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 Electronics & Communication Engineering (ECE)

THIRD SEMESTER

Sl No	Code	Subject	Contacts			Credits
			L	T	P	
A. Theory						
1	TIU-UMA-T201	Mathematics - III	3	1	0	4
2	TIU-UMA-T203	Probability and Statistics	3	1	0	4
3	TIU-UEC-T201	Semiconductor Devices	3	1	0	4
4	TIU-UEC-T203	Network Theory	3	1	0	4
5	TIU-UEN-T201	CASD	2	1	0	3
6	TIUEV-303	Environmental Science	2	1	0	3
B. Practical						
1	TIU-UCS-L205	Mathematics – III (Numerical Methods) Lab	0	0	3	2
2	TIU-UEC-L201	Semiconductor Devices Lab	0	0	3	2
3	TIU-UEC-L203	Network Theory Lab	0	0	3	2
C. Sessionals						
1	TIU-UES-S299	Entrepreneurship Skill Development	0	0	0	2
Total						30

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

Mathematics - III
TIU-UMA-T201
L-T-P: 3-1-0 **Credits: 4**

UNIT – I: Transform Calculus

Laplace Transform: Evaluation of integrals by Laplace Transform, Solution of initial and boundary value problems. Fourier Series : Periodic functions, Fourier series representation of a function, half range series, sine and cosine series, Fourier integral formula, Parseval's identity. Fourier Transform: Fourier Transform, Fourier sine and cosine transforms. Linearity, scaling, frequency shifting and time shifting properties. Self reciprocity of Fourier Transform, convolution theorem. Applications to boundary value problems.

UNIT II: Numerical Methods

Approximations and round off errors, Truncation errors and Taylor Series. Numerical Differentiation, Interpolation – Newton's Forward, Backward, Divided Difference. Numerical Integration – Trapezoidal, Simpson's $1/3^{rd}$, Weddle's Rule. Determination of roots of polynomials and transcendental equations by Bisection, Iteration, Newton-Raphson, Regula-Falsi, Secant and Bairstow's method. Solutions of linear simultaneous linear algebraic equations by Gauss Elimination and Gauss-Siedel iteration methods. Curve fitting- linear and nonlinear regression analysis, Application of difference relations in the solution of partial differential equations, Numerical solution of ordinary differential equations by Euler, Modified Euler, Runge-Kutta and Predictor-Corrector method.

Probability and Statistics
TIU-UMA-T203
L-T-P: 3-1-0 **Credits: 4**

UNIT – I: Probability

Probability: Classical, relative frequency and axiomatic definitions of probability, addition rule and conditional probability, multiplication rule, total probability, Bayes' Theorem and independence. Random Variables: Discrete and continuous random variables, probability mass, probability density and cumulative distribution functions, mathematical expectation, moments. Distributions: Uniform, Binomial, Geometric, Poisson, Exponential, Gamma, Normal distributions. Functions of a random variable. Joint Distributions: Joint, marginal and conditional distributions, product moments, correlation, independence of random variables.

UNIT II: Statistics

Graphical representation of data, Frequency distributions, measures of central tendencies – mean, median, mode, measures of dispersion – standard deviation, variance, Measures of skewness and kurtosis, Bivariate data, Principle of Least Squares, curve fitting.

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

CASD
TIU-UEN-T201
L-T-P: 2-1-0 **Credits: 3**

Module -1
Précis Writing.
Resumes and CVs and Cover letters. Memos and Notices.

Module -2
Non-verbal skills
Paralanguage and Body language.

Module -3
Classroom Presentations.

Semiconductor Devices
TIU-UEC-T201
L-T-P: 3-1-0 **Credits: 4**

Module -1
Energy Bands and Charge Carriers in Semiconductors-
Semiconductor fundamentals, crystal structure, Fermi level, Energy-band (E-k) diagram, effective mass, intrinsic andextrinsic semiconductor, carrier concentration, scattering and drift of electrons and holes, driftcurrent , diffusion mechanism, transientresponse, basic governing equations in semiconductor.*(12L)*

Module -2
Rectifier and detector diodes-
Physical description of p-n junction, transport equations, current voltage characteristics and temperature dependence, Junction Capacitance, small signal ac analysis, Diode switching, Optical devices & Solar cells, Zener diode, Tunnel diode, , photoconductors, PIN photodiode, avalanche photodiode, LED, semiconductor lasers, negative conductance in semiconductors.*(12L)*

Module -3
Bipolar Junction Transistors-
Physical mechanism, current gain, Equivalent circuits and modeling frequency response of transistors, High voltage and high power transistors, Frequency limitations, High frequency transistors, Power transistors.*(12L)*

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

Module -4
Field Effect Transistors-
JFETS and its characteristics, Equivalent Circuit, IJFETS and MOSFETs, MOS structure, flat-band threshold voltages, MOS static characteristics, small signal parameters and equivalent circuit, MOS-capacitors, strong, moderate and weak inversion, short channel effects, Gate protection of MOSFET, MOS capacitance, scaling laws of MOS transistors, P and N-channel MOSFETS, CMOS and VLSI MOSFETS, BiCMOS devices, Semiconductor sensors and detectors.*(12L)*

Recommended Textbooks:
1. J. Millman & C. C. Halkias, "Integrated Electronics", McGraw Hill
2. D. A. Neamen, "Semiconductor Physics & Devices", McGraw Hill
3. B. G. Streetman & S. Banerjee, "Solid State Electronic Devices", Prentice Hall
4. S. M. Sze, "Physics of Semiconductor Devices", John Wiley
5. J. Millman& A. Grabel, "Microelectronics", McGraw Hill

Network Theory
TIU-UEC-T203
L-T-P: 3-1-0 **Credits: 4**

Module-1
Network Solution Methodology & components-
passive and active components, Series and Parallel Connection of Circuit Elements, Mesh Analysis, Nodal Analysis, Voltage and Current Source, Dependent Sources, Power and Energy, Network Theorems, physical phenomenon and circuit interpretation of network using appropriate models.*(6L)*

Module-2
Signals: significance of eigen function, Fourier transform and Laplace transform of Standard Functions, Transient and steady state response of RC, RL and RLC circuits using Laplace transform. Network equations and solutions using Laplace transform initial conditions. Degenerate networks.*(14L)*

Module-3
Graph theory & Coupled Circuits: basic definitions loop (or tie set), cut-set, mesh matrices and their relationships, applications of graph theory in solving network equations, Magnetic coupling, concept of Self and mutual inductance, Coefficient of coupling, Solution of Problems. *(6L)*

Module-4
Two-port networks: network parameters (z parameters, y parameters, h parameters, ABCD matrix, transmission matrix),Inter-Connection of Two Port Networks, reciprocity theorem, image parameter concepts, balanced/unbalanced transmission lines, lumped-parameter model, characteristic impedance, propagation aspects.*(14L)*

Module-5
Network functions &Elements of network synthesis: driving point function, transfer function,

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

concepts of poles and zeros. Impulse response and convolution, basic concepts of insertion-loss synthesis, Approximation functions for filters - Design of Butterworth and Chebyshevfilters.*(8L)*

Recommended Textbooks:
1. M. A. Van Valkenburg, "Network Analysis", Prentice Hall
2. D. Roy Choudhury, "Networks & Systems", New Age
3. D. Chattopadhyay& P. C. Rakshit, "Fundamentals of Electric Circuit Theory", S. Chand
4. S. M. Durbin, J. E. Kemmerly& W. H. Hayt, "Engineering Circuit Analysis", McGraw Hill
5. C. K. Alexander & M. N. O. Sadiku, "Fundamentals of Electric Circuits", McGraw Hill
6. F. F. Kuo, "Network Analysis and Systhesis", John Wiley
7. P. Ramesh Babu, "Electric Circuit Analysis", Scitech
8. J. Edminister& M. Nahmi, "Schaum's Outlines in Electric Circuits", McGraw Hill

Environmental Science
TIU-UMB-T201
L-T-P: 2-1-0 **Credits: 3**

Module-1
Introduction:
Environment and environmental pollution from chemical process industries, characterization of emission and effluents, environmental Laws and rules, standards for ambient air, noise emission and effluents.

Module-2
Pollution Prevention:
Process modification, alternative raw material, recovery of by co-product from industrial emission effluents, recycle and reuse of waste, energy recovery and waste utilization.
Material and energy balance for pollution minimization. Water use minimization, Fugitive emission/effluents and leakages and their control-housekeeping and maintenance.

Module-3
Air Pollution Control:
Particulate emission control by mechanical separation and electrostatic precipitation, wet gas scrubbing, gaseous emission control by absorption and adsorption, Design of cyclones, ESP, fabric filters and absorbers.

Module-4
Water Pollution Control:
Physical treatment, pre-treatment, solids removal by setting and sedimentation, filtration centrifugation, coagulation and flocculation.

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

Module-5
Biological Treatment:
Anaerobic and aerobic treatment biochemical kinetics, trickling filter, activated sludge and lagoons, aeration systems, sludge separation and drying.

Module-6
Solids Disposal:
Solids waste disposal - composting, landfill, briquetting / gasification and incineration.

Recommended Textbooks:
1. A. K. De, "Environmental Chemistry", New Age
2. G. M. Masters, "Introduction to Environmental Engineering and Science", Pearson
3. G. S. Sodhi, "Fundamental Concepts of Environmental Chemistry", Narosa
4. E. Odum, M. Barrick& G. W. Barrett, "Fundamentals of Ecology", Brooks & Cole

Mathematics – III (Numerical Methods) Lab
TIU-UCS-L205
L-T-P: 0-0-3 **Credits: 2**

List of Experiments:

1. Assignment on Newton forward, backward interpolation.
2. Assignment on Lagrange's interpolation.
3. Assignment on bisection method.
4. Assignment on Newton Raphson method.
5. Assignment on Simpson's 1/3 rule.
6. Assignment on Trapezoidal rule.
7. Assignment on Gauss elimination method.

Semiconductor Devices Lab
TIU-UEC-L201
L-T-P: 0-0-3 **Credits: 2**
List of Experiments:

1. Measurement of carrier concentration of a semiconductor by using Hall Voltage method.
2. Measurement of band gap energy of a semiconductor by using Four Probe Resistivity meter.
3. Determination of type of semiconductor by hot probe method.
4. Modeling and simulation of BJT by using Empire or any other software.
5. Study of variation of Junction capacitance with voltage of a p-n junction by using C-V plotter

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

Network Theory Lab
TIU-UEC-L203
L-T-P: 0-0-3 **Credits: 2**

List of Experiments:

1. Introduction of Pspice & Verification of Superposition Theorem.
2. Verification of Maximum Power Transfer Theorem.
3. Transient response of Series R-L & R-C Circuit.
4. DC Transient response of R-L-C Circuit.
5. To study of Low Pass & High Pass Filter.
6. To study of Band Pass & Band Stop Filter.
7. To study of Notch Filter.