### II B. Tech – I Sem

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**Total** 18 06 08 22

6 Theory + 2 Laboratories
OBJECTIVES:

- This course aims at providing the student with the concepts of Matrices, Numerical Techniques and Curve fitting.

OUTCOMES:

- The student will be able to analyze engineering problems using the concepts of Matrices and Numerical methods

UNIT – I

UNIT – II

UNIT – III
Interpolation: Newton’s forward and backward interpolation formulae – Lagrange’s formulae. Gauss forward and backward formula, Stirling’s formula, Bessel’s formula.

UNIT – IV

UNIT – V
TEXT BOOKS:

REFERENCES:
JJAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

II B.Tech I-Sem (EIE)  
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(15A04301) ELECTRONIC DEVICES AND CIRCUITS

Course Objectives:
The course aims to provide an understanding of semiconductor physics, the intrinsic, p and n materials, characteristics of the p-n junction diode, diode’s application in electronic circuits, characteristics of BJT, FET, MOSFET, and characteristics of special purpose electronic devices. The course also aims to familiarize students with dc biasing circuits of BJT, FET, and analyzing basic transistor amplifier circuits.

Course Outcomes:
Upon completion of the course, students will:
- Analyze the operating principles of major electronic devices, their characteristics, and applications.
- Design and analyze the DC bias circuitry of BJT and FET.
- Design and analyze basic transistor amplifier circuits using BJT and FET.

UNIT-I
Junction Diode Characteristics: Open circuited p-n junction, Biased p-n junction, p-n junction diode, current components in PN junction Diode, diode equation, V-I Characteristics, temperature dependence on V-I characteristics, Diode resistance, Diode capacitance, energy band diagram of PN junction Diode.

Special Semiconductor Diodes: Zener Diode, Breakdown mechanisms, Zener diode applications, LED, LCD, Photo diode, Varactor diode, Tunnel Diode, DIAC, TRIAC, SCR, UJT. Construction, operation, and characteristics of all the diodes are required to be considered.

UNIT-II
Rectifiers and Filters: Basic Rectifier setup, half wave rectifier, full wave rectifier, bridge rectifier, derivations of characteristics of rectifiers, rectifier circuits-operation, input and output waveforms, Filters, Inductor filter, Capacitor filter, L-section filter, Π-section filter, Multiple L-section and Multiple Π-section filter, comparison of various filter circuits in terms of ripple factors.

UNIT-III
Transistor Characteristics:
BJT: Junction transistor, transistor current components, transistor equation, transistor configurations, transistor as an amplifier, characteristics of transistor in Common Base, Common Emitter and Common Collector configurations, Ebers-Moll model of a transistor, punch through/ reach through, Photo transistor, typical transistor junction voltage values.

FET: FET types, construction, operation, characteristics, parameters, MOSFET types, construction, operation, characteristics, comparison between JFET and MOSFET.
UNIT- IV

Transistor Biasing and Thermal Stabilization: Need for biasing, operating point, load line analysis, BJT biasing- methods, basic stability, fixed bias, collector to base bias, self bias, Stabilization against variations in $V_{BE}$, $I_c$, and $\beta$, Stability factors, ($S, S', S''$), Bias compensation, Thermal runaway, Thermal stability.

FET Biasing- methods and stabilization.

UNIT- V

Small Signal Low Frequency Transistor Amplifier Models:

BJT: Two port network, Transistor hybrid model, determination of $h$-parameters, conversion of $h$-parameters, generalized analysis of transistor amplifier model using $h$-parameters, Analysis of CB, CE and CC amplifiers using exact and approximate analysis, Comparison of transistor amplifiers.

FET: Generalized analysis of small signal model, Analysis of CG, CS and CD amplifiers, comparison of FET amplifiers.

TEXT BOOKS:


REFERENCES:

Course Objectives:
• To provide fundamental concepts used in the design of digital systems and learn the methods for the design of digital circuits.

Course Outcomes:
• To introduce basic postulates of Boolean algebra and the methods for simplifying Boolean expressions
• To illustrate the concepts and study the procedures for the analysis and design of combinational circuits and sequential circuits
• To introduce the concepts of programmable logic devices.

UNIT I
Number System & Boolean Algebra:
Digital Systems, Binary Numbers, Number base conversions, Complements of numbers, Signed binary numbers, Binary codes.
Boolean Algebra-Basic definition, Basic theorems and properties, Boolean Functions, Canonical & Standard forms, other logic operations & Logic gates.

UNIT II
Gate Level Minimization:
The map method, four variable & Five variable K-map, POS & SOP Simplification, Don’t care conditions, NAND & NOR Implementation, Other two level Implementation, Ex-or Function, Tabular Method- Simplification of Boolean function using tabulation Method.

UNIT III
Combinational Logic Circuits:
Combinational circuits, Analysis & Design procedure, Binary Adder-Subtractor, Decimal Adder, Binary Multiplier, Magnitude comparator, Decoder, Encoders, Multiplexers.

UNIT IV
Sequential Logic Circuits:

UNIT V
Programmable Devices:
Memory organization, classification of semiconductor memories, ROM, PROM, DROM, EPROM, EEPROM, RAM, expansion of memory, CCD, Flash memories, content
addressable memory, programmable logic devices, PROM at PLD, programmable logic array (PLA) programmable array logic (PAL), field programmable gate array (FPGA).

**Text Books:**

**References:**
**Course objectives:**
- To study about signals and systems.
- To do analysis of signals & systems (continuous and discrete) using time domain & frequency domain methods.
- To understand the stability of systems through the concept of ROC.
- To know various transform techniques in the analysis of signals and systems.

**Learning Outcomes:**
- For integro-differential equations, the students will have the knowledge to make use of Laplace transforms.
- For continuous time signals the students will make use of Fourier transform and Fourier series.
- For discrete time signals the students will make use of Z transforms.
- The concept of convolution is useful for analysis in the areas of linear systems and communication theory.

**UNIT I**
**SIGNALS & SYSTEMS:** Definition and classification of Signal and Systems (Continuous time and Discrete time), Elementary signals such as Dirac delta, unit step, ramp, sinusoidal and exponential and operations on signals. Analogy between vectors and signals-orthogonality-Mean Square error-Fourier series: Trigonometric & Exponential and concept of discrete spectrum

**UNIT II**
**CONTINUOUS TIME FOURIER TRANSFORM:** Definition, Computation and properties of Fourier Transform for different types of signals. Statement and proof of sampling theorem of low pass signals

**UNIT III**
**SIGNAL TRANSMISSION THROUGH LINEAR SYSTEMS:** Linear system, impulse response, Response of a linear system, linear time-invariant (LTI) system, linear time variant (LTV) system, Transfer function of a LTI system. Filter characteristics of linear systems. Distortion less transmission through a system, Signal bandwidth, system bandwidth, Ideal LPF, HPF and BPF characteristics, Causality and Poly-Wiener criterion for physical realization, Relationship between bandwidth and rise time. Energy and Power Spectral Densities

**UNIT IV**
**DISCRETE TIME FOURIER TRANSFORM:** Definition, Computation and properties of Fourier Transform for different types of signals.
UNIT V
LAPLACE TRANSFORM: Definition-ROC-Properties-Inverse Laplace transforms-the S-plane and BIBO stability-Transfer functions-System Response to standard signals-Solution of differential equations with initial conditions.

The Z–TRANSFORM: Derivation and definition-ROC-Properties-Linearity, time shifting, change of scale, Z-domain differentiation, differencing, accumulation, convolution in discrete time, initial and final value theorems-Poles and Zeros in Z-plane-The inverse Z-Transform-System analysis-Transfer function-BIBO stability-System Response to standard signals-Solution of difference equations with initial conditions.

TEXT BOOKS:


REFERENCES:

II B.Tech I-Sem (EIE)  

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(15A02306) ELECTRICAL TECHNOLOGY

Objective:
Electrical Technology contains Single phase transformers, Induction motors, Synchronous Machines, DC generators and motors. The objective is to study their performance aspects.

UNIT- I  DC GENERATORS


UNIT – II  D.C. MOTORS


UNIT-III  SINGLE PHASE TRANSFORMERS


UNIT-IV  3-PHASE INDUCTION MOTORS


UNIT – V  SYNCHRONOUS MACHINES


OUTCOME:

After going through this course the student acquires knowledge on basics of DC generators and motors, Transformers, Induction motors and Synchronous Machines.
TEXT BOOKS:

REFERENCES:
2. Electrical and Electronic Technology, Hughes, Pearson Education.
Course Objective:
• To provide basic knowledge about sensors and transducers used in Process industry, manufacturing industry and Automated plants.

Learning Outcome:
• Upon completion of the subject, students shall be able to understand the sensors, transducers and their applications in Process control industry, manufacturing industry and Automation plants.

UNIT-I

Mechanical and Electromechanical sensor: Resistive (potentiometric type): Forms, material, resolution, accuracy, sensitivity. Strain gauge: Theory, type, materials, design consideration, sensitivity, gauge factor, variation with temperature, adhesive, rosettes. Inductive sensor: common types - Reluctance change type, Mutual inductance change type, transformer action type, Magnetostrictive type, brief discussion with respect to material, construction and input output variable. Ferromagnetic plunger type, short analysis. LVDT: Construction, material, output input relationship, I/O curve, discussion. Proximity sensor.

UNIT-II
Capacitive sensors: variable distance-parallel plate type, variable area-parallel plate, serrated plate/teeth type and cylindrical type, variable dielectric constant type, calculation of sensitivity. Stretched diaphragm type: microphone, response characteristics. Piezoelectric element: piezoelectric effect, charge and voltage co-efficient, crystal model, materials, natural & synthetic type, their comparison, force & stress sensing, ultrasonic sensors.

UNIT-III
Thermal sensors: Material expansion type: solid, liquid, gas & vapor, Resistance change type: RTD materials, tip sensitive & stem sensitive type, Thermister material, shape, ranges and accuracy specification. Thermoemf
sensor: types, thermoelectric power, general consideration, Junction semiconductor type IC and PTAT type. **Radiation sensors:** types, characteristics and comparison. Pyroelectric type.

**UNIT-IV**


**UNIT-V**

Introduction to smart sensors, MEMS Applications, Nano sensors, on-board automobile sensors, home appliance sensors, aerospace sensors.

**Text books:**


**Reference:**

1. *Sensors and Signal Conditioning, Ramon Pallas-Areny, John G.Webster, 2nd Edition*
3. *Instrument Transducers – An Introduction to their Performance and design – by Herman K.P.Neubrat, Oxford University Press.*
   4. *Electronic Instrumentation by H.S.Kalsi.*
II B.Tech. I-Sem (EIE)  

(15A40305) ELECTRONIC DEVICES AND CIRCUITS LABORATORY

Objectives:
- This Lab provides the students to get an electrical model for various semiconductor devices. Students can find and plot V-I characteristics of all semiconductor devices. Student learns the practical applications of the devices. They can learn and implement the concept of the feedback and frequency response of the small signal amplifier.

Outcomes:
- Students able to learn electrical model for various semiconductor devices and learns the practical applications of the semiconductor devices.

PART A: Electronic Workshop Practice
1. Identification, Specifications, Testing of R, L, C Components (Colour Codes), Potentiometers, Coils, Gang Condensers, Relays, Bread Boards.
2. Identification, Specifications and Testing of active devices, Diodes, BJTs, JFETs, LEDs, LCDs, SCR, UJT.
3. Soldering Practice- Simple circuits using active and passive components.
4. Study and operation of Ammeters, Voltmeters, Transformers, Analog and Digital Multimeter, Function Generator, Regulated Power Supply and CRO.

PART B: List of Experiments
(For Laboratory Examination—Minimum of Ten Experiments)

1. P-N Junction Diode Characteristics
   Part A: Germanium Diode (Forward bias & Reverse bias)
   Part B: Silicon Diode (Forward bias only)
2. Zener Diode Characteristics
   Part A: V-I Characteristics
   Part B: Zener Diode act as a Voltage Regulator
3. Rectifiers (without and with c-filter)
   Part A: Half-wave Rectifier
   Part B: Full-wave Rectifier
4. BJT Characteristics(CE Configuration)
   Part A: Input Characteristics
   Part B: Output Characteristics
5. FET Characteristics(CS Configuration)
Part A: Drain (Output) Characteristics
Part B: Transfer Characteristics
6. SCR Characteristics
7. UJT Characteristics
8. Transistor Biasing
9. CRO Operation and its Measurements
10. BJT-CE Amplifier
11. Emitter Follower-CC Amplifier
12. FET-CS Amplifier

PART C: Equipment required for Laboratory

1. Regulated Power supplies
2. Analog/Digital Storage Oscilloscopes
3. Analog/Digital Function Generators
4. Digital Multimeters
5. Decade Résistance Boxes/Rheostats
6. Decade Capacitance Boxes
7. Ammeters (Analog or Digital)
8. Voltmeters (Analog or Digital)
9. Active & Passive Electronic Components
10. Bread Boards
11. Connecting Wires
12. CRO Probes etc.
Objective:

To experiment in detail on DC generators and motors, Transformers, Induction Motors and Synchronous Machines, and evaluate their performance characteristics.

1. Magnetization characteristics of DC shunt generator. Determination of critical field resistance and critical speed.
2. Load test on DC shunt generator. Determination of characteristics.
3. Load test on DC compound generator. Determination of characteristics.
5. Swinburne’s Test on DC Shunt Machine (Predetermination of Efficiency of a Given DC Shunt Machine (i) while working as a Motor and (ii) while working as a Generator.
6. Speed control of DC shunt motor.
8. Sumpner’s Test on a pair of Single Phase Transformers
9. Load test on 3-phase Induction motor
10. No load & Blocked rotor tests on Three phase Induction motor

Note: Any 10 of the above Experiments are to be conducted

OUTCOMES:

- After going through this laboratory course, the student acquires sufficiently good practical knowledge about the operation, testing, and characteristics of DC generators and motors, Transformers, Induction Motors and Synchronous Machines.