Analog Integrated Circuits (TEC-502)

Unit	Topic	Text Book/ Chapter	Lecturers
1	IC OP-AMP applications: OP-AMP Fundamentals (brief review of differential amplifier, current mirror, active load, level shifter, output stage; ac and dc characteristics) Basic building blocks using OP-AMPS. Inverting/Non-inverting VCVS, Integrators, Differentiators, CCVS and VCCS, Instrumentation Amplifiers.	1/ 2, 6 & 7	08
2	Waveform Generator: Square wave generators: 555Timer, Crystal controlled Oscillator Ramp Generator: Triangle generator, Sawtooth generator Sine wave generator: Requirement for sinusoidal oscillations, Wien-bridge and twin-T oscillators. Function Generators: Multi op-amp function generators, IC function generators Digitally controlled frequency synthesizer: PLL Fundamentals, PLL synthesizer, Totally digital synthesizer.	2/ 6	08
3	Active Filters: Introduction to filtering: Frequency response, Characteristics and terminology, Active versus passive filters Low pass filter: First order low pass active filter, second order active filter model, second order low pass filter characteristics, Sallen-Key unity gain filter, Sallen-Key equal component filter, Higher order filters. High pass active filter. Band pass filter: single op-amp band pass filter, multistage band pass filter State variable filter	2/7	08
4	Non-linear Circuits: Logarithmic Amplifiers, Log/Antilog Modules, Precision Rectifier, Peak Detector, Sample and Hold Circuits. OP-AMP as Comparator, Schmitt Trigger, Square and Triangular Wave Generator, Monostable Multivibrator. IC Analog Multiplier applications OTA	2/8	08
5	Voltage Regulators: OP-AMP Regulators, IC Regulators, Fixed Voltage Regulators (78/79, XX), SMPS.	2/3	08

Text Book:

1. Sedra and Smith, Microelectronic Circuits", Oxford University press, 5th Edition, 2005.
2. J. Michael Jacob, Applications and design with Analog Integrated Circuits", PHI, 2nd Edition, 2004.

Reference Book :

1. B.P. singh and Rekha Singh, Electronic Devices an Integrated Circuits; Pearson Education, 1st Edition 2006.

Microprocessors and Applications (TEC- 503)

Unit	Topic	Text Book/ Chapter	Lectures
1	Introduction to Microprocessors: Evolution of Microprocessors, History of computers, Timing and control, memory devices: semiconductor memory organization, Category of memory, 8-bit Microprocessor (8085): Architecture, Instruction set, Addressing modes, Assembly Language Programming.	1/2 1/3 14 1/6	8
2	16-bit Microprocessors (8086/8088): Architecture, Physical address,	2//2	10

	segmentation, memory organization, Bus cycle, Addressing modes, difference between 8086 and 8088, Introduction to 80186 and 80286, Assembly Language Programming of 8086/8088.		
3	Data Transfer Schemes: Introduction, Types of transmission, 8257 (DMA), 8255 (PPI), Serial Data transfer (USART 8251), Keyboard-display controller (8279), Programmable Priority Controller (8259)	1/8, 1/8 1/11,1/10 , 1/12	8
4	Programmable Interval Timer/ Counter (8253/8254): Introduction, modes, Interfacing of 8253, applications. ADC and DAC: Introduction, DAC memthodes, ADC converters, Types of ADC, ADC IC (0808/0809, DAC and ADC Interfacing and Applications.	1/9 1/13	8
5	Advanced Microprocessors: Introduction to 32-bit and 64-bit microprocessors, PowerPC, Microcontroller (8051): Introduction, Architecture, Instruction set.	2/3, 2/4 2/5, 2/7	8

Text Books

1. R. Singh and B. P. Singh : Microprocessor Interfacing and Application, New Age International Publishers, 2nd Edition.
2. B.P. Singh and R. Singh : Advanced Microprocessor and Microcontrollers, New Age International Publishers, 2nd Edition.

Reference Books

1. D. V. Hall : Microprocessors Interfacing, TMH (2nd Edition).
2. R. S. Gaunkar: Microprocessor Architecture, Programming and Applications with 8085/8080, Penram Publication
3. Y.C. Liu and G.A. Gibson : Microcomputer Systems: The 8086/8088 Family Architecture Programming and Design, PHI 2nd Edition,

Automatic Control System (TEC- 504)

Unit	Topic	Text Book/ Chapter	Lectures
1	Introduction to open loop and closed loop control systems, feedback characteristics of control systems, Mathematical Representation of physical systems Electrical, Mechanical, Hydraulic, Thermal systems, Block diagram algebra and signal flow graphs, Mason's gain formula.	1/1, 1/2	8
2	**Time Domain Analysis:** Standard Test Signals, Time response of First, Second and Higher order systems, Performance Indices. **Error Analysis:** Static and Dynamic Error Coefficients, Effect of adding poles and zeroes to the system, response of P, PI, and PID controllers.	1/5	10
3	**Concept of Stability:** Concept of stability, Asymptotic and conditional stability, Routh Hurcoitz Criterion, Root Locus technique (Concept and construction) **Frequency Response Analysis:** Correlation between time and frequency response, polar and inverse polar plots, Nyquist stability criterion, Bode plots, All pass and minimum phase systems, M and N circle.	1/6, 1/7, 1/8	9
4	**Design through compensation techniques:** Realization of lag, lead and lag-lead compensators, Design of closed loop control system using root locus and Bode plot Compensation	1/10	7
5	**Stable Variable Analysis:** Introduction, State space representation, State modes of linear systems, State equations, transfer matrices, diagonalization solution of state equations, controllability and observability, effect of pole zero cancellation in transfer function.	1/12, 1/14	9

	Advances in Control Systems: Basic Introduction to Neural Networks and Fuzzy logic control.		

Text Books:

1. I J Nagrath & M Gopal, Control System Engineering; New Age International publishers.

Reference Books:

1. B C Kuo, Automatic Control Systems; PHI
2. Norman S Nise, Control System Engineering;John Wiley & Sons, Singapore
3. Dr D Ganesh Rao, Control System; Sanguine Technical Publisher, Bangalore
4. K Ogata, Modern Control Engineering; PHI.

Antenna and Wave Propagation (TEC-505)

Unit	Topic	Text Book/ Chapter	Lectures
1.	**Antenna Principles:** Potential Functions & Electromagnetic Field, Current Elements, Radiation from Monopole & Half Wave Dipole, power radiated by current element, radiation resistance.	1/10	4
	Network Theorems Directional Properties of Dipole Antenna.	1/11	1
	Antenna Gain, Effective Area, Antenna Terminal Impedance, Practical Antennas and Methods of Excitation, Antenna Temperature and Signal to Noise Ratio.	1/11	4
2.	**Antennas Arrays:** Two Element Array, Horizontal Patterns in Broadcast Arrays, Linear Arrays, Multiplication of patterns, effect of the earth on vertical patterns, Binomial array.	1/11	6
3.	**Wave Propagation:** Modes of Propagation, Plane Earth Reflection, Space wave and Surface Wave, Refelection and refraction waves by the Ionosphere Tropospheric Wave.	1/16	3
	Ionosphere Wave Propagation in the Ionosphere, Virtual Height, MUF Critical frequency, Skip Distance, Duct Propagation, Space wave	1/17	4
4.	Practical antennas: VLF and LF transmitting antennas, effect of antenna height, Field of short dipole, electric field of small loop antenna, Directivity of circular loop antenna with uniform current, Yagi-Uda array: Square corner yagi-uda hybride, circular polarization Rhombic Antenna: Weight and Leg length Parabolic Reflectors: Properties, Comparison with corner reflectors Horn Antenna: Length and Aperture. Introduction to Turstile Antenna Effect of ground on antenna performance. Broadband Antenna: Frequency independent concept, RUMSEY's Principle, Frequency independent planar log spiral antenna, Frequency independent conical spiral Antenna.	 2/4 2/11 2/11 2/12 2/13 2/16 2/16 2/15	11
5.	Antenna Measurements: Radiation Pattern measurement, Distance requirement for uniform phase, uniform field amplitude requirement, Introduction to phase measurement; Gain Measurement: Comparison method, Near field method, Introduction to current distribution measurement, Measurement of antenna efficiency, measurement of Noise figure and noise temperature of an antenna polarization measurement.	2/18	9

Text Books:

1. Jordan Edwards C. and Balmain Keith G./ "Electromagnetic Waves and Radiating Systems"/ Prentice Hall (India)
2. Kraus, John D. & Mashefka, Ronald J. / "Antennas: For All Applications" / Tata McGraw Hill, 3rd Ed.

Reference Books:

1. Prasad, K.D./ "Antennas and Wave Propagation"/ Khanna Publications
2. Collin, R. / "Antennas and Radiowave Propagation" / Tata McGraw-Hill
3. Hayt Jr. William H./ "Engineering Electromagnetics "/ Tata McGraw-Hill
4. Das, Annaparna & Das, Sisir K. / "Microwave Engineering"/ Tata McGraw Hill.
5. Roy, Sitesh Kumar & Mitra, Monojit / "Microwave Semiconductor Devices" / Prentice Hall (India).

Communication Lab-I (TEC-551)

1. To study Amplitude modulation using a transistor and determine depth of modulation.
2. To study envelope detector for demodulation of AM signal and observe diagonal peak clipping effect.
3. To study frequency modulation using reactance modulator.
4. Study of frequency modulation using varactor modulator.
5. Narrow band FM generator using Armstrong method.
6. Study of Foster- Seely discriminator.
7. Generation of DSB-SC signal using balanced modulator.
8. Generation of single side band signal.
9. Study of phase lock loop and detection of FM signal using PLL.
10. Measurement of noise figure using a noise generator.
11. Study of superheterodyne AM receiver and measurement of sensitivity, selectivity & fidelity.
12. Study and demonstration of active filter (low pass, high pass, and band pass type) .

Analog Integrated Circuits Lab (TEC-552)

1. Measurement of Op-amp Parameters. (Open Loop Gain, Input offset Voltage, CMRR, Slew rate)
2. Determination of Frequency response of Op-Amp.
3. Precision Rectifier
4. Instrumentation Amplifier.
5. Open Loop operation of Op-amp -Comparators - Schmitt Trigger.
6. Astable & Monostable Operation Using 555.
7. IC Voltage Regulator.
8. Voltage Controlled Oscillator.
9. Phase Locked Loop.
10. Frequency Multiplier
11. A/D Converters & D/A Converters.
12. Second Order Active Filter- High Pass & Low Pass Realization

Microprocessor Lab (TEC- 553)

8085/8086 Based Experiments
1. Signed Multiplication using Booth's Algorithm.
2. Recursive routine for finding Factorial N.
3. Look up table method for finding the ASCII of an alphanumeric code.
4. Interfacing with 8255 in I/O mode/BSR mode.
5. Interfacing with 8253.
6. Verification of Interrupts.
7. Interfacing with ADC/DAC.
8. Mini Project on some interfacing applications.
9. Serial communication between two kits through RS-232C using 8251.

Note :
In addition, Institutes may include two more experiments based on the expertise

Control System Lab (TEC-554)

1. To use D.C. potentiometers as an error detectors.
2. To verify characteristics of (a) self excited magnetic amplifiers, (b) Self excited magnetic amplifier with (i) Positive feedback (ii) Negative feedback.
3. To draw characteristics of (a) Series connected (b) Parallel connected magnetic amplifier.

4. To draw characteristics of synchro torque transmitters. Also draw the characteristics error detector using of two synchros.
5. To study speed control of universal motor using SCR and stroboscope
6. Speed control of AC motor using TRAIC.

YEAR III, SEMESTER-VI

Industrial Management (TAS-601)

Unit	Topic	Text Book/ Chapter	Lectures
1	What is Operations Research? OR-research model, solving the OR model, Queuing and simulation models, Art of modeling, Phases of OR study.	1/1 Except 1.5, 1.7	2
2.	**Introduction to Linear Programming:** Two variable L-P model, Graphical LP solution, Analysis of selected LP models.	1/2.1, 2.2, 2.5	3
	The Simplex Method: LP solution space, Graphical to algebraic solution, The simplex method, Artificial starting solution, Special cases in simplex method applications.	1/3	4
	Transportation Model and its Variants: Definition of transportation model, Non-traditional transportation models, Transportation algorithms, Assignment model	1/5 Except 5.5	4
3.	**Network Models**: Network definitions, Minimal spanning tree algorithm, CPM and PERT.	1/6.1, 6.2, 6.6	4
	Game Theory: Optimal solution of two persons zero sum games, Solution of mixed strategy games.	1/ 14.4	2
4.	Introduction to Patents and Intellectual Propriety Right	Notes Supplied by UPTU	3
	Introduction to Engineering Management: Engineering and Management Historical Development of Engineering Management	 1/1 1/2	3
5.	**Functions of Technology Management** Planning and Forecasting Decision Making Organizing Motivating and Leading Technical People Controlling	 2/3 2/4 2/5 2/7 2/8	6
	Project Management Project Planning and Acquisition Project Organization, Leadership, and Control	 2/14 2/15	4

Text Books:

1. Hamdy H Taha, Operations Research – An Introduction; 7e, Pearson Education/ PHI – 2002.
2. Babcock & Morse, Managing Engineering and Technology; Pearson Education, 2004

Reference Books:

1. Hillier & Hillier, Introduction to Management Science; TMH Ed 05

.

Digital Communication (TEC-601)

Unit	Topic	Text Book/ Chapter	Lectures
1.	**Elements of Digital Communication and Information Theory** Model of a Digital Communication, System, Probability Theory and Random Variables, Logarithmic Measure of Information, Entropy and Information Rate, Conditional Entropy and Redundancy, Source Coding, Fixed and Variable Length Code Words, Source Coding Theorem, Prefix Doing and Kraft Inequality, Shannon-Fanno and Huffman Coding.	1/9 1/9	5 4
2	**Digital Base band Transmission** PCM Coding, DM, DPCM, ADCM, Data Transfer Rate, Line Coding and Its Properties, NRZ & RZ Types, Signalling Format For Unipolar, Polar, Bipolar(AMI) & Manchester Coding and Their Power Spectra (No Derivation) Matched Filter Reciver, Derivation of Its Impulse Response and Peak Pulse Signal to Noise Ratio. Correlation Detector Decision Threshold and Error Probability For Binary, Unipolar(ON-OFF) Signalling, ISI, Nyquist Criterion For Zero ISI & Raised Cosine Spectrum.	1/4 1/5 1/4	4 4
3 & 4	**Digital Modulation Techniques** Gram-Schmidt Orthogonalization Procedure, Types of Digital Modulation, Wave forms for Amplitude, Frequency and Phase Shift Keying, Method of Generation and Detection of Coherent & Non-Coherent Binary ASK, FSK & PSK Differential Phase Shift Keying, Quadrature Modulation Techniques QPSK, Probability of Error and Comparison of Various Digital Modulation Techniques. **Digital Multiplexing** Fundamentals of Time Division Multiplexing, Electronic Commutator, Bit, Byte Interleaving T1 Carrier System, Synchronization and Signaling of T1, TDM, PCM Hierarchy, T1 to T4 PCM TDM System (DS1 to DS4 Signals)	1/6 1/3	11 3
5	**Error Control Coding** Error Free Communication Over a Noise Channel, Hamming code, Relation Between Minimum Distance and Minimum Distance Error Correcting Capability, Linear Block Codes, Encoding and Syndrome Decoding, Cyclic Codes, Encoder and Decoder For Cyclic Codes, Convolution Codes, Tree diagram state diagram and Trellis Diagram, Viterbi and Sequential Decoding, Comparison of Performance.	1/10	9

Text Book:

1. Haykin, Simon / "Communication Systems" / John Wiley / 4th Ed.

References Books:

1. Singh, R.P. & Sapre, S.D. / "Communication Systems: Analog & Digital" / Tata McGraw-Hill.
2. Lathi, B.P / "Modern Digital & Analog Communication Systems" / Oxford University Press /.
3. Simon Haykin / "Digital Communication" / John Wiley.

4. Taub & Schilling / “Principles of Communication Systems” / Tata McGraw-Hill /
5. A.B. Carlson / “Communication Systems” / Tata McGraw-Hill.
6. Prokis J.J / “Digital Communications” / McGraw Hill /
7. Charkrabarti, P. / “Analog Communication Systems” / Dhanpat Rai & Co.
8. Schaum’s Outlines / “Analog & Digital Communication” / Tata McGraw-Hill.
9. Kennedy, George & Davis, Bernard / “Electronic communication systems” / Tata McGraw-Hill /

Digital Signal Processing (TEC-602)

Unit	Topic	Text Book/ Chapter	Lectures
1.	**Discrete Fourier Transform:** Frequency Domain Sampling: The Discrete Fourier Transform Frequency-Domain Sampling and Reconstruction of Discrete-Time Signals. The Discrete Fourier Transform (DFT). The DFT as a linear Transformation. Relationship of the DFT to Other Transforms. Properties of the DFT. Periodicity, Linearity, and Symmetry Properties. Multiplication of two DFTs and Circular Convolution. Additional DFT Properties. Frequency analysis of signals using the DFT.	1/5	10
2.	**Efficient Computation of DFT** Efficient Computation of the DFT: FFT Algorithms, Direct Computation of the DFT. Radix-2 FFT algorithms. Efficient computation of the DFT of two real sequences, computations, Efficient computation of the DFT of a 2N-Point real sequences, Gortezel Algorithm, Chirp Z-transform algorithm.	1/6	10
3.	Basic IIR Filter Structures: Direct forms (I & II), cascade and parallel realizations. Signal flow graph, Transposed structure, Basic FIR filter structures-. Direct form structure, frequency sampling structure, Lattice structure, Linear phase FIR structure . FIR structures.	1/7	08
4.	Symmetric and Anti-symmetric FIR Filters, Design of Linear-Phase FIR Filters Using Windows, Design of Linear-Phase FIR Filters by the Frequency Sampling Method, Design of FIR, Equiripple filter design Differentiators. Design of Hilbert Transformers.	1/8	08
5.	**Design of IIR Filters From Analog Filters:** IIR Filter Design by Approximation of Derivatives, IIR Filter Design by Impulse Invariance. IIR Filter Design by the Bilinear Transformation. The Matched-z Transformation, Characteristics of Commonly Used Analog Filters. Application of above technique to the design of Butterworth & Chebyshev filters.	1/8	08

Text Books:

1. Proakis, J.G. & Manolakis, D.G., “Digital Signal Processing: Principles Algorithms and Applications”, Prentice Hall (India).

Reference Books:

1. Sanjit K. Mitra, “Digital Signal Processing”, Third Edition, TMH, 2005
2. Oppenheim A.V. & Schafer, Ronald W., “Digital Signal Processing”, Pearson Education.
3. Rabiner, L.R. and Gold B., “Theory and applications of DSP”, PHI.
4. DeFatta, D.J., Lucas, J.G. & Hodgkiss, W.S., “Digital Signal Processing”, John Wiley & Sons

VLSI Technology and Design (TEC-603)

Unit	Topic	Text Book/ Chapter	Lectures

1	**1.Era of Integrated Circuit:** Introduction to Monolithic Integrated Circuit Technology, Bipolar & MOS IC, Film IC 2. **Crystal Growth:** Silicon wafer Preparation & characterization, **Oxidation:** Thermal oxidation, Oxide thickness measurement, Oxidation system.	 1	2 6

2.	**Diffusion** of dopants: Diffusion Eqns. Dopant profiles, sheet resistance, diffusion furnace, liquid and gaseous dopants, **Ion Implantation**: Ion implantation techniques, dopant profiles, apparatus used, **Exitaxy**: Eepitaxial growth of Si, apparatus for epitaxy, Photolithography techniques for pattern transfer, Mask making, photo resist & **Etching** techniques. **Film Deposition**: Vacuum deposition & Sputtering apparatus, CVD Processes and its applications in IC Lab, **Metallization**	1	8
3.	**1.MOS Transistor:** MOS Structure, MOS/IGFET Devices, MOS System under external bias, Structure & operation of MOSFET, Enhancement mode & Depletion mode devices, I-V Characteristics, MOSFET Scaling & Small-Geometry Effects. **2.CMOS Basic Circuits**: MOS Inverters, static & dynamic characteristics, NAND, NOR, AOI Circuits, Design Considerations, Layout Design, Micron & Submicron technologies, parasitic effects, Physical limitations, Concepts of SPICE for Circuit simulation.	2	6 4
4.	**Standard Digital ICs:** Combinational and Sequential MOS Logic Circuits, Design of standard Cells for LSI, VLSI Circuits, Computer-Aided Design Technology, Semiconductor Memories: DRAM, SRAM, Flash	3	7
5.	**Programmable Logic Devices**: PLA, PAL, PLD/CPLD, PGA/FPGA, ASIC, VLSI Testing.	3	7

Text Books:

1. S.M. Sze (Ed.) / VLSI Technology / M Hill. 1988.
2. Basic VLSI Design by D.A. Pucknell & Eshraghian (PHI)
3. Modern VLSI Design Systems on Silicon by Wayne Wolf (Pearson Pub.)

References

1. S. Gandhi / VLSI Fabrication Principles / 2nd ED. John Willey 1994.
2. Modern VLSI Design Systems on Silicon by Wayne Wolf (Pearson Pub.)
3. S.A. Campbell / The Science and Engineering of Microelectronic Fabrication / Oxford Univ. Press 1996
4. Introduction to Digital Microelectronics Circuits by K. Gopalan (TMH)
5. Microelectronic Circuits *International Student Edition* by Sedra / Smith (Oxford)
6. Microelectronics by Milman & Grabel (Mc Graw-Hill)

Microwave & Radar Engineering (TEC-604)

Unit	Topic	Text Book/ Chapter	Lectures
1.	Propagation through waveguides: Rectangular waveguide, solution of wave equation in rectangular co-ordintes, Derivation of field equations for TE & TM modes degenerate and dominant mode, Power Transmission and Power loss, Excitation of waveguides, non existence of TEM mode in waveguides, Introduction to circular Waveguides, Stripline and microstripline.	¼, 1/11	9

2.	Microwave cavity resonators: Rectangular and cylindrical cavities, Quality factor, Excitation of cavities. Microwave components: Waveguide couplings, bends and twists, Transitions, Directional couplers, hybrid couplers, Matched load, Attenuators and phase shifters, E-plane, H-plane and Hybrid Tees, Hybrid ring, Waveguide discontinuities, Windows, Irises and Tuning screws, Detectors, wave meters; Isolators and Circulators, tunable detector, slotted line carriage, VSWR meter. Scattering Matrix.	¼ 2/6	2 8
3.	Microwave Measurements: Measurement of frequency, Wave length, VSWR, Impedance, Attenuation, Low and high power. Radiation pattern.	3/10	6
4.	Limitation, of conventional active devices at Microwave frequency.	1/9	1
5.	Microwave Tubes : Klystron, Reflex Klystron, Magnetron, TWT, BWO: Their schematic, Principle of operation, performance characteristics and application.	1/10	6
6.	Microwave Semiconductor Devices: PIN diode, Tunnel diode, LSA diode, varactor diode, Gunn Devices, IMPATT and TRAPATT, their Principal of operation, characteristics and applications.	1/5, 1/7, 1/8	8
7.	Principles of Radar: Radar Block diagram operation, Radar Range equation, Radar Frequencies, Pulse and C.W. Radar, Introduction to Doppler and M.T. Radar, Applications.	1/1, 1/2, 1/3	6
8.	Radar Transmitters & Devices: Block diagram of radar receiver for C.W. and pulse radar, front end amplifier, Receiver noise figure, Duplexers Radar antennas, Radar Displays, Introduction to Radar clutter.	1/10, 1/11, 1/7	8

Text Book:

1. Liao, S.Y. / Microwave Devices & Circuits; PHI 3rd Ed.

2. M.I. Skolnik, Introduction to Radar Engineering; THM

Reference:

1. Collin, R.E. Foundations for Microwave Engineering; TMH 2nd Ed.
2. Rizzi, Microwave Engineering: Passive Circuits; PHI.
3. A Das and S.K. Das, Microwave Engineering; TMH.

Communication Lab-II (TEC-651)

1. Study of Sample and hold circuit using Op-amp- ST2101

2. Study of PAM generation and detector and observe characteristics of both single and dual polarity pulse amplitude modulation.

3. Study of pulse width modulation and demodulation.

4. Study of pulse position modulation demodulation.

5. Study of delta modulation and demodulation and observe effect of slope overload DCL-07.

6. Study of pulse data coding techniques for NRZ formats.

7. Data decoding techniques for NRZ formats. ST2106-7.

8. Study of amplitude shift keying modulator and demodulator.

9. Study of frequency shift keying modulator and demodulator.

10. Study of phase shift keying modulator and demodulator ST-467

11. Study of single bit error detection and correction using Hamming code. ST-2103.

12. Study of Pulse code modulation and demodulation.

Digital Signal Processing Lab (TEC-652)

1. Sampling & Waveform Generation.
2. Quantization
3. PCM Encoding
4. Delta Modulation
5. Digital Modulation Schemes (ASK, PSK, FSK)
6. Error Correcting Codes
7. DFT Computation.
8. Fast Fourier Transform.
9. FIR Filter implementation.
10. IIR Filter implementation.
11. DSP Processor Implementation
12. Computational Experiments with Digital Filters

Electronics CAD Lab (TEC-653)

1. Design, Simulation and Analysis of following circuits using Circuit simulator:
    a. Pushpull Amplifier.
    b. Differantial Amplifier
    c. NMOS and CMOS inverter
    d. Two input NAND Gate
    e. Two input NOR Gate
2. Layout Design of NMOS and CMOS Inverter using Layout Generator
3. Layout Design of Two Input NAND Gate
4. Simulation of Full Adder using HDL
5. Chip Design using VHDL (Mini Project).

Microwave Engineering Lab (TEC-654)

1. Measurement of guide wavelength and frequency of the signal in a rectangular waveguide.
2. Measurement of VSWR using slotted line.
3. Study of mode characteristics of reflex Klystron and determination of mode number, transit time & electronic tuning sensitivity.
4. Study of characteristics of Gunn oscillator.
5. Study of Gunn diode as modulated source (PIN modulation) and determination of modulation depth.
6. Measurement of coupling coefficient and directivity of a directional coupler.
7. Study of insulation & coupling coefficient of a magic T.
8. Measurement of attenuation using substitution method and plot of attenuation versus frequency characteristics.
9. Study of waveguide horn and its radiation pattern and determination of the beam width.
10. Study of a ferrite circulator and measurement of isolation, insertion loss, cross coupling and input VSWR.
11. Measurement of microwave power using power meter

U.P. TECHNICAL UNIVERSITY
LUCKNOW

Syllabus
of
3rd yr. (V & VI Semester)

1. **Electronics & Communication Engineering**
2. **Electronics Engineering**
3. **Electronics & Telecommunication Engineering**

B.TECH. COURSES