2nd Year syllabus of Electronics and Communication Engineering

Semester-III-ECE

Subject Code	Subject	L T P	Marks E + S	Marks Total	Credit
TCS-301	Computer Based Numerical Technique	2-1-0	75+25	100	3
TEC-301	Electronic Devices and Circuits	3-1-0	100+50	150	4
TEC-302	Digital Electronic and Design Aspects	3-1-0	100+50	150	4
TEC-303	Electronic Measurement and Instrumentation	3-1-0	100+50	150	4
TEE-301	Network Analysis and Synthesis	3-1-0	100+50	150	4
THM-301	Engineering Economics	2-0-0	75+25	100	2
PRACTICAL:					
PEC-351	Electronics Circuits Lab	0-0-2	25+25	50	3
PEC-352	Digital Electronics Lab	0-0-2	25+25	50	2
PEE-353	Measurement Lab	0-0-2	25+25	50	2
Personality development/GP				50	
TOTAL				**1000**	**28**

Semester-IV-ECE

Subject Code	Subject	L T P	Marks E + S	Marks Total	Credit
TEC-401	Electro Magnetic Field Theory	3-1-0	100+50	150	4
TEC-402	Analog Integrated Circuits	3-1-0	100+50	150	4
TCS-403	Computer Organization and Architecture	2-1-0	75+25	100	3
TEC-404	Signal and Systems	3-1-0	100+50	150	4
TEC-405	Analog Communication	3-1-0	100+50	150	4
TEC-406	Solid State Devices and Semiconductor Materials	2-1-0	75+25	100	2
Practical					
PEC -451	Analog Integrated Circuit Lab	0-0-2	25+25	50	2
PEC -452	Circuit Design on PCB	0-0-2	25+25	50	3
PEC-453	Analog Communication Lab	0-0-2	25+25	50	2
Personality Development/GP				50	
TOTAL				**1000**	**28**

Sl. No.	**TEC 301** **ELECTRONIC DEVICE AND CIRCUIT**	
1.	**Unit-I** **Crystal Properties and charge Carriers in Semiconductors:** Elemental and compound semiconductor materials, crystal lattice structure **Magnetic material:-**Origin of magnetic dipoles in solids, permanent magnetic dipoles, diamagnetic paramagnetic, ferromagnetic anti-ferromagnetic and ferry-magnetic materials	5
2.	**Unit-II** **Transistor amplifier Frequency response:** Bipolar Transistor as amplifier, Ebers mole and h-parameter model high Frequency model) high frequency response of common source, common collector, common base. High frequency response of common source, common gate, common drain.	10
3.	**Unit-III** **Feedback:** Concept of feedback, classification feedback, Analysis of different type of feedback. **Oscillators:** Concept of oscillators, condition of oscillations, frequency and amplitude stability of oscillations, analysis of quartz, Hartely, colpitts, RC phase shift, Wein bridge and UJT oscillators	10
4.	**Unit-IV** **Multistage and Tuned Amplifiers:** Introduction to multistage amplifiers, cascade amplifiers, coupling of amplifiers, direct coupled, differential coupling, and transformer coupled amplifier, Darlington amplifier and its analysis, bootstrapping, tuned and double tuned voltage amplifiers	10
5.	**Unit-V** **Multivibrator:** Astable, mono-stable, and bi-stable multivibrators	5

Reference Books:

1. Electronic Devices Circuit and SSD, R K Singh and D S Chauhan, Vikash Publication, Delhi
2. Boylestad, Electronic Devices and Circuit Theory, 10/e, Pearson
3. Donald A Neaman, "Semiconductor Physics and Devices Basic Principles" 3rd Ed TMH India.

Sl. No	TEC 302 DIGITAL ELECTRONICS AND DESIGN ASPECT	
1.	**Unit-I** **Introduction:** Characteristics of digital system, Types of Digital circuits, Number system: Direct conversion between bases Negative numbers & BCD and their arithmetic's, Boolean algebra, Minimization of Boolean Functions: K Map up to 6 variable and multiple output circuits, Quine Mcclusky method, error detection & correcting codes, Hamming & cyclic codes	(8)
2.	**Unit-II** **Combinational Logic Circuits:** Design Procedure, adders, subtractors & code conversion, Multiplexers/Demultiplexers, encoder/decoders, decimal adders & amplitude comparators, ROM as decoder, PLA & PAL	(7)
3.	**Unit-III** **Sequential Logic Circuits:** Flip-Flops and their conversions, analysis and synthesis of synchronous sequential circuit, excitation table, state table & diagram. Design of synchronous counters, shift registers and their applications, Finite State Machine	(8)
4.	**Unit-IV** **Logic Families:** Diode, BJT & MOS as a switching element concept of transfer characteristics, Input characteristics and output characteristics of logic gates, TTL, Tri-state logic, open collector output, IIL,ECL,NMOS,CMOS, Pass Transistor Logic Interfacing between logic families, packing density, power consumption & gate delay.	(6)
5.	**Unit-V** **Hazard and Fault Detection:** Static and dynamic Hazard: Gate delay, Generation of spikes, Determination of hazard in combinational circuits, Fault detection methods: Fault Table & Path sensitizing methods. **Memories:** Sequential, Random Access, NMOS & CMOS Static and Dynamic Memory elements, one and multi-dimensional selection arrangement, Read-only memories, Formation of memory banks, internal & External address decoding	(10)

Reference Books:

1. Digital Systems: Principles and Design, Raj Kamal, Pearson
2. M. Morris Mano and M. D. Ciletti, Digital Design, M. Morris Mano and M. D. Ciletti, 4th Edition, pearson
3. Switching Circuit & Logic Design, Hill & Peterson, Wiley

Sl. No.	TCS-302 Computer Based Numerical Technique	L T P 2 0 0
1.	**Unit-I** **Introduction:** Numbers and their accuracy, Computer Arithmetic, Mathematical preliminaries, Errors and their Computation, General error formula, Error in a series approximation. **Solution of Algebraic and Transcendental Equation:** Bisection Method, Iteration method, Method of false position, Newton-Raphson method, Methods of finding complex roots, Muller's method, Rate of convergence of Iterative methods, Polynomial Equations	**8**
2.	**Unit-II** **Interpolation:** Finite Differences, Difference tables Polynomial Interpolation**:** Newton's forward and backward formula Central Difference Formulae: Gauss forward and backward formula, Stirling's, Bessel's, Everett's formula.	**5**
3.	**Unit-III** **Numerical Integration and Differentiation:** Introduction, Numerical differentiation Numerical Integration: Trapezoidal rule, Simpson's 1/3 and 3/8 rule, Boole's rule, Waddle's rule.	**6**
4.	**Unit-IV** **Statistical Computation:** Frequency chart, Curve fitting by method of least squares, fitting of straight lines, polynomials, exponential curves etc, Data fitting with Cubic splines, Regression Analysis, Linear and Non linear Regression, Multiple regression, Statistical Quality Control methods.	**8**

Reference Books:

1. Digital Systems: Principles and Design, Raj Kamal, Pearson
2. M. Morris Mano and M. D. Ciletti, Digital Design, M. Morris Mano and M. D. Ciletti, 4th Edition, pearson

Sl. No.	TEC 303 ELECTRONIC INSTRUMENTATION AND MEASUREMENTS	
1.	**Unit-I** **Unit, dimensions and standards:** Scientific notations and metric prefixes. SI electrical units, SI temperature scales, Other unit systems, dimension and standards. Measurement Errors: Gross error, systematic error, absolute error and relative error, accuracy, precision, resolution and significant figures, Measurement error combination, basics of statistical analysis. PMMC instrument, galvanometer, DC ammeter, DC voltmeter, series ohm meter	8
2.	**Unit-II** Transistor voltmeter circuits, AC electronic voltmeter, current measurement with electronic instruments, multimeter probes Digital voltmeter systems, digital multimeters, digital frequency meter System, Voltmeter and ammeter methods, Wheatstone bridge, low resistance measurements, low resistance measuring instruments AC bridge theory, capacitance bridges, Inductance bridges, Q meter	8
3.	**Unit-III** **Analog to digital converter:** Transfer characteristics, A/D conversion technique: Simple potentiometer and servo method, successive approximation method ramp type, integrating and dual slope integrating method **D/A Converter:** Transfer characteristic, D/A conversion technique, digital mode of operation, performance characteristics of D/A convertors. **Display Devices:** Alpha numeric display using LCD and LED Specification of digital meters, Display digits and count resolution, sensitivity, accuracy, speed and settling time etc.	9
4.	**Unit-IV** **CRO:** CRT, wave form display, time base, dual trace oscilloscope, measurement of voltage, frequency and phase by CRO, Oscilloscope Probes, Oscilloscope specifications and performance. Delay time based Oscilloscopes, Sampling Oscilloscope, DSO, DSO Applications	6
5.	**Unit-V** **Signal generator and analyzer:** Signal generator: Sine wave, non-sinusoidal signal and function generators, frequency synthesis techniques and digital signal generators **Signal analyzers:** Spectrum analyzer and distortion, **Concept of ECG, EMI, EMC, EEG** etc. **Recorders:** X-Y recorders, plotters	8

Reference Books:

1. David A. Bell, "Electronic Instrumentation and Measurements", 2nd Ed., PHI , New Delhi 2008
2. Elements of Electronic Instrumentation and Measurement, 3/e, Carr. Pearson
3. Oliver and Cage, "Electronic Measurements and Instrumentation", TMH, 2009.
4. Alan S. Morris, "Measurement and Instrumentation Principles", Elsevier (Buterworth Heinmann), 2008

Sl. No	TEE 301 NETWORK ANALYSES AND SYNTHESIS	
1.	**Unit-I** **Graph Theory:** Graph of a Network, definitions, tree, co tree, link, basic loop and basic cut set, Incidence matrix, cut set matrix, Tie set matrix Duality, Loop and Node methods of analysis.	(8)
2.	**Unit-II** **Network Theorems (Applications to ac networks):** super-position theorem, Thevenin's theorem, Norton's theorem, maximum power transfer theorem, Reciprocity theorem. Millman's theorem, compensation theorem, Tellegen's theorem.	(8)
3.	**Unit-III** **Network Functions:** Concept of Complex frequency, Transform Impedances Network functions of one port and two port networks, concept of poles and zeros, properties of driving point and transfer functions, time response and stability from plot, frequency response and Bode plots.	(9)
4.	**Unit-IV** **Two Port Networks:** Characterization of LTI two port networks , ZY, ABCD and h-parameters, reciprocity and symmetry. Inter-relationships between the parameters, inter-connections of two port networks, Ladder and Lattice networks. T & π Representation.	(8)
5.	**Unit-V** **Network Synthesis:** Positive real function, definition and properties; Properties of LC, RC and RL driving point functions, synthesis of LC, RC and RL driving point immittance functions using Foster and Cauer first and second forms.	(7)

Reference Books:

1. Network Analysis with Applications, 4/e (with CD), Stanley. pearson
2. Franklin F. Kuo, "Network Analysis and synthesis", 2nd Edition, Wiley India Pvt Ltd.
3. Behrouz Peikari, "Fundamentals of Network Analysis & synthesis", Jaico Publishing House, 2006.
4. M. E. Van Valkenberg, "Network Analysis", 2nd Edition, Prentice Hall of India Ltd.Oliver and Cage,

Sl. No	**THU-301** **ENGINEERING ECONOMICS**	
1.	**Unit-I** **Time value of money :** Simple and compound interest, Time value equivalence, Compound interest factors, Cash flow diagrams, Calculation, Calculation of time –value equivalences. Present worth comparisons, Comparisons of assets with equal, unequal and infinite lives, comparison of deferred investments, Future worth comparison, payback period comparison.	(8)
2.	**Unit-II** Use and situations for equivalent annual worth comparison, Comparison of assets of equal and unequal life. Rate of return, Internal rate of return, comparison of IIR with other methods, IRR misconceptions.	(8)
3.	**Unit-III** **Analysis of public Projects:** Benefit/ Cost analysis, quantification of project, cost and benefits, benefit/ cost applications, Cost –effectiveness analysis.	(9)
4.	**Unit-IV** Depreciation, computing depreciation charges, after tax economic comparison, Break-even analysis; linear and non-linear models. Product and Process Costing, Standard Costing, cost estimation, Relevant Cost for decision making, Cost control and Cost reduction techniques.	(8)

ELECTRONICS DEVICES & CIRCUITS LAB

L T P
0 0 2

The following experiments must be performed on Bread Board

1. Field Effect Transistors-Single stage Common source FET amplifier –plot of gain in dB Vs frequency, measurement of bandwidth, input impedance, maximum signal handling capacity (MSHC) of an amplifier

2. Bipolar Transistors- Design of single stage RC coupled amplifier –design of DC biasing circuit using Potential divider arrangement –Plot of frequency Vs gain in dB. Measurement of bandwidth of an amplifier , input impedance and Maximum Signal Handling Capacity of an amplifier.

3. Two stage Amplifier. Plot of frequency Vs gain. Estimation of Q factor, bandwidth of an amplifier

4. Common Collector Configuration-Emitter Follower (using Darlington pair)-Gain and input impedance Measurement of the circuit.

5. Study of Series and shunt feedback amplifier and determination of voltage and current gain, Plot of gain in dB Vs frequency, measurement of bandwidth

6. Study of Wein bridge oscillator (b) phase shift oscillator

7. Study of Hartely & Colpitts oscillator

8. Study of Mono and astable multiviberator using transistor

9. Fabrication of DC unregulated power supply

10. PCB Lab: (a) Artwork & printing of a simple PCB. (b) Etching & drilling of PCB. (c) Testing of power supply fabricated in Experiment No. 6 (d) Mini Project

PEC-301 **DIGITAL ELECTRONICS LAB**

L T P
0 0 2

1. Bread-board implementation of various flip-flops.
2. Bread-board implementation of counters & shift registers.
3. Determination of Delay time and NAND, NOR, Ex-OR, AND & OR Gates.
4. Experiments with clocked Flip-Flop.
5. Design of Counters.
6. Implementation of Arithmetic algorithms.
7. Bread Board implementation of Adder/Subtractor (Half, Full)
8. Transfer characteristics of TTL inverters & TTL Schmitt Trigger inverter.
9. Transfer characteristics of CMOS inverters series and CD40 series and
10. Estimation of Gate delay of CD40 series CMOS inverter.
11. Monoshot multivibrators using 74121 and 74123.
12. Clock circuit realization using 555 and CMOS inverter and quartz crystal.
13. Demultiplexer / Decoder operation using IC-74138.

PEC 453 MEASUREMENT LAB

1. Study of semiconductor diode voltmeter and its us as DC average responding AC voltmeter.
2. Study of L.C.R. Bridge and determination of the value of the given components.
3. Study of distortion factor meter and determination of the % distortion of the given oscillator.
4. Study of the transistor tester and determination of the parameters of the given transistors.
5. Study of the following transducer (i) PT-100 Transducer (ii) J- type Transducer (iii) K-type Transducer (IV) Presser Transducer
6. Measurement of phase difference and frequency using CRO (Lissajous Pattern)
7. Measurement of low resistance Kelvin's double bridge.
8. Radio Receiver Measurements
9. Study of A to D convertor and its realization
10. Study of D to A convertor and its realization
11. Designing of some characters like A by alpha numeric Display.

Sl. No.	**TEC 303** **ELECTROMAGNETIC FIELD THEORY**	3 1 0
1.	**Unit-I** **Coordinate systems and transformation:** Cartesian coordinates, circular cylindrical coordinates, spherical coordinates Vector calculus: Differential length, area and volume, line surface and volume integrals, del operator, gradient of a scalar, divergence of a vector and divergence theorem, curl of a vector and Stoke's theorem, Laplacian of a scalar.	9
2.	**Unit-II** **Electrostatics:** Electrostatic fields, Coulombs law and field intensity, Electric field due to charge distribution, Electric flux density, Gausses's Law – Maxwell's equation, Electric dipole and flux lines, energy density in electrostatic fields. **Electric field in material space:** Properties of materials, convection and conduction currents, conductors, polarization in dielectrics, dielectric constants, continuity equation and relaxation time, boundary condition. **Electrostatic boundary value problems:** Poission's and Laplace's equations, general procedures for soling Poission's or Laplace's equations, resistance and capacitance, method of images.	
3.	**Unit-III** **Magnetostatics:** Magneto-static fields, Biot-Savart's Law, Ampere's circuit law, Maxwell's equation, application of ampere's law, magnetic flux density, Maxwell's equation, Maxwell's equation for static fields, magnetic scalar and vector potential. Magnetic forces, materials and devices: Forces due to magnetic field, magnetic torque and moment, a magnetic dipole, magnetization in materials, magnetic boundary conditions, inductors and inductances, magnetic energy.	9
4.	**Unit-IV** **Waves and applications:** Maxwell's equation, Faraday's Law, transformer and motional electromotive forces, Displacement current, Maxwell's equation in final form. **Electromagnetic wave propagation:** Wave propagation in lossy dielectrics, plane waves in lossless dielectrics, plane wave in free space, plain waves in good conductors, power and the pointing vector, reflection of a plain wave in a normal incidence.	
5.	**Unit-V** **Transmission lines:** Transmission line parameters, Transmission line equations, input impedance, standing wave ratio and power, The Smith chart, Some applications of transmission lines.	

Sl. No.	TEC **ANALOG INTEGRTED CIRCUIT**	
1.	**Unit-I** Introduction of different fabrication steps, IC biasing-Current sources, Current Mirrors and Current steering circuits: The basic MOSFET current source, MOS Current steering circuits, BJT circuits. The cascade Amplifier: The MOS cascade, frequency response of the MOS cascade, the BJT cascade, a cascade current source, double cascading, the folded cascade, Bi-CMOS cascode.	9
2.	**Unit-II** **Power Amplifiers**: Introduction to power amplifiers (large signal amplifiers), classifications of power amplifiers, class A, B, AB, and C power amplifiers, push-pull and complementary push-pull amplifiers, power output, efficiency, cross-over distortions and harmonic distortions, specifications of power amplifiers, class B and class C-tuned amplifiers	
3.	**Unit-III** **The 741 OPAMP Circuit:** Bias circuit, short circuit protection, the input stage, the second stage, the output stage, the Device parameters **DC Analysis of 741:** Reference bias current, input stage bias, input bias and offset current, input offset voltage, input common range, second stage bias, output stage bias **Small Signal Analysis of 741:** The input stage, second stage, the output stage Gain, Frequency Response and Slew rate of 741: Small signal gain, frequency response, a simplified model, slew rate, relationship between Ft and SR.	9
4.	**Unit-IV** **Introduction to filtering:** Frequency response, characteristics and terminology, Active versus passive filter **Low Pass filter:** first order and second order active filter model, second order low pass filter characteristic, Sallen-Key unity gain filter, Sallen-Key equal component filter, high order filter, High pass filter **Band Pass Filter:** Singe op-amp band pass filter, Multistage band pass filter.	
5.	**Unit-V** Generation of square and triangular waveform using OPAMP based astable multiviberator: Operation of astable multiviberator, generation of triangular waveform. **Generation of standardized pulse:** The OPAMP based monostable multiviberator **Integrated Circuit Timer:** The 555 Circuit, implementing monostable multiviberator using 555 IC, astable multiviberator using 555 IC	

Sl. No.	**TCS-401** **COMPUTER ORGANIZATION AND ARCHITECTURE**	L T P 3 1 0
1.	**Unit-I** Register Transfer Language, Bus and Memory Transfers, Bus Architecture, Bus Arbitration, Arithmetic Logic, Shift Micro operation, Arithmetic Logic Shift Unit, Design of Fast address, Arithmetic Algorithms (addition, subtraction, Booth Multiplication), IEEE standard for Floating point numbers.	
2.	**Unit-II** **Control Design:** Hardwired & Micro Programmed (Control Unit): Fundamental Concepts (Register Transfers, performing of arithmetic or logical operations, fetching a word from memory, Storing a word in memory), Execution of a complete instruction, Multiple-Bus organization, Hardwired Control, Micro programmed control(Microinstruction, Micro program sequencing, Wide-Branch addressing, Microinstruction with Next-address field, Pre-fetching Microinstruction).	
3.	**Unit-III** **Processor Design:** Processor Organization: General register organization, Stack organization, Addressing mode, Instruction format, Data transfer & manipulations, Program Control, Reduced Instruction Set Computer **Input-Output Organization:** I/O Interface, Modes of transfer, Interrupts & Interrupt handling, Direct Memory access, Input-Output processor, Serial Communication.	
4.	**Unit-IV** **Memory Organization:** Memory Hierarchy, Main Memory (RAM and ROM Chips), organization of Cache Memory, Auxiliary memory, Cache memory, Virtual Memory, Memory management hardware.	
5.	**Unit – V** **Parallel Processing & Pipelining:** Arithmetic Pipelining, Instruction Pipelining, RISC Pipelining, Vector Processing, Array Processor. **Multiprocessor:** Characteristic of Multiprocessor, Interconnection Structure, Inter-processor Arbitration, Cache Coherence	

Sl. No.	TEC-402 SIGNAL S AND SYSTEMS	
1.	**Unit-I** **Signals and Systems:** Continuous-time and discrete-time Signals, Transformations of the Independent Variable, Exponential and Sinusoidal Signals, Continuous-Time and Discrete-Time LTI Systems and their properties, convolution sum and convolution integrals, LTI System described by differential and difference equation.	8
2.	**Unit-II** **Fourier series and Fourier Transformer:** The response of LTI Systems to Complex Exponentials, Fourier Series Representation of Continuous-time Periodic Signals and their Properties, Continuous time and discrete time Fourier Transforms and their properties, System Characterized by Linear Constant Coefficient Differential equations and Difference equation.	10
3.	**Unit-III** **Time and Frequency Characterization of Signals and Systems:** Magnitude Phase Representation of the Fourier Transform, Magnitude Phase Representation of the Frequency response of LTI systems, Time domain Properties of Ideal Frequency Selective filter, Time Domain and Frequency Domain aspects of Non ideal filters, First Order and Second Order Continuous Time and Discrete time Systems.	6
4.	**Unit-IV** **Sampling and Laplace Transform:** Signal representation by samples, sampling theorem, Impulse train sampling, sampling of discrete time signals, discrete time processing of continuous time signals. Laplace Transform, Region of convergence, inverse Laplace Transform, Analysis and characterization of LTI System, Block diagram representation, Unilateral Laplace transform.	8
5.	**Unit-V** **Z-Transform:** Z-Transform, Region of convergence, Inverse Z-transform, analysis and characterization of LTI system, Block diagram representation, Unilateral Z-transform.	8

Sl. No.	**TEC 303** **ANALOG COMMUNICATION**	3 1 0
1.	**Unit-I** **Introduction:** Overview of Communication system, Communication channels Need for modulation, Baseband and Pass band signals, Amplitude Modulation, Double side band with Carrier (DSB-C), Double side band without Carrier, Single Side Band Modulation, DSB-SC, DSB-C, SSB Modulators and Demodulators, Vestigial Side Band (VSB), Quadrature Amplitude Modulator	9
2.	**Unit-II** **Amplitude Modulation:** Frequency division and time division multiplexing suppressed carrier systems, single side band transmission, amplitude modulation with carrier, power, effect of frequency and phase errors in synchronous detection, comparison of various AM systems, vestigial band transmission.	
3.	**Unit-III** **Angle Modulation:** Angle Modulation, Tone Modulated FM Signal, Arbitrary Modulated FM Signal, FM Modulators and Demodulators, Approximately Compatible SSB Systems, Stereophonic FM Broadcasting, Examples Based on Mat Lab.	9
4.	**Unit-IV** **Pulse Modulation Digital Transmission of Analog Signals:** Sampling Theorem and its applications, Pulse Amplitude Modulation (PAM), Pulse Width Modulation, and Pulse Position Modulation. Their generation and Demodulation, Digital Representation of Analog Signals, Pulse Code Modulation (PCM), PCM System, Issues in digital transmission: Frequency Division Multiplexing, Time Division Multiplexing ,Line Coding and their Power Spectral density, T1 Digital System, TDM Hierarchy	
5.	**Unit-V** **Transmission lines:** Transmission line parameters, Transmission line equations, input impedance, standing wave ratio and power, The Smith Chart, Some applications of transmission lines.	

Sl. No.	TEC SOLID SATE DIVICES AND RELATED MATERIAL	
1.	**UNIT-I** **Semiconductor Material:** Secondary, Ternary, Tetra compound semiconductor material , Their properties, Direct & indirect band gap material, K-selection rule, different transition mechanism of Carriers.	(5)
2.	**UNIT-II** **Opto-electronic Devices:** Photodiodes- Current and Voltage in illuminated Junction – Solar Cells – Photo detectors – Noise and bandwidth of Photo detectors – Light Emitting Diodes – Light Emitting Materials – Fiber Optic Communications Multilayer Hetro-junctions for LEDs – Lasers – Semiconductor lasers – Population Inversion at a Junction Emission spectra for p-n junction – Basic semiconductor lasers – Materials for Laser.	(10)
3.	**UNIT-III** **Sigh Frequency and High Power Devices:** Schottkey diode, Varactor diode IMPATT Diode, operation of TRAPATT and BARITT Diodes, Gunn Diode – transferred – electron mechanism, formation and drift of space charge domains, p-n-p-n Diode, Semiconductor Controlled Rectifier, Insulated Gate Bipolar Transistor.	(10)

PEC 551 **INTEGRATED CIRCUITS LAB**

Objective: - To design and implement the circuits to gain knowledge on performance of the circuit and its application. These circuits should also be simulated on Pspice.

1. Log and antilog amplifiers.
2. Voltage comparator and zero crossing detectors.
3. Second order filters using operational amplifier for–
    a. Low pass filter of cutoff frequency 1 KHz.
    b. High pass filter of frequency 12 KHz.
    c. Band pass filter with unit gain of pass band from 1 KHz to 12 KHz.
4. Wien bridge oscillator using operational amplifier.
5. Determine capture range; lock in range and free running frequency of PLL.
6. Voltage regulator using operational amplifier to produce output of 12V with maximum load current of 50 mA.
7. Voltage to current and current to voltage convertors.
8. Function generator using operational amplifier (sine, triangular & square wave)
9. Astable and monostable multiviberator using IC 555

Circuit Designing on PCB

The listed practical must be designed and tested on PCB

1. Three stages RC coupled common emitter amplifier and its testing for various parameters.
2. Designing of Phase shift and Hartely Oscillators for variable frequency generation.
3. Testing and designing of Class A and Class B Push-pull amplifier.
4. Testing and designing of Tuned amplifier.
5. Testing and designing of A to D and D to A convertor.
6. Testing and designing of any Modulator and Demodulator Circuit

PEC 552 **COMMUNICATION LAB-I**

1. To study DSB/ SSB amplitude modulation & determine its modulation factor & power in side bands.
2. To study amplitude demodulation by linear diode detector
3. To study frequency modulation and determine its modulation factor
4. To study PLL 565 as frequency demodulator.
5. To study sampling and reconstruction of Pulse Amplitude modulation system.
6. To study the Sensitivity, Selectivity, and Fidelity characteristics of super heterodyne receiver.
7. To study Pulse Amplitude Modulation-
    a. using switching method
    b. by sample and hold circuit
8. To demodulate the obtained PAM signal by 2nd order LPF.
9. To study Pulse Width Modulation and Pulse Position Modulation.
10. To plot the radiation pattern of a Dipole, Yagi-uda and calculate its beam width.
11. To plot the radiation pattern of Horn, Parabolic & helical antenna. Also calculate beam width & element current.
12. Design and implement an FM radio receiver in 88-108 MHz..