Faculty of Engineering & Technology
KAKATIYA UNIVERSITY, WARANGAL-506 009
Department of Electronics & Communication Engineering

B. Tech. (ECE) V SEMESTER

S. No.	Course Code	Course Title	Scheme of Instruction			Lecture hrs/week	Scheme of Examination		Credits
			L	T	P		CIE	SEE	
1	PC3101EC	Control System Engineering	3	0	0	3	30	70	3
2	PC3102EC	Analog and Digital Communication	4	0	0	4	30	70	4
3	PC3103EC	Microprocessor and Microcontroller	4	0	0	4	30	70	4
4	PC3104EC	Antenna Wave Propagation	3	0	0	3	30	70	3
5	PE-I*	Program Elective –I	3	0	0	3	30	70	3
6	HS3108LW	Law and Engineering	2	0	0	2	30	70	2
8	PC3109EC	Analog and Digital Communication Laboratory	0	0	3	3	25	50	1.5
9	PC3110EC	Microprocessor and Microcontroller Laboratory	0	0	3	3	25	50	1.5
10	PW3111EC	Mini-project	0	0	4	4	50	00	2
		Total	**19**	**0**	**10**	**29**	**280**	**520**	**24**

*(PE-I) Professional Elective – I
PE3105EC: Digital System Design using Verilog HDL
PE3106EC: Bio-Medical Electronics.
PE3107EC: MOOCS Course**

Faculty of Engineering & Technology

KAKATIYA UNIVERSITY, WARANGAL-506 009

Department of Electronics & Communication Engineering

B. Tech. (ECE) V SEMESTER

PC3101EC CONTROL SYSTEM ENGINEERING
Credits: 3

Instruction: 3 periods per week　　　　　　　*Duration of SEE: 3 hours*
CIE: 30 marks　　　　　　　　　　　　　　　*SEE: 70 marks*

UNIT – I
Introduction to control systems: Basic components, classification of control systems, effects of feedback, mathematical modeling of physical systems, transfer functions, DC and AC position control systems, block diagrams, signal flow graphs.

UNIT – II
State-variable analysis of continuous data systems: state, state variables, state equations, solution of state equations, state transition matrix and its properties, state diagram, relationship between state equations and transfer functions, concept and testing of controllability and observability.

UNIT – III
Time-domain analysis: Typical test signals, steady-state error, unit-step response and time-domain specifications and transient response of a prototype second-order system.
 Stability analysis of continuous data systems: Bounded-Input, Bounded-output stability, Zero input and asymptotic stability, Routh-Hurwitz criterion.
Root-Locus technique: Properties and construction of the root loci.

UNIT – IV
Frequency-domain analysis: frequency response and frequency domain specifications, Nyquist stability criterion, Bode plots, relative stability – gain margin and phase margin.

UNIT – V
Design of control systems: Cascade and feedback compensation using Bode plots. Phase lag, phase lead and phase Lag-Lead compensators and their design.
Controllers: Introduction to PI, PD and PID controllers.

Suggested Readings:
1. Benjamin C. Kuo, *"Automatic Control Systems",* Prentice Hall of India, 2009, 7th Edition.
2. I.J.Nagrath and M Gopal, *"Control System Engineering",* New Age International Private Limited, New Delhi, 2008, 5th Edition
3. Katsuhiko Ogata, *"Modern Control Engineering"*, Prentice-Hall of India Private Limited, New Delhi, 2003, 4th Edition.

Faculty of Engineering & Technology

KAKATIYA UNIVERSITY, WARANGAL-506 009

Department of Electronics & Communication Engineering

B. Tech. (ECE) V SEMESTER

PC3102EC ANALOG AND DIGITAL COMMUNICATION

Credits: 4

Instruction: 4 periods per week   *Duration of SEE: 3 hours*
CIE: 30 marks   *SEE: 70 marks*

UNIT- I

Modulation Schemes: Introduction to communication system, Need for modulation, TDM and FDM, Amplitude Modulation, Frequency Modulation (FM) and Phase Modulation (PM), concept of Generation and demodulation of the above.

UNIT- II

Transmitters and Receivers: classification of transmitters, AM and FM radio transmitters and Receivers. Noise performance of AM, FM and PM systems: Sources of noise, thermal noise, shot noise, noise in linear systems, Signal-to noise ratio (SNR) calculations for DSB-SC AM, SSB, FM and PM systems.

UNIT-III

Analog Pulse Modulation Schemes: Sampling of continuous-time signals, pulse amplitude modulation (PAM), pulse width modulation (PWM) and pulse position modulation (PPM), generation and demodulation.

Digital Coding Techniques: Elements of digital communication system, sampling theorem, quantization noise, source coding techniques: PCM, DPCM, DM, noise in PCM, DM system. Performance comparison of above systems.

UNIT – IV

Error Control Coding: Binary discrete channels, types of transmission errors, need for error control coding, Coding theory: Introduction, source coding/decoding, Huffman coding, Shannon fano coding, linear block codes, binary cyclic codes, characteristics of BCH codes, convolution codes.

UNIT – V

Digital Carrier Modulation Techniques: optimum receiver, coherent and non-coherent ASK, FSK, PSK, DPSK, MSK, and QPSK schemes, M-ary signaling schemes, and synchronization methods.

Spread Spectrum Modulation: introduction, generation and characteristics of PN sequences. DSSS, FHSS system and their application, acquisition scheme for spread spectrum receivers, tracking of FH and DS signals.

Suggested Readings:

1. Simon Haykin, *"Communication Systems",* 4th Edition, John WiLey&sons.inc, 2000.
2. K Sam Shanmugam, *"Digital and Analog Communication Systems",* John Wiley & sons, 1979.
3. Herbert Taub and Donald L.Schilling, *"Principles of Communication Systems",* 2nd Edition,Tata McGraw-Hill publishing company Limited, New Delhi, 1986.
4. George Kennedy, Bernard Davis, *"Electronic Communication Systems",* 4th Edition, Tata McGraw-Hill publishing company Limited, New Delhi, 1993.
5. John G.Proakis, *"Digital Communications",* 4th Edition, Tata McGraw- Hill publishing company Limited, New Delhi, 2003.

Faculty of Engineering & Technology

KAKATIYA UNIVERSITY, WARANGAL-506 009

Department of Electronics & Communication Engineering

B. Tech. (ECE) V SEMESTER

PC3103EC MICROPROCESSOR AND MICROCONTROLLER
Credits: 4

Instruction: 4 periods per week   *Duration of SEE: 3 hours*
CIE: 30 marks   *SEE: 70 marks*

UNIT – I
Introduction to 8086: The 8086 Microprocessor Family- Overview, 8086 architecture, segmented memory, Pin configuration, Maximum and Minimum mode of operation, addressing modes, Memory read and write bus cycles, memory interfacing,

UNIT – II
Assembly Language Programming: Instructions for data transfer, arithmetic, logical, simple sequence program Jumps, Flags, and Conditional jumps, Loops and Constructs, Instruction Timing and Delay Loops; String instructions, Procedures and Macros, Assembler Directives, Interrupts in 8086.

UNIT – III
Peripherals: Programmable Peripheral Interface 8255 – examples using DAC, ADC, stepper motor etc., DMA controllers, Programmable Interrupt Controller 8259, Programmable Interval Timer 8254, USART 8251.

UNIT – IV
Introduction to microcontroller: Difference between microcontroller and microprocessor, 8051microcontroller architecture. 8051 registers. Memory organizations-program memory and data memory, internal RAM and bit addressable memory, special function registers.

UNIT - V
8051 assembly language programming: instruction sets, addressing modes, programming using different instructions, timers, I/O Ports, interrupts, Serial ports. Interfacing 8051 with peripherals – LCD, Stepper motor, ADC, DAC, PWM, and Relay.

Suggested Readings:
1. Douglas V.Hall, *"Microprocessors and Interfacing Programming and Hardware"*, 2nd Edition, Tata McGraw- Hill publishing company Limited, New Delhi, 1994.
2. Walter A.Triebel and Avatar singh, *"The 8088 and 8086 Microprocessors Programming, Interfacing,Software, Hardware and Applications"*, Prentice-Hall of India Private Limited, New Delhi, 1996.
3. Muhammad Ali Mazidi, Janice Gillispie Mazidi and Rolin D.McKinlay, *"The 8051 Microcontroller and Embedded Systems using Assembly and C"*, 2nd Edition, Pearson education, 2009.

Faculty of Engineering & Technology

KAKATIYA UNIVERSITY, WARANGAL-506 009

Department of Electronics & Communication Engineering

B. Tech. (ECE) V SEMESTER

PC3104EC ANTENNA WAVE PROPAGATION
Credits: 3

Instruction: 3 periods per week   *Duration of SEE: 3 hours*
CIE: 30 marks   *SEE: 70 marks*

UNIT - I
Fundamentals of Antenna theory: Principle of radiation, Basic Antenna Parameters – Patterns, Beam Area, Radiation Intensity, Beam Efficiency, Directivity, Gain, Antenna Apertures, Effective Height, Illustrative Problems. Retarded Potentials – Helmholtz Theorem Thin Linear Wire Antennas – Radiation from Small Electric Dipole, Quarter Wave Monopole and Half Wave Dipole – Current Distributions, near field and far field Components, Radiated Power, Radiation Resistance, Beam Width, Directivity, Effective Area and Effective Height. Loop Antennas – Introduction, Small Loop, Comparison of Far Fields of Small Loop and Short Dipole.

UNIT - II
Antenna Arrays: Basic two element array, N element uniform linear array, Pattern multiplication, Broadside and End fire array, Planar array, Concept of Phased arrays, Adaptive array, Basic principle of antenna Synthesis- Binomial array, Tschebyscheff array.

UNIT - III
Practical Antennas: Yagi-uda antenna, V- Antenna, Rhombic antenna, Travelling wave antennas, Microstrip antennas – Introduction, Features, Advantages and Limitations, Rectangular Patch Antennas – Geometry, Design equations and Characteristics.

UNIT - IV
Aperture and Modern Antennas: - Reflector Antennas – Introduction, Flat Sheet and Corner Reflectors, Paraboloidal Reflectors – Geometry, Pattern Characteristics, Feed Methods, and Reflector Types – Related Features, Illustrative Problems. Horn Antennas – Types, Fermat's Principle, Radiation from sectorial and pyramidal horns, Design Considerations of Pyramidal Horns, Reconfigurable antenna, Active antenna, Dielectric antennas, Electronic band gap structure and applications

UNIT - V
Wave propagation: Ground wave propagation. Space and surface waves, Tropospheric refraction and reflection. Sky wave propagation – Virtual height, critical frequency, Maximum usable frequency – Skip distance, Fading, Multi hop propagation

Suggested Reading:
1. Constantine A. Balanis, *"Modern Antenna Handbook"*, a John Wiley & Sons, Inc., Publication, 2008.
2. John D.Kraus, Ronald J.Marhefka and Ahmed S.Khan, *"Antennas for All Applications"* 3rd Edition, Tata McGraw- Hill publishing company Limited, New Delhi, 2006.
3. K.D.Prasad, *"Antennas and Wave Propagation"*, Khanna or Satya Publications.

Faculty of Engineering & Technology

KAKATIYA UNIVERSITY, WARANGAL-506 09

Department of Electronics & Communication Engineering

B. Tech. (ECE) V SEMESTER

PROFESSIONAL ELECTIVE –I

PE3105EC DIGITAL SYSTEM DESIGN USING VERILOG HDL
Credits: 3

Instruction: 3 periods per week   *Duration of SEE: 3 hours*
CIE: 30 marks   *SEE: 70 marks*

UNIT – I
Structural modeling: Overview of Digital Design with Verilog HDL, modules and ports, gate-level modeling and design examples.
Dataflow modeling: dataflow modeling, operands and operators. Switch Level Modeling: CMOS switches and bidirectional switches and design examples. Introduction to test bench design.

UNIT – II
Behavioral Modeling: Structured Procedures, Procedural Assignments, Timing Controls, Conditional Statements, multi-way branching, Loops, Sequential and Parallel blocks, Generate blocks. Combinational, sequential logic modules and design examples.

UNIT-III
Digital Integrated Circuits: Classification of Integrated Circuits, Comparison of Various Logic Families Combinational Logic ICs – Specifications and Applications of TTL-74XX & Code Converters, Decoders, De-multiplexers, LED & LCD Decoders with Drivers, Encoders, Priority Encoders, Multiplexers, De-multiplexers, Priority Generators/Checkers, Parallel Binary Adder/Subtractor and Magnitude Comparators.

UNIT-IV
Sequential Logic IC's and Memories: Familiarity with commonly available TTL 74XX, CMOS 40XX Series ICs – All Types of Flip-flops, Asynchronous and synchronous Counters, Decade Counters, Shift Registers. Memories - ROM Architecture, Types of ROMS & Applications, RAM Architecture and applications, Static & Dynamic RAMs.

UNIT –V
Real time implementations: Fixed-Point Arithmetic modules: Addition, Multiplication, Division, Arithmetic and Logic Unit (ALU), Timer, Universal Asynchronous Receiver and Transmitter (UART), DSP modules: FIR and IIR filters, CPU design: Data path and control units.

Suggested Readings:
1. Samir Palnitkar, *"Verilog HDL A Guide to Digital Design and Synthesis,"* 2nd Edition, Pearson Education, 2006.
2. R.P.Jain, *"Modern Digital Electronics",* Tata McGraw Hill, 4th Edition, 2009.
3. Ming-Bo Lin, *"Digital System Designs and Practices: Using Verilog HDL and FPGA,"* Wiley India Edition, 2008.
4. J. Bhasker, *"A Verilog HDL Primer,"* 2nd Edition, BS Publications, 2001.

Faculty of Engineering & Technology

KAKATIYA UNIVERSITY, WARANGAL-506 009

Department of Electronics & Communication Engineering

B. Tech. (ECE) V SEMESTER

PROFESSIONAL ELECTIVE –I

PE3106EC BIO-MEDICAL ELECTRONICS

Credits: 3

Instruction: 3 periods per week   *Duration of SEE: 3 hours*

CIE: 30 marks   *SEE: 70 marks*

UNIT-I

Block diagram of a medical instrumentation system, Challenges faced with physiological measurements, Role of electronic circuits in analysis of biomedical signals. Bio-potential electrodes: Electrode-Electrolyte Interface, Equivalent circuit and applications of biopotential electrodes.

UNIT-II

Electrocardiography: Block diagram and preamplifier circuit, Single channel & multi-channel ECG systems, Holter monitors, Blood Pressure measurement: components and working principle of sphygmomanometer, Direct and indirect methods of Blood Pressure measurements. Electromagnetic and Ultrasonic techniques of Blood flow measurement.

UNIT-III

Phonocardiography- Origin of Heart Sounds, types of microphones for heart sound measurement, Contact and non-contact type of measurement. Electroencephalography: EEG-Block diagram and preamplifier circuit, electrodes and their placement. Lead configuration and general EEG graphs. Evoked potentials and their measurement.

UNIT-IV

Electromyography: Introduction to EMG signals, EMG-Block diagram and circuits, Electrodes and their placement, Nerve conduction velocity determination using EMG. Oximeters-Ear, pulse, skin reflectance.

UNIT-V

Impedance plethysmography. Ultrasonic, Xray and nuclear imaging. Prostheses and aids: pacemakers, defibrillators, heart-lung machine, artificial kidney, aids for the handicapped.

Suggested Readings:

1. Webster J.G., Medical Instrumentation Application and Design. Houghton Mifflin, 2009.
2. Khandpur R.S. Hand Book of Biomedical Instrumentation, Tata McGrawHill,2003.
3. John Enderle, Susan M. Blanchard, and Joseph Bronzino, Introduction to Biomedical Engineering, Second Edition, 2005.

Faculty of Engineering & Technology

KAKATIYA UNIVERSITY, WARANGAL-506 009

Department of Electronics & Communication Engineering

B. Tech. (ECE) V SEMESTER

HS3108LW LAW AND ENGINEERING
Credits: 2

Instruction: 2 periods per week   *Duration of SEE: 3 hours*
CIE: 30 Marks   *SEE: 70 Marks*

Unit-I: The Legal System - Meaning, nature and definition of jurisprudence - Schools of jurisprudence- Analytical, Historical, Philosophical and Sociological Schools of jurisprudence - Meaning and Definition of Law - The Nature and functions of Law - Sources of Law - Legal and Historical sources – Precedent/Case Law as Source of Law - Definition of Precedent, Kinds of Precedent - Legislation as Source of Law- Definition of Legislation - Classification of Legislation – Supreme and Subordinate Legislation – Court System and Hierarchy of Judiciary in India - Concept of Alternative Dispute Resolution System (ADR) – History and Reasons for the growth of ADR – Important forms of ADR – Mediation - Negotiation – Arbitration - Definition of Arbitration and Essentials - Online Dispute Resolution (ODR)**.**

Unit-II: Society and Constitutional law - Social Change: Definition, nature and characteristics of Social change – Social Transformation - Factors of Social Change - Law and social Change - State, Law and Society, their inter-relationship and interdependence - Identification of Goals of Social Changes in Indian Constitution - Constitution-Meaning and Significance - Nature and Salient Features of Indian Constitution - Preamble to Indian Constitution – Fundamental Rights - Right to Equality(Art.14-18) – Freedoms and Restrictions under Art.19 - Right to Life and Personal Liberty - Directive Principles of State Policy – Significance – Nature – Classification.

Unit-III: Contract law - Definition and essentials of a Valid Contract - Meaning and Definition of Consideration - Capacity of the parties to enter into contract - Concepts of Free Consent - Lawful Object - Illegal agreements - Void and Voidable contracts - Discharge of Contracts - Remedies for breach of contract - Kinds of damages - Contract of sale of Goods – Formation of contract of sale - Sale and Agreement to Sell -Conditions and Warranties - Express and implied Conditions and Warranties - Caveat Emptor - Rights and duties of seller and buyer before and after sale – Rights of Unpaid Seller - Remedies of breach.

Unit-IV: Business Organizations - Corporate Personality - General Principles of Company Law – Companies Act, 2013 - Nature and Definition of Company - Characteristics of a Company - Different kinds of Company - Private Company and Public Company – Registration & Incorporation of Company –Advantages and Disadvantages of Incorporation - Lifting of the Corporate Veil – Company distinguished from Partnership and Limited Liability Partnership - Shares & Stock - Kinds of shares – Share Capital - Directors – Different kinds of Directors - Appointment, position , qualifications and disqualifications - Powers of Directors - Rights and Duties of Directors – Corporate Governance and Role of Directors – Meetings of Company - Winding up of Companies-Modes of Winding up of Companies.

Unit-V: Meaning, Definition and Concept of Environment - Types of Environment - Concept of Pollution – Sources of Pollution, Types of Pollution, and Effects of Pollution – Ozone Depletion – Global Warming – Climate Change - The Environment Protection Act of 1986 - Main Aims and Objectives of the Act - Meaning, Nature, Classification and significance of Intellectual Property - The main forms of Intellectual Property - Patents - Concept of Patent - Kinds of Patents - The Patents Act, 1970 - Rights and obligations of a patentee - The notion of 'abuse' of patent rights - Infringement of patent rights and remedies available - Meaning, Definition and Nature of Cyber crimes - Information Technology Act, 2000 - Specific Cyber crimes - Cyber Stalking – Hacking - Child Pornography - Phishing – Cyber Crimes and Issues of Privacy - Investigation and Jurisdiction over Cyber crimes.

References:

1. Salmond: Jurisprudence, Universal Publishers.

2. Mahajan V.D.: Legal Theory and Jurisprudence, Eastern Book Company, Lucknow.

3. M.P.Jain, Indian Constitutional Law, Wadhwa & Co, Nagpur

4. H.M.Seervai, Constitutional Law of India (in 3 Volumes), N.M.Tripathi, Bombay

5. J.N.Pandey, Constitutional Law of India, Central Law Agency, Allahabad

6. Anson: Law of Contract, Clarendon Press, Oxford, 1998.

7. Avtar Singh: Law of Contract , Eastern Book Company, Lucknow, 1998.

8. P.S.Atiyah: Sale of Goods Act, Universal Book Traders, Delhi.

9. Acharya N.K.: Law relating to Arbitration and ADR, Asia Law House, Hyderabad

10. Tripathi S.C.: Arbitration, Conciliation and ADR, Central Law Agency, Allahabad.

11. Avatar Singh: Arbitration and Conciliation, Eastern Law Book House, Lucknow

12. V.K. Krishna Iyer: Environment Pollution and Law

13. Paras Diwan : Environmental Law and Policy in India,1991

14. Dr. N. Maheshwara Swamy, Environmental Law, Asia Law House, Hyderabad.

15. Avtar Sing : Company Law, Eastern Book Company.

16. Ramaiah: Company Law, Wadhwa & Co.

17. P. Narayanan: Patent Law, Eastern Law House, 1995.

18. Roy Chowdhary, S.K. & Other: Law of Trademark, Copyrights, Patents and Designs, Kamal Law House, 1999.

19. Dr. G.B. Reddy, Intellectual Property Rights and the Law Gogia Law Agency.

20. Dr Jyoti Rattan, Dr Vijay Rattan, Cyber Laws & Information Technology, 2019, Bharat Law House, New Delhi

Faculty of Engineering & Technology

KAKATIYA UNIVERSITY, WARANGAL-506 009

Department of Electronics & Communication Engineering

B. Tech. (ECE) V SEMESTER

PC3109EC ANALOG AND DIGITAL COMMUNICATION LABORATORY
Credits: 1.5

Instruction: 3 periods per week   *Duration of SEE: 3 hours*

CIE: 25 marks   *SEE: 50 marks*

List of experiments
Cycle-I
1. AM generation and Demodulation
2. FM generation and Demodulation
3. Spectrum Analyzer and Analysis of AM and FM Signals
4. Radio Receiver measurements
5. AGC Characteristics of Radio Receiver
6. Squelch Circuit and Frequency Multiplier Circuit
7. Pre-emphasis and De-emphasis Circuits

Cycle-II

8. Sampling and Reconstruction of Sine Wave
9. PAM generation and Demodulation
10. PWM generation and Demodulation
11. PPM generation and Demodulation
12. PCM generation and Demodulation
13. Delta Modulation
14. Spectrum Analyzer and Analysis of PAM and PWM Signals
15. ASK, FSK, PSK, QPSK and DPSK modulation and Demodulation using MATLAB

Note: At least 10 experiments need to be completed in a semester (5 from analog and 5 from digital communication systems).

Suggested Readings:
1. Simon Haykin*, "Communication Systems",* 4th Edition, John Wiley &sons.inc, 2000.
2. George Kennedy, Bernard Davis, *"Electronic Communication Systems"*, 4th Edition, Tata McGraw-Hill publishing company Limited, New Delhi, 1993.
3. K.C. Raveendranathan *"Communication systems Modelling and simulation using Matlab and Simulink"* Universities Press 2011.

Faculty of Engineering & Technology

KAKATIYA UNIVERSITY, WARANGAL-506 009

Department of Electronics & Communication Engineering

B. Tech. (ECE) V SEMESTER

PC3110EC MICROPROCESSOR AND MICROCONTROLLER LABORATORY
Credits: 1.5

Instruction: 3 periods per week   *Duration of SEE: 3 hours*
CIE: 25 marks   *SEE: 50 marks*

List of Experiments:
1. Addition, subtraction using 8085
2. Multiplication and division using 8085
3. Simple programs on 8086 kits
4. Searching and sorting using 8086 assembly language
5. String operations like concatenation and swapping using 8086
6. DAC interface to 8086
7. ADC interface to 8086
8. Stepper motor interface to 8086
9. Study of Keil software for 8051
10. Basic programs using 8051 instructions
11. Flashing LED program using 8051
12. Timer program to generate square wave on ports of 8051

Suggested Readings:
1. Ramesh S.Gaonkar, *"Microprocessor Architecture programming and Applications with the 8085",* 5th Edition, Penram International publishing (India) private Limited, 1999.
2. Douglas V.Hall, *"Microprocessors and Interfacing programming and Hardware",* 2nd Edition, Tata McGraw- Hill publishing company Limited, New Delhi, 1994.
3. Muhammad Ali Mazidi, Janice Gillispie Mazidi and Rolin D.McKinlay, *"The 8051 Microcontroller and Embedded Systems using Assembly and C*", 2nd Edition, Pearson education, 2009.

Annexure

**Student is required to complete MOOCs course offered by the following agencies. The student is required to take prior approval from the Department, before registering for any course. The student can register for such a course in 5th Semester and/or 6th semester. Unless the student submits a pass certificate, he/she shall not be eligible for the award of degree.

SWAYAM: www.swayam.gov.in ,NPTEL: www.onlinecourse.nptel.ac.in

Abbreviations

L	:	Lectures	T	:	Tutorials
P	:	Practicals	CIE	:	Continuous Internal Evaluation
SEE	:	Semester End Examination	PC	:	Professional Core