MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)
B.Tech. III 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	Proficiency	Mid Sem Marks	Quiz/ Assignment Marks	End Sem Mark	Lab work & Sessional Mark	Skill based mini project		L	T	P	
140320 / 200320	DC	Analog Communication	50	10	20	20	60	20	20	200	2	1	2	4

Analog Communication (2140320/ 2200320)

Course objective: To understand the concept of modulation, various types of modulation, application, standards, analysis of modulation and demodulation process, probability theory and probability function, and concept of noise.

Unit I: Spectral Analysis: Introduction to signals and classifications, Introduction to Fourier series, Introduction to Fourier Transforms and its properties, Fourier transform of important functions, Autocorrelation, Cross correlation and their properties.

Unit II: Amplitude Modulation: Needs of modulation, Amplitude modulation, SSB, DSB,VSB suppressed carrier modulation, 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, comparison of narrow band and wide band FM, generation of FM.

Unit IV Probability and random variables: Random variable, sample space and events, probability and its properties, cumulative distribution function, probability density function, statistical average, variance, moment, Distributions: Binomial, Poisson, 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, Wiley & Sons.
2. Communication Systems - B. P. Lathi, BSP Publication

Reference Books:
1. Electronic Communication System: Kennedy-Devis, Tata McGraw-Hill Education.
2. Modern Digital & Analog Communication System: B.P. Lathi ,Oxford University Press.
3. Principles of Communication System: Taub and Schilling McGraw-Hill Education.

Course Outcomes
After the completion of this course students will be able to:
- CO1.   **Analyze** the frequency domain representation of various signals.
- CO2.   **Describe** amplitude modulation, their generation & detection methods.
- CO3.   **Explain** the generation and detection techniques for angle modulated signal.
- CO4.   **Evaluate** the statistical parameters for general PDF/CDF.
- CO5.   **Evaluate** the effects of noise on modulation techniques

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2140322/2200322	DC	Analog Integrated Circuits	50	10	20	20	60	20	20	200	2	1	2	4

Analog Integrated Circuits (2140322/2200322)

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

Unit I Differential Amplifiers: Introduction to differential amplifier, Differential gain, Common Mode Rejection Ratio (CMRR), Types of differential amplifier: Dual input unbalanced output, Single input balanced output, Dual input balanced output.

Unit II Operational Amplifier: Introduction of op-amp, Block diagram, characteristics and equivalent circuits of an op-amp, Power supply rejection ratio for op-amp(PSRR), common-mode rejection ratio (CMRR), Slew rate and its Effect, Input and output offset voltages. Open and Closed loop configuration of Op-amp, Inverting and non-inverting amplifier configurations, Summing amplifier, Integrators and differentiators, Schmitt Trigger, Logarithmic and anti-logarithmic amplifier etc.

Unit III Active Filter Design: Characteristics of filters, Classification of filters, Magnitude and frequency response, 1st and 2nd order Low pass and High pass ,Band pass filters and Band reject filters.

Unit IV Oscillators using OPAMP: Phase shift oscillator, Clapp oscillator, Wien bridge oscillator, Hartley Oscillator, Colpitt's oscillator, crystal oscillator.

Unit V Multivibrator Design using 555 IC: The 555 IC Circuit, 555 IC block diagram, Using the 555 IC as Astable , Monostable and Bistable Multivibrator Circuits and its applications.

Text Books:

1. Electronics Devices and Circuits: Boylested & Nashelsky,11th Edition**,** 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.** **Design** the circuits of differential amplifiers.
- **CO2.** **Design** the applications using Operational amplifier IC.
- **CO3.** **Implement** the active filters based on given specifications.
- **CO4.** **Design** Oscillator using OPAMP.
- **CO5.** **Design** Multivibrator circuits using IC 555.

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2140323/ 2200323	DC	Communication Networks	50	10	20	20	-	-	-	100	2	1	_	3

Communication Networks (2140323/ 2200323)

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, $\lambda/8$, $\lambda/4$, $\lambda/2$ lines, Smith chart and application, Single stub matching.

Text Books:

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

Reference Books:

1. Principles of Active Network Synthesis and Design: G. Daryanani,1ᵗ Edition, John Wiley & Sons.
2. Network Analysis and Synthesis - F.F. Kuo,2nd Edition, John Wiley & Sons.
3. Networks, Lines, & Fields: J.D. Ryder, 2nd Edition, Prentice Hall of India.
4. 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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2140324/ 2200324	DC	Data Communication	50	10	20	20	-	-	-	100	2	1	_	3

Data Communication (2140324/ 2200324)

Course objectives: To provide an introduction to fundamental computer network architecture concepts and their applications.

Unit I Introduction to Switching Techniques: Circuit switching, Message switching, Packet switching, Protocols, Layered network architecture and architecture OSI & TCP/IP reference model, Physical layer transmission medium, RS 232 C, Modem, Topologies.

Unit II Data Link Layer: Framing BSC, HDLC. ARQ: Stop and wait, Sliding window, Efficiency, Error detection and Error correction, Hamming codes, Parity checks – CRC, Checksum, HARQ.

Unit III MAC Layer: MAC sub layer – LAN protocols, ALOHA, Slotted and pure ALOHA, CSMA, CSMA/CD, Token bus, Token Ring, TDMA, CDMA, FDMA, Ethernet, Bridge, Router, Gateway, Switch.

Unit IV Network Layer: Routing – Data gram and Virtual Circuit, Distance vector and Link state Routing, Dijkstra's Algorithms, Congestion Control: Leaky bucket algorithm, Slow start, ATM model and ATM traffic management – AAL, X.25, IP layer, IP addressing.

Unit V Transport Layer: Connection oriented transport protocol mechanism, TCP, Transport flow regulation, UDP Segmentation & Reassemble, Session and Transport Interaction, Synchronization, Session protocols, FTP, Remote login.

Text Books:
1. Data Communication & Networking – B.A. Forouzan, Tata Mc-Graw Hill
2. Data and Computer Communication – W. Stallings, Pearson

Reference Books:
1. LANs – Keiser, Tata Mc-Graw Hill
2. Internetworking with TCP/IP – VOL-I – D.E. Comer, PHI
3. ISDN and Broad band ISDN with Frame Relay & ATM – W. Stalling, Pearson

Course Outcome:
After successful completion of the course, students will be able to:
- **CO1.** **Analyze** the error and flow control in communication network.
- **CO2.** **Explain** the concepts of MAC layer.
- **CO3.** **Identify** the different types of routing used in IP.
- **CO4.** **Classify** the transport mechanism in TCP/UDP.
- **CO5.** **Explore** the different application protocol used in internetworking.