Two:

Course:

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

Types of Electrical power Supply → DC } overview
→ AC
→ Single phase
→ Three phase

Numerical calculation of V, I, P, E.

ohm's Law :→ Definition/Statement
→ Graphical representation
→ Limitations.

* Simple Numericals on ohm's Law

Series and parallel → voltage divider rule
→ 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 Kulshreetha)

AC Circuits *Generation of AC Voltage

Representation of AC Quantity (Standard termilogy)

→ Cycle → angular frequency.
→ Time
→ frequency

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

Simple numericals on above topic.

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

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

Simple Numericals on each topic.

* power factor.

Significance of power factor.

power triangle → active
→ Reactive
→ Apparent.

Module II : Three phase Circuits & Machines

Three phase Circuits;

* Generation of 3Ø AC Quantity
* Advantages of 3Ø over 1Ø
* 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 derivation

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 → AC (Not required)
→ DC only → Explain

Static Machine → Transformers

DC only → DC Generator
→ DC Motor

DC Generator; principle, working, Construction

EMF Equation → Required Derivation + Numerical

DC Motor: principle, Construction, Working

Back Emf Concept } Derivation + Numericals
Torque Equation }

Applications of (i) generators
(ii) Motors

Transformer: Construction, principle & Working

EMf Equation → { Derivation + Numericals

Applications of Transformer.

Module III : Semiconductor Diodes & Applications

★ Introduction to Semiconductor → P type, N type

★ PN junction diode and characteristics, Eq Circuit → FB, RB

★ Zener diode and characteristics → Forward Bias, Reverse Bias

★ Zener diode as Voltage regulator
Simple Numericals on Zener diode.

Rectifiers: Half wave, Full wave, Bridge

Derivation
+
Numericals
+
Differences b/w all rectifiers

★ Capacitor filter only for Half wave
Simple Numericals.

★ photodiode, LED, photo Couplers → Diagram, Working, Applications

Module IV : BJT applications / Feedback amplifiers / Oscillator

- ★ BJT Transistor
  - PNP (diagram, Symbol, Working)
  - NPN (diagram, Symbol, Working)

Relationship between α & β

Numericals on transistor (Current, Voltage) α, β

- ★ Transistor regions
  - Active
  - Cutoff
  - Saturation
- ★ Transistor as an amplifier
- ★ Transistor as a switch
  - on/off
  - LED, LAMP
- ★ Transistor Configuration
  - Common Base
  - Common Emitter
  - common collector
- ★ Introduction to feedback amplifiers
  - +ve
  - -ve

1. Feedback amplifiers and Types of feed back
   only 4 types
2. Gain stability with feedback
   Only one type (Voltage Series feedback)
   Ref Kotari

★ Oscillator : Introduction
Condition for Oscillator
Applications.

Module V : Digital Electronics

1. Difference b/w 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