

Course:

Wo:

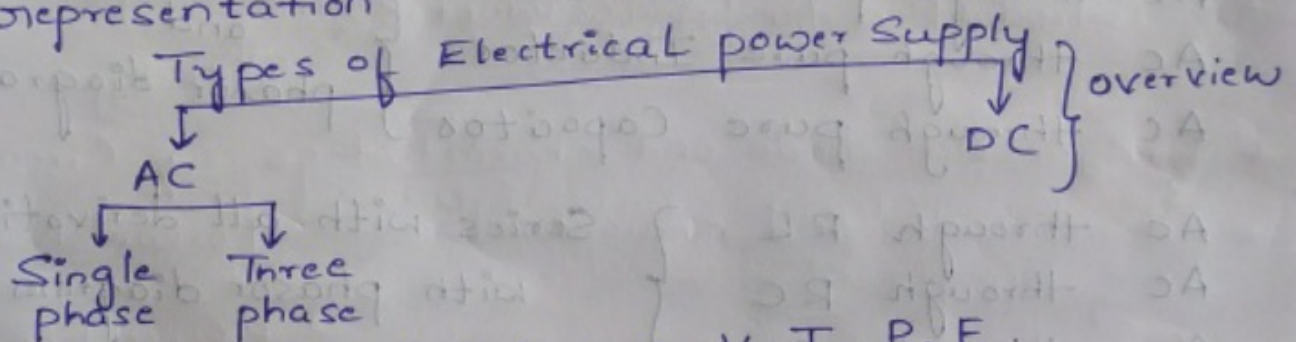
Basics of Electrical and Electronics Engineering

UNIT WISE SYLLABUS DETAIL

Module I : Introduction to DC & AC Fundamentals

* DC Circuits:

Introduction:- Charge, Voltage, Current, power, Energy, resistor, Capacitor, Inductor, Basic Circuit Elements (R, C, I), Sources, Active Elements, passive elements with example. open circuit, Short circuit. Independent sources, dependent sources (only diagram with representation)



Numerical calculation of V, I, P, E

Ohm's Law :- Definition/Statement

→ Graphical representation

→ Limitations.

* Simple Numericals on Ohm's Law

Series and parallel

```
graph LR
    A[Series and parallel] --> B[voltage divider rule]
    A --> C[current divider rule]
```

Numericals on Series and parallel.

KVL → Statement → One source, 2 Voltage Source

KCL → Statement → one source, 2 voltage source

Loop 2 and 3 [excluding Cramer's rule]

Numericals on KVL & KCL (Refer DC Kulkarni)

AC Circuits * Generation of AC Voltage

Representation of AC Quantity (Standard terminology)

- Cycle
- Time
- frequency
- angular frequency.

- * RMS } with derivation
- * Average }
- * Form factor
- * peak factor
- * power factor

Simple numericals on above topic.

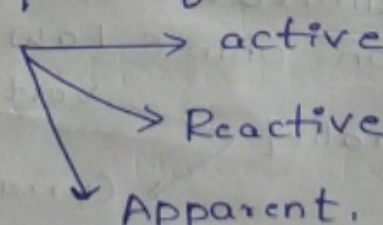
AC through pure Resistor } with Derivations
AC through pure Inductor } and
AC through pure Capacitor } phasor diagram.

AC through RL } Series with all derivations
AC through RC } with phasor diagram
AC through RLC }

Simple Numericals on each topic.

- * power factors.

Significance of power factors.

power triangle 

Module II : Three phase Circuits & Machines

Three phase Circuits;

- * Generation of 3 ϕ AC Quantity
- * Advantages of 3 ϕ over 1 ϕ
- * Limitations

Star & Delta Connection

Star Connection: $V_L = \sqrt{3} V_{ph}$

$$I_L = I_{ph}$$

$$P = \sqrt{3} V_L I_L \cos \phi$$

No
deriva-
tion

Delta Connection: $I_L = \sqrt{3} I_{ph}$

$$V_L = V_{ph}$$

$$P = \sqrt{3} V_L I_L \cos \phi$$

$$\phi = \cos^{-1} \left(\frac{W_1 - W_2}{W_1 + W_2} \right)$$

Simple Numericals on direct formula with power.

DC Machines; Introduction!

Rotating Machine $\begin{cases} \rightarrow \text{AC (Not required)} \\ \rightarrow \text{DC only} \rightarrow \text{Explain} \end{cases}$

Static Machine \rightarrow Transformers

DC only $\begin{cases} \rightarrow \text{DC Generator} \\ \rightarrow \text{DC Motor} \end{cases}$

DC Generator; principle, working, Construction

EMF Equation $\begin{cases} \rightarrow \text{Required Derivation} \\ \rightarrow \text{Numerical} \end{cases}$

DC Motor: principle, Construction, Working

Back EMF Concept } Derivation
Torque Equation } + Numericals

Applications of (i) generators
(ii) Motors

Transformer: Construction, principle & Working

EMF Equation \rightarrow { Derivation + Numericals

Applications of Transformer.

Module III: Semiconductor Diodes & Applications

- ★ Introduction to Semiconductors $\begin{cases} \rightarrow \text{P type} \\ \rightarrow \text{N type} \end{cases}$
- ★ PN junction diode and characteristics, Eq, Circuit $\begin{cases} \nearrow \text{FB} \\ \searrow \text{RB} \end{cases}$
- ★ Zener diode and characteristics $\begin{cases} \rightarrow \text{Forward Bias} \\ \rightarrow \text{Reverse Bias} \end{cases}$
- ★ Zener diode as voltage regulator

Simple Numericals on Zener diode.

Rectifiers: Half wave : Full wave : Bridge

Derivation
+
Numericals

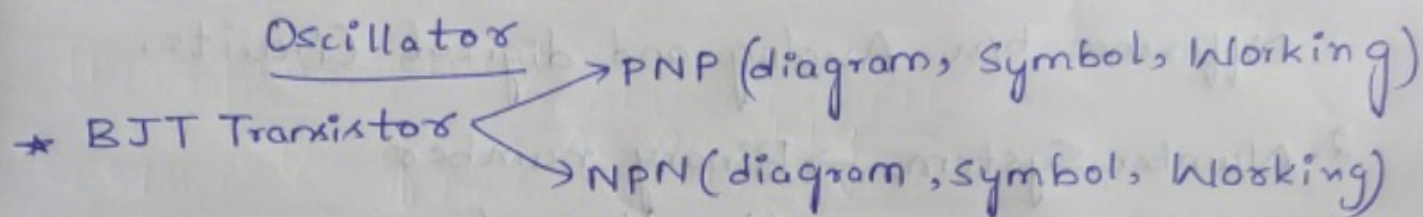
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Differences b/w all rectifiers

- ★ Capacitor filter only for Half wave

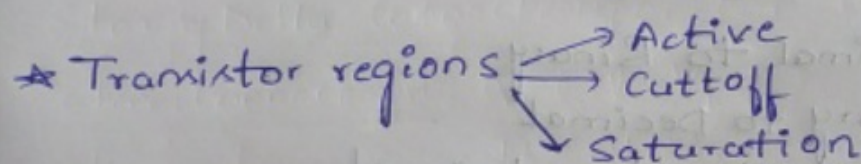
Simple Numericals.

- ★ $\begin{cases} \text{photodiode} \\ \text{LED} \\ \text{photo Coupler} \end{cases} \begin{cases} \rightarrow \text{Diagram} \\ \rightarrow \text{Working} \\ \rightarrow \text{Applications} \end{cases}$

Module IV : BJT applications / Feedback amplifiers /



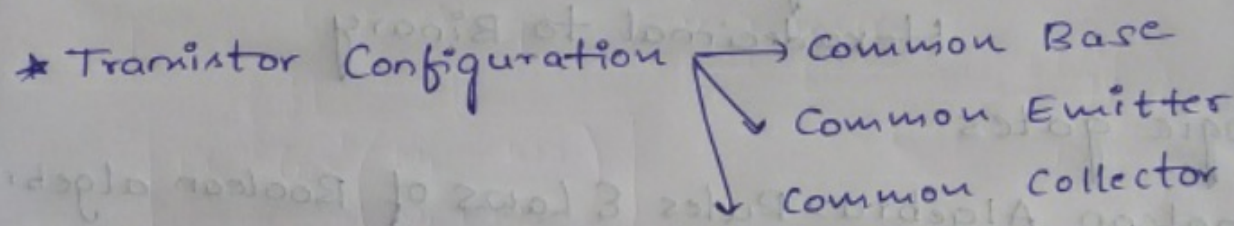
Relationship between α & β
Numericals on transistor (Current, Voltage)
 α, β



★ Transistor as an amplifier

★ Transistor as a switch

- on/off
- LED, LAMP



★ Introduction to feedback amplifiers

- +ve
- -ve

1. Feedback amplifiers and Types of feedback
only 4 types

2. Gain stability with feedback
only one type (Voltage Series feedback)
Def. Kotari

★ Oscillator : Introduction

Condition for Oscillator

Applications.

Module V: Digital Electronics

1. Difference b/n Analog and digital Circuits.
2. Number System → Binary number
→ Hexadecimal
→ Decimal
→ Octal
3. Conversion → Decimal to Binary
Binary to Decimal
Decimal to Hexadecimal
Hexadecimal to Decimal
Binary to Hexadecimal
Hexadecimal to Binary
4. Logic gates
5. Boolean Algebra, Rules & Laws of Boolean algebra
Simple Numericals
6. Demorgans theorem
7. Universal gates → NAND
→ NOR
8. Adders → Half adder - LG + NAND gate
→ Full adder - LG + NAND gate
9. MUX / DEMUX → 2:1
→ 4:1
10. Flip flops: SR, JK, D and T
11. Block diagram of Communication System.
12. Evolution / Generations of mobile Networks
1G, 2G, 3G, 4G, 5G, 6G