

**CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (C.G.)**

**Scheme of Teaching & Examination**

**M.E. Electronics & Telecommunication (Communication)**

**I Semester**

S. No.	Board of Study	Subject Code	Subject	Periods per Week			Scheme of Examination			Total Marks	Credit L+(T+P)/2
				L	T	P	Theory / Practical				
							ESE	CT	TA		
1	Electronics & Telecom	551111 (28)	Modern Digital Communication Techniques	3	1	-	100	20	20	140	4
2	Electronics & Telecom	551112 (28)	Communication Hardware Design Using VH DL	3	1	-	100	20	20	140	4
3	Electronics & Telecom	551113 (28)	High performance communication network	3	1	-	100	20	20	140	4
4	Electronics & Telecom	551114 (28)	Microwave & Radar Engineering	3	1	-	100	20	20	140	4
5	Refer Table –I		Elective-I	3	1	-	100	20	20	140	4
6	Electronics & Telecom	551121 (28)	VHDL Design Lab	-	-	3	75	-	75	150	2
7	Electronics & Telecom	551122 (28)	Modern Digital Communication Techniques Lab	-	-	3	75	-	75	150	2
<b>Total</b>				<b>15</b>	<b>5</b>	<b>6</b>	<b>650</b>	<b>100</b>	<b>250</b>	<b>1000</b>	<b>24</b>

L- Lecture  
P- Practical ,  
CT- Class Test

T- Tutorial  
ESE- End Semester Exam  
TA- Teacher's Assessment

**Table-I**

ELECTIVE - I			
S.No.	Board of Study	Subject Code	Subject
1	Applied Mathematics	551131 (14)	Applied Mathematics for Electronics Engineer
2	Electronics & Telecom	551132 (28)	Satellite Communication
3	Electronics & Telecom	551133 (28)	Digital System Design

**Note (1) –** 1/4<sup>th</sup> of total strength of students subject to minimum of twenty students is required to offer an elective in the college in a Particular academic session .

**Note (2) –** Choice of elective course once made for an examination cannot be changed in future examinations.

# CHHATISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (C.G.)

Semester: **M. E. I**

Branch: **Electronics & Telecommunication**

Subject: **Modern Digital Communication Techniques** Code: **551111(28)**

Total Theory Periods: **40**

Total Tutorial Periods: **12**

Total Marks in End Semester Exam. : **100**

Minimum number of class test to be conducted: **02**

## Unit 1

**Introduction** : Functional Architecture Coded And Encoded Digital Communication System Architecture, Types of Networks And Services , Performance Criterion And Link Budgets.

## Unit 2

**Digital Modulations:** PSD , DTA Pulse Stream, M-Ary Markov Source, Convolutionally Coded Modulation, Continuous Phase Modulation ( CPM) , Scalar And Vector Communications Over Memory Less Channel , Scalar Receiver, BER Performance , Detection Criterion.

## Unit 3

**Coherent And Non-Coherent Communication With Waveforms:** Optical Receiver In WGN, MF Receiver, Matrix Generation, Colored GN, Whitening Approach , Inphase And Quadrature Phase Modem, Non- Coherent Receivers, Random Phase Channel, Optimum And Suboptimum M-FSK, Performance Of Non- Coherent Receivers In Random Phase Channel, Optimum Receivers In Rayleigh And Rician Channels, M-Ary Symbol Error Probability.

## Unit 4

**Band Limited Channels:** Optimum Pulse Shape Design, Optimum Demodulations Of Digital Signals In The Presence of ISI And AWGN , Equalization Techniques, Diminishing And Detection - Q Modulation , QAM , QPSK, QBM, CPM , FSK, MSK.

## Unit 5

**Coded digital communication:** Architecture , Interfacing , Detailing, Synchronization , Block Coded Digital Communication System , Performance , Types of Binary Block Codes , Shanon Channel Coding Theorem , Linear Block Codes, Conventional Coded Digital Communication System, Representation of Convolution Codes, Decoding , Problems of Decreasing Errors, Sequencing And Threshold Decoding.

## Text Books

1. M.K. Simon , S.M. Hinedi and W.C. Lindsey, " Digital Communication Techniques" : Signaling and detection, Prentice Hall India, New Delhi, 1995.
2. Simon Haykin, " Digital Communications" , John Wiley and sons , 1998.

## Reference Books

1. Wayne Tomasi, "Advanced Electronic Communication Systems", 4<sup>th</sup> Edition, Oxford University Press, 1998.
3. B.P. Lathi, " Modern Digital and Analog Communication Systems" 3<sup>rd</sup> edition Oxford University Press , 1998.

# CHHATISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (C.G.)

Semester: **M. E. I**

Branch: **Electronics & Telecommunication**

Subject: **Communication Hardware Design Using VHDL** Code: **551112 (28)**

Total Theory Periods: **40**

Total Tutorial Periods: **12**

Total Marks in End Semester Exam. : **100**

Minimum number of class test to be conducted: **02**

## **Unit 1**

**Design Concepts:** Digital Hardware, Design Process, Design of Digital Hardware, Programmable Logic devices(PLA, PAL, CPLD, FPGA)

## **Unit 2**

**Hardware Modeling:** Introduction, Hardware Modeling Languages, Abstract Models, compilation and behavioral optimization, perspectives.

## **Unit 3**

**Digital Circuits Design:** Multiplexes, Decoders, Encoders, Code Converters, Arithmetic Comparison Circuit, VHDL for Combinational Circuits: Assignment Statement, Selected Signal Assignment, Conditional Signal Assignment, Generate Statement, Concurrent and Sequential Statement assignment statement, Process Statement, Case Statement. Flip-Flops, Registers and Counters.

## **Unit 4**

**Sequential Circuit Design:** Basic Design Steps, State assignment problem, Mealy State Model, Design of FSM, Asynchronous Behavior, Analysis of Asynchronous Circuits, State Reduction, State Assignment Problem

## **Unit 5**

**Simulation of Communication Ckt. :** Design of FSK Modulator , Simulation of FSK Modulator , Design of FSK Demodulator , Simulation of FSK Demodulator, Design and Simulation of Filters

## **Text Books**

- 1) Fundamentals of Digital Logic with VHDL Design: Brown Vranesic, TMH Publication.
- 2) Synthesis and Optimization of Digital Circuits: Giovanni De Micheli, TMH Publication.

## **Reference Books**

- 1) Circuit Design with VHDL Prdroni PHI Publication
- 2) VHDL Primer Bhaskar PHI Publication

# CHHATISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (C.G.)

Semester: **M. E. I**

Branch: **Electronics & Telecommunication**

Subject: **High Performance Communication Network** Code: **551113 (28)**

Total Theory Periods: 40

Total Tutorial Periods: **12**

Total Marks in End Semester Exam. : **100**

Minimum number of class test to be conducted: **02**

## Unit 1

**BASICS OF NETWORKS** : Telephone , computer, Cable television and Wireless networks, working principles, Digitization: Service Integration network services and layered architecture traffic characterization and QOS, network services: network elements and network mechanisms

## Unit 2

**PACKET SWITCHED NETWORKS** : OSI and IP Model, Different Layers, Performance issues of flow control protocols Packet Switching :Optimum packet size, Routing Strategies LAN Protocols; Ethernet (IEEE 802.3); token ring (IEEE 802.5),FDDI, DQDB, SMDS ,Frame relay

## Unit 3

**INTERNET AND TCP/IP NETWORKS** : Overview; Internet protocol; TCP and VDP; performance of TCP/IP networks :SONET; DWDM, Fiber to home, DSL Intelligent networks. CATV.

## Unit 4

**ATM AND WIRELESS NETWORKS** : Main features-addressing, signaling and routing: ATM header structure -adaptation layer, management and control; B-ISDN, interworking with ATM, Wireless networks: Spread spectrum LANs, IR LANs

## Unit 5

**OPTICAL NETWORKS AND SWITCHING** : Optical links- WDM systems. Optical LAN's, optical paths and networks; TDS and SDS: Distributed, shared input and output buffers

## Text Books

Jean Warland and Pravin Varaiya, " High Performance Communication Networks", 2<sup>nd</sup> edition, Harcourt and Morgan Kauffman , London, 2000.

William Stalling , " Data and computer Communication"

## Referance Books

1)Leon Gracia, Widjaja, " Communication Networks", Tata McGraw -Hill, New Delhi, 2000

2)Sumit Kaseria , Pankaj Sethi, " ATM Networks" , Tata McGraw-Hill, New Delhi, 2000

# CHHATISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (C.G.)

Semester: **M. E. I**

Subject: **Microwave and Radar Communication**

Total Theory Periods: **40**

Total Marks in End Semester Exam. : **100**

Minimum number of class test to be conducted: **02**

Branch: **Electronics & Telecommunication**

Code: **551114 (28)**

Total Tutorial Periods: **12**

## UNIT 1

**Industrial Microwaves & Component:** Microwave Waveguide Components: Attenuators, phase shifters, matched loads, detectors and mounts, slotted-sections, E-plane tee, H-plane tee, hybrid tees, directional couplers, tuners, circulators and isolators; Signal generators: Fixed frequency, sweep frequency and synthesized frequency oscillators; Microwave in process control instrumentation;

## UNIT 2

**Microwave Measurement Techniques:** Noise sources and noise meters used in microwave measurements; Frequency meters and VSWR meters; Measurements of frequency, attenuation, VSWR and impedance; Cavity measurements: Q -factor, bandwidth; Cavity and Waveguide methods; Measurements of power Calorimetric and Microwave bridges; Principles of time domain and frequency domain reflectometry, spectrum analyser and network analyser; Measurement of Scattering parameters of passive and active devices.

## UNIT 3

**Microwave Devices and Amplifiers:** Microwave Transistor; Microwave Tunnel Diode; Varacter Diode; Schottky Diode; MESFET: Principle of operation, equivalent circuit, cut off frequency, power frequency limitations; Charge Coupled Devices (CCD); Transferred Electron Devices: Gunn Diode, LSA Diode, modes of operation, Microwave Generation and Amplification; Avalanche Effect Devices: Read diode, carrier current and external current; IMPATT diodes. Klystron: Velocity modulation process, bunching process, output power and beam loading; Reflex Klystron: power output and efficiency; Traveling Wave Tubes; Magnetron.

## UNIT 4

**MTI Radar, transmitter and receiver:** Oscillator amplifier, mixer, displays, duplexer, matched filter, receiver, correlation, detection, constant falls alarm rate, receiver, protector, selectivity, time control., Introduction , Operation of MTI Radar , MTI Receiver With Delay Line , Cnceler Range Gated, Doppler Filter, Digital Signal Processing, MTI For A Moving Platform , Limitations of MTI Platform .

## UNIT 5

**Aircraft homing system and instrument landing system:** Introduction, Switched cardiod homing system, four course radio range, omnidirectional ranges, tactical air navigation, instrument landing aids, ground controlled approach, radio altimeter, microwave landing system, advantages of MLS.

## Textbooks

1. Introduction to radar system. MERRICC, I-SKOC, NIK, TMH.
2. Microwave Devices & Circuits Liao, Samuel Y. PHI

## Reference Books

1. Passive Rf & Microwave Integrated Circuits Maloratsky, Leo G, Elsevier
2. Recent Advances In Microwaves & Lightwaves E.K. Sharma New Age

# CHHATISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (C.G.)

Semester: **M. E. I**

Branch: **Electronics & Telecommunication**

Subject: **Applied Mathematics for Electronics Engineer** Code: **551131 (14)**

Total Theory Periods: **40**

Total Tutorial Periods: **12**

Total Marks in End Semester Exam. : **100**

**Minimum number of class test to be conducted: 02**

## **Unit 1 LINEAR ALGEBRA**

Vector space, Linear Transformation, Elementary canonical forms, The rational and Jordan form, Inner product space, Operators on inner product spaces.

## **Unit 2 SPECIAL FUNCTIONS**

Series solutions-Bessel's equation-Bessel Functions-Legendre's equation-Legendre polynomials-Rodrigue's formula-Recurrence relations-generating functions and orthogonal property for Bessel functions of the first kind - Legendre polynomials.

## **Unit 3 THE WAVE EQUATIONS**

Solution of initial and boundary value problems - Characteristics - D' Alembert's solution - Significance of characteristic curves - Laplace transform solutions for displacement in along string - a long string its weight - a bar with prescribed force on one end free vibrations of a string.

## **Unit 4 WAVELETS**

Wavelet definition, examples for wavelets, wavelet transform, comparison of WT and FT, continuous wavelet transform, properties of CWT. Discrete wavelet transforms.

## **Unit 5 PROBABILITY AND RANDOM VARIABLES**

Probability concepts - Random variables, Moment generating function - standard distributions - Two dimensional random variables - Transformation of Random variables - Correlation - Regression system - queuing applications.

### **Text Books**

1. K. Hoffman and R. Kunze "Introduction to Linear Algebra", Prentice-Hall, 1996, 2/e.

### **Reference Books**

1. Grewal B.S. "Higher Engineering Mathematics", Khanna Publishers 34<sup>th</sup> Edition
2. Wavelet Transforms "Introduction to Theory and Applications", Rao R.M, and Bopardikar A.S., Pearson Education (Singapore Pvt. Ltd., Third Indian Print, 2002).

# CHHATISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (C.G.)

Semester: **M. E. I**

Subject: **Satellite Communication**

Total Theory Periods: **40**

Total Marks in End Semester Exam. : **100**

Minimum number of class test to be conducted: **02**

Branch: **Electronics & Telecommunication**

Code: **551132 (28)**

Total Tutorial Periods: **12**

## UNIT - I

**ORBITAL DYNAMICS AND LAUNCHING MECHANISM:** Growth of satellite communication, Kepler's laws, Newton's Gravitational Law, Different orbits of satellite, Frequency Coordination and regulatory services, Look angle, orbital disturbances, Launch vehicles and propulsion mechanism, orbital effects on communication system performance.

## UNIT - II

**SPACE SEGMENT:** Satellite subsystems, Station keeping, attitude control, stabilization techniques, atmospheric losses, satellite link design, C/N ratio of the link, G/T of earth station, overall system temperature.

## UNIT - III

**MODULATION - MULTIPLEXING - MULTIAccess:** Telephone channel, Analog FM Transmission, Satellite-Television signal, Digital signals, Digital modulation, error control coding, satellite access: FDMA - TDMA - CDMA

## UNIT - IV

**EARTH SEGMENT:** Different types of earth stations: TVRO - SMATV - CATV - Transmit-receiver earth stations-antennas - tracking systems - terrestrial interface - Test methods - different types of interferences - interference specifications and protection ratio.

## UNIT - V

**SATELLITE APPLICATIONS:** Intelsat series - INSAT series - satellite navigation and the global positioning system, VSAT, mobile satellite services, IMMERSAT, DTH, Email, Video conferencing - Internet connectivity.

### **Text Books:**

1. Dennis Roddy, "Satellite Communication", Third Edition, McGraw Hill, 2001.
2. Wilbur L. Pritchard, Henri G. Snyderhoud, Robert A. Nelson, "Satellite Communication Systems Engineering", Second Edition, Pearson Education, 1993.

### **Reference Books:**

1. Timothy Pratt, Charles Bostian, Jeremy Allnut, "Satellite Communications", Second Edition, John Wiley & Sons., 2003.
2. Bruce R. Elbert, "The Satellite Communication Applications Handbook", Second Edition, Artech House Inc, Boston London, 2004.
3. Brij N. Agrawal, "Design of Geosynchronous Spacecraft", Prentice Hall Inc. 1986.
4. M. Richharia, "Satellite Communication Systems- Design Principles", Second Edition, Macmillan Press Ltd, 1999.
5. Tri T. Ha, "Digital Communications", Second Edition, McGraw Hill Publishing Edition, 1990.

# CHHATISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (C.G.)

Semester: **M. E. I**

Subject: **Digital System Design**

Total Theory Periods: **40**

Total Marks in End Semester Exam. : **100**

Minimum number of class test to be conducted: **02**

Branch: **Electronics & Telecommunication**

Code: **551133 (28)**

Total Tutorial Periods: **12**

## **Unit 1**

### **The General Purpose Machine, Languages and Digital Logic**

The General Purpose Machine, User's View, The Machine/Assembly Language Programmer's View The Computer Architect's View, The Computer System Logic Designer's View, Classification of Computers and Their Instructions, Computer Instruction Sets, Informal Description of the Simple RISE Computer, SRC , Formal Description of SRC Using Register Transfer Notation, RTN , Describing Addressing Modes with RTN , Register Transfers and Logic Circuits: From Behavior to Hardware

## **Unit 2**

### **Processor Design**

The Design Process, AI-Bus Microarchitecture for the SRC, Data Path Implementation, Logic Design for the I-Bus SRC, The Control Unit, The 2- and 3- Bus Processor Designs, The Machine Reset, Machine Exceptions, Pipelining, Instruction-Level Parallelism, Microprogramming

## **Unit 3**

### **Computer Arithmetic and the Arithmetic Unit**

Number Systems and Radix Conversion, Fixed-Point Arithmetic, Seminumeric Aspects of ALU Design, Floating-Point Arithmetic

## **Unit 4**

### **Memory System Design**

The Components of the Memory System, RAM Structure, The Logic Designer's Perspective, Memory Boards and Modules, Two-Level Memory Hierarchy, The Cache  
Virtual Memory, The Memory Subsystem in the Computer

## **Unit 5**

### **Input and Output**

The I/O Subsystem, Programmed I/O, I/O Interrupts, Direct Memory Access (DMA) ,  
I/O Data Format Change and Error Control.

## **Text Books**

Computer Systems Design and Architecture Vincent P. Heuring & H. Jordan Pearson Education  
Computer organization & Architecture Stallings Pearson Education

## **Referances**

Digital System Design & Microprocessors Hayes, John P Tmh  
Digital System (Principles & Applications) R.J. tocci - P.H.I.



**CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY,  
BHILAI (C.G.)**

Semester: **M. E. I**

Subject: **VHDL Design Lab**

Total Marks in End Semester Exam. : **75**

Branch: **Electronics & Telecommunication**

Code: **551121 (28)**

Total Lab Periods: **40**

**List of Experiments (to be performed at least 10 experiments)**

- 1) To design and simulate the basic gates
- 2) Designing of the combinational blocks
  - a) Mux b) Encoders c) Decoders
- 3) Designing and simulation of Code converters
- 4) Designing, simulation and implementation 9-bit parity generator/checker
- 5) Designing, simulation and implementation Flip-Flops
- 6) Designing and simulation of Registers
- 7) Designing and simulation of Counters
- 8) FSM modeling (Design Sequence Detector "101")
- 9) Designing, simulation and implementation of ROM
- 10) Designing, simulation and implementation of RAM
- 11) Designing, simulation and implementation of FIFO
- 12) Design, simulation and implementation of ALU
- 13) Designing and simulation of Filter
- 14) Designing and simulation of FSK modulator and Demodulator
- 15) Designing and simulation of PN generator.

**List of Equipments/Machine Required:**

- 1) Computer System with Pentium 4 processor, 256MB Ram
- 2) EDA tools:
  - 1) FPGA implementation kit
  - 2) CPLD implementation kit
  - 3) Xilinx project navigator 5.2
  - 4) Active HDL 6.2
  - 5) Modelsim

**Recommended Books:**

- 1) Fundamentals of Digital Logic with VHDL Design: Brown Vranesic, TMH Publication.
- 2) Circuit Design with VHDL Prdroni PHI Publication
- 3) VHDL Primer Bhaskar PHI Publication

**CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY,  
BHILAI (C.G.)**

Semester: **M. E. I**  
Subject: **Modern Digital Communication Lab**  
Total Marks in End Semester Exam. : **75**

Branch: **Electronics & Telecommunication**  
Code: **551122 (28)**  
Total Lab Periods: **40**

**List of Experiments (to be performed at least 10 experiments)**

- i. To generate various signals used in digital communications
- ii. To find correlation autocorrelation between various signals
- iii. To find convolution of signals and simulate response of LTI system
- iv. To write different algorithms of FFT
- v. To design IIR and FIR digital filters
- vi. To use raised cosine filters for pulse shaping
- vii. To source code using DPCM, Huffman etc.
- viii. To channel code and verify Shannon's channel capacity
- ix. To modulate signals using ASK, PSK, MSK etc in presence of AWGN
- x. To study and simulate the effects of equalization
- xi. To model a channel with power of transmission and fading perspectives
- xii. Study of various antenna signal and polar plot
- xiii. Study of frequency response of various signals using spectrum Analyzer
- xiv. Study of Code division multiple access
- xv. Study GSM communication technology

**List of Equipments/Machine Required:**

- i. Mat lab 7.0
- ii. Computer System (PIV with 256 MB Ram)
- iii. CDMA trainer
- iv. GSM trainer
- v. Spectrum Analyzer

**Recommended Books:**

1. M.K. Simon, S.M. Hinedi and W.C. Lindsey, " Digital Communication Techniques": Signaling and detection, Prentice Hall India, New Delhi, 1995.
2. Simon Haykin, " Digital Communications" , John Wiley and sons , 1998.