M.TECH IN ECE -(DIGITAL COMMUNICATION)
(REGULAR)

I SEMESTER

SUBJECT CODE	NAME OF SUBJECT	HOURS/WEEK			CREDIT POINTS
		L	T	P	
01MDC101	Signal Theory	4	1	0	5
01MDC102	Digital Communication System	4	1	0	5
01MDC103	Satellite Communication	4	1	0	5
01MDC104	Optimization Techniques	4	1	0	5
01MDC201	Communication System Lab	0	0	3	2
01MDC301	Discipline & Co Curricular activities	0	0	4	1
total		16	4	7	23

II SEMESTER

SUBJECT CODE	NAME OF SUBJECT	HOURS/WEEK			CREDIT POINTS
		L	T	P	
02MDC101	Digital Signal Processing	4	1	0	5
02MDC102	Information theory & Coding	4	1	0	5
02MDC103	Advanced Optical Communication	4	1	0	5
02MDC104	Antenna Theory & Techniques	4	1	0	5
02MDC201	Modeling & Simulation Lab	0	0	3	2
02MDC301	Discipline & Extra Curricular activities	0	0	4	1
	Total	16	4	7	23

III SEMESTER

SUBJECT CODE	NAME OF SUBJECT	HOURS/WEEK			CREDIT POINTS
		L	T	P	
03MDC101	Mobile Communication	4	1	0	5
03MDC102	Telecommunication Switching & Networks	4	1	0	5
03MDC201	Seminar	4	0	0	4
03MDC202	Projects	4	0	0	4
03MDC301	Discipline & Co Curricular activities	0	0	4	1
TOTAL		16	2	8	19

IV SEMESTER

SUBJECT CODE	NAME OF SUBJECT	HOURS/WEEK			CREDIT POINTS
		L	T	P	
04MDC201	DISSERTATION a) Continuous Evaluation b) Project Report c) Viva Voice	 5 6 6	0	0	 5 6 6
04MDC301	Discipline & Co Curricular activities	0	0	4	1
TOTAL		17	0	4	18

Semester I

SIGNAL THEORY

Course/Paper: 01MDC-101
MDC Semester-I

Representation of deterministic signals: Orthogonal representation of signals. Dimensionality of signal spaces. Construction of orthogonal basis functions.

Random Processes: Definition and classification, stochastic integrals, Fourier transforms of random processes, stationary and non-stationary processes, correlation functions. Ergodicity, power spectral density, transformations of random processes by linear systems.

Representation of random processes (via sampling, K-L expansion and narrow band representations), special random processes: white Gaussian noise, Wiener-Levy process, Poisson process, shot-noise process, Markov process.

Optimum Filtering: Matched filters for deterministic signals in white and colored Gaussian noise. Wiener filters for random signals in white and colored Gaussian noise.

Reference:

1. Populis – "random variable & stochastic processes" , TMH
2. Hsu – "Random Variable & Stochastic Process", Schoum's Outline.
3. Simon Hakins – "Digital Communication", John willy
4. Hsu- "analog & Digital Communication" Schoum's Outline.

DIGITAL COMMUNICATION SYSTEM

Course/Paper: 01MDC-102
MDC Semester-I

Characterization of communication signals, signal space representation, equalization, matched filtering, binary PSK, QPSK, FSK, QAM & M-Ary modulation techniques and their representation. Coherent & non coherent detection, carrier & symbol synchronization, bits vs symbol error probability, bandwidth efficiency, Spread spectrum modulation: Pseudo noise sequences, DS & FH spread spectrum.

Reference:

1. B.P.Lathi – "Coomunication system", John Willy
2. Simon Hakins – "Digital Communication", John willy
3. K.Shmungum – "Digital Communication", John Willy
4. Taub & Shilling – "communication system", TMH.
5. Tomashi – "Communication System", Pearson.
6. Singh & Shpre "communication System", TMH

SATELLITE COMMUNICAITON

Course/Paper: 01MDC-103
MDC Semester-I

Introduction: Orbital mechanics and launching, earth station and satellite sub systems, satellite link: design and analysis, multiplexing techniques, multiple accesses for satellite links: FDMA, TDMA CDMA & DAMA, propagation effects, DBS-TV, GPS. VSAT: Network architecture, access control protocol & link analysis.

Reference:

1. Prett – "satellite Communication", John Willy
2. Denis Roodi – "Satellite Communication", Mc Graw Hill.
3. william Stallings – "wireless communication", Pearson

OPTIMIZATION TECHNIQUES

Course/Paper: 01MDC-104
MDC Semester-I

Introduction: Historical development, application to engineering problems, statement of optimization, classification of optimization, examples of optimization problems.
Linear Programming: Graphical method, simplex method, revised simplex method, Big-M method, phase method, alternate optimal solutions, unbounded LPs, degeneracy and convergence, duality in linear programming, sensitivity analysis, dual simplex method, Transportation, assignment and other applications.
Non-Linear Programming: Unconstrained optimization techniques, direct search methods (Fibannoci method, golden section, quadrature and cubic interpolation) descent methods, constrained optimization, direct and indirect methods, optimization with calculm, kuhn-tucker conditions.
Dynamic Programming: Multistage decision process, principles of optimality, computational procedures in dynamic programming.

Reference:

1. **S.S.Rao – "Optimization – theory & Application", Willy Eastern.**
2. **A.L.Fox – "Optimization method for engineering design", Addition weshley,**
3. **H.A.Taha – "operation research and introduction", Mcmillan Co.**
4. **Jain & Rawat – "optimization Technique", CBC.**

COMMUNICAITON SYSTEM LAB

Course/Paper: 01MDC-201
MDC Semester-I

PART I : PCM AND LINK ANALYSIS
Link establishment, Noise on PCM link, Error detection, BER calculation, Error correction, TDM.
PART II : DIGITAL MODULATION & KEYING
ASK, FSK, PSK, QPSK Modulation and Demodulation.
PART III : CDMA - DSSS
Modulation, Demodulation & BER measurement.
PART IV : SIMULATION IN MATLAB ENVIRONMENT
BPSK, QPSK, FSK Modulation & Demodulation. BER calculation.

Semester II

DIGITAL SIGNAL PROCESSING

Course/Paper:02MDC-101
MDC Semester-II

DFT & its properties. Decimation in time and decimation in frequency FFT algorithms, discrete cosine transform. IIR Filter design: Butterworth design, bilinear transformation. Low Pass, High Pass, Band Pass and Band Stop digital filters. Spectral transformation of IIR filters.

FIR filter design: Symmetric and anti symmetric linear phase. FIR filter by rectangular, triangular and Blackman window functions.

Finite word length effects in FIR and IIR digital filters: Quantization, round off errors and overflow errors.

Multi rate digital signal processing: Concepts, design of practical sampling rate converters, Decimators, interpolators. Poly phase decompositions.
Reference:

1. **S .K. Mitra – "Digital Signal Processing", TMH.**
2. **Prokis & Monalskis – "Digital signal processing", PHI.**
3. **Shahliwahnan – "digital signal processing ", Eastern economy edition.**
4. **Schafer & Buck – "discrete time sinal processing", Pearson.**

INFORMATION THEORY & CODING

Course/Paper: 0MDC-102
MDC Semester-II

Shannon's fundamental coding theorems, Differential entropy & mutual information for discrete & continuous ensembles, source coding, Rate distortion theory.
Introduction to Algebra: Groups,fields,Binary field arithmatic,Basic properties of Galois field GF(2_m)and vector spaces.

Channel coding & decoding: Run length limited codes, LBC, cyclic code, BCH code, convolution code, Trellis coded modulation, Reed-Solomon code.
Reference:

1. R.Bose "Information Theory & Coding",
2. Shamungum "Digital Communication", John Wiley
3. Singh & Shapre "digital Communication", TMH.
4. Simon Hakins – "Digital Communication", John willy

ADVANCED OPTICAL COMMUNICATION

Course/Paper: 02MDC103
MDC Semester-II

Optical fibers: review of fundamentals, Signal distortion and attenuation, Intermodal and intramodal dispersion, dispersion flattened and dispersion compensated fibers, Profile dispersion, study of PMD. Laser diode and photodiode, Photo detector noise analysis, Analog and Digital communication link design. WDM, DWDM, optical couplers, Mach-Zehnder interferometer multiplexer, optical add/drop multiplexers, isolators, circulators, optical filters, tunable sources and tunable filters, arrayed waveguide grating, diffraction grating, optical amplifiers, optical integrated circuits .Characterization of optical fibers, OTDR
SONET: frame format, overhead channels, payload pointer, Virtual tributaries, multiplexing hierarchy.
SDH: Standards, frame structure and features.
Optical switching, WDM networks,
Classification of optical sensors. Intensity modulated, phase modulated and spectrally modulated sensors.
Reference:

1. **Shinner "Optical Fiber Communication", Pearson.**
2. **Gerd Keiser – "Optical Fiber Communication", TMH.**
3. **J.N.Senior - "Optical fiber communication", PHI**

ANTENNA THEORY AND TECHNIQUES

Course/Paper: 02MDC-104
MDC Semester-II

Review of the theory of electromagnetic radiation. Introduction to various antenna types wire, loop and helical antennas, analysis using assumed current distribution.
Aperture antennas: slot, wave guide, horn, and reflector antennas. Analysis using field equivalence principle and Fourier transform methods. Linear arrays. Traveling wave & broadband antennas. Antenna measurements.
Printed antennas: Feeding methods, transmission line & cavity models, analysis and design of rectangular & circular microstrip antenna. Arrays: pattern synthesis, planar arrays, phased arrays. Active antennas and arrays.
Paraboloidal reflector antenna, different feed configurations, shaped beam antennas, lens antenna. Antennas for biomedical applications.

Smart antennas for mobile communications.
Antenna for infrared detectors.
Reference:

1. Balanis – "Antenna", John Wiley.
2. J.D.Kores. "antennas" MGH
3. K.D.Prasad "Antenna & wave Propagation", Satya Prakashan
4. R.E.Collin "antenna and Wave propagation", MGH.

MODELING & SIMULATION LAB

Course/Paper: 02MDC-201
MDC Semester-II

EXPERIMENTS USING TMS320C6XXX DSP KITS
1. FIR Digital Filter Design
2. IIR Digital Filter Design
3. FFT of a given signal
4. Plot PSD/Power Spectrum of a signal
5. Discrete Cosine Transform
6. Adaptive Filter Design using Standard LMS Algorithm
7. Speech analysis using L.P.C.

Semester III

MOBILE COMMUNICATION

Course/Paper: 03MDC-101
MDC Semester-III

Cellular concept. Mobile radio propagation. Co-channel interference. Diversity. Multiple access. Cellular coverage planning. Wireless networking. Wireless systems and standards. Fading channels, spreading codes, power control. WAP and other protocols for internet access. Data transmission in GSM and UMTS, TCP in wireless environment, multi-user detection and its performance analysis. Blue-tooth and other wireless networks, system comparison.
Spread spectrum concept. Basics of CDMA. Properties and generation of PN sequences. Applications of CDMA to cellular communication systems. Second and third generation CDMA systems/ standards. Multicarrier CDMA. Synchronization and demodulation .Diversity techniques and rake receiver.

Reference:

1. **Rapaport "wireless communication", Pearson .**
2. **William Stalings "wireless Communication & Network",Pearson**
3. **Dr. Kamilo Feher "digital wireless communication" PHI.**
4. **William C.Y..Lee "Mobile cellular Telecommunication", MGH**

TELECOMMUNICATION SWITCHING & NETWORKS

Course/Paper: 03MDC-102
MDC Semester-III

Principles of circuit switching & signaling schemes, space time & space time division switching, single stage & multi stage switching network. Traffic engineering and teletraffic theory.
Markov processes representing traffic, calculation of blocking probability.
Modeling and analysis of important media access control protocols: ALOHA, slotted ALOHA,CSMA,CSMA/CD.
LAN: Ethernet, token ring, FDDI.
B-ISDN architecture, B-ISDN protocols, ATM traffic & congestion control, signaling, routing and addressing, Internetworking: switches, bridges, routers, gateways. ATM switching.

1. T. Wishwanathan "telecommunication switching system & Network", PHI
2. Floyd "Telecommunication Switching Traffic & Network", Pearson
3. Tenenbaum "Computer network", Pearson.
4. Galleger "Data Network", PHI.
5. Frouzan "data communication & networking", TMH

SEMINAR

Course/Paper: 03MDC-201
MDC Semester-III

OBJECTIVE

The students are to select one technical topic related its branch for Seminar. The student is to submit the synopsis for assessment and approval. Progress for preparation of the seminar topic would be continuously assessed from time to time. Two periods per week are to be allotted and students are expected to present the seminar Progress. A faculty guide is to be allotted and he / she will guide and monitor the progress of the student and maintain the attendance.

Students have to give a final presentation for 15 minutes on his topic. Students are encouraged to use various teaching aids such as over head projectors, power point presentation and demonstrative models. This will enable them to gain confidence in facing the placement interviews

PROJECT

Course/Paper: 03MDC-202
MDC Semester-III

OBJECTIVE

The objective of the project work is to enable the students in convenient groups of not more than 3 members on a project involving theoretical and experimental studies related to the branch of study. Every project work shall have a guide who is the member of the faculty of the institution.
The student should select any one of the topics offered from the department or select one on his own duly approved from the department. Candidate is required to submit the detailed synopsis of the work that he would complete in the part-II

Each student shall finally produce a comprehensive report covering back ground information, literature survey, problem statement, project work details and conclusion. This final report shall be typewritten form as specified in the guidelines.

Semester IV

DISSERTATION

Course/Paper: 04MDC-201
MDC Semester-IV

The student will submit a synopsis at the beginning of the semester for the approval from the University project committee in a specified format. Synopsis must be submitted within a two weeks. The first defense, for the dissertation work, should be held with in a one month. Dissertation Report must be submitted in a specified format to the University for evaluation purpose.