Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

Name of Program: Bachelor of Technology in Electronics & Communication

SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTEC601	EC	Wireless Communication	60	20	20	0	0	3	1	0	4

Legends: **Th** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Educational Objectives (CEOs):

Motivation for the wireless systems and technology enhancement, to be in phase with outer world.

Course Outcomes (COs):
After completion of this course the students are expected to be able to demonstrate following knowledge, skills and attitudes. The students will be able to:

1. Determine the type and appropriate model of wireless fading channel based on the system parameters and the property of the wireless medium.
2. Analyze and design receiver and transmitter diversity techniques.
3. Determine the appropriate transceiver design of multi-antenna systems and evaluate the data rate performance.
4. Design wireless communication systems with key 3G (e.g., CDMA) and 4G (OFDM) technologies.
5. Describe and differentiate four generations of wireless standard for cellular networks.

Syllabus

Unit-I

Introduction to wireless standards (2G/3G/4G), BER performance of Communication system in AWGN channel, modeling of Wireless systems, Rayleigh fading channel, BER performance of wireless system, channel estimation.

Unit-II

Wireless Propagation channels Statistical description of the wireless channel: time invariant and variant two path models, small-scale fading with and without a dominant component, Doppler spectra, and temporal dependence of fading, large scale fading. WSS-US model. Link Budget design.

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Unit-III

Structure of a wireless communication link, Principles of Offset-QPSK, p/4-DQPSK, Minimum Shift Keying, Gaussian Minimum Shift Keying, Error performance in fading channels, OFDM principle, Cyclic prefix, Windowing, PAPR.

Unit-IV

Diversity: Introduction, micro diversity, macro diversity and simulcast, combination of signals, error probability in fading channels with diversity reception, transmit diversity.
Equalizers: Introduction, linear equalizers, decision feedback equalizers, maximum likelihood sequence estimation (Viterbi detector), and comparison of equalizer structures, fractional spaced equalizers, blind equalizers.

Unit-V

Spread Spectrum Systems- Cellular Code Division Multiple Access Systems- Principle, Power control, Effects of multipath propagation on Code Division Multiple Access, Second Generation(GSM, IS–95) and Third Generation Wireless Networks and Standards.

Text Books:

1. Theodore S. Rappaport, "Wireless Communications: Principles and Practice", 2nd Edition, Pearson PHI Publication, 2009.
2. Aditya Jagannatham, "Principles of Modern Wireless Communication Systems: Theory & Practice", 1st Edition, McGraw Hill, 2016.

References Books:

1. Andrea Goldsmith, Wireless Communications, Cambridge University Press, 1st Edition, 2005.
2. David Tse and Pramod Viswanath, "Fundamentals of Wireless Communication", Cambridge University Press, 1st Edition, 2005.
3. Andreas. F. Molisch, "Wireless Communications", John Wiley – India, 2nd Edition.

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			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTEC602	EC	Antenna and Microwave Engineering	60	20	20	30	20	3	1	2	5

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

COURSE EDUCATIONAL OBJECTIVES (CEOs):

To provide the fundamental aspects of antennas, their principle of operation and their applications and also to learn the basic theory pertaining to microwaves and other high-frequency devices and subsystems, and examine some of its applications to modern communication systems.

COURSE OUTCOMES (COs):

After completion of this course the students are expected to be able to demonstrate following knowledge, skills and attitudes

The students will be able to:

1. Elucidate the basic concepts of electromagnetic wave theory and describe basic radiating antennas.
2. Select antennas and antenna arrays as per their operating frequency ranges and radiation pattern for the specific application & mode of wave propagation.
3. Demonstrate fundamental understanding of microwave components and circuits in terms of electrical characteristics of waveguides through electromagnetic field analysis.
4. Gain proficiency in using various microwave sources, their principle of operation and measurement of various parameters and fundamental understanding of the various Semiconductor devices and Amplifiers.

Unit-I

Fundamentals of Radiation: Definition of antenna parameters – Gain, Directivity, Effective aperture, Radiation Resistance, Band width, Beam width, Input Impedance. Duality and Reciprocity theorems matching – Baluns, Polarization mismatch, Antenna noise temperature. Radiation from oscillating dipole, Half wave dipole. Folded dipole, Yagi-Uda antenna.

Unit-II

Aperture and Slot Antennas: Radiation from rectangular apertures, Uniform and Tapered aperture, Horn antenna, Reflector antenna, Aperture blockage, Feeding structures, Slot antennas, Microstrip Antennas – Radiation mechanism & Applications, Numerical tool for antenna analysis.

Unit-III

Antenna Arrays and Special Antennas: N element linear array, Pattern multiplication, Broadside and End fire array – Concept of Phased arrays, Adaptive array, Basic principle of antenna Synthesis-Binomial array. Principle of frequency independent antennas –Spiral antenna, Helical antenna, Log periodic. Modern antennas: Reconfigurable antenna, Active antenna, Dielectric antennas.

Unit-IV

Waveguides & Microwave Components: General representation of EM field in terms of TEM, TE and TM components, Rectangular & Circular waveguide. Wave guide parameters, Dominant Poles, Power Loss. Microwave Components: Construction and operation of E-plane, H-plane, Magic Tee and Directional couplers. Ferrite components: Faraday rotation, Construction and operation of Gyrator, Isolator and Circulator.

Unit-V

Microwave Tubes & Solid State Devices: Two Cavity Klystron, Reflex Klystron, Magnetron, Traveling Wave Tube, Backward Wave Oscillators: Their Schematic, Principle of Operation, Performance Characteristic and their applications. PIN Diode, Tunnel Diode, TEDs, Gunn Diodes, IMPATT diode and TRAPATT diode. Structural details, principle of operation, various modes, specifications, and applications of all these devices.

Text Books:

1. John D. Kraus, Ronald J Marhefka and Ahmad S Khan, "Antennas for all Applications", Tata McGraw-Hill Book Company, 3rd Edition, 2007.
2. A. R. Harish, M. Sachidanada, "Antennas and Wave propagation", Oxford University Press, 1st Edition, 2007.
3. Samuel Y. Liao, Microwave Devices and Circuits, 3rd Edition, PHI.
4. D.M. Pozar, "Microwave Engineering", John Wiley & Sons,3rd Edition, 2009

References Books:

1. E.C.Jordan and Balmain, "Electromagnetic waves and Radiating Systems", Pearson Education / PHI, 2nd Edition, 2006.
2. G.S.N.Raju, Antenna Wave Propagation, Pearson Education, 1st Edition, 2004.
3. Constantine A. Balanis, Antenna Theory Analysis and Desin, John Wiley, 2nd Edition, 2007.
4. A.Das and S.K.Das,"Microwave Engineering", Tata McGraw Hill, 2nd Edition, 2009
5. R.E.Collins, "Foundations of Microwave Engineering", IEEE Press, John Wiley, 2nd Edition,2002
6. S. Vasuki, "Microwave Engineering", Tata McGraw Hill, 1st Edition, 2015

List of Experiments:

Experiments for Antenna:

1. Studying antenna parameters, Radiation pattern, Pattern beam width Radiation intensity, Directivity, Gain, Radiation efficiency, Front to back ratio.
2. To plot the radiation characteristics and to understand the concept of directivity of antenna and beam widths.

3. To learn about current distribution of center fed and end fed y/2 antenna to measure and compare the current distribution of centre fed and end fed half wave dipole antennas.
4. To verify the radiation pattern of the Yagi-Uda antenna in transmitting mode is same as that of receiving mode.
5. To plot the radiation pattern of end fire arrays.

Experiments for Microwave Engineering:

1. Measurement of guide wavelength and frequency of the signal in a rectangular Waveguide.
2. To study the V-I characteristics of Gunn Diode.
3. Determine the S-parameter of E Plane Tee, H plane Tee and Magic Tee.
4. Measurement of isolation and insertion loss of a circulator.
5. Determine coupling coefficient, Insertion loss, Directivity and Isolation coefficient of Multi-Hole directional coupler.

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SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTEC603	EC	Discrete Time Signal Processing	60	20	20	30	20	3	1	2	5

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit; ***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Objective:

This course will introduce the basic concepts and techniques for processing of discrete time signals. To familiarize with the important methods in DSP, including digital filter design, transform-domain processes and Multirate processing.

Course Outcome:

After completion of this course the students are expected to be able to demonstrate following attributes:

1) Student will be able to represent discrete time signal analytically and visualize them in the time & frequency domain and also understand the different transforms techniques & their significance.
2) Student will be able to analyze and design the discrete time system and design different digital filters using the concept of digital signal processing.

UNIT-I

Discrete-Time Signals and Systems: Discrete-time signals, discrete-time systems, system properties (linearity, time-invariance, memory, causality, BIBO stability), analysis of discrete-time LTI systems, discrete time systems described by difference equation, solution of difference equation

UNIT-II

z-Transform: The direct z-transform, Region of Convergence , properties of ROC, properties of the z-transform, inverse z transform, analysis of linear time-invariant systems in the z- domain, pole-zero plots, time-domain responses of simple pole-zero plots, causality and stability.

UNIT-III

Discrete Fourier Transform: DFT, Properties of the DFT, Efficient computation of the DFT: Decimation-in-time and Decimation-in frequency Fast Fourier transform algorithms, decomposition for 'N' composite number.

Unit-IV

Digital filters Design Techniques: Design of IIR digital filters: Approximation of Derivatives, Impulse invariant and Bilinear transformation, Lowpass/Highpass Butterworth & Chebyshev filter design, Design of FIR digital filters: windowing techniques Rectangular, Hamming, Hanning windows.

UNIT-V

Multi rate digital signal processing: Introduction, design of practical sampling rate converters, Decimators, Interpolators, signal flow graph, Polyphase decompositions.

TEXT BOOKS:

1 John. G Proakis & D.G. Manolakis, "Digital Signal Processing: Principles, Algorithms and Application", 4th Edition, Pearson Education.
2 S.Salivahanan, A Vallavaraj & C.Gnanapriya, "Digital Signal Processing", 3rd Edition, TMH, 2017.
3 A.V. Oppenheim & R.W. Schaffer, "Digital Signal Processing", 2nd Edition, PHI.

REFERENCE BOOKS:

1 Rabiner and Gold: Theory and Application of Digital Signal Processing, 1st Edition, PHI Learning, 2009.
2 Ingle and Proakis: Digital Signal Processing- A MATLAB based Approach, 3rd Edition, Thompson, Cengage Learning, 2010.
3 Proakis, Rader & Ling, Advanced Digital Signal Processing, Macmillan Inc., USA, 1992.
4 S. K. Mitra, "Digital Signal Processing: A Computer Based Approach", 3rd Edition, TMH.

LIST OF EXPERIMENT:

1. Generate, analyze and plot various discrete-time signals.
2. Verify the operations on sequences (addition, multiplication, scaling, shifting, folding etc).
3. Implement linear time-invariant (LTI) systems and test them for stability and causality.
4. Analyze and Compute z-transforms of various discrete time signals.
5. Compute DFT of sequences and generate the phase and frequency plots.
6. Generate linear convolution of two sequences and plot the response.
7. Generate circular convolution of two sequences and plot the response.
8. Design IIR Filter for the given parameters.
9. Design FIR Filter for the given parameters.
10. Implement Up sampling and Down sampling of a sinusoidal signal and analyze the results.

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COURSE CODE	COURSE NAME	EVALUATION SCHEME								
		THEORY			PRACTICAL		Th	T	P	CREDITS
		END SEM UNIVERSITY EXAM 60%	TWO TERM EXAM 20%	TEACHERS ASSESSMENT* 20%	END SEM UNIVERSITY EXAM 60%	TEACHERS ASSESSMENT* 40%				
BTIT502	Computer Networks	60	20	20	30	20	3	1	2	5

Legends: L-Lecture; T-Tutorial/Teacher Guided Student Activity: P–Practical; C-Credit; Q/A – Quiz/Assignment/Attendance, MST Mid Semester Test.

***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Objectives:-

1. Build an understanding of the fundamental concepts of computer networking.
2. Familiarize the student with the basic taxonomy and terminology of the computer networking area.
3. Introduce the student to advanced networking concepts, preparing the student for entry Advanced courses in computer networking.

Course Outcomes:-

1. Independently understand basic computer network technology.
2. Understand and explain Data Communications System and its components.
3. Identify the different types of network topologies and protocols.
4. Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer.
5. Identify the different types of network devices and their functions within a network
6. Understand and building the skills of sub netting and routing mechanisms.

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Syllabus

Unit-I:

Computer Network: Definitions, goals, components, Architecture, Classifications & Types. Layered Architecture: Protocol hierarchy, Design Issues, Interfaces and Services, Connection Oriented & Connectionless Services, Service primitives, Design issues & its functionality. ISO-OSI Reference Model: Principle, Model, Descriptions of various layers and its comparison with TCP/IP. Network standardization.

Unit-II:

Data Link Layer: Need, Services Provided, Framing, Flow Control, Error control. Data Link Layer Protocol: Elementary & Sliding Window protocol: 1-bit, Go-Back-N, Selective Repeat, Hybrid ARQ. Bit oriented protocols: SDLC, HDLC, BISYNC, LAP and LAPB.

Unit-III:

MAC Sublayer: MAC Addressing, Binary Exponential Back-off (BEB) Algorithm, Distributed Random Access Schemes/Contention Schemes: for Data Services (ALOHA and Slotted-ALOHA), CSMA/CA, CSMA/CD Ethernet, token bus, token ring, (IEEE 802.3, IEEE 802.4, IEEE 802.5)

Unit-IV:

Network Layer: Need, Services Provided , Design issues, Routing and congestion in network layer, Routing algorithms: Least Cost Routing algorithm, Dijkstra's algorithm, Bellman-ford algorithm, Hierarchical Routing, Broadcast Routing, Multi cast Routing, IP protocol, IP Addresses, Subneeting, Comparative study of IPv4 & IPv6, Mobile IP.

Unit-V:

Transport Layer: Design Issues, UDP: Header Format, Per-Segment Checksum, Carrying Unicast/Multicast Real-Time Traffic, TCP: Connection Management, Reliability of Data Transfers, TCP Flow Control, TCP Congestion Control, TCP Header Format, TCP Timer Management .Session layer: Authentication, Authorisation, Session layer protocol. Presentation layer: Data conversion, Encryption and Decryption, Presentation layer protocol (LPP, Telnet, X.25 packet Assembler/Disassembler).Application Layer: WWW and HTTP, FTP, SSH, Email (SMTP, MIME, IMAP), DNS, Network Management (SNMP).

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Text Book:

1. "Computer Networks" Andrew S. Tanenbaum, David J. Wetherall ,Pearson Education.

Reference Books:

1. "Networking Fundamentals", Kaveh Pahlavan, Prashant Krishnamurthy,Wiley Publication.
2. "Data communication and networking", Forouzan, TMH 4th edition.
3. "Computer Communications & Networking Technologies" Michael A. Gallo & William M. Hancock Cengage Pearson publications.

List of Experiments:

1. Study of Different Types of Network Equipment's.
2. Color coding standard of CAT 5, 6, 7 and crimping of cable in RJ-45.
3. LAN installations and Configurations.
4. Study of basic network command and Network configuration commands.
5. Study of network IP.
6. Write a program to implement various types of error correcting techniques.
7. Write a program to implement various types of farming methods.
8. Study of Tool Command Language (TCL).
9. Study and Installation of Standard Network Simulator: N.S-2.
10. Implement & simulate various types of routing algorithm.
11. Study & Installation of ONE (Opportunistic Network Environment) Simulator for High Mobility Networks.
12. Simulate STOP AND WAIT Protocols on NS-2.
13. Simulate various Routing Protocol on NS-2.
14. Simulate various Network Topologies on NS-2.
15. Configuring routers, bridges and switches and gateway on NS-2.

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Name of Program: Bachelor of Technology in Electronics & Communication

SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTEC614	EC	Advance Digital Design(HDL)	60	20	20	30	20	3	1	2	5

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
*Teacher **Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Objectives:-
The subject aims to provide the student with:

1. Learn digital design principles and practice and learn to design using building blocks such as counters, shift registers, and adders.
2. Learn design concepts of Programmable Logic Devices such as FPGAs and CPLD.
3. Learn methods to design clocked sequential circuits using state diagrams and tables, state reduction and state assignment methods.
4. Learn to perform timing analysis at each step of the design.

Course Outcomes:-
The students will have the ability
1. To apply knowledge of mathematics, science, and engineering.
2. To design and conduct experiments, as well as to analyze and interpret data.
3. To identify, formulate, and solve engineering problems.
4. To use the techniques, skills, and modern engineering tools.

Syllabus

UNIT-I

Review of Basic Digital Logic Design: Combinational Logic- Multiplexer, Demultiplexer, Encoder, Decoder, Structured Logic Implementation, Sequential Logic- Latches and Flip Flops, Registers, Counters, Finite State Machines.

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UNIT-II

Overview of Digital Technology: Logic families, Reading and understanding data sheets, Interfacing Fixed-Function Devices, TTL/CMOS, Glue logic, RAM/ROM, Programmable Devices, PROMs, PALs and PLDs, FPGAs.

Introduction to VHDL, Language Constructs, Modeling Style, Assignment Structures, Delays and Continuous Assignments, Assignment to Vectors, Operators, Structural Description, Organization of the Structural Descriptions.

UNIT-III

Throughput, Latency, Setup and Hold Time, Pipeline, Parallel Design, **Design for Area**-Rolling Up the Pipeline, Control Based Logic Reuse, Resource Sharing , Impact of Reset on Area, **Design for Speed**- Parallel Structures, Flatten Logic Structures, Register Balancing , Reorder Paths, **Design for Power**- Clock Skew, Input Control, Reducing the Voltage Supply, Dual Edge Triggered Flip Flops.

UNIT-IV

High Level System Design: Abstract Design Technique, Graphical State Machine, Hardware Software Co-Design, **Clock Domains**- Crossing Clock Domain Problems and Solutions, Gated Clocks, **Static Timing Analysis**- Standard Analysis, Latches, Asynchronous Circuits.

UNIT-V

Coding for Synthesis- Decision Trees, Priority Versus Parallel, Full Conditions, Multiple Control Branches, Traps- Blocking Versus Non Blocking, For Loops, Combinatorial Loops, Inferred Latches, **Synthesis Optimization**- Speed Versus Area, Resource Sharing, Pipelining, Retiming, Register Balancing, FSM Compilation.

TEXT BOOKS:

1. Advanced FPGA design: Architecture, Implementation, and Optimization, Steve Kilts, Wiley,2007
2. Stephen Brown and Zvonko Vranesic, Fundamentals of Digital Logic with VHDL Design , McGraw-Hill Higher Education, 3rd edition, 2009.

REFERENCE BOOKS:

1. John F. Wakerly, Digital Design, Pearson Education Asia, 3rd Ed.
2. M. M. Mano, Digital Design, Pearson Education, 3rd Ed.
3. C. H. Roth, Jr., Fundamentals of Logic Design, Jaico Publishing House.
4. Fletcher, An Engineering Approach to Digital Design, PHI.
5. J. M. Yarbrough, Digital Logic, Thomson Learning.

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UBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTEE503	**EE**	**Control System Engineering**	60	20	20	30	20	3	1	2	5

Legends: **Th** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit; ***Teacher Assessment** shall be based following components: , Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Educational Objectives (CEOs):

The course will provide understanding of open loop and closed loop systems. Students will understand the stability, time and frequency domain responses of first and second order system inputs.

Course Outcomes (COs):

After the successful completion of this course students will be able to

1. Demonstrate the understanding of basic elements and modeling of the control system.
2. Determine mathematical models of physical systems.
3. Analyze the stability in time domain and frequency domain.
4. Design the controllers and compensators for the system.

Syllabus

Unit 1

Introduction: Basic Elements of Control System, Open loop and Closed loop systems, Differential equation, Transfer function, Modeling of Electrical systems, Translational and rotational mechanical systems, Block diagram reduction Techniques, Signal flow graph, Constructional and working concept of ac servomotor.

Unit 2

Time Domain Analysis: Standard test signals, Time response of first order systems, Characteristic Equation of Feedback control systems, Transient response of second order systems, Time domain specifications, Steady state response, Steady state errors and error constants. P, PI, PD and PID Compensation.

Unit 3

Stability Analysis and Root locus: The concept of stability – Routh's stability criterion: qualitative stability and conditional stability, limitations of Routh's stability. The root locus concept: construction of root loci, effects of adding poles and zeros to G(s) H(s) on the root loci.

Unit 4

Frequency domain Analysis: Frequency domain specifications: Bode diagrams, determination of Frequency domain specifications and Phase margin and Gain margin, Stability Analysis from Bode Plots, Polar Plots, Nyquist Plots Stability Analysis. Compensation techniques: Lag, Lead, Lead-Lag Controllers design in frequency Domain.

Unit 5

State Space Analysis of Continuous Systems: Concepts of state, state variables and state model, derivation of state models from block diagrams, Diagonalization- Solving the Time invariant state Equations, State Transition Matrix and it's Properties, Concepts of Controllability and Observability.

TEXTBOOK:

1. J.Nagrath and M.Gopal," Control System Engineering", New Age International Publishers, 5th Edition, 2007.
2. M.Gopal, "Control System – Principles and Design", Tata McGraw Hill, 2nd Edition, 2002.

REFERENCES:

1. Benjamin.C.Kuo, "Automatic control systems", Prentice Hall of India, 7th Edition, 1995.
2. M.Gopal, "Digital Control and State Variable Methods", 2nd Edition, TMH, 2007. Schaum's Outline Series, "Feedback and Control Systems", Tata McGraw- Hill, 2007.
3. John J.D'azzo & Constantine H.Houpis, "Linear control system analysis and design", Tata McGrow-Hill, Inc., 1995.
4. Richard C. Dorf & Robert H. Bishop, "Modern Control Systems", Addidon – Wesley, 1999.

List of Experiments:

1. To generate step response of a transfer function.
2. To generate impulse response of a transfer function.
3. To generate ramp response of a transfer function.
4. To determine the torque speed characteristics and transfer function of a DC servomotor.
5. To analyze the characteristics of a small AC servomotor and determine its transfer function.
6. To determine the transient and frequency response of a second order system.
7. To analyze the performance of various types of controllers used to control the temperature of an oven.
8. To analyze the stability using Nyquist plot from a transfer function.
9. To generate root locus from a transfer function.
10. To analyze the stability using Bode plot from a transfer function.
11. To analyze the performance characteristics of analog PID Controller using simulated system.
12. To design different cascade compensation network for a given system.

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			THEORY			PRACTICAL					
			END SEM UNIVERSITY EXAM	TWO TERM EXAM	TEACHERS ASSESSMENT	END SEM UNIVERSITY EXAM	TEACHERS ASSESSMENT	Th	T	P	CREDITS
BTEI614	EI	Data Acquisition System	60	20	20	30	20	3	1	2	5

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Educational Objectives (CEOs):

1. To know about the types of transducers and display systems associated with it.
2. To understand the function of Data Acquisition system .
3. To gain information about data acquisition, data logging and application of sensors in condition based monitoring.
4. To learn about communication devices used in Data Acquisition system .

Course Outcomes (COs):

The students will be able to

1. Summarize the working and construction of sensors measuring various physical parameters.
2. Outline operations of various data acquisition and transmission systems.
3. Distinguish smart sensors from normal sensors by their operation and construction.
4. Classify various sensing methods used in condition monitoring.

SYLLABUS

UNIT-I **7hr.**

Introduction to Display System: Seven segment, Dot matrix, Multiplexed, Code converter, LCD(construction ,principle), Plasma and vapor displays. Nixie Tube and its principle, OLED ; Discharge tubes, application of display systems , interfacing with LED, interfacing with LCD.

UNIT- II **10hr.**

Recorders: Galvanometric type, Null type, Potentiometer type, Strip Chart and circular charttype ,Magnetic tape recorder, principle & operation, Digital tape recorders, Optical storage disk, recorders applications in data acquisition system. Computer control introduction: Need of computer in a control

system-Functional block diagram of a computer control system-Data loggers- Supervisory computer control.

UNIT-III **12hr.**

General Telemetric Systems: land line & RF telemetry, voltage, current and Position telemetry with feedback mechanism, RF telemetry, Amplitude modulation , Frequency modulation , Pulse modulation, pulse amplitude modulation, pulse code modulation, Microwave channels. Radio ink, Transmitting and receiving antenna, telemetry with time and frequency division multiplexing, telemetry hardware.

UNIT-IV **12hr.**

Data Acquisition System(DAS): single channel and multi channel. SuperVisory control and data acquisition system(SCADA), data acquisition system around microprocessor, micro controller & PC, Introduction to PLC: Evolution of PLC's – Sequential and programmable controllers – Architecture-Programming of PLC – Relay
logic – Ladder logic, and its IEEE standard..

UNIT-V **10hr.**

Requirement of communication networks of PLC – connecting PLC to computer – Interlocks and alarms - Case
study of Tank level control system, Data transfer techniques: DMA controller and data transfer in DMA mode, Serial data transmission methods, RS - 232C: specifications connection and timing , RS-422,RS-423 applications GPIB/IEEE-488 standard digital interface use, parallel communication applications in DAS, Local Area networks and its standard, Universal serial bus design with its application , Foundation –Fieldbus, ModBus, TCP/IP.

TEXT BOOK

1. Murty D V S, "Transducers & Instrumentation", PHI, New Delhi (2016)
2. Sawhney A K, "Electrical and Electronics Measurements and Instrumentation", Dhanpat Rai and Sons.(2015)

REFERENCE BOOKS

1. Mathivanan N "Microprocessor PC Hardware and interfacing", PHI, New delhi
2. H S Kalsi " Electronic Instrumentation" TMH, New delhi (2012)
3. Patranabis-Principles of Industrial Instrumentation 3rd Ed., TMH(2009)
4. D.Roy Choudhury and Shail B.Jain, Linear Integrated circuits, New age International Pvt. Ltd, 2003.

LIST OF EXPERIMENT

1. To learn about basics of LabView and its HMI(Human Machine Interface).
2. To Study the Various Palettes Used in LabView to create virtual instruments.
3. To perform and Study of Creation of Virtual Instruments. (Creation of Random Wave Analyzer.)

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4. Implement Virtual Instrument (Random Wave Analyzer)& Control its Wave plot Speed by adding Time Delay.
5. Develop Virtual Instrument (Random Plot Analyzer) and Also add a function that will calculate the mean values of Plot.
6. Design a HMI of PLC using LabView.
7. Develop HMI using LabView for Fahrenheit (°F) to Celsius (°C).
8. Design a table to create data logging.
9. Write a program for table of 2 using loop.
10. Design a HMI to display sine wave

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Name of Program: Bachelor of Technology in Electronics & Communication

SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTEC606	EC	Technical Communication and Soft Skills	0	0	50	0	0	1	0	0	1

Legends: **Th** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
Q/A – Quiz/Assignment/Attendance, MST Mid Semester Test.
*Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Objective:

The Lab focuses on using computer-aided multimedia instruction for language development to meet the following targets:

1. To improve the students' accuracy and fluency in English through a well-developed vocabulary, and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.
2. To enable students face competitive exams and placement activities.
3. To enable them communicate their ideas relevantly and coherently in writing.

Course Outcomes:

Students will be able to use language accurately, fluently and appropriately.

1. They will be able to show their skills of listening, understanding and interpreting.
2. They will be able to write project reports, reviews and resumes.
3. They will be able to express their ideas relevant to given topics.
4. Students will also exhibit advanced skills of interview, debating and discussion.

UNIT I

Information Design and Development: Different kinds of technical documents, Information development life cycle, Organization structures, factors affecting information and document design, Strategies for organization, Information design and writing for print and for online media.

UNIT II

Technical Writing, Grammar and Editing: Technical writing process, forms of discourse, Writing drafts and revising, Collaborative writing, creating indexes, technical writing style and language. Basics of grammar, study of advanced grammar, editing strategies to achieve

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appropriate technical style. Introduction to advanced technical communication, Usability, Hunan factors, Managing technical communication projects, time estimation, Single sourcing, Localization.

UNIT III

Self Development and Assessment: Self assessment, Awareness, Perception and Attitudes, Values and belief, Personal goal setting, career planning, self esteem.

UNIT IV

Communication and Technical Writing: Public speaking, Group discussion, Oral; presentation, Interviews, Graphic presentation, Presentation aids, Personality Development. Writing reports, project proposals, brochures, newsletters, technical articles, manuals, official notes, business letters, memos, progress reports, minutes of meetings, event report.

UNIT V

Ethics: Business ethics, Etiquettes in social and office settings, Email etiquettes, Telephone Etiquettes, Engineering ethics, Managing time, Role and responsibility of engineer, Work culture in jobs, Personal memory, Rapid reading, Taking notes, Complex problem solving, Creativity.

TEXT BOOKS:

1. David F. Beer and David McMurrey, "Guide to writing as an Engineer", John Willey, New York, 2004.
2. Diane Hacker, Pocket Style Manual, Bedford Publication, New York, 2003. (ISBN 0312406843)
3. Shiv Khera, "You Can Win", Macmillan Books, New York, 2003.
4. Raman Sharma, Technical Communications, Oxford Publication, London, 2004.

REFERENCE BOOKS:

1. Dale Jungk, "Applied Writing for Technicians", McGraw Hill, New York, 2004. (ISBN:07828357-4)
2. R. Sharma and K. Mohan, "Business Correspondence and Report Writing", TMH New Delhi 2002.
3. Xebec, "Presentation Book", TMH, New Delhi, 2000. (ISBN 0402213)

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