Semester III

Electrical Circuit Analysis

1.1 Course Number: EE201
1.2 Contact Hours: 3-1-0 Credits: 11
1.3 Semester-offered: 2nd Year –Odd
1.4 Prerequisite: Class 10th level Mathematics & Science
1.5 Syllabus Committee Members: Dr. Chinmayee Hazarika, Dr. M. Chakkarapani & Dr. Santosh Kumar Verma

2. **Objective:**

1. To study the network theorems for the analysis of electrical circuits.
2. To gain knowledge about single phase and three phase circuits
3. To understand about series and parallel resonance in AC circuits.
3. To know the transient and steady-state response of electrical circuits.
4. To calculate the various two port network parameters.

3. **Course Content:**

Unit-wise distribution of content and number of lectures

Unit	Topics	Sub-Topic	Lectures
1	D.C. Circuits	Superposition theorem. Thevenin's theorem. Norton's theorem Maximum power transfer theorem Reciprocity theorem Duality in electric circuits. Star/delta and delta/star transformation	8
2	Single Phase A.C Series Circuits	'J' Operator, rectangular and polar coordinates, Sinusoidal voltage and current, pure resistive, inductive and capacitive circuits, RL, RC, RLC series circuits, impedance, phase angle, phasor diagram, power and power factor, power triangle, apparent power, active and reactive power, parallel circuits (two branches only), conductance, susceptance and admittance, problems on all the above topics.	10
3	Resonant Circuits	Series Resonance and Parallel Resonance (R, L & C parallel, RL & C parallel only), Quality factor, Dynamic Resistance, Comparison of series and parallel resonance, Problems in the above topics, Applications of Resonance Circuits.	7
4	Three Phase A.C. Circuits	Three phase systems, phase sequence, necessity of three phase system, concept of balanced and unbalanced load, balanced star and delta connected loads, relation between line and phase voltages and	8

		currents, phasor diagram, three phase power and power factor measurement by single wattmeter and two wattmeter methods.	
5	DC Transients and Two port network	DC Transients: RL circuit – RC circuit – RLC circuit – Simple problems, Basic concepts of the following terms: Symmetrical and asymmetrical networks: Balanced and unbalanced network; T network, π network, Ladder network.	8
Total			**41**

4. Readings

4.1 Recommended Books:

References:

1. Theraja, B. L. : Theraja, A. K;, A Text Book of Electrical Technology Vol-I, S. Chand & Co. Ramnagar, New Delhi, ISBN : 978812192440
2. Sudhakar, A. ; Shyammohan, S. Palli; Circuit and network, McGraw Hill Education, New Delhi, ISBN : 978-93-3921-960-4
3. Bell, David A., Electric Circuits, Oxford University Press New Delhi, ISBN : 978-01-954-2524-6
4. Boylested, R.L., Introductory circuit Analysis, Wheeler, New Delhi,ISBN: 978-00-231-3161-5
5. Mittle, V.N. ;Mittle, Arvind; Basic Electrical Engineering, McGraw Hill Education, Noida, ISBN: 978-00-705-9357-2
6. Sivanandam, S.N, Electric Circuit Analysis, Vikas Publishing House Pvt. Ltd, Noida, ISBN:978- 81259-1364-1
7. Salivahanan, S.; Pravinkumar, S; Circuit theory, Vikas Publishing House Pvt. Ltd, Noida;ISBN:978-93259-7418-07.

5. Outcome of the Course:

After the completion of this course the students will be able to:

1. Apply network theorems for the analysis of electrical circuits.
2. Calculate various parameters pertaining to single-phase, resonance and three-phase circuits.
3. Obtain the transient and steady-state response of electrical circuits.
4. Calculate the different two port circuit parameters.

Electrical Machines - I

1.1 Course Number: EE202
1.2 Contact Hours: 3-1-0 Credits: 11
1.3 Semester-offered: 2nd Year –Odd
1.4 Prerequisite: Class 10th level Mathematics, Science and FEEE
1.5 Syllabus Committee Members: Dr. Chinmayee Hazarika, Dr. M. Chakkarapani & Dr. Santosh Kumar Verma

2. **Objective:**

1. To know the constructional details, working principles & evaluate the performance of DC machines and transformers.
2. To decide the suitability of dc generator, motor & transformer for particular application.
3. To familiarize with the constructional details, principle of operation of certain special purpose DC motors and transformers.

3. **Course Content:**

Unit-wise distribution of content and number of lectures

Unit	Topics	Sub-Topic	Lectures
1	DC Generator	DC generator: construction, parts, materials and their functions. Principle of operation of DC generator, schematic diagrams, e.m.f. equation of generator, armature reaction, commutation and. Applications of DC generators.	8
2	D.C Motors	Types of DC motors, Principle of operation, Back e.m.f. and its significance, Voltage equation of DC motor, Torque and Speed; Armature torque, Shaft torque, BHP, losses, efficiency Brake test and Swinburne test. DC motor starters: Necessity, two point and three-point starters, Speed control of DC shunt and series motor: Flux and Armature control.	8
3	Single Phase Transformers	Types of transformers: Shell type and core type; Construction: Parts and functions. Transformer: Principle of operation, EMF equation of transformer: Derivation, Voltage transformation ratio, Significance of transformer ratings, Equivalent circuit of transformer: Equivalent resistance and reactance. Voltage regulation and Efficiency: Direct loading, OC/SC method, All day efficiency	8
4	Three Phase Transformers	Bank of three single phase transformers, Single unit of three phase transformer, Distribution and Power	8

		transformers. Construction, cooling, Three phase transformers connections, Three phase to two phase conversion (Scott Connection), Criteria for selection of distribution transformer, and power transformer, Need of parallel operation of three phase transformer, Conditions for parallel operation.	
5	Special Purpose DC Motors and Transformers	Permanent magnet d.c. motor, Brushless d.c motor, Stepper motor and D.C. servo motor, construction and application. Single phase and three phase auto transformers: Construction, working and applications. Instrument Transformers: Construction, working and applications of Current transformer and Potential transformer.	8
Total			**40**

4. Readings

4.1 Recommended Books:

References:

1. G.C. Garg & P.S. Bimbhra, Electrical Machines, Vol-I, II, Khanna Book Publishing House (ISBN: 978-9386173-447, 978-93-86173-607), New Delhi
2. Mittle, V.N. and Mittle, Arvind., Basic Electrical Engineering, McGraw Hill Education, New Delhi,ISBN: 9780070593572
3. Kothari, D. P. and Nagrath, I. J., Electrical Machines, McGraw Hill Education. New Delhi,ISBN: 9780070699670
4. Bhattacharya, S. K., Electrical Machines, McGraw Hill Education, New Delhi, ISBN: 9789332902855
5. Mehta, V. K. and Mehta, Rohit, Principles of Electrical Machines, S. Chand and Co. Ltd., New Delhi, ISBN: 9788121930888
6. Theraja, B.L., Electrical Technology Vol-II (AC and DC machines), S. Chand and Co. Ltd., New Delhi, ISBN: 9788121924375
7. Bandyopadhyay, M. N., Electrical Machines Theory and Practice, PHI Learning Pvt. Ltd., New Delhi, ISBN: 9788120329973 Vi
8. Murugesh Kumar, K., DC Machines and Transformers, ISBN: 9788125916055

5. Outcome of the Course:

After the completion of this course the students will be able to:

1) Understand the operation of different types of DC generators, DC motors and Transformers.
2) Perform speed control on DC motors and open circuit & short circuit tests on a single-phase Transformer.
3) Select the different types of special purpose DC motors and transformers used in different applications.

Analog Electronic Circuits

1.1 Course Number: EE203
1.2 Contact Hours: 3-0-0 Credits:9
1.3 Semester-offered: 2nd Year –Odd
1.4 Pre-requisite: Fundamental of Electrical and Electronics Engineering
1.5 Syllabus Committee Members: Dr. Chinmayee Hazarika, Dr. M. Chakkarapani& Dr. Santosh Kumar Verma

2. Objective:

i) To expose the students about semiconductor materials, device, performance characteristics and their application.
ii) To introduce basic principles, operation and applications of the various analog electronic circuits and devices like: BJT, and FETs.
iii) To expose the basic principle of operations and application of various electronic circuits like: Amplifiers, oscillators, feedback amplifiers and operational amplifiers.

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3. Course Content:

Unit-wise distribution of content and number of lectures

Unit	Topics	Sub-Topic	Lectures
1	**Semiconductor Diode**	PN junction diode, mechanism of current flow in PN junction, Drift and diffusion current, depletion layer, forward and reverse biased PN junction, potential barrier, Concept of junction capacitance in forward and reverse bias condition. V-I characteristics. Types of diodes and its applications,	7
2	**Bipolar Transistor and Field Effect Transistors**	Bipolar junction transistor: Construction of PNP and NPN transistor, Current relations in transistor; concept of leakage current; configuration of the transistor; Input and output characteristics; Current amplification factors. Comparison of Configurations; Transistors as an amplifier. Construction, operation and characteristics of FET and its application. Construction, operation and characteristics of MOSFET in depletion and enhancement modes and its applications.	8
3	**Single stage transistor amplifier and Power amplifier**	Single stage transistor amplifier circuit, calculation of currents and voltage gain of a single stage amplifier circuit. Analysis of high frequency response of CE amplifier. High frequency equivalent circuits, cut-off frequency. Power amplifier Classification, Transformer coupled class A power amplifier, push pull class B and class AB power amplifiers, efficiency and distortion, Transformer-less class B and Class AB power amplifiers, Class C power amplifier (no analysis required).	8

4	**Feedback amplifiers and Oscillators**	Effect of positive and negative feedback on gain, frequency response and distortion, Feedback topologies and its effect on input and output impedance, Feedback amplifier circuits in each feedback topologies (no analysis required) Classification of oscillators, Barkhausen criterion, Analysis of RC phase shift and Wien bridge oscillators, Working of Hartley, Colpitts and Crystal oscillators.	8
5	**Basics and Applications of Operational Amplifiers**	Basic information about op-amps– Ideal Operational Amplifier, DC and AC performance characteristics, slew rate, Open and closed loop configurations. Sign Changer, Scale Changer, Phase Shift Circuits, Voltage Follower, V-to-I and I-to-V converters, adder, Integrator, Differentiator, Instrumentation amplifier, Comparators, Schmitt trigger, Precision rectifier, peak detector, clipper and clamper, Active filters.	7
Total			**38**

4. Readings

4.1 Textbooks:

1. Principles of Electrical and Electronics Engineering by VK Mehta; S Chand and Co., New Delhi
2. Electronics Devices and Circuits-I by Naresh Gupta, JyoteshMalhotra and harish C Saini, Eagle Prakashan, Jalandhar
3. Electronics Devices and Circuits by Rama Reddy, Narosa Publishing House Pvt. Ltd., New Delhi.

4.2 Reference Books

1. Basic Electronics and linear Circuit by NN Bhargava and Kulshreshta, Tata McGraw Hill, New Delhi.
2. Electronic Components and Materials by SM Dhir, Tata McGraw Hil, New Delhi.
3. Electronic Devices and Circuits by Millman and Halkias; McGraw Hill.
4. Principles of Electronics by Albert Paul Malvino; Tata McGraw Hill, New Delhi

5. Outcome of the Course:

After the completion of this course the student will be able to:
1) Demonstrate an understanding about semiconductor materials, device, performance characteristics and their application.
2) Demonstrate the basic principle of operation and applications of the various analog electronic circuits and devices like: BJT, and FETs. and solve the numerical problems related to these circuits.
3)Demonstrate the basic principle of operations and application of various electronic circuits like: Amplifiers, oscillators, feedback amplifiers and operational amplifiers.

Digital Circuits

1.1 Course Number: EE204
1.2 Contact Hours: 3-0-0 Credits:9
1.3 Semester-offered: 2nd Year –Odd
1.4 Pre-requisite: Fundamental of Electrical and Electronics Engineering
1.5Syllabus Committee Members: Dr. Chinmayee Hazarika, Dr.M. Chakkarapani & Dr. Santosh Kumar Verma

2. **Objective:**

i) To present a problem oriented introductory knowledge of Digital circuits and its applications.
ii) To help in understanding for future subjects like microprocessor and embedded systems.

3**. Course Content:**

Unit-wise distribution of content and number of lectures

Unit	Topics	Sub-Topic	Lectures
1	**Introduction to Digital System**	Conversion of number from one number system to another, Binary addition, subtraction, multiplication, division, Binary Coded Decimal(BCD) numbers and their limitations, addition of BCD coded numbers, conversion of BCD to decimal and vice-versa, Excess-3 code, gray code, binary to gray and gray to binary conversion, Concept of parity, Positive and negative logic, pulse waveform, definition, symbols, truth tables, pulsed operations of gates, Sum of products form(minterm), Product of sum form (maxterms),simplification of Boolean expressions with the help of laws of Boolean algebra Karnaugh mapping techniques up to 4 variables and their applications.	9
2	**Combinational Circuits**	Half adder, full adder circuits and their operation, Parallel binary adder, 2-bit binary full adder, symbols and logic diagrams multiplexers. Realization of Boolean expression using multiplexer/ demultiplexers, Basic Binary decoder, BCD to 7-segment/driver, LED/LCD display, Encoder, Priority encoder, Magnitude comparators, symbols and logic diagrams.	8
3	**Latches and Flip-flop**	Latches, SR Latch, Flip-flops, difference between latch and flip-flop, Conversion from one flip flop to another. Race around condition, JK flip-flop, master slave and their operation using waveform and truth tables.	7
4	**Sequential circuits: Shift Registers and Counters**	Shift registers functions, serial-in-serial out, serial-in-parallel-out, parallel-in serial-out, parallel-in-parallel out, Universal shift register,4-bit Asynchronous counter, 4-bit Synchronous binary counter, Up/down Asynchronous counters, divided by N-counter MOD-3,	8

		MOD-5, counters, Ring counter, Johnson's Counter, and applications.	
5	**Analog to Digital and Digital to Analog Converters**	Analog and Digital Data Conversions, D/A converter, specifications, weighted resistor type, R-2 Ladder type, Voltage Mode and Current-Mode R. 2R Ladder types, switches for D/A converters high speed sample-and-hold circuits, A/D Converters, specifications, Flash type, Successive Approximation type, Single Slope type and Dual Slope type.	8
Total			**40**

4. Readings

4.1 Textbooks:

1. Digital Electronics by KS Jamwal, DhanpatRai& Co., New Delhi
2. Digital Electronics by Rajiv Sapra, Ishan Publication, Ambala
3. Digital Electronics by BR Gupta, Dhanpat Rai & Co., New Delhi
4. Digital Systems: Principles and Applications by RJ Tocci, Prentice Hall of India, New Delhi
5. Digital Electronics by Rajaraman V., Prentice Hall of India, New Delhi

4.2 Reference Books:

1. Digital Electronics and Applications by Malvino leach, Tata McGral Hill, New Delhi
2. Digital Logic Designs by Morris Mano, Prentice Hall of India, New Delhi
3. Digital Fundamentals by Thomas Floyds, Universal Book Stall
4. Digital Electronics by RP Jain, Tata McGraw Hill, New Delhi

5. Outcome of the Course:

1) Use digital electronics in the present contemporary world
2) Design various combinational digital circuits using logic gates
3) Do the analysis and design procedures for synchronous and asynchronous sequential circuits

Materials Science and Engineering

1.1 Course Number: ME203
1.2 Contact Hours: 3-0-0 Credits: 9
1.3 Semester-offered: 2nd Year –Odd
1.4 Pre-requisite: Class-XII Physics
1.5 Syllabus Committee Members: Dr. Chinmayee Hazarika, Dr. M. Chakkarapani, Dr. Santosh Kumar Verma & Dr. Naveen Mani Tripathi

2. Objective:

1. To Understand the classification of materials, bonding and the crystal structure.
2. To understand the Properties of conducting, insulating, semiconducting, dielectricand semiconductor materials.

3. Course Content:

Unit-wise distribution of content and number of lectures

Unit	Topics	Sub-Topic	Lectures
1	**Introduction**	Introduction and historical importance of Materials, Classification of Materials, Engineering Materials, Advanced Materials and Future Materials like ceramics, polymers, composites, Dielectric etc. Bravais Lattices, Crystal Structures, Crystalline, Quasi Crystalline and Non-Crystalline Materials, Miller Indices, Miller-Bravais Indices for Planes and Directions of Cubic and Non-Cubic Structures, structure of ceramics, polymers, and composites materials. Classical theory of electrical and thermal conduction in solids, temperature dependence of resistivity, skin effect, Hall effect.	7
2	**Diffusion and Heat treatment**	Phase Diagrams: Phase Rule, Equilibrium Phase Diagrams, Phase Systems - Isomorphous, Eutectic with No and Limited Solid Solubility and Peritectic, Iron-Carbon Phase Diagram, TTT Diagram. Imperfections in Solids and Strengthening Mechanisms: Point Defects, Line Defects and Dislocations, Interfacial Defects and Bulk or Volume Defects, Recovery, Recrystallization and Grain Growth. Alteration of properties by heat treatment, Heat treatment method, Quantification of altered material properties by heat treatments.	8
3	**Mechanical behavior of Metals and Alloys**	Types of Loading, Stress-Strain Curves for Brittle and Ductile Materials, Theoretical and Observed Shear Stress, Critical Resolved Shear Stress, Deformation – Elastic, Anelastic, Plastic and Super Plastic, Yield Criteria,	8

		Macroscopic Aspects of Plastic Deformation, Toughness Measurements by S-S Curve, Impact Testing and Fracture Toughness Testing. Types of Mechanical Loading and Failures: Ductile and Brittle Fracture, Modes of Fracture Toughness, Impact Fracture, Ductile-Brittle Transition, Types of Impact Testing, Fatigue, Crack Initiation and Propagation, Fatigue Testing, Creep, Stages of Creep Curve, Stress and Temperature Effects.	
4	**Dielectric and Magnetic Property of Materials**	Introduction, polarization of dielectric material, dielectric constant of monatomic gases, frequency dependence of permittivity, dielectric losses, frequency and temperature dependence of the dielectric constant, dielectric properties of polymeric system, ionic conductivity in insulators, insulating materials, ferroelectricity, piezoelectricity. Introduction, Classification of magnetic materials, diamagnetism, paramagnetism, ferromagnetism, magnetization curve, the hysteresis loop, factors affecting permeability and hysteresis loss, common magnetic materials, magnetic resonance.	8
5	**Properties of Metals and Semiconductors**	Energy band in Metals, Semiconductors and Insulators, types of semiconductors, Intrinsic and Extrinsic semiconductors, Effect of temperature on the electrical conductivity of metals, insulator and semiconductor, thermal properties, thermal conductivity of metals and semiconductors, factors affecting the resistivity of electrical materials, electrical conductivity of doped materials, thermoelectric effects.	7
Total			**38**

5. Outcome of the Course:

After the completion of this course the student will be able to:

1) Describe the fundamentals of material science and concepts of unit cell & crystallography.
2) Classify materials based on their conducting, insulating, semiconducting, dielectric properties.
3)Know the practical uses of various materials in different electrical engineering field.

4. Readings

4.1 Textbooks:

1. C.S.Indulkar and S. Thiruvengadam, S., “An Introduction to Electrical Engineering”.

2. P L Kapoor. A Textbook of Electrical and Electronics Engineering Materials: Khanna publishers

3. Kenneth G. Budinski, “Engineering Materials: Prentice Hall of India, New Delhi

Transform Calculus

1.1 Course Number: MA201
1.2 Contact Hours: 3-1-0 Credits:11
1.3 Semester-offered: 2nd Year –Odd
1.4 Pre-requisite: NA
1.5 Syllabus Committee Members: Dr. Rupjit Saikia, Dr. Satish Kumar Tiwari & Dr. M. Chakkarapani

2. Objective:

i) To apply Laplace Transforms to find the solutions of ordinary differential equations.
ii) To apply Fourier Transforms to solve the boundary value problems.
iii) To introduce Z-transform concepts and its applications in solving difference equations.

3. Course Content:

Unit-wise distribution of content and number of lectures

Unit	Topics	Sub-Topic	Lectures
1	**Laplace Transforms-I**	Laplace transform, Properties of Laplace transform, Laplace transform of Unit Step functions, Dirac delta function, Laplace transform of derivatives and integrals.	10
2	**Laplace Transforms-II**	Inverse Laplace transform, Convolution Theorem, Laplace transform of Periodic functions, Evaluation of integrals by L.T and Solutions of ODE.	7
3	**Z - Transforms**	Definition of Z-Transform and its properties, Evaluation of Inverse Z- Transform, Convolution theorem and Application to difference equation.	8
4	**Fourier Transforms-I**	Fourier Transform: Fourier Integral formula, Fourier Transform, Fourier sine and cosine transforms. Linearity, Scaling, frequency shifting and time shifting properties.	9
5	**Fourier Transforms-II**	Inverse Fourier Transform, Self-reciprocity of Fourier Transform. Convolution theorem. Application to boundary value problems.	8
Total			**42**

4. Readings

4.1 Textbooks:

1. Grewal. B.S., “Higher Engineering Mathematics”, 42nd Edition, Khanna Publishers, Delhi, 2012.
2. Veerarajan. T., “Transforms and Partial Differential Equations”, Tata McGraw Hill Education Pvt. Ltd., New Delhi, Second reprint, 2012.
3. Murray R. Spiegel, Schaum's Outline of Laplace Transforms, McGraw Hill, 1965.

4.2 Reference Books:

1. Erwin Kreyszig, “Advanced Engineering Mathematics”, 8th Edition, Wiley India, 2007.
2. Ray Wylie. C and Barrett.L.C, “Advanced Engineering Mathematics” Tata Mc Graw Hill Education Pvt Ltd, Sixth Edition, New Delhi, 2012.

5. Outcome of the Course:

1) Apply Laplace Transform techniques for solving the different engineering represented by differential equations.
2) Use Fourier Transform for solving different boundary value problems.
3) Apply Z-Transforms for solving the difference equations.

Electrical Machines-I Laboratory

1.1 Course Number: EE202L
1.2 Contact Hours: 0-0-2 Credits:2
1.3 Semester-offered: 2nd Year –Odd
1.4 Pre-requisite: FEEE
1.5 Syllabus Committee Members: Dr. Chinmayee Hazarika, Dr. M. Chakkarapani& Dr. Santosh Kumar Verma.

1. No load and load characteristics of self-excited DC shunt generator
2. Load test on DC shunt motor and DC series motor
3. Load test on a DC compound motor
4. Speed Control of DC Shunt motor by a) Armature control method. b) Field control method.
5. Predetermine the efficiency of a DC machine by Swinburne's test
6. Load test on a single-phase transformer
7. Equivalent circuit of a single-phase transformer by conducting open circuit and short circuit test and predetermine the efficiency and regulation.
8. Parallel operation of two similar single-phase transformers.
9. Finding the voltage and current relationships of primary and secondary of a three phase
10. transformer under balanced load in various configurations conditions such as

    (a) Star-star
    (b) Star-delta
    (c) Delta-star

Recommended Books:

1. G.C. Garg & P.S. Bimbhra, Electrical Machines, Vol-I, II, Khanna Book Publishing House (ISBN: 978-9386173-447, 978-93-86173-607), New Delhi

2. Mittle, V.N. and Mittle, Arvind., Basic Electrical Engineering, McGraw Hill Education, New Delhi,ISBN: 9780070593572

3. Kothari, D. P. and Nagrath, I. J., Electrical Machines, McGraw Hill Education. New Delhi,ISBN: 9780070699670

4. Bhattacharya, S. K., Electrical Machines, McGraw Hill Education, New Delhi, ISBN: 9789332902855

5. Mehta, V. K. and Mehta, Rohit, Principles of Electrical Machines, S. Chand and Co. Ltd., New Delhi, ISBN: 9788121930888

6. Theraja, B.L., Electrical Technology Vol-II (AC and DC machines), S. Chand and Co. Ltd., New Delhi, ISBN: 9788121924375

Analog Electronic Circuits Laboratory

1.1 Course Number: EE203L
1.2 Contact Hours: 0-0-2 Credits: 2
1.3 Semester-offered: 2nd Year –Odd
1.4 Pre-requisite: NA
1.4 Syllabus Committee Members: Dr. Chinmayee Hazarika, Dr. M. Chakkarapani, Dr. Santosh Kumar Verma.

1. Study of VI characteristics of Zener diode.
2. Half wave and full wave rectifier with and without filters.
3. To plot and study the input and output characteristics of BJT in common emitter configuration.
4. To plot and study the input and output characteristics of BJT in common base configuration.
5. To plot and study the input and output characteristics of BJT in common collector configuration.
5. To obtain DC and AC load line for fixed bias circuit.
6. To Design and setup a RC phase shift oscillator circuit.
7. Feedback amplifier.
8. To design and setup a summing and difference amplifier circuit with OP AMP 741C for a gain of 2 and verify the output.
9. To design and setup a Differentiator circuit using OP AMP 741C and plot their pulse response.
10. To design and setup an Integrator circuit using OP AMP 741C and plot its pulse response.

Recommended books:

1. Basic Electronics and linear Circuit by NN Bhargava and Kulshreshta, Tata McGraw Hill, New Delhi.
2. Principles of Electrical and Electronics Engineering by VK Mehta; S Chand and Co., New Delhi
3. Electronic Components and Materials by SM Dhir, Tata McGraw Hil, New Delhi.
4. Electronic Devices and Circuits by Millman and Halkias; McGraw Hill.
5. Principles of Electronics by Albert Paul Malvino; Tata McGraw Hill, New Delhi
6. Electronics Devices and Circuits-I by Naresh Gupta, JyoteshMalhotra and harish C Saini, Eagle Prakashan, Jalandhar
7. Electronics Devices and Circuits by Rama Reddy, Narosa Publishing House Pvt. Ltd., New Delhi.

Digital Circuits Laboratory

1.1 Course Number: EE204L
1.2 Contact Hours: 0-0-2 Credits:2
1.3 Semester-offered: 2nd Year –Odd
1.4 Pre-requisite: NA
1.5 Syllabus Committee Members: Dr. Chinmayee Hazarika, Dr. M. Chakkarapani& Dr. Santosh Kumar Verma.

1. Verification of the truth tables of basic logic gates.
2. Verify the NAND and NOR gates as universal logic gates.
3. Design and verification of the truth tables of Half and Full adder circuits.
4. Verification of the truth table of the Multiplexer and Demultiplexer.
5. Verify the truth table of a J-K flip-flop, T flip-flop and D flip-flop.
6. Verify the operation of the counters
7. Design of 4-bit shift register (shift right).
8. Design of 4-bit shift register (shift left).
9. Verification of Analog to Digital Converter
10. Verification of Digital to Analog converter

Recommended Books:

1. Digital Electronics and Applications by Malvino leach, Tata McGral Hill, New Delhi
2. Digital Logic Designs by Morris Mano, Prentice Hall of India, New Delhi
3. Digital Fundamentals by Thomas Floyds, Universal Book Stall
4. Digital Electronics by RP Jain, Tata McGraw Hill, New Delhi