TELEVISION ENGINEERING

UNIT I:

Brief Introduction to TV transmission and reception , Interlaced scanning , TV picture : resolution , brightness , Video Bandwidth , Line and frame wave frequency , blanking synchronizing ad equalizing pulses , complete composite video signal , VSB transmission and Reception.

UNIT II:

Monochrome TV camera tubes: image Orthicon, Vidicon and Plumbicon tubes, Monochrome TV transmitter block diagram, and TV transmitting and receving antenna.

UNIT III:

Monochrome TV Receiver block diagram, Balun, RF tuner, Video IF amplifier, Video detector, Intercarrier sound system, Sound take off circuit, Sound IF and FM detector, Transistorized Keyed AGC circuit, Horizontal and Vertical deflection circuits, EHT generator.

UNIT IV:

Essential of color TV, Compatibility, Three – colors theory, chromaticity diagram, color TV camera, production of luminance and color – difference signals color TV picture tubes: Delta gun, P.I.L. and Trinitron tubes.

UNIT V:

Color signal transmission and reception, frequency interleaving, modulation of color – difference signals. PAL color TV system, choice of sub – carrier frequency, PAL color receiver, comparison of PAL with NTSCa and SECAM system.

UNIT VI:

Remote control circuits, MATV, CATV and CCTV system, HDTV and TV via satellite

PRACTICAL: Minimum 8 experiments based on above – syllabus. Practical should include experiments on fault – finding and trouble – shooting.

BOOKS:

1. Monochrome & Color TV .By R.R. Gulati
2. TV Engineering By Dhake

ADVANCED MICROPROCESSOR & MICROCONTROLLERS

UNIT I:

Introduction to 16 bit microprocessor, 8086 / 8088 CPU architecture, memory organization, interfacing addressing modes, Instruction set, programming examples, pseudo opcodes, assembler directives.

UNIT II:

Interfacing of peripheral 8255, 8253 & 8251. Interfacing of ADC & DAC, stepper motor, and serial communication standards RS232, IC Bus.

UNIT III:

Architecture, organization operation & interfacing of 8259, ICWs, OCWs, Cascading 8279 – keyboard display mode, sensor matrix mode, command words and programming DTMF transceiver (Mittel 8880), real time clock: DS 1307, EEPROM.

UNIT IV:

8086 / 88 maximum mode, 8087 architecture, 80386 architecture, real and protected mode, 8237 DMA controllers, organization, control words.

UNIT V:

Introduction to 8051 family architecture, pin diagram, operation, ports, addressing modes, internal & external memory, SFR, flags, organization, counters and timers, serial communication.

UNIT VI:

8051 instruction set interrupts; programming exercises for interlaced with keyboard, LED matrix time delays, serial communications

NAME OF BOOKS RECOMMENDED:

1. Programming & Interfacing of 8086 / 8088, D.V. Hall, TMH.
2. Intel Reference Manuals, Microprocessor & Microcontrollers: Intel
3. Advances Microprocessor & peripherals. A. K Ray (TMH)
4. Microcontrollers – Peatman, Mc Graw Hill.
5. Microcontrollers – Ayala (TMH).
6. Microprocessors 8086 / 88 Family Prog. Interfacing: Liu, Gibson

DIGITAL SIGNAL PROCESSING

UNIT I: DISCRETE TIME SIGNALS & SYSTEM

Discrete time signals, Discrete time systems, Linearity, causality, stability, static / dynamic, Time Invariance / Time variance, classification of discrete time system, Linear convolution, Circular convolution, Cross Correlation, Autocorrelation.

Linear constant coefficient difference equations, sampling theorem & sampling process. Reconstruction of sampling data, convolution.

UNIT II:

Frequency domain representation of discrete time signals and systems, Fourier transform of discrete time signals, properties of discrete time, Fourier transform.

UNIT III:

The Z – transform, Definition, properties of the region of convergence for the Z – transform, Z – transform properties, Inverse Z – transform using contour integration, complex convolution theorem, Parseval's, Unilateral Z – transform, stability interpretation using Jury's array.

UNIT IV:

Transform analysis of LTI system & structure for discrete – time system.

Frequency response of LTI system, relationship between magnitude & phase, all pass systems, minimum phase system, and linear system with generalized linear phase.

Block diagram representation & signal flow graph representation of Linear constant. Coefficient difference equations, Basic structures for IIR systems, transposed forms, basic network structures for FIR systems, lattice structures.

UNIT V:

Filter design Techniques: Design of discrete time IIR filters from continuous time filters frequency transformation of low pass IIR filters, Design of FIR filters by windowing, FIR filter design by Kaiser window method. Frequency sampling methods.

UNIT VI:

Discrete Fourier Transform: Discrete Fourier series, properties of discrete fourier series, Discrete fourier transform, properties of DFT, circular convolution using discrete fourier

transform. Decimation in time; FET algorithm, decimation in frequency FFT, FFT of long sequences using overlap add and overlap save method.

BOOKS:

1. Discrete time signal processing 2nd ED. Alan V Oppenheim, Ronald W. Schafer & Buch, Pearson.
2. Digital Signal Processing – A Computer based approach Sanjit K. Mitra.

REFERENCE:

1. Digital signal Processing Theory and application. Proakis and Manolakis – 3rd edition PHI Ltd.

Digital Signal Processing: Suggested experiments are as follows.

1. Signal generation and sampling principles.
2. Convolution.
3. LTI system characteristics.
4. DTFT & Properties.
5. Z transform and applications, solution of difference equation.
6. DFT, FFT linear & circular convolution.
7. Design of IIR filter.
8. Design of FIR filter.
    - Windows method
    - Kaiser window method.

Note: At least one experiment with C and At least one with MATLAB.

Optional – with DSP kit and Excel.

DIGITAL COMMUNICATION

UNIT I: DIGITAL MODULATION

PCM systems, Channel capacity, Delta modulation, Adaptive digital waveform coding schemes, method filter receiver, Coherent Binary: PSK, FSK, QPSK, MSK, DPSK.

UNIT II: SOURCE CODING METHODS

Review of information theory, Huffman and L – Z encoding algorithm Rate distortion theory for optimum quantanization, scalar and vector quantanization.

UNIT III:

Waveform coding methods, ADPCM, Adaptive sub band and transform coding, model based speech coding like LP coding, CELP coding, Introduction to Image compression, Review of techniques used in JPEG and MPEG standards.

UNIT IV: ADVANCED MODULATION METHODS

The signal space concept, Gram – Schmitt procedure, signal space representation of modulated signals, nonlinear modulation methods with memory, Error probability and optimum receivers for AWGN channels.

UNIT V: ADVANCED TRANSMISSION METHODS

Review of channel coding, convolution, encoding and decoding, distance properties, Viterbi algorithm and Fano algorithm. Trellis coded modulation methods.

UNIT VI: SPREAD – SPECTRUM METHODS

Study of PN sequences, direct sequence methods, Frequency hop methods, digital spread spectrum, slow and fast frequency hop, performance analysis, synchronization methods for spread spectrum. Application of spread spectrum, CDMA.

TEXT BOOKS:

1. Digital Communication: John G. Prokis (TMG)
2. Digital Communication: Simon Haykin (WEP)

1. Modern communication systems (Principles and application): Leon W. Couch II (PHI)
2. Digital communication: Shanmugh.

DIGITAL SYSTEM DESIGN

UNIT I:

Introduction to VHDL, design units, data objects, signal drivers, inertial and transport delays, delta delay, VHDL data types, concurrent and sequential statements.

UNIT II:

Subprograms – Functions, Procedures, attributes, generio, generate, package, IEEE standard logic library, file I/O, test bench, component declaration, instantiation, configuration.

UNIT III:

Combinational logic circuit design and VHDL implementation of following circuits – first adder, subtractor, decoder, encoder, multiplexer, ALU, barrel shifter, 4X4 key board encoder, multiplier, divider, Hamming code encoder and correction circuits.

UNIT IV:

Synchronous sequential circuits design – finite state machines, Mealy and Moore, state assignments, design and VHDL implementation of FSMs, Linear feedback shift register (Pseudorandom and CRC)

UNIT V:

Asynchronous sequential circuit design – primitive flow table, concept of race, critical race and hazards, design issues like metastability, synchronizers, clock skew and timing considerations.

UNIT VI:

Introduction to place & route process, Introduction to ROM, PLA, PAL, Architecture of CPLD (Xilinx / Altera).

TEXT BOOKS:

1. VHDL – 3rd Edition – Douglas Perry – TMH
2. Fundamentals of Digital Logic with VHDL design – Stephen Brown, Zvonko Vranesic – TMH.

3. Digital Design Principles – Fletcher.
4. VHDL Synthesis – J Bhasker.
5. VHDL Primer – J Bhasker – Pearson Education.

REFERENCE BOOKS:

1. Digital System Design Using VHDL – Chales H. Roth.
2. Digital System Design – John Wakerley.
3. VHDL – Zainalabedin Navabbi.
4. VHDL – D. Smith.

Digital System Design: Practicals based on above syllabus.

RADAR ENGINEERING

UNIT I:

RADAR Range Equation, CW and FM modulated RADAR.

UNIT II:

MTI and Pulse Doppler RADAR, Tracking RADAR.

UNIT III:

RADAR transmitter, Magnetron oscillator, Traveling tube amplifier, Klystron amplifier, Modulator.

UNIT IV:

RADAR antennas, parabolic reflector, Scanning field reflector, Lens antennas.

UNIT V:

RADAR Receivers, Displays and Duplexer, Detection of RADAR; signals in noise

UNIT VI:

RADAR clutter, Effects of weather on RADAR, Detection of targets in Precipitation, Synthetic Aperture RADAR, HF over the Horizon RADAR.

BOOKS:

1. Introduction of RADAR system by Skolnik (McGraw Hill)
2. Principles of RADAR by Heartes & Coates (McGraw Hill)
3. Introduction to RADAR system by Kingslles (McGraw Hill)
4. Navigational Aids by Sen & Bhattacharya.

SATELLITE COMMUNICATION

UNIT I:

Introduction: Origin of Satellite communication, Current state of satellite communication. Orbital aspect of satellite communication: Orbital mechanism, equation of orbit, locating satellite in orbit, orbital elements, and orbital perturbation. Space craft subsystem: Attitude and orbit control system, Telemetry tracking and command power system, and communication subsystem.

UNIT II:

Satellite link design: System noise temperature and T / T ratio, down link design, domestic satellite system, uplink design, design of satellite link for specified (C / N).

UNIT III:

Multiple access techniques: FDMA, FDM / FM / FDMA, effects of intermodulation, companded FDM / FM / FDMA, TDMA, TDMA frame structure and design, TDMA synchronization and timing, code division multiple access, SS transmission and reception; Applicability of CDMA to commercial system, multiple access on board processing SCPS system, digital speech interpolation system, DAMA.

UNIT IV:

Propagation on satellite: Earth's path – propagation effects, atmospheric absorption, Scintillation effects, Land and Sea multipath, Rain and ice effects, Rain drop distribution, calculation of attenuation. Rain effects on Antenna noise temperature.

UNIT V:

Encoding and forward error correction: Error detection and correction, channel capacity, error detecting codes, linear block codes, error correction with linear block codes, performance of block error correction codes, convolution codes, cyclic codes, BCH and codes, error detection on satellite links.

UNIT VI:

Earth Station technology: Earth Station design; antennas tracking, LNA, HPA, RF multiplexing, factors affecting orbit utilization, tracking, equipment for earth station.

BOOKS:

1. Satellite Communication by T. Pratt.
2. Satellite Communication by D. C. Agrawal.
3. Satellite Communication by Dennis Roddy.
4. Satellite Communication by T. T. Hai.