**ACHARYA NAGARJUNA UNIVERSITY**

**SCHEME OF INSTRUCTION AND EXAMINATION, w.e.f. 2019-2020**

**ELECTRONICS & COMMUNICATION ENGINEERING BRANCH**

**II/IV B.TECH - I SEMESTER**

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sl. No.** | **Course Details** | | **Scheme of Instruction** | | | **Scheme of Examination** | | | **Credits** |
| **Code No.** | **Subject Name** | **Periods per week** | | | **Maximum Marks** | | **Total Marks** |
| **L** | **T** | **P** | **Internal** | **External** |
| 1. | BS6 | Mathematics-III | 3 | - | - | 40 | 60 | 100 | 3 |
| 2. | PC01 | Network Theory | 3 | - | - | 40 | 60 | 100 | 3 |
| 3. | PC02 | Electronics Devices & Circuits | 3 | - | - | 40 | 60 | 100 | 3 |
| 4. | PC03 | Electromagnetic Field Theory and Transmission Lines | 3 | - | - | 40 | 60 | 100 | 3 |
| 5. | PC04 | Digital Logic Design | 3 | - | - | 40 | 60 | 100 | 3 |
| 6. | PCL1 | Digital Logic Design Lab | 3 | - | 3 | 40 | 60 | 100 | 2 |
| 7. | PCL2 | Electronic Devices and Circuits Lab | 3 | - | 3 | 40 | 60 | 100 | 2 |
| 8. | BSL3 | Soft Skill Lab | 3 | - | 3 | 40 | 60 | 100 | 2 |
|  | Total |  | 24 | - | 12 | 360 | 540 | 800 | 21 |

**MATHEMATICS – III**

**BS6 L T P M C**

**3 0 0 100 3**

UNIT – I

Partial Differential Equations:

Introduction - Formation of Partial Differential Equations - Solutions of a Partial Differential Equation- Equations solvable by direct Integration - Linear Equations of the first Order- Non-Linear Equations of the first Order- Charpits Method - Homogeneous Linear Equations with Constant Coefficients- Rules for finding The Complementary Function - Rules for finding the Particular Integral- Non – Homogeneous Linear equations.

UNIT – II

Integral Transforms:

Introduction- Definition – Fourier integrals – Fourier integral theorem (without proof)-Fourier sine and cosine integrals – complex form of Fourier integral - Fourier Transforms - Properties of Fourier Transforms - Finite Fourier sine and cosine transforms - Convolution theorem (without proof), Parseval's Identity for Fourier Transforms(without proof)

Numerical Solutions of Equations: Introduction - Solution of Algebraic and Transcendental Equations - Bisection method-Newton- Raphson Method - Solutions of linear Simultaneous Linear Equations: iterative methods - Gauss-Seidel Method.

UNIT-III

Finite Differences and Interpolation:

Finite Differences – Differences of a polynomial – factorial notation – relations between operators – Newton’s Interpolation formulae – central difference interpolation formulae - Gauss interpolation formulae – stirlings formula - interpolation with unequal intervals – Lagranges interpolation – inverse interpolation.

UNIT-IV

Numerical Differentiation and Integration:

Numerical Differentiation – Formulae for derivatives.

Numerical Integration: Trapezoidal rule - Simpson's one-third rule - Simpson's three-eighth.

Numerical Solution of Ordinary Differential Equations: Introduction – Picard’s Method- Euler's Method -Runge- Kutta Method of fourth order.

Numerical Solution of Partial Differential Equations: Introduction - Classification of second order equations

TEXT BOOK:

1. B.S. Grewal, Higher Engineering Mathematics, 43rd Edition, Khanna Publishers,

REFERENCE BOOKS:

1. N.P. Bali, A textbook of Engineering Mathematics, Laxmi publications

2. Erwin Kreyszig, Advanced Engineering Mathematics, 8th Edition, New Age International

3. Engineering Mathematics– I BYN.P. Bali, Satyanarayana Bhavanari and Indrani Kelker      Laxmi

publications, New Delhi.

**PC01 CIRCUIT THEORY L T P M C**

**3 0 0 100 3**

**UNIT – I**

**Review of R,L,C and M(Mutual Inductance) and their V-I characteristics-dot rule**-Energy Sources, Ideal, Practical and dependent sources and their V-I characteristics, Source transformation, Voltage and Current division; V-I characteristics of Passive elements and their series / parallel combination; Star Delta transformation

**Graph Theory**: Introduction to Graph Theory, Tree, Branch, Link, Cutset and loop matrices, relationship among various matrices and parameters, Mesh and Nodal Analysis for DC circuits. Formulation of mesh & nodal equations involving are R,L,C and M.

**UNIT – II**

**Review of sinusoidal analysis**: Phase relation in pure resistor, Inductor and capacitor; Impedance diagram, phasor diagram, series and parallel circuits, compound Circuits.

Computation of active, reactive and complex powers; power factor.

First order R-L, R-C circuits, Initial conditions in RLC elements- initial conditions for complicated network-time constant-second order circuits (RLC series and parallel circuits).

**UNIT – III**

**Laplace Transforms:**

Laplace Transforms of typical signals, periodic functions, Inverse transforms, Initial and final value theorems, Application of Laplace transforms in circuit analysis.

Transformed Network Analysis: Response of RL, RC, RLC circuits for impulse and pulse excitations using Laplace Transform method.

Definition of operational/ transformed impedances and admittances of L, C and transformer with initial conditions; development of transformed networks incorporating initial conditions as sources and solution of transformed networks.

**UNIT – IV**

**Network Theorems:** Superposition theorem, Thevenin’s and Norton’s theorems, Reciprocity, Compensation, Maximum power transfer theorems, Tellegan’s and Millman’s theorems, Application of theorems to DC circuits. Sinusoidal steady state Mesh and Node Analysis. Application of network theorems to AC circuits.

**Resonance:** Series resonance, Impedance and phase angle, voltages and currents, bandwidth and Q factor and its effect on bandwidth, magnification, parallel resonance, resonant frequency, variation of impedance with frequency , Q factor, magnification, reactance curves in parallel resonance. Frequency response of RL, RC circuits.

**TEXT BOOKS:**

1. William H. Hayt, Jack E. Kemmerly and Steven M. Durbin, Engineering Circuit Analysis, 6th Edition,TMH, 2002.

2. M.E.Vanvalkenburg, Network Analysis, 3rd Edition, PHI, 2003.

3. A Sudhakar and Shyam Mohan SP, Circuits and Networks: Analysis and Synthesis, 4th  Edition, TMH, 2010

**REFERENCE BOOKS:**

1. Franklin F.Kuo, Network Analysis and Synthesis, 2nd Edition, John Wiley & Sons, 2003.

2. Mahmood Nahvi and Joseph Edminister, Electric Circuits, 4th Edition, Schaum’s outline     series, TMH, 2004.

**PC02 ELECTRONIC DEVICES AND CIRCUITS L T P M C**

**3 0 0 100 4**

**UNIT I**

**THE PN JUNCTION DIODE:** Basic Structure of the PN Junction, Biasing of PN Junction Diode, V-I characteristics of PN junction diode, Diode Current Equation, Effect of temperature on PN junction diodes, Static and Dynamic Resistances, Break Down of PN Junction Diode, Diffusion Capacitance, Transition Capacitance of The Diode, Diode Switching times, Piecewise Linear Diode Model.

**UNIT II**

**BIPOLAR JUNCTION TRANSISTOR (BJT):** Transistor Construction, Operation, Specification Sheet,Transistor Testing, Transistor Casing and Terminal Identification,Transistor Biasing, Operation of NPN and PNP transistor, Transistor as an Amplifier, Transistor configurations and their characteristics, Ebers Moll Model.

**UNIT III**

**TRANSISTOR BIASING AND STABILIZATION:** Need for Biasing, Operating Point, Load lines and Quiescent Point, Fixed Bias Circuit, Self Bias Circuit, Voltage Divider Bias Circuit, Collector to Base Bias Circuit Emitter Stabilized Bias Circuit, Bias Compensation using Diodes and Transistors Stabilization Factors, Stabilization against variations in VBE and β, Bias Compensation using Diodes and Transistors, Thermal Runaway, Thermal Stability, .

**UNIT IV**

**JFET BIASING:** Biasing Circuits for FET: Fixed Bias Circuit, Voltage Divider Bias Circuit, Self Bias Circuit, Graphical Solution for Self Bias.

**MOSFET:** Depletion MOSFET, Enhancement MOSFET, Comparison of BJT, JFET and MOSFET, Comparison of DMOSFET and EMOSFET, Biasing of MOSFET.

**TEXT BOOKS**:

1. Jacob Millman, Christos C. Halkias, and Satyabrata Jit “Electronic devices and Circuits”, 2nd Edition TMH, 1998.
2. Donald A. Neamen, “Semiconductor Physics and Devices”, 3rd edition, TMH,2003
3. Robert L.Boylestad and Louis Nashelsky, “Electronic Devices and Circuit Theory, Tenth Edition, PEARSON Publications.

**REFERENCE BOOKS:**

4.S.Salivahanan, N.Suresh Kumar and A.Vallavaraju, “Electronic Devices and Circuits” 2nd Edition, 2008, TMH.

5. U.A.Bakshi and A.P.Godse “Electronic Devices and Circuits” 1st Edition, 2014, Technical Publications.

**PC03** **ELECTROMAGNETIC FIELD THEORY AND TRANSMISSION LINES**

**L T P M C**

**3 0 0 100 3**

**UNIT – I**

**Electrostatics –I:**

The experimental law of coulomb, Electric field intensity, Field due to a continuous volume charge distribution, Field of a line charge, sheet of charge. Electric Flux Density, Guass’s law, Applications of Gauss law, Divergence, Maxwell’s First equation (Electrostatics), Energy expended in moving a point charge in an electric field, The line integral, Definition of potential and potential difference. The potential field of a point charge, system of charges, potential gradient, the dipole and Energy density in electrostatic field.

**UNIT – II**

**Electrostatics – II:**

The nature of dielectric materials, boundary conditions for perfect dielectric materials. Capacitance. Several capacitance examples. Capacitance of a two wire line. Derivations of Poisson’s and Laplace’s equations, Examples of the solution of Laplace’s equation. Current and current density, continuity of current, conductor properties and boundary conditions.

**UNIT – III**

**The Steady Magnetic Field:** Biot-Savart Law, Ampere’s Circuital Law, Magnetic Flux and Magnetic Flux Density, The scalar and vector magnetic potentials

**Magnetic Forces and Materials**: Force on a moving charge, Force on a differential current element, Force between differential current elements, Force and torque on a closed circuit, The nature of magnetic materials, Magnetization and Permeability. Magnetic boundary conditions. Potential energy in magnetic fields.

**UNIT – IV**

**Time Varying Fields and Maxwell’s Equations**: Faraday’s law, Displacement current, Maxwell’s equations in point form, integral form.

**The Uniform Plane Wave**: Wave propagation in free space, dielectrics. Pointing theorem and wave power. Propagation in good conductors: skin effect. Wave polarization. Reflection of uniform plane waves at normal incidence. Plane wave reflection at oblique incidence angles.

**Transmission Lines**: The Transmission Line equations, Transmission line parameters, some Transmission line examples. TheSmith Chart as an Admittance chart, Impedance Matching and the Smith Chart, Quarter Wave Length Trasformer Matching. Several practical problems.

**TEXT BOOKS:**

1) W H Hayt, J A Buck Engineering Electromagnetics, 7th Edition TMH, 2006.

2) Mathew NO Sadiku, Elements of Electromagnetics, Oxford University Press, 2003.

3) G S N Raju, Electromagnetic Field Theory and transmission lines, 1st Edition, Pearson Education India,2005.

**REFERENCE BOOKS:**

1) Joseph A Edminister, Theory and Problems of Electromagnetics, 2nd Edition, Schaum’s Outline Series, Mc-Graw Hill International, 1993

2) EC Jordan and KG Balmain, Electromagnetic Waves and Radiating Systems, PHI 2003.

**PC04 DIGITAL LOGIC DESIGN L T P M C**

**3 0 0 100 4**

**UNIT-I**

NUMBER SYSTEMS AND CODES: Decimal, Binary, Hexadecimal Number Systems and their Conversions Arithmetic Additions Subtraction using the method of Complements, Multiplication and Division Codes: BCD, Excess-3, Gray and Alphanumeric Codes

BOOLEAN ALGEBRA: Boolean Expressions and Theorems, Logic Gates, Universal Gates, Canonical and Standard forms, Boolean functions, Simplification of Boolean functions using K maps, Minimal Functions and their properties, Tabulation Method NAND and NOR Implementations Two Level and Multi Level

UNIT-II

COMBINATIONAL LOGIC CIRCUITS: EX-OR EX-NOR Circuits, General procedure

for combinational logic circuits, design and application of binary Adders and Subtractors, Comparators, Encoders, Decoders Multiplexers and Demultiplexers, Design of BCD to 7 Segment Decoder, Parity Generator and Checker, BCD Adder/Subtractor, Carry Look Ahead Adders

**UNIT-III**

**SEQUENTIAL LOGIC CIRCUITS**: Latches, characteristic table, characteristic

Equation, Excitation Table, State table and State Diagrams for SR, JK, Master Slave JK, D and T flip-flops, Conversion from one type of Flip-Flop to another, shift registers, Analysis and Synthesis of Sequential Circuits, Sequence Generator, Sequence detector, Parity Generator

COUNTERS USING FLIP-FLOPS: Design of Ripple Counters, Synchronous Counter Up/Down Counters using Flip-Flops.

**UNIT-IV**

SYNCHRONOUS SEQUENTIAL CIRCUITS: Basic Design Steps, Sate Assignment Problem, Mealy State Model, Serial Adder Example, State Minimization, Design of a Counter using the Sequential Circuit Approach, FSM as an Arbiter Circuit, Analysis of Synchronous Sequential Circuits, ASM Charts, Formal Model for Sequential Circuits

**IC LOGIC FAMILIES**: RTL, DTL, TTL, ECL and IIL families and their comparison

**TEXT BOOKS**:

1. M Morris Mano and Micael D. Ciletti, Digital Design, Pearson Education, 2008

2. Digital Principles and Design, Donald D. Givone,TMH,20Cb

**REFERENCE BOOKS**

1. Thomas L. Floyd, Digital Fundamentals 7th Edition, Pearson

2. Charles H. Roth jr., Fundamentals of logic Design, Jaico publications, 1992

3. Taub and Schilling, Digital Integrated Electronics.

**PCL 01 DIGITAL LOGIC DESIGN LAB L T P M C**

**0 0 3 100 2**

1. Realization of Gates using Discrete Components.

2.Realization of Gates using Universal Building Block (NAND only).

3. Design of Combinational Logic Circuits like Half-adder, Full-adder, ·Half-

Subtractor and Full- Subtractor

4. Verification of 4-bit Magnitude Comparator.

5. .Design of Decoders like BCD-Decimal decoder.

6. Applications of IC Parallel Adder (1’s & 2's compliment addition).

• .. **-:7 ...** Design of Code Converters (Binary to Gray).

8*.* ·Design of Multiplexers/De-Multiplexers.

**·9.** Verification of Truth-Table of Flip-Flops using Gates.

l0. Design of Shift registers (To Verify Serial to parallel, parallel to Serial, Serial

to Serial and parallel to parallel Converters) using Flip-Flops.

11. Design of ring& Johnson counters using flip-flops.

12. Conversion of flip-flops (JK-T, JK-D).

13. Design of binary/decade counter

14. Design of Asynchronous counter, mod counter**,** up counter**,** down counter &

up/down counter.

15. Design of synchronous counter, mod counter, up counter, down counter&

up/down counter

**PCL2 ELECTRONIC DEVICES AND CIRCUITS LAB L T P M C**

**0 0 3 100 2**

1. Study of C.R.O

2. Characteristics of Silicon and Germanium diodes

3. Characteristics of Zener diode and regulator

4. Characteristics of Common Base configuration

5. Characteristics of Common Emitter configuration

6. Characteristics of Emitter follower circuit

7. Drain and Transfer Characteristics of JFET

8. Drain and Transfer Characteristics of Depletion MOSFET

9. Drain and Transfer Characteristics of Enhancement MOSFET

10. Design and verification of Self bias circuit

11. Characteristics of LDR and Thermistor

12. Characteristics of source follower circuit

13. Characteristics of Photo transistor

14. Design and verification of collector to base bias circuit

15. Design and verification of Current Source Bias Circuit