

# Chhattisgarh Swami Vivekanand Technical University, Bhilai

## Scheme of Teaching and Examination

### B.E. VII Semester Electronics & Telecommunication Engineering

Sl. No.	Board of Study	Code No.	Subjects	Period Per Week			Scheme of Exam			Total Marks	Cred L+(T+P)
				L	T	P	Theory/ Practical				
							ESE	CT	TA		
1	Electronics & Telecom.	328711 (28)	Mobile & Cellular Communication	4	1	-	80	20	20	120	5
2	Electronics & Telecom.	328712 (28)	Microwave Communication & Engineering	3	1	-	80	20	20	120	4
3	Electronics & Telecom.	328713 (28)	Microcontroller & Embedded System	3	1	-	80	20	20	120	4
4	Electronics & Telecom.	328714 (28)	Satellite Communication	3	1	-	80	20	20	120	4
5	Refer Table -2		Professional Elective - II	3	1	-	80	20	20	120	4
6	Electronics & Telecom.	328721 (28)	Advanced Signal Processing Laboratory	-	-	4	40	-	20	60	2
7	Electronics & Telecom.	328722 (28)	Microwave Communication & Engineering Lab	-	-	4	40	-	20	60	2
8	Electronics & Telecom.	328723 (28)	Microcontroller & Embedded System Lab	-	-	4	40	-	20	60	2
9	Electronics & Telecom.	328724 (28)	Minor Project	-	-	4	100	-	40	140	2
10	Management	300725 (36)	Innovative & Entrepreneurial Skills	-	-	2	-	-	40	40	1
11	Electronics & Telecom.	328726 (28)	**Practical Training Evaluation and Library	-	-	1	-	-	40	40	1
<b>TOTAL</b>				<b>16</b>	<b>5</b>	<b>19</b>	<b>620</b>	<b>100</b>	<b>280</b>	<b>1000</b>	<b>31</b>

L-Lecture, T- Tutorial, P - Practical, ESE- End Semester Examination, CT - Class Test, TA - Teacher's Assessment

\*\* To be completed after VI Semester and before the commencement of VII Semester

**Table -2**

#### Professional Elective - II

##### Telecommunication Group:

Sl. No.	Board of Study	Code	Subject
1	Electronics & Telecom.	328751 (28)	Electronic Instrumentation & Automation
2	Electronics & Telecom.	328752 (28)	Cryptography & Secure Communication

##### Allied Group:

Sl. No.	Board of Study	Code	Subject
1	Electronics & Telecom.	328753 (28)	Consumer Electronics
2	Electronics & Telecom.	328754 (28)	Neural Network & Fuzzy Logic
3	Electronics & Telecom.	328755 (28)	Advanced Solid State Devices
4	Electronics & Telecom.	328756 (28)	Speech Signal Processing
5	Electronics & Telecom.	328757 (28)	Artificial Intelligence & Expert Systems

Note (1)- 1/4th of total strength of students subject to minimum of twenty students is required to offer an elective in the college a particular academic session.

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

# *Chhattisgarh Swami Vivekanand Technical University, Bhilai*

Semester : VII  
Subject: Mobile and Cellular Communication  
Total Theory Periods: 50  
Total Marks in End Semester Examination: 80  
Minimum number of Class tests to be conducted: Two

Branch: Electronics & Telecommunication  
Code: 328711 (28)  
Total Tutorial Periods: 12

## **UNIT – I**

**Introduction to Mobile and Wireless Devices:** Mobile and wireless devices, history, Applications, Wireless transmission, frequencies for radio transmission, regulations, signals, antennas, signal propagation, multiplexing, modulation, Wireless LANs and Wireless WANs, spread spectrum, FHSS and DSSS Spread Spectrum Technology; cellular systems, Medium Access Control, specialized MAC; Problems in wireless communications, Various Multiple Access Techniques, Vocoding.

## **UNIT – II**

**Telecommunications and Broadcast Systems:** GSM; Mobile services, System architecture, GSM subsystems, GSM communication frame, localization and calling, handover, security, new data services; Satellite systems, applications, GEO, LEO, MEO, routing, localization, handover; Broadcast systems, cyclic repetition of data.

## **UNIT – III**

**Wireless Networks and other 3G Technologies:** Wireless LAN, Infrared v/s radio transmission; Infrastructure and adhoc networks, IEEE 802.11, architecture (details of protocol not required); DFWMAC schemes, MAC frames, MAC management, Roaming; HIPERLAN (just basics, frame and protocol details not required); Bluetooth, applications, physical layer, modes, MAC layer, packet format, networking, security, Link Management, Brief discussions (frame details and protocols not required) on GPRS, DECT, TETRA, UMTS, IMT-2000; CDPD.

## **UNIT – IV**

**Mobile Network and Transport Layers:** Mobile Network Layer; requirements, entities, IP packet delivery, agent advertisement and discovery, registration, encapsulation and tunneling, optimization, messages, reverse tunneling, IPv6, DHCP; Mobile IP, DHCP, Adhoc networks; Mobile Transport Layer; Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP; Fast transmit/fast recovery, transmission/time out freezing, selective retransmission, transaction oriented TCP.

## **UNIT – V**

**Signaling and Intelligent Networks:** Signaling: Introduction, Out of Band Signaling, Signaling Network Architecture, Basic Signaling Architecture, SS7 Link Types, Basic Call Setup, Database query, SS7 Protocol Layers, SS7 Addressing, Signal unit Structure, Functions of Signaling Units, Intelligent Networks: Network Evolution, Benefits of Intelligent Network, AIN Releases, AIN Release 1 Architecture, The Call Model, AIN Release 0, AIN Release 0.1, AIN Release 0.2, AIN Service creation, AIN Services.

### **Text Books:**

1. Mobile Communications – Schiller, Jochen; 2<sup>nd</sup> Indian Reprint, Pearson Education Asia – Addison Wesley Longman Pte. Ltd.
2. Mobile Communication Engineering by W.C. Lee, TMH Pub.

### **Reference Books:**

1. Mobile Cellular Telecommunications by W.C. Lee, TMH Pub.
2. The Essential Guide to Wireless Communication Applications – Dornan, A.; 1<sup>st</sup> Indian Reprint, Pearson Education Asia
3. Mobile Data Wireless LAN Technologies – Dayem, Rifaat A.; Prentice Hall International

# *Chhattisgarh Swami Vivekanand Technical University, Bhilai*

**Semester : VII**

**Subject: Microwave Communication & Engineering**

**Total Theory Periods: 40**

**Total Marks in End Semester Examination: 80**

**Minimum number of Class tests to be conducted: Two**

**Branch: Electronics & Telecommunication**

**Code: 328712 (28)**

**Total Tutorial Periods: 12**

## **UNIT – I**

**Wave Propagation:** Sky wave: Surface wave; space wave: Field and Range Calculation. Ionosphere Propagation –Refractive Index at High Frequencies. Mechanism of Radio Wave Bending, Critical Frequency. Effect of Earth's Magnetic Field. Effective Dielectric Constant and conductivity. MUF .Skip Distances. Optimum Working Frequency. Multihop propagation .Ionospheric Abnormalities. Tropospheric Propagation. Field Strength of Troposphere wave. Effect of Earth's Curvature and Dielectric Constant. Tropospheric Scatter and Duct propagation

## **UNIT – II**

**Microwave Linear Beam and Crossed-Field Tubes:** Failure of conventional tube at high frequency; Klystron-Velocity modulation; Bunching; output power and loading; Reflex klystron-Velocity modulation; power output and efficiency and electronic admittance; Helix traveling wave tubes; amplification process; Conventional current; Electric field wave modes; Basic principle of coupled cavity; Magnetron-Types and Principles of operation; Modes of oscillation; Strapping; pi-mode separation.

## **UNIT – III**

**Microwave Devices :** Transistors, Tunnel Diodes and Microwave FETs: Structure; Operation; Characteristics and Power frequency limitations of microwave transistors; Tunnel diodes and Field-Effect Transistors. Transfer Electron Devices: Gunn diode; Gunn effect; Principle and Mode of operation; Microwave generation and amplification Tunnel Diode; PIN diode and Crystal diode. Avalanche Transit- Time Devices: Physical Structure; Principle of operation; Characteristics; Power output and Efficiency of IMPATT, TRAPATT and BARITT Diodes; Parametric amplifiers.

## **UNIT – IV**

**Microwave Components and Measurement:** Rectangular cavity resonators; Q of a cavity resonator; Reentrant cavities; Slow-wave structure; Microwave hybrid circuits; S-parameters and their properties; Wave guide tees ; Hybrid ring; Waveguide corners bends and twists; Two hole directional coupler; S- Matrix; Circulators and Isolators; Hybrid couplers, MICROWAVE MEASUREMENT: Microwave bench; Precautions; Power measurement; Bolometric method; Attenuation; VSWR; Impedance, Frequency and Q of the Cavity.

## **UNIT – V**

**Microwave Filters:** Periodic structures – Analysis of infinite periodic structures and terminated periodic structures, Filter design by image parameter method – Constant k, m-derived and composite. Filter design by insertion loss method. Filter transformation and implementation.

### **Name of Text Books:**

1. Microwave Devices and Circuits by Samuel Y. Liao, 3<sup>rd</sup> Ed., Pearson Education
2. Foundations of Microwave Engineering by R .E. Collin, TMH Pub.

### **Name of Reference Books:**

1. Microwave Principles by Reich
2. Microwaves, Gupta, New Age International Publishers
3. Microwave Semiconductor Devices, Roy & Mitra, PHI
4. D. M. Pozar: *Microwave Engineering*, John Wiley, 1998, 2/e.
5. G. D. Vendelin, A. M. Pavio and U. L. Rohde: *Microwave Circuit Design*, John Wiley, 1990.
6. Guillermo Gonzalez, *Microwave Transistor Amplifiers: Analysis and Design* (2nd Edition), Prentice Hall, 2000

# *Chhattisgarh Swami Vivekanand Technical University, Bhilai*

**Semester : VII**

**Subject: Microcontroller & Embedded System**

**Total Theory Periods: 40**

**Total Marks in End Semester Examination: 80**

**Minimum number of Class tests to be conducted: Two**

**Branch: Electronics & Telecommunication**

**Code: 328713 (28)**

**Total Tutorial Periods: 12**

## **UNIT - I**

**Introduction to Microcontroller:** A brief History of 8051, 8052, 8031, 8751, AT89651, Pin configuration of 8051, 89C52RD2.

## **UNIT - II**

**Instruction Set of 8051:** Assembly language programming , Internal structure of 8051 , Power resetting , Built up RAM & ROM, I/O programming and Addressing modes.

## **UNIT - III**

**Counter and Timer details:** Counter and timer programming using 8051, interrupt programming, Types of interrupt.

## **UNIT - IV**

**Asynchronous serial communication:** Data programming, RS232 standard, RS422 Standard, 1488 & 1489 standard, GPIB, Max 232 Driver, Serial communication programming.

## **UNIT - V**

**Interfacing:** ADC & DAC interfacing, stepper motor interfacing, keyboard interfacing, Memory interfacing, embedded design concept, Embedded design card, 8096 Architecture.

### **Names of Text Books:**

1. Microcontrollers: Architecture, Programming, Interfacing and System Design, Rajkamal, Pearson Education.
2. The 8051 Microcontroller and Embedded Systems using Assembly and C, Mazidi, Mazidi & McKinlay, 2<sup>nd</sup> Ed., PHI.

### **Names of Reference Books:**

1. 8051 Programming, Interfacing and Applications K.J.Ayala, Penram Pub.
2. 8 bit Microcontrollers & Embedded Systems Manual.
3. Programming and Customizing the 8051 Microcontroller, Predko; TMH
4. Handbook of Microcontrollers, Myke Predko, TMH

# *Chhattisgarh Swami Vivekanand Technical University, Bhilai*

Semester : VII  
Subject: Satellite Communication  
Total Theory Periods: 40  
Total Marks in End Semester Examination: 80  
Minimum number of Class tests to be conducted: Two

Branch: Electronics & Telecommunication  
Code: 328714 (28)  
Total Tutorial Periods: 12

## **UNIT-I**

**Introduction:** Synchronous satellite; Synchronous orbit; Orbital parameters; Satellite location with respect to earth; Look angles; Earth coverage and slant range; Eclipse effect; Satellite frequency allocation and band spectrum; General and technical characteristics of satellite communication system; Advantages of the satellite communication; Active and Passive satellite systems; Current trends in satellite communication.

## **UNIT-II**

**Communication Satellite Link Design:** Link design equation; System noise temperature; C/N, G/T ratio; Atmosphere and ionosphere effects on link design; Uplink design; Complete link design; Interference effects on complete link design; Earth station parameters. SATELLITE COMMUNICATION LINKS: Analog baseband signal; FDM techniques: SNR and CNR in FM in satellite link; SNR in FM with multiplexed telephone signals: SCPC system CSSB system; Analog FM/FDM TV satellite link; Intermodulation effects in FM/FDM system; Energy dispersal in FM/FDM signals; Digital baseband signal; K digital satellite design.

## **UNIT-III**

**Multiple Access Techniques:** TDMA-Frame and burst structure; Frame Efficiency; Superframe: TDMA frame acquisition and synchronization: FDMA compared to TDMA; TDMA burst TME plan; multiple beam TDMA satellite system; Beam hopping TDMA; CDMA and hybrid access techniques; CSMA

## **UNIT-IV**

**Communication Satellite Subsystem:** Power supply; Attitude and orbit control; Propulsion subsystem; Repeaters; Antenna subsystem; TTC subsystem; Thermal subsystem; Structure subsystem; Reliability of satellite subsystem

## **UNIT-V**

**Satellite Earth Stations:** Earth station design requirements; Earth station subsystem; Monitoring and control; Frequency coordination; Small earth station VSAT; Mobile and transport earth station; TVRO system

### **Names of Text Books:**

1. Fundamentals of Satellite Communication, Raja Rao, Pearson Education.
2. Satellite Communication, Mitra, PHI

### **Names of Reference Books:**

1. Satellite Communications, Dr. D.C. Agarwal, Khanna Publishers
2. Satellite Communication System Engineering, Pritchard, Pearson Education
3. Satellite Communication, Timothy Pratt, John Wiley & sons
4. Satellite Communication, Robert M. Gagliardi, CBS Publishers & Distributors

# *Chhattisgarh Swami Vivekanand Technical University, Bhilai*

Semester : VII  
Subject: Electronic Instrumentation & Automation  
Total Theory Periods: 40  
Total Marks in End Semester Examination: 80  
Minimum number of Class tests to be conducted: Two

Branch: Electronics & Telecommunication  
Code: 328751 (28)  
Total Tutorial Periods: 12

## **UNIT: I**

**Instrument Errors & Error Reduction** : Errors and their statistical behavior, Types of errors, Statistical analysis of data, Probability of errors. Limiting errors, Error reduction using intelligent instruments.

**Recorders** : Single and Multivariable recorders, Servo recorders, Potentiometric Recorders, X-Y recorders, Paper-less recorders, Magnetic Tape recorders, Digital recorders and recording process.

## **UNIT: II**

**Instrument Displays**: Special Oscilloscopes: Oscilloscope controls, Sampling oscilloscope. Analog & Digital Storage oscilloscope. Dual channel and dual trace oscilloscope. Displays: Digital displays: LED and LCD and displays based on them, Plasma displays, TFT Displays

## **UNIT: III**

**Voltage and Current Measurements**: Digital Voltmeters: Non-Integrating type, Integrating Type, Using counting circuits, Principles of AC voltage measurement: Average and Peak responding detectors, Peak to Peak detector, Root mean square detectors, DC and AC probes, Basic Hand-held Multimeter, Bench type Digital Multimeters, Comparison of Analog and Digital Multimeters, Digital LCR meters.

## **UNIT: IV**

**Frequency & Power Measurement**: Bolometer method. Calorimeter method.

Frequency Measurement: Basic Frequency Meter, Spectral analysis, Swept superheterodyne frequency analyzer, Harmonic Mixing, Multifilter Real Time Spectrum Analyzer, Digital Spectrum Analyzer, Audio Analyzer, Modulation Analyzer.

## **UNIT: V**

**Advanced Topics in Instrumentation**: Telemetry: Various types of Telemetry, Principles of Telemetry, Telemetry Equipment, Basics of - Data Loggers, Data Acquisition Systems, Distributed Control Systems, Programmable Logic Controllers.

### ***Name of Text Books:***

1. Electronic and Electrical Measurement and Instrument: Sawhney: Dhanpat Rai & sons.
2. Modern Electronic Instrumentation and Measurement Techniques: Cooper & Helfrick, Pearson Education.

### ***Name of Reference Books:***

1. Industrial Control & Instrumentation, W. Bolton, University Press.
2. Electronic Measurements and Instrumentation: Oliver and Cage: TMH.
3. Electronic Instrumentation, H.S. Kalsi, 2<sup>nd</sup> Ed., TMH.

# *Chhattisgarh Swami Vivekanand Technical University, Bhilai*

Semester: VII  
Subject: Cryptography & Secure Communication  
Total Theory Periods: 40  
Total Marks in End Semester Examination: 80  
Minimum number of Class tests to be conducted: Two

Branch: Electronics & Telecommunication  
Code: 328752 (28)  
Total Tutorial Periods: 12

## **UNIT – I**

**Public Key Encryption:** Introduction to number theory: Fermat's and Euler's theorem, discrete algorithm, Principle of public key cryptosystem, RSA algorithm, key management: Diffie-Hellman key exchange.

## **UNIT – II**

**Message Authentication and Hash Function:** Authentication requirement, authentication function, message authentication codes, hash function, security of hash function: Brute force attack.

## **UNIT – III**

**Hash Algorithm and Digital Signature:** MD5 Message digest algorithm, secure hash algorithm, digital signature: introduction, authentication protocols, digital signature standards.

## **UNIT – IV**

**Network and System Security:** IP security: introduction and architecture, web security: threats and web traffic security approaches, SSL architecture and protocol, firewalls: design principle.

## **UNIT – V**

**Steganography:** Introduction, Cryptography and Steganography, Simplified model of Steganography, Security using Information theory: Deterministic and Indeterministic model.

### *Name of Text Book:*

1. Cryptography and Network Security, William Stallings, Pearson Education
2. M. Y. Rhee, *Cryptography and Secure communication*, McGraw-Hill

### *Name of Reference Books:*

1. Computer Networks, Tannenbum , PHI
2. Internet Cryptography by Smith, Pearson Education Pub.

# *Chhattisgarh Swami Vivekanand Technical University, Bhilai*

Semester : VII

Subject: Consumer Electronics

Total Theory Periods: 40

Total Marks in End Semester Examination: 80

Minimum number of Class tests to be conducted: Two

Branch: Electronics & Telecommunication

Code: 328753 (28)

Total Tutorial Periods: 12

## **UNIT – I**

**Audio Input Equipments:** Microphones: characteristics, Types – Carbon, Crystal Dynamic, Ribbon, Capacitor, Electret, Gun, Lavalier, Tie-clip, Wireless, Dual-unit. Headphones and Headsets: Types - Moving-iron, Crystal, Dynamic, Electrostatic, Electret. Hearing Impairments, Audiometry, Hearing Aids - internals, controls, filters, AGC.

## **UNIT – II**

**Audio Output Equipments and Acoustics Fundamentals:** Ideal Loudspeaker, Basic Loudspeaker, Types: Crystal, Electrostatic, Dynamic Loudspeakers, Permanent Magnet. Loudspeaker construction, Permanent magnet, Voice Coil, Loudspeaker impedance, Acoustic Impedance and Resonance, Woofers, Mid-range and Extended range Loudspeakers, HF Loudspeakers, Tweeters: Cone-type, Dome type, Horn type. Hi-Fi, Multispeaker Systems, Crossover Networks, Impedance Matching. Speaker Baffles and enclosures, Acoustic doublets, baffles, Infinite Baffle systems, Bass-reflex systems, Acoustic Labyrinth Systems, Folded-Horn Systems, Corner folded Horn Systems. Acoustics: Reflection of sound, Reverberation, Absorption of Sound, Sabine's Equation, Listening Room Characteristics, Live Rooms, Dead Rooms, Absorbent Materials, Acoustic Design of Auditoriums, Acoustics of Studios, Sound Insulation, Noise. Commercial sound: Electric Guitar, Electric Wind Instruments, Recording, Manual Synthesizer, Programmed Synthesizer, PA System, planning, speaker matching, characteristics, amplifiers, Megaphones, Intercommunication Equipment, Background Music and Paging Systems, Anatomy of Hi-Fi System, Source Units, Signal Propagation, Signal Multiplex, Compatibility, Theatre Sound System: Sound Track, Types of Sound Film, Theatre Sound Reproduction Systems, Working of a Projector, Sound Pick-up, Cine Screens, DTS and Dolby Systems for Theatres, Satellite relay system

## **UNIT – III**

**Musical Equipments:** Portable Stereo: Eight-Track System, Stereo Car-cassette player, Auto-reverse Car Stereo Player, Car-Cassette Stereo Player with Auto-eject and Fast-Forward, Rewind System. Electronic Music Synthesizers: Typical Generators, Basic Modifiers, Voltage Control, Envelop Generator, Other Signal Modifiers. Set-Top Boxes: Interoperable Set-top boxes, Middleware for Set-top boxes.

## **UNIT – IV**

**Multipurpose Equipments:** Facsimile, Xerography: Xerographic Process, Extension to a dynamic copier, Calculators: Structure, internal organization. Digital Clocks: Working, LSI Digital Clocks, In-Car Computers: Applications, Electronic Ignition, Electronic Ignition Lock System, ABS, ECS, Instrument Panel Displays, Ultrasonic Car Safety Belt System, Air Bag System, Vehicle Proximity Detection System, Car Navigation Systems – Travel Pilot and AVIC-1

## **UNIT – V**

**Domestic Equipments:** Microwave Ovens: Microwave Oven Block Diagram, LCD Timer with alarm, Single-chip Controllers, Types of Microwave Ovens, Wiring and Safety, Operating Problems, Care and cleaning. Washing Machines: Electronic Controller for Washing Machines, Washing Machine Hardware, Washing Cycle, Hardware and Software development, Types of Washing Machines, Fuzzy Logic Washing Machines, Air conditioners and Refrigerators: Air Conditioning, Components of Air Conditioning Systems, All-weather and All-air Air Conditioning Systems, Remote Control Buttons, Combination Systems, Unitary and Central Air Conditioning Systems, Split Air Conditioning Systems, Refrigeration, refrigerants, Refrigeration Systems, Domestic refrigerators.

### **Name of Text Books:**

Consumer Electronics, Bali S.P., Pearson Education

### **Name of Reference Books:**

K. Blair, Benson "Audio Engineering Hand book"

# *Chhattisgarh Swami Vivekanand Technical University, Bhilai*

Semester: VII  
Subject: Neural Network & Fuzzy Logic  
Total Theory Periods: 40  
Total Marks in End Semester Examination: 80  
Minimum number of Class tests to be conducted: Two

Branch: Electronics & Telecommunication  
Code: 328754 (28)  
Total Tutorial Periods: 12

## **UNIT-I**

**Introduction to ANS Technology:** Elementary Neurophysiology, Models of a Neuron, Neural Networks viewed as directed graphs, Feedback, from neurons to ANS, Artificial Intelligence and Neural Networks.

## **UNIT-II**

**Learning and Training:** Hebbian, Memory based, Competitive, Error-Correction Learning, Credit Assignment Problem: Supervised and Unsupervised learning, Memory models, Recall and Adaptation. Network Architectures, Single-layered Feed-forward Networks, Multi-layered Feedforward Networks, Recurrent Networks, Topologies,

## **UNIT-III**

**Algorithms for ANN:** Activation and Synaptic Dynamics, Stability and Convergence. A Survey of Neural Network Models : Single-layered Perceptron – least mean square algorithm, Multi-layered Perceptrons – Back propagation Algorithm, XOR – Problem, The generalized Delta rule, BPN Applications, Adalines and Madalines – Algorithm and applications.

## **UNIT-IV**

**Applications:** The Traveling salesperson problem, Talking Network and Phonetic typewriter : Speech Generation and Speech recognition, Character Recognition and Retrieval, Handwritten Digit recognition.

## **UNIT-V**

**Adaptive Fuzzy Systems:** Introduction to Fuzzy sets and operations, Examples of Fuzzy logic, Fuzzy Associative memories, Fuzziness in neural networks, Comparison of Fuzzy and neural Truck-Backer upper control systems.

### **Names of Text Books:**

1. Artificial Neural Networks by B. Yagna Narayan, PHI
2. Neural Network: A Comprehensive Foundation, Haykin, Pearson Education

### **Names of Reference Books:**

1. Neural Networks, Freeman, Pearson Education
2. Fundamentals of Artificial Neural Networks, Hassoun, PHI

# *Chhattisgarh Swami Vivekanand Technical University, Bhilai*

**Semester : VII**

**Subject: Advanced Solid State Devices**

**Total Theory Periods: 40**

**Total Marks in End Semester Examination: 80**

**Minimum number of Class tests to be conducted: Two**

**Branch: Electronics & Telecommunication**

**Code: 328755 (28)**

**Total Tutorial Periods: 12**

## **UNIT – I**

**Material Properties and Technologies:** SiGe and group III-V compound semiconductors, band gaps and lattice constants, velocity overshoot, band gap discontinuity, band gap narrowing, strained layer and critical thickness, electron mobility, hole mobility.

## **UNIT – II**

**Heterojunction Technologies:** Heterojunction Bipolar Transistors (HBTs), Heterostructure Field Effect Transistors (HFETs), Modulation Doped Field Effect Transistors (MODFETs), High Electron Mobility Transistors (HEMTs), Resonant tunneling diodes (RTDs), Single Electron Transistors (SETs) and Velocity Modulated Transistors (VMTs),

## **UNIT – III**

**MOS Physics & Technologies:** MOS structure, MOS capacitance, CCD and application , Flat-band threshold voltages, MOS static characteristics, small signal parameters and equivalent circuit, charge –sheet model, strong, moderate and weak inversion, short channel effects, hot –carrier effects, scaling laws of MOS transistors, LDD MOSFET, NMOS and CMOS IC technology, CMOS latch-up phenomenon, Ideal Schottky barrier, current-voltage characteristics, MIS diode , Ohmic contacts, Heterojunction MESFET

## **UNIT – IV**

**Optical Devices:** Optical absorption in a semiconductor, Photovoltaic effect, Solar Cell, Photoconductors, PIN photodiode, Avalanche photodiode, LED, semiconductor lasers.

## **UNIT – V**

**OTA & Switched Capacitor filters:** OTA Amplifiers. Switched Capacitor Circuits and Switched Capacitor Filters.

### **Text Books:**

1. Ben G. Streetman, *Solid State Electronic Devices*, PHI, 5th ed, 2001
2. Ramakant Gayakwad, *Opamps & Linear Integrated Circuits*, Pearson Education

### **Reference Books:**

1. Fiber Optic Technology D K Mynbaev & LL Scheiner Pearson Education Asia
2. Optical Fiber Communication and applications S C Gupta PHI
3. Dilip K. Roy, *Physics of Semiconductor Devices*, University Press
4. Dasgupta & Dasgupta, *Semiconductor Devices*, PHI
5. D.G. Ong, *Modern MOS Technology: Processes, Devices and Design*, McGraw Hill
6. J. Singh, *Semiconductor Devices - Basic Principles*; John Wiley & Sons Inc., 2001
7. M. S. Tyagi, *Introduction to Semiconductor Materials and Devices*, John Wiley & Sons Inc.

# *Chhattisgarh Swami Vivekanand Technical University, Bhilai*

**Semester : VII**

**Subject: Speech Signal Processing**

**Total Theory Periods: 40**

**Total Marks in End Semester Examination: 80**

**Minimum number of Class tests to be conducted: Two**

**Branch: Electronics & Telecommunication**

**Code: 328756 (28)**

**Total Tutorial Periods: 12**

## **UNIT – I**

**Speech: Production, Perception and Acoustic-Phonetic Characterization:** Introduction, Speech-production process, Time and frequency domain representation of speech, Speech sounds and features, The vowels, Diphthongs, Semivowels, Nasal Consonants, Unvoiced Fricatives, Voiced Fricatives, Voiced & Unvoiced Stops, Acoustic-Phonetic Approach to Speech Recognition, Statistical Pattern-Recognition Approach to Speech Recognition, AI Approaches to Speech Recognition, Neural Networks and their Application to Speech Recognition.

## **UNIT – II**

**Spectral Analysis of Speech:** Short time Fourier analysis, filter bank design, speech coding, subband coding of speech, transform coding, channel vocoder, formant vocoder, cepstral vocoder, vector quantizer coder.

## **UNIT – III**

**Speech Synthesis:** Pitch extraction algorithms, Gold Rabiner pitch trackers, autocorrelation pitch trackers, voice/unvoiced detection, homomorphic speech processing, homomorphic systems for convolution, complex cepstrums, pitch extraction using homomorphic speech processing

## **UNIT – IV**

**Automatic speech recognition systems:** Isolated word recognition, connected word recognition, large vocabulary word recognition systems, pattern classification, DTW, HMM, speaker recognition systems, speaker verification systems, speaker identification systems.

## **UNIT – V**

**Hidden Markov Models:** Discrete-Time Markov Processes, Extensions to HMMs, Coin-toss Models, The Urn-and-Ball Model, Elements of an HMM, HMM generator of observations. Three Basic problems for HMMs and their solutions, Probability Evaluation, 'Optimal' State sequence, Parameter estimation, Re-estimation procedure. HMM types, continuous observation densities in HMMs, Autoregressive HMMs, Variants on HMM structures, Inclusion of Explicit State Duration Density in HMMs, Optimization Criterion – ML, MMI and MDI, Comparisons of HMMs.

### **Name of Text Books:**

1. Fundamentals of Speech Recognition, Rabiner L. and Juang B., Pearson Education
2. Owens F.J., "Signal Processing of Speech", Macmillan New Electronics

### **Names of Reference Books:**

1. Speech and Language Processing, Jurafsky, Pearson Education
2. Discrete Time Speech Signal processing: Principles and Practice, Quatieri, Pearson Education
3. Saito S. & Nakata K., "Fundamentals of Speech Signal Processing", Academic Press
4. Thomas Parsons, "Voice and Speech Processing", McGraw Hill Series

# *Chhattisgarh Swami Vivekanand Technical University, Bhilai*

**Semester : VII**

**Subject: Artificial Intelligence & Expert System**

**Total Theory Periods: 40**

**Total Marks in End Semester Examination: 80**

**Minimum number of Class tests to be conducted: Two**

**Branch: Electronics & Telecommunication**

**Code: 328757 (28)**

**Total Tutorial Periods: 12**

## **UNIT – I**

**Overview of AI :** What is AI? The importance of AI, Early works in AI, AI and Related fields. Knowledge: Importance of Knowledge, knowledge-based system representation, organization, manipulation, acquisition.

## **UNIT – II**

**Search Techniques:** Problem Solving, State space search, Blind search: Depth first search, Breadth first search, informed search: Heuristic search, Hill climbing search, Best first search, A\*, AO\*, Constraint satisfaction. Game Playing: Minimax search, Alpha – beta pruning.

## **UNIT – III**

**Knowledge Representation:** Predicate Logic ( well formed formulas, quantifiers, Prenex Normal Form, Skolemization , Unification, Modus ponens, Resolution refutation – various strategies ), Rule Based Systems ( Forward reasoning: Conflict resolution , Conflict resolution, backward reasoning: Use of No. Backtracking, Structured Knowledge Representations (Semantic Net: slots, inheritance, Frames: exceptions and defaults handling. Conceptual Dependency formalism, Object oriented representations.

## **UNIT – IV**

**Handling uncertainty:** Probabilistic reasoning: Bayes Net, Dempster Shafer Theory, Use of certainty Factors, Fuzzy Logic, Non monotonic reasoning, Dependency directed backtracking, Truth maintenance systems, Learning : Concept of learning, Learning automation, The Genetic algorithm, Learning by induction, Neural Networks: Hopfield Networks, Perceptrons- Learning algorithm, Back propagation Network, Boltzman Machine, Recurrent Networks.

## **UNIT – V**

**Planning:** Components of Planning System, Plan Generation Algorithms: Forward state propagation, Backward state propagation, Nonlinear planning using constraint posting, Natural Language Processing: Syntactic analysis, Top down and bottom up parsing, Augmented Transition Networks, Semantic analysis, case grammars.

**Expert System:** Need and Justification for expert systems- cognitive problems, Expert System Architectures( Rule based systems, Non production system, knowledge acquisition, Case studies: MYCIN , R1.

### **Name of Text Books:**

1. Artificial Intelligence By Elaine Rich and Kevin Knight , Tata McGraw Hill.
2. Introduction to AI and Expert Systems By Dan W.Patterson, PHI.

### **Name of Reference Books:**

1. Principles of Artificial Intelligence By Nils J.Nilsson, Narosa Pub. house.
2. Foundation Artificial Intelligence & Expert Systems by VS Janakiraman K, Sarukesi P Gopalakrishnan Macmillan series in computer science

# *Chhattisgarh Swami Vivekanand Technical University, Bhilai*

**Semester : VII**

**Subject: Advanced Signal Processing Lab**

**Total Practical Periods: 50**

**Total Marks in End Semester Examination: 40**

**Branch: Electronics & Telecommunication**

**Code: 328721 (28)**

## **Experiments to be performed:**

1. Generation of various signals
2. Implementation of Linear convolution, Circular convolution, Linear convolution using circular convolution.
3. DFT Implementation
4. Design & implementation of IIR filters
5. Design & implementation of FIR filters
6. Spectral analysis of Biomedical signals like ECG, EEG, EMG, EOG etc.
7. Design of adaptive noise canceller
8. Design of interference suppressor
9. Detection of abrupt changes in a signal
10. Performance evaluation of a signal
11. Parameter Estimation (Maximum likelihood) of a signal
12. Parameter Estimation (linear and nonlinear least squares) of a signal
13. Parameter Estimation (recursive and sequential least squares) of a signal
14. Parameter Estimation (minimum mean square error) of a signal
15. Parameter Estimation (maximum a posteriori) of a signal
16. Development of a general linear model for a signal
17. Design of Pace maker Analyzer
18. Design of Muscle Stimulator
19. Design and development of a data compression scheme
20. Design and development of a data encryption scheme

## **List of Equipments/Machine Required:**

PCs, MATLAB, C/C++ editor, DSP Kits

## **Recommended Books:**

1. Manuals of MATLAB and SMULINK along with Signal Processing Tool Box
2. Salomon, D. *A guide to data compression methods*. Springer
3. Stein, J. *Digital Signal Processing - a computer science perspective*. Wiley

# *Chhattisgarh Swami Vivekanand Technical University, Bhilai*

**Semester : VII**

**Subject: Microwave & Communication & Engineering Lab**

**Total Practical Periods: 50**

**Total Marks in End Semester Examination: 40**

**Branch: Electronics & Telecommunication**

**Code: 328622 (28)**

## **Experiments to be performed:**

1. To measure the VSWR at all the three open ports of a directional coupler.
2. To measure the coupling factor, directivity and insertion loss of a directional coupler.
3. To study mode characteristics of a reflex klystron and hence to determine mode number, transit time, Electronic Tuning Sensitivity (ETS) and Electronic Tuning Range (ETR).
4. To study the characteristics of wave propagation in a wave guide by studying standing wave pattern and hence to plot  $\omega - \beta$  diagram and verify relationship between guide wavelength ( $\lambda_g$ ) and free space wavelength  $\lambda$ .
5. To study the V-I characteristics of a GUNN diode and to measure output power and frequency vs. voltage.
6. To study and measure square wave modulation through PIN voltage.
7. To Energies a GUNN oscillator.
8. To Energies a Reflex oscillator.
9. To calibrate phase shifter.
10. To measure Dielectric Constant.
11. To study the characteristic and behavior of a Magic Tee.
12. To study the characteristics and behavior of Isolator and Circulators.
13. To study the characteristics and behavior attenuator (fixed and variable type).
14. To measure microwave frequency using frequency meter.
15. Measurement of Q of a cavity.
16. To study the function of multiple directional coupler by measuring the following parameters:
  - a. To measure main-line and auxiliary-line VSWR.
  - b. To measure the coupling factor and directivity of the coupler.
17. To study the characteristics of the reflex Klystron tube and to determine its electronic tuning range.
18. To determine the frequency and wave length in a rectangular wave guide working on TE<sub>10</sub> mode.
19. To determine the standing wave ratio and reflection coefficient.

## **List of Equipments/Machine Required:**

Microwave source, Isolator, Variable attenuator, Fixed Attenuator, Frequency meter, Slotted line, Tunable probe, Circulators, Matched terminations, Gunn/Klystron power supply, Detector mount, Cooling fan, Magic Tee, Phase shifter, Movable short, Dielectric Material.

## **Recommended Books:**

# *Chhattisgarh Swami Vivekanand Technical University, Bhilai*

Semester : VII

Subject: Microcontroller & Embedded System Lab

Total Practical Periods: 50

Total Marks in End Semester Examination: 40

Branch: Electronics & Telecommunication

Code: 328723 (28)

## Experiments to be performed:

1. Write a microcontroller 8051 program to transfer the bytes into RAM locations starting at 50H, assuming that ROM space starting at 240H contains CHHATTISGARH by using – a) a Counter, b) null char for end of string .
2. Write a microcontroller 8051 program to get hex data on the range of 00-FFh from port 0 and convert it to decimal. Save the digits in R7, R6 and R5, where the least significant digit is in R7.
3. Write a microcontroller 8051 program to add two 16 Bit unsigned numbers. Operands are two RAM variables. Results to be in R1-R0 pair.
4. Write a microcontroller 8051 program to subtract an unsigned 16 Bit number from another. Operands are two RAM variables. Results to be in R1-R0 pair.
5. Write a microcontroller 8051 program to add two unsigned 32-bit numbers. Operands are two RAM variables. Results to be in R1-R0 pair.
6. Write a microcontroller 8051 program to add two 16 Bit signed numbers.
7. Write a microcontroller 8051 program to convert a binary number to equivalent BCD
8. Write a microcontroller 8051 program to convert a packed BCD number to two ASCII numbers and place them in R5 and R6.
9. Write a microcontroller 8051 program to calculate the square root of an 8-bit number using iterative method.
10. Write a microcontroller 8051 program to add two floating-point numbers.
11. Write a microcontroller 8051 program to multiply two floating-point numbers.
12. 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.
13. Write a microcontroller 8051 program for counter 1 in mode 2 to count the pulses and display the state of the TL1 count on P2. Assume that the clock pulses are fed to pin T1.
14. Write a microcontroller 8051 program to transfer letter "N" serially at 9600 baud, continuously. Assume crystal frequency to be 11.0592 MHz.
15. Write a microcontroller 8051 program to transfer word "CSV TU" serially at 4800 baud and one stop bit, continuously. Assume crystal frequency to be 11.0592 MHz.
16. 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.

## List of Equipments/Machine Required:

Microcontroller kit, Interfacing kit, Keyboard, Monitor, SMPS for Microcontroller

## Recommended Books:

# *Chhattisgarh Swami Vivekanand Technical University, Bhilai*

**Semester : VII**  
**Telecommunication**

**Subject: Minor Project**  
**Total Practical Periods: 50**  
**Total Marks in End Semester Examination: 100**

**Branch: Electronics &**

**Code: 328724 (28)**

- The students are expected to take up a Project under the guidance of a faculty from the Institute.
- The topic of the project should be justified for the degree of BE (Electronics & Telecommunication)
- The project selected should ensure the satisfaction of the urgent need to establish a direct link between education, national development and productivities.
- The students may be asked to work individually or in a group having not more than FOUR students.
- The student/group of student shall collect all necessary information from literature on selected topic/project.
- It should include the scope of project, identification of necessary data, source of data, development of design method and identification, methodology, software analysis.
- Students should deliver a seminar on the selected Project/topic.
- The students are expected to submit the report in standard format approved by the University in partial fulfillment of the requirement for the degree of B.E. (Electronics & Telecommunication).
- There will be an external viva-voce at the end of the semester and the students are to demonstrate the project at the time of viva-voce.

# Chhattisgarh Swami Vivekanand Technical University, Bilai (C.G.)

Semester: VII  
Subject: Innovative & Entrepreneurial Skill  
Total Practical Periods: 28  
Total Marks in End Semester Exam: ---  
Minimum number of class test to be conducted: 2

Branch: Common to all branches  
Code: 300725 (36)  
Total Tut Periods: NIL

## Unit I

Innovation: innovation- an abstract concept; creativity, innovation and imagination; types of innovation -classified according to products, processes or business organizations.

## Unit II

Entrepreneurship: who is an entrepreneur? Entrepreneurship- A state of Mind, Emergence of entrepreneur; Role of Entrepreneur; A Doer not a Dreamer- Characteristics of an entrepreneur; Factors affecting entrepreneurial growth – Social, cultural, personality factors, psychological and Social Factors. Impact of Entrepreneurship for sustainable development.

## Unit III

Difference between entrepreneur and entrepreneurship, Difference between entrepreneur and intra-preneur, Common Entrepreneurial competencies/Traits; Entrepreneurship stimulants, Obstacles inhibiting Entrepreneurship; Types of entrepreneurs, Functions of an entrepreneur.

## Unit IV

Identification of Business Opportunities: Introduction, Sources of Business of Product Ideas, Steps in Identification of Business opportunity and its SWOT Analysis.

## UNIT-V

Techno-Economic Feasibility of the project: Introduction, Techno- Economic feasibility of the Project, Feasibility Report, Considerations while preparing a Feasibility Report, Proforma of Feasibility Report, Role of Institutions and entrepreneurship.

## Text and Reference Books:

- Competing through Innovation-Bellon & Whittington, Prentice Hall of India
- A Guide to Entrepreneurship – David Oates- JAICO Publishing House.
- Entrepreneurship- Rober D Hisrich, Peters, Shepherd- TMH
- Entrepreneurship in Action- Coulter, Prentice Hall of India
- Entrepreneurship Management and Development – Ajith Kumar, HPH
- Fundamentals of entrepreneurship- Mohanty, PHI
- Patterns of Entrepreneurship- Jack M Kaplan, Wiley, student Edition.