T K R COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous)

B.TECH. ELECTRONICS & COMMUNICATION ENGINEERING

COURSE STRUCTURE & SYLLABUS

III SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1	A43HS1	Mathematics – IV	4	1	0	4
2	A43PC2	Analog Electronics	4	1	0	4
3	A43PC3	Electrical Technology	4	1	0	4
4	A43PC4	Signals and Stochastic Process	3	1	0	3
5	A43PC5	Network Analysis	3	1	0	3
6	A43PC6	Electronic Devices and Circuits Lab	0	0	3	2
7	A43PC7	Basic Simulation Lab	0	0	3	2
8	A43PC8	Basic Electrical Engineering Lab	0	0	3	2
9	A43MC3	*Environmental Science and Technology	3	0	0	0
		Total Credits	**21**	**5**	**9**	**24**

IVSEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1	A44PC1	Switching Theory and Logic Design	3	1	0	3
2	A44PC2	Pulse and Digital Circuits	4	0	0	4
3	A44PC3	Control Systems	4	1	0	4
4	A44PC4	Analog Communications	4	0	0	4
5	A44HS5	Business Economics and Financial Analysis	3	0	0	3
6	A44PC6	Analog Communications Lab	0	0	3	2
7	A44PC7	Pulse and Digital Circuits Lab	0	0	3	2
8	A44PC8	Analog Electronics Lab	0	0	3	2
9	A44MC4	*Gender Sensitization Lab	0	0	3	0
		Total Credits	**18**	**2**	**12**	**24**

***Mandatory Course**

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B.Tech III Semester **L/T/P/C**
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MATHEMATICS- IV (A43HS1)

Course Objectives:
To learn
1. Differentiation and integration of complex valued functions
2. Evaluation of integrals using Cauchy's integral formula and residue theorem.
3. Laurent's series expansion of complex functions
4. Express a periodic function by Fourier series
5. Express a non-periodic function by Fourier transform

Course Outcomes:
After learning the contents of this paper the student must be able to
1. Analyze the complex functions with reference to their analyticity, integration using Cauchy's integral theorem
2. Find the Taylor's and Laurent's series expansion of complex functions
3. The bilinear transformation
4. Finding any periodic function in term of sines and cosines
5. Finding a non-periodic function as integral representation

UNIT–I:
Functions of a complex variable:
Introduction, Continuity, Differentiability, Analyticity, properties, Cauchy, Riemann equations in Cartesian and polar coordinates**.** Harmonic and conjugate harmonic functions-Milne-Thompson method.
Bilinear transformation- fixed point-cross ratio-properties-invariance of circles

UNIT–II:
Complex integration:
Line integral, Cauchy's integral theorem, Cauchy's integral formula, and Generalized Cauchy's integral formula, Power series: Taylor's series- Laurent series

UNIT–III:
Evaluation of integrals
Singular points, isolated singular points, pole of order m – essential singularity, Residue, Cauchy Residue theorem (Without proof).
Types of real integrals:
a) Improper real integrals $\int_{-\infty}^{\infty} f(x)dx$ b) $\int_{c}^{c+2\Pi} f(cos\theta, sin\theta)dx$

UNIT–IV:

Fourier series:

Introduction, Periodic functions, Fourier series of periodic function, Dirichlet's conditions, Even and odd functions, Change of interval, Half range sine and cosine series.

UNIT–V:

Fourier transforms

Fourier integral theorem (without proof), Fourier sine and cosine integrals, sine and cosine, transforms, properties, inverse transforms, Finite Fourier transforms

Applications Fourier Transforms: Heat Equation and Wave Equation

Text Books:

1. A first course in Complex Analysis with applications by Dennis G. Zill and Patrick Shanahan, Johns and Bartlett Publishers.
2. Higher Engineering Mathematics by Dr. B. S. Grewal, Khanna Publishers.
3. Advanced Engineering Mathematics with MATLAB by Dean G.Duffy

Reference Books:

1. Fundamentals of Complex Analysis by Saff, E. B. and A. D. Snider, Pearson.
2. Advanced Engineering Mathematics by Louis C. Barrett, McGraw-Hill.

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ANALOG ELECTRONICS (A43PC2)

Course Objectives

- To introduce circuit realizations with components such as diodes, BJTs and transistors studied earlier.
- To give understanding of various types of amplifier circuits such as small signal, cascaded, large signal and tuned amplifiers.
- To familiarize about frequency response of amplifier of tuned or untuned using BJT.
- To familiarize the Concept of feedback in amplifiers so as to differentiate between negative and positive feedback.
- To introduce concept of different types of oscillators.

Course Outcomes

Upon completion of the Course, the students will be able

- To Design and analyze small signal amplifier circuits applying the biasing techniques learnt earlier.
- To Cascade different amplifier configurations to obtain the required over all specifications Like Gain, Bandwidth, Input and Output interfacing Impedances.
- To Design and realize different classes of Power Amplifiers and tuned amplifiers use able for audio and Radio applications.
- To Design and realize the concept of tuning for required frequency with stability of amplifier for real time application.
- Utilize the Concepts of negative feedback to improve the stability of amplifiers and Positive feedback to generate sustained oscillations.

UNIT – I

Analysis and Design of Small Signal Low Frequency BJT Amplifiers

Classification of Amplifiers–Distortion in amplifiers, Miller's theorem Hybrid Models, Determination of h- parameters from transistors characteristics, Analysis of CE,CC, and CB Amplifiers , CE Amplifier with emitter resistance, r_e model of transistor ,low frequency response of BJT Amplifiers, effect of coupling and bypass capacitors, Design of single stage RC coupled amplifier, Different coupling schemes used in amplifiers, Analysis of Cascaded RC Coupled amplifiers, Cascode amplifier, Darlington pair.

UNIT – II

Transistor at High Frequency

Logarithms, Decibels. The Hybrid-pi (π)–Common Emitter transistor model, CE short circuit current gain, current gain with resistive load, single stage CE transistor amplifier response, Gain-bandwidth product.

UNIT – III

FET Amplifiers

Analysis of JFET Amplifiers, Analysis of CS, CD, CG JFET Amplifiers, comparison of performance with BJT Amplifiers, Basic Concepts of MOS Amplifiers, MOS Small signal model, Common source amplifier with resistive, Diode connected and Current source loads, Source follower, Common Gate Stage, Cascade and Folded Cascade Amplifier– frequency response.

UNIT – IV

Positive & Negative Feedback in Amplifiers

Classification of amplifiers, Concepts of feedback – Classification of feedback amplifiers – General characteristics of negative feedback amplifiers–Effect of Feedback on Amplifier characteristics–Voltage series, Voltage shunt, Current series and Current shunt Feedback configurations – Simple problems. Condition for oscillations .RC and LC type Oscillators–Frequency and amplitude stability of oscillators–Generalized analysis of LC oscillators, Quartz, Hartley, and Colpitts Oscillators–RC-phase shift and Wien-bridge oscillators.

UNIT – V

Large Signal Amplifiers

Class A Power Amplifier, Maximum Value of Efficiency of Class–A Amplifier, Transformer Coupled Class A Power Amplifier, Class A Push Pull Power Amplifier, Class B Power Amplifier, Class B Push-Pull and Complimentary Symmetry Power Amplifiers. Distortion in amplifiers- crossover distortion and harmonic distortion. Transistor Power Dissipation, Heat Sinks.

Tuned Amplifiers

Introduction, Q-Factor, Small Signal Tuned amplifier: Single Tuned Amplifier (capacitive coupling & Inductive Coupling), Double Tuned Amplifier, stagger tuned Amplifier.

TEXT BOOKS

1. Electronic Devices and Circuits, David A. Bell – 5th Edition, Oxford.
2. Electronic Devices and Circuits theory– Robert L. Boylestead, Louis Nashelsky, 11th Edition, 2009, Pearson.
3. Electronic Devices Conventional and current version -Thomas L. Floyd 2015, person

REFERENCES

1. Integrated Electronics, Jacob Millman, Christos C Halkias, McGraw Hill Education
2. Electronic Devices and Circuits, S. Salivahanan, N. Suresh Kumar, A Vallvaraj, 5th Edition, MC GRAW HILL EDUCATION.
3. Electronics circuits and applications, Md H Rashid, Cengage 2014.

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ELECTRICAL TECHNOLOGY (A43PC3)

Course Objectives

To know the basic principle of DC generators and motors.

- To know the basic principle of single phase transformers.
- To understand the basic principle of three-phase induction motor and alternators.
- To understand the basic principle of electrical instruments.

Course Outcomes

- To analyze the performance of dc generators and motors.
- To analyze the performance of transformers.
- To learn the in-depth knowledge on three phase induction motors.
- To analyze the performance of electrical instruments in real time applications.

UNIT- I

D.C Generators and DC Motors

Principle of operation of DC Machines- EMF equation –Types of generators – Magnetization and load characteristics of DC generators, DC Motors –Types of DC Motors – Characteristics of DC motors – 3-point starters for DC shunt motor Losses and efficiency – Swinburne's test – Speed control of DC shunt motor – Flux and Armature voltage control methods.

UNIT- II

Transformers & Performance

Principle of operation of single phase transformer – types –Constructional features – Phasor diagram on No Load and Load – Equivalent circuit, Losses and Efficiency of transformer and Regulation – OC and SC tests – Predetermination of efficiency and regulation (Simple Problems).

UNIT-III

Three Phase Induction Motor

Principle of operation of three-phase induction motors –Slipring and Squirrel cage motors – Slip-Torque characteristics – Efficiency calculation --Starting methods.

UNIT- IV

Alternators

Alternators – Constructional features – Principle of operation – Types – EMF Equation – Distribution and Coil span factors – Predetermination of regulation by Synchronous Impedance Method – OC and SC tests.

UNIT- V

Electrical Instruments

Introduction, classification of instruments, operating principles, essential features of measuring instruments, Moving coil permanent magnet (PMMC) instruments, Moving Iron of Ammeters and Voltmeters (elementary Treatment only).

TEXT BOOKS

1. Introduction to Electrical Engineering – M.S Naidu and S. Kamakshaiah, TMH Publ.
2. Basic Electrical Engineering - T.K. Nagasarkar and M. S. Sukhija, Oxford University Press, 2005

REFERENCES

1. Principles of Electrical Engineering - V.K Mehta, S. Chand Publications.
2. Theory and Problems of basic electrical engineering - I.J. Nagarath and D.P Kothari, PHI Publications
3. Essentials of Electrical and Computer Engineering - David V. Kerns, JR. J. David Irwin

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SIGNALS AND STOCHASTIC PROCESS (A43PC4)

Course Objectives

- This gives the basics of Signals and Systems required for all Electrical Engineering related courses.
- This gives concepts of Signals and Systems and its analysis using different transform techniques.
- This gives basic understanding of random process which is essential for random signals and systems encountered in Communications and Signal Processing areas.

Course Outcomes:

Upon completing his course, the student will be able to

- Represent any arbitrary Analog or Digital time domain signal in frequency domain.
- Understand the importance of sampling, sampling theorem and its effects.
- Understand the characteristics of linear time invariant systems.
- Determine the conditions for distortion less transmission through a system.
- Understand the concepts of Random Process and its Characteristics.
- Understand the response of linear time Invariant system for a Random Processes.

UNIT - I

Signal Analysis

Analogy between Vectors and Signals, Orthogonal Signal Space, Signal approximation using Orthogonal functions, Mean Square Error, Closed or Complete set of Orthogonal functions, Orthogonality in Complex functions.

Introduction to Signals

Definition of Signals and Systems, Classification and Characteristics of Signals and Systems, Singularity functions and Operations on Signals.

Signal Transmission through Linear Systems

Linear System, Impulse response, Response of a Linear System, Linear Time Invariant (LTI) System, Linear Time Variant (LTV) System, Transfer function of a LTI system, Filter characteristics of Linear Systems, Ideal LPF, HPF and BPF characteristics, Signal bandwidth, System bandwidth, Causality and Paley-Wiener criterion for physical realization, Relationship between Bandwidth and Rise time. Concept of convolution in Time domain and Frequency domain, Graphical representation of Convolution.

UNIT – II

Fourier series, Transforms, and Sampling

Fourier series

Representation of Fourier series, Continuous time periodic signals, Properties of Fourier Series, Dirichlet's conditions, Trigonometric Fourier Series and Exponential Fourier Series, Complex Fourier spectrum.

Fourier Transforms

Deriving Fourier Transform from Fourier series, Fourier Transform of arbitrary signal, Fourier Transform of standard signals, Fourier Transform of Periodic Signals, Properties of Fourier Transform, Fourier Transforms involving Impulse function and Signum function.

Sampling

Sampling theorem – Graphical and analytical proof for Band Limited Signals, Reconstruction of signal from its samples, Effect of under sampling – Aliasing.

UNIT – III

Laplace Transforms and Z–Transforms

Laplace Transforms

Review of Laplace Transforms (L.T), Partial fraction expansion, Concept of Region of Convergence (ROC) for Laplace Transforms, Constraints on ROC for various classes of signals of L.T, Inverse Laplace Transforms, Properties of L.T, Relation between L.T and F.T of a signal, Laplace Transform of certain signals using waveform synthesis, Analysis and characterization of LTI system using Laplace transform

Z – Transforms

The Z - Transform, The Region of Convergence (ROC) for Z - transform and its properties, properties of Z -transform, constraints on ROC for various classes of signals, transfer function, causality and stability, Inverse Z- transform using various methods, Analysis and characterization of LTI systems using Z-transforms.

UNIT – IV

Random Processes – Temporal Characteristics

The Random Process Concept, Classification of Processes, Deterministic and Nondeterministic Processes, Distribution and Density Functions, concept of Stationarity and Statistical Independence. First-Order Stationary Processes, Second- Order and Wide-Sense Stationarity, (N-Order) and Strict-Sense Stationarity, Time Averages and Ergodicity, Autocorrelation Function and Its Properties, Cross-Correlation Function and Its Properties, Covariance Functions, Gaussian Random Processes, Poisson Random Process. Random Signal, Mean and Mean-squared Value of System Response, autocorrelation Function of Response, Cross-Correlation Functions of Input and Output.

UNIT – V

Random Processes – Spectral Characteristics

The Power Spectrum: Properties, Relationship between Power Spectrum and Autocorrelation Function, the Cross-Power Density Spectrum, Properties, Relationship between Cross-Power Spectrum and Cross-Correlation Function. Spectral Characteristics of System Response: Power Density Spectrum of Response, Cross-Power Density Spectrums of Input and Output.

TEXT BOOKS

1. Signals, Systems & Communications - B.P. Lathi , 2013, BSP.
2. Signal and systems principles and applications, shaila dinakar Apten, Cambridez university press, 2016.
3. Probability, Random Variables & Random Signal Principles - Peyton Z. Peebles, MC GRAW HILL EDUCATION, 4th Edition, 2001.

REFERENCE BOOKS

1. Signals and Systems – A.Anand Kumar, PHI Learning, 3 Edition.
2. Signals and Systems - A.V. Oppenheim, A.S. Willsky and S.H. Nawab, 2 Ed.,
3. Signals and Signals – Iyer and K. Satya Prasad, Cengage Learning.

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NETWORK ANALYSIS (A43PC5)

Course Objectives

Objectives of this course are

- To understand the basic concepts on RLC circuits.
- To know the behaviour of the steady states and transients states in RLC circuits.
- To know the basic Laplace transforms techniques in periods waveforms.
- To understand the two port network parameters and their interrelations.
- To understand the properties of LC networks and filters.

Course Outcomes

After completion of this course student:

- Gains the knowledge on Basic network elements.
- Learns and analyze the RLC circuits' behaviour in detail.
- Analyze the performance of periodic waveforms.
- Learns and gain the knowledge in characteristics of two port network parameters Z, Y, ABCD, h & g and applications to Transmission lines.
- To analyze the filter design concepts in real world applications.

UNIT - I

Review of R, L,C, RC, RL, RLC circuits, Network Topology, Terminology, Basic cutest and tie set matrices for planar networks, Illustrative Problems, Magnetic Circuits, Self and Mutual inductances, dot convention, impedance, reactance concept, Impedance transformation and coupled circuits, co-efficient of coupling, equivalent T for Magnetically coupled circuits, Ideal transformer.

UNIT - II

Steady state and transient analysis of RC, RL and RLC Circuits, Circuits with switches, step response, 2^{nd} order series and parallel RLC Circuits, damping factor, over damped, under damped, critically damped cases, quality factor and bandwidth for series & parallel resonance, Resonance curves.

UNIT - III

Network Analysis using Laplace transform techniques, step, impulse and exponential excitation, response due to periodic excitation, RMS and average value of periodic waveforms.

UNIT - IV

Two port network parameters, Z, Y, ABCD, h and g parameters, conditions for symmetry and reciprocity, inter relation between network parameters, series, parallel and cascaded configurations, Characteristic impedance, Image transfer constant, image and iterative impedance, network function, driving point and transfer functions – using transformed (S) variables, Poles and Zeros.

UNIT - V

Standard T, □, L Sections, Characteristic impedance, image transfer constants, Design of Attenuators, impedance matching network, T and □ Conversion, LC Networks and Filters: Properties of LC Networks, Foster's Reactance theorem, design of constant K, LP, HP and BP Filters, Composite filter design.

TEXT BOOKS

1. Network Analysis – ME Van Valkenburg, Prentice Hall of India, 3rd Edition, 2000.
2. Networks, Lines and Fields - JD Ryder, PHI, 2nd Edition, 1999.

REFERENCES

1. Engineering Circuit Analysis – William Hayt and Jack E Kemmerly, MGH, 5th Edition, 1993.
2. Electric Circuits – J. Edminister and M.Nahvi – Schaum's Outlines, MCGRAW HILL EDUCATION, 1999.
3. Network Theory – Sudarshan and Shyam Mohan, Mc Graw Hill Education.

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ELECTRONIC DEVICES AND CIRCUITS LAB (A43PC6)

Course Objectives

- To identify various components and testing of active devices.
- To study and operation of millimeters, function generators, regulated power supplies and CRO to know the characteristics of various active devices.
- To study frequency response amplifier.

Course Outcomes

After Completion of the course the student is able to

- Apply various devices to real time problems.
- Compute frequency response of amplifiers.
- Design different transistor biasing circuits

Part A: (Only for viva-voce Examination)

ELECTRONIC WORKSHOP PRACTICE (in 3 lab sessions):

1. Identification, Specification, testing of R,L,C components (color codes), Potentiometers (SPDT, DPDT, and DIP), Coils, Gang Condensers, Relays, Bread Board, PCB's.
2. Identification, Specification, testing of Active devices: Diodes, BJT, Low power JFET's, MOSFET's, Power Transistors, LED's, LCD's, SCR.
3. Study and operation of: Multimeters (Analog and Digital), Function Generator, Regulated Power Supplies, CRO.

Part B: (For Laboratory Examination – Minimum of 12 experiments)

1. Forward And Reverse Bias V-I Characteristics Of PN Junction Diode.
2. Zener Diode V-I Characteristics.
3. Zener Diode as a Voltage Regulator.
4. Half Wave Rectifier With and With Out Filter.
5. Full Wave Rectifier With and With Out Filter.
6. Input and Output Characteristics of BJT in CE Configuration.
7. Input and Output Characteristics of BJT in CB Configuration.
8. FET Characteristics in CS Configuration.
9. Calculation Of h-Parameters from Transistor CE Configuration
10. Design of Fixed Bias Circuit.
11. Design of Collector to Base Bias Circuit.
12. Design Of Self Bias Circuit
13. SCR Characteristics.
14. Frequency Response of CC Amplifier.

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BASIC SIMULATION LAB (A43PC7)

Note:

All the experiments are to be simulated using MATLAB or equivalent software Minimum of 15 experiments are to be completed

List of Experiments

1. Basic Operations on Matrices.
2. Generation of Various Signals and Sequences (Periodic and Aperiodic), such as Unit Impulse, Unit Step, Square, Saw tooth, Triangular, Sinusoidal, Ramp, Sinc.
3. Operations on Signals and Sequences such as Addition, Multiplication, Scaling, Shifting, Folding, Computation of Energy and Average Power.
4. Finding the Even and Odd parts of Signal/Sequence and Real and Imaginary parts of Signal.
5. Convolution for Signals and sequences.
6. Auto Correlation and Cross Correlation for Signals and Sequences.
7. Verification of Linearity and Time Invariance Properties of a given Continuous/Discrete System.
8. Computation of Unit sample, Unit step and Sinusoidal responses of the given LTI system and verifying its physical realiazability and stability properties.
9. Gibbs Phenomenon Simulation.
10. Finding the Fourier Transform of a given signal and plotting its magnitude and phase spectrum.
11. Waveform Synthesis using Laplace Transform.
12. Locating the Zeros and Poles and plotting the Pole-Zero maps in S-plane and Z-Plane for the given transfer function.
13. Generation of Gaussian noise (Real and Complex), Computation of its mean, M.S. Value and its Skew, Kurtosis, and PSD, Probability Distribution Function.
14. Sampling Theorem Verification.
15. Removal of noise by Autocorrelation / Cross correlation.
16. Extraction of Periodic Signal masked by noise using Correlation.
17. Verification of Weiner-Khinchine Relations.
18. Checking a Random Process for Stationarity in Wide sense.

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BASIC ELECTRICAL ENGINEERING LAB (A43PC8)

Note: Minimum 6 experiments from each part are to be conducted

PART – A

1. Verification of KVL and KCL.
2. Serial and Parallel Resonance – Timing, Resonant frequency, Bandwidth and Q-factor determination for RLC network.
3. Time response of first order RC/RL network for periodic non-sinusoidal inputs – time constant and steady state error determination.
4. Two port network parameters – Z-Y Parameters, chain matrix and analytical verification.
5. Two post network parameters -ABCD and h parameters
6. Verification of Superposition and Reciprocity theorems.
7. Verification of maximum power transfer theorem. Verification on DC, verification on AC with Resistive and Reactive loads.
8. Experimental determination of Thevenin's and Norton's equivalent circuits and verification by direct test.

PART – B

1. Magnetization characteristics of D.C. Shunt generator. Determination of critical field resistance.
2. Swinburne's Test on DC shunt machine (Predetermination of efficiency of a given DC Shunt machine working as motor and generator).
3. Brake test on DC shunt motor. Determination of performance characteristics.
4. OC & SC tests on Single-phase transformer (Predetermination of efficiency and regulation at given power factors and determination of equivalent circuit).
5. Brake test on 3-phase Induction motor (performance characteristics).
6. Regulation of alternator by synchronous impedance method.
7. Load test on single phase transform

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ENVIRONMENTAL SCIENCE AND TECHNOLOGY (A43MC3)

Course Objectives

- Understanding the importance of ecological balance for sustainable development.
- Understanding the impacts of developmental activities and mitigation measures.
- Understanding the environmental policies and regulations

Course Outcomes

- Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of ecological principles and environmental regulations which in turn helps in sustainable development.

UNIT-I

Ecosystems

Definition, Scope, and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains, food webs, and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Biomagnification, ecosystem value, services and carrying capacity, Field visits.

UNIT-II

Natural Resources: Classification of Resources

Living and Non-Living resources.

Water resources use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems.

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

Land resources: Forest resources.

Energy resources: growing energy needs, renewable and non renewable energy sources, use of alternate energy source, case studies.

UNIT-III

Biodiversity and Biotic Resources

Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation. National Biodiversity act.

UNIT-IV

Environmental Pollution and Control Technologies: Environmental Pollution

Classification of pollution.

Air Pollution

Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards.

Water pollution

Sources and types of pollution, drinking water quality standards.

Soil Pollution

Sources and types, Impacts of modern agriculture, degradation of soil.

Noise Pollution

Sources and Health hazards, standards.

Solid waste

Municipal Solid Waste management, composition and characteristics of e-Waste and its management.

Pollution control technologies

Wastewater Treatment methods: Primary, secondary and Tertiary. Overview of air pollution control technologies, Concepts of bioremediation.

Global Environmental Problems and Global Efforts

Climate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions / Protocols: Earth summit, Kyoto protocol, and Montréal Protocol.

UNIT-V

Environmental Policy, Legislation & EIA

Environmental Protection act, Legal aspects Air Act – 1981, Water Act, Forest Act, Muncipal Solid Waste Management and handling rules, biomedical waste management and handling rules, hazardous waste. Management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio-economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan (EMP).

Towards Sustainable Future

Concept of Sustainable Development, Population and its explosion, Crazy Consumerism, Environmental Education, Urban Sprawl, Human health, Environmental Ethics, Concept of Green Building, Ecological Foot Print, Life Cycle assessment (LCA), Low carbon life style.

TEXT BOOKS

1 Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.

2 Environmental Studies by R. Rajagopalan, Oxford University Press.

REFERENCE BOOKS

1. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Private Ltd. New Delhi.
2. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHI Learning Pvt. Ltd.
3. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition.
4. Environmental Studies by Anubha Kaushik, 4th Edition, New age international publishers.
5. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications.

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SWITCHING THEORY AND LOGIC DESIGN (A44PC1)

Course Objectives

This course provides in-depth knowledge of switching theory and the design techniques of digital circuits, which is the basis for design of any digital circuit. The main objectives are:

- To learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems.
- To understand common forms of number representation in digital electronic circuits and to be able to convert between different representations.
- To implement simple logical operations using combinational logic circuits
- To design combinational logic circuits, sequential logic circuits.
- To impart to student the concepts of sequential circuits, enabling them to analyze sequential systems in terms of state machines.
- To implement synchronous state machines using flip-flops.
- To implement memory devices using RAM and ROM.

Course Outcomes

Upon completion of the course, students should possess the following skills:

- Be able to manipulate numeric information in different forms, e.g. different bases, signed integers, various codes such as ASCII, Gray, and BCD.
- Be able to manipulate simple Boolean expressions using the theorems and postulates of Boolean algebra and to minimize combinational functions.
- Be able to design and analyse small combinational circuits and to use standard combinational functions/building blocks to build larger more complex circuits.
- Be able to design and analyse small sequential circuits and devices and to use standard sequential functions/building blocks to build larger more complex circuits.

UNIT -I

Number System and Boolean Algebra And Switching Functions

Number Systems, Base Conversion Methods, Complements of Numbers, Codes- Binary Codes, Binary Coded Decimal Code and its Properties, Unit Distance Codes, Error Detecting and Correcting Codes.

Boolean Algebra

Basic Theorems and Properties, Switching Functions, Canonical and Standard Form, Algebraic Simplification of Digital Logic Gates, Properties of XOR Gates, Universal Gates, Multilevel NAND/NOR realizations.

UNIT -II

Minimization and Design of Combinational Circuits:

Introduction, The Minimization with theorem, The Karnaugh Map Method, Five and Six Variable Maps, Prime and Essential Implications, Don’t Care Map conditions, Tabular Method.

Combinational circuits

Introduction, Adders, subtractors, Multiplexers, Demultiplexers, Encoders, Decoders, Comparator, Code Converters, Hazards. Applications: Design of BCD to 7-Segment Decoder

UNIT -III

Sequential Circuits I

Introduction, Basic Differences between Combinational and Sequential circuits, The Binary Cell, Latch, Flip-Flop-Types, Race around condition, Excitation tables and characteristic equations. Conversion from one type of Flip-Flop to another, Preset and Clear inputs, Timing and Triggering Consideration, Clock Skew.

UNIT -IV

Sequential Circuits II

Introduction, Register-Types, Counters –Types, Design of Ripple (mod-N) Counters, Ring Counter. Memory types- RAM, ROM, Realisation of switching functions using PLD's

UNIT -V

Sequential Machines

State Diagram, Analysis of Synchronous Sequential Circuits, Approaches to the Design of Synchronous Sequential Finite State Machines, Finite state machine-capabilities and limitations, Mealy and Moore models-minimization of completely specified and incompletely specified sequential machines, Partition techniques and Merger chart methods-concept of minimal cover table. Application: Design of sequence detector, Binary adder.

TEXT BOOKS

1. Digital Design- Morris Mano, PHI, 3rd Edition.
2. Switching and Finite Automata Theory- Zvi Kohavi & Niraj K. Jha, 3rd Edition, Cambridge.

REFERENCES

1. Anand Kumar, "Switching Theory and Logic Design" PHI, 2008
2. Charles H. Roth, "Fundamentals of Logic Design" Thomson Publications, 5th Edition, 2004.

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ELECTRONICS & COMMUNICATION ENGINEERING

B.Tech IV Semester **L/T/P/C**
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PULSE AND DIGITAL CIRCUITS (A44PC2)

Course Objectives

- To explain the complete response of R-C and R-L-C transient circuits.
- To explain clippers, clampers, switching characteristics of transistors and sampling gates.
- To construct various multivibrators using transistors, design of sweep circuits and sampling gates.
- To discuss and realize logic gates using diodes and transistors

Course Outcomes

At the end of the course, the student will be able to:

- Understand the applications of diode as integrator, differentiator, clippers, and clamper circuits.
- Learn various switching devices such as diode, transistor, SCR. Difference between logic gates and sampling gates
- Design multi-vibrators for various applications, synchronization techniques and sweep circuits.
- Realizing logic gates using diodes and transistors.
- Understanding of time and frequency domain aspects. Importance of clock pulse and its generating techniques.

UNIT - I

Linear Wave Shaping

High pass and low pass RC circuits and their response for Sinusoidal, Step, Pulse, Square, & Ramp inputs, High pass RC network as Differentiator, Low pass RC circuit as an Integrator, Attenuators and its application as a CRO Probe, RL and RLC Circuits and their response for Step Input, Ringing Circuit.

UNIT - II

Non-Linear Wave Shaping

Diode clippers, Transistor clippers, Clipping at two independent levels, Comparators, Applications of Voltage comparators. Clamping Operation, Clamping circuit taking Source and Diode resistances into account, Clamping Circuit Theorem, Practical Clamping Circuits, and Effect of Diode Characteristics on Clamping Voltage.

UNIT - III

Switching Characteristics of Devices

Diode as a Switch, Piecewise Linear Diode Characteristics, Diode Switching times, Transistor as a Switch, Break down voltages, Transistor in Saturation, Temperature variation of Saturation Parameters, Transistor-switching times, Silicon-controlled-switch circuits

Time Base Generators

General features of a Time base Signal, Methods of Generating Time Base Waveform, Transistor Miller Time Base generator, Transistor Bootstrap Time Base Generator, Transistor Current Time Base Generators, Methods of Linearity improvement.

UNIT – IV

Multi vibrators (using BJT's)

Bistable Multivibrator: Fixed bias and Self bias transistor binary, Stable state voltages and currents,

Design of Fixed bias and Self bias binary, Commutating capacitors, Symmetrical and Unsymmetrical Triggering. Analysis and Design of Schmitt Trigger Circuit, Monostable Multivibrator (collector coupled only), Analysis and Design of Astable Multivibrator (collector coupled only) and Applications of Multivibrators.

UNIT - V

Sampling Gates

Basic operating principles of Sampling Gates, Unidirectional and Bi-directional Sampling Gates, Reduction of pedestal in Gate Circuits, Four Diode Sampling Gate, An alternate form of four diode Gate, Six Diode Sampling Gate**,** Applications of Sampling Gates**.**

Realization of Logic Gates Using Diodes & Transistors:

AND, OR and NOT Gates using Diodes and Transistors, DCTL, RTL, DTL, TTL, CML and CMOS Logic Families and its Comparison.

TEXT BOOKS:

1. Millman's Pulse, Digital and Switching Waveforms –J. Millman, H. Taub and Mothiki S. Prakash Rao, 2 Ed., 2008, McGraw Hill.
2. Pulse, Switching and Digital Circuits - David A. Bell, 5th edition 2015, OXFORD University Press.

REFERENCE BOOKS

1. Pulse and Digital Circuits -Venkata Rao K, Rama Sudha K, Manmadha rao G, Pearson, 2010
2. Pulse and Digital Circuits – A. Anand Kumar, 2005, PHI.

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CONTROL SYSTEMS (A44PC3)

Course objectives

- To understand the different ways of system representations such as Transfer function representation to assess the system dynamic response
- To assess the system performance using time domain analysis and methods for improving it
- To assess the system performance using frequency domain analysis and techniques for improving the performance
- To design various controllers and compensators to improve system performance
- To understand the different ways of system behaviour using state space representation for continuous systems.

Course outcomes

After completion of this course the student is able to

- Improve the system performance by selecting a suitable controller and/or a compensator for a specific application
- Apply various time domain and frequency domain techniques to assess the system performance
- Apply various control strategies to different applications (example: Power systems, electrical drives etc…)
- Test system Controllability and Observability using state space representation and applications of state space representation to various systems.

UNIT – I

Introduction

Concepts of Control Systems- Open Loop and closed loop control systems and their differences- Different examples of control systems- Classification of control systems, Feed-Back Characteristics, Effects of feedback, Mathematical models – Differential equations - Impulse Response and transfer functions - Translational and Rotational mechanical systems.

Transfer Function Representation

Block diagram representation of systems considering electrical systems as examples - Block diagram algebra – Representation by Signal flow graph - Reduction using mason's gain formula. Signal flow graphs to the Electrical Networks. Construction of Signal flow graph from Block diagram.

UNIT-II

Time Response Analysis

Standard test signals - Time response of first order systems – Characteristic Equation of Feedback control systems, Transient response of second order systems - Time domain specifications – Steady state response - Steady state errors and error constants – Effects of proportional derivative, proportional integral systems. Effects of Adding poles and zeros to the second order system.

UNIT – III

Stability Analysis

The concept of stability –Effects of Location of poles on stability, Relative stability, Routh-Hurwitz criterion, Limitations of Routh's stability.

Root Locus Technique

The root locus concept - construction of root loci-Root contours, effects of adding poles and zeros to G(s) H(s) on the root loci.

Frequency Response Analysis

Introduction, Correlation between time and frequency response, Frequency domain specifications-Bode diagrams-Determination of Frequency domain specifications and transfer function from the Bode Diagram-Phase margin and Gain margin-Stability Analysis from Bode Plots.

UNIT - IV

Stability Analysis in Frequency Domain

Polar Plots, Nyquist Plots and applications of Nyquist criterion to find the stability - Effects of adding poles and zeros to G(s)H(s) on the shape of the Nyquist diagrams. All pass and minimum phase systems.

Classical Control Design Techniques:

Compensation techniques – Lag, Lead, and Lead-Lag Controllers design in frequency Domain, PID Controllers, Tuning of PID controllers.

UNIT – V

State Space Analysis of Continuous Systems

Concepts of state, state variables and state model, derivation of state models from block diagrams, Signal flow graphs and Electrical networks, Caley-Hamilton theorem, Diagonalization- Solving the Time invariant state Equations- State Transition Matrix and its Properties. Concepts of Controllability and Observability.

TEXT BOOKS

1. "I. J. Nagrath and M. Gopal", "Control Systems Engineering", New Age International (P) Limited, Publishers, 5th edition, 2009
2. "B. C. Kuo", "Automatic Control Systems", John wiley and sons, 8th edition, 2003.

REFERENCE BOOKS

1. "N. K. Sinha", "Control Systems", New Age International (P) Limited Publishers, 3rd Edition, 1998.
2. "NISE", "Control Systems Engineering", John wiley, 6th Edition, 2011.
3. "Katsuhiko Ogata", "Modern Control Engineering", Prentice Hall of India Pvt. Ltd., 3rd edition, 1998.
4. "S Palani", "Control Systems Engineering", McGraw Hill Education private limited, 2nd Edition, 2010.

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ELECTRONICS & COMMUNICATION ENGINEERING

B.Tech IV Semester **L/T/P/C**
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ANALOG COMMUNICATIONS (A44PC4)

Course Objectives

- To develop ability to analyze system requirements of analog communication systems.
- To understand the need for modulation
- To understand the generation, detection of various analog modulation techniques and also perform the mathematical analysis associated with these techniques.
- To acquire knowledge to analyze the noise performance of analog modulation techniques.
- To acquire theoretical knowledge of each block in AM and FM receivers.
- To understand the pulse modulation techniques.

Course Outcomes

- Able to analyze and design various modulation and demodulation analog systems.
- Understand the characteristics of noise present in analog systems.
- Study of signal to Noise Ration (SNR) performance, of various Analog Communication systems.
- Analyze and design the various Pulse Modulation Systems.
- Understand the concepts of Multiplexing: Time Division Multiplexing (TDM) and Frequency Division Multiplexing (FDM).

UNIT I

AMPLITUDE MODULATION

Introduction to communication system, Need for modulation, Time domain multiplexing, Frequency division multiplexing Amplitude Modulation, Definition, Time domain and frequency domain description, single tone modulation, power relations in AM waves, Generation of AM waves, square law Modulator, Switching modulator, Detection of AM Waves; Square law detector, Envelope detector.

DSB MODULATION

Double side band suppressed carrier modulators, time domain and frequency domain description, Generation of DSBSC Waves, Balanced Modulators, Ring Modulator, Coherent detection of DSB-SC Modulated waves, COSTAS Loop.

UNIT II

SSB MODULATION

Frequency domain description, Frequency discrimination method for generation of AM SSB Modulated Wave, Time domain description, Phase discrimination method for generating AM SSB Modulated waves, Demodulation of SSB Waves, VESTIGIAL SIDEBAND MODULATION: Frequency description, Generation of VSB Modulated wave, Time domain description, Envelope detection of a VSB Wave pulse Carrier, Comparison of AM Techniques, Applications of different AM Systems.

UNIT III

ANGLE MODULATION

Basic concepts, Frequency Modulation: Single tone frequency modulation, Spectrum Analysis of Sinusoidal FM Wave, Narrow band FM, Wide band FM, Constant Average Power, Transmission bandwidth of FM Wave

ANGLE MODULATION METHODS

Generations of Fm Waves, Direct FM, Detection of FM Waves, Balanced Frequency discriminator, Zero crossing detector, Phase locked loop, Comparison of FM &AM, Applications of FM waves.

UNIT IV

NOISE IN ANALOG COMMUNICATION SYSTEM

Types of Noise: Resistive(thermal) noise source, Shot noise, Extraterrestrial noise, Arbitrary noise sources, White noise, Modeling of noise sources, Average noise Bandwidth, Effective noise temperature, Average noise figure of cascaded networks. Noise in DSB and SSB System, Noise in AM System, Noise in Angle Modulation System, Noise triangle in Angle Modulation System, Pre-emphasis & de-emphasis.

UNIT V

TRANSMITTERS

Classifications of Radio transmitters, AM and FM transmitter block diagram and explanation of each block, Carrier frequency requirements of radio transmitter.

RECEIVERS

Radio Receiver, Receiver Types, Tuned radio frequency receiver, Super heterodyne receiver, RF section and Characteristics - Frequency changing and tracking, Intermediate frequency, AGC, FM Receiver, Comparison with AM Receiver, Amplitude limiting.

PULSE MODULATION

Types of Pulse modulation, PAM (Single polarity, double polarity) Generation and demodulation, PWM: Generation and demodulation of PWM, PPM: Generation and demodulation of PPM.

TEXTBOOKS

1. Communication Systems by Simon Haykins John Wiley & Sons, 4th Edition.
2. Electronics & Communication System – George Kennedy and Bernard Davis, McGraw Hill Education 2004.

REFERENCES

1. Communication theory, thomas, 2nd edition, McGraw-Hill Education.
2. Communication Systems, 2E, R.P.Singh, S. D. Sapre, McGraw-Hill Education, 2008.
3. Analog and Digital Communication – K. Sam Shanmugam, Willey, 2005.
4. Electronics Communication Systems- Wayne Tomasi, 6th Edition, Person 2009.

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ELECTRONICS & COMMUNICATION ENGINEERING

B.Tech IV Semester **L/T/P/C**
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BUSINESS ECONOMICS AND FINANCIAL ANALYSIS (A44HS5)

Course Objective

To learn the basic Business types, impact of the Economy on Business and Firms specifically. To analyze the Business from the Financial Perspective.

Course Outcome

The students will understand

- The various Forms of Business and the impact of economic variables on the Business.
- The Demand, Supply, Production, Cost, Market Structure, Pricing and taxes on goods are learnt.
- The firm's financial position by analyzing the Financial Statements of a Company.

UNIT – I

Introduction to Business and Economics

Business

Define Business, characteristics of business, Types of Business Entities, Limited Liability Companies, Sources of Capital for a Company, Non-Conventional Sources of Finance.

Economics

Significance of Economics, Micro and Macro Economic Concepts, Concepts and Importance of National Income, Business Cycle, Features and Phases of Business Cycle. Nature and Scope of Business Economics, Role of Business Economist,

UNIT – II

Demand and supply Analysis

Elasticity of Demand

Elasticity, Types of Elasticity, Law of Demand, Measurement and Significance of Elasticity of Demand, Factors affecting Elasticity of Demand, Elasticity of Demand in decision making, Demand Forecasting: Steps in Demand Forecasting, Methods of Demand Forecasting.

Supply Analysis: determinants of supply, supply function

UNIT- III

Production, Cost, Market Structures & Pricing

Production Analysis

Production function, Law of returns to scale, Internal and External Economies of Scale.

Cost analysis

Cost concepts, Types of Costs. Break-even Analysis (BEA)

Pricing

Types of Pricing, product life cycle, **GST** (**Goods & service Tax**)

Market Structures

Types of competition, Features of Perfect competition, Monopoly and Monopolistic Competition, oligopoly.

UNIT - IV

Financial Accounting

Accounting concepts and Conventions, Accounting Equation, Double-Entry system of Accounting, Rules for maintaining Books of Accounts, Journal, Posting to Ledger, Preparation of Trial Balance, Elements of Financial Statements, and Preparation of Final Accounts.

UNIT - V

Financial Analysis through Ratios

Concept of Ratio Analysis, Liquidity Ratios, Turnover Ratios, Profitability Ratios, Proprietary Ratios, Solvency, Leverage Ratios (simple problems).

TEXT BOOKS

1. D. D. Chaturvedi, S. L. Gupta, Business Economics - Theory and Applications, International Book House Pvt. Ltd. 2013.
2. Dhanesh K Khatri, Financial Accounting, Tata McGraw Hill, 2011.
3. Geethika Ghosh, Piyali Gosh, Purba Roy Choudhury, Managerial Economics, 2e, Tata McGraw Hill Education Pvt. Ltd. 2012.
4. Rakesh garg,sandeep garg, Hand book of GST in India
5. A.R. Aryasri (2011), Managerial Economics and Financial Analysis, TMH, India.

REFERENCES

1. Paresh Shah, Financial Accounting for Management 2e, Oxford Press, 2015.
2. S. N. Maheshwari, Sunil K Maheshwari, Sharad K Maheshwari, Financial Accounting, 5e, Vikas Publications, 2013.

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ANALOG COMMUNICATION LAB (A44PC6)

Note:

Minimum 12 experiments should be conducted

Experiments are to be simulated first either using MATLAB, Comsim or any other simulation software tools and then testing to be done in hardware.

LIST OF EXPERIMENTS

1. Amplitude modulation and demodulation.
2. DSB-SC Modulator & Detector
3. SSB-SC Modulator & Detector (Phase Shift Method)
4. Frequency modulation and demodulation.
5. Study of spectrum analyzer and analysis of AM and FM Signals
6. Pre-emphasis & de-emphasis.
7. Time Division Multiplexing & De multiplexing
8. Frequency Division Multiplexing & De multiplexing
9. Verification of Sampling Theorem
10. Pulse Amplitude Modulation & Demodulation
11. Pulse Width Modulation & Demodulation
12. Pulse Position Modulation & Demodulation
13. Frequency Synthesizer.
14. AGC Characteristics.
15. PLL as FM Demodulator.

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PULSE AND DIGITAL CIRCUITS LAB (A44PC7)

Note:

Minimum Twelve experiments to be conducted:

1. Linear wave Shaping
   a. RC Low Pass Circuit for different time constants
   b. RC High Pass Circuit for different time constants
2. Non-linear wave shaping (Clippers)
   Transfer characteristics and response of Clippers:
   i. Positive and Negative Clippers
   ii. Clipping at two independent levels
3. Non-linear wave shaping (Clampers)
   The steady state output waveform of clampers for a square wave input
   i. Positive and Negative Clampers
   ii. Clamping at different reference voltage
4. Comparison Operation of different types of Comparators
5. Switching characteristics of a transistor
6. Design a Bistable Multivibrator and draw its waveforms
7. Design an Astable Multivibrator and draw its waveforms
8. Design a Monostable Multivibrator and draw its waveforms
9. Response of Schmitt Trigger circuit for loop gain less than and greater than one
10. UJT relaxation oscillator
11. The output- voltage waveform of Boot strap sweep circuit
12. The output- voltage waveform of Miller sweep circuit
13. Pulse Synchronization of An Astable circuit
14. Response of a transistor Current sweep circuit
15. Sampling gates
    a. Response of Unidirectional gate
    b. Response of Bidirectional gate using transistors
16. Study of logic gates

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ANALOG ELECTRONICS LAB (A44PC7)

Note:
Minimum 12 experiments should be conducted:
Experiments are to be simulated using Multisim or P-spice or Equivalent Simulation and then testing to be done in hardware.

LIST OF EXPERIMENTS

1. Common Emitter Amplifier
2. Common Base Amplifier
3. Common Source amplifier
4. Two Stage RC Coupled Amplifier
5. Current Shunt Feedback Amplifier
6. Voltage Series Feedback Amplifier
7. Cascode Amplifier
8. Wien Bridge Oscillator using Transistors
9. RC Phase Shift Oscillator using Transistors
10. Class A Power Amplifier (Transformer less)
11. Class B Complementary Symmetry Amplifier
12. Hartley Oscillator
13. Colpitt's Oscillator
14. Single Tuned Voltage Amplifier
15. Source Follower
16. Class B Push Pull Power Amplifier

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B.TECH. ELECTRONICS & COMMUNICATION ENGINEERING

B.Tech IV Semester **L/T/P/C**
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GENDER SENSITIZATION LAB (A44MC4)

Course Objectives

- To develop students' sensibility with regard to issues of gender in contemporary India.
- To provide a critical perspective on the socialization of men and women.
- To introduce students to information about some key biological aspects of genders. To expose the students to debates on the politics and economics of work.
- To help students reflect critically on gender violence.
- To expose students to more egalitarian interactions between men and women.

Course Outcomes

- Students will have developed a better understanding of important issues related to gender in contemporary India.
- Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature, and film.
- Students will attain a finer grasp of how gender discrimination works in our society and
- Students will acquire insight into the gendered division of labour and its relation to politics and economics.
- Men and women students and professionals will be better equipped to work and live together as equals.
- Students will develop a sense of appreciation of women in all walks of life.
- Through providing accounts of studies and movements as well as the new laws that provide protection and relief to women, the textbook will empower students to understand and respond to gender violence.

UNIT - I

UNDERSTANDING GENDER

Gender

Why Should We Study It? (Towards a World of Equals: Unit -1)

Socialization

Making Women, Making Men (Towards a World of Equals: Unit -2) Introduction. Preparing for Womanhood. Growing up Male. First lessons in Caste. Different Masculinities.

UNIT - II

GENDER AND BIOLOGY

Missing Women

Sex Selection and Its Consequences (Towards a World of Equals: Unit -4) Declining Sex Ratio. Demographic Consequences.

Gender Spectrum

Beyond the Binary (Towards a World of Equals: Unit -10) Two or Many? Struggles with Discrimination.

UNIT - III

GENDER AND LABOUR

Housework:

The Invisible Labour (Towards a World of Equals: Unit -3) "My Mother doesn't Work." "Share the Load."

Women's Work

Its Politics and Economics (*Towards a World of Equals*: Unit -7) Fact and Fiction. Unrecognized and Unaccounted work. Additional Reading: Wages and Conditions of Work.

UNIT-IV

ISSUES OF VIOLENCE

Sexual Harassment

Say No! (*Towards a World of Equals*: Unit -6) Sexual Harassment, not Eve-teasing- Coping with Everyday Harassment- Further Reading: "*Chupulu".*

Domestic Violence

Speaking Out (Towards a World of Equals: Unit -8) Is Home a Safe Place? -When Women Unite [Film]. Rebuilding Lives. Additional Reading: New Forums for Justice. Thinking about Sexual Violence *(Towards a World of Equals: Unit -11*) Blaming the Victim-"I Fought for my Life…." - Additional Reading: The Caste Face of Violence.

UNIT - V

GENDER: CO - EXISTENCE

Just Relationships

Being Together as Equals (Towards a World of Equals: Unit -12) Mary Kom and Onler. Love and Acid just do not Mix. Love Letters. Mothers and Fathers. Additional Reading: Rosa Parks-The Brave Heart.

TEXTBOOK

All the five Units in the Textbook**, "*Towards a World of Equals: A Bilingual Textbook on Gender*"** written by A. Suneetha, Uma Bhrugubanda, Duggirala Vasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu and published by **Telugu Akademi, Hyderabad**,Telangana State in the year **2015**.

Note: Since it is an Interdisciplinary Course, Resource Persons can be drawn from the fields of English Literature or Sociology or Political Science or any other qualified faculty who has expertise in this field from engineering departments.

REFERENCE BOOKS

1. Menon, Nivedita. Seeing like a Feminist. New Delhi: Zubaan-Penguin Books, 2012.
2. Abdulali Sohaila. "*I Fought For My Life…and Won*."Available online at: http://www.thealternative.in/lifestyle/i-fought-for-my-lifeand-won-sohaila-abdulal/