R.K.D.F. UNIVERSITY, BHOPAL
M-Tech (Digital Communication)
FIRST YEAR
Semester –I
Course Content & Grade

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
DC	Advanced Mathematics	MTDC-1001	3L-1T-P	4

Course Outcomes

Students will

CO1 Perform basic algebraic manipulation with complex numbers
CO2 Understand the geometric interpretation of complex numbers
CO3 Know methods of finding the nth roots of complex numbers and the solutions of simple polynomial equations.
CO4 Develop a working knowledge of concepts and methods related to designing and managing operations and supply chains.
CO5 Develop a skill set for quality and process improvement

Solution of Partial Differential Equation (PDE) by separation of variable method, numerical solution of PDE (Laplace, Poisson's, Parabola) using finite difference methods, Elementary properties of FT, DFT, WFT, Wavelet transform, Haar transform.

Probability, compound probability and discrete random variable. Binomial, Normal, Poisson's distribution.Sampling distribution, elementary concept of estimation and theory of hypothesis, recurred relations.Stochastic process, Markov process transition probability transition probability matrix, just and higher order Markov process, Markov chain.

Queuing system, transient and steady state, traffic intensity, distribution queuing system, concepts of queuing models (M/M/1: Infinity/ Infinity/ FC FS), (M/M/1: N/ Infinity/ FC FS), (M/M/S:Infinity/ Infinity/ FC FS) Operations of fuzzy sets, fuzzy arithmetic & relations, fuzzy relation equations, fuzzy logics.

MATLAB introduction, programming in MATLAB scripts, functions and their application. Introduction and definition of reliability, derivation of reliability functions, Failure rate, Hazard rate, mean time t future & their relations, concepts of fault tolerant analysis, Elementary idea about decision theory and goal programming.

Reference Books:

1. Higher Engineering Mathematics by B.V. Ramana, Tata Mc Hill.

2. Advance Engineering Mathematics by Ervin Kreszig, Wiley Easten Edd.
3. Applied Numerical Methods with MATLAB by Steven C chapra, Tata Mc Graw Hill.
4. Introductory Methods of Numerical Analysis by S.S. Shastry,
5. Introduction of Numerical Analysis by Forberg
6. Numerical Solution of Differential Equation by M. K. Jain
7. Numerical Mathematical Analysis By James B. Scarborogh
8. Fourier Transforms by J. N. Sheddon
9. Fuzzy Logic in Engineering by T. J. Ross
10. Fuzzy Sets Theory & its Applications by H. J. Zimmersoms

R.K.D.F. UNIVERSITY, BHOPAL
M-Tech (Digital Communication)
FIRST YEAR
Semester –I
Course Content & Grade

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
DC	Micro Controller System Design	MTDC-1002	3L-1T	4

Course Outcomes:

The purpose of this course is to develop a strong base in design and analysis of Microcontroller systems. Students will learn to

CO1 Fundamental principles of 8 bit, 16 bit Microprocessor Controller design and layout and its interfacing techniques.
CO2 Have an overview of single chip microcontrollers. its memory mapping, addressing modes, etc
CO3 Learn about software development modular approach and Object oriented interfacing and programming.
CO4 Get Knowledge of Design and application of Micro-Controller in Data acquisition, Embedded controllers, Process control,etc
CO5 Have hands-on design experience on DSP Processor architecture and sample design using TI – DSP.

SYLLABUS

Review of 8-Bit and 16-bit microprocessor, support chips and interfacing techniques, single chip microcomputers, architecture, program and data memory, ports, input Output interfacing and programming,

Single chip micro controllers- INTEL 8051/ 8751, MOTOROLA 68HC0/68HC11 architecture, instruction set and programming, Memory mapping, addressing modes, Registers, expanded modes. Interrupt handling timing and serial I / O.

Software development Modular approach, integrated software development environment, Object oriented interfacing and programming, Recursion and debugging.

ATMEL 89C51 / 52 and PIC micro-Controllers- Case studies.Design and application of Micro-Controller in Data acquisition, Embedded controllers, Process control etc.

DSP Processor architecture and sample design using TI – DSP.

Reference Books:

1. Embedded Systems 8051 By Majidi & Majidi

2. Design With Micro-Controllers By John P. Peatman Tmh

3. Embedded Micro-Computers System By J

R.K.D.F. UNIVERSITY, BHOPAL
M-Tech (Digital Communication)
FIRST YEAR
Semester –I
Course Content & Grade

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
DC	DSP Application	MTDC-1003	3L-1T	4

Subject code:- MTDC 103

Subject Name: - DSP Application

Course Outcomes

The purpose of this course is to understand the concept of Digital Signal Processing systems and its Applications. Students will learn

CO1 Fundamental principles of Discrete time signals and systems.

CO2 Understand the need and basics Z Transform – Properties, ROC, Stability, Causality, and Criterion. Inverse Z Transform, Recursive and Non Recursive systems.

CO3 Become familiar with types of DFT- its Properties, Linear and Circular convolution, Discrete Cosine Transform, Relationship between DFT and DCT.

CO4 Understand the Utility of FIR and IIR systems, its Basic structure, Bilinear Transformation, Designing of Discrete time IIR filter-Butterworth , Chebychev , Inverse Chebyshev Elliptic etc.

CO5 Application of MATLAB for Design of Digital filters. Effect of Finite register length in filter Design.

CO6 Understand the concept of Discrete time Random signals, energy signals, Discrete time random process, Spectrum Representation of finite energy signals and response of linear systems to random signals.

CO7 Basic principles of spectrum estimation, estimate of auto con variance, power spectrum, cross con variance and cross spectrum.

CO8 Learn the Utility of Advance signal processing technique and transforms, introduction to discrete Hilberts Transform, Wavelet Transform, Haar Transform etc.

SYLLABUS

Review of Discrete time signals: sequences, representation. Discrete time systems: linear, time in variant, LTI systems, properties, and constant coefficients difference equations. Frequency Domain representation of discrete time signals and systems.

Review of Z Transform – Properties, ROC, Stability, Causality, Criterion. Inverse Z Transform, ecursive and Non Recursive systems, Realization of discrete time system

DFT: Properties, Linear and Circular convolution, Discrete Cosine Transform, Relationship between DFT and DCT. Computation of DFT: FFT/Decimation in Time and Decimation in Frequency.

FIR and IIR systems: Basic structure of FIR and IIR, Bilinear Transformation, Design of Discrete time IIR filter-Butterworth , Chebychev , Inverse Chebychev , Elliptic etc. Design of FIR filters by windowing –Rectangular, Bartlett, Hann, Hamming, Kaiser, Window filter, Design method relationship of Kaiser to other window. Application of MATLAB for Design of Digital filter. Effect of Finite register length in filter Design

Discrete time Random signals: Discrete time random process, Averages, Spectrum Representation of finite energy signals, response of linear systems to random signals. power spectrum estimation: Basic principals of spectrum estimation, estimate of auto con variance, power spectrum ,cross con variance and cross spectrum.

Advance signal processing technique and transforms: multi rate signal processing- down sampling/up sampling, introduction to discrete Hilberts Transform, Wavelet Transform, Haar Transform etc.

Reference Books:

1. Discreate time signal Processing by Opperenheim & Schaffer PHI 2nd Edition

2. Digital Signal Processing using MATLAB by S.Mitra

3 Digital Signal Processing By Proakis Pearson Education

4. Theory & application of Digital Signal Processing by L.R.Rabiner & B. Gold PHI

R.K.D.F. UNIVERSITY, BHOPAL
M-Tech (Digital Communication)
FIRST YEAR
Semester –I
Course Content & Grade

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
DC	VLSI Design	MTDC-1004	3L-1T	4

Subject code:- MTDC 104

Subject Name: - VLSI Design

Course Outcomes

Students will learn the

CO1 Basic concept of integrated circuits and manufacturing, Design fundamental for digital MOS circuits, Design Abstraction and circuit Validation.
CO2 Understand the basics of CMOS circuit and Logic Design, CMOS Logic gate design, Basic Physical design and Power and Delay considerations.
CO3 Understand the Utility of System Design, CMOS Chip Design, standard cells, Programmable gate array, Design Capture, Simulation and Verification
CO4 Get Knowledge of Subsystem Design, Data Operation, CMOS Sub System Design, Memory and Control Strategies, PLA and ROM Implementation
CO5 Understand the concept of CAD system and Algorithms, Layout Analysis, Placement and Routing Algorithms, Timing Analysis, Optimization, Logic Synthesis and Simulations.

SULLABUS

Introduction: Basic concept of integrated circuits and manufacturing, Design fundamental for digital CMOS circuits, Design Abstraction and circuit Validation.

CMOS circuit and Logic Design: CMOS Logic gate design, Basic Physical design, CMOS Logic structure, I/O Structure, Power and Delay consideration

System Design: CMOS Chip Design, standard cells, Programmable gate array, Design Capture, Simulation and Verification.

Subsystem Design: Data Operation, CMOS Sub System Design, Memory and Control Strategies, PLA and ROM Implementation.

CAD system and Algorithms: CAD systems, Layout Analysis, Placement and Routing Algorithms, Timing Analysis, Optimization, Logic Synthesis and Simulation, Testability Issues.

Reference Books:

1. Principal Of Cmos Design: A System Prospective By Waste And Eshraghin

2. VLSI Design: System On Silicon, Pearson Education

3 VLSI Technology By Sze S.M. Tmh

4 Basic VLSI Design, System And Circuits By Pucknil D.A. Phi

5 Vhdl Primer By Bhaskar Star Galax Pub.

R.K.D.F. UNIVERSITY, BHOPAL
M-Tech (Digital Communication)
FIRST YEAR
Semester –I
Course Content & Grade

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
DC	Data Communication and Computer Network	MTDC-1005	3L-1T	4

Subject code: - MTDC 105

Subject Name: - Data Communication and Computer Network

Course Outcomes:

Students will

CO1 Understand basics of synchronous and asynchronous transmission, circuit switching, message switching, packet switching and their comparison, RS-232 C and X.21 standards, modern operation, null model.

CO2 Learn the concept of various communication protocols like Data link control, point-to-point, etc , various ARQ technique for error control and their comparison and performance analysis, HDLC as a bit oriented link control protocol. Replacement and Game Theory.

CO3 Get knowledge of Communication Network, Virtual circuit and datagram, routing algorithm, Dijkstera and Bellman ford least cost, algorithm, various routing protocol, congestion control technique, deadlock and its avoidance.

CO4 Get a comprehensive knowledge of various LAN topologies and medium access control schemes such as contention, polling, token parsing and performance analysis, various IEEE standards for LAN, UBS LANs, FDDI.

CO5 Get Understanding of WAN packet switching technologies such as ATM and Frame relay. Introduction to TCP / IP protocols.

SYLLABUS

Review of synchronous and asynchronous transmission, circuit switching, message switching, packet switching and their comparison, various detector techniques, parity check, vertical and

longitudinal redundancy check and CRC code and their error detecting capabilities. RS-232 C and X.21 standards, modern operation, null model.

Data link control, point-to-point and multi-point links, flow control, sliding window protocol, various ARQ technique for eroor control and their comparison and performance analysis, HDLC as a bit oriented link control protocol.

Communication Network:- Virtual circuit and datagram, routing algorithm, dijkstera and Bellman ford least cost, algorithm, various routing protocol, congestion control technique, deadlock and its avoidance.

Local Area network:- Various topologies and medium access control schemes such as contention, polling, token parsing and performance analysis, various IEEE standards for LAN, UBS LANs, FDDI.

Introduction to WAN packet switching technologies such as ATM and Frame relay. Introduction to TCP / IP protocols.

Reference Books:-

1. Data And Computer Communication By W. Stalling Phi
2. Computer Networks Y Tanenebaum Phi
3. Telecommunication Network, Protocols, Modelings And Analysis By M. Schwartz
4. Local Area Network By Keiser Tmh

R.K.D.F. UNIVERSITY, BHOPAL
M-Tech (Digital Communication)
FIRST YEAR
Semester –II
Course Content & Grade

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
DC	System Programming	MTDC-2001	3L-1T	4

Subject code:- MTDC 201

Subject Name: - System Programming

Course Outcomes:

Students will

CO1 Get the Concepts of Fundamental of programming, steps in problem solving with digital computer algorithm, flow chart and textual representation, primitive actions, control construct like conditional, iteration, conditional repetition, recursion, programming with Pascal of C

CO2 Get knowledge of Data types, data representation, data structure array-various operations with array, concept of pointers and pointers manipulations, pointers for data structures and functions, static and dynamic allocations, implementations with arrays and pointers, various operations like searching, appending, insertion & deletion in lists, doubly linked list and their implementations.

CO3 Will understand the concept of Searching and sorting, linear, binary and Hash search, minimum and maximum selection, divide and conquer, sorting, insertion sort, bubble sort, quick sort & heap sort, matrix operations, dynamic programming.

CO4 Understand Overview of system programs, Assembler, interpreter, compiler, Editor and operating system.

Modeling and Simulation

SYLLABUS

Fundamental of programming, steps in problem solving with digital computer algorithm, flow chart and textual representation, primitive actions, control construct like conditional, iteration, conditional repetition, recursion, programming with Pascal of C

Data & Data types, data representation, data structure array-various operations with array, concept of pointers and pointers manipulations, pointers for data structures and functions, static and dynamic allocations, implementations with arrays and pointers, various operations like searching, appending, insertion & deletion in lists, doubly linked list and their implementations, stack,PUSH/POP & TOP of stack operation, applications of stacks, queues & various operations on queues, tree, binary and K-ary trees, tree traversal, insertion and deletion in tree, B-tree and AVL tree, operations on those tree applications

Searching and sorting, linear, binary and Hash search, minimum and maximum selection, divide and conquer,sorting, insertion sort, bubble sort, quick sort & heap sort, matrix operations, dynamic programming

Overview of system programs, Assembler, interpreter, compiler, Editor and operating system.

Reference books: -

1. Data structure & Program design by Kruze, PHI

2. Algorithms,Data structure & programs by Wirth N., PHI

3. The programming language by Kernighan & Ritchi, PHI 4.Introductory problem solving by pascal by Schieder,John Wiley

R.K.D.F. UNIVERSITY, BHOPAL
M-Tech (Digital Communication)
FIRST YEAR
Semester –II
Course Content & Grade

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
DC	Modeling and Simulation of Computer	MTDC-2002	3L-1T	4

Subject code: - MTDC 202

Subject Name: - Modeling and Simulation of Computer

Course Outcomes:

Students will

1. Learn basics of Discrete event system simulation, its applications, Discrete and Homogeneous system, modeling of system and type of models, Various steps in simulation, General concept in discrete event simulation.
2. Get familiar with Practical models in simulation and its concepts, useful statistical models, discrete distributions, continuous distributions, Possion process and empirical distribution .
3. Get Knowledge of Queuing model and its Characteristics , measures of performance using queuing systems property.
4. Learn the concept of Random number and its generation, Properties of random numbers, distribution of pseudo random no, test for random no., Random variant Distribution, inverse transform technique, Direct transformation for normal distribution, Acceptance and rejection technique.

5. Understand the applications of Modeling, Data Collection, identifying the distribution with data, parameter variation, etc.
6. Get Introduction and validation of simulation models, output analysis for single model, nature of output data, types of simulation with respect to output analysis and types of performance and their estimation.

SYLLABUS

Induction to Discrete event system simulation, its applications, advantages and advantages, system and system, environments and component of system, Discreate and Homogeneous system, modeling of system and type of models, Various steps in simulation, General concept in discrete event simulation.

Practical models in simulation: review of terminology and concepts, useful statistical models, discrete distandom number and its generation: Properties of random numbers, distribution of pseudo random no, test for random no., Random variant Distribution, inverse transform technique, Direct transformation for normal distribution, Acceptance and rejection technique.

Modeling: Data Collection, identifying the distribution with data, parameter variation, goodness of fit tests, selection of input model without data, multivariate and input models.

Introduction and validation of simulation models: output analysis for single model, nature of output data, types of simulation with respect to output analysis, types of performance and their estimation, output analysis for terminating simulations, analysis for terminating simulation.

Reference Books:

1. Simulation Modeling and Analysis by
2. Modeling and simulation by Bank and Carson PHI
3. Network Modeling, simulation and analysis by Garcia and Garcia
4. Telecommunication Network: Protocols, Modeling and Analysis By M. Schwartz

R.K.D.F. UNIVERSITY, BHOPAL
M-Tech (Digital Communication)
FIRST YEAR
Semester –II
Course Content & Grade

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
DC	Network Design Technology	MTDC-2003	3L-1T	4

Subject code: - MTDC 203

Subject Name: - Network Design Technology

Course Outcomes:

Students will

CO1 Understand basic concepts of Layering and Layered models- OSI & TCP/IP LAN Technology, transmission Medium, Topology, Medium Access Control (MAC) Techniques including MAC& LLC sub layers.

CO2 Learn the concept of LAN system, Ethernet system, Fast Ethernet& Gigabit Ethernet, Token Ring, FDDI Internet working with TCP/IP, Internet Protocol (IP) Suite including IP V4, IP V6 Transport Protocols, TCP and UDP.

CO3 Get knowledge of IP routing, various interior gateways protocols like RIP, OSPF and exterior gateway protocols like BGP

CO4 Get a comprehensive knowledge of label Switching and MPLS WAN technology, WAN Vs LAN, Circuit switching mechanism and network design, packet switched networking including routing and traffic control, X.25 ISDN and Broadband ISDN,High Speed network frame relay, frame relay protocols, services and congestion control,

CO5 ATM: ATM adaptation layer (AAL), ATM traffic and congestion control ATM LAN, ATM LAN emulation and multi protocols over ATM (MPOA)

SYLLABUS

Review of concepts of Layering and Layered models- OSI & TCP/IP LAN Technology, transmission Medium, Topology, Medium Access Control (MAC) Techniques including MAC& LLC sub layers,

LAN system, Ethernet system, Fast Ethernet& Gigabit Ethernet, Token Ring, FDDI Internet working with TCP/IP, Internet Protocol (IP) Suite including IP V4, IP V6 Transport Protocols, TCP and UDP

Introduction to IP routing, various interior gateways protocols like RIP, OSPF and exterior gateway protocols like BGP

Introduction to label Switching and MPLS WAN technology: WAN Vs LAN, Circuit switching mechanism and network design, packet switched networking including routing and traffic control, X.25 ISDN and Broadband ISDN: Overview, ISDN, interface and functions, layers and ISDN services-ISDN standards and services High Speed network frame relay, frame relay protocols, services and congestion control,

ATM: ATM adaptation layer (AAL), ATM traffic and congestion control ATM LAN, ATM LAN emulation and multi protocols over ATM (MPOA)

Reference Books.

1. Redia Pearlman, Interconnections, bridges, routers, switches and Int protocols Pearson Edu
2. Comer, Internetworking with TCP/IP Vol. I PHI
3. Tenenbaum, Computer Networks, PHI
4. Forouzan B, Data communication and networking, TMH.
5. Stalling W, Data and computer communications, PHI
6. Hardy, Inside networks, PHI
7. Glover and Grant, Digital Communication, PHI

R.K.D.F. UNIVERSITY, BHOPAL
M-Tech (Digital Communication)
FIRST YEAR
Semester –II
Course Content & Grade

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
DC	Optical Network	MTDC-2004	3L-1T	4

Subject code:- MTDC 204

Subject Name: - Optical Network

Course Outcomes

Students will learn the

1. Basic concept of optical network, first generation optical network, multiplexing technique, second generation optical network, virtual circuit services and data gram.

2. Understand the basics of Network components like couplers, Isolators, Circulators, Multiplexer , filter, fiber Bragg gratings as ADD/Drop multiplexers, acoustics optical tunable filters, characterization of switches, mechanical, electro-optic, thermo-optic, and SOA switches, switching architecture.

3. Understand the concept of First generation of optical network: SONET, SDH, goals of SONET design , Multiplexing in SONET, elements of SONET/SDH infrastructure, SONET physical layer, FDDI,ATM,IP layered architecture , physical layer, data link layer, network layer, transport layer.

4. Get Knowledge of network topologies for broadcast networks like bus topology, star topology, media access control (MAC) protocols, throughput calculation, synchronization, aloha and slotted ALOHA.

5. Understand the concept of Wavelength routing network, optical layer, wavelength cross connect, wavelength reuse reliability, virtual topology and circuit switching and node design, degree of wavelength conversion, network design and operation traffic models, and performance criteria, static and reconfigurable network, classification of light paths.

6. Learn about Photonic packet switching, optical time domain multiplexing (OTDM), Method of multiplexing and demultiplexing, OTDM network, bit interleaving and packet interleaving, etc.

SYLLABUS

Introduction to optical network: Telecommunication, first generation optical network, multiplexing technique, second generation optical network, virtual circuit services and data gram, transparencies of regenerator

Network components: couplers, Isolators, Circulators, Multiplexer , filter, fiber bragg gratings as ADD/Drop multiplexers, frabry perot filters, acoustics optical tunable filters, characterization of switches, mechanical, electro-optic, thermo-optic, and SOA switches, switching architecture.

First generation of optical network: SONET, SDH, goals of SONET design , Multiplexing in

SONET, elements of SONET/SDH infrastructure, SONET physical layer, comuter interconnections, ESCON, fiber channel, FDDI,ATM,IP layered architecture , physical layer, data link layer, network layer, transport layer.

Broad cast and select network: topologies for broadcast networks, bus topology, star topology, media access control(MAC) protocols, throughput calculation, synchronization, aloha and slotted ALOHA, test beds, LAMBDANET, rainbow, starnet

Wavelength routing network: optical layer, wavelength cross connect, wavelength reuse reliability, virtual topology and circuit switching and node design, degree of wavelength conversion, network design and operation traffic models, and performance criteria, static and reconfigurable network, classification of light paths

Photonic packet switching ,optical time domain multiplexing(OTDM),Method of multiplexing and demultiplexing, Broadcast ,OTDM network ,bit interleaving and packet interleaving, optical and gates non linear optical loop mirror, tera hertz optical asymmetric demultiplexer, switch based network, deflection routing

Reference Books:

1. Optical Networks: Apractical Prospective By R.Ramaswamy and K.N.Shivrajan

2. Optical Networks By C.S.R.Murthy and M.Guruswamy, PHI

3. Computer Networks By Tanenbaum

R.K.D.F. UNIVERSITY, BHOPAL
M-Tech (Digital Communication)
FIRST YEAR
Semester –II
Course Content & Grade

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
DC	Mobile and Satellite Communication	MTDC-2005	3L-1T	4

Subject code: - MTDC 205

Subject Name: - Mobile and Satellite Communication

Course Outcomes

Students will

CO1 Get Knowledge of wireless and cellular radio communication: The cellular concept, system design fundamentals, frequency reuse, reused distance, cluster size, channel assignment strategies, handoff strategies, co-channel interference and system capacity, trunking and grade of service.

CO2 Learn about Speech coding for wireless system applications and broadcast systems, coding techniques for audio and voice and popular speech codes. Brief introduction to radio channel characterization, multi-path propagation, co channel interference, exponential power delay profile, propagation effects, scattering, ground reflection, fading, long normal shadowing, coherence bandwidth

CO3 Learn concepts of Modulation techniques for mobile and satellite communication, their generation and detection, performance of spectral and power efficiency. Physical layer technique, diversity, spread, spectrum, frequency hopping, direct sequence, adaptive equalization, Orthogonal Frequency Division Multiplexing (OFDM)

CO4 Get Knowledge of MAC Protocols; 802.11 and its variants, ETSI-HILARAN type 1 MAC protocol, multiple access with collision avoidance.

CO5 Get the concepts of GEO, MEO and LEO satellite systems, Antenna positioning in GEO and Link calculations, wideband CDMA concepts principles.

SYLLABUS

Review of wireless and cellular radio communication: The cellular concept, system design fundamentals, frequency reuse, reused distance, cluster size, channel assignment strategies, handoff strategies, co-channel interference and system capacity, trunking and grade of service.

Speech coding for wireless system applications and broadcast systems, coding techniques for audio and voice and popular speech codes. Brief introduction to radio channel characterization, multi-path propagation, co channel interference, exponential power delay profile, propagation effects, scattering, ground reflection, fading, long normal shadowing, coherence bandwidth

Modulation techniques for mobile and satellite communication, their generation and detection, performance of spectral and power efficiency. Physical layer technique, diversity, spread, spectrum, frequency hopping, direct sequence, adaptive equalization, Orthogonal Frequency Division Multiplexing (OFDM)

MAC Protocols; 802.11 and its variants, ETSI-HILARAN type 1 MAC protocol, multiple access with collision avoidance.

Introduction to GEO, MEO and LEO satellite systems, Antena positioning in GEO and Link calculations, wideband CDMA concepts principles.

Reference Books.

1. Wilkies and Garg, Principles of GSM technology, PHI
2. Schiller J., Mobile Communications, Addison Wesley
3. Viterbi A, CDMA, Addison Wesley
4. Gokhle, Introduction to Telecommunications, Delmer Thomson

R.K.D.F. UNIVERSITY, BHOPAL
M-Tech (Digital Communication)
SECOND YEAR
Semester –III
Course Content & Grade

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
DC	Information Theory and Coding	MTDC-3001(A)	3L-1T	4

Subject code: - MTDC 301(A)

Subject Name: - Information Theory and Coding

Course Outcomes:

Students will

CO1 Learn basics of uncertainty, information, entropy and its properties, entropy of binary memory less source and its extension to discrete memory less source, coding theorem, data compression, prefix coding, HUFFMAN coding, Lempel-Ziv Coding.

CO2 Understand Discrete memory less channels, Binary symmetric channel, mutual information & its properties, channel capacity, channel coding theorem, and its application to BSC, Shannon's theorem on channel capacity, capacity of channel of infinite bandwidth, Bandwidth signal to noise Trade off, Practical communication system in light of Shannon's theorem, Fading Channel.

CO3 Learn about Group and field of Binary system Galois field and its construction in GF (2) and its basic properties, vector spaces and matrices in GF(2), Linear Block Codes, Systematic codes, and its encoding circuits, syndrome and error detection ,minimum distance, error detecting and correcting capabilities of block code, Decoding circuits,

Probability of undetected error for linear block code in BSC ,Hamming code and their applications.

CO4 Learn basics of Cyclic codes and its basic properties, Generator & parity check matrix of cyclic codes, encoding & decoding circuits, syndrome computation & error detection, cyclic Hamming codes.

CO5 Get Introduction to BCH codes, its encoding & decoding, error location & correction.

CO6 Get knowledge about convolution codes, its construction & viterbi algorithm for maximum likelihood decoding.

SYLLABUS

Introduction to uncertainty, information, entropy and its properties, entropy of binary memory less source and its extension to discrete memory less source, coding theorem, data compression, prefix coding, HUFFMAN coding, Lempel-Ziv Coding

Discrete memory less channels, Binary symmetric channel, mutual information & its properties, channel capacity, channel coding theorem, and its application to BSC, Shannon's theorem on channel capacity, capacity of channel of infinite bandwidth, Bandwidth signal to noise Trade off, Practical communication system in light of shannon's theorem, Fading Channel.

Group and field of Binary system Galois field and its construction in GF (2) and its basic properties, vector spaces and matrices in GF(2), Linear Block Codes, Systematic codes, and its encoding circuits, syndrome and error detection ,minimum distance, error detecting and correcting capabilities of block code, Decoding circuits, Probability of undetected error for linear block code in BSC ,Hamming code and their applications.

Cyclic codes and its basic properties, Generator & parity check matrix of cyclic codes, encoding & decoding circuits, syndrome computation & error detection, cyclic Hamming codes.

Introduction to BCH codes, its encoding & decoding, error location & correction.

Introduction to convolution codes, its construction & viterbi algorithm for maximum likelihood decoding.

Reference Books:

1. Digital Communication by Haykins Simon Wiley Publ.
2. Error control Coding: Theory and Application, by Shu Lin and Cosstlello,PHI
3. Modern analog and Digital Communication system, by B.P. Lathi

4. Digital Communication by Sklar, Pearson Education

5. Principal of Communication system by Taub & Schilling, TMH

6. Error Correcting Codes by Peterson W., MIT Press

7. Digital Communication by Carson,MGH

8. Digital Communication by Proakis,TMH

R.K.D.F. UNIVERSITY, BHOPAL
M-Tech (Digital Communication)
SECOND YEAR
Semester –III
Course Content & Grade

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
DC	**Advanced Digital Communication**	**MTDC-3002(A)**	**3L-1T**	**4**

Subject code: - MTDC 302(A)

Subject Name: -Advanced Digital Communication

Course Outcomes:

Students will

CO1 Learn about digital modulation technique and their spectral characteristics, optimum receivers for signals corrupted by AWGN and their performance for memory less channel, optimum receivers for PCM, regenerative repeaters and link budget analysis.

CO2 Get Knowledge about Estimation of signal parameters, carrier phase and symbol timings. Signal design band limited channels and their characterization, probability of error in detection PAM with zero ISI, modulation codes for spectrum spacing.

CO3 Get basics of Optimum receivers for channels with ISI and AWGN, linear equalization and decision feedback equalization, adaptive linear and adaptive decision feedback equalizer.

CO4 Become familiar with Multi channel and multi carrier systems, spread spectrum signals for digital communication, direct sequence spread spectrum signals and frequency hopped spread spectrum signals and their performances, OFDM.

CO5 Learn concepts of fading multi path channels, frequency non-selective slowly padding channels, diversity techniques for padding multi path channels, coded waveform for padding channels and their application

SYLLABUS

Introduction to digital modulation technique and their spectral characteristics, optimum receivers for signals corrupted by AWGN and their performance for memory less channel, optimum receivers for PCM, regenerative repeaters and link budget analysis.

Estimation of signal parameters, carrier phase and symbol timings.Signal design band limited channels and their characterization, probability of error in detection PAM with zero ISI, modulation codes for spectrum spacing.

Optimum receivers for channels with ISI and AWGN, linear equalization and decision feed back equalization, adaptive linear and adaptive decision feed back equalizer.

Multi channel and multi carrier systems, spread spectrum signals for digital communication, direct sequence spread spectrum signals and frequency hopped spread spectrum signals and their performances, OFDM.

Characterization of fading multi path channels, frequency non-selective slowly padding channels, diversity techniques for padding multi path channels, coded waveform for padding channels and their application.

Reference Books:

1. Digital Communication by Proakis TMH
2. Digital Communication by Glover and Grantt PHI
3. Digital Communication by Simon Haykins

R.K.D.F. UNIVERSITY, BHOPAL
M-Tech (Digital Communication)
SECOND YEAR
Semester –III
Course Content & Grade

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
DC	Optical Instrumentation and Measurement	MTDC-3002(B)	3L-1T	4

Subject code: - MTDC 302(B)

Subject Name: - Optical Instrumentation and Measurement

Course Outcomes:

Students will

CO1 Understand basics of Optical Time Domain Reflector, Optical low Coherence Reflect meter, Optical Spectrum Analyzer, Optical power and energy meter, Monochrometer, CCD, Ellipsometer, transducer, etc.

CO2 Learn about Fiber Optics Component and Devices like Direction Couplers, beam splitters, switches, modulations, connectors, couplers, polarizer, polarization controllers, amplifiers, fiber laser, reflector, wavelength filters, polarizing beam splitter, wavelength division multiplexes, fiber optic isolator etc.

CO3 Get knowledge of Fiber optic sensors, sensors based on characteristics like intensity, phase, polarization, frequency and wavelength of light wave.

CO4 Get Knowledge of Fiber optic Measurements and its techniques.

CO5 Multimode Fiber: Refractive Index Profile, Geometric Measurement, Numerical Aperture, Total Attenuation, Scattering Loss and differential mode loss, Non destructive loss Measurement (OTDR), Transmission, Bandwidth and dispersion, Bandwidth of Jointed fiber, Differential Mode Delay (DMD)

CO6 Understand concept of Single Mode Fiber Attenuation, Refractive Index Profile (RIP), Mode Field Diameter, Equivalent step Index (EXI) Profile, Mode Cut off Wave length

and the Single Mode operating regime, Dispersion, Birefringenence Measurement, Measurement of the Propagation constant of fiber mode.

SYLLABUS

Optical Instrument: Optical Time Domain Reflector, Optical low Coherence Reflect meter, Optical Spectrum Analyzer Optical power and energy meter, Monochrometer, CCD, Ellipsometer, transducer, Lock in Amplifier, Box car Average.

Fiber Optics Component and Devices: Direction Couplers, beam splitters, switches, modulations, connectors, couplers, polarizer, polarization controllers, amplifiers, fiber laser, reflector, wavelength filters, polarizing beam splitter, wavelength division multiplexes, fiber optic isolator

etc.Fiber optic sensors: Pressure, temperature, strain, Magnetic & Electric field sensors based on characteristics like intensity, phase, polarization, frequency and wavelength of light wave.

Fiber optic Measurement: Introduction to measurement techniques.

Multimode Fiber: Refractive Index Profile, Geometric Measurement, Numerical Aperture, Total Attenuation, Scattering Loss and differential mode loss, Non destructive loss Measurement (OTDR), Transmission Bandwidth and dispersion, Bandwidth of Jointed fiber, Differential Mode Delay (DMD).

Single Mode Fiber: Attenuation, Refractive Index Profile (RIP), Mode Field Diameter, Equivalent step Index (EXI) Profile, Mode Cut off Wave length and the Single Mode operating regime, Dispersion, Birefringenence Measurement, Measurement of the Propagation constant of fiber mode

Reference Books:

1. Optical Fiber Communication By S. Senior
2. Fiber Optics Measurement By A. Ghatak, M.R. Shenoy
3. Fundamental Of Fiber Optics in Telecommunication & Sensors Systems
4. Introduction to Fiber Optics By A. Ghatak and Tyagrajan
5. Optical Fiber Sensors system And Application By B. Culshaw

R.K.D.F. UNIVERSITY, BHOPAL
M-Tech (Digital Communication)
SECOND YEAR
Semester –III
Course Content & Grade

Course Content & Grade

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
Digital Communication	**Dissertation Part- I (Literature Review/Problem Formulation/ Synopsis**	**MTDC-3003**	**0L-0T-2P**	**2**

Course Outcomes: After studying this course, students will be able to,

CO1- To define and limit of the research.

CO2- To place your study in an historical perspective.

CO3- To avoid unnecessary duplication.

CO4- To evaluate promising research methods.

Course Content

The objective of Dissertation Part-I is to promote a systematic understanding of the knowledge, critical awareness of current problems, originality in the application of knowledge and the quality of work. The ideal work may be characterized by a new result in design, development and implementation. It should have the potential of industrial/scientific acceptance. The first part of the Dissertation should be to determine the interest of students and broadly identify the area of work, finalize the research problem based on literature survey. Also, by now the students should have familiarity with the concepts, tools, techniques required to carry out the Dissertation work. Student is expected to start the research work. Outcome of Dissertation Part-I should be to conclude the work on the identified problem its importance, its justification, literature survey, field work, research work etc. Minor variation may be accepted depending upon nature of title.

R.K.D.F. UNIVERSITY, BHOPAL
M-Tech (Digital Communication)
SECOND YEAR
Semester –IV
Course Content & Grade

Course Content & Grade

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credit
DC	Dissertation Part- II	MTDC-4001	0L-0T-2P	2

Course Outcomes: After studying this course, students will be able to,

CO1- The programme of instruction will consist of advanced subjects of the respective specialization. The complete programme is distributed over four semesters with two semesters per academic year. Course work is offered in the first two semesters (except for PG programme in Mechanical engineering where it is extended up to third semester) and the dissertation work will be carried out during third and fourth semesters. Every branch of M.E/ M. Tech programme will have a curriculum and syllabi for the courses recommended by the board of studies and approved by the academic council. The academic programmes of the Institute follow the credit system.

CO2- Every candidate shall be required to submit the record of dissertation work at the end of fourth semester.

Course Content

The objective of Dissertation Part-I is to promote a systematic understanding of the knowledge, critical awareness of current problems, originality in the application of knowledge and the quality of work. The ideal work may be characterized by a new result in design, development and implementation. It should have the potential of industrial/scientific acceptance. Dissertation Part-II should be seen in continuation with Dissertation Part-I. The researcher should continue the research work in the two parts.