SEMESTER 4

EC7351 COMMUNICATION THEORY

UNIT I AMPLITUDE MODULATION

Review of Fourier and Hilbert Transforms-**Amplitude Modulation – AM, DSBSC, SSBSC, VSB(one out of these will be for sure)**–Spectral analysis of modulated signals–Demodulation – **Square law, envelope detectors Superheterodyne receivers(V.Imp).**

UNIT II ANGLE MODULATION

Angle modulation – PM and FM – Narrow band, Wideband FM - Spectral analysis of modulated signal **– FM Modulators and FM Demodulators – Discriminator, PLL, Stereo FM**

UNIT III RANDOM PROCESS

Random variable**s, Central limit Theorem, Random Process, Stationary Processes, Mean, Correlation & Covariance functions, Power Spectral Density, Ergodic Processes, Gaussian Process, Transmission of a Random signal Through a LTI filter.**

UNIT IV NOISE PERFORMANCE

Noise sources and types – Noise figure and noise temperature **– Noise in cascaded systems – Narrow band noise –** PSD of in-phase and quadrature noise **– Noise performance in AM systems – Noise performance in FM systems – Pre-emphasis and de-emphasis – Capture effect, threshold effect.**

UNIT V BASEBAND TECHNIQUES

Quantization – Uniform and non-uniform quantization – Quantization noise – Companding laws of speech signals **– PCM, DPCM, ADPCM, DM, ADM, and Subband Coding. Multiplexing– TDM (E and T lines), FDM**

EC7401 ELECTROMAGNETIC FIELDS AND WAVES

UNIT I STATIC ELECTRIC FIELD

Introduction to co-ordinate systems , Gradient , **Divergence , Curl , Divergence theorem, Stokes theorem , Coulombs law , Electric field intensity** , Principle of superposition , Electric scalar potential, Electric flux density. **Gauss_s law and its application, Permittivity, Polarization, Boundary relation, Capacitance, Dielectric strength ,Energy and Energy density,** Poisson and Laplace equation and their application, Numerical examples

UNIT II STATIC MAGNETIC FIELD

Magnetic field of a current carrying element ,Amperes law , The Biot – Savart law , Magnetic flux Density and Field intensity , **Gauss law for magnetic fields** , Torque, Magnetic moment ,Magneto motive force , Permeability , Vector potential , Field computation. Inductance, Energy in an Inductor and Energy density, **Boundary relation,** Hysterisis, Reluctance and Permeance. Numerical examples

UNIT III TIME VARYING ELECTRIC AND MAGNETIC FIELDS

Faradays law , Transformer and Mutual induction , Maxwell_s equation , Self and Mutual inductance ,Displacement current , Amperes law and its inconsistency for time varying fields , Boundary relation , Poynting vector , Numerical examples.

UNIT IV PLANE EM WAVES IN ISOTROPIC MEDIA

Wave equation from Maxwell_s Equation, Uniform plane waves in perfect dielectric, conductors, free space. Polarization, Reflection and Refraction of plane waves at different boundaries, Surface impedance, Numerical examples

UNIT V APPLICATION OF STATIC FIELDS AND COMPUTATIONAL METHODS

Deflection of a charged particle, CRO, Ink Jet Printer, Electro static generator, Magnetic Separator, Cyclotron, Velocity selector and Mass Spectrometer, Electromagnetic pump, Introduction to field computation methods-FDM, FEM, MOM, Numerical examples.

EC7402 ELECTRONIC CIRCUITS - II

UNIT I FEEDBACK AMPLIFIERS AND STABILITY

Basic feedback concepts – Properties of Negative feedback – **Four feedback topologies– Analysis of series–shunt, series-series, shunt-shunt and shunt-series feedback amplifiers** – stability problem – Gain and Phase-margins- Frequency compensation.

UNIT II OPERATIONAL AMPLIFIER

Design of **two stage operational amplifier**, Compensation of Op Amps, **Cascode Op Amps, Folded Cascode Op Amps, Telescopic Opamp.**

UNIT III OSCILLATORS

Barkhausen criteria for oscillator – Analysis of RC oscillators – **Phase shift and Wein bridge oscillators – LC oscillators – Colpitts, Hartley, Clapp, and Ring Oscillators(one out of this)**

UNIT IV TUNED AMPLIFIERS

Basic principles – Inductor losses – Use of transformers – **Single tuned amplifier frequency analysis - Amplifier with multiple tuned circuits – Cascade – Synchronous tuning** – Stagger tuning – Stability of tuned amplifiers using Neutralization techniques

UNIT V POWER AMPLIFIERS AND DC CONVERTERS

Power amplifiers- class A-Class B-ClassAB-Class C-Power MOSFET-Temperature Effect- Class AB Power amplifier using MOSFET –DC/DC convertors – **Buck, Boost, Buck-Boost analysis and design**

EC7451 MICROPROCESSORS AND MICROCONTROLLERS

UNIT I 8- BIT MICROPROCESSOR.

8085 Architecture, Pin configuration, **Instruction set, Addressing modes, Interrupts, Timing diagrams Memory and I/O interfacing.**

UNIT II 16- BIT MICROPROCESSOR.

8086 Architecture, Instruction set, **Addressing modes**, Minimum and Maximum mode configuration, **Assembler Directives, Assembly Language Programming, Interrupts. Features of 80186, 80286, 80386, and 80486.**

UNIT III PERIPHERALS AND INTERFACING

Programmable Peripheral Interface (8255), Keyboard display controller (8279), ADC0808 and DAC0808 Interface, Programmable Timer Controller (8254), Programmable interrupt controller (8259), Serial Communication Interface (8251).

UNIT IV MICROCONTROLLER

8051 – Architecture, Special Function Registers (SFRs), Instruction set, **Addressing modes,** Assembly language programming, I/O Ports, **Timers / counters, Interrupts and serial communication.**

UNIT V MICROCONTROLLER BASED SYSTEM DESIGN

Interfacing to: matrix display, (16x2) LCD, high power devices, optical motorshaft encoder, **Stepper Motor, DC Motor speed Control using PWM, RTC and EEPROM interface using I2C protocol.**

EC7452 OPERATIONAL AMPLIFIERS AND ANALOG INTEGRATED CIRCUITS

UNIT I CIRCUIT CONFIGURATION FOR LINEAR ICS

Current sources, Analysis of difference amplifiers with active loads, supply and temperature independent biasing, Band gap references, Monolithic IC operational amplifiers, specifications, **frequency compensation**, **slew rate** and methods of improving slew rate. interpretation of TL082 datasheet.

UNIT II APPLICATION OF OPERATIONAL AMPLIFIERS

Linear and Nonlinear Circuits using operational amplifiers and their analysis, Inverting and **Noninverting Amplifiers, Differentiator, Integrator, Voltage to Currency converter, Instrumentation amplifier**, Sine wave Oscillators, Low pass and band pass filters, Comparator, **Multivibrator and Schmitt trigger, Triangle wave generator, Precision rectifier, Log and Antilog amplifiers,** Non-linear function generator.

UNIT III ANALOG MULTIPLIER AND PLL

Analysis of four quadrants and **variable Transconductance multipliers, Analog multiplier** MPY634 features**, Voltage controlled oscillator, Closed loop analysis of PLL, AM, PM and FSK modulators and demodulators**, AVC using op-AMP, **Frequency synthesizers, Compander ICs.**

UNIT IV ANALOG TO DIGITAL AND DIGITAL TO ANALOG CONVERTORS

Analog switches, High speed sample and hold circuit and IC's, **Types of D/A converter, Current driven DAC, Switches for DAC, A/D converter - Flash, Single slope, Dual slope, Successive approximation(one of these), DM and ADM, Voltage to Time and Voltage to Frequency converters.**

UNIT V SPECIAL FUNCTION ICS

Timers, Voltage regulators - linear and switched mode types, **Switched capacitor filter,** SMPS,features of TPS40200, TPS40210 **buck and boost controller**(V imp), **Frequency to Voltage converters, Tuned amplifiers, Power amplifiers and Isolation Amplifiers**, Video amplifiers**, Fiber optics ICs and Opto couplers, Sources for Noises,** Op Amp noise analysis and Low noise OP-Amps

MA7353 LINEAR ALGEBRA AND NUMERICAL METHODS

UNIT I VECTOR SPACES

Vector spaces – Subspaces – Linear combinations and system of Linear equations – Linear independence and Linear dependence – Bases and Dimensions – **Linear Transformation – Matrix representation of Linear Transformation - Null space, Range and dimension theorem.**

UNIT II LINEAR TRANSFORMATIONS

Linear transformations - Null spaces - Range - Matrix representation of linear transformation - Eigenvalues - Eigenvectors - **Diagonalization.**

UNIT III INNER PRODUCT SPACES

Inner product and norms - **Gram Schmidt orthonormalization process - Orthogonal Complement - Least square approximation.**

UNIT IV NUMERICAL SOLUTION OF LINEAR SYSTEM OF EQUATIONS

Solution of linear system of equations – Direct method: **Gauss elimination method** – Pivoting – **Gauss-Jordan method - LU decomposition method** – Cholesky decomposition method - Iterative methods: Gauss-Jacobi and Gauss-Seidel – **SOR Method**.

UNIT V NUMERICAL SOLUTION OF EIGENVALUE PROBLEMS AND GENERALISED INVERSES

Eigen value Problem**s: Power method – Jacobi's rotation method –** Conjugate gradient method – **QR decomposition - Singular value decomposition method.**