Faculty of Engineering & Technology

P. K. University Shivpuri (MP)

Department of Electronics Engineering

Evaluation Scheme & Syllabus for

B.Tech - Electronics & Instrumentation Engineering

2nd year

(III to IV Semester)

CHOICE BASED CREDIT SYSTEM (CBCS)

[Effective from the Session: 2025-26]

P.K.University,Vill-Thanra,Teh-Karera,Distt-Shivpuri (M.P.) 473665

EVALUATION SCHEME

B.TECH –ELECTRONICS & INSTRUMENTATION ENGINEERING

3rd SEMESTER

Study And Evaluation Scheme For B.Tech In Electronics & Instrumentation Engineering

YEAR2nd/SEMESTER-III

SUBJECT CODE	SUBJECTSNAME	STUDY SCHEME Periods/Week			Credits	MARKS IN EVALUATION SCHEME						Total Marks of Internal & External
						INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT			
		L	T	P		Th	Pr	Tot	Th	Pr	Tot	
UENGIEI301	Engineering Mathematics-III	3	1	0	4	30	-	30	70	-	70	100
UNETEI302	Network Analysis & Synthesis	3	1	0	4	30	-	30	70	-	70	100
UELECEI-303	Electrical & Electronics Engineering Materials	3	1	0	4	30	-	30	70	-	70	100
UDIGIEI304	Digital System Design	3	1	0	4	30	-	30	70	-	70	100
UELECEI305	Electronic Devices	3	1	0	4	30	-	30	70	-	70	100
UENVIEI306	Environment & Ecology	3	0	0	3	30	-	30	70	-	70	100
UNETWEI307	Network Analysis & Synthesis Lab	0	0	2	1	-	25	25	-	25	25	50
UDIGIEI308	Digital System Design Lab	0	0	2	1	-	25	25	-	25	25	50
UELECEI309	Electronic Devices Lab	0	0	2	1	-	25	25	-	25	25	50
Total		18	5	6	26	180	75	255	420	75	495	750

B.TECH –ELECTRONICS & INSTRUMENTATION ENGINEERING

4TH SEMESTER

Study And Evaluation Scheme For B.Tech. In Electronics & Instrumentation Engineering

YEAR2nd/SEMESTER-4TH

SUBJECTCODE	SUBJECTSNAME	STUDYSCHEME Periods/Week			Credits	MARKSINEVALUATIONSCHEME						Total Marks of Internal & External
						INTERNALASSESSMENT			EXTERNALASSESSMENT			
		L	T	P		Th	Pr	Tot	Th	Pr	Tot	
UNANOEI401	NANO SCIENCE	3	0	0	3	30	-	30	70	-	70	100
UCOMMEI402	COMMUNICATION ENGINEERING	3	1	0	4	30	-	30	70	-	70	100
UANALEI403	ANALOG CIRCUIT	3	0	0	3	30	-	30	70	-	70	100
UELECEI404	ELECTRONIC MEASUREMENTS & INSTRUMENTATION	3	0	0	3	30	-	30	70	-	70	100
USIGNEI405	SIGNAL SYSTEM	3	1	0	4	30	-	30	70	-	70	100
UUNIVEI406	UNIVERSAL HUMAN VALUES & PROF. ETHICS	3	0	0	3	30	-	30	70	-	70	100
UCOMMEI407	COMMUNICATION ENGINEERING LAB	0	0	2	1	-	25	25	-	25	25	50
UANALEI408	ANALOG CIRCUIT LAB	0	0	2	1	-	25	25	-	25	25	50
UELECEI409	ELECTRONIC MEASUREMENTS & INSTRUMENTATION LAB	0	0	2	1	-	25	25	-	25	25	50
USIGNEI410	SIGNAL SYSTEM LAB	0	0	2	1	-	25	25	-	25	25	50
Total		18	2	8	24	180	100	280	420	100	520	800

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II Year III Semester

L	T	P
3	1	0

UENGIEI 301: ENGINEERING MATHMATICS–III

UNIT I

Numerical Techniques – **I**: Zeroes of transcendental and polynomial equations, Bisection method, Regula-falsi method, Newton-Raphson method, Rate of convergence of above methods.

Interpolation: Finite differences, Newton's forward and backward interpolation. Lagrange's and Newton's divided difference formula for unequal intervals**.**

UNIT II

Numerical Techniques –**II**: Solution of system of linear equations, Matrix Decomposition methods, Jacobi method, Gauss- Seidal method.

Numerical differentiation & Integration: Trapezoidal rule, Simpson's one third and three- eight rules, Solution of ordinary differential equations (first order, second order and simultaneous) by Euler's, Picard's and fourth-order Runge- Kutta methods.

UNIT III

Statistical Techniques: Moments, Moment generating functions, Skewness, Kurtosis, Curve fitting, Method of least squares, Fitting of straight lines, Polynomials, Exponential curves, Correlation, Linear, non – linear and multiple regression analysis, Binomial, Poisson and Normal distributions. Tests of significations: Chi-square test, t-test.

UNIT IV

Function of Complex variable: Analytic function, C-R equations, Harmonic Functions, Cauchy's integral theorem, Cauchy's integral formula, Derivatives of analytic functions, Taylor's and Laurent's series, Singularities, Zeroes and Poles, Residue theorem.

UNIT V

Integral Transforms: Fourier integral, Complex Fourier transform, Inverse Transforms, Convolution Theorems, Fourier sine and cosine transform, Applications of Fourier transform to simple one dimensional heat transfer equations, wave equations and Laplace equations, Z- Transform and its application to solve difference equation.

Text Books:

1. R.K. Jain & S.R.K. Iyenger, Advance Engineering Mathematics, Narosa Publication House..
2. Jain, Iyenger Jain, Numerical Methods for Scientific and Engineering Computation, New Age International, New Delhi

J.N. Kapur, Mathematical Statistics, S. Chand & company Ltd.

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*II Year III Semester*ts

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3	1	0

UNETEI302: NETWORK ANALYSIS & SYNTHESIS

Unit I

Node and mesh analysis, matrix approach of network containing voltage & current sources and reactances, source transformation and duality.

Unit II

Network theorems: Superposition, reciprocity, Thevenin's, Norton's, Maximum power transfer, compensation and Tallegen's theorem as applied to A.C. circuits.

Unit III

Trigonometric and exponential Fourier series: Discrete spectra and symmetry of waveform, steady state response of a network to non sinusoidal periodic inputs, power factor, effective values, Fourier transform and continuous spectra, three phase unbalanced circuit and power calculation.

Unit IV

Laplace transforms and properties: Partial fractions, singularity functions, waveform synthesis, analysis of RC, RL, and RLC networks with and without initial conditions with Laplace transforms evaluation of initial conditions.

Unit V

Transient behaviour, concept of complex frequency, driving points and transfer functions poles and zeros of immittance function, their properties, sinusoidal response from pole-zero locations, convolution theorem and two four port network and interconnections, behaviour of series and parallel resonant circuits, introduction to band pass, low pass, high pass and band reject filters.

Text/Reference Books

1. Franklin F. Kuo, "Network Analysis and Synthesis," Wiley India Education, 2nd Ed., 2006.
2. Van, Valkenburg, "Network analysis," Pearson, 2019.
3. Sudhakar, A., Shyammohan, S. P., "Circuits and Network," Tata McGraw-Hill New Delhi, 1994.
4. A William Hayt, "Engineering Circuit Analysis," 8th Edition, McGraw-Hill Education.
5. A. Anand Kumar, "Network Analysis and Synthesis," PHI publication, 2019

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II Year III Semester

L	T	P
3	1	0

UELECEI-303:
ELECTRICAL & ELECTRONICS ENGINEERING MATERIALS

UNIT -I

Dielectric Materials: Dielectric as Electric Field Medium, leakage currents, dielectric loss, dielectric strength, breakdown voltage, breakdown in solid dielectrics, flashover, liquid dielectrics, electric conductivity in solid, liquid and gaseous dielectrics, Ferromagnetic materials, properties of ferromagnetic materials in static fields, spontaneous, polarization, curie point, anti-ferromagnetic materials, piezoelectric materials, pyroelectric materials.

UNIT- II

Magnetic Materials: Classification of magnetic materials, spontaneous magnetization in ferromagnetic materials, magnetic Anisotropy, Magnetostriction, diamagnetism, magnetically soft and hard materials, special purpose materials, feebly magnetic materials, Ferrites, cast and cermet permanent magnets, ageing of magnets. Factors effecting permeability and hysteresis.

UNIT- III

Semiconductor Materials: Properties of semiconductors, Silicon wafers, integration techniques, Large and very large scale integration techniques (VLSI).

UNIT- IV

Materials For Electrical Applications: Materials used for Resistors, rheostats, heaters, transmission line structures, stranded conductors, bimetals fuses, soft and hard solders, electric contact materials, electric carbon materials, thermocouple materials. Solid Liquid and Gaseous insulating materials.Effect of moisture on insulation.

UNIT- V

Special Purpose Materials: Refractory Materials, Structural Materials, Radioactive Materials, Galvanization and Impregnation of materials, Processing of electronic materials, Insulating varnishes and coolants, Properties and applications of mineral oils, Testing of Transformer oil as per ISI Reading.

Text Books:

1. RK Rajput, A course in Electrical Engineering Materials, Laxmi Publications, 2009
2. TK Basak, A course in Electrical Engineering Materials, New Age Science Publications, 2009
3. Adrianus J. Dekker, Electrical Engineering Materials, Pearson, 2016.

Reference Books:

1. TTTI Madras, Electrical Engineering Materials
2. C S Indulkar& S Thiruvengadam, Electrical Engineering Materials

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II Year III Semester

UDIGIEI304: DIGITAL SYSTEM DESIGN

L	T	P
3	1	0

Unit I

Logic simplification and combinational logic design: Binary codes, code onversion, review of Boolean algebra and Demorgans theorem, SOP & POS forms, Canonical forms, Karnaugh maps up to 6 variables, tabulation method.

Unit II

MSI devices like comparators, multiplexers, encoder, decoder, driver & multiplexed display, half and full adders, subtractors, serial and parallel adders, BCD adder, barrel shifter and ALU.

Unit III

Sequential logic design: Building blocks like S-R, JK and Master-Slave JK FF, edge triggered FF, state diagram, state reduction, design of sequential circuits, ripple and synchronous counters, shift registers, finite state machines, design of synchronous FSM, algorithmic state machines charts. Designing synchronous circuits like pulse train generator, pseudo random binary sequence generator, clock generation.

Unit IV

Logic families and semiconductor memories: TTL NAND gate, specifications, noise margin, propagation delay, fan-in, fan-out, tristate TTL, ECL, CMOS families and their interfacing, memory elements, concept of programmable logic devices like FPGA, logic implementation using programmable devices.

Unit V

Digital-to-Analog converters (DAC): Weighted resistor, R-2R ladder, resistor string etc. analog-to-digital converters (ADC): single slope, dual slope, successive approximation, flash etc. switched capacitor circuits: Basic concept, practical configurations, application in amplifier, integrator, ADC etc.

Text/Reference Books:

1. R.P. Jain, "Modern Digital Electronics," Tata McGraw Hill, 4th edition, 2009.
2. A. Anand Kumar, "Fundamental of Digital Circuits," PHI 4th edition, 2018.
3. W.H. Gothmann, "Digital Electronics- An Introduction to Theory and Practice," PHI, 2nd edition, 2006.
4. D.V. Hall, "Digital Circuits and Systems," Tata McGraw Hill, 1989.
5. A. K. Singh, "Foundation of Digital Electronics & Logic Design," New Age Int.Publishers.

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II Year III Semester

L	T	P
3	1	0

UELECEI305: ELECTRONIC DEVICES

Unit I

Introduction to semiconductor physics: Review of quantum mechanics, electrons in periodic lattices, E-k diagrams.

Unit II

Energy bands in intrinsic and extrinsic silicon, carrier transport, diffusion current, drift current, mobility and resistivity, sheet resistance, design of resistors.

Unit III

Generation and recombination of carriers, Poisson and continuity equation P-N junction characteristics, I-V characteristics, and small signal switching models.

Unit IV Avalanche breakdown, Zener diode, Schottky diode, Bipolar Junction Transistor, I-V characteristics, Ebers-Moll model.

Unit V MOS capacitor, C-V characteristics, MOSFET, I-V characteristics, and small signal models of MOS transistor, LED, photodiode and solar cell.

Text /Reference Books:

1. G. Streetman, and S. K. Banerjee, “Solid State Electronic Devices,” 7th edition, Pearson, 2014.
2. D. Neamen , D. Biswas, "Semiconductor Physics and Devices," McGraw-Hill Education.
3. S. M. Sze and K. N. Kwok, “Physics of Semiconductor Devices,” 3rd edition, John Wiley &Sons, 2006.
4. C.T. Sah, “Fundamentals of Solid State Electronics,” World Scientific Publishing Co. Inc, 1991.
5. Y. Tsividis and M. Colin, “Operation and Modeling of the MOS Transistor,” Oxford univ. press, 2011.
6. Muhammad H. Rashid, “Electronic Devices and Circuits,” Cengage publication, 2014.

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II Year III Semester

L	T	P
3	0	0

UENVIEI306: ENVIRONMENT & ECOLOGY

UNIT-I

Definition, Scope & Importance, Need For Public Awareness• Environment definition, Eco system - Balanced ecosystem, Human activities - Food, Shelter, Economic and social Security.
Effects or human activities on environment· Agriculture, Housing, Industry, Mining and Transportation activities, Bask$ of Environmental Impact Assessment. Sustainable Development.

UNIT-II

Natural Resources Water Resources· Availability and Quality aspects. Water borne diseases, Water Induced diseases, Fluoride problem in drinking water. Mineral Resources, Forest Wealth, Material Carbon ,Nitrogen and Sulphur Cycles.
Energy - Different types of energy, Electromagnetic radiation. Conventional and Non-Conventional sources - Hydro Electric, Fossil Fuel based Nuclear, Solar, Biomass and Bio.gas. Hydrogen gas and alternative future source of Energy.

UNIT-III

Environmental Pollution and their effects. Water pollution, Land pollution. Noise pollution, Public Health aspects, Air Pollution, Solid waste management, e-waste management Current Environmental Issues of Importance: Population Growth, Climate Change and Global warming-Effects, Urbanization, Automobile pollution. Acid Rain Ozone Layer depletion, Animal Husbandry,

UNIT-IV

Environment-ill Protection- Role of Government, Legal aspects, initiatives by Non-, governmental organizations (NGO), Environmental Education,

Text books:

l. Environmental Studies -Benny Joseph- Tata McgrawHiU-200S
2. Environmental Studies- Dr. D.l. Manjunath, Pearson Education-2006.
3. Environmental Science & Technology- M. Anaji Reddy- BS Publication ..

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II Year III Semester

L	T	P
0	0	2

UNETWEI307: NETWORK ANALYSIS & SYNTHESIS LAB

LIST OF EXPERIMENTS

1. Verification of Kirchhoff's laws.
2. Verification of Superposition theorem.
3. Verification of Thevenin's Theorem and Maximum power transfer theorem.
4. Verification of Tallegen's theorem.
5. Measurement of power and power factor in a single phase AC series inductive circuit and study improvement of power factor using capacitor.
6. Study of phenomenon of resonance in RLC series circuit and obtain resonant frequency.
7. Determination of parameters of AC single phase series RLC circuit.
8. To find poles and zeros of immittance function.
9. Design and find cut-off frequency of low pass and high pass filters.
10. Design and find the pass band frequencies of band pass filters.
11. Design and find the stop band frequencies of band reject filters.

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II Year III Semester

L	T	P
0	0	2

UDIGIEI308: DIGITAL SYSTEM DESIGN LAB

LIST OF EXPERIMENTS

1. Introduction to digital electronics lab- nomenclature of digital ICs, specifications, study of the data sheet, Concept of Vcc and ground, verification of the truth tables of logic gates using TTL ICs.
2. Implementation of the given Boolean function using logic gates in both SOP and POS forms.
3. Verification of state tables of RS, JK, T and D flip-flops using NAND & NOR gates.
4. Implementation and verification of Decoder using logic gates.
5. Implementation and verification of Encoder using logic gates.
6. Implementation of 4:1 multiplexer using logic gates.
7. Implementation of 1:4 de-multiplexer using logic gates.
8. Implementation of 4-bit parallel adder using 7483 IC.
9. Design, and verify the 4-bit synchronous counter.
10. Design, and verify the 4-bit asynchronous counter.
11. Implementation of Mini Project using digital integrated circuits and other components.

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II Year III Semester

UELECEI309: ELECTRONIC DEVICES LAB

L	T	P
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LIST OF EXPERIMENTS

1. Study of Lab Equipment and Components: CRO, multimeter, and function generator, power supply- active, passive components and bread board.
2. P-N Junction diode: Characteristics of PN junction diode - static and dynamic resistance measurement from graph.
3. Applications of PN Junction diode: Half & Full wave rectifier- Measurement of Vrms, Vdc, and ripple factor.
4. Characteristics of Zener diode: V-I characteristics of Zener diode, graphical measurement of forward and reverse resistance.
5. Characteristics of Photo diode: V-I characteristics of photo diode, graphical measurement of forward and reverse resistance.
6. Characteristics of Solar cell: V-I characteristics of solar cell, graphical measurement of forward and reverse resistance.
7. Application of Zener diode: Zener diode as voltage regulator. Measurement of percentage regulation by varying load resistor.
8. Characteristic of BJT: BJT in CE configuration- graphical measurement of hparameters from input and output characteristics. Measurement of Av, AI, Ro and Ri of CE amplifier with potential divider biasing.
9. Field Effect Transistors: Single stage common source FET amplifier –plot of gain in dB Vs frequency, measurement of, bandwidth, input impedance, maximum signal handling capacity (MSHC) of an amplifier.
10. Metal Oxide Semiconductor Field Effect Transistors: Single stage MOSFET amplifier –plot of gain in dB Vs frequency, measurement of, bandwidth, input impedance, maximum signal handling capacity (MSHC) of an amplifier.
11. Simulation of amplifier circuits studied in the lab using any available simulation Software and measurement of bandwidth and other parameters with the help of simulation software.

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II Year IV Semester

L	T	P
3	0	0

UNANOEI401 NANO SCIENCE

UNIT I

Introduction: Definition of Nano-Science and Nano Technology, Applications of Nano- Technology. Quantum Theory for Nano Science: Particle in a box, Potential step: Reflection and tunneling (Quantum leak). Penetration of Barrier, Potential box (Traped particle in 3D: Nanodot). Physics of Solid State Structures: Size dependence of properties, crystal structures, face centered cubic nano particles; Tetrehedrally bounded semiconductor structures; lattice vibrations. Energy Bands: Insulators, semiconductor and conductors; Reciprocal space; Energy bands and gaps of semiconductors; effective masses; Fermi Surfaces. Localized Particles: Acceptors and deep taps; mobility; Excitons.

UNIT II

Quantum Nanostructure: Preparation of quantum wells, Wires and Dots, Size and Dimensionality effect, Fermi gas; Potential wells; Partial confinement; Single electron Tunneling, Infrared detectors; Quantum dot laser superconductivity. Properties of Individual Nano Particles: Metal nano clusters; Magic numbers; Theoretical modeling of nanoparticles; geometric structure; electronic structure; Reactivity, Fluctuations, Magnetic clusters; Bulk to nanostructure, semiconducting nano particles, Optical Properties, Photo fragmentation, Columbic Explosion. Rare Gas & Molecular clusters; Inert gas clusters; Super fluid clusters; Molecular clusters.

UNIT III

Growth Techniques of Nano materials: Litho and Non lithograpahic techniques, RF Plasma, Chemical methods, Thermolysis, Pulsed laser method, Self-assembly, E-beam evaporation, Chemical Vapour Deposition, Pulsed Laser Deposition.

UNIT IV

Methods of Measuring Properties: Structure: X-ray Diffraction Technique, Particle size determination, surface structure. Microscopy: Scanning Probe Microscopy (SPM), Atomic Force Microscopy (AFM), Field Ion Microscopy, Scanning Electron Microscopy, Transmission Electron Microscopy(TEM).Spectroscopy: Infra red and Raman Spectroscopy, X-ray Spectroscopy, Magnetic resonance, Optical and Vibrational Spectroscopy, Luminescence.

UNIT V

Carbon Nano Materials: Bucky Ball and Carbon Nano- Tubes: Nano structures of carbon (fullerene),Fabrication, Structure. Electrical, Mechanical and Vibrational properties and applications. Nano Diamond, Boron Nitride Nano-tubes, Single Electron Transistors, Molecular Machine, Nano- Biometrics, Nano Robots.

Text/Reference Books:

1. CP Poole Jr, FJ Owens, –Introduction to Nanotechnology|.

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II Year IV Semester

L	T	P
3	1	0

UCOMMEI402: COMMUNICATION ENGINEERING

Unit I
Review of signals and systems, frequency domain representation of signals, principles of amplitude modulation systems- DSB, SSB and VSB modulations.

Unit II
Angle modulation, representation of FM and PM signals, spectral characteristics of angle modulated signals.

Unit III
Review of probability and random process, Gaussian and white noise characteristics, noise in amplitude modulation systems, noise in frequency modulation systems, pre-emphasis and de-emphasis, threshold effect in angle modulation.

Unit IV Pulse modulation, sampling process, pulse amplitude and pulse code modulation (PCM), differential pulse code modulation. Delta modulation, noise considerations in PCM, time division multiplexing, digital Multiplexers.

Unit V Digital modulation schemes- phase shift keying, frequency shift keying, quadrature amplitude modulation, continuous phase modulation and minimum shift keying.

Text/Reference Books:

1. Haykin S., "Communications Systems," John Wiley and Sons, 2001.
2. Proakis J. G. and Salehi M., "Communication Systems Engineering," Pearson Education,2002.
3. Taub H. and Schilling D.L., "Principles of Communication Systems," Tata McGraw Hill,2001.
4. Wozencraft J. M. and Jacobs I. M., "Principles of Communication Engineering," JohnWiley, 1965.
5. Barry J. R., Lee E. A. and Messerschmitt D. G., "Digital Communication," Kluwer Academic Publishers, 2004.
6. Proakis J.G., "Digital Communications',' 4th Edition, McGraw Hill, 2000.
7. Abhay Gandhi, "Analog and Digital Communication," Cengage publication, 2015.

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II Year IV Semester

L	T	P
3	0	0

UANALEI403: ANALOG CIRCUITS

Unit I

Diode circuits, amplifier models: Voltage amplifier, current amplifier, trans-conductance amplifier and trans-resistance amplifier. Biasing schemes for BJT and FET amplifiers, bias stability, various configurations (such as CE/CS, CB/CG, CC/CD) and their features, small signal analysis, low frequency transistor models, estimation of voltage gain, input resistance, output resistance etc., design procedure for particular specifications, low frequency analysis of multistage amplifiers.

Unit II

High frequency transistor models, frequency response of single stage and multistage amplifiers, cascode amplifier, various classes of operation (Class A, B, AB, C etc.), their power efficiency and linearity issues, feedback topologies: Voltage series, current series, voltage shunt, current shunt, effect of feedback on gain, bandwidth etc., calculation with practical circuits, concept of stability, gain margin and phase margin.

Unit III

I Oscillators: Review of the basic concept, Barkhausen criterion, RC oscillators (phase shift, Wien bridge etc.), LC oscillators (Hartley, Colpitt, Clapp etc.), non-sinusoidal oscillators.

Unit IV

Current mirror: Basic topology and its variants, V-I characteristics, output resistance and minimum sustainable voltage (VON), maximum usable load, differential amplifier: Basic structure and principle of operation, calculation of differential gain, common mode gain, CMRR and ICMR, Op-Amp design: Design of differential amplifier for a given specification, design of gain stages and output stages, compensation.

Unit V

Op-Amp applications: Review of inverting and non-inverting amplifiers, integrator and differentiator, summing amplifier, precision rectifier, Schmitt trigger and its applications, active filters: Low pass, high pass, band pass and band stop, design guidelines.

Text/Reference Books:

1. J.V. Wait, L.P. Huelsman and GA Korn, “Introduction to Operational Amplifier theory and applications,” Mc Graw Hill, 1992.
2. J. Millman and A. Grabel, “Microelectronics,” 2nd edition, McGraw Hill, 1988.
3. P. Horowitz and W. Hill, “The Art of Electronics,” 2nd edition, Cambridge University Press, 1989.
4. A.S. Sedra and K.C. Smith, “Microelectronic Circuits,” Saunder's College11 Publishing, 4th edition.
5. Paul R. Gray and Robert G. Meyer, “Analysis and Design of Analog Integrated Circuits,” John Wiley, 3rd edition.
6. Muhammad H. Rashid, “Electronic Devices and Circuits,” Cengage publication, 2014.

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II Year IV Semester

L	T	P
3	0	0

UELECEI404: ELECTRONIC MEASUREMENT AND INSTRUMENTATION

UNIT I

Unit, dimensions and standards: Scientific notations and metric prefixes. SI electrical units, SI temperature scales, Other unit systems, dimensions and standards.

Measurement Errors: Gross error, systematic error, absolute error and relative error, accuracy, precision, resolution and significant figures, Measurement error combination, basics of statistical analysis.

PMMC instrument, Galvanometer, DC ammeter, DC voltmeter, series ohm meter.

UNIT II

Transistor voltmeter circuits, AC electronic voltmeter, current measurement with electronic instruments, probes, Digital voltmeter systems, Digital multimeter, digital frequency meter System.

UNIT III

Voltmeter and ammeter methods, Wheatstone bridge, low resistance measurements, Low Resistance Measuring Instruments, AC bridge theory, capacitance bridges, Inductance bridges, Q meter.

UNIT IV

CRO: CRT, Wave Form Display, Time Base, Dual Trace Oscilloscope, measurement of voltage, frequency and phase by CRO, Oscilloscope probes, Delay time based Oscilloscopes, Sampling Oscilloscope, DSO, DSO applications.

UNIT V

Instrument calibration: Comparison method, digital multimeter as standard instrument, calibration instrument, Recorders: X-Y recorders, plotters Transducers.

Text Book:

1. David A. Bell, “Electronic Instrumentation and Measurements”, Oxford University Press.

1. Oliver and Cage, “Electronic Measurements and Instrumentation”, Tata McGraw Hill Publication.
2. Alan S. Morris, “Measurement and Instrumentation Principles”, Elsevier (Buterworth Heinmann).

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II Year IV Semester

USIGNEI405: SIGNAL SYSTEM

L	T	P
3	1	0

UNIT I

Signals and systems as seen in everyday life, and in various branches of engineering and science, energy and power signals, continuous and discrete time signals, continuous and discrete amplitude signals, system properties: linearity, additivity and homogeneity, shift-invariance, causality, stability, reliability.

UNIT I

Linear shift-invariant (LSI) systems, impulse response and step response, convolution, input-output behavior with a periodic convergent inputs, characterization of causality and stability of linear shift invariant systems, system representation through differential equations and difference equations, Periodic and semi-periodic inputs to an LSI system, the notion of a frequency response and its relation to the impulse response

UNIT I

Fourier series representation, Fourier transform, convolution/multiplication and their effect in the frequency domain, magnitude and phase response, Fourier domain duality , Discrete-Time Fourier Transform (DTFT) and the Discrete Fourier transform (DFT), Parseval's Theorem, the idea of signal
space and orthogonal bases, the Laplace transform, notion of Eigen functions of LSI systems, a basis of Eigen functions, region of convergence, poles and zeros of system, Laplace domain analysis, solution to differential equations and system behavior.

UNIT I

The z-Transform for discrete time signals and systems-Eigen functions, region of convergence, z-domain analysis.

UNIT I

The sampling theorem and its implications- spectra of sampled signals, reconstruction: ideal interpolator, zero-order hold, first-order hold, and so on, aliasing and its effects, relation between continuous and discrete time systems.

Text/Reference books:

1. A.V. Oppenheim, A.S. Willsky and I.T. Young, "Signals and Systems," Pearson, 2015.
2. R.F. Ziemer, W.H. Tranter and D.R. Fannin, "Signals and Systems - Continuous and Discrete," 4th edition, Prentice Hall, 1998.
3. B.P. Lathi, "Signal Processing and Linear Systems," Oxford University Press, 1998.
4. Douglas K. Lindner, "Introduction to Signals and Systems," McGraw Hill International Edition: 1999.
5. Simon Haykin, Barry van Veen, "Signals and Systems," John Wiley and Sons (Asia) Private Limited, 1998.
6. V. Krishnaveni, A. Rajeswari, ""Signals and Systems," Wiley India Private Limited, 2012.
7. Robert A. Gabel, Richard A. Roberts, "Signals and Linear Systems," John Wiley and Sons, 1995.
8. M. J. Roberts, "Signals and Systems - Analysis using Transform methods and MATLAB," TMH, 2003.
9. J. Nagrath, S. N. Sharan, R. Ranjan, S. Kumar, "Signals and Systems," TMH New Delhi,2001.
10. A. Anand Kumar, "Signals and Systems," PHI 3rd edition, 2018.
11. D. Ganesh Rao, K.N. Hari Bhat, K. Anitha Sheela, "Signal, Systems, and StochasticProcesses," Cengage publication, 2018.

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Semester-IV

UUNIVEI406: UNIVERSAL HUMAN VALUES AND PROFESSIONAL ETHICS

L	T	P
3	0	0

Course Objectives

UNIT 1: Course Introduction –

Need, Basic Guidelines, Content and Process for Value Education

1. Understanding the need, basic guidelines, content and process for Value Education
2. Self Exploration–what is it? - its content and process; 'Natural Acceptance' and Experiential Validation- as the mechanism for self exploration
3. Continuous Happiness and Prosperity- A look at basic Human Aspirations
4. Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being with their correct priority
5. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario
6. Method to fulfill the above human aspirations: understanding and living in **harmony** at various levels

UNIT 2: Understanding Harmony in the Human Being - Harmony in Myself!

7. Understanding human being as a co-existence of the sentient 'I' and the material 'Body'
8. Understanding the needs of Self ('I') and 'Body' - *Sukh*and *Suvidha*
9. Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer)
10. Understanding the characteristics and activities of 'I' and harmony in 'I'
11. Understanding the harmony of I with the Body: *Sanyam*and *Swasthya*; correct appraisal of Physical needs, meaning of Prosperity in detail
12. Programs to ensure *Sanyam*and *Swasthya*

- Practice Exercises and Case Studies will be taken up in Practice Sessions.

UNIT 3: Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship

13. Understanding Harmony in the family – the basic unit of human interaction
14. Understanding values in human-human relationship; meaning of *Nyaya*and program for its fulfillment to ensure *Ubhay-tripti*;
Trust (*Vishwas)* and Respect (*Samman)* as the foundational values of relationship
15. Understanding the meaning of *Vishwas*; Difference between intention and competence
16. Understanding the meaning of *Samman*, Difference between respect and differentiation; the other salient values in relationship
17. Understanding the harmony in the society (society being an extension of family): *Samadhan, Samridhi, Abhay, Sah-astitva*as comprehensive Human Goals
18. Visualizing a universal harmonious order in society- Undivided Society (*AkhandSamaj),* Universal Order (*SarvabhaumVyawastha)*- from family to world family!

- Practice Exercises and Case Studies will be taken up in Practice Sessions.

UNIT 4: Understanding Harmony in the Nature and Existence - Whole existence as Co-existence

19. Understanding the harmony in the Nature
20. Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self-regulation in nature
21. Understanding Existence as Co-existence (*Sah-astitva*) of mutually interacting units in all-pervasive space
22. Holistic perception of harmony at all levels of existence
- Practice Exercises and Case Studies will be taken up in Practice Sessions.

UNIT 5: Implications of the above Holistic Understanding of Harmony on Professional Ethics

23. Natural acceptance of human values
24. Definitiveness of Ethical Human Conduct
25. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order
26. 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.
27. Case studies of typical holistic technologies, management models and production systems
28. Strategy for transition from the present state to Universal Human Order:
a) At the level of individual: as socially and ecologically responsible engineers, technologists and managers
b) At the level of society: as mutually enriching institutions and organizations

Reference Material

The primary resource material for teaching this course consists of

a. The text book

R.R Gaur, R Sangal, G P Bagaria, A foundation course in Human Values and professional Ethics, Excel books, New Delhi, 2010, ISBN 978-8-174-46781-2

b. The teacher's manual

R.R Gaur, R Sangal, G P Bagaria, A foundation course in Human Values and professional Ethics – Teachers Manual, Excel books, New Delhi, 2010

c. A set of DVDs containing

 Video of Teachers' Orientation Program
PPTs of Lectures and Practice Sessions
 Audio-visual material for use in the practice sessions

In addition, the following reference books may be found useful for supplementary reading in connection with different parts of the course:

1. B L Bajpai, 2004, *Indian Ethos and Modern Management*, New Royal Book Co., Lucknow. Reprinted 2008.
2. PL Dhar, RR Gaur, 1990, *Science and Humanism*, Commonwealth Purblishers.
3. Sussan George, 1976, *How the Other Half Dies,* Penguin Press. Reprinted 1986, 1991
4. Ivan Illich, 1974, *Energy & Equity,* The Trinity Press, Worcester, and HarperCollins, USA
5. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, limits to Growth, Club of Rome's Report, Universe Books.
6. SubhasPalekar, 2000, *How to practice Natural Farming,* Pracheen(Vaidik) KrishiTantra Shodh, Amravati.

Relevant websites, movies and documentaries

1. Value Education websites, http://uhv.ac.in, *http://www.uptu.ac.in*
2. Story of Stuff, *http://www.storyofstuff.com*
3. Al Gore, *An Inconvenient Truth*, Paramount Classics, USA
4. Charlie Chaplin, *Modern Times*, United Artists, USA
5. IIT Delhi, *Modern Technology – the Untold Story*
6. *Gandhi A., Right Here Right Now, Cyclewala Productions*

Department of Electronics Engineering
(Faculty of Engineering & Technology)

P.K. University, Shivpuri (MP)

II Year IV Semester

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UCOMMEI407:COMMUNICATION ENGINEERING LAB

LIST OF EXPERIMENTS

1. To study DSB/ SSB amplitude modulation & determine its modulation factor & power in side bands.
2. To study amplitude demodulation by linear diode detector.
3. To study frequency modulation and determine its modulation factor.
4. To study sampling and reconstruction of pulse amplitude modulation system.
5. To study pulse amplitude modulation.

a) Using switching method

b) By sample and hold circuit

6. To demodulate the obtained PAM signal by 2nd order LPF.
7. To study pulse width modulation and pulse position modulation.
8. To study pulse code modulation and demodulation technique.
9. To study delta modulation and demodulation technique.
10. To construct a square wave with the help of fundamental frequency and its harmonic component.
11. Study of amplitude shift keying modulator and demodulator.
12. Study of frequency shift keying modulator and demodulator.
13. Study of phase shift keying modulator and demodulator.
14. Study of single bit error detection and correction using hamming code.
15. Study of quadrature phase shift keying modulator and demodulator.
16. To simulate differential phase shift keying technique using MATLAB software.
17. To simulate M-ary Phase shift keying technique using MATLAB software (8PSK, 16PSK) and perform BER calculations.
18. Design a front end BPSK modulator and demodulator.

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UANALEI408: ANALOG CIRCUIT LAB

LIST OF EXPERIMENTS

1. Characteristic of BJT: Study of BJT in various configurations (such as CE/CS, CB/CG, CC/CD).
2. BJT in CE configuration: Graphical measurement of h-parameters from input and output characteristics, measurement of Av, AI, Ro and Ri of CE amplifier with potential divider biasing.
3. Study of Multi-stage amplifiers: Frequency response of single stage and multistage amplifiers.
4. Feedback topologies: Study of voltage series, current series, voltage shunt, current shunt, effect of feedback on gain, bandwidth etc.
5. Measurement of Op-Amp parameters: Common mode gain, differential mode gain, CMRR, slew rate.
6. Applications of Op-Amp: Op-Amp as summing amplifier, difference amplifier, integrator and differentiator.
7. Field effect transistors: Single stage common source FET amplifier –plot of gain in dB vs frequency, measurement of bandwidth, input impedance, maximum signal handling capacity (MSHC) of an amplifier.
8. Oscillators: Study of sinusoidal oscillators- RC oscillators (phase shift, Wien bridge etc.).
9. Study of LC oscillators (Hartley, Colpitt, Clapp etc.),
10. Study of non-sinusoidal oscillators.
11. Simulation of amplifier circuits studied in the lab using any available simulation software and measurement of bandwidth and other parameters with the help of simulation software.
12. ADC/DAC: Design and study of Analog to Digital Converter.
13. Design and study of Digital to Analog Converter.

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II Year IV Semester

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UELECEI409: ELECTRONIC MEASUREMENT & INSTRUMENTATION LAB

1. Study of semiconductor diode voltmeter and its use as DC average responding AC voltmeter.

2. Study of L.C.R. Bridge and determination of the value of the given components.

3. Study of distortion factor meter and determination of the % distortion of the given scillator.

4. Study of the transistor tester and determination of the parameters of the given transistors.

5. Study of the following transducer (i) PT-100 transducer (ii) J- type transducer (iii) K-type transducer (iv) Pressure transducer

6. Measurement of phase difference and frequency using CRO (Lissajous Figure)

7. Measurement of low resistance Kelvin‟s double bridge.

8. To measure unknown capacitance of small capacitors by using Schering‟s bridge.

9. To measure unknown Inductance using Hay‟s bridge.

10. To measure unknown frequency using Wein‟s frequency bridge.

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II Year IV Semester

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USIGNEI410: SIGNAL SYSTEM LAB

LIST OF EXPERIMENTS

1. Introduction to MATLAB

a. To define and use variables and functions in MATLAB.
b. To define and use Vectors and Matrices in MATLAB.
c. To study various MATLAB arithmetic operators and mathematical functions.
d. To create and use m-files.

2. Basic plotting of signals

a. To study various MATLAB commands for creating two and three dimensional plots.
b. Write a MATLAB program to plot the following continuous time and discrete time signals.
i. Step Function ii. Impulse Function
iii. Exponential Function iv. Ramp Function v. Sine Function

3. Time and Amplitude transformations

Write a MATLAB program to perform amplitude-scaling, time-scaling and time shifting on a given ignal.

4. Convolution of given signals

Write a MATLAB program to obtain linear convolution of the given sequences.

5. Autocorrelation and Cross-correlation

a. Write a MATLAB program to compute autocorrelation of a sequence x(n) and verify the property.
b. Write a MATLAB program to compute cross-correlation of sequences x(n) and y(n) and verify the property.

6. Fourier Series and Gibbs Phenomenon

a. To calculate Fourier series coefficients associated with Square Wave.
b. To Sum the first 10 terms and plot the Fourier series as a function of time.
c. To Sum the first 50 terms and plot the Fourier series as a function of time.

7. Calculating transforms using MATLAB

a. Calculate and plot Fourier transform of a given signal.
b. Calculate and plot Z-transform of a given signal.

8. Impulse response and Step response of a given system

a. Write a MATLAB program to find the impulse response and step response of asystem form its difference equation.
b. Compute and plot the response of a given system to a given input.

9. Pole-zero diagram and bode diagram

a. Write a MATLAB program to find pole-zero diagram, bode diagram of a given system from the given system function.
b. Write a MATLAB program to find, bode diagram of a given system from the given system function.

10. Frequency response of a system

Write a MATLAB program to plot magnitude and phase response of a given system.

11. Checking linearity/non-linearity of a system using SIMULINK

a. Build a system that amplifies a sine wave by a factor of two.
b. Test the linearity of this system using SIMULINK.