmable Unijunction Transistor (PUT)
8. Phase Control using Pedestal & Ramp Triggering
9. Firing system for DC/DC Choppers
10. Firing Circuit for a Three phase Inverter Bridge

Series and Parallel Operation of Thyristors



1. Introduction
2. Series Operations of Thyristors
3. Need for Equalising Network
4. Equalising Network Design
5. Triggering of Series Connected Thyristors
6. Parallel Operation of Thyristors
7. Methods for ensuring proper current sharing
8. Triggering of Thyristors in Parallel
9. String Efficiency
10. Derating

Phase Controlled Rectifiers

1. Introduction
2. Phase Angle Control
3. Single phase Half wave Controlled Rectifier

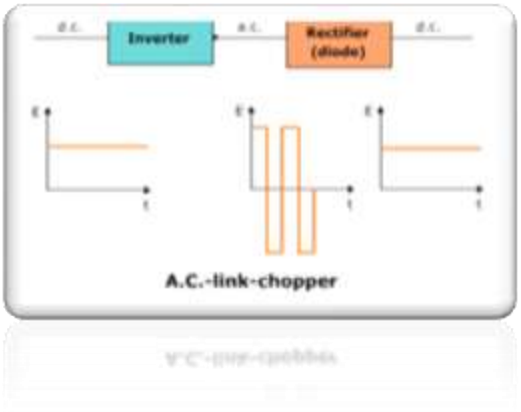
4. Single phase Full wave Controlled Rectifier
5. Single phase Half Controlled Bridge Rectifier
6. Three phase Controlled Converters
7. Three phase Fully controlled Bridge Converter
8. The Effect of Input Source Impedance
9. Dual Converters

Inverters

1. Introduction
2. Thyristor Inverter Classification
3. Series Inverters
4. Self Commutated Inverters
5. Parallel Inverters
6. Single Phase Bridge Voltage Source Inverter
7. Three Phase Bridge Inverters
8. Three Phase Bridge Inverter with Input Circuit Commutation
9. Voltage control of Single Phase Inverter
10. Voltage control of Three Phase Inverter
11. Harmonic Reduction
12. Harmonic Filters
13. Current source Inverters

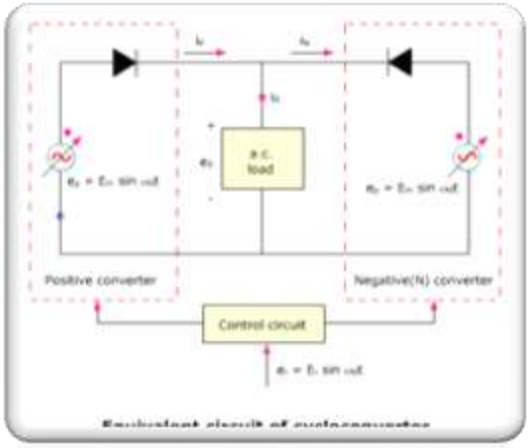
Choppers

1. Learning Objectives
2. Introduction
3. Principle of Chopper Operation
4. Control Strategies
5. Step Up Choppers
6. Step Up/Down Choppers
7. Chopper Configuration
8. Chopper Commutation
9. Jones Chopper
10. Morgan Chopper



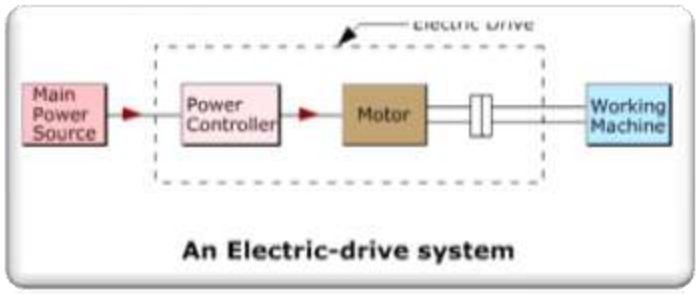
11. A. C. Choppers

Cycloconverters



1. Learning Objectives
2. Introduction
3. The Basic Principle of operation
4. Single phase to Single phase Cycloconverter
5. Three phase Half wave Cycloconverters
6. Cycloconverters Circuits for Three phase Output
7. Ring connected Cycloconverters Circuits
8. Output Voltage Equation
9. Control Circuit
10. Comparison of Cycloconverters and D. C. Link Converter
11. Load commutated Cycloconverters

Electric Drives



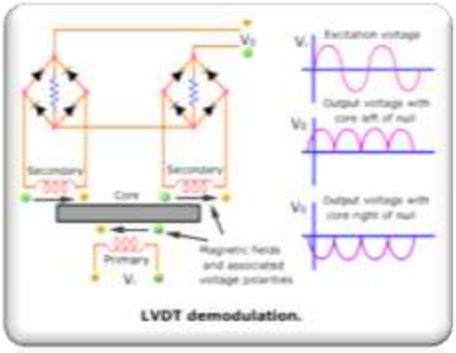
1. Learning Objectives
2. Concept of Electric Drives
3. DC Drives
4. Single Phase DC Drives
5. Three Phase DC Drives
6. Chopper Drives
7. AC Drives
8. Induction Motor Drives
9. Speed Control of Three Phase Induction Motors

Introduction to Industrial Automation

1. Introduction
2. Industrial Communication Networks
3. Transmission Media
4. Transmission Methods

Introduction to Sensors and Measurement Systems

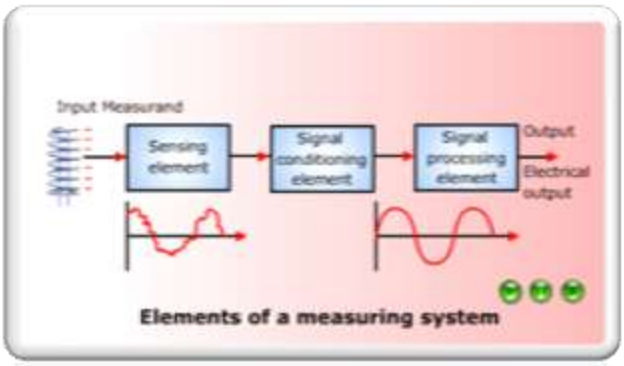
1. Introduction
2. Position and Speed Measurements
3. Proximity Sensors and Switches
4. Linear Variable Differential Transformer
5. Digital Optical Encoder
6. Electrical Resistance Strain Gage
7. Measuring Resistance Changes
8. Force Measurement with Load Cells
9. Liquid-in-Glass Thermometer
10. Electrical Resistance Thermometer
11. Piezoelectric Accelerometer
12. Introduction to Temperature Measurement
13. Sources of temperature measurement error
14. Pressure and Force Measurement
15. Displacement and Speed Measurement
16. Rotary Variable Differential Transformer



LVDT demodulation.

Signal Conditioning and Processing

1. Introduction
2. Unbalanced D.C. Bridge
3. Push-pull Configuration
4. Capacitance Amplifier
5. Amplifiers
6. Errors and Calibration Introduction
7. Systematic Errors
8. Calibration and error reduction



Elements of a measuring system

Sequence Control, PLCs and RLL

1. Programmable Logic Control
2. Industrial Example of Discrete Sensors
3. Comparing Logic and Sequence Control
4. Evolution of the PLC
5. Application Areas
6. Special Purpose Modules
7. The Software Environment and Programming
8. Programming Languages
9. Typical Operands of PLC Programs
10. Realization of off-delay timer
11. Operation Set
12. Requirements Analysis
13. Design of RLL Program
14. Function Block Diagram (FBD)
15. Divergence of a Selective Sequence
16. The PLC Hardware Environment

Control of Machine Tools

1. Fundamentals of C.N.C
2. CNC Lathe (Horizontal Type)
3. Direct Measurement
4. Hydraulics
5. Pneumatics

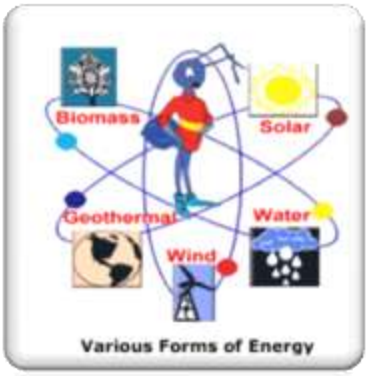
Power Plant Engineering (ME13)

Audience: Students of Second Year Electrical Engineering

Objective: *At the end of the course the student will learn about power plant cycles, Steam, Diesel, Gas Turbine, Hydro Electric, Nuclear Power Plants, conventional and non conventional power generation, Economics of power generation.*

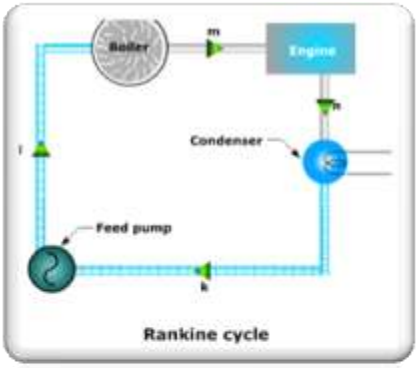
Contents

Introduction



1. Introduction
2. Sources of Energy
3. Fuels
4. Classification of Fuels
5. Energy Stored in Water
6. Nuclear Energy
7. Wind Power
8. Characteristics of Wind Power
9. Solar Energy
10. Tidal Power
11. Geothermal Energy
12. Thermo Electric Power
13. Principal Types of Power Plants

Power Plant Cycles

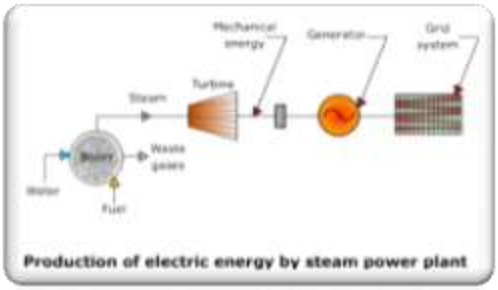


1. Introduction
2. Classification of Power Plant Cycles
3. Rankine Cycle
4. Reheat Cycle
5. Regenerative Cycle
6. Advantages & Disadvantages of Regen. Cycle
7. Binary Vapour Cycle

8. Analysis of Binary Vapour Cycle
9. Otto Cycle
10. Diesel Cycle
11. Dual Combustion Cycle

Steam Power Plant

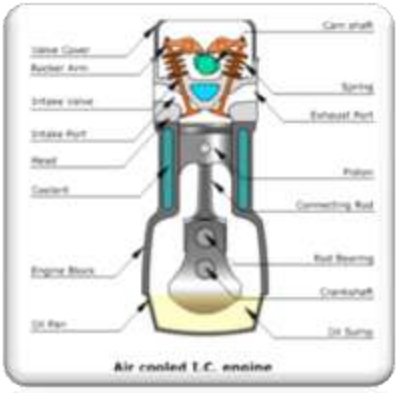
1. Introduction
2. Classification of Steam Power Plant
3. Layout of a Modern Steam Power Plant
4. Components of a Modern Steam Power Plant
5. Fuel Handling
6. Coal Handling Systems
7. Combustion Equipment for Steam Boilers
8. Fluidised Bed Combustion (FBC)
9. Ash Handling
10. Dust Collection
11. Chimney Draught
12. Boilers
13. Accessories
14. Feed Water Heaters & Evaporators
15. Steam Nozzles
16. Steam Turbines
17. Steam Condensers
18. Cooling Ponds & Cooling Towers
19. Feed Water Treatment
20. Piping System
21. Advantages & Disadvantages of Power Plants



Production of electric energy by steam power plant

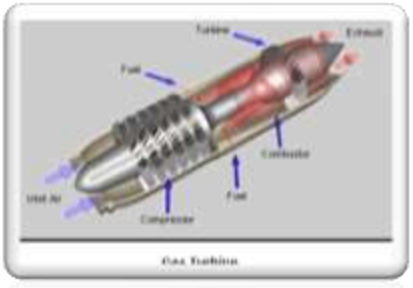
Diesel Engine Power Plant

1. Introduction
2. Advantages & Disadvantages
3. Application of Diesel Power Plant
4. Site Selection
5. Heat Engines
6. Classification of I. C. Engines
7. Different Parts of I. C. Engines
8. Terms Connected with I. C. Engines
9. Four Stroke Cycle Diesel Engines
10. Two Stroke Cycle Diesel Engines
11. Comparison of Four & Two Stroke Engines
12. Comparison of Petrol & Diesel Engine
13. Essential Components of Diesel Power Plant
14. Combustion Phenomenon in C. I. Engines
15. Delay Period in C. I. Engines
16. Basic Designs of C. I. Engines
17. Supercharging
18. Operation of a Diesel Power Plant
19. Diesel Engines used for Diesel Power Plants
20. Layout of a Diesel Engine Power Plant



Gas Turbine Power Plant

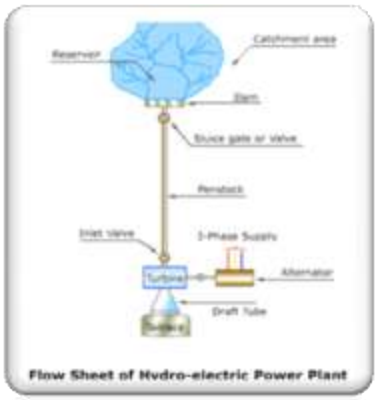
1. Introduction
2. The Simple Gas Turbine Plant
3. Performance Terms
4. Classification of Gas Turbine Power Plants
5. Merits & Demerits of Gas Turbines



6. Constant Pressure Combustion Gas Turbines
7. Constant Volume Combustion Turbines
8. Gas Turbine Fuels
9. Effect of Operating Variables on Thermal Effi.
10. Combination Gas Turbine Cycles
11. Operation of a Gas Turbine
12. Gas Turbine Power Plant Layout
13. Components of Gas Turbine Power Plant
14. Arrangements of Gas Turbine Power Plants
15. Effect of Thermodynamic Variables on Air Ratio
16. Free Piston Engine Plant
17. Relative Thermal Eff. of Different Cycles

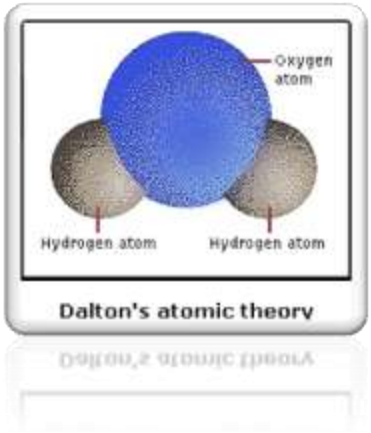
Hydro-Electric Power Plant

1. Introduction
2. Application of Hydro-Electric Plant
3. Advantages & Disadvantages
4. Selection of site for a Hydro-Electric Plant
5. Essential Features of Hydro-Electric Plant
6. Classification of Hydro-Electric Plant
7. Hydraulic Turbines
8. Plant Layout
9. Hydro Plant Auxiliaries
10. Hydro Plant Control
11. Electrical & Mechanical equip. in a Hydro Plant
12. Underground Hydro Plants
13. Automatic & Remote Control of Hydro Station
14. Safety Measures in Hydro-Electric Plant
15. Hydrology



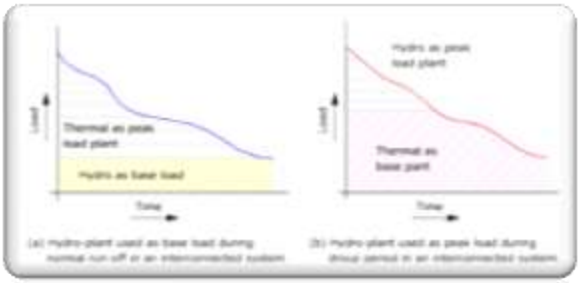
Flow Sheet of Hydro-electric Power Plant

Nuclear Power Plant



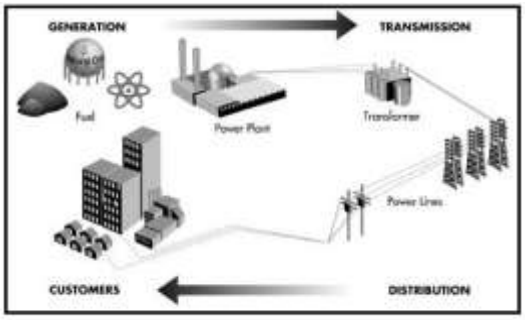
1. General Aspects of Nuclear Engineering
2. Nuclear Power Systems
3. Nuclear Reactors
4. Selection of Materials for Reactor Components
5. Metals for Nuclear Energy
6. Advantages of Nuclear Power Plant
7. Nuclear Plant site selection
8. Application of Nuclear Power Plants
9. Economics of Nuclear Power Plants
10. Safety Measures for Nuclear Power Plants
11. Nuclear Power Plants in India
12. Future of Nuclear Power
13. Useful By-Products of Nuclear Power Generation

Combined Operation of Different Power Plants



1. General Aspects
2. Advantages of Combined Operation of Plants
3. Load Division between Power Stations
4. Combination of Hydro-Electric & Steam Plant
5. Combination of Run-Of-River & Steam Plant
6. Comb. of Pump Storage & Steam/Nuclear Plant
7. Co-ord. of Hydro-Electric & Gas Turbine Station
8. Co-ord. of Different Types of Plants

Economics of Power Generation



Economics of Power Generation

1. Introduction
2. Terms & Definitions
3. Principles of Power Plant Design
4. Location of Power Plant

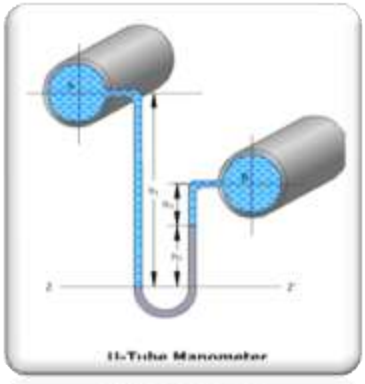
5. Layout of Power Plant Building
6. Cost Analysis
7. Selection of Type of Generation
8. Selection of Power Plant Equipment
9. Economics in Plant Selection
10. Economic Load Sharing

Non-Conventional Power Generation & Direct Energy Conversion

1. Introduction
2. Wind Power Plants
3. Tidal Power Plants
4. Solar Power Plants
5. Geothermal Power Plants
6. Direct Energy Conversion Systems
7. Direct Energy Conversion Systems

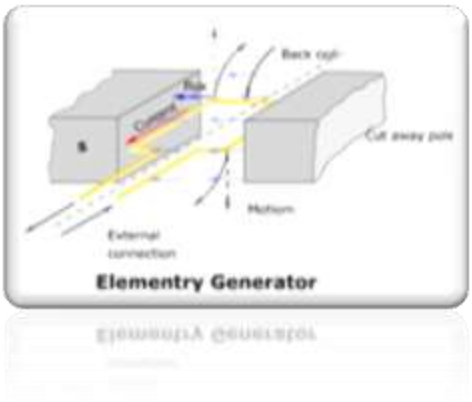
Plant Instrumentation

1. General Aspects
2. Classification of Instruments
3. Pressure Gauges
4. Thermometers
5. Liquid Level Gauges
6. Flow Meters
7. p-H Measuring Instruments
8. Gas Analysers
9. Humidity Measuring Instruments
10. Impurity Measuring Instruments
11. Speed Measuring Instruments
12. Steam Calorimeters & Fuel Calorimeters



Major Electrical Equipment in Power Plants

1. Introduction
2. Generating Equipment
3. Transformers
4. Switchgear
5. Protection of Electrical Systems
6. Short Circuits in Electrical Installations
7. Control Room
8. Earthing of a Power System
9. Electrical Equipment Layout
10. Voltage Regulation
11. Transmission of Electric Power
12. Substations
13. Indian Electricity Act



Pollution & Its Control

1. Introduction
2. Pollution from Thermal Power Plant
3. Pollution from Nuclear Power Plant
4. Pollution from HydroElectric, Solar Power Plant

Microprocessor & Microcontroller (ET11)

Audience: Students of Third Year Electrical Engineering

Objective: *At the end of the course the student will learn about* detailed concepts of microprocessor 8085 and microcontroller 8051.

Contents

Microprocessor Systems Theory

1. Introduction to Microcomputer
2. Microcomputer Architecture & Organization
3. System Bus
4. Microcomputer Characteristics
5. Applications of Microprocessor
6. Microprocessor Architecture

The 8085 Microprocessor Theory

1. Introduction
2. Features of 8085A
3. Architecture of 8085
4. 16 Bit Registers
5. Pin Definitions of 8085
6. Interrupt Signals

The 8085 Instructions & Programming

1. Introduction
2. Steps Involved in Programming
3. Opcode Formats
4. Addressing Modes
5. 8085 Instruction Set
6. Arithmetic operations
7. Branch Group

8. Logic Group
9. Stack Operations
10. Program Examples

Timinng Diagrams

1. Instruction cycle, machine cycle, and T-state
2. Representation of Signals
3. 8085 Machine Cycles and Their Timings
4. Timing Diagrams for 8085 Instructions

Stacks & Subroutines

1. Concept of Stack
2. Stack Operations
3. PUSH Instructions
4. POP Operation
5. Subroutine
6. CALL
7. Machine Control
8. Nested Subroutines
9. Nested Loops

Memory Interfacing

1. Memory Module
2. ROM
3. RAM
4. Memory Structure & its Requirements
5. Basic Concept in Memory Interfacing
6. Address Decoding
7. Address Decoding & Memory Addresses

Interrupts

1. Introduction
2. Necessity of Interrupts
3. Classification of Interrupts
4. Nested Interrupts
5. Software Interrupts in 8085
6. SIM Instruction Format

I/O Data Transfer Techniques & Peripherls

1. Introduction
2. Microprocessor Controlled Data Transfer
3. Direct Memory Access 8237
4. Pin Diagram of 8237A
5. IC 8155
6. Interfacing 8155 with 8085 in I/O Mapped I/O
7. Programmable Peripheral Interface 8255A
8. Interfacing 8255 in I/O Mapped I/O
9. IC 8355/8755
10. Digital to Analog Converters (DAC)
11. Analog to Digital Converters

Microcontroller 8051

1. Introduction
2. Block Diagram
3. Serial Interface
4. Interrupts
5. Addressing Modes
6. Instruction Sets
7. CPU Timing
8. Timing Diagram for External Data Memory
9. 8051 a Boolean Processor

10. Power Saving Options

Memory & Interfacing Theory of 8051

1. Introduction
2. Internal RAM
3. The Stack & the Stack Pointer
4. Internal ROM
5. Connecting External Memory
6. 8751 EPROM Version
7. Keyboard Interface
8. Serial Communication
9. 8051 I/O Expansion using 8255
10. Multiprocessor Communication in MCS 51
11. Interfacing Examples

Study of 8051 & Derivatives

1. AT89C51/52-8-Bit Microprocessor
2. Program Memory Lock Bits
3. Programming the Flash

Power Electronics (ET12)

Audience: *Students of Third Year Electrical Engineering*

Objective: : At the end of the course the student will learn about various electronic devices and transducers, Electric circuit, typical industrial electronic systems, various high power electron devices, working and control of high power supply systems, transformation of power supply to suit the electronic system etc.

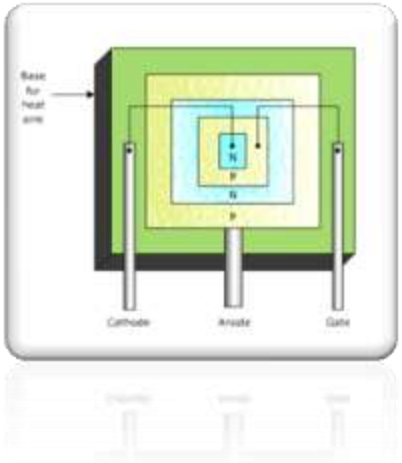
Contents

Introduction

1. Scope of Industrial Electronics
2. Power Electronics
3. Power Electronics V Communication Electronics
4. Scope & Application of Power Electronics
5. Classification of Power Processors
6. Classification of Power Converters
7. Merits & Demerits of Power Electronics
8. Interdisciplinary Nature of Power Electronics
9. Power Semiconductor Devices

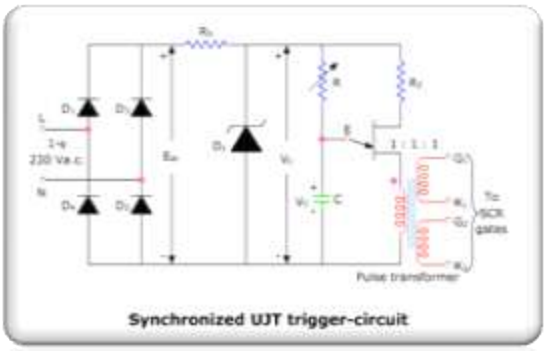
Thyristor Principles and Characteristics

1. Introduction
2. Thyristor Family
3. Principle of Operations of SCR
4. Static Anode - Cathode Characteristics of SCR
5. The Two Transistor Model of SCR
6. Thyristor Construction
7. Gate Characteristics of SCR
8. Turn-on Methods of a Thyristor
9. Dynamic Turn-on Switching Characteristics
10. Turn-off Mechanism
11. Turn-off Methods
12. Thyristor ratings



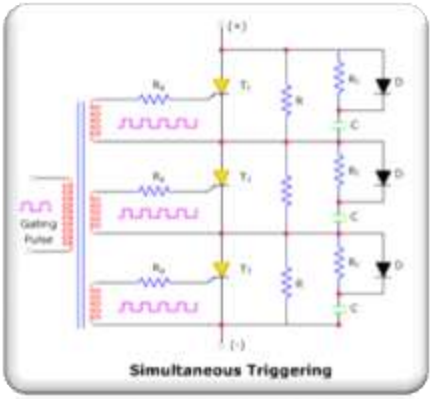
13. Measurement of Thyristor Parameters
14. Comparison between Gas Tubes and Thyristors
15. Comparison between Transistors and Thyristors

Gate Triggering Circuits



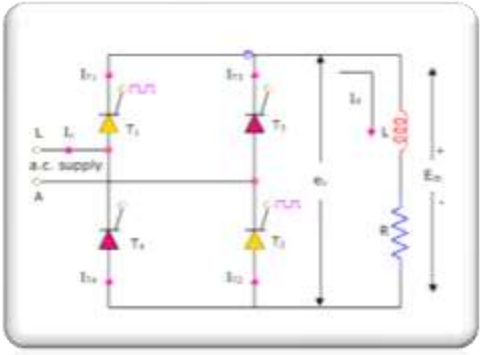
1. Introduction
2. Firing of Thyristors
3. Pulse Transformers
4. Optical Isolators Optoisolators
5. Gate Trigger Circuits
6. Unijunction Transistor
7. Programmable Unijunction Transistor (PUT)
8. Phase Control using Pedestal & Ramp Triggering
9. Firing system for DC/DC Choppers
10. Firing Circuit for a Three phase Inverter Bridge

Series and Parallel Operation of Thyristors



1. Introduction
2. Series Operations of Thyristors
3. Need for Equalising Network
4. Equalising Network Design
5. Triggering of Series Connected Thyristors
6. Parallel Operation of Thyristors
7. Methods for ensuring proper current sharing
8. Triggering of Thyristors in Parallel
9. String Efficiency
10. Derating

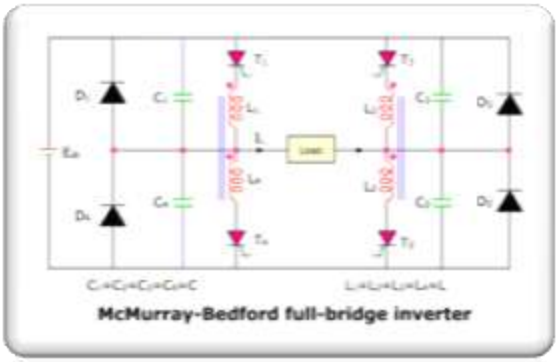
Phase Controlled Rectifiers



1. Introduction
2. Phase Angle Control

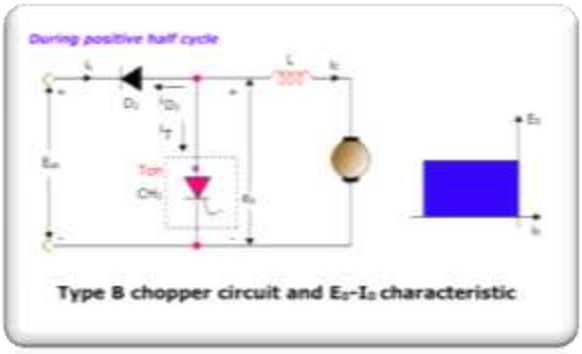
3. Single phase Half wave Controlled Rectifier
4. Single phase Full wave Controlled Rectifier
5. Single phase Half Controlled Bridge Rectifier
6. Three phase Controlled Converters
7. Three phase Fully controlled Bridge Converter
8. The Effect of Input Source Impedance
9. Dual Converters

Inverters



1. Introduction
2. Thyristor Inverter Classification
3. Series Inverters
4. Self Commutated Inverters
5. Parallel Inverters
6. Single Phase Bridge Voltage Source Inverter
7. Three Phase Bridge Inverters
8. Three Phase Bridge Inverter with Input Circuit Commutation
9. Voltage control of Single Phase Inverter
10. Voltage control of Three Phase Inverter
11. Harmonic Reduction
12. Harmonic Filters
13. Current source Inverters

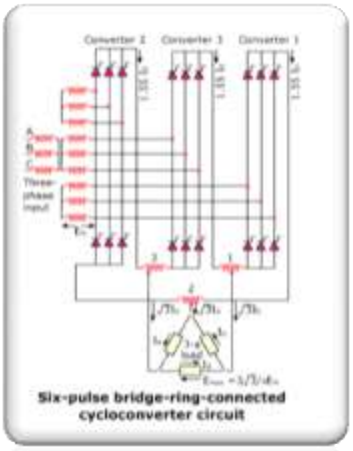
Choppers



1. Introduction
2. Principle of Chopper Operation
3. Control Strategies
4. Step Up Choppers
5. Step Up/Down Choppers
6. Chopper Configuration

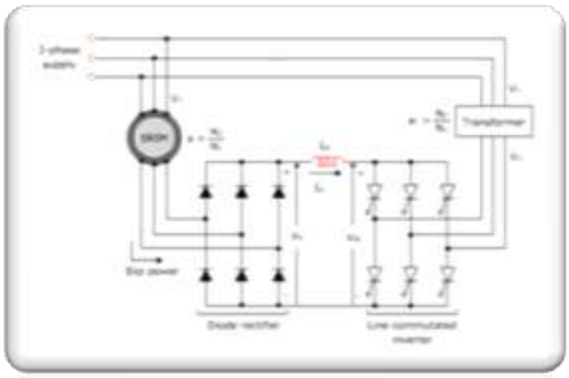
7. Chopper Commutation
8. Jones Chopper
9. Morgan Chopper
10. A. C. Choppers

Cycloconverters



1. Introduction
2. The Basic Principle of operation
3. Single phase to Single phase Cycloconverter
4. Three phase Half wave Cycloconverters
5. Cycloconverters Circuits for Three phase Output
6. Ring connected Cycloconverters Circuits
7. Output Voltage Equation
8. Control Circuit
9. Comparison of Cycloconverters and D. C. Link Converter
10. Load commutated Cycloconverters

Electric Drives



1. Concept of Electric Drives
2. DC Drives
3. Single Phase DC Drives
4. Three Phase DC Drives
5. Chopper Drives
6. AC Drives
7. Induction Motor Drives
8. Speed Control of Three Phase Induction Motors

Renewable Energy Sources (ME15)

Audience: Students of Final Year Mechanical Engineering

Objective: *At the end of the course the student will learn about* different energy sources like Solar, wind, geothermal, bio energy.

Contents

Introduction to Energy Sources

The Solar Energy

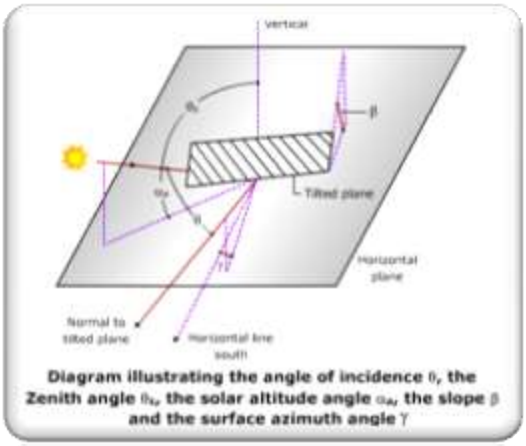


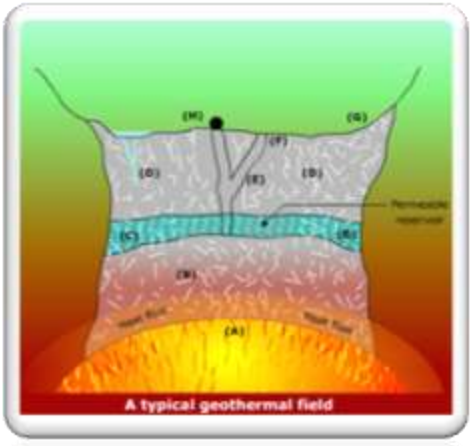
Diagram illustrating the angle of incidence θ, the Zenith angle θ_z, the solar altitude angle α_s, the slope β and the surface azimuth angle γ

16. Conversion Efficiency
17. Actual Efficiency Values

Wind Energy

1. Wind Electrical Systems
2. Historical Background
3. Tip Speed Ratio
4. Power Contained in Wind
5. Thermodynamics of Wind Energy
6. Efficiency Limit for Wind Energy Conversion
7. Efficiency Limit for a Thrust-operated Converter
8. Types of Wind Energy Conversion Devices
9. Power Coefficient
10. Wind Turbine Ratings and Specifications
11. Wind Electrical Systems
12. Aerodynamic Efficiency
13. Design of the Wind Turbine Rotor

Geothermal Energy



1. Introduction
2. Geothermal Sources
3. Hydrothermal (Convective) Resources
4. Vapour Dominated Systems
5. Characteristics of Geothermal steam electric plants
6. Liquid-Dominated Systems
7. Geopressured Resources
8. Comparison of Flashed & Total Flow Concept
9. Interconnection of Geothermal Fossil Systems
10. Prime-Movers for Geo. Energy Conversion

11. Space Heating
12. Process Heating
13. Material Selection for Geothermal Power Plants
14. Geothermal Exploration
15. Operational and Environmental Problems
16. Geothermal Energy in India

Bio Energy

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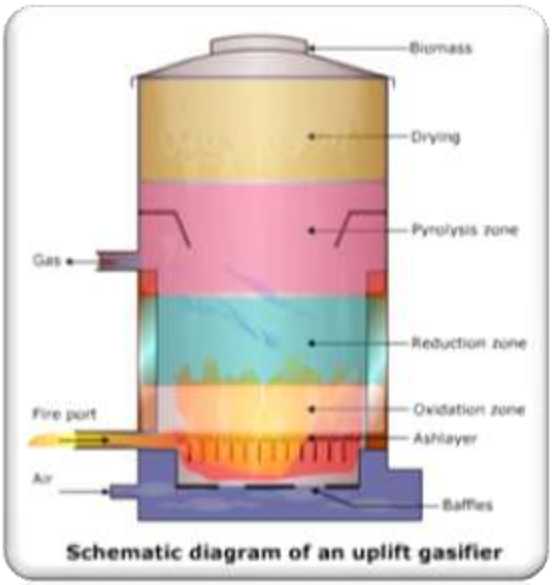
2. Biomass Types & Sources
3. Biomass Technologies
4. Pyrolysis
5. Combustion
6. Gasification
7. Liquid Biofuels
8. Energy Conversion Technology
9. Environment
10. Biomass Implementation
11. Economy
12. Benefits
13. Conversion of Biological Material
14. Heat Production from Biomass
15. Composition
16. Biogas
17. Fuel Production from Biomass



Schematic diagram of an uplift gasifier

Non Destructive Testing (CE20)

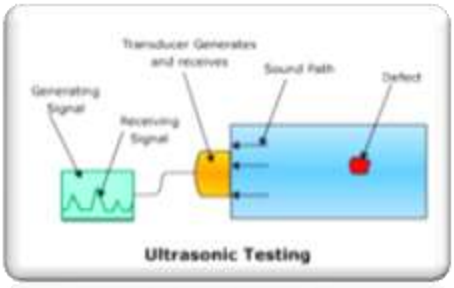
Objective: At the end of the course the student will learn about various non destructive testing method like ultrasonic testing, radiographic testing, magnetic particle testing, liquid penetrant testing, eddy current testing, etc.

Contents

Contents

Ultrasonic Testing

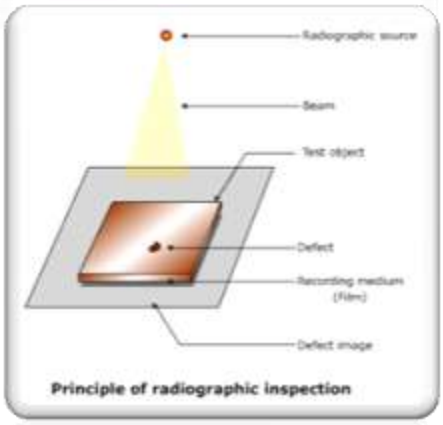
1. Scientific Principles
2. Construction of Probes
3. Tests on welded joints
4. Ultrasonic Flaw Detector
5. Advanced Ultrasonic Testing Technology



Ultrasonic Testing

Radiographic Testing

1. Scientific Principles
2. Gamma Rays
3. Industrial X-Ray Films
4. High Resolution Radiography



Principle of radiographic inspection

Magnetic Particle Testing

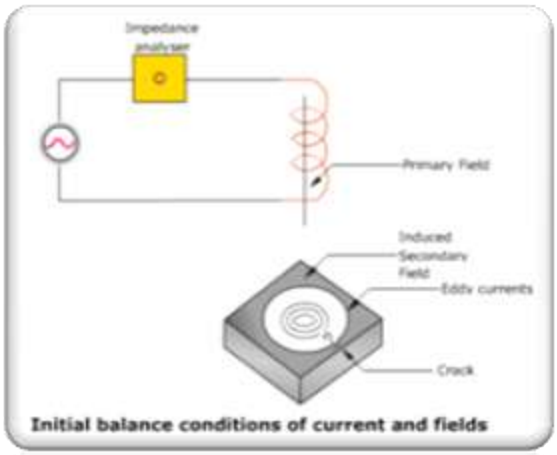
1. Scientific Principles
2. Methods Of Demagnetisation

Liquid Penetrant Testing

1. Scientific Principles
2. Selection of Method and Type of Liquid
3. Uses and Advantageous

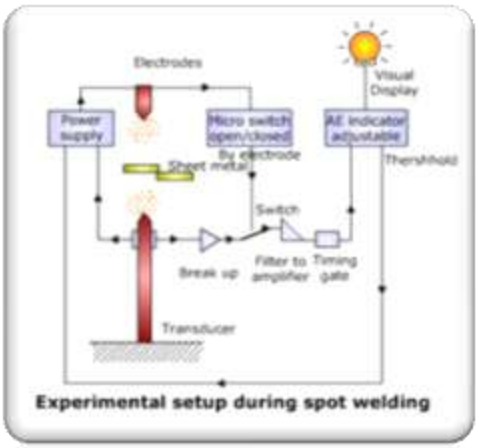
Eddy Current Testing

1. Principle
2. Factors affecting the eddy current
3. Instrumentation For ECT
4. Inspection 0f Welds
5. Advanced Eddy Current Testing
6. Remote Field ECT
7. Computer Modelling Of ECT



Initial balance conditions of current and fields

8. Digital Signal Processing
9. Eddy Current Imaging



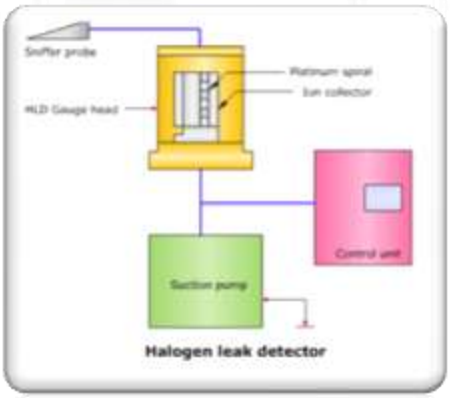
Experimental setup during spot welding

Acoustic Emission Technique

1. Principle of Acoustic Emission Testing
2. On-Line Monitoring Of Welds By Acoustic Emission
3. Experimental Setup
4. Advantages of AET For Weld Monitoring
5. Applications of AET For Monitoring
6. AET for Structural Integrity Monitoring

Leak Testing

1. Introduction
2. Methods of Pressure Leak Detection
3. Halogen, Hydrogen and Sulphur Hexa-Fluoride Detectors
4. Helium Leak Testing of A Large Volume Pipeline



Halogen leak detector

Thermography Testing

1. Basic Principle
2. Detectors And Equipment