Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of Program:	Bachelor of Technology.		
Branch:	**Electronics & Telecommunication**	Semester:	VII
Subject:	**RF & Microwave Engineering**	**Code:**	**D028711(028)**
Total Theory Periods:	40	Total Tutorial Periods:	Ten (Minimum)
Class Tests:	Two (Minimum)	Assignments:	2 (Minimum)
ESE Duration:	Three Hours	Max Marks:100	Min Marks: 35

Course Objectives:

- To inculcate understanding of the basics required for circuit representation of RF networks.
- To deal with the issues in the design of microwave amplifier.
- To instill knowledge on the properties of various microwave components.
- To deal with the microwave generation and microwave measurement techniques

UNIT I	**Introduction:** RF & Microwave spectrum, Historical Background, Typical application of RF & Microwaves, **Two port Network Theory:** Review of Low frequency parameters: Impedance, Admittance, Hybrid and ABCD parameters, Different types of interconnection of Two port networks, High Frequency parameters, Formulation of S parameters, Properties of S parameters, Reciprocal and lossless Network, Transmission matrix, RF behavior of Resistors, Capacitors and Inductors.
UNIT II	**RF Amplifiers and matching networks:** Characteristics of Amplifiers, Amplifier power relations, Stability considerations, Stabilization Methods, Noise Figure, Constant VSWR, Broadband, High power and Multistage Amplifiers, Impedance matching using discrete components, Two component matching Networks, Frequency response and quality factor, T and Pi Matching Networks, Microstrip Line Matching Networks
UNIT III	**Microwave Generation:** Limitation of conventional tubes in microwaves, working principles and characteristics of Two cavity and multicavity Klystron, Reflex Klystron, Traveling wave tube, Magnetron, Backward wave Crossed field amplifier and oscillator
UNIT IV	**Passive and active Microwave Devices:** Tunnel diode, Gunn diode, IMPATT diode, TRAPATT diode, Microwave bipolar transistor, hetero-junction bipolar transistor, parametric amplifier, Varactor diodes Passive Components: S- matrix, Directional couplers, Bethe-hole coupler, T-junctions, Magic tee, Hybrid ring, Circulator, Isolator, matched Terminators, Attenuators, Phase shifters, Power dividers.
UNIT V	**Microwave Measurements:** Measurement of VSWR-Low, Medium and High, Measurement of power, Bolometer, Measurement of Impedance, Frequency, Q-factor, Attenuation, S-parameters. **Measuring Instruments :** Principle of operation and application of VSWR meter, Power meter, Spectrum analyzer, Network analyzer, **Application of Microwaves:** Introduction to satellite communication, Radar, Industrial application of microwaves.

Text books:

1. Microwave Devices & Circuits S.Y.Liao Pearson Education/PHI
2. Microwave Engineering ,Monojit Mitra ,Dhanpath Rai New Delhi
3. Microwaves ,K.C.Gupta ,New Age Publishers
4. Microwave Engineering , Kulkarni , Dhanpat Rai New Delhi
5. Reinhold Ludwig and Gene Bogdanov, "RF Circuit Design: Theory and Applications", Pearson Education Inc., 2011
6. Robert E Colin, "Foundations for Microwave Engineering", John Wiley & Sons Inc, 2005

REFERENCES:

1. R. F. Soohoo, "Microwave Electronics", Wesley publication, 1971.
2. D.M.Pozar," Microwave Engineering (3/e)", Wiley India, 2009.
3. Thomas H Lee, "Planar Microwave Engineering: A Practical Guide to Theory, Measurements and Circuits", Cambridge University Press, 2004.
4. Mathew M Radmanesh, "RF and Microwave Electronics", Prentice Hall, 2000.
5. Annapurna Das and Sisir K Das, "Microwave Engineering", Tata Mc Graw Hill Publishing Company Ltd, New Delhi, 2005.

Course Outcomes:

Upon completion of the course, students will be able to:

1. Explain the active & passive microwave devices & components used in Microwave communication systems.
2. Analyze the multi- port RF networks and RF transistor amplifiers.
3. Generate Microwave signals and design microwave amplifiers.
4. Measure and analyze Microwave signal and parameters.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of Program:	Bachelor of Technology.		
Branch:	**Electronics & Telecommunication**	Semester:	VII
Subject:	**Instrumentation & IoT**	**Code:**	**D028712(028)**
Total Theory Periods:	40	Total Tutorial Periods:	Ten (Minimum)
Class Tests:	Two (Minimum)	Assignments:	2 (Minimum)
ESE Duration:	Three Hours	Max Marks:100	Min Marks: 35

Course Objectives:

The course intends to provide an overview of the principles, operation and application of the different transducer and sensors like, Resistive, Inductive and capacitive transducers, Piezo-electric transducers and photo electric transducers. And to equip the students with the basic and advanced knowledge of Pressure, Temperature, flow and optical measurements.

The course also intends to understand about the fundamentals of Internet of Things and its building blocks along with their characteristics& understand the protocols and standards designed for IoT and the current research on it.& to understand the recent application domains of IoT in everyday life

UNIT I	**Introduction to Sensors & Transducer:** Transducer definition, classification, and Static and Dynamic performance characteristics of Transducer, selection criteria for sensors, Resistive: Piezo-resistive effect, Basics of Strain Gauge, Inductive: LVDT, RVDT, Capacitive: Differential capacitance cell.
UNIT II	**Pressure and Photoelectric Sensor: Pressure Measurement:** Terminology, pressure units, manometers-U-tube Single and double column, elastic pressure transducer: Bourdon Tube, Dead weight piston gauge. Piezoelectric transducer, photoelectric transducer: Photoconductive cell, Photo emissive cell and Photo Voltaic Cell
UNIT III	**Thermal and Flow Sensor: Temperature Measurement:** Temperature scales units and relations, Bimetallic thermometer, Resistance thermometers, Thermocouple: Its types & characteristics, Thermistor, radiation & optical pyrometers Flow Sensors: Theory of variable head meters, constructional details of variable head meters– Venturimeter, Flow Nozzle, Orifice flow meter, Pitot tube, Ultrasonic flow meter.
UNIT IV	**Introduction to Internet of Things:** Introduction to Internet of Things: Overview of Internet of Things-the Edge, Cloud and the Application Development, Industrial Internet of Things (MOT - Industry 4.0), Quality Assurance, Predictive Maintenance, Real Time Diagnostics, Design and Development for IOT, Understanding System Design for IOT, Design Model for IOT.
UNIT V	**Understanding Internet Protocols & Domain specific IOT:** Simplified OSI Model, Network Topologies, Standards, Types of Internet Networking - Ethernet, WiFi, Local Networking, Bluetooth, Bluetooth Low Energy (BLE), Zigbee,6LoWPAN, Sub 1 GHz, RFID,NFC, Proprietary Protocols, Simplicity, Networking Design - Push, Pull and Polling, Network APIs. Domain specific IOT and their challenges: Illustrated domains-home automation, smart cities, health and

	life style issues.

Text books:

1. Mechanical Measurements & Control, D.S.Kumar, Metropolitan Publication.

2. Electrical & Electronics Measurement & Instrumentation, A. K. Sawhney, Dhanpat Rai Publication.

3. Foundational Elements of an IOT Solution - The Edge, Cloud and Application Development, Joe Biron & Jonathan Follett, Oreilly media inc.

4. Internet of Things A Hands-On- Approach, Vijay Madisetti, Arshdeep Bahga, Orient Blackswan Private Limited.

REFERENCES:

1. "Measurement Systems Application and Design" , fourth edition, Doebelin, E.O , McGraw Hill International .

2. The Internet of Things (A Look at Real World Use Cases and Concerns), Lucas Darnell, International Kindle paper white Edition

Course Outcomes:

On successful completion of the course, the student will be able to:

1. Be acquainted with different characteristics of Transducer and working of Resistive, Inductive and Capacitive Transducer.

2. To analyze constructional and operational features of different types of Pressure and Optical sensor.

3. To Analyze the constructional and operational features of different types of Thermal and Flow sensor.

4. To be acquainted with design and development issues of IOT.

5. To Analyze Internet protocol and design issues and use the IoT technologies in practical domains of society

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of Program:	Bachelor of Technology.		
Branch:	**Electronics & Telecommunication**	Semester:	VII
Subject:	**Wireless Communication**	**Code:**	**D028713(028)**
Total Theory Periods:	40	Total Tutorial Periods:	Ten (Minimum)
Class Tests:	Two (Minimum)	Assignments:	2 (Minimum)
ESE Duration:	Three Hours	Max Marks:100	Min Marks: 35

Course Objectives:

1. To give students brief history of the evolution of mobile communications throughout the world.
2. To give knowledge of cellular concepts and its designing aspects.
3. To give students a detailed overview of modern communication model used in 5G.
4. To familiarize students about GSM and advances in modern communication Technology
5. To educate students about the useful limitations on the performance of wireless communication systems.

UNIT I	**Introduction to wireless communications:** Evolution of Mobile Radio Communication, Different Wireless Communication Systems. Comparison of Various Wireless Communication System, Introduction to Modern Wireless Communicating System- Third Generation (3G) ,Fourth Generation (4G)and Fifth (5G)Generation, Wireless in local loop, wireless local area networks, Blue tooth and Personal Area networks, Over view of WIMAX Technologies, architecture, spectrum allocation
UNIT II	**Cellular concept,** hand off strategies, Interference and system capacity: Cell Splitting, Sectoring, Repeaters, and Microcells. Cellular System Design Fundamentals: Frequency Reuse, channel assignment strategies, handoff Strategies, Interference and system capacity, tracking and grade off service, improving coverage and capacity
UNIT III	**Wireless propagation mechanism,** free space propagation model, ground Reflection model, knife edge diffraction model, path loss prediction in hilly Terrain, introduction to fading and diversity techniques, Introduction to MIMO system, Channel Estimation in MIMO System, spatial diversity and spatial multiplexing.
UNIT IV	**GSM system architecture,** radio link aspects, network aspects Introduction to new data services like High Speed Circuit Switched Data (HSCSD), General Packet Radio Service (GPRS), Digital Enhanced Cordless Telecommunications (DECT) , Enhanced Data Rate for Global Evolution (EDGE), Ultra wideband systems (UWB), Push To Talk (PTT) technology, Mobile IP, Modulation Techniques: Constant Envelop Modulation, MSK, GMSK, Combined Linear and Constant Envelope Modulation Technique, MPSK, QAM,
UNIT V	**Introduction to Radio Wave Propagation:** The basic Propagation Mechanisms: Reflection, Diffraction, Scattering .Path Loss, Shadowing, Time dispersion, Time Alignment, Wireless Networking, Difference between wireless and fixed telephone networks, development of wireless networks, fixed network transmission hierarchy, traffic routing in wireless networks, wireless data services, Wireless standards,

Text books:

1. .Simon Haykin, Michael Mohar, Modern wireless communication, Pearson Education, 2008.

2.Theodore S. Rappaport: Wireless communication principles and practice,2/e, Pearson Education, 1990

REFERENCES:

1.Jochen Schiller, Mobile Communications, Pearson, 2008.

2. Mishra, Wireless communications and Networks, McGraw Hill, 2/e, 2013.

3. Nathan, Wireless communications,PHI, 2012.

4. Singal, Wireless communications, Mc Graw Hill, 2010.

5. Tomasi, Advanced Electronic Communication Systems, 6/e, Pearson, 2015

Course Outcomes:

1. Students will have idea about the growth in mobile communications that gives rise to technological improvements.
2. Students will be able to visualize the use of frequency reuse to increase the systems capacity and also other designing aspects.
3. Students will be able to understand the architecture of the GSM and mechanism to support mobility of the GSM terminals.
4. Students will see how modulation techniques are used to transport the message signal via a radio channel with best possible quality with minimum radio spectrum.
5. Students will be able to understand various transmission problems and their counter measures

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of Program:	Bachelor of Technology.		
Branch:	**Electronics & Telecommunication**	Semester:	VII
Subject:	**Microwave Engineering Lab**	**Code:**	**D028721(028)**
Total Lab Periods	36	Batch Size	30
Max Marks	40		Min Marks: 20

List of Experiments: (At least Ten experiments are to be performed by each student)

1. V-I characteristics of Gunn diode and to measure output power and frequency vs voltage.
2. Study of different characteristics of klystron amplifier
3. Study of different characteristics of reflex klystron amplifier and hence to determine mode number, transit time, Electronic Tuning Sensitivity(ETS) and Electronic Tuning Range (ETR).
4. Measurement of Q of a cavity.
5. To determine the standing wave ratio and reflection coefficient.
6. To study the characteristic and behavior of a Magic Tee.
7. Determination of S matrix of Magic Tee, E plane Tee & H plane Tee
8. To study the characteristics and behavior of Isolator and Circulators
9. To study the characteristics and behavior of Attenuator(fixed and variable type).
10. To measure the VSWR at all the three open ports of a Directional Coupler.
11. To measure the Coupling Factor, directivity and insertion loss of a Directional Coupler.
12. To measure Microwave Frequency using Frequency Meter.
13. To study various Frequency measurements techniques.
14. To measure VSWR using various methods
15. To measure Attenuation
16. Impedance measurement techniques
17. To study and measure square wave modulation through PIN voltage.
18. To energize a GUNN Oscillator.
19. To energize a Reflex Oscillator.
20. To calibrate Phase Shifter.
21. To measure Dielectric Constant.

List of Equipments 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.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of Program:	Bachelor of Technology.		
Branch:	**Electronics & Telecommunication**	Semester:	VII
Subject:	**Instrumentation & IoT Laboratory**	**Code:**	**D028722(028)**
Total Lab Periods	36	Batch Size	30
Max Marks	40		Min Marks: 20

List of Experiments: (At least Ten experiments are to be performed by each student)

1. Measurement of linear displacement using Linear Variable Differential Transformer (LVDT).
2. To study LVDT as displacement transducer and observe displacement versus output voltage characteristics.
3. To study measurement of humidity using Humidity Transmitter set up.
4. To study the characteristics of IC temperature sensor (LM 335).
5. To study the characteristics of NTC Thermistor.
6. To study the characteristics of Temperature Sensor Setup (Thermocouple, RTD, Thermistor Setup). 11. To study working of Pressure sensor (Piezo resistive/strain) and to observe characteristics of air pressure versus output voltage.
7. To study Dead Weight Pressure Gauge Tester.
8. To study calibration of flow meters setup with Electromagnetic Flow Meter.
9. To measure liquid flow using Orifice, Ventury, Rotameter and Turbine type flow sensor.
10. To study the characteristics of Filament Lamp.
11. To study the characteristics of Photovoltaic Cell.
12. To study the characteristics of Photoconductive Cell.
13. Measurement of displacement using Light Dependent Resistor (LDR).
14. To study Rotary Encoder for speed and angular measurement.
15. To study Strain gauge working as displacement sensor.
16. Interfacing Arduino to GSM module
17. Interfacing Arduino to Bluetooth Module
18. Introduction to Raspberry PI platform and python programming
19. Interfacing sensors to Raspberry PI
20. Communicate between Arduino and Raspberry PI using any wireless medium

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of Program:	Bachelor of Technology.		
Branch:	**Electronics & Telecommunication**	Semester:	VII
Subject:	**Digital Circuit Design with Verilog HDL (Professional Elective III)**	**Code:**	**D028731(028)**
Total Theory Periods:	40	Total Tutorial Periods:	Ten (Minimum)
Class Tests:	Two (Minimum)	Assignments:	2 (Minimum)
ESE Duration:	Three Hours	Max Marks:100	Min Marks: 35

Course Objectives:

1. To understand basics of Verilog HDL Language, including its use in synthesis of digital designs.
2. To gain knowledge of modeling, simulation and verification of designs with Verilog HDL
3. To understand combinational circuit design of digital systems with Verilog HDL.
4. To understand sequential circuit design of digital systems with Verilog HDL.
5. To understand designing using Mealy State and Moore State Model.

UNIT I	**Overview of Digital Design with Verilog-HDL:** Emergence of HDLs, Typical Design Flow, Importance of HDLs, Popularity of Verilog HDLs. Design Methodologies, Modules, Instances, Lexical conventions, Data Types, System Tasks and Compiler directives.
UNIT II	**Modeling in Verilog- HDL:** Modules and Ports, Gate- Level Modeling: Gate Types, Gate Delays; Data flow Modeling: Assignment Statement, Delays, Expressions, Operator Types, Operands; Behavioral Modeling: Structured Procedures, Procedural Assignment, Timing Controls, Conditional Assignment Statements, Loops, Sequential and Parallel, Blocks, Generate Blocks.
UNIT III	**Combinational Circuit Design:** Multiplexers, Demultiplexers, Encoder, Decoders, Code Converters, Arithmetic Comparisons Circuits, Tasks and Functions.
UNIT IV	**Sequential Circuit Design:** Flip-Flops: SR, JK, T and D; Registers: Shift Registers, Parallel Access Shift Registers; Counter: Asynchronous Counters, Synchronous Counters, Counters with Parallel load, BCD counter.
UNIT V	**FSM:** Basic Design Steps, State Diagram, State Table, State Assignment, State Assignment Problem, One Hot Encoding, Mealy State Model, Moore State Model, Design Example: Serial Adder, Vending Machine, Bus Architecture.

Text books:

1. VERILOG HDL: A Guide to Digital and Synthesis, IEEE1364-2001 Compliant, Samir Palnitkar, Pearson Ed.
2. Fundamentals of Digital Logic with Verilog Design, Stephen Brown & Zvonko Vranesic, The McGraw-Hill.

REFERENCES:

1. Design Through Verilog- HDL, T. R. Padmanbhan and B. Bala Tripura Sundari; IEEE Press
2. Verilog HDL Synthesis: A Practical Primer,J. Bhasker PHI.

Course Outcomes :

Students will be able to:

1. Use VLSI design methodologies to understand and design complex digital systems.
2. Create circuits that realize specified digital functions.
3. Identify logic and technology-specific parameters to control the functionality, timing, power, and parasitic effects.
4. Complete a significant VLSI design project having a set of objective criteria & design constraints.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of Program:	Bachelor of Technology.		
Branch:	**Electronics & Telecommunication**	Semester:	VII
Subject:	**Adaptive Signal Processing (Professional Elective III)**	**Code:**	**D028732(028)**
Total Theory Periods:	40	Total Tutorial Periods:	Ten (Minimum)
Class Tests:	Two (Minimum)	Assignments:	2 (Minimum)
ESE Duration:	Three Hours	Max Marks:100	Min Marks: 35

Course Objectives:

1. Understand the concepts of gradient and mean square error performance in adaptive systems
2. Explain gradient descent algorithms and gradient estimate
3. Derive LMS algorithms and formulate conditions of convergence
4. Explain applications of adaptive signal processing

UNIT I	**Introduction: Adaptive Systems –** Definition and characteristics, General properties, Open and Closed Loop Adaptations, Applications. The Adaptive Linear Combiner: Performance function, Gradient and Mean Square Error, Examples.
UNIT II	**Theory of Adaptation with Stationary Signals:** Properties of the Quadratic Performance Surface, Significance of eigen values, eigen vectors, correlation matrix. **Searching the Performance Surface:** Basic ideas of gradient search A simple gradient search algorithm, Stability and Rate of convergence, the learning curve. Newton's method, Steepest descent method, Comparison.
UNIT III	**Gradient Estimation and its effects on adaptation:** Gradient component estimation by derivative measurement, The performance penalty, Variance of the gradient estimate, Misadjustment. **Adaptive Algorithms and Structures:** The LMS Algorithm, Derivation, Convergence of the weight vector, learning Curve, Performance analysis, Filtered X LMS algorithm.
UNIT IV	**Adaptive Lattice predictor, Adaptive filters with orthogonal signals. Applications of Adaptive signal** processing: Adaptive modeling of a multi-path communication channel, adaptive model in geophysical exploration, Adaptive interference canceling: applications in Bio-signal processing.
UNIT V	**Adaptive Control Systems using Filtered X LMS Algorithm, Adaptive Noise Cancellation using Adaptive filter , Adaptive Modeling and System Identification using adaptive filter, Inverse Adaptive Modeling, Deconvolution, and equalization using adaptive filter.**.

Text books:

1. Adaptive Signal Processing, Bernard Widrow and Samuel D. Stearns, Pearson Education, 2nd impression, 2009.
2. Simon Haykin Adaptive Filter Theory Fourth Edition Prentice Hall
3. B. Widrow and S. D. Sterns Adaptive Signal Processing Pearson Education

REFERENCES:

1. M. J. Larrimore, C. R. Johnson and J. R. Treichler Theory and Design of Adaptive Filters
2. Ingle and Kogon Manalokis, Statistical and Adaptive signal processing- Artech House INC., 2005.
3. Sayed A H, Adaptive filters-, John Wiley.
4. Poularikas A, Z M Ramadan, Adaptive filtering primer with MATLAB –, Taylor and Francis Publications.

Course Outcomes

After the course the student will be able to

1. Understand the concepts of gradient and mean square error performance in adaptive systems
2. Apply gradient descent algorithms, gradient estimate and LMS algorithms in adaptive systems
3. Formulate conditions of convergence
4. Implement applications of adaptive signal processing
5. To design adaptive filters for different applications

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of Program:	Bachelor of Technology.		
Branch:	**Electronics & Telecommunication**	Semester:	VII
Subject:	Industrial Automation **(Professional Elective III)**	**Code:**	**D028733(028)**
Total Theory Periods:	40	Total Tutorial Periods:	Ten (Minimum)
Class Tests:	Two (Minimum)	Assignments:	2 (Minimum)
ESE Duration:	Three Hours	Max Marks:100	Min Marks: 35

Course Objectives:

1. To develop and apply Mathematical and Engineering skills to identify, formulate and solve industrial process problems.
2. This subject seeks to close the gap between Instrumentation and Mechanical Engineering.
3. This subject provides the knowledge of different types of controller & their applications.
4. This subject provides the basic knowledge of PLC and DCS.

UNIT I	**Introduction to Process Control:** Process Control Block Diagram, Control System Evaluation, Digital Control, Supervisory Control, Direct Digital Control, Networked Control Systems, Distributed Digital Control, Smart Sensor, Definitions of the terms used to describe Process Control. Data Acquisition Systems: DAS Hardware, DAS Software, Data Logger.
UNIT II	**Controller Principles:** Process Characteristics, Process Equation, Process Load, Process Lag, Self Regulation, Control System Parameters: Error, Variable Range, Control Parameter Range, Control Lag, Dead Time, Cycling, Controller Modes: Discontinuous Controller Mode, Two Position Mode, Multi Position Mode, Floating Control Mode, Continuous Control Mode, Proportional Control Mode, Integral Control Mode, Derivative Control Mode, Composite Control Modes: PI Control, PD Control, PID Control.
UNIT III	**Analog Controllers:** Introduction, Electronic Controllers: Error Detector, Single Controller Modes, Composite Controller Modes, Pneumatic Controllers: General features, Mode Implementation.
UNIT IV	**Programmable Logic Controller:** PLC Architecture, Basic Structure, PLC Programming: Ladder Diagram, Ladder Diagram symbols, Ladder Diagram circuits, PLC Communications and Networking, PLC Selection, I/O Quantity and Type, I/O Remoting requirements, Memory size and type, Programmer Units, PLC Installation, Advantages of using PLCs.
UNIT V	**Distributed Control System:** Introduction, Overview of Distributed Control Systems, DCS Software configuration, DCS Communication, DCS Supervisory Computer Tasks, DCS Integration with PLCs and Computers, Features of DCS, Advantages of DCS.

Text books:

1.Process Control Instrumentation Technology by C.D. Johnson, PHI

2. Computer Aided Process Control by S. K. Singh, PHI

REFERENCES:

1. Reference Books: 1.IntroductiontoInstrumentation&Controlby A.K. Ghosh,Eastern Economy Edition
2.IntelligentInstrumentation, by George C.Barney, Prentice Hall India.

Course Outcomes:

The students will be able to:

1. Understand process variables, degrees of freedom, and Self regulation, first & second order Process System.
2. Know the importance of on-off, proportional, integral and derivative modes, composite control modes-PI, PD and PID controllers.
3. Understand, Communication in DCS, DCS system integration with PLC and computers, Data loggers, Data Acquisition systems (DAS),computer control hierarchy levels and Direct Digital control (DDC).

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of Program:	Bachelor of Technology.		
Branch:	**Electronics & Telecommunication**	Semester:	VII
Subject:	**Speech and Audio Processing (Professional Elective III)**	**Code:**	**D028734(028)**
Total Theory Periods:	40	Total Tutorial Periods:	Ten (Minimum)
Class Tests:	Two (Minimum)	Assignments:	2 (Minimum)
ESE Duration:	Three Hours	Max Marks:100	Min Marks: 35

Course Objectives:

To provide an introduction to basic concepts and methodologies for the analysis, modeling, synthesis and coding of speech and music. To provide a foundation for developing applications and for further study in the field. To introduce software tools for the analysis and manipulation of speech and music and to gain practical experience in the design and implementation of speech and music processing algorithms

UNIT I	**Introduction**: Anatomy and physiology of speech production, categorization of speech sounds, Prosody, Parameters of Speech: Pitch and Formants.
UNIT II	**Analysis and Synthesis of Speech and Audio signals**: Spectral Analysis Models, Linear Predictive Coding Model for Speech Recognition, The autocorrelation method, The covariance method, Short-Time Fourier Transform Analysis and Synthesis, Short-Time Fourier Transform Magnitude, Filter Bank Summation method, Overlap-Add method.
UNIT III	**Frequency Domain Pitch Estimation:** A correlation-based Pitch Estimator, Pitch Estimation based on Comb Filter, Pitch Estimation based on a Harmonic Sine wave Model.
UNIT IV	**Speech Coding** Vector Quantization, Frequency-Domain Coding, Model-based Coding. Enhancement of Speech and Audio Signals Spectral subtraction, Cepstral Mean Subtraction, Wiener Filtering.
UNIT V	**Speaker Recognition** Spectral Features required for Speaker Recognition, Minimum Distance classifier, Gaussian Mixture Model.

Text books:

1. L.R. Rabiner, R. W. Schafer, Theory and Applications of Digital Speech Processing, Prentice Hall
2. B. Gold, N. Morgan, D. Ellis, Speech and Audio Signal Processing: Processing and Perception of Speech and Music, Wiley-Blackwell
3. Ian Vince Mcloughlin. Speech and Audio Processing: A MATLAB-based Approach, Cambridge University Press

REFERENCES:

1. T. Dutoit, F. Marqués, L.R. Rabiner, Applied signal processing: a MATLAB-based Proof of Concept, Springer
2. T.F. Quartieri, Discrete-Time Speech Signal Processing: Principles and Practice, Prentice Hall

Course Outcomes: At the end of the course, the students will be able to

1. Comprehend the speech production and hearing models.
2. Design and apply models for speech and audio signal processing.
3. Apply speech coding, speech enhancement and speaker recognition algorithms for speech and audio processing.
4. Implement the methods for speech enhancement and speech coding for speech signals.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of Program:	Bachelor of Technology.		
Branch:	**Electronics & Telecommunication**	Semester:	VII
Subject:	**Power Electronics (Professional Elective III)**	**Code:**	**D028735(028)**
Total Theory Periods:	40	Total Tutorial Periods:	Ten (Minimum)
Class Tests:	Two (Minimum)	Assignments:	2 (Minimum)
ESE Duration:	Three Hours	Max Marks:100	Min Marks: 35

Course Objectives:

1. To understand basic knowledge of Thyristor family members.
2. To understand the various firing schemes for convertors.
3. To understand the operation of power conditioning circuits.

UNIT I	**Silicon Controlled Rectifiers:** Introduction to SCR and its Construction, Principle of Operation, Characteristics & SCR Terminologies, Two-Transistor Analogy of SCR. **General idea of Modern Power Semiconductor Devices:** Power Diode, Power BJT, Power MOSFET,GTO, DIAC, TRAIC, IGBT, SIT, SITH, MCT, SUS, SBS, SCS.
UNIT II	**Switching and Triggering of SCRs:** Different Methods of Turning-ON & Turning-OFF of SCRs, Typesof Triggering Circuits, Series & Parallel Operation of SCRs. **Phase Controlled Rectifier I:** Phase Angle Control Techniques, Classification of Converter, Single Phase Half and Full Wave Converters with R, RL and RLE Loads
UNIT III	**Phase Controlled Rectifier II:** Symmetrical and Asymmetrical Bridge Converters with R and RL Load, Three-Phase three and six pulse Converters, Three-phase fully Controlled Bridge Converters, Dual Converters: Phase Controlled Dual Converter, Single-Phase Dual Converter, Three-Phase Dual Converter, Circulating Current Type Dual Converter: Mid-Point Configuration & Dual Bridge Configuration.
UNIT IV	**Power Conditioning Circuits I: Inverters:** Single Phase - Half and Full Bridge Inverter with R and RL Load, 3-Phase Bridge Inverter, Mcmurray Full Bridge Inverter**.** **Choppers:** Principle of Operation, Chopper Control Technique, Voltage Step-Down (Buck) Chopper & Step-Up (Boost) Chopper, Buck-Boost Chopper, Jones Chopper.
UNIT V	**Power Conditioning Circuits II:** A C Voltage Controller: Types of Power Control, Integral Cycle Control, Full Wave AC Voltage Regulator with R and RL, TRIAC based AC Voltage Regulators, **Cycloconverters:** Single Phase to Single Phase: Midpoint Configuration & Bridge Configuration, Three Phase to Single Phase Cyclo converter: Circulating Current Type, Non-Circulating Current Type.

Text books:

1. Industrial Electronics & Control by B. Paul, PHI.
2. Power Electronics by M. D. Singh, Khanchandani, TMH.
3. Power Electronics by P.S Bhimbra, Khanna publications

REFERENCES:

1. Industrial & Power Electronics by H.C. Rai, Umesh Publications.
2. Power Electronics by K. Hari Babu, SCITECH Publications.
3. Power Electronics by P.C. Sen, TMH.

Course Outcomes:

1. Students will be able to understand the controlled and uncontrolled rectifications.
2. Students will be able to understand phase control operation of different power electronics devices.
3. Students will be able to understand mechanism of invertors and choppers.
4. Students will be able to understand mechanism of cyclo converters and AC voltage controllers.

Chhattisgarh Swami Vivekananda Technical University, Newai

Name of the Program: Bachelor of Technology

Semester: B. Tech – 7th **Branch: ET&T**

Subject: Universal Human values 2 **Course Code: D000701(046)**

Total Marks in End Semester Exam: **L: T: P: 2 Credits: 0**

Course Objective(s):

- Development of a holistic perspective based on self- exploration about themselves (human being), family, society and nature/existence.
- Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence
- Strengthening of self-reflection.
- Development of commitment and courage to act.

UNIT-I Introduction- Need, Basic Guidelines, Content and Process for Value Education

- Purpose and motivation for the course, recapitulation from Universal Human Values-I.
- Self-Exploration–what is it? - Its content and process; 'Natural Acceptance' and Experiential Validation- as the process for self-exploration.
- Continuous Happiness and Prosperity- A look at basic Human Aspirations
- Right understanding, Relationship and Physical Facility- the basic requirements for fulfillment of aspirations of every human being with their correct priority.
- Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario
- Method to fulfill the above human aspirations: understanding and living in harmony at various levels.
- Include practice sessions to discuss natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony and co-existence) rather than as arbitrariness in choice based on liking-disliking.

UNIT-II Understanding Harmony in the Human Being - Harmony in Myself!

- Understanding the needs of Self ('I') and 'Body' - happiness and physical facility.
- Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer).
- Understanding the characteristics and activities of 'I' and harmony in 'I'.
- Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail.
- Programs to ensure Sanyam and Health.
- Include practice sessions to discuss the role others have played in making material goods available to me. Identifying from one's own life.
- Differentiate between prosperity and accumulation. Discuss program for ensuring health vs dealing with disease

UNIT-III Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship

- Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship

- Understanding the meaning of Trust; Difference between intention and competence
- Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship
- Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals
- Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family.
- Include practice sessions to reflect on relationships in family, hostel and institute as extended family, real life examples, teacher-student relationship, goal of education etc. Gratitude as a universal value in relationships. Discuss with scenarios. Elicit examples from students' lives.

UNIT-IV Understanding Harmony in the Nature and Existence - Whole existence as Coexistence

- Understanding the harmony in the Nature
- Interconnectedness and mutual fulfilment among the four orders of nature- recyclability and self-regulation in nature.
- Understanding Existence as Co-existence of mutually interacting units in all-pervasive space.
- Holistic perception of harmony at all levels of existence.
- Include practice sessions to discuss human being as cause of imbalance in nature (film "Home" can be used), pollution, depletion of resources and role of technology etc.

UNIT-V Implications of the above Holistic Understanding of Harmony on Professional Ethics

- Natural acceptance of human values
- Definitiveness of Ethical Human Conduct
- Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order
- Competence in professional ethics: a. Ability to utilize the professional competence for augmenting universal human order b. Ability to identify the scope and characteristics of people friendly and eco-friendly production systems, c. Ability to identify and develop appropriate technologies and management patterns for above production systems.
- Case studies of typical holistic technologies, management models and production systems
- Strategy for transition from the present state to Universal Human Order:
  - At the level of individual: as socially and ecologically responsible engineers, technologists and managers
  - At the level of society: as mutually enriching institutions and organizations
- Include practice Exercises and Case Studies will be taken up in Practice (tutorial) Sessions e.g. to discuss the conduct as an engineer or scientist etc.

Text Books:

1. Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010
2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. Jeevan Vidya: EkParichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.

Reference Books:

1. The Story of Stuff (Book).
2. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi.
3. Small is Beautiful - E. F Schumacher.

Course Outcome:

After completion of course, student should be able to

- To become more aware of themselves, and their surroundings (family, society, nature); they would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.
- They would have better critical ability. They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society). It is hoped that they would be able to apply what they have learnt to their own self in different day-to- day settings in real life, at least a beginning would be made in this direction.