B.Tech. III Semester (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	
3200320	DC	Analog Communication	50	10	20	20	40	30	30	200	2	1	2	4

Analog Communication (3200320)

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. **Analyze** amplitude modulated signals, their generation & detection methods.
CO3. **Explain** the generation and detection techniques for frequency modulated signals.
CO4. **Evaluate** the statistical parameters for general PDF/CDF.
CO5. **Evaluate** the effects of noise on modulation techniques.

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	2	2	1	-	1	2	3	1	2	3	3
CO2	3	3	3	3	3	1	1	1	2	3	1	3	3	3
CO3	3	3	3	3	3	1	1	-	-	3	1	3	3	3
CO4	3	3	3	3	1	-	-	1	2	3	-	2	3	3
CO5	3	3	3	2	2	1	2	1	2	3	1	3	3	3

1 - Slightly; 2 - Moderately; 3 – Substantially

B.Tech. III Semester (Electronics & Telecommunication Engineering)

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3200322	DC	Analog Integrated Circuits	50	10	20	20	40	30	30	200	2	1	2	4

Analog Integrated Circuits (3200322)

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

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, Single input unbalanced 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, 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. **Analyze** differential amplifier configurations.
CO2. **Design** the applications using Operational amplifier.
CO3. **Design** the active filters based on given specifications using OP-Amp.
CO4. **Design** Oscillator circuits using OPAMP.
CO5. **Design** Multivibrator circuits using IC 555.

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	3	3	2	2	3	2	2	2	2	2
CO2	3	3	3	3	2	3	2	2	3	2	2	2	2	2
CO3	3	3	3	3	2	3	2	2	3	1	2	2	2	2
CO4	3	3	3	3	2	3	3	2	3	1	2	2	2	2
CO5	3	3	3	3	2	3	2	2	3	2	2	2	2	2

1 - Slightly; 2 - Moderately; 3 – Substantially

B.Tech. III Semester (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 Marks	Lab work & Sessional Marks	Skill based mini project		L	T	P	
3200323	DC	Communication Networks	50	10	20	20	-	-	-	100	2	1	_	3

Communication Networks (3200323)

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 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:

1. Principles of Active Network Synthesis and Design: G. Daryanani,1st 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. **Analyze** the electrical properties of different passive networks.
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 transmission lines.
CO5. **Calculate** the impedance and SWR graphically and analytically.

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2	1	1	2	-	2	2	-	2	3	3
CO2	3	3	3	3	2	1	-	2	2	2	-	3	3	3
CO3	3	3	3	3	2	1	-	1	2	2	2	3	3	3
CO4	3	3	2	2	2	1	1	1	2	2	1	3	3	3
CO5	2	2	2	3	1	1	-	-	2	2	-	3	3	3

1 - Slightly; 2 - Moderately; 3 – Substantially

B.Tech. III Semester (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	
3200324	DC	Data Communication	50	10	20	20	-	-	-	100	2	1	_	3

Data Communication (3200324)

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: Apply various switching techniques in a layered network architecture.

CO2: Analyze protocols and techniques related to the Dynamic Link Layer.

CO3: Explain MAC sub-layer protocols to design and manage efficient LAN.

CO4: Analyze routing algorithms, congestion control mechanisms, and IP addressing techniques.

CO5: Explore transport-layer protocols for flow and error control.

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3	2	0	2	1	1	1	3	1	3	3	2
CO2	3	3	2	2	0	1	1	1	2	1	2	3	3	1
CO3	3	1	1	1	0	2	1	1	1	2	1	3	3	2
CO4	3	3	2	2	0	1	2	1	2	1	2	2	3	1
CO5	3	3	1	1	0	1	2	1	2	1	2	2	3	1

1 - Slightly; 2 - Moderately; 3 – Substantially

B.Tech. III Semester (Electronics & Telecommunication Engineering)

L	T	P	C
-	-	2	1

Subject Name: Analog Communication
Subject Code: 3200320

Analog Communication - To enable students to understand the fundamental techniques for the transmission, reception, and processing of continuous analog signals using MATLAB.

List of Experiments

1. Perform Fourier transform of continuous time signals.
2. Perform Amplitude modulation and demodulation using MATLAB Software.
3. Perform Amplitude demodulation using MATLAB Software.
4. Perform DSB-SC Modulator using MATLAB Software.
5. Perform DSB-SC Detector using MATLAB Software.
6. Perform SSB-SC Modulator & Detector using MATLAB Software.
7. Perform Frequency modulation using MATLAB Software.
8. Analysis of AM & FM Spectrum using MATLAB Software.

Course Outcomes

After performing experiments students will able to:

CO1. **Execute** modulation and demodulation using MATLAB.
CO2. **Analyze** the waveform of various modulation techniques.
CO3. **Express** the working of DSB and SSB modulator and demodulator.

Skill Based Mini Project

1. Design of Envelope Detector
2. Design of Switching Modulator
3. Design of Balance Modulator
4. Design of Amplitude Modulator
5. Design of DSB-SC Amplitude Modulator
6. Design of SSB-SC Amplitude Modulator
7. Design of Amplitude Demodulator
8. Design of Sinusoidal Signal Generator
9. Design of Square Wave Generator
10. Design of Triangular Wave Generator
11. Design of Sawtooth Wave Generator
12. Design of Signal Multiplier
13. Design of Frequency Modulator
14. Design of Frequency Demodulator
15. Design of Frequency Multiplier Circuit
16. Design of Phase Modulator
17. Design of Voltage Multiplier Circuit.
18. Design of Square Wave Generator using 741 IC
19. Design of Multiplexer circuit
20. Design of De-multiplexer circuit

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L	T	P	C
-	-	2	1

Subject Name: Analog Integrated Circuits
Subject Code: 3200322

Course Objective: This course gives the ability to the students to design various Analog Integrated Circuits using OPAMP and 555 timer.

List of Experiments

1. Design of the circuit using IC 741 Op-amp.
   (a) Summer and Subtractor
   (b) Inverting and Non Inverting Amplifier
   (c) Voltage Follower
   (d) Comparator and Schmitt trigger
   (e) Integrator and Differentiator

2. To Design the Multivibrator circuit using 555 timers IC.
   (a) Astable Multivibrator
   (b) Bistable Multivibrator
   (c) Monostable Multivibrator

3. To design RC low pass and high pass filter.

Course Outcomes

After performing experiments students will able to:

CO1. **Design** various applications using Op-amp.
CO2. **Troubleshoot** fabricated circuit individually and in a team.
CO3. **Design** various amplifier circuits.

Skill Based mini project

1. Design an Oscillator using 555 timer IC.
2. Design pulse generator using 555 timer IC
3. Design one bit memory storage element using 555 timer IC.
4. Design frequency divider circuit using 555 timer IC.
5. Design phase lock loop using 555 timer IC.
6. Design logarithmic and antilog operator using 741 IC.
7. Design a DC Volt Polarity Indicator Using IC 741.
8. Design an Active low pass filter using IC 741.
9. Design a 741 IC Tester.
10. Design an automatic Light Operated Switch Using LDR and 741.
11. Design microphone amplifier using 741IC.
12. Design operational amplifier tester.
13. Design triangular wave generator circuit using 741IC.
14. Design square wave generator circuit using 741IC.
15. Design a circuit for Simple Temperature Monitor.

16. Design a circuit for Invisible Burglar Alarm.
17. Design a circuit for Automatic Door Bell Ringer.
18. Design a circuit for electronic fuse.
19. Design a circuit for water sensor alarm.
20. Design a circuit for Flashing Lamps Using 555 Timer.

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L	T	P	C
-	-	2	1

Subject Name: Hardware Lab
Subject Code: 3200321

Course Objective: The lab aims to provide hands-on experience in designing and creating printed circuit boards. Students learn about schematic capture, component selection, layout design, and the use of PCB design software tools.

Lab 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.
8. Design hardware model for Half Wave and Full Wave Rectifier without Filter.
9. Design hardware model for Half Wave and Full Wave Rectifier with Filter.
10. Design hardware model for Electronic EYE.

Course Outcomes

After completing the experiments students will be able to

- **CO1. Design** various applications using electronics Components.
- **CO2. Learn** use of sensors, filters and 555 Timers.
- **CO3. Troubleshoot** fabricated circuit individually and in a team.

Skill Based mini project

1. Design hardware model for Simple Rain Water Alarm System.
2. Design hardware model for Flashing Lamps Using 555 Timer.
3. Design hardware model for Night Sensing Light.
4. Design hardware model for Simple Light Sensitivity Metronome Using Transistors.
5. Design hardware model for Simple Temperature Monitor.
6. Design hardware model for Invisible Burglar Alarm.
7. Design hardware model for Automatic Door Bell Ringer.
8. Design hardware model for electronic fuse.
9. Design hardware model for Geyser timer circuit
10. Design hardware model for water sensor alarm.
11. Design a Variable Power Supply With Adjustable Voltage and Current
12. Design a high current Regulated Dc Power supply circuit.
13. Light Dimmer Circuit Using Triac with BTA26 | DB3 | AC Voltage Regulator
14. Design a audio amplifier for home using LM 386 audio amplifier with bass boost
15. Design a Adjustable Battery Charger with Charge Protection
16. Design a Capacitor Dropper Circuit using Transformerless Power Supply
17. Design an Oscillator using 555 timer IC
18. Design pulse generator using 555 timer IC
19. Design one bit memory storage element using 555 timer IC
20. Design a fully Automatic Inverter with Smart Switch Inverter with Battery Charger