



# SARVEPALLI RADHAKRISHNAN UNIVERSITY, BHOPAL

## Grading System Course Name: M.TECH(D.C.) Scheme of Examination w.e.f. 2016-17 Semester/Year : I SEM/I YEAR

S. No.	Subject Code	Subject Name	Maximum Marks Allotted						Hours/Week			Credit	Total Marks
			Theory			Practical			L	T	P		
			End Sem.	Mid Sem	Quiz, Assignment	End Sem	Lab work	Assignment / Quiz					
1	MTDC-101	ADVANCED MATHEMATICS	100	30	20	-	-	-	3	1	-	4	150
2	MTDC-102	MICROCONTROLLER SYSTEM DESIGN	100	30	20	-	-	-	3	1	-	4	150
3	MTDC-103	DSP APPLICATION	100	30	20	-	-	-	3	1	-	4	150
4	MTDC-104	VLSI DESIGN	100	30	20	-	-	-	3	1	-	4	150
5	MTDC-105	DATA COMMUNATION & COMPUTER NETWORKS	100	30	20	-	-	-	3	1	-	4	150
6	MTDC-106	LAB-I(102,103)	-	-	-	50	50	-	-	-	4	2	100
7	MTDC-107	LAB-II(104,105)	-	-	-	50	50	-	-	-	4	2	100
8	MTDC-108	COMPERHENSIV VIVA-I	-	-	-	50	-	-	-	-	-	-	50
<b>TOTAL</b>			<b>500</b>	<b>150</b>	<b>100</b>	<b>150</b>	<b>100</b>	<b>-</b>	<b>15</b>	<b>5</b>	<b>8</b>	<b>24</b>	<b>1000</b>

L: Lecture

T:Tutorial

P:Practical



**SARVEPALLI RADHAKRISHNAN UNIVERSITY, BHOPAL**

**Grading System**  
**Course Name:M.TECH(D.C.)**  
**Scheme of Examination w.e.f. 2016-17**  
**Semester/Year :II SEM/I YEAR**

S. No.	Subject Code	Subject Name	Maximum Marks Allotted						Hours/Week			Credit	Total Marks
			Theory			Practical			L	T	P		
			End Sem.	Mid Sem	Quiz, Assignment	End Sem	Lab work	Assignment / Quiz					
1	MTDC-201	INFORMATION THEROY & CODING	100	30	20	-	-	-	3	1	-	4	150
2	MTDC-202	NETWORK DESIGN TECHNOLOGY	100	30	20	-	-	-	3	1	-	4	150
3	MTDC-203	OPTICAL NETWORK	100	30	20	-	-	-	3	1	-	4	150
4	MTDC-204	MOBILE & SATELLITE COMMUNICATION	100	30	20	-	-	-	3	1	-	4	150
5	MTDC-205	REASEARCH METHODOLOGY	100	30	20	-	-	-	3	1	-	4	150
6	MTDC-206	LAB-III(201)	-	-	-	50	50	-	-	-	4	2	100
7	MTDC-207	LAB-IV(202)	-	-	-	50	50	-	-	-	4	2	100
8	MTDC-208	COMPERHENSIV VIVA-II	-	-	-	50	-	-	-	-	-	-	50
<b>TOTAL</b>			<b>500</b>	<b>150</b>	<b>100</b>	<b>150</b>	<b>100</b>	<b>-</b>	<b>15</b>	<b>5</b>	<b>8</b>	<b>24</b>	<b>1000</b>

L: Lecture

T:Tutorial

P:Practical



# SARVEPALLI RADHAKRISHNAN UNIVERSITY, BHOPAL

## Grading System Course Name:M.TECH(D.C.) Scheme of Examination w.e.f. 2016-17 Semester/Year : III SEM/II YEAR

S. N o.	Subject Code	Subject Name	Maximum Marks Allotted						Hours/ Week			Credit	Total Marks
			Theory			Practical			L	T	P		
			End Sem.	Mid Sem	Quiz, Assignme nt	End Sem	Lab work	Assignment / Quiz					
1	MTDC-DP(1)	DESSERTATION (PHASE-I)	-	-	-	100	100	-	-	-	12	200	
<b>TOTAL</b>			-	-	-	<b>100</b>	<b>100</b>	-	-	-	<b>12</b>	<b>200</b>	

L: Lecture

T:Tutorial

P:Practical



# SARVEPALLI RADHAKRISHNAN UNIVERSITY, BHOPAL

## Grading System Course Name: M.TECH(D.C.) Scheme of Examination w.e.f. 2016-17 Semester/Year : IV SEM/II YEAR

S. N o.	Subject Code	Subject Name	Maximum Marks Allotted						Hours/ Week			Credit	Total Marks
			Theory			Practical			L	T	P		
			End Sem.	Mid Sem	Quiz, Assignme nt	End Sem	Lab work	Assignment / Quiz					
1	MTDC-DP(II)	DESSERTATION (PHASE-II)	-	-	-	150	150	-	-	-	-	12	300
<b>TOTAL</b>			-	-	-	<b>150</b>	<b>150</b>	-	-	-	-	<b>12</b>	<b>300</b>

L: Lecture

T: Tutorial

P: Practical



**MTDC 101-ADVANCED MATHEMATICS**

**UNIT 1**

Linear Algebra: Linear transformation, vector spaces, hash function, Hermite polynomial, Heavisite's unit function and error function. Elementary concepts of Modular mathematics.

**UNIT 2**

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

**UNIT 3**

Probability, compound probability and discrete random variable. Binomial, Normal and Poisson's distributions, Sampling distribution, elementary concept of estimation and theory of hypothesis, recurred relations.

**UNIT 4**

Stochastic process, Markov process transition probability transition probability matrix, just and higher order Markov process, Application of Eigen value problems in Markov Process, Markov chain. Queuing system, transient and steady state, traffic intensity, distribution queuing system, concepts of queuing models (M/M/1: Infinity/ Infinity/ FCFS), (M/M/1: N/ Infinity/ FC FS), (M/M/S: Infinity/ Infinity/ FC FS)

**UNIT 5**

Operations of fuzzy sets, fuzzy arithmetic & relations, fuzzy relation equations, fuzzy logics. MATLAB introduction, programming in MATLAB scripts, functions and their application.

**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, TMH.
4. Advance Engg Mathematics, O' Neil, Cengage (Thomson)
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. Scarborough
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



## MTDC-102 MICROCONTROLLER SYSTEM DESIGN

### **Unit 1**

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

### **Unit2**

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.

### **Unit3**

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

### **Unit 4**

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

### **Unit 5**

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 Jonathan W. Valvano
4. Data Manuals – Intel Motorola.



**MTDC-103 DSP APPLICATION**

**Unit 1**

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

**Unit 2**

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

**Unit 3**

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.

**Unit 4**

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.

**Unit5**

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 principles of spectrum estimation, estimate of auto covariance, power spectrum, cross covariance 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. Discrete time signal processing by Oppenheim & 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



## MTDC-104 VLSI DESIGN

### **Unit 1**

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

### **Unit 2**

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

### **Unit 3**

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

### **Unit 4**

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

### **Unit 5**

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





# **SARVEPALLI RADHAKRISHNAN UNIVERSITY, BHOPAL (M.P.)**

## **MTDC-105 DATA COMMUNICATION AND COMPUTER NETWORK**

### **Unit 1**

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.

### **Unit 2**

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

### **Unit 3**

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.

### **Unit 4**

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.

### **Unit 5**

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, Modeling's and Analysis by M. Schwartz
4. Local Area Network By Keiser TMH



**MTDC – 201 INFORMATION THEORY AND CODING**

**Unit 1**

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

**Unit 2**

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.

**Unit 3**

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.

**Unit 4**

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

**Unit 5**

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 Cosstllo, 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



**MTDC – 202 NETWORK DESIGN TECHNOLOGY**

**Unit 1**

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,

**Unit 2**

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

**Unit 3**

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

**Unit 4**

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,

**Unit 5**

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



## **MTDC – 203 OPTICAL NETWORK**

### **Unit 1**

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

### **Unit 2**

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.

### **Unit 3**

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

### **Unit 4**

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

### **Unit 5**

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

### **Unit 6**

Photonic packet switching ,optical time domain multiplexing(OTDM),Method of multiplexing and de-multiplexing, Broadcast ,OTDM network ,bit interleaving and packet interleaving, optical and gates non linear optical loop mirror, tera-hertz optical asymmetric de-multiplexer, 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



**MTDC – 204 MOBILE & SATELLITE COMMUNICATION**

**Unit 1**

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.

**Unit 2**

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

**Unit 3**

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)

**Unit 4**

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

**Unit 5**

Introduction to GEO, MEO and LEO satellite systems, Antenna 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



## **MTDC – 205 RESEARCH METHODOLOGY**

### **Unit 1**

Foundations of Research: Meaning, Objectives, Motivation, Utility. Characteristics of scientific method – Understanding the language of research – Concept, Construct, Definition, Variable, Research process, Problem Identification & Formulation – Research Question – Investigation Question – Measurement Issues – Hypothesis – Qualities of a good Hypothesis – Null Hypothesis & Alternative Hypothesis. Hypothesis Testing – Logic & Importance

**Assignment 1: Identify Research Problem based on Trends**

### **Unit 2**

Research Design: Concept and Importance in Research – Features of a good research design – Exploratory Research Design – concept, types and uses, Descriptive Research Designs – concept, types and uses. Experimental Design: Concept of Independent & Dependent variables.

**Assignment 2: Identify Research methodology for Research Problem identified**

### **Unit 3**

Data Analysis: Data Preparation – Univariate analysis (frequency tables, bar charts, pie charts, percentages), Bivariate analysis – Cross tabulations and Chi-square test including testing hypothesis of association.

**Assignment 3: Propose a method for Data Analysis on Research problem identified**

### **Unit 4**

Importance of Literature Review. Interpretation of Data and Paper Writing – Layout of a Research Paper, Journals in Computer Science, Impact factor of Journals, When and where to publish ? Ethical issues related to publishing, Plagiarism and Self-Plagiarism. Use of Encyclopedias, Research Guides, Handbook etc., Academic Databases for Computer Science Discipline.

**Assignment 4: Write paper on Literature Review of your research Problem**

### **Unit 5**

Use of tools / techniques for Research: methods to search required information effectively, Reference Management Software like Zotero/Mendeley, Software for paper formatting like Latex/MS Office, Software for detection of Plagiarism. Documentation of Research work, Synopsis, Presentations, Writing Research papers on experimentation results, proposed methods, thesis formats

**Assignment 5: Write Synopsis for proposed Research Problem**

### **Reference Books:**

1. Business Research Methods – Donald Cooper & Pamela Schindler, TMGH, 9th edition
2. Business Research Methods – Alan Bryman & Emma Bell, Oxford University Press.
3. Research Methodology – C.R.Kothari
4. Select references from the Internet.