

# NM INSTITUTE OF ENGINEERING AND TECHNOLOGY

**DEPARTMENT OF ELECTRICAL ENGINEERING** 

## THEORY COURSE OUTCOMES

## **DEPARTMENT OF ELECTRICAL ENGINEERING**

## Semester: 1st / 2nd

## Subject: Basic Electrical Engineering

## Subject Code: RBE2B001

**Course Outcomes:** 

#### Students will be able to

- CO1: Understand and analyse DC circuit
- CO2: Understand and analyse AC circuit
- CO3: Understand and analyse three phase circuits
- **CO4:** Understand the basic concepts of magnetic circuits, electro magnetism and electrostatics
- **CO5:** Understand the working principle and applications of DC machines
- **CO6:** Understand the working principle and applications of AC machines

#### Semester: 3<sup>rd</sup>

## **Subject: Network Theory**

## Subject Code: REE3C002

#### **Course Outcomes:**

- CO1: Apply network theorems for the analysis of electrical circuits
- CO2: Obtain the transient and steady-state response of electrical circuits
- **CO3:** Analyse the steady-state response of single-phase and three-phase circuits using sinusoidal excitation.
- CO4: Apply Laplace Transformation for network analysis and realise its behaviour
- **CO5:** Analyse two port circuits and network functions
- **CO6:** Understand coupled circuits

#### Semester: 4<sup>th</sup>

#### **Subject: Electromagnetic Theory**

#### Subject Code: REC4D001

#### **Course Outcomes:**

#### Students will be able to

- CO1: Understand the basic mathematical concepts related to electromagnetic vector fields
- **CO2:** Apply the principles of electrostatics to the solutions of problems related to electric field and electric potential, boundary conditions and electric energy density
- **CO3:** Apply the principles of magneto statics to the solutions of problems relating to magnetic field and magnetic potential, boundary conditions and magnetic energy density
- CO4: Understand the concepts related to Faraday's law, induced EMF and Maxwell's equations
- **CO5:** Apply Maxwell's equations to solutions of problems relating to transmission lines and uniform plane wave propagation
- CO6: Formulate field equation and propagation through different wave-guides

#### **Subject: Electrical Machine-1**

#### Subject Code: REL4C002

#### **Course Outcomes:**

- **CO1:** Acquire knowledge about the fundamental principles and classification of electromagnetic circuits
- CO2: Understand the operation of DC machines
- **CO3:** Understand different excitation and starting methods of DC machines
- CO4: Analyse the differences in operations of different DC machine configurations
- **CO5:** Acquire knowledge about the constructional details and principle of operation of single phase and three phase transformers
- **CO6:** Gain knowledge about testing and applications of single phase and three phase transformers

## **Subject: Power Electronics:**

## Subject Code: REL4C003

## **Course Outcomes:**

#### Students will be able to

- **CO1:** Understand the differences between signal level and power level devices
- **CO2:** Analyse various single phase and three phase power converter circuits and understand their applications
- CO3: Analyse the operation of DC-DC converters and their applications
- **CO4:** Compare different types of modulation techniques
- CO5: Analyse the operation of voltage source and current source inverters and their applications
- **CO6:** Understand the application of different type of power electronic circuits like SMPS, UPS, Electronic Ballast, etc

## Semester: 5<sup>th</sup>

## Subject: Electrical Power Transmission & Distribution

## Subject Code: REL5C001

## **Course Outcomes:**

- **CO1:** Understand the general structure of power systems
- CO2: Impart the knowledge of electrical design aspects of transmission line
- **CO3:** Analyse the performance and function of transmission line
- **CO4:** Analyse mechanical design aspects of transmission system
- CO5: Analyse different types of distribution systems and its design criteria
- **CO6:** Analyse and design aspects of underground cable and impart the knowledge on power system Earthing

## Subject: Industrial Process Control & Dynamics

#### Subject Code: REL5D003

#### **Course Outcomes:**

#### Students will be able to

- **CO1:** Understand the differences between signal level and power level devices
- CO2: Understand control systems, process control block diagram
- **CO3:** Know op-amp circuits in instrumentation
- **CO4:** Analyse digital signal conditioning
- **CO5:** Understand optical sensors
- **CO6:** Analyse controller principles

#### Semester: 5<sup>th</sup>

## Subject: Electrical Machine-2

#### Subject Code: REL5C003

#### **Course Outcomes:**

#### Students will able to

- **CO1:** Know the structure and working of magnetic cores and electrical windings of different electrical machineries
- **CO2:** Gain knowledge on different magnetic fields, which have been produced by DC and AC with different spatial shifting of windings
- **CO3:** Know the basic operation, principle, characteristic and application of three-phase induction motor and induction generator
- **CO4:** Analyse various split phase induction motor and also be able to calculate different parameters of the induction motor
- **CO5:** Understand the operation and performance analysis (V curve and inverted V curve) of synchronous motor
- **CO6:** Gain knowledge over basic principle, EMF generation, voltage regulation and different characteristic of three-phase alternator

Semester: 5<sup>th</sup>

## Subject: Control System

## Subject Code: REL5C002

#### Course Outcomes:

#### Students will be able to

- **CO1:** Understand the mathematical model of physical system as well as open loop and closed loop system
- **CO2:** Understand the time response of first order and second order systems for different test signals and the concept of stability using Routh-Hurwitz Criteria and Root loci method
- **CO3:** Analyze the frequency response of a system using different graphical methods like Bode plots, Nyquist plots, M-circle and N-circle
- **CO4:** Design different feedback controllers
- CO5: Design lead-lag compensators and understand about the tuning of PID controllers
- **CO6:** Analyze state-space of a system and understand the concept of controllability and observability as well as state-space models of linear discrete-time systems

#### Semester: 5<sup>th</sup>

#### **Subject: Electric Drives**

#### Subject Code: REL5C004

#### **Course Outcomes:**

#### Students will be able to

- CO1: Investigate the nature classification and dynamics of electrical drives
- **CO2:** Analyse the performance and speed control of DC motor drives
- CO3: Analyse the performance and speed control of AC motor drives
- CO4: Understand the operation of synchronous motor drives and its characteristics
- **CO5:** Evaluate the combined operation of AC and DC drives
- CO6: Understand different types of traction drives and applications

## Semester: 6<sup>th</sup>

#### Subject: Power System Operation and control

#### Subject Code: REL6C001

**Course Outcomes:** 

- **CO1:** Understand the planning, operation and control of power generation and transmission systems in electric utilities
- **CO2:** Analyse load flow problem in power system network
- **CO3:** Analyse the economic operation problem in power system network
- **CO4:** Evaluate the load frequency control in complex power system network
- **CO5:** Analyse control area system and modelling of Tie line
- **CO6:** Analyse the stability problem of power system and the factors affecting stability

### Semester: 6<sup>th</sup>

#### **Subject: Electrical Power System Protection**

#### Subject Code: REL6D001

#### **Course Outcomes:**

#### Students will be able to

- **CO1:** Identify and understand different protection schemes in power system
- CO2: Calculate and analyze different types of faults in power system
- CO3: Understand the principles and operations of different types of relay
- **CO4:** Understand the basic principle of numerical relay and protection of different electrical equipments
- **CO5:** Understand the theory of auto-reclosing and different methods of current interruptions in circuit breakers
- CO6: Get the basic ideas about different types of circuit breaker

#### Semester: 7<sup>th</sup>

#### Subject: Advance control System

## Subject Code: REL7D001

#### **Course Outcomes:**

#### Students will be able to

**CO1:** Analyse discrete-time mathematical models in both time domain (difference equations, state equations) and z-domain (transfer function using z-transform)

- **CO2:** Analyse transient and steady state responses, stability and sensitivity of both open-loop and closed-loop, linear, time-invariant, discrete-time control systems
- **CO3:** Utilize knowledge of state space and state feedback in modern control systems, pole placement, design of state observers and feedback controllers
- **CO4:** Define and explain the basic properties of multivariable linear systems such as controllability, observability, and transfer functions
- CO5: Explain the stability of linear and nonlinear systems by Lyapunov method
- CO6: Explain the nonlinear system behaviour by phase plane and describing function methods

#### Semester: 7<sup>th</sup>

#### Subject: Smart Grid

#### Subject Code: REL7D003

#### **Course Outcomes:**

- **CO1:** Understand concept of power grid
- CO2: Study different type of devices used in smart grid
- CO3: Analyse different aspects of measurements and applications of smart grid
- **CO4:** Explain different types of turbines and equipment
- **CO5:** Describe power quality monitoring
- CO6: Analyse variable speed wind generators, fuel cells, and micro-turbines