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

3-Year Diploma Engineering Curriculum and Syllabus for Electronics & Communication Engineering (ECE)

THIRD SEMESTER

Sl No	Code	Subject	Contacts			Credits
			L	T	P	
A. Theory						
1	TIU-DMB-T201	Environmental Science	2	1	0	3
2	TIU-DCS-T201	Programming in C	2	1	0	3
3	TIU-DEC-T201	Network Theory	2	1	0	3
4	TIU-DEC-T203	Analog Electronics	2	1	0	3
5	TIU-DEC-T205	Digital Electronics & Circuit Design	2	1	0	3
6	TIU-DEN-T201	CASD	2	1	0	3
B. Practical						
1	TIU-DCS-L201	Programming in C Lab	0	0	3	2
2	TIU-DEC-L201	Network Theory Lab	0	0	3	2
3	TIU-DEC-L203	Analog Electronics Lab	0	0	3	2
4	TIU-DEC-L205	Digital Electronics & Circuit Design Lab	0	0	3	2
C. Sessionals						
1	TIU-DES-S299	Entrepreneurship Skill Development	0	0	0	2
Total						28

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

Module 1: Non-verbal skills
Module 2: Classroom presentations
Module 3: Practice: Précis writing Resumes, CVs and Cover letters

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

G R O U P – A A I R & E N V I R O N M E N T

Module 1 INTRODUCTION
Man & Environment**:** Overview (socio-economic structure & occupational exposures) –Scope of Environmental Engineering – pollution problem due to urbanisation & industrialisation.

Module 2 AIR POLLUTION
Causes of air pollution – types & sources of air pollutants – Climatic & Meteorological effect on air pollution concentration – formation of smog & fumigation, Idea of Air Pollutants like: SO2, Nitrogen oxides, CO, Ozone, Particulate Matter, Lead according to USEPA. Control of Particulate & Gaseous Emission: Basic idea on Flue Gas Treatment Methods**:** Stacks Gravitational and Inertial Separation, Settling Chambers, Dynamic Separators, Cyclones, Filtration, Liquid Scrubbing, Spray Chambers, Packed Towers, Orifice and Venturi Scrubbers, Electrostatic Precipitators, Gas/solid Adsorption, Thermal Decomposition.

Module 3 METHODS & APPROACH OF AIR POLLUTION CONTROL

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Controlling smoke nuisance — Develop air quality criteria and practical emission standards — creating zones suitable for industry based on micrometeorology of air area — Introducing artificial methods of removal of particulate and matters of waste before discharging to open atmosphere.

G R O U P – B W A T E R & E N V I R O N M E N T

Module 4 WATER SOURCES
Origin of wastewater — Type of water pollutants and their effects

Module 5 DIFFERENT SOURCES OF WATER POLLUTION
Biological Pollution (point & non-point sources) – Chemical Pollutants: Toxic Organic & Inorganic Chemicals – Oxygen demanding substances – Physical Pollutants**:** Thermal Waste – Radioactive waste – Physiological Pollutants: Taste affecting substances – other forming substances

Module 6 WATER POLLUTION & ITS CONTROL
Adverse effects on**:** Human Health & Environment, Aquatic life, Animal life, Plant life — Water Pollution Measurement Techniques – Water Pollution Control Equipments & Instruments – Indian Standards for Water Pollution Control

G R O U P – C SO I L & NOISE & ENVIRONMENTAL MANAGEMENT SYSTEM

Module 7 SOIL POLLUTING AGENCIES & EFFECT OF SOLUTION
Liquid & Solid Wastes – Domestic & Industrial Wastes – Pesticides – Toxic**:** Inorganic & Organic Pollutants – Soil Deterioration – Poor Fertility, Septicity, Ground Water Pollution, Concentration of Infecting Agents in Soil

Module 8 SOLID WASTE DISPOSAL
Dumping domestic & Industrial Solid Wastes: Advantages & Disadvantages – Incineration: Advantages & Disadvantages – Sanitary Land Field: Advantages & Disadvantages – Management of Careful & Sanitary Disposal of Solid Wastes

Module 9 NOISE POLLUTION & CONTROL
Noise Pollution: Intensity, Duration – Types of Industrial Noise – Ill effects of Noise – Noise Measuring & Control – Permissible Noise Limits

Module 10 ENVIRONMENTAL LEGISLATIONS, AUTHORITIES & SYSTEMS
Air & Water Pollution Control Acts & Rules (Salient Features only) – Functions of State / Central Pollution Control Boards – Environmental Management System: ISO 14 000 (Salient Features only)

Programming in C
TIU-DCS-T201
L-T-P: 2-1-0

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Credits: 3

Module 1 INTRODUCTION TO PROGRAMMING

Concept of programming---different programming languages and programming logic—algorithms and floe charts overview of C programming

Introduction of c language- history of C-importance of C demerits of C- basic structure of C working steps of c compiler-source code—object code—executable code, data types and sizes-declaration of variables—different operators and expressions type conversions.

Module 2 MANAGING INPUT AND OUTPUT OPERATIONS & CONTROL FLOW (DECISION MAKING)

Decision making and branching ,simple and nested IF statements,IF-ELSE statements CASE-SWITCH statements ,looping concept,GOTO statement,Looping: FOR,WHILE,and DO-WHILE statements, comparative study among them, BREAK and CONTINUE statements.

Module 3

Introduction to arrays, function, pointer, structure, union, file etc.

REFERENCE BOOKS

1.PROGRAMMING WITH C / BYRON GOTTERIED/TATA MCGRAW HILL
2.PROGRAMMING IN ANSI C /E.BALAGURUSWAMI/ TATAMCGRAW HILL
3.LET US C /Y.KANETKAR/ BPB

Programming in C Lab
TIU-DCS-L201

Credits: 2

Basic of C Programming

Introduction of C language, Merit & Demerits of C , Working steps of C Compiler

1.1 To execute a sample C program to study the basic structure of C program.
1.2 To be familiar with keywords and identifiers through some program.
1.3 To apply constant, variables and different types of data types.

Operators & Expressions

2.1 To write program using Arithmetic, Relational, Logical and Assignment operators.
2.2 To write program to implement increment & decrement operators and to find the greatest between two numbers using conditional operator.

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2.3 To evaluate an expression to study operator precedence and associativity and to write a program using casting a value.

Decision Making

3.1 To use formatted scanf( ) and printf( ) functions for different types of data.
3.2 To find the roots of a quadratic equation. Find the greatest of three numbers using IF – ELSE and IF -ELSE IF statements.
3.3 To test whether the given character is vowel or not, using nested if –else statement and Switch-case statement.
3.4 To find sum of first n natural number using 'GOTO' statement
3.5 To find the sum of all Fibonacci numbers in between 1 to n using 'for' loop.
3.6 To find G.C.D and L.C.M of two numbers using 'WHILE' loop.
3.7 To find the sum of the digits of an integer using DO –WHILE loop structure.
3.8 To solve other problems for the implementation of different loop structure.

Arrays

4.1 To write a program to accept 10 numbers, store them in a single dimensional array and to make the average of the numbers.
4.2 To make an array of n elements and sort them and to write a program to check whether an input number is palindrome or not.
4.3 To write a program to accept a string and to count the no of vowels present in this string.
4.4 To write programs on matrix operation (addition, subtraction & multiplication).
4.5 To write some programs to utilize different string handling functions and to create an array to store the names of 10 students arranging them alphabetically.

User Defined Functions

5.1 To write a program to find the sum of the digits of a given number using function.
5.2 To write program using functions: — (a) with no argument and no return value; (b) with argument and no return value; (c) with argument and return value.
5.3 To find out the factorial of a given number using recursive function.
5.4 To write a program that uses a function to sort an array of integers.
5.5 To write programs to illustrate auto variable, external variable, static variable and register variable.

Pointers

6.1 To write a program to access variables using pointer.
6.2 To write a program to assign the address of an integer array to a pointer variable 'p' and add all the array elements through 'p'.
6.3 To write programs to explain parameter passing 'by reference 'and 'by value'.

Structure

7.1 To write a program to define and assign values to structure members
7.2 To write program to explain structure with arrays.
7.3 To define and assign values to 'Union' members.

File Handling

8.1 To write to and read from a sequential access file (use character type data).

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8.2 To create an integer data file, to read this file and to write all odd numbers to a new file.
8.3 To write program to use different functions used in file handling.
8.4 To make a random access to a file.

Network Theory
TIU-DEC-T201
L-T-P: 2-1-0
Credits: 3

G R O U P – A

Module 1 **NETWORK FUNDAMENTALS**

1.1 Active and passive network – Balanced and unbalanced network – Symmetrical and asymmetrical network – T and Π network and their conversion – Simple problems

1.2 Characteristic impedance – Propagation constant and image impedance – Open and short circuit impedance and their relation to characteristic impedance

1.3 Thevenin's theorem – Norton's theorem – Maximum Power Transform theorem – Superposition theorem – Simple problems

Module 2 **COUPLED CIRCUITS**

2.1 Idea of resonance – Series and parallel resonant circuits – Q-value, selectivity, bandwidth

2.2 Principle of coupling – Self-inductance & mutual inductance and their relationship – Co-efficient of coupling

2.3 Analysis of single tuned and double tuned circuits

G R O U P – B

Module 3 **Filter Circuits**

3.1 Definition and relationship between neper and decibel

3.2 Basic idea of passive filter – Definitions of pass band, stop band and cut-off frequency

3.3 CONSTANT-K PROTOTYPE FILTERS**:** a) Low pass filter, b) High pass filter, c) Band pass filter, and, d) Band stop filter

MODULE 4 **ATTENUATOR & EQUALISER**

4.1 Basic idea of attenuator – Difference between attenuator and filter – Symmetrical T and Π attenuator – Field of application of attenuators

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4.2 Concept of equalizer – Purpose of equalizer and its classification – Difference between series & shunt equalizer and their field of applications

G R O U P – C

MODULE 5 TRANSMISSION LINES

5.1 Types of transmission lines**:** Parallel wire and coaxial cable

5.2 Primary and secondary constants of transmission lines

5.3 Characteristic impedance – Reflection co-efficient – Standing wave ratio and their relationship

5.4 Simple matching methods, single and double stub match for transmission lines

5.5 Losses in transmission lines

5.6 Distortion in transmission line – Causes of distortion and condition for distortion-less transmission – Practical feasibility for distortion-less transmission

MODULE 6 TRANSIENT RESPONSE IN ELECTRICAL NETWORK

6.1 Laplace Transform: Definition – Condition of existence - Transforms of some elementary functions – Linearity property – First shifting property – Change of scale property – Inverse Laplace Transform

6.2 Transient response in electrical networks with sinusoidal and step function – Analysis with RL, RC, RLC circuits, time constant

Network Theory Lab
TIU-DEC-L201

Credits: 2

1) Familiarisation with P-Spice software and Plotting graph of Ohm's Law
2) Verifying Maximum Power Transfer Theorem
3) Verifying Superposition Theorem
4) To find transient response of 1^{st} order R-L and R-C circuits
5) To verify under-damped, over-damped, and critically damped conditions in series R-L-C circuits
6) To design Low-pass filter and High-pass filters using series R-V and R-L circuits
7) To design Band-pass filter, Band-reject filter and Notch filter using R-L-C circuits

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

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5. C. K. Alexander & M. N. O. Sadiku, "Fundamentals of Electric Circuits", McGraw Hill
6. F. F. Kuo, "Network Analysis and Synthesis", John Wiley
7. P. Ramesh Babu, "Electric Circuit Analysis", SciTech
8. J. Edminister & M. Nahmi, "Schaum's Outlines in Electric Circuits", McGraw Hill

Analog Electronics
TIU-DEC-T203
L-T-P: 2-1-0
Credits: 3

G R O U P – A

Module 1 Semi-Conductor Diodes

1.1 Operation of PN Junction Diode
1.2 V.I. Characteristics of Semi-Conductor Diode
1.3 Zener Diode
1.4 Zener & Avalanche break down
1.5 Characteristics & equivalent circuit of Zener Diode
1.6 Simple Voltage regulator circuit with Zener diode

Module 2 Special Semiconductor Diodes

General features of: Varactor diode – Pin diode – Tunnel diode – Schottky diode – Their field of applications

Module 3 Transistors

3.1 Construction & operation of NPN & PNP transistors, V.I. Characteristics – Active saturation & cut-off regions
3.2 CE, CB, CC configuration and their differences.
3.3 Definitions of α&β and their relationship
3.4 Concept of Q-point, AC and DC load lines
3.5 Stabilization and stability factor
3.6 Biasing: Base bias — Collector feedback bias — Emitter feedback bias — Potential Divider bias.
3.7 Bias compensation circuits using diode and thermistors
3.8 Construction, operation & V.I. Characteristics of JFET, pinch off voltage, drain resistance, trans-conductance, amplification factor and their relationship
3.9 FET biasing.
3.10 Difference between JFET and BJT.

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G R O U P – B

Module 4 Small Signal Transistor Amplifiers

3.1 Hybrid model and h-parameters of CB, CE & CC mode transistor amplifiers – Calculation of voltage gain, current gain, power gain, input and output impedance in terms of h-parameters – Comparison of the three configurations.

3.2 Small signal FET equivalent circuits – Common source and common drain amplifier – FET application as VVR, constant current source etc.

Module 5 Multistage Amplifier

Coupling: RC coupled – Direct coupled – Transformer-coupled amplifiers – Effect on Gain & Bandwidth and Frequency response for cascading – Comparison of different types of cascading

G R O U P – C

Module 6 Power Amplifier

6.1 Characteristics of Class A, Class B, Class C and Class AB amplifier

6.2 Difference between Voltage and Power Amplifier

6.3 Transformer coupled Class A Power Amplifier: Circuit operation – Calculation of power, efficiency & distortion

6.4 Class B Push Pull Amplifier: Circuit operation – Calculation of power, efficiency & distortion – Crossover distortion – Advantages and disadvantages – Complementary symmetry and quasi-complementary symmetry Class B Push Pull Amplifier

Module 7 Rectifier and Power Supply

7.1 Half wave and full wave rectifiers: Average voltage – rms voltage, efficiency and ripple factor – Percentage voltage regulation

7.2 Function of filter circuits – Capacitor input filter – Inductive filter – Πtype filter – Calculation of ripple factor and average output voltage – Function of bleeder resistor

7.3 Series and shunt regulator using transistor – IC Voltage Regulators: Positive & Negative, their specifications

Module 8 Voltage Multiplier

Voltage doublers – Tripler – Quadrupler – Their applications

Analog Electronics Lab

TIU-DEC-L203

Credits: 2

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1. Study of lab equipment and components: CRO, Multimeter, Function Generator, Power supply-Active and Passive Components & Bread Board, Soldering WorkStation.
2. Study of Zener regulator as voltage regulator
3. Study of Half wave, full wave & Bridge rectifiers.
4. To plot the input and output characteristics of CE configuration.
5. To study the characteristics of a Class- A amplifier.
6. To study the characteristics of Class- B amplifier.
7. To study the characteristics of Class- B push-pull amplifier.

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 & Circuit Design
TIU-DEC-T205
L-T-P: 2-1-0
Credits: 3

G R O U P – A

Module 1 Basic Logic Gates

Symbolic representation and truth table for logic gates: BUFFER – NOT – OR – AND – NAND – NOR – XOR – X-NOR

Module 2 Boolean Algebra

2.1 Boolean variables – Boolean function – Rules and laws of Boolean algebra – De Morgan's theorem
2.2 Max. term and min. term – Canonical form of equation – Simplification of Boolean expression
2.3 Karnaugh map technique – Don't care condition – Prime implicants – Canonical forms – Quine-McClusky method
2.4 Realization of Boolean expression with logic gates

Module 3 Combinational Logic Circuits

3.1 Arithmetic circuits: Half adder – Full adder – Half subtractor – Full subtractor – Parallel

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and serial full adder (1's complement, 2's complement and 9's complement addition)

3.2 Design of circuits using universal gates

3.3 Code converter, encoder and decoder – Multiplexer & demultiplexer

3.4 Parity generator and checker – Comparator

3.5 Combinational Circuit Design using SSI/MSI/LSI chips and their Applications.

G R O U P – B

Module 4 Sequential Logic Circuits

4.1 Difference between combinational and sequential logic circuits – Triggering of sequential logic circuits

4.2 Difference between flip flop and latch – Construction of RS, D, JK, JK master slave, T flip flops using basic gates, preset and clear signal

4.3 Counters: Asynchronous and synchronous counter – Ripple counter – Mod-N counter – Up-down counter – Applications

4.4 Registers: Shift registers – Serial in serial out – Serial in parallel out – Parallel in serial out – Parallel in parallel out – Applications

4.5 ALU design with IC 74181

Module 5 Memory Devices

5.1 Memory Addressing: Read, Write and Read Only operations

5.2 Memory Cells: ROM, PROM, EEROM, EPROM, CDROM

5.3 Static and dynamic RAM

5.4 Volatile and non-volatile memories, PLA, PAL,CPLD, FPGA

5.5 Basic Concept of CCD Operation and Applications

G R O U P – C

Module 6 Data Converters

6.1 Digital to Analog Converters: Binary weighted resistor type – R-2R ladder type – Specifications and applications of DA converter

6.2 Analog to Digital Converter: Comparator type – Successive approximation type – Dual slope AD converter – Specifications and applications of AD converter

Module 7 Logic Families

7.1 Comparative studies of different type of logic families like DTL, TTL, CMOS, and ECL etc. with the following characteristics: (a) logic levels, (b) power dissipation, (c) fan in and fan out, (d) propagation delay, and, (e) noise immunity.

7.2 Interfacing of ICs of different logic families – Logic hazards

Digital Circuit Design Lab
TIU-DEC-L205
Credits: 2

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1. Study of Logic Gates: Truth-table verification of OR, AND, NOT, XOR, NAND and NOR gates; Realization of OR, AND, NOT and XOR functions using universal gates.
2. Realization Half Adder / Full Adder using Logic gates.
3. Realization Half Subtractor / Full Subtractor using Logic gates
4. Design Multiplexer: Truth-table verification and realization of Half adder and Full adder using MUX.
5. Demultiplexer: Truth-table verification and realization of Half subtractor and Full subtractor using DEMUX.
6. Flip Flops: Truth-table verification of RS, JK , D, JK Master Slave Flip Flops.

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”, Eureka