MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

B.Tech. IV Semester (Electronics Engineering)

Subject Code	Category Code	Subject Name	Theory Slot			Practical Slot		Total Marks	Contact Hr/week			Total Credits
			End Sem Marks	Mid Sem Marks	Quiz/ Assignment Marks	End Sem Mark	Lab work & Sessional Mark		L	T	P	
100003	BSC	Mathematics-III	70	20	10	-	-	100	3	2	-	4

Mathematics-III (100003)

Course Objective: To familiarize with Complex variable, To know about the formulation of L.P.P. & Its solution, To explore the knowledge of numerical techniques

Unit I: Complex Variable, Analytic functions, Cauchy-Riemann equations, Harmonic functions, Milne-Thomson method to find conjugate function, Transformations: Conformal, magnification and rotation, inversion and reflection, bilinear transformation.

Unit II: Complex integration, integration of regular function, Cauchy's theorem, Cauchy's integral formula, Taylor's and Laurent's series, Cauchy's residue theorem, evaluation of integrals by residue theorem.

Unit III: Introduction of OR, LPP formulation, Graphical method, Simplex method, Big- M method, Duality of LPP, Transportation and Assignment problems.

Unit IV: Solution of algebraic and transcendental equations by Bisection, Regula-Falsi and Newton-Raphson method, Solution of linear system of equations by Gauss elimination, Gauss-Seidal, and Gauss Jacobi, Interpolation: finite differences, difference ope rators, Newton's interpolation formulae, Newton's divided difference formula, Lagrange's interpolation formula

Unit V: Numerical differentiation up to second order , Numerical integration by Trapezoidal, Simpson's 1/3, Simpson's 3/8 Weddle's rule. Numerical solution of differential equations: Euler's method, Taylor's series, Picard's method, Runge- Kutta method of fourth order.

Reference Books:

1. M. K. Jain, R. K. Jain and S. R. K. Iyengar: Numerical Methods for Scientific & Engineering, New Age International Pvt Ltd Publisher, 6th Edition (2014).
2. R. K. Jain, S. R. K. Iyengar: Advance Engg. Mathematics, Narosa Pub. House Pvt. Ltd, 5th Edition (2016).
3. B. S. Grewal: Higher Engineering Mathematics, Khanna Publishers, 43rd Edition (2015).
4. B.V. Ramanna: Higher Engineering Mathematics, McGraw Hill Education, 1st Edition (2017).
5. H. A. Taha: Operations Research an Introduction, Pearson, 9th Edition 2014.
6. S. D. Sharma: Operation Research, Kedar Nath Ram Nath, 2003.

Course Outcomes

After completing this course, the students will be able to:

- **CO1.** **Acquire** the knowledge of Complex Variable.
- **CO2.** **Solve** the problems of Complex Variable.
- **CO3.** **Find** the optimal solution using various methods of Linear Programming Problem.
- **CO4.** **Apply** different numerical methods in problem solving
- **CO5.** **Evaluate** Ordinary Differential Equation by Numerical methods

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140411	DC	Digital Circuits & Systems	60	20	20	60	20	20	200	3	-	2	4

Digital Circuits & Systems (140411)

Course Objective: To understand the concept of digital systems, design& analyze the combinational and sequential logic circuits.

Unit I: Boolean algebra and switching functions: Minimization of Boolean functions, Canonical & standard form, concept of prime implicant etc. Karnaugh's map method, Quine-McCluskey's method, Universal gates, NAND/NOR realization of Boolean functions.

Unit II: Combinational Logic circuits: Half adder, Half subtractor, Full adder, Full subtratctor circuits. Serial and parallel adder, BCD adders, look-ahead carry generator, Code Converters, Decoders, Encoders, Multiplexers & demultiplexers.

Unit III: Sequential Circuits: Latches, Flip-flops - SR, JK, D, T, and Master-Slave, **Race around condition** Characteristic table and equation, Excitation table, Edge triggering, Level Triggering, Realization of one flip flop using other flip flops.

Unit IV: Registers and Counters: Asynchronous Ripple or serial counter, Asynchronous Up/Down counter, Synchronous counters, Synchronous Up/Down counters, Design of Synchronous counters: State diagram, State table, State minimization, State assignment, Excitation table and Maps Circuit, Implementation: Modulo-n-counter, Registers: Shift registers, Universal shift registers, Shift register counters, Ring counter, Sequence generators, **Johnson Counter**.

Unit V: Logic Families: Diode and transistor as a switch, FET as a switch, specifications for Logic Families, RTL, DCTL, IIL, DTL, all types of TTL circuits, ECL, HTL and PMOS, NMOS & CMOS logic, Comparison of various logic families.

Text Books:

4. Digital Design: M. Mano, 4th Edition**,** Prentice Hall of India.
5. Logic & Computer Design Fundamental: M.Mano, 5th Edition, Pearson Education India.
6. Digital Circuits and Design: S. Salivahanan,5th Edition**,** Oxford University Press.

Reference Books:

4. Digital Electronics: W.H. Gothman, Prentice Hall of India.
5. Digital System Principles & Applications: R.J. Tocci,11th Edition**,** Pearson Education India.
6. Pulse, Digital & Switching Waveforms: Millman&Taub,McGraw Hill Education.

Course Outcomes

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

CO1. Implement the Boolean expression using basic and universal logic gates.
CO2. Design different combinational logic circuits
CO3. Design various latches and flip-flops
CO4. Design various shift registers and counters using flip-flops.
CO5. Analyze different types of logic families, semiconductor memories, & multivibrators.

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Subject Code	Category Code	Subject Name	Theory Slot			Practical Slot			Total Marks	Contact Hr/week			Total Credits
			End Sem Marks	Mid Sem Marks	Quiz/ Assignment Marks	End Sem Mark	Lab work & Sessional Mark	Skill based mini project		L	T	P	
140412	DC	Analog Integrated circuits	60	20	20	60	20	20	200	2	1	2	4

Analog Integrated Circuits (140412)

Course objective: Students will be able to learn the concepts of power, multistage and operational amplifiers. Further, they will learn to design multivibrators using IC 555 and active filter design using Opamp.

Unit I Power Amplifiers: Introduction, amplifier classification, Analysis and design of Class A, Class B, Class AB, class C amplifiers, Amplifier Distortion, Power Transistor Heat Sinking, Class C, harmonic distortion, push pull amplifiers.

Unit II Multistage Amplifiers: classification of amplifiers, distortion in amplifiers, frequency response of an amplifier, step response of an amplifier, types of coupling, low frequency response of an RC coupled stages, effect of an emitter bypass capacitor on low frequency response, two Stage RC coupled Amplifier.

Unit III Multivibrator Design using 555 IC: The 555 IC Circuit, 555 IC block diagram, Using the 555 IC as Astable and Monostable Multivibrator Circuits and its applications: Phase Locked Loops (PLL), Phase Detectors.

Unit IV: Operational Amplifier: Differential amplifier and analysis, Introduction of op-amp, Block diagram, characteristics and equivalent circuits of an op-amp, Power supply configurations for op-amp, thermal drift, Effect of variation in power supply voltage, common-mode rejection ratio (CMRR), Slew rate and its Effect, Gain bandwidth product, frequency limitations and compensations. OP AMP Application circuits such as: Inverting and non-inverting amplifier configurations, Summing amplifier, Integrators and differentiators, Schmitt Trigger, Logarithmic and anti-logarithmic amplifier etc.

Unit V Active Filter Design: Characteristics of filters, Classification of filters, Magnitude and frequency response, Butterworth 1st and 2nd order Low pass, High pass and band pass filters, Chebyshev filter characteristics, Band reject filters, Notch filter; all pass filters, self-tuned filters.

Text Books:

1. Electronics Devices and Circuits: Boylested & Nashelsky,11thEdition**,** Pearson Education India
2. Op-Amp and Linear Integrated Circuit: R.A.Gayakwad, 4th Edition, Prentice Hall of India.

Reference Books:

1. Integrated Electronics: Millman&Halkias, 2nd Edition,McGraw Hill Education
2. Electronics Devices and Circuits: Shalivanan, 2nd Edition, Tata Mcgraw Hill Education.
3. Microelectronic Circuits- Theory and Application: Sedra& Smith,7th Edition**,** Oxford Press.

Course Outcomes

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

- **CO1. Compare** the efficiency of various power amplifiers.
- **CO2. Analyze** the parameters of multistage amplifiers.
- **CO3. Design** Multivibrator circuits using IC 555.
- **CO4. Design** the electronic circuits using Operational amplifier.
- **CO5. Implement** the active filters based on given specifications.

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B.Tech. IV Semester (Electronics Engineering)

Subject Code	Category Code	Subject Name	Theory Slot			Practical Slot			Total Marks	Contact Hr/week			Total Credits
			End Sem Mark	Mid Sem Mark	Quiz/ Assignment Marks	End Sem Mark	Lab work & Sessional Mark	Skill based mini project		L	T	P	
140413	DC	Analog Communication	60	20	20	60	20	20	200	2	1	2	4

Analog Communication (140413)

Course objective: To understand the concept of multiplexing, various types of modulation, design and analysis of transceiver for AM, FM application, probability theory and probability function, noise.

Unit I Amplitude Modulation: Introduction to multiplexing, types of multiplexing, need of modulation, Amplitude modulation**,** single side band and double side band suppressed carrier and vestigial side band, modulation techniques their generation, detection and spectral analysis, square law modulators, switching modulator, envelope and square law detector, balanced modulator, Power calculation for AM, DSB-SC & SSB-SC.

Unit II Angle Modulation: Relationship between Frequency and phase modulation, frequency and phase deviation, types of FM, comparison between NBFM & AM signal., Carson's rule, spectrum of FM signal, Constant bandwidth of FM, comparison of narrow band and wide band FM, generation and detection of FM.

Unit III AM & FM transmitter and receiver: Tuned radio receiver, limitation of TRF, Super heterodyne receiver, concept of IF frequency, image signal rejection, selectivity, sensitivity and fidelity, Noise in AM, FM, Block diagram of FM transmitter& receiver.

Unit IV Probability, and random variables: Cumulative distribution function, probability density function, average and variance of random variables, Various types of elementary Discrete and continuous PDF function and calculation of statistical averages, moment generating and characteristic function, Gaussian and Rayleigh probability density function.

Unit V Noise Analysis: Various sources of noise, types of noise with their characteristics, Mathematical representation of noise figure, Noise bandwidth, Noise temperature and noise figure of amplifiers in cascades, Figure of merit of modulation techniques, comparison of modulation scheme for noise.

Text Books:

1. Communication System: Simon Haykins,4th Edition, Wiley & Sons.
2. Communication Systems - B. P. Lathi, BSP Publication

Reference Books:

1. Communication System: George Kennedy, 5th Edition, Tata McGraw-Hill Education.
2. Modern Digital & Analog Communication System: B.P. Lathi ,4th Edition, Oxford University Press;
3. Principles of Communication System: Taub and Schilling,3rd Edition, McGraw-Hill Education.

Course Outcomes

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

CO1.	**Analyze** the amplitude modulation, their generation & detection methods.
CO2.	**Explain** the generation and detection techniques for angle modulated signal**.**
CO3.	**Explain** the working of transmitter and receiver.
CO4.	**Evaluate** the statistical parameters for general PDF/CDF.
CO5.	**Evaluate** the effects of noise on modulation techniques.

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B.Tech. IV Semester (Electronics Engineering/ Electronics & Telecommunication Engineering)

Subject Code	Category Code	Subject Name	Theory Slot			Practical Slot			Total Marks	Contact Hr/week			Total Credits
			End Sem Marks	Mid Sem Marks	Quiz/ Assignment Marks	End Sem Mark	Lab work & Sessional Mark	Skill based mini project		L	T	P	
140414	DC	Communication Networks	60	20	20	-	-	-	100	2	1	-	3

Communication Networks (140414)

Course objective: To make the students capable of analyzing electrical network and how to synthesize an electrical network from a given impedance/admittance function.

Unit I Basic Parameters of Networks: Characteristic impedance, iterative impedance, Propagation constant, analysis of symmetrical T, π, Lattice and Bridged-T networks, image impedance, attenuators and their design.

Unit II-Network Synthesis: Positive real function, LC, RL, RC and RLC network synthesis, Foster and Cauer form realization , Minimum positive real function, Brune's method, Bott-Duffin method, Insertion Loss Synthesis, and Coefficient matching technique.

Unit III- Passive Filters: Constant K prototype Filters: Low pass, high pass, band pass and band elimination filters, m-derived filters, composite filters, frequency transformation.

Unit IV-.Transmission Line: Voltage and current on a transmission line; characteristic impedance and propagation constant of a transmission line, Lossless & Distortion less line, reflection on a line, Standing wave ratio, and Transient analysis of terminated transmission line.

Unit V- Lines at radio frequency: Dispersion less line, Input impedance of open circuit and short circuit line, power and impedance measurement, λ/8, λ/4, λ/2 lines, Smith chart and application, Single stub and double stub matching.

Text Books:

1. Introduction to Modern Network Synthesis: Van Valkenberg,1st Edition, John Wiley & Sons.
2. Communication Network and Transmission Lines by Bakshi & Bakshi, Technical Publication

Reference Books:

3. Principles of Active Network Synthesis and Design: G. Daryanani,1st Edition, John Wiley & Sons.
4. Network Analysis and Synthesis - F.F. Kuo,2nd Edition, John Wiley & Sons.
5. Networks, Lines, & Fields: J.D. Ryder, 2nd Edition, Prentice Hall of India.
6. Elements of Electromagnetics: Mathew N. O.Sadiku, 3rd Edition, Oxford Publication Press.

Course Outcomes

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

- **CO1. Design** the symmetrical and asymmetrical attenuators.
- **CO2. Synthesize** the network for a given positive and minimum positive real function.
- **CO3. Design** passive filters for the given specifications.
- **CO4. Analyze** the characteristics of various transmission lines.
- **CO5. Calculate** the impedance and SWR graphically /analytically.

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Item 12

To review and finalize the Experiment list/ Lab manual for Laboratory Courses to be offered in IV ***(for batch admitted in 2020-21)***

Subject Name: Digital Circuits and Systems
Subject Code: 140411

L	T	P	C
-	-	2	1

List of Experiments

1. To Implement logic gates – NAND,AND,NOR,EX-OR,EX-NOR.
2. To construct the basic gates using universal gates.
3. To verify the truth table of half adder and full adder.
4. To verify the truth table of half and full subtractor.
5. To Design R-S flip flop.
6. To Design a J-K flip flop.
7. To examine parity generator/checker circuit.
8. To design ripple counter using J-K Flip Flop.

Course Outcomes:
After completing the lab, students will be able to:

CO1. **Verify** the operation of basic logic gates.
CO2. **Construct** the basic gates by using universal gates.
CO3. **Develop** half adder and full adder circuits using their truth table.
CO4. **Develop** the D, RS and JK flip-flops and verify their operation.
CO5. **Design** Counters.

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Subject Name: Analog Integrated Circuits
Subject Code: 140412

L	T	P	C
-	-	2	1

List of Experiments

1. Design of the circuit using IC 741 Op-Amp:
    a. Summer, &Subtractor
    b. Differentiator,& Integrator.
    c. Inverting & Non-inverting amplifier.
    d. Voltage,& Current follower.
    e. Comparator, &Schmitt Trigger
2. To design the multistage amplifier.
3. To design the Tuned amplifier with given specification.
4. To design the RC coupled amplifier.

Course Outcomes:

After completing the lab, students will be able to:

CO1. **Design** various applications using Op-Amp.
CO2. **Troubleshoot** the already fabricated circuit individually or in a team.
CO3. **Design** various amplifier circuits.

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Subject Name: Analog Communication
Subject Code: 140413

L	T	P	C
-	-	2	1

List of Experiments

1. To generate amplitude modulated wave and determine the percentage modulation.
2. To generate amplitude demodulated wave and determine the percentage modulation.
3. To generate AM-Double Side Band Suppressed Carrier (DSB-SC) signal
4. To generate SSB-SC -Double Side Band Suppressed Carrier (DSB-SC) signal
5. Verify the generation and detection of AM Signal using MATLAB
6. Verify the generation and detection of DSB-SC Signal using MATLAB
7. Verify the generation and detection SSB-SC signal using MATLAB
8. Verify the generation and detection of FM Signal using MATLAB.

Course Outcome:

After completing the lab, students will be able to:

CO1. **Differentiate** modulation and demodulation techniques.
CO2. **Calculate** the modulation index for a given modulated wave.
CO3. **Generate** AM, DSB, SSB and FM signals.

ANNEXURE-VIII

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Subject Name: PCB Design Lab

Subject Code: 140415

L	T	P	C
-	-	2	1

LIST OF EXPERIMENTS

1. Introduction to PCB Design software.
2. Design of Low Pass Filter using PCB Design software.
3. Design of High Pass Filter using PCB Design software.
4. Design of Band Pass Filter using PCB Design software.
5. Fabrication of the Regulated Power Supply circuit on PCB.
6. Fabrication of the Half wave Rectifier circuit on PCB.
7. Fabrication of the Full wave Rectifier circuit on PCB.

Course Outcomes:

After the completion of this lab, students will be able to:

CO1. **Design** electronic circuits on PCB using software.

CO2. **Fabricate** electronic circuits on PCB.