TECHNO INDIA UNIVERSITY
WESTBENGAL

EM 4, Sector V, Salt Lake, Kolkata-700091, West Bengal, India
Phone: +91 9836544416/17/18/19, Fax: +91 33 2357 1097

4-Year Bachelor of Technology (B.Tech.) Curriculum and Syllabus for Electronic & Communication Engineering (ECE)

FOURTH SEMESTER

Sl No	Code	Subject	Contacts			Credits
			L	T	P	
A. Theory						
1	TIU-UEC-T202	Analog Electronic Circuits	3	1	0	4
2	TIU-UEC-T204	Digital Electronics & Logic Design	3	1	0	4
3	TIU-UEC-T206	Signals & Systems	3	1	0	3
4	TIU-UCS-T210	Data Structures & Algorithms through C	3	1	0	3
5	TIU-UEN-T200	CASD - IV	2	1	0	3
6	TIU-UEC-T208	Electronic Measurement & Instrumentation	3	1	0	3
B. Practical						
1	TIU-UEC-L202	Analog Circuits Lab	0	0	3	2
2	TIU-UEC-L204	Digital Electronics Lab	0	0	3	2
3	TIU-UCS-L210	Data Structure Lab	0	0	3	2
4	TIU-UEC-L208	Measurement Lab	0	0	3	2
C. Sessionals						
1	TIUCSL-481	Entrepreneurship Skill Development	0	0	0	2
Total						30

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CASD
TIU-UEN-T200
L-T-P: 2-1-0 **Credits: 3**

Module -1
Preparing and delivering speeches; Steve Jobs – Commencement address (12 June 2005).

Module -2
Basics of Formal Reports.
Interview Skills.

Module -3
Group Discussions: Use of persuasive strategies including some rhetorical devices for emphasizing (for instance; being polite and firm; handling questions and taking in criticism of self; turn-taking strategies and effective intervention; use of body language).

Module -4
"The Adventure of the Speckled Band".

Analog Electronic Circuits
TIU-UEC-T202
L-T-P: 3-1-0 **Credits: 4**

Module -1
Introduction to Electronic circuits-
Diode& their Applications: rectifier circuits (half-wave and fullwaverectifiers, rectifiers with capacitor filter), voltage regulator (using Zener diode), voltage multipliers, clipper(amplitude limiter) clipper(limiter) circuits, clamper circuits.*(6L)*

Module -2
Bipolar Junction Transistors and their Applications:
Structure and modes of operation, n-p-n and p-n-p transistor, DC analysis of both transistor circuits, Transistor Biasing and Stability, Q-point, BJT as an amplifier, small signal equivalent circuits, single-stage BJT amplifier, BJT as a switch.*(8L)*

Module -3
Metal Oxide Semiconductor Field-Effect Transistors and their Applications- structure and physicaloperation of n-type and p-type MOSFET, MOSFET biasing circuits, MOSFET as anamplifier, small-signal equivalent circuits, single-stage MOSFET amplifier, MOSFET as a switch.*(10L)*

Module -4
Feedback Amplifiers & Oscillators-
Feedback concept, negative & positive feedback, voltage/current, series/shunt feedback,

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Berkhausen criterion, Colpitts, Hartley's, Phase shift, Wein bridge and crystal oscillators.*(6L*)

Module -5
Operational Amplifier (Op Amp) –
ideal op amp; inverting amplifier, amplifier with a T-network, effect of finite gain, summing amplifier; non-inverting configuration, voltage follower; op-amp applications like current-to-voltage converter, voltage-to-current converter, difference amplifier, instrumentation amplifier, integrator and differentiator, Current mirror circuit, Active Filter Design using op-amp.*(8L)*

Module -6
Power amplifiers - Class A, B, AB, C, Conversion efficiency, Tuned amplifier,
Multivibrator- Monostable, Bistable, Astable multivibrators using BJT, Monostable and astable operation using 555 timer
Special Functional Circuits- VCO and PLL *(10L)*

Recommended Textbooks:
1. J. Millman & C. C. Halkias, "Integrated Electronics", McGraw Hill
2. P. Horowitz & W. Hill, "The Art of Electronics", John Wiley
3. R. Boylestad& L. Nashelsky, "Electronic Devices & Circuit Theory", Pearson
4. T. L. Floyd, "Electronic Devices", Pearson
5. P. C. Rakshit& D. Chattopadhyay, "Electronics: Fundamentals &Applications ", New Age
6. A. Malvino, "Electronic Principles"
7. R. A. Gayakwad, "Op-Amps and Linear Integrated Circuits", Pearson/Prentice Hall of India
8. A. S. Sedra& K. C. Smith, "Microelectronic Circuits", Oxford University Press
9. D. A. Neamen, "Electronic Circuits: Analysis and Design", McGraw Hill

Digital Electronics & Logic Design
TIU-UEC-T204
L-T-P: 3-1-0 **Credits: 4**

Module 1
Number System and Codes:
Decimal, binary, octal and hexadecimal number systems and their arithmetic operations, conversion of one number system to another, Signed and floating point representations of binary numbers, 1's complement and 2's complement representations, Binary codes, natural BCD codes, Excess-3, Gray codes, Alphanumeric codes, code conversion- from one code to another.*(6L)*

Module 2
Logic Gates, Boolean Algebra & Basic logic families:
NOT, AND, OR, NAND, NOR, XOR and XNOR –operations, truth tables and Venn diagram representations, universal gates, postulates and laws of Boolean algebra, De Morgan's theorem, minterms and maxterms, SOP and POS forms, Switching algebra, Minimizing functions using K-maps, Minimization using QM method, Different logic families: TTL, ECL, I2L.

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Module 3
Combinational and arithmetic logic circuits:
Adders/subtractors circuit using logic gates, fast adder, magnitude comparator, multiplexer demultiplexers, encoders, decoders, priority encoders, parity generator and checkers, BCD adder and subtractor. *(8L)*

Module 4
Sequential Logic Circuits:
Flip flops and latches, S-R, J-K, D and T type flip-flops and their conversions, master-slave configuration, edge triggered and level triggered clock, registers, shift registers, synchronous and asynchronous counters, ring and Johnson (twisted ring) counters, Modulus Counters.

Module 5
Memory and Programmable Logic Devices:
ROM, PROM, RAM-SRAM, DRAM, EPROM, EEPROM, Flash ROM, Programmable and gated array devices for designing combinational circuits PAL, PLA, PLD, CPLD, FPGA with examples.

Module 6
Finite State Machines:
Finite state machine state transition diagrams and state transition tables**,** Moore & Mealy machine state diagram, state variable, state table and state minimization, design of state machines using combinational logic circuits and memories*.(6L)*

Recommended Textbooks:
1. D. P. Leach & A. Malvino, “Digital Principles and Applications”, McGeaw Hill
2. Jain, “Modern Digital Electronics”, Tata McGraw Hill
3. D. L. Schilling & H. Taub, “Digital Integrated Electronics”, McGraw Hill
4. V. K. Puri, “Digital Electronics”, Tata McGraw Hill
5. S. Salivahanan& S. Arivazhagan, “Digital Circuits & Design”, Vikas
6. T. L. Floyd, “Digital Fundamentals”, Pearson
7. M. Morris Mano & M. D. Ciletti, “Digital Design”, Prentice Hall
8. V. Kumar, “Digital Technology”, New Age
9. D. Ray Chowdhury, “Digital Circuits”, Platinum Publishers.
10. Yarbrough, “Digital Logic Applications & Design”, Vikas
11. A. Anand Kumar, “Fundamentals of Digital Circuits”, Prentice Hall

Signals and Systems
TIU-UEC-T206
L-T-P: 3-1-0 **Credits: 3**

Module-1
Types of signals: - Introduction to signals, Periodic & non periodic, analog & digital, deterministic & random, energy & power signals. Fourier analysis: Fourier series representation of periodic signals, Fourier transform & their properties, singularity function, unit impulse, unit step etc.

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Application of Fourier transform for analysis of LTI networks, the concept of frequency in continuous & discrete time domain, LTI system: Causality, stability,
Introduction to Fourier series for discrete time periodic signals, discrete Fourier transform, DFT as a linear transformation, properties of DFT such as convolution, multiplication.

Module-2
Time and frequency characterization
Magnitude phase representation of Fourier transform, frequency response of LTI systems, time domain properties of ideal frequency selective filters, time domain and frequency domain aspects of non ideal filters.

Module-3
Random variable & process:
Random variable, random process. Correlation function (auto & cross) cumulative distribution function. Probability density function, joint cumulative & distribution and probability density function. System response to random signals: Filtered random process lowpass and bandpass; Basic concept of optimum filtering: Wiener Hopf filter.

Module-4
Sampling
Sampling theorem, reconstruction of signals from samples. Effect of sampling, continuous and discrete time signals, transformation of the independent variable. Continuous and discrete time systems.

Module-5
Introduction to Z transform
Region of convergence, properties of z-transform, inverse z-transform using different technique, its application.

Module-6
System modeling:
Modeling in terms of differential equation, state variables, transfer function(using Laplace Transform); concept of impulse and step response.

Recommended Textbooks:
1. A. V. Oppenheim, A.S. Willsky& W. H. Nawab, “Signals and Systems”, Prentice Hall
2. S. Haykin& B. Van Veen, “Signals and Systems”, John Wiley
3. E. W. Kamen&B. S. Heck, “Fundamentals of Signals and Systems: Using the Web and Matlab”, Pearson.
4. J. G. Proakis& D. G. Manolakis, “Digital Signal Processing: Principles, Algorithms and Applications”, Pearson.
5. P. Ramesh Babu, “Digital Signal Processing”, Scitech
6. M. H. Hayes, “Statistical Digital Signal Processing & Modelling”, John Wiley
7. S. Haykin, “Adaptive Filter Theory”, Pearson
8. H. P. Hsu, “Schaum's Outlines in Signals and Systems”, McGraw Hill

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Electronic Measurement and Instrumentation
TIU-UEC-T208
L-T-P: 3-1-0 **Credits: 3**

Module-1
Electrical Measurements
Standards of Measurement & Errors, Review of indicating and integrating instruments: Voltmeter, Ammeter, Ohmmeter – series & shunt type, Wattmeter, Analog & Digital Multimeter, Megger and Energy meter, Q-meter.

Module-2
Measurement of Resistance, Inductance and Capacitance
Measurement of low, medium and high resistances, insulation resistance measurement, AC bridges for inductance and capacitance measurement.

Module-3
Instrument Transformers
Current and Potential transformers, ratio and phase angle errors, design considerations and testing.

Module-4
Electronic Measurements
Electronic voltmeter, multimeter, wattmeter & energy meter. Time, Frequency and phase angle measurements using CRO; Spectrum & Wave analyzer. Digital counter, frequency meter, voltmeter, multimeter and storage oscilloscope.

Module-5
Instrumentation
Transducers, classification & selection of transducers, strain gauges, LVDT, inductive & capacitive transducers, piezoelectric and Hall-effect transducers, thermisters, thermocouples, Resistance thermometers, photo-diodes & photo-transistors, encoder type digital transducers, signal conditioning and telemetry, basic concepts of smart sensors and application. Data Acquisition Systems.

Module-6
Systems applications:
Biometrics, Digital scent technology, Three-dimensional integrated circuit, Molecular electronics, Nano electromechanical systems, Electronic nose, Flexible electronics, E-textiles, Memristor, Thermal copper pillar bump, Spintronics,

Recommended Textbooks:

1. A. K. Sawhney, “A Course in Electrical and Electronic Measurements and Instrumentation”, DhanpatRai
2. A. D. Helfrick and W. D. Cooper, “Modern Electronic Instrumentation and Measurement Techniques”, Prentice Hall

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3. B. E. Jones, "Instrumentation Measurement and Feedback", McGraw Hill
4. E. W. Golding, "Electronic Measurement and Measuring Instruments", Sir Isaac Pitman & Sons.

5. H. Buckingham and E. N. Price, "Principles of Electronic Measurements"
6. H. Kalsi, 'Electronic Instrumentation', Tata McGraw Hill.

Data Structure & Algorithms through C
TIU-UCS-T210
L-T-P: 3-1-0 **Credits: 3**

Module-1
Basic Concepts of Data Representation:
Abstract Data Types Fundamental And Derived Data Types, Representation, Primitive Data Structures.

Module-2
Introduction to Algorithm Design and Data Structures:
Design And Analysis Of Algorithm: Algorithm Definition, Comparison Of Algorithms, Top-Down And Bottom Up Approaches To Algorithm Design, Analysis Of Algorithm, Frequency Count, Complexity Measures In Terms Of Time And Space, Structured Approach To Programming.

Module-3
Arrays:
1- Representation of Arrays Single And Multidimensional Arrays, Address Calculation Using Column And Row Major Ordering, Various Operations On Arrays. 2- Application Of Arrays Matrix Multiplication, Sparse Polynomial Representation And Addition.

Module-4
Stacks and Queues:
1- Representation of Stacks And Queues Using Arrays And Linked-List. 2- Circular Queues Priority Queue and D-Queue. 3- Applications Of Stacks Conversion From Infix To Postfix And Prefix Expressions, Evaluation Of Postfix Expression Using Stacks.

Module-5
Linked Lists:
Singly Linked List, Operations On List, Linked Stacks And Queues, Polynomial Representation And Manipulation Using Linked Lists, Circular Linked Lists, Doubly Linked Lists, Generalized List Structure, Sparse Matrix Representation Using Generalized List Structure.

Module-6
Trees: 1- Binary Tree Traversal Methods Preorder, In-Order, Post-Ordered Traversal, Recursive and Non-Recursive. 2- Algorithms For Above Mentioned Traversal Methods 3- Representation To Trees And Its Applications Binary Tree Representation Of A Tree, Conversion Of Forest Into Tree, Threaded Binary Trees, Lexical Binary Trees, Decision And Game Trees, Binary Search Tree: Height Balanced (Avl) Tree, B-Trees.

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Module-7

Searching, Sorting And Complexity: 1- Searching: Sequential And Binary Searches, Indexed Search, Hashing Schemes. 2- Sorting: Insertion, Selection, Bubble, Quick, Merge, Radix, Shell, Heap Sort. 3- Comparison of Time Complexity.

Module-8

Graphs:

1- Graph Representation Adjacency Matrix, Adjacency Lists, Adjacency Multicasts
2- Traversal Schemes, Depth First Search, Breadth First Search.

Recommended Books:

1. S. Chottopadhyay, D. Ghoshdastider& M. Chottopadhyay, Data Structures Though C Language, First Edition, 2001, BPB Publication.
2. Lipshutz, Data Structures with C, Mcgraw Hill.
3. Y. Kanitkar, Let Us C, BPB Publication.
4. Robert Lafore, Data Structures and Algorithms in Java, Sams.
5. A.M. Tennenbaum, Y. LangsamAnd M. J. Augenstein, Data Structures Using C, PHI, 1996.
6. D. E. Knuth, The Art of Computer Programming-Vol-I &Vol-II, Narosa Publication.

Analog Circuits Lab
TIU-UEC-L202
L-T-P: 0-0-3 **Credits: 2**

List of Experiments:

1. Positive & Negative clipper circuit.
2. Positive & Negative biased clipper circuit.
3. Positive & Negative clamper circuit.
4. Voltage doubler & voltage Tripler circuit.
5. a) OP-AMP offset null adjustment
   b) OP-AMP non inverting Amplifier.
6. OP-AMP inverting Amplifier.
7. OP-AMP as a unity gain follower.
8. OP-AMP as low pass filter.

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Digital Electronics Lab
TIU-UEC-L204
L-T-P: 0-0-3 **Credits: 2**

List of Experiments:

1. Familiarization with logic gates such as Basic, Universal and Exclusive gates.
2. Realization of NOT, OR, AND, XOR, XNOR Gates Using Universal Gates.
3.a) Gray to Binary Conversion & Vice-Versa.
   b) Code Conversion between BCD And Excess-3.
4.a) Odd and Even Parity Generation And Checking.
   b) 4-Bit Comparator Circuit.

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5. Design of Combinational Circuit To Drive Seven-Segment Display.
6. Design of Combinational Circuits Using Multiplexer.
7.a) Adder/ Subtractor Circuits Using Full-Adder Using IC And/ Or Logic Gates.
b) BCD Adder Circuit Using IC And/ OR Logic Gates.
8. Realization Of S-R, J-K, And D Flip Flops Using Universal Logic Gates.
9. Realization of Asynchronous Up/Down Counter.
10. Realization of Synchronous Mod-N Counter

Measurement Lab
TIU-UEC-L208
L-T-P: 0-0-3

Credits: 2

List of Experiments:

1. Measurement of strain using strain gauge.
2. Measurement of medium resistance using voltmeter- ammeter method.
3. Study of temperature sensors.
4. Study of Linear Variable Differential Transformer (LVDT).
5. Measurement of self-inductance using Maxwell's bridge.
6. Measurement of three phase power using two-wattmeter method.
7. Measurement of low resistance using Kelvin-double bridge.
8. Measurement of hysteresis and eddy current losses.
9. Study on different sub-system of CRO.

Data Structure Lab
TIU-UCS-L210
L-T-P: 0-0-3 **Credits: 2**

List of Experiments:

1. Write a program to push an item in Stack.
2. Write a program to pop into the Stack.
3. Write a program for queue insertion, deletion.
4. Write a program for binary search sorting.
5. Write a program for bubble sort.
6. Write a program for insertion sort.
7. Write a program for Merge sort.
8. Write a program for Heap sort.
9. Write a program for Selection sort.
10. Write a program for Radix sort.