

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

**Scheme of Teaching & Examination**

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

**II 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	551211 (28)	Secure Communication	3	1	-	100	20	20	140	4
2	Electronics & Telecom	551212 (28)	Advanced Mobile Communication	3	1	-	100	20	20	140	4
3	Electronics & Telecom	551213 (28)	Digital Communication Receivers	3	1	-	100	20	20	140	4
4	Electronics & Telecom	551214 (28)	Embedded Technology in communication System	3	1	-	100	20	20	140	4
5	Refer Table –II		Elective-II	3	1	-	100	20	20	140	4
6	Electronics & Telecom	551221 (28)	Embedded Technology in Communication Systems Lab	-	-	3	75	-	75	150	2
7	Electronics & Telecom	551222 (28)	Signal Processing 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                      T- Tutorial  
P- Practical ,                  ESE- End Semester Exam  
CT- Class Test                TA- Teacher's Assessment

**Table-II**

<b>ELECTIVE II</b>			
S.No.	Board of Study	Subject Code	Subject
1	Electronics & Telecom	551231 (28)	Advanced Digital Signal Processing & Applications
2	Electronics & Telecom	551232 (28)	Microwave Integrated Circuits
3	Electronics & Telecom	551233 (28)	Optical Communication System

**Note (1) –**             $1/4^{\text{th}}$  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. II**  
Subject: **Secure 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: **551211 (28)**  
Total Tutorial Periods: **12**

## **UNIT - I**

**CONVENTIONAL ENCRYPTION:** Introduction, Conventional Encryption model, Stenography, Data Encryption, Standard block cipher, Encryption algorithms, confidentially key distribution.

## **UNIT - II**

**PUBLIC KEY ENCRYPTION AND HASHING:** Principles of public key cryptosystems, RSA algorithm, Diffie-Hellman key Exchange, Elliptic curve cryptology, message authentication and Hash function, Hash and Mac algorithms, Digital signatures.

## **UNIT - III**

**IP SECURITY:** IP Security Overview, IP Security Architecture, authentication Header, Security payload, Security associations, Key Management.

## **UNIT - IV**

**WEB SECURITY:** Web security requirement, secure sockets layer, transport layer security, secure electronic transaction, dual signature.

## **UNIT - V**

**SYSTEM SECURITY:** Intruders, Viruses, Worms, Firewall design, Trusted systems, antivirus techniques, digital immune systems

### ***Textbooks:***

1. William Stallings, "Cryptography and Network Security", 2<sup>nd</sup> Edition, Prentice hall of India, New Delhi, 1999
2. Baidwin R and Rivest.R, "The RC5-CBC, TC5-CBC-PAD and RC5-CT5 algorithms, RFC2040'

### ***Reference Books:***

- a. Cryptography & Network Security W.stallings PHI
- b. Applied Cryptography Schneier, Bruce John Wiley

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

Semester: **M. E. II**  
Subject: **Advanced Mobile 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: **551212 (28)**  
Total Tutorial Periods: **12**

## **Unit 1**

### **Introduction to wireless mobile communications:**

History & Evolution Of Mobile Radio Systems. Types Of Mobile Wireless Services / Systems- Cellular, WLL, Paging, Satellite Systems, Standards, Future Trends In Personal Wireless Systems.

## **Unit 2**

### **Cellular Concept And System Design Fundamentals:**

Cellular Concept And Frequency Reuse, Multiple Schemes, Channel Assignment And Handoff, Interference And System Capacity, Trunking And Erlang Capacity Calculations.

## **Unit 3**

### **Mobile Radio Propagation**

Radio Wave Propagation Issues In Personal Wireless Systems, Propagation Models, Multipath Fading And Base Band Impulse Respond Models, Parameters Of Mobile Multipath Channels, Antenna Systems In Mobile Radio.

## **Unit 4**

### **Modulation And Signal Processing:**

Analog And Digital Modulation Techniques- Performance Of Various Modulation Techniques, Spectral Efficiency, Error Rate, Power Amplification, Equalizing Rake Receiver Concepts, Diversity And Space Time Processing, Speech Coding Channel Coding.

## **Unit 5**

### **System Example and Design Issues:**

Multiple access techniques -FDMA, TDMA and CDMA Systems, Operational Systems, Wireless Networking, Design Issues In Personal Wireless Systems.

## **Text Books**

K.Feher "Wireless digital Communication " PHI New Delhi1995.

T.S. Rappaport, " Wireless Digital Communication: Principles and Practices" PHI NJ 1996.

## **Reference Books**

W.CY. Lee, " Mobile Communications Engineering: Theory and applications, 2<sup>nd</sup> edition" MC-Graw Hill New York 1990.

Schiller " Mobile communications" Peason Education Asia Ltd. 2000.

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

Semester: **M. E. II**  
Subject: **Digital Communication Receivers**  
Total Theory Periods: **40**  
Total Marks in End Semester Exam. : **100**  
**Minimum number of class test to be conducted: 02**

Branch: **Electronics & Telecommunication**  
Code: **551213 (28)**  
Total Tutorial Periods: **12**

## **UNIT - I**

### **Detection of Binary Signal in Gaussian Noise:**

Detection of Binary signal in Gaussian Noise: Maximum Likelihood Receiver Structure, The Matched Filter, Correlation Realization of Matched Filter, Optimum error performance, Error performance of Binary Signaling.

## **UNIT - II**

### **Coherent and Noncoherent Detection:**

Coherent Detection: Coherent Detection of PSK, Sampled Matched Filter, Coherent Detection of Multiphase Shift Keying, Coherent Detection of FSK.

Noncoherent Detection: Detection of Differential PSK, Binary Differential PSK example, Noncoherent Detection of FSK, Required Tone Spacing for Noncoherent Orthogonal FSK.

## **UNIT - III**

### **Waveform Coding:**

Waveform Coding and Structured Sequences: Antipodal and Orthogonal Signals, M-ary Signaling, Waveform Coding. Error-Detecting and Correcting Capability: Weight and Distance of Binary vectors, Minimum Distance of a Linear code, Error Detection and Correction, Convolutional Encoding, Reed-Solomon Codes.

## **UNIT - IV**

### **Channel Coding:**

Adaptive Predictions: Forward Prediction, Synthesis/Analysis Coding, Block Coding: Vector Quantizing, Transform Coding: Quantization for Transform Coding, Subband Coding, Source coding for Digital Data.

## **UNIT - V**

### **Microwave Receiver:**

Block Diagram of a Digital Transceiver, Bandwidth-Efficient Digital Radio System: 8-phase 8-PSK System, Quadrature Amplitude Modulated M=16-state Radio System, Filtering Requirement in Digital Radio System, Radio System Performance Design Guidelines, Performance characteristics of Typical M-ary PSK and QAM Microwave System.

### **Text Books:**

1. Digital Communications, 2<sup>nd</sup> Ed, Bernard Sklar, Pearson Education, 2001.
2. Digital Communication Microwave Applications By Kamilo Feher, PHI, 1987.

### **Reference Books:**

1. Digital Communication, Proakis, John G. Tata McGraw Hill.
2. Digital Communication Technique, Signal Design & Detection By Simon, Marvin K, Hinedi, Sami M & Lindsey, William C, PHI.

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

Semester: **M. E. II**

Branch: **Electronics & Telecommunication**

Subject: **Embedded Technology in Communication System**

Code: **551214 (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 - I

**Microcontrollers:** Brief review of the 8 bit microcontroller 8051 - Programming , CPU Block diagram, Memory Organization, SFR s ,Ports and Interfacing -Introduction to a 16 bit micro controller 80186 High Speed Input, High Speed Output, Interrupts, ADC, PWM, Timers, Watch Dog Timer, Serial Port, I/O Port

## UNIT - II

**Introduction to Embedded Systems:** Characteristics of Embedded systems , Software embedded into a system .-General ideas of Processor and Memory organization - Processor and memory selection ,Interfacing to Memory and I/O devices- Devices and Buses- Device Drivers and Interrupt Servicing mechanisms

## UNIT - III

**Inter-process Communication and Synchronization of Processes ,Tasks and Threads:** Multiple Processes in an Application - Data sharing by multiple tasks and routines- Inter Process Communication

## UNIT - IV

**Real Time Operating Systems:** Operating System Services, I/O Subsystems - Network Operating Systems - Real Time and Embedded System Operating systems.

Interrupt routines in RTOS Environments - RTOS Task Scheduling models , Interrupt Latency and response Times - Standardisation of RTOS - Ideas of Embedded Linux

## UNIT - V

**Case Study:** Study of VX works - Case Studies of programming with RTOS - Case study /design using ARM processor/PIC microcontroller

### Text Books:

1. Ajay V. Deshmukh , " Microcontrollers -Theory and Applications", Tata Mc Graw Hill Publications
2. Rajkamal; "Embedded Systems Architecture; Programming and Design"; Tata McGraw Hill Publications.

### Reference Books:

1. Programming and Customizing the 8051 microcontroller, 1<sup>st</sup> Edition; by: Predko, Myke; McGraw Hill International
2. 8051 microcontroller: Architecture, Programming & Applications, 1<sup>st</sup> Edition; by: Ayala, Kenneth J
3. Real-Time Systems - Jane Liu, PH 2000
4. Real-Time Systems Design and Analysis : An Engineer's Handbook: Phillip A Laplante
5. Structured Development for Real - Time Systems V1 : Introduction and Tools: Ward, Paul T & Mellor, Stephen J
6. Embedded Software Primer - Simon, David E.
7. VxWorks Programmers guide
8. VxWorks Reference manual

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

Semester: **M. E. II**  
Subject: **Advanced Digital Signal Processing &  
Application**

Branch : **Electronics & Telecommunication**  
Code: **551231 (28)**

Total Theory Periods: **40**  
Total Marks in End Semester Exam. : **100**  
Minimum number of class test to be conducted: **02**

Total Tutorial Periods: **12**

## UNIT - I

**Discrete Random Signal Processing** : Discrete Random Processes, Expectations, Variance, Co-Variance, Scalar Product, Energy of Discrete Signals- Parseval's Theorem , Wiener Khintchine Relation- Power Spectral Density- Periodogram- Sample, Autocorrelation- Sum Decomposition Theorem, Spectral Factorization Theorem- Discrete Random Signal Processing By Linear Systems- Simulation Of Noise- Low Pass Filtering of White Noise.

## UNIT - II

**Spectrum Estimation**: Non-Parametric Methods -Co-Relation Method- Co-Variance Estimator- Performance Analysis Of Estimators- Unbiased, Consistent Estimators - Periodogram Estimator- Barlett Spectrum Estimation- Welch Estimation - Model Based Approach-Ar, Ma, Arma Signal Modeling -Parameter Estimation Using Yule -Walker Method.

## UNIT - III

**Adaptive Filters**: FIR Adaptive Filters- Newton's Steepest Decent Method-Adaptive Filter Based On Steepest Decent Method- Widrow Hoff LMS -Adaptive Algorithm-Adaptive Channel Equalization-Adaptive Echo Canceller- Adaptive Noise Cancellation-RLS Adaptive Filters- Exponentially Weighted RLS Sliding Window RLS -Simplified IIR LMS Adaptive Filter.

## UNIT - IV

**Multirate Digital Signal Processing** : Mathematical Description Of Change Of Sampling Rate- Introduction And Decimation- Continuous Time Model - Direct Digital Domain Approach - Decimation By An Integer Factor - Interpolation By An Integer Factor- Single And Multistage Realization- Ploy Phase Realization- Application To Sub Band Coding - Wavelet Transform And Filter Bank Implementation of Wavelet Expansion of Signals.

## UNIT - V

**Digital signal Processors**: Introduction To Programmable Dsp, Multiplier And Multiplier Accumulator (MAC), Modified Bus Structures And Memory Access Schemes In P- Dsp. Multiple Access Memory. Multi Ported Memory. VLIW Architecture , Pipelining , Special Addressing Modes In P-Dsp, On-Chip Peripherals. Architecture Of TMS320C50X, TMS320C50X Assembly Language Instructions & Programming. Introduction About Other DSP Processors.

### **Text Books:**

1. Monson H. Hayes, " Statistical Digital Signal Processing and Modeling " , John Wiley and Sons, Inc. New York, 1996.
2. Socrates J. Orfanidis, " Optimum Signal Processing" , Mc Graw Hill, 1990

### **Reference Books:**

1. John G. Proakis , Dimitris G. Manolakis , " Digital Signal Processing" , Prentice Hall of India, 1995.
2. B. Venkataramani , M. Bhaskar, " Digital Signal Processor - Architecture , Programming & Applications" Tata Mc Graw Hill 2003.
3. K. Padmnabhan, S. Awasthi, R. Vijayarajeshwaran, " A Practical Approach to Digital Signal Processing "

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

Semester: **M. E. II**

Subject: **Microwave Integrated Circuits**

Total Theory Periods: **40**

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

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

Branch: **Electronics & Telecommunication**

Code: **551232 (28)**

Total Tutorial Periods: **12**

## **UNIT - I**

**MICROSTRIPS LINES, DESIGN, ANALYSIS:** Introduction, types of MICs and their technology, Propagating models, Analysis of MIC by conformal transformation, Numerical analysis, Hybrid mode analysis. losses in Microstrip, Introduction to slot line and coplanar wave guide

## **UNIT - II**

**COUPLED MICROSTRIP, DIRECTIONAL COUPLERS AND LUMPED ELEMENTS FOR MICS:** Introduction to coupled Microstrip, Even and odd mode analysis, Directional couplers, branch line couplers, Design and Fabrication of Lumped elements for MICs, Comparison with distributed circuits

## **UNIT - III**

**NON-RECIPROCAL COMPONENTS AND ACTIVE DEVICES FOR MICS:** Ferromagnetic substrates and inserts, Microstrip circulators, Phase shifters, Microwave transistors, Parametric diodes and Amplifiers, PIN diodes, Transferred electron devices, IMPATT, BARITT, Avalanche diodes, Microwave transistors circuits.

## **UNIT - IV**

**MICROSTRIP CIRCUIT DESIGN AND APPLICATIONS:** Introduction, Impedance transformers, Filters, High power circuits, Low power circuits, MICs in satellite and Radar.

## **UNIT - V**

**MMIC TECHNOLOGY:** Fabrication process of MMIC, Hybrid MICs, Configuration, Dielectric substances, thick and thin film technology, Testing methods, Encapsulation and mounting of Devices.

### **References:**

1. Hoffman R.K. "HandBook of Microwave intergrated circuits", Artech House, Boston, 1987.
2. Gupta .K.C and Amarjit Singh, "Microwave Intergrated circuits" John Wiley, New York, 1975.

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

Semester: **M. E. II**

Subject: **Optical communication System**

Total Theory Periods: **40**

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

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

Branch: **Electronics & Telecommunication**

Code: **551233 (28)**

Total Tutorial Periods: **12**

## **UNIT - I**

**Fiber Optic Guides:** Light Wave Generation Systems, System Components , Optical Fibers, SI, GI-Fibers, Modes, Dispersion in Fibers, Limitations Due To Dispersion, Fiber Loss, Non-Linear Effects, Dispersion Shifted And Dispersion Flattened Fibers.

## **UNIT - II**

**Optical Transmitters And Receivers:** Basic Concepts, LED's Structures Spectral Distribution, Semiconductor Lasers, Gain Coefficients, Modes, SLM And STM Operation, Transmitter Design, Receiver PIN And APD Diodes Design , Noise Sensitivity And Degradation, Receiver Amplifier Design.

## **UNIT - III**

**Light Wave System:** Coherent, Homodyne And Heterodyne Keying Formats, BER In Synchronous - And Asynchronous- Receivers, Sensitivity Degradation, System Performance, Multichannel, WDM, Multiple Access Networks, WDM Components, TDM, Subcarrier And Code Division Multiplexing.

## **UNIT - IV**

**Amplifiers:** Basic Concepts , Semiconductor Laser Amplifiers, Raman - And Brillouin- Fiber Amplifiers, Erbium Doped - Fiber Amplifiers, Pumping Phenomenon, Lan And Cascaded In -Line Amplifiers. Fiber Optic Network- Architecture , Management And Future Of Fiber Optic Network.

## **UNIT - V**

**Dispersion compensation:** Limitations, Post- And Pre- Compensation Techniques, Equalizing Filters , Fiber Based Gratings, Broad Band Compersation , Soliton Communication System, Fiber Soliton, Soliton Based Communication System Design , High Capacity And WDM Soliton System. Isolators , Circulator And Attenuator , Optical Switches And Modules.

### **Text Books:**

1. G.P. Agrawal, " Fiber Optic Communication Systems" , 2<sup>nd</sup> Edition, John Wiley & Sons. New-York, 1997.
2. Optical Fiber Communacation Keiser,gerd Mgh

### **Reference Books:**

1. Franz and Jain , " Optical Communication System", Narosa Publications, New Delhi, 1995.
2. G. Keiser, " Optical Fiber Communication" , Systems and Components , Narosa Publications, New Delhi, 2000.



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

**M.E. Semester: II**  
**Subject: Embedded Technology in  
Communication Systems Laboratory**

**Branch: Electronics & Telecommunication  
Code: 551221 (28)**

**Total Practical Periods: 40**  
**Total Marks in End Semester Exam -75**

**List of experiments to be performed:**

- (i) Create ,compile and test a program to print a string a message on standard output device
- (ii) Create a program to print powers of 2 from  $2^0$  to  $2^{12}$
- (iii) Write a program tht continuously reads Port A and provides output to port B
- (iv) Use External Hard ware Interrupt to print a message to the standard output devices each time an interrupt occurs . Also print number of time interrupt occur
- (v) Create a program that will turn on an LED when falling edge occur on external interrupt 0 and turn it off when rising edge occur on external interrupt 1
- (vi) Create a programme that will demonstrate how watchdog timer resets the processor if programme hangs up to infinite loop
- (vii) Create a programme that will read the data on all 8 bits of port B swap the nibble of data and send it to port A
- (viii) Create a simulated engine speed monitor that will light a LED if the motor speed drops below 200rpm and another LED if motor speed exceed 500 rpm and light another LED if motor speed between 200 to 500 rpm
- (ix) Create a programme to output the ASCII character G every 50 msec via USART at 9600 baud rate
- (x) Write a microcontroller 8051 program to add two floating-point numbers.
- (xi) Write a microcontroller 8051 program to multiply two floating-point numbers.
- (xii) Write a microcontroller 8051 program that generates 2kHz square wave on pin P1.0, 2.5 kHz on pin P1.2 and 25 Hz on pin P1.3.
- (xiii) Write a microcontroller 8051 program for counter 1 in mode 2 to count the pulses and display the state o the TL1 count on P2. Assume that the clock pulses are fed to pin T1.
- (xiv) Write a microcontroller 8051 program to transfer word "COMMUNICATION" serially at 4800 baud and one stop bit, to the com port of PC continuously.
- (xv) Write a microcontroller 8051 program to receive bytes of data serially, and put them in P1. Set the baud rate at 2400 baud, 8-bit data, and 1 stop bit. Assume crystal frequency to be 11.0592 MHz.

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**Recommended Books:**

1. Embedded C Programming and the Microchip by PIC Barneet , Cox ,O'cull Thomson publication
2. Embedded system by Raj Kamal TMH

**List of Equipments/Machine Required :**

1. MATLAB Software with Simulink
2. Emulation software with Cross C complier

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

M.E. Semester: **II**  
Subject: **Signal Processing Lab**  
Total Practical Periods: **40**  
Total Marks in end Semester Exam -**75**

Branch: **Electronics & Telecommunication**  
Code: **551222 (28)**

**List of Practical**

1. To Generate the following waveforms
  - a: Unitstep Sequence
  - b. Ramp Sequence
  - c. Exponential Sequence
  - d. Sine Sequence
  - e. Sine Sequence
2. Program for linear convolution
3. Program of computing circular convolution.
4. Program for computing cross correlation of the given sequence.
5. Program for design of Butter worth LPF.
- 6 Program for the design of FIR, LP, HP, BP and BS Filters using Rectangular Window.
7. Program for estimating PSD of Two sinusoid Plus noise.
8. Program for Downsampling a Sinusoidal sequence by a factor M.
9. Cancellation of echo produced on the telephone base band channel (Simulation).
10. Program for the solution of normal equation using Levinson-Durbin Algorithms.
11. Study of DSP Processor. (Texas Instrument)
12. To observe the effect of interpolation and decimation on the spectrum of a signal (DSP Works Software)
13. To Generate and amplitude modulation Signal and observe the presence of sideband in its spectrum. (DSP works software)
14. To Demonstrate Spectral Leakage.
15. Program for partial fraction decomposition of a rational transfer function.

**Recommended Books:**

1. DSP - S Salivaliaran, A Vallavraj, C, TATA MCGRAW HILL.
2. Digital Signal Processors - Architecture, Programming and Application- B Venkatramani, M Bhaskar, TATA MCGRAW HILL.
3. dsp - a Hands-on approach - Charles schuler, Mahesh chugani, TATA MCGRAW HILL

**List of Equipments/Machine Required :**

1. MATLAB Software with DSP Toolbox.
2. DSP<sub>works</sub> Signal generation and Analysis Software.
3. TMS 320C6\*\* service starter Kits with Code composer Studio.