DKTE Society's
TEXTILE & ENGINEERING INSTITUTE
(An Autonomous Institute)

Rajwada , Ichalkaranji 416115

ELECTRONICS AND TELECOMMUNICATION ENGINERING DEPARTMENT

CURRICULUM
B.Tech Electronics and Telecommunication Engineering Program

Second Year

With Effect From

2017-18

Promoting Excellence in Teaching Learning & Research

Semester - III

Sr. No.	Course Code	Name of the Course	Group	Teaching Scheme										
				Theory	Tutorial	Practical					Practical		Total	Credit
				Hrs / week	Hrs / week	Hrs / week	Total	SE I	SE II	SEE	CIE	SEE		
1	ETL201	Engineering Mathematics-III	A	3	-	-	3	25	25	50	-	-	100	3
2	ETL202	Analog Circuits & Design-I	D	4	-	-	4	25	25	50	-	-	100	4
3	ETL203	Digital Electronics & Microprocessor	D	4	-	-	4	25	25	50	-	-	100	4
4	ETL204	Network Analysis	D	3	1	-	4	25	25	50	-	-	100	4
5	ETL205	Measurements and Instrumentation	D	3	-	-	3	25	25	50	-	-	100	3
6	ETL206	C Programming	D	2	-	-	2	-	-	-	-	-	-	2
7	ETP202	Analog Circuits & Design-I Lab	D	-	-	2	2	-	-	-	50	50	100	1
8	ETP203	Digital Electronics & Microprocessor lab	D	-	-	2	2	-	-	-	50	50	100	1
9	ETP206	C Programming Lab	D	-	-	2	2	-	-	-	50	50	100	1
10	ETD207	Mini Project I	F	-	-	2	2	-	-	-	50	-	50	2
Total				19	1	8	28	125	125	250	200	150	850	25
11	ETL208	Environment Studies- Part I (Mandatory Audit Course)	C	2	-	-	2	-	-	-	-	-	-	2 Units
Total				21	1	8	30	125	125	250	200	150	850	25

Abbreviations:

CIE: Continuous Internal Evaluation
SEE: Semester End Examination
SE-I: Semester Examination-I
SE-II: Semester Examination-II

Group Details

A: Basic Sciences
B: Engineering Sciences
C: Humanities, Social Sciences & Management
D: Professional Subjects - Core and Electives
E: Open Electives
F: Project/ Seminar/ Training

Second Year B.Tech.
ETL201 ENGINEERING MATHEMATICS -III

Teaching Scheme	
Lectures	3 Hrs. /Week
Total Credits	3

Evaluation Scheme	
SE-I	25
SE-II	25
SEE	50
Total	**100**

Prerequisites-Engineering Mathematics-I, Engineering Mathematics-II

Course Objectives

1. To provide knowledge of Linear differential equations and partial differential equations.
2. To provide knowledge of fourier series
3. To provide knowledge of Laplace transforms
4. To provide knowledge of vector differentiation and vector integration.

Course Outcomes

At the end of the course students will be able to

1. Use the knowledge L.D.E. And P.D.E. to solve the problems related to linear circuits.
2. Apply fourier series to solve the problems of signal system
3. Apply the Laplace transforms to solve differential equations.
4. Apply the knowledge of vector differentiation and vector integration .

Course Contents

Unit 1. **Linear Differential Equations** **7Hrs.**

Linear Differential Equations with constant coefficients, Applications of LDE with constant coefficients to Electrical systems.

Unit 2. **Partial Differential Equation :** **6 Hrs.**

Four standard forms of partial differential equation of first order viz :
i)f(p,q)=0, ii)f(p,q,z)=0,iii)f(x,p)=f(y,q),iv)f(x,y,p,q,z)=0

Unit 3. **Fourier series:** **6 Hrs.**
Definition, Euler's formulae, Conditions for a Fourier expansion, Functions having points of discontinuity, change of interval, expansions of odd and even periodic functions, Half range series.

Unit 4. **Laplace Transform and applications** **7Hrs.**
Definition, properties of Laplace transforms, transforms of derivatives, transforms of integral, Inverse Laplace transforms, Convolution theorem. , Heaviside Unit step function, Dirac-delta function, Periodic function

Unit 5. **Vector Differentiation :** **6 Hrs.**
Differentiation of vectors, Gradient of scalar point function, Directional derivative, Divergence of vector point function, Curl of a vector point function. Irrotational and solenoidal vector field.

Unit 6. **Vector Integration:** **7Hrs**
The line integral, Surface integral, volume integral, Gauss's Divergence theorem, Stoke's theorem, Green's theorem (Without proof).

Reference Books

1. A text book of Applied Mathematics: Vol. I, II and III by J. N. Wartikar& P. N. WartikarVidyarthiGrihaPrakashan, Pune.
2. Higher Engineering Mathematics by Dr. B. S. Grewal.
3. Advanced Engineering Mathematics by Erwin Kreyszig, Wiley India Pvt. Ltd.
4. Advanced Engineering Mathematics by H. K. Dass, S. Chand, New Delhi.
5. A text book of Engineering Mathematics Volume I by Peter V. O'Neil and Santosh K. Sengar, Cengage Learning.
6. Mathematical methods of Science and Engineering by Kanti B. Datta, Cengage Learning.
7. A text book of Engineering Mathematics by N. P. Bali, Iyengar, Laxmi Publications (P) Ltd., New Delhi

Second Year B.Tech.
ETL202: Analog circuits & Design-I

Teaching Scheme	
Lectures	4 Hrs. /Week
Total Credits	4

Evaluation Scheme	
SE-I	25
SE-II	25
SEE	50
Total	**100**

Course Objectives

1. To depict an introduction and basic understanding of devices.
2. To understand selection of components in an application based on their specification.
3. To develop analytical skills and basic circuit design techniques using Active and Passive devices.
4. Develop an ability to analyse the electronic circuit.

Course Outcomes

Upon successful completion of this course, the student will be able to

1. Apply basic engineering science to electronic circuit to design and analyse it.
2. Able to construct and develop unregulated and regulated DC power supplies
3. Students will be able to analyse and design different voltage amplifier circuits and its frequency response.
4. Students will able to understand advanced electronic components.

Course Contents

Unit 1. Unregulated Power Supplies: 8 Hrs.

Rectifier- Operation, Parameter Evaluation and Design of Half Wave, Full Wave Centre tapped and Bridge Rectifier.
Filters-Need of Filters, Types (C, L, LC, CLC), Design of rectifiers with filters.

Unit 2. Regulated Power Supplies: 8 Hrs.

Needof voltage regulator andClassification.
Discrete Regulators-Analysis and Design of Zener Shunt Regulator, Transistor Shunt Regulator, Emitter Follower Regulator, Series Pass Regulator(with Pre- regulator & Overload protection circuit).
Study and design of regulators using IC's:78XX, 79XX, 723, LM317, Switching regulator: Introduction, study of LM3524.

Unit 3. BJT Biasing: 8 Hrs.

BJT Overview: Physical structure, Transistor currents, CE, CB & CC configuration, CE Configuration characteristics curves (Cutoff, Active & saturation regions),
Biasing:Requirement of biasing, DC load line analysis, operating point,

thermal runaway, Different biasing circuits: fixed bias, collector to base bias & voltage divider bias. Stability factor, General expression for stability factor, stability factor for all biasing circuits.

Unit 4. BJT Voltage Amplifiers: 8 Hrs.

Single Stage Amplifier- H-Parameters, Hybrid model for transistor (CE, CB & CC configuration), amplifier equations for Voltage Gain, Current gain, Input resistance & Output resistance, Approximate H-parameter model, Design of single stage RC coupled amplifier & Emitter follower.

Unit 5. Amplifiers Frequency Response: 8 Hrs

Low frequency response: Effect of emitter bypass capacitor(CE) & Coupling capacitor(CC), Amplifier response to square wave(Sag & Rise Time)

High frequency response: Hybrid π model, Derivation for CE short circuit & resistive current gain, β&αcutoff frequency, Gain Bandwidth Product.

Unit 6. Introduction to FET & MOSFET: 8 Hrs

FET- Classification, Construction and Operation, Characteristics, Merits and Demerits of JFETs, Practical FET structure. Biasing Methods.

MOSFET- Depletion and Enhancement type MOSFETs, Characteristics and Handling Precautions. Difference between JFETs and MOSFETs.

Reference Books

1. Bell, David A. /"Electronic Devices & Circuits"/ Prentice-Hall (India), 4th Ed.
2. Salivahanan, S. & Kumar, Suresh N. &Vallavraj / "Electronic Devices & Circuits" / Tata McGrawHill.
3. Allen Mottershed /"Electronic devices & circuits"/ Prentice- Hall India.
4. N.C. Goyal& R.K. Khetan /"Monograph on Electronics Design Principles"/ Khanna Publishers.
5. Robert L. Boylsted, Louis Nashelsky /"Electronic devices & circuit theory"/ Pearson Education.
6. J. Millman&C.Halkias/ "Electronic devices & circuits", Tata McGraw Hill Publication.
7. Milliman, J. Halkias/ "Integrated Elctronics", Tata McGraw Hill Publication.
8. J.B. Gupta/"Electronic Devices & Circuits"/Katson Publications.

Second Year B.Tech.
ETP202: Analog circuits & Design-I Lab

Teaching Scheme	
Practical	2 Hrs. /Week
Total Credits	1

Evaluation Scheme	
CIE	50
SEE	50
Total	**100**

List of Experiments

1. Study of ratings of Electronic components and lab equipment
2. Design and analysis of Half wave rectifier (with & without filter).
3. Design and analysis of Centre Tap full wave rectifier (with & without filter).
4. Design and analysis of Bridge rectifier (with & without filter).
5. Design and analysis of zener shunt regulator
6. Design and analysis of transistorized shunt regulator
7. Design and analysis of emitter follower regulator
8. Design and analysis of series pass voltage regulator
9. Study of IC voltage Regulator
10. Design and analysis of voltage divider bias circuit.
11. Determination of H-parameter for CE configuration using input and output characteristics.
12. Calculation of performance parameters (Av, Ai, Ri, Ro) for single stage RC coupled amplifier
13. Design and study frequency response of single stage RC coupled amplifier
14. Design and study frequency response of Emitter Follower.
15. Calculation of sag for low frequency square wave response of single stage RC amplifier
16. Design and study frequency response of Two stage RC coupled amplifier.

Second Year B.Tech.
ETL203: Digital Electronics & Microprocessor

Teaching Scheme	
Lectures	4 Hrs/week
Credits	4

Evaluation Scheme	
SE-I	25
SE-II	25
SEE	50
Total	**100**

Course Objectives

1 To Understand principles, characteristics and operations of combinational & sequential logic circuits.

2 Explain Boolean algebra and the various methods of Boolean function reduction, Kmap Reduction.

3 To design, implement and analyze, asynchronous and synchronous sequential circuits

4 To gain basic understanding of Logic Families and their implementation

5 To develop fundamental knowledge and core expertise in microprocessor.

6 To write assembly language programs for microprocessor useful in various applications.

Course Outcomes
At the end of the course students will be able to

1. Students will be able to apply the concepts of digital circuits and design combinational logic and implement.
2. Students will be able to apply various Boolean expression reduction techniques to minimize the hardware.
3. Students will be able to Demonstrate logical skills, debugging skills in designing small digital circuits for Industrial applications
4. Students will be able to understand basic processor architecture and implementation
5. Students will be able to write Assembly language program in 8085 as well as apply various interfacing techniques for various applications

Course Contents

Unit 1.	**Combinational Logic** Reducing Boolean Equations: MIN terms, MAX terms, K-maps Adder, subtractor, Four bit parallel adder, Look ahead carry adder, Parity bit generator/checker, Comparator, MUX/DEMUX, decoder, BCD to 7 Segment Decoder,Code converters, Design of ALU	**8 Hrs.**
Unit 2.	**Sequential Logic** 1 Bit Memory Cell, Latches (SR, JK, D and T), Clocked latches (SR, JK, D and T), flips flop (JK, T and D).conversion of FF. State machines: Mealy and Moore machines, Analysis and design of a sequential circuit using state diagram. State reduction.	8 **Hrs.**
Unit 3.	**Digital System Applications** Shift Registers, Universal shift registers, Counters: Synchronous, Asynchronous, Ring counter, Johnson counter.Memory and their types like ROM, RAM, EPROM, EEPROM, D-RAM etc.	8 **Hrs.**
Unit 4.	**Logic Families** Introduction to Logic Families, Transistor-Transistor Logic(TTL), Emitter-Coupled Logic(ECL), MOSFET Logic, NMOS & PMOS, CMOS Logic, CMOS Implementation	8 **Hrs.**
Unit 5.	**Fundamentals of Microprocessor** 8085 architecture, programming model: pin functions, De-multiplexing of Address/Data bus, Introduction to Timing diagram-T-state, machine cycle, WAIT state, Single cycle and single step execution, stack operations and subroutines, Interrupt structure	8 **Hrs.**
Unit 6.	**Programming of 8085** Addressing modes, Instruction set, Timing diagram of instructions, Assembly language programming, Basic Interfacing Concepts, Introduction to Interfacing(8255,LED,Display,motor.	**8 Hrs.**

Reference Books

1 Roth Kinney, "Fundamentals of Logic Designs", 6th edition, CENGAGE learning (For Lab Design Problems)

2 A. Anand Kumar, "Fundamentals of digital circuits" 1st edition, PHI publication, 2001

3 Anil K. Maini, "Digital Electronics principles and Integrated Circuits" Wiley Publications

4 Ramesh Gaonkar, "Microprocessor Architecture Programming and Application with 8085", Penram International Publishing India.

5 K. Udaykumar,b S Umashankar,The 8085 Microprocessor-Architecture & programming and Interfacing

6 Intel Datasheet(8085)

Second Year B.Tech.
ETP208: Digital Electronics & Microprocessor

Teaching Scheme	
Practical	2 Hrs. /Week
Total Credits	1

Evaluation Scheme	
CIE	50
SEE	50
Total	**100**

List of Experiments

1. Realization of basic gates using universal gates.
2. Design of Half adder and full adder using logic gates.
3. Design of Half subtractor and full subtractor using logic gates.
4. Design of 8:1 MUX using IC 74151.
5. Design 1:8 DEMUX using IC 74138.
6. Study of basic gates using TTL and CMOS IC.
7. Study of D FF and JK FF.
8. Design and test counter using Flip-flop.
9. Design and test MOD 4 counter using Flip-flop.
10. Experiment Based on Arrays:- (Minimum one)
    Exchange, Addition, Finding Minimum / Maximum, Ascending / Descending, etc.
11. Experiment Based on Arithmetic and Logical Operation:- (Minimum one)
    Multidigit Addition, Multiplication / Division, Finding Even / Odd Numbers, Factorial,Fibonacci Series.
12. 8255 Based Experiments: (Minimum one) Display interface using 8255,Stepper motor interface,ADC,DAC

Second Year B. Tech.
ETL204: Network Analysis

Teaching Scheme	
Lectures	3 Hrs /Week
Tutorial	1 Hr /Week
Total Credits	4

Evaluation Scheme	
SE-I	25
SE-II	25
SEE	50
Total	**100**

Course Objectives

1 To introduce the concept of circuit elements lumped circuits, circuit laws and reduction.
2 To study the transient response of series and parallel A.C. circuits.
3 To study the concept of coupled circuits and two port networks.
4 To make the students capable of analyzing any given electrical network.
5 To make the students learn how to synthesize an electrical network from a given Impedance/admittance function.

Course Outcomes

At the end of the course students will be able to

CO1 Students will be able to analyze circuit system using graphical & analytical method to calculate the circuit parameters using direct application of different network analysis techniques.

CO2 Students can find different parameters of two port networks analyze and formulate network function of a network using pole and zero concepts and comment on stability of system.

CO3 Students can demonstrate knowledge of resonance in a series and parallel circuits.

CO4 Students can apply filter approximations to design analog passive filters.

CO5 Students will be able to perform Network synthesis which will help them to design circuits with desired properties.

Course Contents

Unit 1. **Development Of Basic Circuit Concepts And Graph Theory** **6 Hrs.**

Passive & active elements, Lumped & distributed elements, Definitions: Node, Loop, Path & Branch, source transformation, star-delta transformation, loop analysis, node analysis, Supermesh and supernode analysis.(Examples – Kirchoff's Laws and Application, formulations of networks, loop analysis, node analysis (Both AC & DC).

Graph Theory: Graph of a network, Trees, chords and branches, Incidence matrix, loop matrix, Tie-set and cutest of a graph, examples based on above concepts

Unit 2. **Resonance** **6 Hrs.**

Introduction to resonance, Series resonance, Parallel resonance, Q Factor-half power frequency, resonant frequency- Variation of impedance, admittance, current & voltage across L & C with respect to frequency, Effect of resistance on frequency response, Selectivity , B.W.& Quality factor

Parallel resonance – Anti resonance frequency, variation of impedance & admittance with frequency

Unit 3. **Network Theorems: (Both Dc & Ac Circuit Analysis)** **6 Hrs.**

Duality Theorem, Linearity & Super Position theorem, Thevenin's theorem, Norton's Theorem, Reciprocity Theorem, Compensation Theorem, Millman's Theorem, Maximum Power Transfer theorem.

Unit 4. **Two Port Parameters** **6 Hrs.**

Relationship of Two-port variables, short-circuit admittance parameters, the open circuit impedance parameters, transmission parameters, the hybrid parameters, relationships between parameters sets, series & parallel connections of two-port networks

Network Functions: Poles and Zeros terminal pairs or port network functions for the one port and two port, the calculation of network functions, ladder network general networks, poles and zeros of network functions, restrictions on pole and zero locations for transfer functions

Unit 5. **Transient Analysis** **6 Hrs.**

Initial Conditions: Initial conditions in elements, procedure for evaluating initial conditions, The Laplace Transformation, some basic theorems for the Laplace transformation, examples of the solution of problems with the Laplace transformation, partial fraction expansion, Steady state & transient response (Voltage & Current), DC response of RL circuit, DC response of RC circuit, DC response of RLC circuit, Sinusoidal response of RL, RC & RLC circuit

Unit 6. **Filters** **6 Hrs**

Introduction, Classification, Low pass, High pass, Band pass & Band reject filter, Design & analysis of constant K, M derived & composite filters (low pass, high pass, band pass & band stop filters): T & Pi sections.

Reference Books

1 A. Sudhakar ,ShyammohanS.Palli 'Circuit & Network – Analysis & Synthesis' IIIrd Edition – Tata McGraw Hill Publication
2 A.Chakrabarti 'Circuit Theory (Analysis & Synthesis)' - IIIrd Edition, DhanpatRai& co
3 D. Roy Choudhury 'Networks & Systems' - New Age International Publisher
4 Soni Gupta 'Electrical Circuit Analysis' DhanpatRai& Co.
5 Boylestad 'Introductory Circuit Analysis – Universal book stall, New Delhi.
6 William H Hayt, Jack E Kimmerly and Steven M.Durbin, Engineering Circuit Analysis, Tata McGraw Hill
7 M.E.VanValkenburg ' Network Analysis' – IIIrd Edition , Pearson Education / PHI
8 JosephEdministrar 'Theory & Problems of Electronic Circuit (Schaum's series) – Tata McGraw Hill, Publication
9 R.G .Kaduskar, S.O.Rajankar, T.S. Khatavkar, Network Fundamentals and Analysis – Wiley India

Second Year B. Tech
ETL205: Measurements & Instrumentation

Teaching Scheme	
Lectures	3 Hrs/ week
Total Credits	3

Evaluation Scheme	
SE-I	25
SE-II	25
SEE	50
Total	**100**

Course Objectives

1 To Understand the basic theory & operation of different transducers
2 To Understand concepts of Data acquisition
3 To Realize importance of Measurements Systems and Measuring Instruments
4 To understand the basic theory of oscilloscope, signal generator &analyser
5 To Understand different bridges & power devices

Course Outcomes

At the end of the course students will be able to

1 Understand applications of different transducers.
2 Understand applications of Data Acquisition system
3 Understand need & use ofmeasurement systems & instruments
4 Understand use of oscilloscope, signal generator & analyzer
5 Understand use of different bridges & power devices

Unit No.	Contents	No. of Hours
1	**Transducers** Definition, Various Types of Transducers, Classification of Transducers, Detailed Study of Transducers: (i) Motion, (ii) Flow, (iii) Pressure, (iv) Temperature, (v) Force and Torque, (vi) Sound Transducer, Hall Effect Transducers, Digital Transducers, Proximity Devices, optical Sensors, Smart Sensors, Piezo-electric sensors.	**08**
2	**Data Acquisition System** Introduction,Signal Conditioning of inputs , Sample and hold.DAC concepts: Binary weighted DAC, R-2R ladder circuit DAC. ADC concept: flash, single slope, dual slope, stair case Ramp ADC, successive approximation ADC and DVM.	**06**

3	**Measurements Systems and Measuring Instruments** Measurements, significance of measurements, methods of measurements-Direct & indirect method, Performance characteristics- static and dynamic characteristic, Errors- Types & source of error.	**06**
4	**Oscilloscope** Block diagram based study of CRO, Sweep Modes, Role of delay line, single and Dual beam Dual trace CROs, Chop and Alternate modes, Measurement of Voltage, Frequency, Lissajous Figures in Detection of frequency and phase, Introduction to Digital Storage oscilloscope (DSO).	**04**
5	**Signal Generators and Analyzer** Signal generators: Function generators, Sweep, pulse and square wave generator. Wave Analyzers: Introduction, basic wave analyzer, heterodyne harmonic distortion analyzer, spectrum analyzer, logic analyzer,	**06**
6	**AC and DC Bridges** Measurement of Resistance with Bridges, Wheatstone's Bridge, Kelvin Double Bridge, AC Bridges such as Haye's Bridge, Wein Bridge, Maxwell's-Wein Bridge, Maxwell' L/C Bridge, Descourty's Bridge & Schering Bridge	**06**

Reference Books

1 A.K.Sawhney 'A Course in Electrical & Electronics Measurement & Instrumentation.' –11th Edition, 1996 --DhanpatRai& sons
2 C.S. Rangan ,G.R. Sharma , V.S.V. Mani 'Instrumentation devices and system' 2nd edition --Tata McGraw Hill Publication
3 B.C.Nakra, K.K.Choudhary 'Instrumentation, Measurement and Analysis', 2nd edition -- Tata McGraw Hill Publication
4 E.O.Doebeline.'Measurement systems application and design 'Tata McGraw Hill Publication
5 Oliver Cage 'Electronic measurement and instrumentation 'Tata McGraw Hill Publication
6 H .S. Kalsi 'Elecronic Instrumentation' – 2nd edition --Tata McGraw Hill Publication
7 A. D. Helfrick , W. D. Cooper ' Modern Electronic Instrumentation and Measurement Techniques'-- Pearson Education
8 M.D. Singh &Khanchandani : Power Electronics McGraw Hill publication (Ch.7)
9 P.C.Sen: Power electronics; MGH publication (Ch.7)

Second Year B.Tech.
ETL206 : C Programming

Teaching Scheme	
Lectures	2 Hrs/ week
Total Credits	2

Evaluation Scheme	
SE-I	25
SE-II	25
SEE	50
Total	100

Course Objectives

1. Provide knowledge of Basic Programming concepts
2. Provide information of different inbuilt and user defined data types in C
3. Provide knowledge about different control statements structures in C
4. Provide knowledge of Functions and Pointers in C
5. Provide Knowledge of file handling using C Programming

Course Outcomes

At the end of the course students will be able to

1. Understand the basic programming concepts.
2. Understand the use of different data types available in C.
3. Understand how a good program design can reduce coding and debugging time.
4. Apply C programming concepts in engineering applications.
5. Demonstrate good programming skills.

Course Contents

Unit 1. **Introduction to C Programming Language:** Introduction to C programming Language, Constants, Variables and Keywords with its datatypes, C storage classes,arithmetic and logical operators with its hierarchy. **4 Hrs.**

Unit 2. **Decision, Loop and case control structures:** Introduction to control instructions in C, Decision control structure-if, if-else , nested if-else, Conditional operator,Loop control structure-while-loop,do-while loop,for loop,break statement,continue statement. Case control Structure-switch case. **5 Hrs.**

Unit 3. **Functions and Pointers:** Introduction to functions, passing values between functions, scope rules of function, recursion.Pointers-Introduction to pointers, pointer notation,advanced features of function return type - call by value & call by reference. **5 Hrs.**

Unit 4. **Array and Strings:** Array- Introduction, Declaration and Initialization of array, types of arrays-two dimensional array, multi-dimensional array, **4 Hrs.**

array of pointers, string-standard string library functions

Unit 5. **Structures:** Structures, Arrays of Structures, Passing Structures to Functions, Structure Pointers. **3 Hrs.**

Unit 6. **Unit VI File handling:** Concept of file – text, binary, files and streams, opening and closing of files **3 Hrs**

Reference Books

1. Yashwant Kanetkar-'Let Us C'-,8th edition-BPB Publications.
2. Pradip Dey,Manas Ghosh-'Programming in C'-II edition-OXFORD University Press
3. E Balgurusamy –'Programming in ANSI C' -, Vth Edition- Tata Mc- Graw Hill Publication
4. Brian W. Kernighan ,Dennis M. Ritchie-'The C Programming Language' –IInd Edition Prentice Hall of india

Second Year B.Tech.
ETP206 : C Programming Lab

Teaching Scheme	
Practical	2 Hrs. /Week
Total Credits	1

Evaluation Scheme	
CIE	50
SEE	50
Total	**100**

List of Experiments

1. Develop a Program for implementation of arithmetic and logical operations
2. Develop a Program for implementation of decision control statements
   - if……
   - if ……. else
   - ternary operator
3. Develop a Program for implementation of loop control statements
   - for….
   - do…while…
   - while….
   - switch case
4. Develop a Program for implementation of functions
   - call by value
   - call by reference
5. Develop a Program for implementation of arithmetic operation to demonstrate concept of adding functions to the library
6. Develop a Program for implementation of pointer.
7. Develop a Program for implementation of array
   - One-dimensional array
   - Multi-dimensional array
8. Develop a Program for string manipulation
9. Develop a Program for implementation of structures
10. Develop a Program for implementation of Union
11. Develop Program using file handling.
12. Develop Program for Computer port programming

Second Year B. Tech
ETL208: Environmental Studies Part-I

Teaching Scheme	
Lectures	2 hrs / week
Total Units	2

Evaluation Scheme	
SE-I	-
SE-II	-
SEE	-
CIE	-
Total	**2 units**

Course Objectives

1 To define multidisciplinary nature of environmental studies.
2 To explain causes and effects of environmental pollution.
3 To explain social issues of the environment.
4 To describe eco-friendly and sustainable development in environment.
5 To examine the local environmental problems.

Course Outcomes

At the end of the course students will be able to

1 Understand definition and importance of environment.
2 Identify causes and effects of environmental pollution.
3 Understand control measure of industrial pollution.
4 Understand social issues of the environment.
5 Observe local environmental problems (group project work).

Course Contents

Unit 1. **N <u>Nature of Environmental Studies</u>:** **3 Hrs.**

Definition, scope and importance.

Multidisciplinary nature of environmental studies. Need for public ic aawareness.

Unit 2 **Natural Resources and Associated Problems:** **10 Hrs.**

Forest resources: Use and over-exploitation, deforestation. Timber extraction, mining, dams and their effects on forests and tribal people.

Mineral resources: Usage and exploitation, environmental effects of extracting and using mineral resources.

Food resources: World food problem, changes caused by agriculture effects of modern agriculture, fertilizer-pesticide problems.

Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of altrnate energy sources.

Land resources: Land as a resource, land degradation, man induced landslides soil erosion and desertification. Role of an individual in conservation of natural resources.

Unit 3 **Ecosystems:** Concept of an ecosystem, Structure and function of an ecosystem. Producers, consumers and decomposers. Energy flow in the ecosystem, Ecological succession. Food chains, food webs and ecological pyramids. Introduction, types, characteristics features, structure and function of the following ecosystem - Forest ecosystem. Grassland ecosystem.Desert ecosystem.Aquatic ecosystems (Ponds, Lakes). Aquatic ecosystems (Lakes, Rivers). Aquatic ecosystems (Streams, Oceans, Estuaries). **Mini Project Part -I** **11 Hrs.**

Text Books

1 Agarwal, K.C.2001, Environmental Biology, Nidi Pub. Ltd., Bikaner.

2 BharuchaErach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad 380013, India, Email:mapin@icenet.net (R)

Reference Books

1 Brunner R.C.,1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p

2 Clank R.S. Marine Pollution, Clanderson Press Oxford (TB)

3 Cunningham, W.P. Cooper, T.H.Gorhani, E. & Hepworth, M.T.2001, Environmental Encyclopedia, Jaico Pub. Mumbai, 1196p

4 De A.K., Environmental Chemistry, Wiley Wastern Ltd

Second Year B.Tech.
ETP214: Mini Project -I

Teaching Scheme			**Evaluation Scheme**	
Practical	2 Hrs. /Week		CIE	50
Total Credits	2		**Total**	**100**

Instruction:
Students have to carry out one mini project in a group of maximum two to three students.

DKTE Society's
TEXTILE & ENGINEERING INSTITUTE
(An Autonomous Institute)

Rajwada , Ichalkaranji 416115

ELECTRONICS AND TELECOMMUNICATION ENGINERING DEPARTMENT

CURRICULUM
B.Tech Electronics and Telecommunication Engineering Program

Second Year

With Effect From

2017-18

Promoting Excellence in Teaching Learning & Research

Semester - IV

Sr. No.	Course Code	Name of the Course	Group	Teaching Scheme										
				Theory	Tutorial	Practical					Practical		Total	Credit
				Hrs /	Hrs /	Hrs /	Total	SE	SE	SEE	CIE	SEE		
				week	week	week		I	II					
1	ETL209	Analog Circuits & Design-II	D	4	-	-	4	25	25	50	-	-	100	4
2	ETL210	Linear Integrated Circuits	D	4	-	-	4	25	25	50	-	-	100	4
3	ETL211	Data structure	D	3	-	-	3	25	25	50	-	-	100	3
4	ETL212	Electromagnetic Engineering	D	3		-	3	25	25	50	-	-	100	3
5	ETL213	Analog Communication Systems	D	4	-	-	4	25	25	50	-	-	100	4
6	ETP209	Analog circuits & Design-II and Circuit simulation lab	D	-	-	2	2	-	-	-	50	50	100	1
7	ETP210	Linear Integrated Circuits Lab	D	-	-	2	2	-	-	-	50	50	100	1
8	ETP211	Datastructure Lab	D		-	2	2				50	-	50	1
9	ETP213	Analog Communication Systems Lab	D	-	-	2	2	-	-	-	50	50	100	1
10	ETD214	Mini Project II	F	-	-	2	2	-	-	-	50	-	50	2
Total				18	0	10	28	125	125	250	250	150	900	24
11	ETL215	Environment studies- Part II (Mandatory Audit Course)	C	-	-	2	2			70*	30*	-	100*	1 Unit
Total				18	0	12	30	125	125	250	250	150	900	24

Note: Asterisk mark (*) indicates course for Minimum Pass Grade

Abbreviations:

CIE: Continuous Internal Evaluation
SEE: Semester End Examination
SE-I: Semester Examination-I
SE-II: Semester Examination-II

Group Details

A: Basic Sciences
B: Engineering Sciences
C: Humanities, Social Sciences & Management
D: Professional Subjects - Core and Electives
E: Open Electives
F: Project/ Seminar/ Training

*** field work/ project**

Second Year B.Tech.
ETL209: Analog circuits & Design-II

Teaching Scheme	
Lectures	4 Hrs. /Week
Total Credits	4

Evaluation Scheme	
SE-I	25
SE-II	25
SEE	50
Total	**100**

Course Objectives

1 To depict an introduction and basic understanding of devices.
2 To understand selection of components in an application based on their specification.
3 To develop analytical skills and basic circuit design techniques using Active and Passive devices.
4 Develop an ability to analyse the electronic circuit.

Course Outcomes

Upon successful completion of this course, the student will be able to:

1 Able to define and classify different wave shaping circuits.
2 Able to understand concept of Power Amplifier and Tunned Amplifier.
3 Describe and design different types of oscillators and multivibrators as per given specifications and requirement using BJT.
4 Understand the pros and cons of different IC Regulator circuits and select the right component for an application.

Course Contents

Unit-1 **Multistage Amplifier:** **07 Hrs**

Multistage Amplifier- **N**eed of cascading, Parameter evaluation such as Ri ,Ro, Av, Ai, bandwidth for general multistage amplifier, Design of two stage RC coupled and Direct coupled amplifier.

Unit 2. **Power Amplifiers:** **07 Hrs.**

Need of Power amplifier, classification of power amplifier, Power considerations, concept of Derating, Distortion in power amplifiers: Phase, Frequency amplitude/ harmonic / non-linear distortion, amplitude distortion using Three point methods. Design of Class A and class B power Amplifiers.

Unit 3. **Tuned Amplifiers:** **07 Hrs.**

Introduction, Classification, Single tuned and double tuned amplifier, Large signal tuned amplifier, Oscillations in tuned amplifiers, Stagger tuned amplifiers.

Unit 4. **Sinusoidal Oscillators:** **07 Hrs.**

Introduction to Feedback- General theory of feedback, Types of Feedback.
Barkhausen's criteria, Frequency and amplitude stability, Classification.
RC oscillators- RC phase shift & Wein bridge oscillator analysis & design using BJT.
LC oscillators- Colpit's&Hartely's oscillator's analysis and design using BJT. Crystal oscillator

Unit-5 **Wave Shaping Circuits** **07 Hrs**

RC Low Pass Circuit as a filter and Integrator. Its response for Square wave (Numerical Expected). RC High Pass Circuit as a filter and Differentiator. Its response for Square wave (Numerical Expected).
Clipper Circuits- Classification, Design and Analysis.
Clamper Circuits- Classification, Design and Analysis.
Voltage Multipliers.

Unit 6. **Multivibrators:** **07 Hrs.**

Transistor as a switch, Different transistor switching parameters(Numerical are expected), overdrive factor, Classification of Multivibrators, Analysis and design of Collector coupled Astable&MonostableMultivibrator, Fixed Bias and Self Bias Bistablemultivibrator. Triggering circuits for BistableMultivibrator, Schmitt Trigger using BJT.

Reference Books

1 Bell, David A. /"Electronic Devices & Circuits"/ Prentice-Hall (India), 4th Ed.
2 Salivahanan, S. & Kumar, Suresh N. &Vallavraj / "Electronic Devices & Circuits" / Tata McGrawHill.
3 Allen Mottershed /"Electronic devices & circuits"/ Prentice- Hall India.
4 N.C. Goyal& R.K. Khetan /"Monograph on Electronics Design Principles"/ Khanna Publishers.
5 Robert L. Boylsted, Louis Nashelsky /"Electronic devices & circuit theory"/ Pearson Education.
6 J. Millman&C.Halkias/ "Electronic devices & circuits", Tata McGraw Hill Publication.
7 Milliman, J. Halkias/ "Integrated Elctronics", Tata McGraw Hill Publication.
8 J.B. Gupta/"Electronic Devices & Circuits"/Katson Publications.
9 MillmanTaub/" Pulse digital and switching circuits"/ Tata McGraw Hill

Second Year B.Tech.
ETP209: Analog circuits & Design-II Lab

Teaching Scheme	
Practical	2 Hrs. /Week
Total Credits	1

Evaluation Scheme	
CIE	50
SEE	50
Total	**50**

List of Experiments

1. Design & Study of RC circuit as Low pass filter and Integrator.
2. Design & Study of RC circuit as High pass filter and Differentiator
3. Design &Study of different Clipper Circuit
4. Design &Study of different Clamper circuit
5. Study of Power Amplifiers
6. Design of RC phase shift oscillator using BJT
7. Design of wein bridge oscillator using BJT
8. Design of colpitts oscillator using BJT
9. Design of Astablemultivibrator
10. Design of monostablemultivibrator using BJT
11. Design of bistablemultivibrator using BJT
12. Design of Schmitt trigger using BJT

Second Year B. Tech
ETL210: Linear Integrated Circuits

Teaching Scheme	
Lectures	4 Hrs. /Week
Total Credits	4

Evaluation Scheme	
SE-I	25
SE-II	25
SEE	50
Total	**100**

Course Objectives

1 To Understand the basics theory of operational amplifiers and its analysis
2 To Understand concepts of op-amp configurations and their frequency response
3 To Realize importance of op-amp in regards to wave shaping and other applications
4 To Study different types of active filters
5 To Understand working of op-amp as an oscillators and some other ICs.

Course Outcomes

At the end of the course students will be able to

1 Students can understand fundamental principles of operational amplifiers & its analysis.
2 Students can understand different configurations of op-amp and frequency response.
3 Students can understand various wave shaping and other applications of op-amps.
4 Students can Analyze and design different active filters
5 Students can Analyze& Design of op-amp as an oscillators and understand some special purpose ICs

Unit No.	Contents	No. of Hours
Unit 1.	**Introduction to op-amp** Block diagram of OP-AMP, Explanations of each block, Differential amplifier analysis (AC & DC) for dual-input balanced-output configuration using 'r' parameters, level shifter, current mirror circuits, ideal parameters and practical parameters of OP-AMP, Comparative study of OP 07, LM 741, LM 311, internal circuit of IC741, Transfer characteristics of op-amp, UGB product.	**8**
Unit 2.	**Op-amp configurations & frequency response:** Virtual ground concept, Open loop configuration, closed loop configuration, unity gain amplifier, frequency Response of both configurations, Stability considerations, Frequency Compensation, Slew Rate. **Effects of slew rate**.	**8**
Unit 3.	**Applications of Op-amp** Summing, Scaling & Averaging Amplifiers using Op-amps, Differential amplifier using op-amp, Subtractor Circuit, Instrumentation amplifier, V to I & I to V Converter, Precision Rectifiers, Study of comparator, Schmitt Trigger, Clippers & Clampers, Peak Detectors, Sample & Hold Circuits, Integrator, Differentiator.	**8**

Unit 4.	**Active Filters and Signal Generators** Introduction, Analysis & Design of Butterworth filters: High Pass filter, Low Pass filter (First & Second order), Band Pass filter, Band Reject filter, All Pass Filter.	**8**
Unit 5.	**Signal Generators** Analysis & Design of RC phase shift oscillator, RC wein bridge oscillator, Colpitts oscillator, Hartley oscillator. Analysis & Design of Square wave generator, Triangular wave generator, Sawtooth wave generator.	**8**
Unit 6.	**Special Purpose ICs** IC 555 Timer: Block Diagram, Operating Principle, Multi-vibrator using IC 555. VCO, IC 565 PLL: Operating Principles, applications, Introduction of (block diagram, features, application areas) : IC OP177 op-amp, TL082 Texas Instruments Op-amp, IC AD620 instrumentation amplifier, INA 118 Precision, Low Power Instrumentation Amplifier	**8**

Reference Books

1 Robert Coughlin, Fredric Driscoll, "Operational Amplifiers and Linear Integrated Circuits", Sixth edition,PE, 2006. (Ch-6)
2 David Bell, "Operational Amplifiers and Linear ICs",Thirded, Oxford University Press
3 B. Somanathan Nair, " Linear Integrated Circuits- Analysis, Design & Applications", Wiley India.
4 T.R Ganesh Babu, "Linear Integrated Circuits" 3rd Edition, Scitech Publication
5 David. A. John & Ken Martin "Analog Integrated Circuit Design", Student Edition, Wiley
6 1 Ramakant A. Gaikwad, "Op Amps and Linear Integrated Circuits", Pearson Education second and latest edition.
7 Sergio Franco "Design with op-amp & Analog Integrated Circuits" , 3rd Edition, Tata McGraw Hill.
8 S.Salivahanan&Bhaaskaran "Linear Integrated Circuits" , 1st Edition, Tata McGraw Hill.

Second Year B. Tech.
ETP210: Linear Integrated Circuits

Teaching Scheme	
Practical	2 Hrs. /Week
Total Credits	1

Evaluation Scheme	
CIE	50
SEE	50
Total	**100**

List of Experiments

1. Measure op-amp parameters and compare with the specifications.
   (a) Measure input bias current, input offset current and input offset voltage.
   (b) Measure slew rate (LM/UA741C)
   (c) Measure CMRR
   (d) Compare the result with datasheet of corresponding Op Amp.
2. Design of inverting, non-inverting amplifier & their frequency response
3. Design of Summing, scaling, and averaging amplifier.
4. Design of V to I convertor
5. Design, build and test differentiator
6. Design, build and test integrator
7. Design, build and test precision half & full wave rectifier.
8. Design, build and test Comparator and Schmitt trigger.
9. Design, build and test Sample and hold circuit
10. Design of Butterworth Low pass filter
11. Design, build and test PLL IC
12. Design, build and test square wave generator.
13. Design, build and test triangular wave generator
14. Design of astable & mono stable multi vibrators using IC555
15. Design and implement Wien bridge oscillator using Op-Amp.
16. Study of TL082 IC parameters using ASKLVs trainer kit.
17. Study of inverting and non inverting configuration applications using TL082.
18. Design, build and test precision half & full wave rectifier (simulation based)
19. Design of astable and monostable multivibrators using IC555 (simulation based)

Second Year B.Tech.
ETL211: DATA STRUCTURE

Teaching Scheme	
Lectures	3 Hrs. /Week
Total Credits	3

Evaluation Scheme	
SE-I	25
SE-II	25
SEE	50
Total	**100**

Prerequisites-

Student should be proficient in C programming Language.

Course Objectives

1. Provide an introduction and basic understanding of data types and their Memory Allocations.
2. Provide basic Knowledge on Algorithms of Operations performed on Linear and NonLinear Data Structure
3. Provide basic Programming Knowledge of Data Structure with C.
4. Provides the Knowledge of using Hash Functions.
5. Provide knowledge of data structure applications in engineering field.

Course Outcomes

At the end of the course students will be able to

1. Apply knowledge of Programming in the Field of Linear and Non Linear data Structure.
2. Perform the Programs of data Structure using C.
3. Logic Development To Design an algorithm form Operation on Linear and Non Linear data Structure.
4. Understand The Concept of Hash Function.
5. Apply data structure concepts in engineering application development.

Course Contents

Unit 1. **Introduction to Data Structure:** Introduction to theory of data structures, Abstract data types, Data types, Primitive data types, Data structure and structured type.Algorithms: Algorithm analysis, complexity, time space trade-off. **4 Hrs.**

Unit 2. **Arrays and Records:**Introduction, linear arrays, traversing, inserting & deleting operations,Sorting: Insertion, Selection and Bubble sort, searching: linear search, binary search, Multidimensional arrays,Records: Recordstructures, representation of records in memory, parallel arrays. **7Hrs.**

Unit 3.	**Linked Lists:**Linked list: Introduction, Representation, Traversing & Searching operations, memory allocation, Garbagecollection, insertion & deletion of nodes of linked list, header linked list, two-way linked lists.	**6 Hrs.**
Unit 4.	**Stacks and Queues:**Introduction to stacks, stack, Stack implementation using Arrays & linked lists,Applications of stacks, Queue, representation,Queue implementation using Arrays & linked lists, circular, doubleended, priority, application of queues.	**7 Hrs.**
Unit 5.	**Trees:** Binary Tree: introduction, types, definitions, properties, representations, binary tree traversal, applications. Advanced trees: AVL trees or height balanced trees, Threaded binary trees, Expression trees,B+ trees, Heaps.	**6 Hrs.**
Unit 6.	**Graphs and Hashing:** Introduction, Graph theory terminology, sequential representation ofgraphs: Adjacency Matrix, Path matrix,Warshall's Algorithm, Traversing. Hashing, Hash functions, collision, chaining.	**6Hrs**

Reference Books

1. Data structure using C, ISRD group, Tata McGraw Hill
2. Data structures, Seymour Lipschautz, Tata McGraw Hill
3. Data structure using C &C++, Langsam, Rubenstein,Tenenbaun, PHI
4. Data structure &algorithmanalysis in C, Mark Allen Weiss, Pearson Education (LPE)
5. Introduction to Datastructures in C, A.N. Kathie, Pearson Education (LPE)

Second Year B.Tech.
ETP211: Data Structure Lab

Teaching Scheme	
Practical	2 Hrs. /Week
Total Credits	1

Evaluation Scheme	
SEE	50
Total	**50**

List of Experiments

1. Revision of C programming Concepts (Functions, Structures, Pointer etc.)
2. Program to Perform Operations on Array
3. Program on Bubble Sort
4. Program for Selection Sort
5. Program on Insertion Sort
6. Program to Perform Linear Search and Binary Search
7. Program to Perform Insert Operation on Linked List
8. Program to Perform Delete Operation on Linked List
9. Program to Perform Push and Pop Operations on Stack
10. Program to Perform Operations on Queue
11. To study Traversing of Binary Tree
12. To study Hash Function

Second Year B.Tech.
ETL212: Electromagnetic Engineering

Teaching Scheme	
Lectures/week	3
Total Credits	3

Evaluation Scheme	
SE-I	25
SE-II	25
SEE	50
Total	**100**

Prerequisites-

Course Objectives

6. To enforce vector algebra and applications of co-ordinate system to electromagnetic theory.
7. To interpret relations related to electrostatics and electromagnetic waves to understand its problem solving.
8. To understand dielectrics, polarization and various boundary conditions.
9. To apply knowledge of Maxwell equations and transmission line equations to the field and circuit theory.
10. To develop mathematical skill to solve problem for all above aspects and to motivate them for higher studies.

Course Outcomes

At the end of the course students will be able to

6. Interpret the applications of co-ordinate system to relevant topics.
7. Implement knowledge of electric field quantities and magnetic field quantities, various theorems to resolve numerical problems.
8. Understand boundary conditions for electric field and magnetic field.
9. Analyze Maxwell equations and transmission line equations and list them in different form.
10. Develop the ability to solve problems related to all above topics using different approaches.

Course Contents

Unit 1. Co-ordinate systems and vector calculus **6 Hrs.**

Digital IC Vector Algebra, Different types of Co-ordinate systems, Transformation of vectors, Curl, Divergence & Gradient Equations, line, Surface & Volume Charge distribution.

Unit 2. Electrostatic Fields **6 Hrs.**

Coulomb's law, Electric Field Intensity, Electric Field due to infiniteline and surface charges, Electric Flux Density, Gauss law (differential andintegral form) and its applications, Divergence Theorem, Electric Potentialand gradient. Work done, Energy Density, Electric Dipole and moment.

Unit 3. Dielectrics & Boundary conditions **6 Hrs.**

Polarization in Dielectrics,Boundaryconditions for Electric field, Poisson's and Laplace, Method of Images for point and line charge.

Unit 4. Magnetostatic Fields **6 Hrs.**

Biot savart law, Magnetic Field Intensity due toinfinite and finite line. Ampere's Circuital Law in integral and differentialform, Magnetic flux density, Magnetic boundary conditions, vectormagnetic potential, Magnetic Torque, moment and dipole.

Unit 5. Maxwell Equations&Wave Propagation **6 Hrs.**

Maxwell equations in point form & Integral formfor various fields, wave equations, wave propagation through Different medium, skin depth, Poynting theorem..

Unit 6. Introduction to Transmission Lines: **6 Hrs.**

Transmission Line parameters, Reflection coefficient VSWR, smith chart (Numerical expected) and its applications.

Reference Books

1 *Electromagnetic Field Theory*- Rakhesh Singh Kshetrimayum – Cengage Publishing – 2012
2 *Electromagnetic with applications* - J.D. Kraus. (MGH Publications)- 4th Edition.
3 *Fundamentals of Engineering Elecromagnetics* – Sunil Bhooshan – Oxford University press. 2012.
4 *Elements of Electromagnetic fields* - Surinder P.Seth (Dhanpat Rai Publications)

Second Year B.Tech.
ETL213: Analog Communication Systems

Teaching Scheme	
Lectures	4 Hrs/ week
Total Credits	4

Evaluation Scheme	
SE-I	25
SE-II	25
SEE	50
Total	**100**

Course Objectives

The goal of the course is to:

11. Build an understanding of fundamental concepts of Analog Communication System, various modulation , demodulation, wave propagation techniques and multiplexing schemes.
12. Become familiar with some typical signals, their waveforms and their representation in time and frequency domain.
13. Understand the different parameters of various modulations and multiplexing schemes such as signal power, modulation index, bandwidth
14. Understand the concept of Noise, types of Noise, Signal to Noise ratio, and Noise Figure.
15. Know pulse modulation, types of pulse modulation system and concepts associated with it.
16. Make aware with types and performance characteristics of different AM and FM receivers.

Course Outcomes

At the end of the course students will be able to

11. Understand different components and performance characteristics of communication system, demonstrate techniques involved in the transfer of information in the field of Radio communication.
12. Evaluate fundamental communication system parameters, such as modulation index, bandwidth, signal to noise ratio to understand the concepts communication system.
13. Categorize different types of noise, its sources and summarize the effect of noise on different types of modulation systems.
14. Develop the ability to compare and contrast the advantages and disadvantages and solve numerical to understand the concepts of different modulation systems, multiplexing schemes.
15. Understand sampling theorem, aliasing effect, and Nyquist rate & distinguish pulse modulation system from continuous wave modulation.
16. Prepare a list of practical needs of modulation, multiplexing scheme to meet multidisciplinary applications.

Course Contents

Unit 1.	**Introduction to Communication System** Elements of communication systems, Need for modulation, types of modulation, Radio spectrum and frequency allocation, time and frequency domain signals, Different types of wave propagation techniques,Noise,Sources of noise, Types of noise , shot noise, thermal noise, partition noise, low frequency or flicker noise, burst noise, avalanche noise, Noise Figure, Noise Temperature ,Noise bandwidth	**8 Hrs.**
Unit 2.	**Amplitude Modulation** Amplitude Modulation principles, mathematical representation of AM signal, AM envelope, frequency spectrum & BW, phase representation of AM wave, Modulation index, % modulation, AM modulating circuits: Low level AM modulation, medium power AM modulation, AM transmitters: Block of low level DSBFC, High level DSBFC, Trapezoidal patterns Evolution and descriptions of SSB, Suppression of carrier using balanced modulator, Suppression of unwanted sideband, Methods: Filter system, phase shift & third method, Vestigial sideband(VSB)	**9 Hrs.**
Unit 3.	**AM Receiver:** Simplified block diagram of AM receiver, receiver parameters: Sensitivity, Selectivity, BW, dynamic range, Tracking, fidelity, Types of AM receiver: TRF and super heterodyne (block diagram), AM detection types: using diode, practical diode detector, distortion in diode detector. Negative peak clipping & diagonal clipping, study of IC based AM receiver circuit, Demodulation of SSB using: product demodulator & diode balanced modulator, Automatic Gain Control (AGC).	**7 Hrs.**
Unit 4.	**Angle Modulation:** Concept of angle modulation, frequency spectrum, mathematical representation of FM signal, Narrow band & Wide Band FM, Modulation Index, Bandwidth, Phase modulation, Bessel's Function and its mathematical Analysis, Generation of FM using direct and indirect method, study of 8038 to generate FM signals, Noise triangle, Comparison of FM and PM.	**9 Hrs.**
Unit 5.	**FM receiver:** Block diagram of FM receivers, FM demodulator, tuned circuit frequency discriminators, slope detectors, fosters seely discriminator, ratio detectors, PLL-FM demodulators, study of IC based FM receiver circuit, FM noise suppression	**7 Hrs.**

Unit 6.	**Pulse Modulation:** Introduction, Sampling theorem: Occurrence of aliasing error, Mathematical proof of sampling theorem., PAM: Channel BW for PAM, Natural Sampling, Flat-top Sampling, PAM & TDM, Signal Recovery, PWM: Uses of PWM, Generation of Analog W/F using PWM, PPM: Generation of PAM, Generation of PWM, Generation of PPM.	**8 Hrs.**

Text Books

6. George Kennedy, "Electronic Communications", McGraw Hill Kennedy.
7. Wayne Tomasi 'Electronics Communication System' -Fundamentals through Advanced.-Vth Edition- Pearson Education.
8. R P Singh, S D Sapre 'Communication System-Analog & Digital' IInd Edition –Tata Mc Graw Hill Publication

Reference Books

1. V. Chandra Sekar, "Analog Communication", OXFORD University press.
2. B.P. Lathi, "Analog and Digital Communication", OXFORD University press.
3. Simon Haykin, "An introduction to analog & digital communications", John Wiley & Sons
4. Blake"Electronic Communication Systems",2nd Edition CENGAGE learning
5. Louis E. Frenzel, "Principals of electronic communication system", IIIrd Ed., TMH Pub

Second Year B.Tech.
ETP213: Analog Communication Systems

Teaching Scheme	
Practical	2 Hrs. /Week
Total Credits	1

Evaluation Scheme	
CIE	50
SEE	50
Total	**100**

List of Experiments

1. Experiment on practical implementation of Amplitude modulation and demodulation.
2. Experiment on practical implementation of calculation of modulation index by using
   a. AM signal
   b. Trapezoidal Pattern
3. Experiment on practical implementation of SSB modulation using Phase shift method and its detection.
4. Experiment on practical implementation of envelope detector using discrete components
5. Experiment on practical implementation of Frequency Modulation and its detection and also find the modulation index.
6. Experiment on practical implementation of Sampling and reconstruction and also observe aliasing effect by varying sampling frequency.
7. Experiment on practical implementation of PAM system
8. Experiment on practical implementation of PPM system
9. Experiment on practical implementation of practical implementation of PWM system
10. Experiment on practical implementation of Pre-emphasis and De-emphasis.
11. Implementation of Noisy signal in MATLAB.
12. Experiment on practical implementation of Amplitude modulation and demodulation in MATLAB.
13. Experiment on practical implementation of DSBFC signal in MATLAB Simulink.
14. Visit to Music Studio/ AIR/Doordarshan Kendra

Second Year B. Tech
ELL208: Environmental Studies- Part II

Teaching Scheme	
Lectures	2 hrs / week
Total Units	1

Evaluation Scheme	
SE-I	-
SE-II	-
SEE	70
CIE	30
Total	100

Course Objectives

1 To define multidisciplinary nature of environmental studies.
2 To explain causes and effects of environmental pollution.
3 To explain social issues of the environment.
4 To describe eco-friendly and sustainable development in environment.
5 To examine the local environmental problems.

Course Outcomes

At the end of the course students will be able to

1 Understand definition and importance of environment.
2 Identify causes and effects of environmental pollution.
3 Understand control measure of industrial pollution.
4 Understand social issues of the environment.
5 Observe local environmental problems (group project work).

Course Contents

Unit No.	Topics	Hrs
Unit 1	**Biodiversity and its Conservation:** Introduction - Definition: genetic, species and ecosystem diversity, Bio-geographical classification of India. Value of biodiversity: Consumptive use, productive use, social, ethical, aesthetic and option values. India as a mega-diversity nation. Western Ghat as a bio-diversity region. Hot-spots of biodiversity. Threats to biodiversity: habit at loss, poaching of wildlife, mad-wildlife conflicts. Endangred and endemic species of India. Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.	**6 Hrs.**

Unit 2 **Environmental Pollution:** Definition: Causes, effects and control measures of Air pollution. Water pollution. Soil pollution, Marine pollution. Noise pollution. Thermal pollution & Nuclear hazards. Solid Waste Management: Causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution. **6 Hrs**

Unit 3 **6 Hrs.**

Social Issues and the Environment: Disaster Management: Floods, earthquake, cyclone and landslides. Tsunami. Urban problems related to energy. Water conservation, rain water harvesting, watershed management. Resettlement and rehabilitation of people; its problems and concerns. Environmental Ethics: Issue and possible solutions. Global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Wasteland reclamation. Consumerism and waste products.

Unit 4 **Environmental Protection:** From Unsustainable to sustainable development. Environment Protection Act. Air (Prevention and Control of Pollution) Act. Water (Prevention and Control of Pollution) Act.Wildlife Protection Act.Forest Conservation Act. Population Growth. **6 Hrs.**

Text Books

1 Agarwal, K.C.2001, Environmental Biology, Nidi Pub. Ltd., Bikaner.

2 BharuchaErach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad 380013, India, Email:mapin@icenet.net (R)

Reference Books

1 Brunner R.C.,1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p

2 Clank R.S. Marine Pollution, Clanderson Press Oxford (TB)

3 Cunningham, W.P. Cooper, T.H.Gorhani, E. & Hepworth, M.T.2001, Environmental Encyclopedia, Jaico Pub. Mumbai, 1196p

4 De A.K., Environmental Chemistry, Wiley Wastern Ltd

Second Year B.Tech.
ETP214: Mini Project -II

Teaching Scheme	
Practical	2 Hrs. /Week
Total Credits	2

Evaluation Scheme	
CIE	50
Total	**100**

Instruction:
Students have to carry out one mini project in a group of maximum two to three students.