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

B. Tech. (ECE)

IV - SEMESTER

Sl. No.	Course Code	Course Title	Scheme of Instruction			Credits
			L	T	P	
1	PC 401 EC	Analog Electronic Circuits	3	1	0	4
2	PC 402 EC	Stochastic Processes	3	0	0	3
3	PC 403 EC	Electromagnetic Waves and Transmission Lines	3	1	0	4
4	PC 404 EC	Pulse and Integrated Circuits	3	1	0	4
5	PC 405 EC	Computer Architecture and Organization	4	0	0	4
6	ES 401 EI	Electronic Measurements and Instrumentation.	3	0	0	3
7	MC 210	Environmental Science	2	0	0	0
8	PC 451 EC	Analog Electronic Circuits Laboratory	0	0	3	1.5
9	PC 452 EC	Pulse and Integrated Circuits Laboratory	0	0	3	1.5
Total			**21**	**3**	**6**	**25**

L : Lectures
T : Tutorials
P : Practical's
CIE : Continuous Internal Evaluation
SEE : Semester End Examination
BS : Basic Sciences
PC : Professional Core
PW : Project Work

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

B. Tech. (ECE) IV SEMISTER
PC-401 EC
ANALOG ELECTRONIC CIRCUITS

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks: 30
3	1	0	4	External Marks: 70

UNIT-I

Small Signal Amplifiers: Introduction to Hybrid-π model, relationship between hybrid-π & h-parameter model; Classification of amplifiers, mid-frequency, Low-frequency and high frequency analysis of single and multistage RC coupled amplifier with BJT and FET. Analysis of transformer coupled amplifier in mid frequency, Low frequency and high frequency regions with BJT.

UNIT-II

Feedback Amplifiers Analysis and Design: The feedback concept, General characteristics of negative feedback amplifier, Effect of negative feedback on input and output impedances, Voltage and current, series and shunt feedbacks. Stability considerations, Local Versus global feedback.

UNIT-III

Oscillators Analysis and Design: Positive feedback and conditions for sinusoidal oscillations, RC oscillators, LC oscillators, Crystal oscillator, Amplitude and frequency stability of oscillator.
Regulators: Transistorized series and shunt regulators.

UNIT-IV

Large Signal Amplifiers: BJT as large signal audio amplifiers, Classes of operation, Harmonic distortion, power dissipation, efficiency calculations. Design considerations of transformer coupled and transform less push-pull audio power amplifiers under Class-A. Class-B, Class D and Class-AB operations.

UNIT-V

RF Voltage Amplifiers: General consideration, Analysis and design of single tuned and double tuned amplifiers with BJT, Selectivity, gain and bandwidth. Comparison of multistage, single tuned amplifiers and double tuned amplifiers. The problem of stability in RF amplifiers, neutralization & uni-laterisation, introduction to staggered tuned amplifiers.

Suggested Reading:

1. Jacob Millman, Christos C. Halkias, and Satyabrata Jit, Electronic Devices and Circuits, 3rd ed., McGraw Hill Education, 2010.
2. David A. Bell, Electronic Devices and Circuits, 5th ed., Oxford University Press, 2009.
3. S Salivahanan, N Kumar, and A Vallavaraj, Electronic Devices and Circuits, 2nd ed., McGraw Hill Education, 2007.
4. Jacob Millman, Christos Halkias, Chetan Parikh, Integrated Electronics, 2nd ed., McGraw Hill Education (India) Private Limited, 2011.
5. Donald L Schilling & Charles Belove, Electronics Circuits, Discrete & Integrated, 3rd ed., McGraw Hill Education (India) Private Limited, 2002.

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Department of Electronics & Communication Engineering

B. Tech. (ECE) IV SEMISTER
PC-402 EC
STOCHASTIC PROCESS

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks: 30
3	0	0	3	External Marks: 70

UNIT-I

Random Variable: The random variable concept, distribution function, density function, the Gaussian random variable and other distribution functions; application in communication systems. Operations on single and multiple random variables: Expectation, moments and function that give moments. (Qualitative treatment only)

UNIT-II

Stochastic Processes: the random process concept, classification of processes, stationarity and independence, wide sense stationary, strict sense stationary, ergodicity, correlation functions, application in communication systems.

UNIT -III

Spectral characteristics of stochastic processes: power density spectrum and its properties, relationship between power spectrum and autocorrelation, cross power density spectrum and its properties, relationship between cross power spectrum and cross correlation, White and coloured noise.

UNIT-IV

Linear systems with random input: random signal response of linear systems, mean and mean squared value of system response, autocorrelation of system response, cross correlation function od input and output, spectral characteristics of system response

UNIT-V

Stochastic Noise Modelling: Narrowband random process and its characteristics, modelling of noise sources, resistive noise source, arbitrary noise sources, effective noise temperature, an antenna as noise source, autoregressive (AR), moving average (MA), autoregressive moving average (ARMA) modelling.

Suggested Readings:

1. Peyton Z Peebles, "Probability, Random Variables & Random Signal Properties", 4th edition, Tata McGraw-Hill, 2001.

7/12/19 7/12/19 07/12/19 7/12/19

2. Richard H. Williams, "Probability, Statistics, Random Processes for Engineers", Thomson Learning, 1st edition, 2003.
3. R. P. Singh and S. D. Sapre, "Communication systems: Analog & Digital" McGrawHill publishers,

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B. Tech. (ECE) IV SEMISTER
PC-403 EC
ELECTROMAGNETIC THEORY AND TRANSMISSION LINES

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks: 30
3	1	0	4	External Marks: 70

UNIT-I

Electrostatics: Review of Vector Calculus and Coordinate systems and Transformation, Coulomb's Law, Electric Field Intensity, Electric field due to different charge distributions - Electric Field due to Line Charge, Sheet Charge and Volume Charge Distribution. Electric Flux, Flux Density, Gauss's Law and Applications. Energy and Potential, Potential Field of a Point Charge, System of Charges, potential gradient, Energy density in Electrostatic fields, Electric Dipole, convection and conduction currents, continuity equation and relaxation time, Poisson's and Laplace's Equations, Capacitance and Capacitors.

UNIT-II

Magnetostatics: Biot-Savart Law, Ampere's Circuital Law, Applications of Ampere's Law, Magnetic Flux Density, Magnetic Scalar and Vector Potentials, Forces due to magnetic fields, Magnetic Dipole, Magnetization, Inductors and Inductances, Magnetic Energy.

UNIT-III

Time Varying Fields and Maxwell's Equations: Faraday's Law, Transformer and Motional EMF's, Displace Current, Maxwell's Equations in Differential and Integral Forms, Time-Varying Potentials, Electromagnetic Boundary Conditions, Time-Harmonic Fields.

UNIT-IV

EM Wave Propagation: Uniform Plane Wave, Wave Propagation in Free Space, Dielectrics, Good Conductors-Skin Effect. Poynting's Theorem and Wave Power, Poynting Vector, Instantaneous, average and complex pointing vector, Wave Polarization-Linear, Circular and Elliptical polarizations, Reflection of Uniform Plane Waves at Normal incidence and Oblique incidence angles, Reflection coefficient, Transmission coefficient, power and energy calculations.

UNIT-V

Transmission Lines: Circuit representation, Equations of voltage and current on transmission line, propagation constant and characteristic impedance, Lossless Line, Distortion less Line, Infinite line concepts, Input impedance relations of open and short-circuited transmission lines, reflection coefficient and VSWR. The Smith Chart, Transmission Line Impedance Matching-Impedance Matching by Quarter wave Transformer, Single Stub Matching and Double Stub Matching.

Suggested Readings:

1. Matthew N,O. Sadiku, *Principles of Electromagnetics*, Oxford University Press, 2009, 4th edition.
2. David K.Cheng, *Field and Wave Electromagnetics*, Pearson Education, 2001, 2nd edition.
3. W.H.Hayt,Jr. and J.A Buck, *Engineering Electromagnetics*, Tata McGraw-Hill, 2006, 7th edition.

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B. Tech. (ECE) IV SEMISTER
PC-404 EC
PULSE AND INTEGRATED CIRCUITS

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks: 30
3	1	0	4	External Marks: 70

UNIT- I

Linear Wave Shaping: High pass, low pass RC circuits, their response for sinusoidal, step, pulse and ramp inputs. RC network as differentiator and integrator, attenuators, its applications in CRO probe.

Non-Linear Wave Shaping: Diode clippers, Transistor clippers, clipping at two independent levels. Clamping operation and Clamping circuit theorem.

UNIT-II

Differential amplifiers: Classification, DC and AC Analysis of Single/Dual input Balanced and Unbalanced output configurations using BJTs. Level Translator.

Operational Amplifier: OP AMP Block diagram, ideal Op-amp characteristics, features, parameters and their Measurement, Input and Output Offset voltages and currents, Slew rate, CMRR, PSRR, Frequency response and Compensation Techniques.

UNIT-III

OPAMP Applications: Inverting and Non-inverting Amplifiers, Integrator and differentiator, summing amplifier, precision rectifier. Active filters: Low pass, high pass, band pass and band stop.

UNIT-IV

Digital Logic families: characteristics of digital ICs, RTL, TTL family IC's, characteristics and comparison among various series of TTL Family IC's, ECL family-operation and characteristics, CMOS logic family, comparison among CMOS series, Interfacing TTL and CMOS IC's.

UNIT-V

555 Timers: Functional Diagram, Monostable, Astable and Schmitt Trigger Applications.

Voltage regulators: Fixed and variable voltage regulators (78XX and 79XX).

Data Converters: Digital-to-analog converters (DAC): Weighted resistor, inverted R-2R ladder, Analog-to-digital converters (ADC): dual slope, successive approximation, flash type. Specifications of Data Converters.

Suggested Reading:

1. J. Millman and H. Taub, Pulse, Digital and Switching Waveforms - McGraw-Hill, 1991.
2. David A. Bell, Solid State Pulse circuits - PHI, 4th Edn., 2002.
3. J.V. Wait, L.P. Huelsman and GA Korn, Introduction to Operational Amplifier theory and applications, McGraw Hill, 1992.
4. D.Roy Chowdhury, Shail B.Jain, "Linear Integrated Circuits", 4/e, New / Age International (P) Ltd., 2008.
5. Ramakanth A Gayakwad, -Op-Amps and Linear Integrated Circuits‖, 3rd Edition, Prentice-Hall of India Limited, New Delhi, 1995.

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Department of Electronics & Communication Engineering

B. Tech. (ECE) IV SEMISTER
PC-405 EC
COMPUTER ARCHITECTURE AND ORGANIZATION

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks: 30
4	0	0	4	External Marks: 70

UNIT-I
CPU Organization: Common bus structure, Arithmetic, Logic and Shift Unit using multiplexer, Register, Instructions, Design of CPU. Example: Intel 8085 – Programming model, Addressing modes, overview of Instruction set, Design of flowchart for CPU operation.

UNIT-II
Data Path Design: Fixed-Point Arithmetic: Addition, Subtraction, Multiplication -Robertson's, Booth's algorithms, Array Multiplier and Wallace tree multiplication, Division - Restoring and Non-restoring algorithms, floating point arithmetic and BCD Adder, Shifter: Barrel shifter and Logarithmic shifter, Examples: HDL descriptions of Fixed-Point and Floating-Point arithmetic.

UNIT-III
Control Design: Basic concepts, Hardwired Control unit design approach: classical and one-hot methods, Micro-programmed Control unit approach: basic concept, micro-program sequencer, Design examples: control unit designs for GCD processor, DMA controller and CPU control unit.

UNIT-IV
Memory and System Organization: Memory Organization: Memory hierarchy, Main memory: RAM, ROM, DRAM, Multi-level memory, cache memory: principles, address mapping techniques, replacement policies, System Organization: communication methods, IO and system control: Programmed IO, DMA and interrupts and Input-Output Processor (IOP), Examples: Three-level cache hierarchy in Intel Pentium Processor.

UNIT-V
Advances in Computer Organization: Reduced Instruction Set Computer (RISC): characteristics and architecture, Parallel processing: Pipeline – Arithmetic and Instruction, Pipeline Conflicts, Instruction Level Parallelism: super-pipeline, super-scalar architectures.

Suggested Reading:

1. Morris Mano M, *Computer System Architecture*, 3rd edition, Prentice Hall India, 2007.
2. William Stallings, *Computer Organization and Architecture*, *Design for Performance*, 7th edition, Prentice Hall India, 2006.
3. John P. Hayes, *Computer Architecture and Organization*, 3rd edition, McGraw Hill, 1998.

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B. Tech. (ECE) IV SEMISTER
ES 401 EI
ELECTRONIC MEASUREMENTS & INSTRUMENTATION

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks: 30
3	0	0	3	External Marks: 70

UNIT- I

Electronic Measurements: Physical measurement, forms and methods of measurements, measurement errors, Statistical analysis of measurement data, Probability of errors, Limiting errors, Standards, Definition of standard units. International standards, primary standards, secondary standards, IEEE Standards, Testing and calibration

Voltage and current measurements: DC & AC voltage measurements using Rectifier, Thermocouple & Electronic voltmeters, Ohm meter, Digital Voltmeters, Range Extension of Ammeters & Voltmeter, Digital Multi meter Frequency Counters, Frequency synthesizer, Wave meters, Wave Analyzers, Output Power meter.

UNIT-II

Bridges: AC Bridges – measurement of inductance: - Maxwell's bridge, Anderson bridge, Hays Bridge measurement of capacitance:-Schering bridge, measurement of impedance: – Kelvin's bridge, Wheat Stone bridge, HF bridges, problems of shielding, and grounding, Q-meter.

UNIT-III

Oscilloscopes: CRO operation, CRT characteristics, probes, Time base sweep modes, Trigger generator, Vertical amplifier, modes of operation, A, B, alternate & chop modes, sampling oscilloscopes, storage oscilloscope, Standard specifications of CRO, Synchronous selector circuits. Analyzers Spectrum analyzers, Different types of spectrum analyzers, Display Devices and Display Systems, Logic Analyzers – State & time referenced data capture. Scalar and Vector network analyzers.

UNIT-IV

Transducers: Transducer & its classification – Basic Requirements of Transducer – Resistive Transducers: Potentiometric type, Strain Gauge type; Capacitive Transducers: Variable gap type, Variable area type and Variable Dielectric type – Inductive Transducers: Variable Reluctance type and LVDT type – Piezo Electric Transducer: Piezoelectric effect, Piezoelectric materials, PZT - Photo electric Transducers: LDR, Photo diode and Photo transistor

UNIT- V

Transducer Applications: Force Measurement using Strain Gauge transducer – Temperature measurement using RTD & Thermocouple type transducer - Pressure measurement using Differential Capacitive type transducer – Acceleration Measurement using Piezoelectric Accelerometer - Flow Measurement using Electro Magnetic Flow Meter – Fluid Velocity Measurement using Hot wire Anemometer – Level Measurement using Ultrasonic Level Gauge – Sound Level Meter – Data Acquisition system

TEXT BOOKS

1. Electronic Instrumentation – HS Kalsi, Tata McGraw Hill, 2004.
2. Electronic Instrumentation and measurements techniques by Helfrick and W.D. Cooper, PHI publications.

REFERENCE BOOKS

1. Principles of measurement systems, John P. Bentley: 3rd edition, Addison Wesley Longman, 2000.
2. Measuring Systems, Application and Design: E. O. Doebelin, McGraw Hill.
3. Electrical and Electronic Measurements: Sawhney, Khanna Publ.
4. Electronic Instrumentation and measurements: David A. Bell, 2nd Edition, PHI, 2003.
5. Electronic instruments and instrumentation Technology, M.M.S. Anand: Prentice Hall of India, 2004

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B. Tech. (ECE) IV SEMISTER
MC-210
ENVIRONMENTAL SCIENCE

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks: 30
2	0	0	0	External Marks: 70

UNIT-I

Environmental studies: Definition, scope and importance, need for public awareness. Natural resources: Water resources use and exploitation of Surface and Ground water. Floods, Drought, Cconflicts over water, Dams-merits and demerits.

Land Resources: Land as a resource, Effects of modern Agriculture, Fertilizer-pesticide problems, Water logging and Salinity, land degradation, soil erosion and Desertification.

Energy resources: Growing energy needs renewable and non-renewable energy resources.

UNIT-II

Ecosystems and Biodiversity: Concept of Ecosystem, structure and function of an ecosystem, producers, consumers and decomposers, energy flow in ecosystem, food chains, food web, ecological pyramids, aquatic ecosystem (ponds, lakes, streams, rivers, oceans, estuaries) **Biodiversity:** Genetic species and ecosystem diversity, bio-geographical classification of India. Value of biodiversity, threats to biodiversity, endangered and endemic species of India, conservation of biodiversity.

UNIT-III

Environmental Pollution: Causes, effects and control measures of air pollution, water pollution, soil pollution, noise pollution, Thermal pollution. Solid waste management, Municipal solid waste management, Biomedical waste management and, hazardous waste management.

Disaster management: Types of disasters, impact of disasters on environment, infrastructure, and development.

UNIT-IV

Environmental protection and Global issues: Environmental protection acts: Air, Water, Forest and wild life Acts, enforcement of Environmental legislation. Water conservation, watershed management, and Eenvironmental ethics. Climate change, Global warming, acid rain, ozone layer depletion.

UNIT-V

Sustainable future: Concept of Sustainable Development, Sustainable development goals, Population and its explosion, Crazy Consumerism, Urban Sprawl, Environmental Education, Human health, Environmental Ethics, Concept of Green Building, Ecological Foot Print, Life Cycle assessment (LCA), Low carbon life style.

Suggested Readings:

1. De A.K., "*Environmental Chemistry"*, Wiley Eastern Ltd., 1989.
2. Odum E.P., "*Fundamentals of Ecology"*, W.B. Sunders Co., USA,1975.
3. G.L. Karia and R.A. Christian, *Waste Water Treatment, Concepts and Design Approach,* Prentice Hall of India, 2005.
4. Benny Joseph, *Environmental Studies,* Tata McGraw Hill,2005.
5. V.K.Sharma, *Disaster Management, National Centre for Disaster Management,* IIPE, Delhi,1999.
6. *Environmental Science: towards a sustainable future* by Richard T. Wright. 2008 PHL Learning Private Ltd. New Delhi

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B. Tech. (ECE) IV SEMISTER
PC-451 EC
ANALOG ELECTRONIC CIRCUITS LABORATORY

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks: 30
0	0	3	1.5	External Marks: 70

List of Experiments

1. Two Stage RC Coupled CE BJT amplifier.
2. Two Stage RC Coupled CS FET amplifier.
3. Voltage Series Feedback Amplifier.
4. Voltage Shunt Feedback Amplifier.
5. Current series feedback Amplifier
6. RC Phase Shift Oscillator.
7. Hartley & Colpitt's Oscillators
8. Design of Class A and Class B Power amplifiers.
9. Constant-k low pass & high pass filters.
10. m-Derived low pass & high pass filters.
11. Series and Shunt voltage Regulators
12. RF Tuned Amplifier

SPICE:

13. Two Stage RC Coupled CS FET amplifier.
14. Voltage Series Feedback Amplifier
15. Current Shunt Feedback Amplifier

Suggested Reading:

1. Paul B. Zbar, Albert P. Malvino, *Micheal A. Miller, Basic Electronics, A text – Lab Manual*, 7th Edition, TMH 2001.

Note: A minimum of 10 experiments should be performed. It is mandatory to simulate any three experiments using SPICE

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B. Tech. (ECE) IV SEMISTER
PC-452 EC
PULSE AND INTEGRATED CIRCUITS LABORATORY

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks: 30
0	0	3	1.5	External Marks: 70

List of Experiments

1. Verification of Low Pass circuit response to step, pulse and square inputs
2. Verification of High Pass RC Circuit response to step, pulse and square inputs
3. Design and verification of RC integrator and differentiator Circuits
4. Design and verification of Low pass and High pass Filters
5. Design and verification of Clipping Circuit (shunt and series)
6. Design and verification of Clamping Circuits (Positive and Negative, with and without bias)
7. Measurement of OPAMP Parameters
8. Inverting and Non-inverting OP-AMP Voltage follower
9. Integrator and Differentiator using OPAMP
10. Design and verification of Active filters
11. Astable and Mono stable multi vibrator using NE555 IC
12. Voltage regulators
13. Digital to Analog Converters
14. Analog to Digital Converters

Note: A minimum of 10 experiments should be performed.

Suggested Reading:

1. Robert Boylestad and Louis Nashelsky, "Electronic Devices and Circuit Theory", 5th Edition, Prentice-Hall of India Private Limited, New Delhi, 1995.
2. David A. Bell, Laboratory Manual for "Electronic Devices and Circuits", 4th Edition, Prentice-Hall of India Private Limited, New Delhi, 2004.