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)

FOURTH SEMESTER

Sl No	Code	Subject	Contacts			Credits
			L	T	P	
A. Theory						
1	TIU-DEC-T202	Analog Communication	2	1	0	3
2	TIU-DEC-T204	Analog Circuit Design	2	1	0	3
3	TIU-DEC-T206	Microprocessor & Microcontroller	2	1	0	3
4	TIU-DEC-T208	Consumer Electronics	2	1	0	3
5	TIU-DMG-T202	Management Fundamentals	2	1	0	3
6	TIU-DEN-T200	CASD	2	1	0	3
B. Practical						
1	TIU-DEC-L202	Analog Communication Lab	0	0	3	2
2	TIU-DEC-L204	Analog Circuit Design Lab	0	0	3	2
3	TIU-DEC-L206	Microprocessor & Microcontroller Lab	0	0	3	2
4	TIU-DEC-L208	Consumer Electronics Lab	0	0	3	2
C. Sessionals						
1	TIU-DES-S298	Entrepreneurship Skill Development	0	0	0	2
Total						28

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

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

Module 1: Preparing and delivering speeches; Steve Jobs – Commencement address (12 June 2005)
Module 2: Interview skills
Module 3: Group Discussions

Analog Communication
TIU-DEC-T202
L-T-P: 2-1-0
Credits: 3

Group A
Unit – I Introduction to Electronic Communication
Importance of communication, Elements of a communication system
Types of electronic communication – Simplex, Half Duplex and Full Duplex,
Electromagnetic spectrum (different bands and their frequencies, concept of transmission bandwidth)
Basic Idea of Fourier Series and Fourier Transform

Unit – II Analog Modulation
Concept and necessity of modulation
Definition of amplitude, frequency and phase modulation
Derivation of sidebands in AM systems:- Evaluation of power - Derivation of sidebands in AM systems – Evaluation of power –Sideband depth –Efficiency of modulation, Percentage of modulation, Representation of AM signal in time and frequency domain.
METHODS OF AM: Principles of operation of collector modulated Class C amplifier – Balanced modulator, Ring modulator
Expression of sidebands in FM and PM systems and its interpretation –Modulation index and bandwidth requirement, Representation of FM signal in time and frequency domain.

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

Principles of operation of frequency modulation using Varactor diode and VCO.
Comparison of AM, FM and PM
Pulse modulation: Introduction, comparison with Continuous Wave Modulation, advantages, Sampling theorem, Nyquist rate, aliasing, natural & flat top sampling
Concept of Pulse Amplitude Modulation (PAM), Pulse Width Modulation (PWM) and Pulse Position Modulation (PPM) –Principle of generation and reception of PAM, PWM & PPM with block diagram and their applications.

Group B

Unit-III Transmitting Systems
Block diagram and function of different stages of AM and FM broadcast transmitter
WORKING PRINCIPLES OF SSB SYSTEMS WITH BLOCK DIAGRAM: Filter Method – Phase Shift Method

Unit-IV Demodulation
Principle of detection with diode detector
AGC circuit delayed AGC
Foster-Seeley discriminator –Ratio Detector –Limiter –Standard AFC Circuits (basic principles only, no derivation)
PLL (block diagram & operation) explanation.

Unit-V Receiving System
Principle of heterodyne, Characteristics of AM radio receiver - Sensitivity, Selectivity, and Fidelity
Block diagram and
Principle of operation of super heterodyne receiver – IF amplifier and choice of IF –Mixer and converter – Alignment and tracking –Tone and volume control –Band spreading –Receiver characteristics & Testing – sensitivity, selectivity and fidelity
Block diagram and principle operation of FM receiver –Pre-emphasis and de-emphasis –AFC and alignment of FM receiver

Group C

Unit – VI Microwave Amplifier
Problems associated with conventional tubes at microwave frequency
Basic idea of amplification with velocity and density modulation in case of MULTI-CAVITY KLYSTRON, REFLEX KLYSTRON AND TRAVELLING WAVE TUBE– Their efficiency, power output & frequency range of operation (no deduction) – Field of applications
General features of GUNN diode and IMPATT diode – their field of applications, Electromagnetic Interference, its effect and necessary measures for Electromagnetic

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

Compatibility (EMC)

Unit – VII Antenna and Waveguide
BASIC PRINCIPLES of antenna — Different types of antenna: Dipole antenna – Half wave and folded, microwave antenna – Horn antenna, parabolic antenna – Dish antenna

PROPERTIES of antenna: Gain – Bandwidth – Beam Width – Impedance – Radiation Pattern
ANTENNA ARRAYS: general idea of antenna array –Yagi Uda Antenna.
WAVE GUIDES: Rectangular – Circular Wave Guide, Modes of propagation in TE, TM and TEM
MICROWAVE COMPONENTS: Directional Coupler – Attenuator – Isolator – Circulator

Recommended Textbooks:
1. W. Tomasi, "Electronic Communication Systems: Fundamentals through Advanced", Pearson
2. H. Taub & D. L. Schilling, "Principles of Communication Systems", McGraw Hill
3. S. Haykin & M. Moher, "Introduction to Analog & Digital Communications", John Wiley
4. S. Haykin, "Communication Systems", John Wiley
5. R. Singh & S. Sapre, "Communication Systems: Analog and Digital", Tata McGraw Hill
6. V. Chandra Sekar, "Analog Communication", Oxford
7. T. Viswanathan, "Telecommunication Switching Systems and Networks", Prentice Hall of India

Analog Communication Lab
TIU-DEC-L202

Credits: 2
1. AM Modulation and Demodulation (Envelope Detector)
2. FM Modulation using PLL
3. Pulse Amplitude Modulation and Demodulation
4. Pre-emphasis and De-emphasis
5. Analog Multiplexing.
6. Study of FM detection
7. Amplitude Modulation using Pspice / Matlab
8. FM Modulation using Matlab

Analog Circuit Design
TIU-DEC-402
L-T-P: 2-1-0
Credits: 3

Group A

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

Unit I: Tuned Amplifier

Circuit operation of single tuned, double tuned and staggers tuned amplifiers

Unit II: Feedback Amplifier

Basic idea of positive and negative feedback – Effect of negative feedback on gain, gain stability, distortion, noise, bandwidth, phase shift, input and output impedances

Voltage and current, series and shunt feedback

Performance of emitter follower circuit –Calculation of gain and input & output impedances – Darlington pair

Unit – III Operational Amplifier

Circuit operation of differential amplifier –single & double ended

INTRODUCTION TO OPERATIONAL AMPLIFIER: Inverting and non - inverting mode and their gain calculation – Common mode rejection ratio – Bias current – Offset voltage and current –Slew rate – Open loop and closed loop gain –Input and output impedance – Frequency response and virtual ground

APPLICATIONS OF OPAMP: Adder – Subtractor – Voltage Follower – Integrator – Differentiator –Comparator –Schmitt Trigger –Voltage Limiter – Log Amplifier, Clipper, Clamper
Concept of Active Filtering

Group B

Unit – IV Oscillator
Concept of Oscillation – Berkhausen Criterion Operation of following oscillators
a) Tuned oscillators b) Hartley c) Colpitt d) Wein-bridge e) phase shift f) crystal oscillator

Unit – V Relaxation Oscillators
Operation of monostable, astable and bistable multivibrator with waveforms
Schmitt trigger circuits
IC-555, internal block diagram and pin function, construction of different multivibrators with IC-555
Unit – VI Sweep Circuits

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

Fundamentals of sweep circuit operation –Difference between voltage time base generator and current time base generator
Operation of Miller and Bootstrap circuits – Applications of Sweep Circuits

Group C

Unit – VII Microelectronics Technology
Advantages of ICs over discrete elements
TYPES OF ICS: Linear and Digital – Monolithic and Hybrid

PLANAR TECHNOLOGY: Crystal growth of wafer – Epitaxial growth –Oxidation– Photolithography – Chemical etching –Diffusion –Ion implantation and metallization (ideas only)

Fabrication of BJT, diode, resistor and capacitor (salient features), Fabrication of NMOS, PMOS & CMOS

Unit-VIII Solar Cells:
Theory of solar cells. Solar cell materials, solar cell array, solar cell power plant, limitations

Analog Circuit Design Lab
TIU-DEC-L402 **Credits: 2**

1. Design Astable, Bistable, and Monostable Multivibrator Circuit using IC 555.
2. Design Current to Voltage and Voltage to Converter using Op Amp 741.
3. Design Integrator & Differentiator using Op-Amp 741
4. To study the response of RC phase shift oscillator and determine frequency of oscillation.
5. To study the response of Hartley oscillator and determine frequency of oscillation.
6. To study the response of Colpitt's oscillator and determine frequency of oscillation.
7. To study the response of Wien Bridge oscillator and determine frequency of oscillation
8. Design a Regulated Power Supply for ±5V using IC7805 and IC7905

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

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

9. D. A. Neamen, "Electronic Circuits: Analysis and Design", McGraw Hill

Microprocessor & Microcontroller
TIU-DEC-T206
L-T-P: 2-1-0
Credits: 3

Group A

Unit – I Introduction to Microprocessor and 8 bit Microprocessor

Distinguish between microprocessor & microcomputer, Generation and evolution of microprocessor
Architecture of intel-8085-registers, timing and control, add buffer and add data, interrupts control, serial input and output control
Concept of Bus, bus organization of 8085
Pin details of 8085 and related signals
Demultiplexing of address and data bus by ALE signal.

Unit – II Timing Cycle of 8085

Machine cycle, instruction cycle
Instruction fetch cycle, read cycle and write cycle
Bus idle cycle, Hold and Halt state
Timing diagram of opcode fetch cycle or memory read cycle, Memory write, I/O read and I/O write cycle, MVI A, 8 bit data; LXI rp, 16 bit data; STA, 16 bit address

Unit – III Programming of 8085

Addressing modes of 8085A
Classification of instruction and Instruction set of 8085A
Concept of assembly language programming - basic assembler directives and labels
Instruction Format (one byte, two byte and three byte instruction), opcode format
Different operations of 8085 with respect to the status of IO/M, S_1, S_0, RD, WR signals.
Instructions related with interrupt
Concept of stack, subroutine and interrupts
Hardware and software interrupts, maskable and non - maskable interrupts, vectored interrupts, Enabling, disabling and masking of interrupts
Hardware structure of the interrupts of 8085

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

Group B

Unit – IV Memory Interfacing and IO Interfacing
Basic bus interface, Address decoding
Interfacing ROM, static RAM and dynamic RAM -Simple example of memory interfacing (RAM /ROM) with microprocessor.
Address space provided by 8085A
Interfacing I/O devices. Comparison of I/O mapped I/O & memory mapped I/O system

Unit – V I/O Transfer Scheme

Synchronous and asynchronous data transfer
Interrupt driven data transfer, single interrupt, multiple interrupt - polling, priority interrupt controller, dairy chaining
Direct memory access – Block transfer DMA – Cycle stealing DMA

Unit - VI I/O Interfacing Devices

Functional block diagram of: —
a) 8253(programmable counter), c) 8279 (Keyboard and display controller)
Functional block description and control word development of: —
a)8257(programmable DMA controller), b) 8259 (programmable interrupt controller) c) 8255(PPI)
Interfacing DAC & ADC with 8085

Group C
Unit – VII Introduction to 8086 and instruction set
Functional Block Diagram of 8086: Bus interface unit, execution unit, general purpose register, flag register, pointer and index register
Memory address space and generating a memory address
Dynamically allocatable relocatable code
Dedicated and reserved memory location
Pin configuration of 8086 - minimum and maximum mode
Addressing mode of 8086, interrupts of 8086 and interrupt vector table
Instruction set of 8086

Unit – VIII Micro-Controller
Van-New-Mann and Harvard Architecture, RISC, CISC. 8051 Flag Bits, PSW Register, Register Banks and Stacks, Memory Organization, Counters, Timers, Input/output Ports, Interrupts.
Explain the Block diagram of the Architectural of 8051
Explain the PIN Diagram features of the 8051 core

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

Explain the 8051 Programming Model
Explain different addressing modes of 8051
Explain the different types of Instruction sets of 8051
Data Transfer
Arithmetic Operations
Logical Operations
Boolean Variable Manipulation
Program Branching

Microprocessor & Microcontroller Lab
TIU-DEC-L206
Credits: 3

1. Study of 8085 Microprocessor Kits.
2. Write a program to add two 8-bit number using 8085.
3. Write a program to add two 16-bit number using 8085.
4. Write a program to subtract two 8-bit number using 8085.
5. Write a program to subtract two 16-bit number using 8085.
6. Write a program to multiply two 8 bit numbers by repetitive addition method using 8085.
7. Study of 8051 Micro controller kits.

Recommended Textbooks:
1. R. Gaonkar, "Microprocessor Architecture, Programming, and Applications with the 8085", Penram
2. P. K. Ghosh and P. R. Sridhar, "0000 to 8085: Introduction to Microprocessors for Engineers and Scientists", PHI Learning
3. D. V. Hall, "Microprocessors and Interfacing", McGraw Hill
4. K. M. Bhurchandi and A. K. Ray, "Advanced Microprocessors and Peripherals", Tata McGraw Hill

Consumer Electronics
TIU-DEC-T208
L-T-P: 2-1-0
Credits: 3

Group A

Unit – I Microphone

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

Discuss the characteristics of Microphones (Sensitivity, Frequency Response, Output Impedance, Distortion, Directivity)
Discuss the Principle of operation, construction, of Advantages and disadvantages of Carbon Microphone —Capacitance Microphone —Moving Coil Microphone - Wireless Microphone

Unit – II Loud Speaker
Constructions and working principles of Moving Coil Loudspeaker – Impedance and Power Level of loudspeaker
Frequency response of Practical Loudspeakers: Woofer, Tweeter, Squawker – Loudspeaker Enclosure

Unit – III Stereo
Explain the concept of monophonic & stereo phonic sound system
DETAILS OF STEREO COMPONENTS: Tone control, Bass, Treble, Balance & Control – Crossover Networks –Graphic Equalizer –Noise Reduction Techniques
Unit – IV Advanced Stereo System

Basic principles of Magnetic Recording, Playback
Basic principles of digital recording & block diagram of MP3 player & Explanation

Group B

Unit – V Black and White TV System
State and explain the following terms: Aspect ratio, Flicker Resolution, Video Bandwidth, Interlaced Scanning
Working principle with block diagram of TV transmitter and receiver
Brief description with circuit diagram: TV Tuner –Video IF stage –Sound stage –Picture tube & its associated circuit –Synchronizing circuits – Automatic Gain Control (AGC) – Horizontal & vertical deflection circuits – EHT section –Remote control of a TV receiver
Television broadcast standards, Describe principle of operation of CCD cameras

Unit – VI Colour TV System
Explain complementary colours, hue, saturation, and Colour circle.
Explain compatibility in TV system
Different colour systems like NTSC, SECAM and PAL system and their comparison

Working principle of Vidicon camera, Block schematic description of a colour TV Transmitter and Receiver, explain working principle of PAL encoder and decoder, discuss Colour picture tube & its associated circuits.

Discuss the colour TV signals (Luminance Signal & Chrominance Signal, (I & Q, U & V

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

Signals), bandwidth of Chrominance Signal, colour subcarrier frequency & colour burst

Discuss the principle of operation of Shadow mask and Trinitron picture tube
Explain the De-gaussing circuit in Colour TV receiver
Basic concept on Flat panel Display, Plasma Display, LCD display, LED display

Group C

Unit – VII CD Player
Working principle of CD recording and CD playing
Block diagram and working principle of VCD and DVD Player

Unit – VIII Principle of Cable, Satellite and HDTV Systems
Modern cable TV system block diagram -Head end processor -Trunk & cable distribution system with block diagram –scrambling – descrambling
State the need for satellite for TV broadcasting over wide area
Concepts of HDTV system, List HDTV standards
Explain TV Remote control transmitter and Receiver with block diagram
Direct to Home System (DTH) Introduction & Block Diagram. Concept of set top box
Block diagram of dB meter with working principle

Recommended Textbooks:
1. S. P. Bali, “Consumer Electronics”, Pearson
2. R. R. Gulati, “Monochrome and Colour Television”, New Age
3. A. M. Dhake, “TV and Video Engineering”, McGraw Hill Education
4. R. G. Gupta, “Audio and Video Systems”, McGraw Hill

Consumer Electronics Lab
TIU-DEC-L208

Credits: 2

1. To study the internal layout of black and white TV receiver.
2. To study the Internal adjustment, control and fault finding procedure of Black & White TV.
3. To study the internal layout of colour television
4. To study the internal adjustments control and simple troubleshooting techniques of Colour TV.
5. Fault finding in given Colour TV :
i) No color ii) Red Colour only iii) Blue color only iv) Green color only.
v) Magenta color only vi) Cyan only vii) Yellow only viii)No raster, No Sound.
6. Fault finding in given Colour TV :
i) In HSYNC section ii) In VSYNC section iii) In SYNC separator

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

7. Installation of DTH System
8. Estimate the cost, layout of Cable TV.
9. Collect information about Set Top box used for Cable TV at home

Management Fundamentals
TIU-DMG-T202
L-T-P: 2-1-0
Credits: 3

Group – A 01. Overview of Business

1.1 Types of Business
• Service
• Manufacturing
• Trade

1.2 Industrial Sectors
Introduction to
• Engineering Industry
• Process Industry
• Textile Industry
• Chemical Industry
• Agro-Industry

1.3 Globalization
• Introduction
• Advantages and Disadvantages with respect to India

1.4 Intellectual Property Rights (I. P. R.)

02. Management Process

2.1 What is management?
• Evolution
• Various Definitions
• Concept of management
• Levels of management
• Administration & management
• Scientific management by F. W. Taylor

2.2. Principles of Management (14 principles by Henry Fayol)

2.3 Functions of Management

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

• Planning
• Organizing
• Directing
• Controlling

Group – B 03. Organizational Management

3.1 Organization:-
• Definition
• Steps in Organization

3.2 Types of Organization
• Line
• Line & staff
• Functional
• Project

3.3 Departmentation
• Centralized & Decentralized
• Authority & Responsibility
• Span of Control

3.4 Forms of Ownership
• Proprietorship
• Partnership
• Joint Stock
• Co-operative Society
• Govt. Sector

04. Human Resource Management

4.1 Personnel Management
• Introduction
• Definition
• Objectives
• Functions

4.2 Staffing
• Introduction to HR planning
• Recruitment Procedure

4.3 Personnel – Training & Development
• Types of Training
• Induction
• Skill Development

4.4 Grievance Handling

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

4.5 Leadership & Motivation
• Maslow's Theory of Motivation

4.6 Safety Management
• Causes of Accident
• Safety Precautions

4.7 Introduction to
• Factory Act
• ESI Act
• Workmen Compensation Act
• Industrial Dispute Act

Group – C 05. Financial Management
5.1 Financial Management – Objectives and Functions

5.2 Capital Generation & Management
• Types of Capitals
• Sources of Raising Capitals

5.3 Budgets and Accounts
• Types of Budgets
• Production Budget (including Variance Report)
• Labour Budget
• Different Financial Ratios
• Introduction to Profit & Loss Account (only concepts)• Balance Sheet

5.4 Introduction to
• Excise Tax
• Service Tax
• Income Tax
• VAT
• Custom Duty

06. Materials Management
6.1 Inventory Management (no numerical)
• Meaning & Objectives

6.2 ABC Analysis

6.3 Economic Order Quantity (EOQ)

6.4 Stores function, stores system, BIN card, Materials Issue Request (MIR), Pricing of Materials,
Introduction and Graphical Procedure

6.5 Purchase Procedure

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

• Objects of Purchasing
• Functions of Purchase Department
• Steps in Purchasing

6.6 Modern Techniques of Material Management

Introductory treatment to JIT/SAP/ERP

Group – D 07. Safety Engineering

7.1 Accidents – causes of accidents, welfare measures
7.2 Need for safety
7.3 Organization for safety
7.4 Safety committee
7.5 Safety programmes
7.6 Safety Measures

Recommended Textbooks:

1. Dr. O. P. Khanna, "Industrial Engineering & Management", Dhanpat Rai
2. V. A. Viswanath, A. S. Nair & S. L. Sabu, "Industrial Engineering and Management", Scitech
3. A. Bhat & A. Kumar, "Management Principles, Processes & Practices", Oxford University Press
4. Dr. S. C. Saksena, "Business Administration & Management", Sahitya Bhavan Agra
5. W. H. Newman, E. K. Warren & A. R. McGill, "The Process of Management", Prentice Hall
6. R. S. Davar, "Industrial Management", Khanna Publications
7. Banga & Sharma, "Industrial Organisation & Management", Khanna Publications
8. Jhamb & Bokil, "Industrial Management", Everest Publications

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

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
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

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

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
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

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

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.
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).

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

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).
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

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

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

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

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

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 1st 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
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

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

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.

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 &

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

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

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

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

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 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

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

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

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