

**AUTONOMOUS**

#### (Approved by A.I.C.T.E & Permanently Affiliated to JNTU, Kakinada)

Accredited by NAAC with “A”Grade

on NH 16, Telaprolu, Krishna Dist – 521109

**B.TECH**

**ELECTRONICS ANDCOMMUNICATION ENGINEERING**

**COURSE STRUCTURE**

**UR23**

# (Applicable for the batches admitted from the Academic Year 2023-24)

**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING**

### COURSE STRUCTURE

**ELECTRONICS AND COMMUNICATION ENGINEERING**

**(Applicable for batches admitted from 2023-2024)**

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| **B.Tech. – I Year I Semester** | | | | | | | | |
| **S.No.** | **Course**  **Category** | **Course**  **Code** | **Course Title** | **L** | **T** | **P** | **Contact**  **Hrs./Wk** | **C** |
| 1 | BS&H | 23BS101B | Engineering Physics | 3 | 0 | 0 | 3 | 3 |
| 2 | BS&H | 23BS103 | Linear Algebra & Calculus | 3 | 0 | 0 | 3 | 3 |
| 3 | ES | 23ES102B | Basic Electrical & Electronics Engineering | 3 | 0 | 0 | 3 | 3 |
| 4 | ES | 23ES105B | Engineering Graphics | 1 | 0 | 4 | 5 | 3 |
| 5 | PC | 23PC104B | Network Analysis | 3 | 0 | 0 | 3 | 3 |
| 6 | BS&H | 23ES113B | IT Workshop | 0 | 0 | 2 | 3 | 1.0 |
| 8 | BS&H | 23BS111B | Engineering Physics Lab | 0 | 0 | 2 | 3 | 1.0 |
| 8 | ES | 23ES112B | Electrical & Electronics Engineering Workshop | 0 | 0 | 3 | 3 | 1.5 |
| 9 | PC | 23PC114B | Network Analysis Lab | 0 | 0 | 3 | 3 | 1.5 |
| 10 | BS&H | 23BS115A | NSS/NCC/Scouts & Guides/Community Service | - | -- | 1 | 1 | 0.5 |
| **Total** | | | | **13** | **0** | **17** | **30** | **20.5** |

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| **B.Tech. – I Year II Semester** | | | | | | | | |
| **S.No.** | **Course Category** | **Course Code** | **Course Title** | **L** | **T** | **P** | **Contact Hrs./Wk** | **C** |
| 1 | BS&H | 23BS201A | Communicative English | 2 | 0 | 0 | 2 | 2 |
| 2 | BS&H | 23BS202A | Chemistry | 3 | 0 | 0 | 3 | 3 |
| 3 | ES | 23BS203 | Differential Equations & Vector Calculus | 3 | 0 | 0 | 3 | 3 |
| 4 | ES | 23ES205A | Basic Civil & Mechanical Engineering | 3 | 0 | 0 | 3 | 3 |
| 5 | ES | 23ES204A | Introduction to Programming | 3 | 0 | 0 | 3 | 3 |
| 6 | BS&H | 23BS211A | Communicative English Lab | 0 | 0 | 2 | 2 | 1 |
| 7 | BS&H | 23BS212A | Chemistry Lab | 0 | 0 | 2 | 2 | 1 |
| 8 | ES | 23ES213A | Engineering Workshop | 0 | 0 | 3 | 3 | 1.5 |
| 9 | ES | 23ES214A | Computer Programming Lab | 0 | 0 | 3 | 3 | 1.5 |
| 10 | BS&H | 23BS215A | Health and wellness, Yoga and Sports | - | -- | 1 | 1 | 0.5 |
| **Total** | | | | **14** | **0** | **11** | **25** | **19.5** |

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| **B.Tech. – II Year I Semester** | | | | | | | | |
| **S.No.** | **Course Category** | **Course Code** | **Course Title** | **L** | **T** | **P** | **Contact Hrs./Wk** | **C** |
| 1 | BS&H | 23BSC301C | Probability theory and stochastic process | 3 | 0 | 0 | 3 | 3 |
| 2 | HSMC | 23HS302 | Universal Human Values–  Understanding Harmony and Ethical Human Conduct | 2 | 1 | 0 | 3 | 3 |
| 3 | ES | 23ES303C | Signals and Systems | 3 | 0 | 0 | 3 | 3 |
| 4 | PC | 23PCEC304 | Electronic Devices and Circuits | 3 | 0 | 0 | 3 | 3 |
| 5 | PC | 23PCEC305 | Switching Theory and Logic Design | 3 | 0 | 0 | 3 | 3 |
| 6 | PC | 23PCEC311 | Electronic Devices and Circuits Lab | 0 | 0 | 3 | 3 | 1.5 |
| 7 | PC | 23PCEC312 | Switching Theory and Logic Design Lab | 0 | 0 | 3 | 3 | 1.5 |
| 8 | SEC | 23SEC313C | Data Structures using Python | 0 | 1 | 2 | 3 | 2 |
| **Total** | | | | **14** | **2** | **8** | **24** | **20** |
| **Mandatory Course** | | | | | | | | |
| 9 | Audit Courses | 23MC300 | Environmental Science | 2 | 0 | 0 | 2 | 0 |

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| **B.Tech. – II Year II Semester** | | | | | | | | |
| **S.No.** | **Course**  **Category** | **Course Code** | **Course Title** | **L** | **T** | **P** | **Contact**  **Hrs./Wk** | **C** |
| 1 | Management Course - I | 23HM401A | Managerial Economics and Financial Analysis | 2 | 0 | 0 | 2 | 2 |
| 2 | ES | 23ES402B | Linear Control Systems | 3 | 0 | 0 | 3 | 3 |
| 3 | PC | 23PCEC403 | Electromagnetic Waves and Transmission Lines | 3 | 0 | 0 | 3 | 3 |
| 4 | PC | 23PCEC404 | Electronic Circuit Analysis | 3 | 0 | 0 | 3 | 3 |
| 5 | PC | 23PCEC405 | Analog Communications | 3 | 0 | 0 | 3 | 3 |
| 6 | PC | 23PCEC411 | Signals and Systems Lab | 0 | 0 | 3 | 3 | 1.5 |
| 7 | PC | 23PCEC412 | Electronic Circuit Analysis lab | 0 | 0 | 3 | 3 | 1.5 |
| 8 | SEC | 23ES413C | Soft Skills | 0 | 1 | 2 | 3 | 2 |
| 9 | ES | 23BS414 | Design Thinking & Innovation | 1 | 0 | 2 | 3 | 2 |
| **Total** | | | | **15** | **1** | **10** | **26** | **21** |
| **Mandatory Community Service Project Internship of 08 weeks duration during summer vacation** | | | | | | | | |

**B.Tech. III Semester COURSE CODE:** **23BSC301C L T P C**

**3 0 0 3**

**PROBABILITY THEORY AND STOCHASTIC PROCESS**

**Internal Marks: 30**

**External Marks: 70**

**Course Objectives:**

1. This gives basic understanding of random variables and operations that can be performed on them.
2. To know the Spectral and temporal characteristics of Random Process.
3. To Learn the Basic concepts of Information theory Noise sources and its representation for understanding its characteristics

**UNIT – I: Probability & Random Variable:**

Probability introduced through Sets and Relative Frequency: Experiments and Sample Spaces, Discrete and Continuous Sample Spaces, Events, Probability Definitions and Axioms, Joint Probability, Conditional Probability, Total Probability, Bay’s Theorem, Independent Events, Random Variable-Definition, Conditions for a Function to be a Random Variable, Discrete, Continuous and Mixed Random Variable, Distribution and Density functions, Properties, Binomial, Poisson, Uniform, Gaussian, Exponential, Rayleigh, Methods of defining Conditioning Event, Conditional Distribution, Conditional Density and their Properties.

**UNIT – II: Operations on Single & Multiple Random Variables – Expectations:**

Expected Value of a Random Variable, Function of a Random Variable, Moments about the Origin, Central Moments, Variance and Skew, Chebychev’s Inequality, Characteristic Function, Moment Generating Function, Transformations of a Random Variable: Monotonic and Non-monotonic Transformations of Continuous Random Variable, Transformation of a Discrete Random Variable. Vector Random Variables, Joint Distribution Function and its Properties, Marginal Distribution Functions, Conditional Distribution and Density – Point Conditioning, Conditional Distribution and Density – Interval conditioning, Statistical Independence. Sum of Two Random Variables, Sum of Several Random Variables, Central Limit Theorem, (Proof not expected). Unequal Distribution, Equal Distributions. Expected Value of a Function of Random Variables: Joint Moments about the Origin, Joint Central Moments, Joint Characteristic Functions, Jointly Gaussian Random Variables: Two Random Variables case, N Random Variable case, Properties, Transformations of Multiple Random Variables, Linear Transformations of Gaussian Random Variables

**UNIT – III: 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, Mean-Ergodic Processes, Correlation-Ergodic Processes, Autocorrelation Function and Its Properties, Cross-Correlation Function and Its Properties, Covariance Functions, Gaussian Random Processes, Poisson Random Process. Random Signal Response of Linear Systems: System Response – Convolution, Mean and Mean-squared Value of System Response, autocorrelation Function of Response, Cross-Correlation Functions of Input and Output.

**UNIT – IV: 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.

**UNIT – V: Noise Sources & Information Theory:**

Resistive/Thermal Noise Source, Arbitrary Noise Sources, Effective Noise Temperature, Noise equivalent bandwidth, Average Noise Figures, Average Noise Figure of cascaded networks, Narrow Band noise, Quadrature representation of narrow band noise & its properties. Entropy, Information rate, Source coding: Huffman coding, Shannon Fano coding, Mutual information, Channel capacity of discrete channel, Shannon-Hartley law; Trade -off between bandwidth and SNR.

**TEXT BOOKS:**

1. Peyton Z. Peebles - Probability, Random Variables & Random Signal Principles,

4th Ed, TMH, 2001.

1. Taub and Schilling - Principles of Communication systems, TMH, 2008

**REFERENCE BOOKS:**

1. Bruce Hajck - Random Processes for Engineers, Cambridge unipress, 2015
2. Athanasios Papoulis and S. Unnikrishna Pillai - Probability, Random Variables and Stochastic Processes, 4th Ed., PHI, 2002.
3. B.P. Lathi - Signals, Systems & Communications, B.S. Publications, 2003.
4. S.P Eugene Xavier -Statistical Theory of Communication, New Age Publications, 2003.

**E-RESOURCES:**

1. https://archive.nptel.ac.in/courses/111/102/111102111/

2. https://archive.nptel.ac.in/courses/111/102/111102014/

**Course Outcomes:**

Upon completion of the Course, the students will be able to:

1. Perform operations on single and multiple Random variables.
2. Determine the temporal characteristics of Random Signals.
3. Determine the Spectral characteristics of Random Signals.
4. Characterize LTI systems driven by stationary random process by using ACFs and PSDs.
5. Understand the concepts of Noise and Information theory in Communication systems.
6. Understand the concepts of Information theory in Communication systems.

**B.Tech. III Semester COURSE CODE: 23HS302 L T P C**

**2 1 0 3**

**Universal human values understanding harmony and**

**Ethical human conduct Internal Marks: 30 External Marks: 70**

**Course Objective:**

The objective of the course is four fold:

1. To help the students appreciate the essential complementary between 'VALUES' and

'SKILLS' to ensure sustained happiness and prosperity which are the core

Aspirations of all human beings.

2. To facilitate the development of a Holistic perspective among students towards life

and profession as well as towards happiness and prosperity based on a correct

understanding of the Human reality and the rest of existence. Such holistic

perspective forms the basis of Universal Human Values and movement towards

value-based living in a natural way.

3 To highlight plausible implications of such a Holistic understanding in terms of

ethical human conduct, trustful and mutually fulfilling human behaviour and

mutually enriching interaction with Nature.

**Course Topics**

The course has 28 lectures and 14 tutorials in 5 modules. The lectures and tutorials are of 1-hour duration. Tutorial sessions are to be used to explore and practice what has been proposed during the lecture sessions.

The Teacher’s Manual provides the outline for lectures as well as practice sessions. The teacher is expected to present the issues to be discussed as propositions and encourage the students to have a dialogue.

**UNIT – I: Introduction to Value Education (6 lectures and 3 tutorials for practice**

**session)**

Lecture 1: Right Understanding, Relationship and Physical Facility (Holistic

Development and the Role of Education)

Lecture 2: Understanding Value Education

Tutorial 1: Practice Session PS1 Sharing about Oneself

Lecture 3: self-exploration as the Process for Value Education

Lecture 4: Continuous Happiness and Prosperity – the Basic Human

Aspirations

Tutorial 2: Practice Session PS2 Exploring Human Consciousness

Lecture 5: Happiness and Prosperity – Current Scenario

Lecture 6: Method to Fulfill the Basic Human Aspirations

Tutorial 3: Practice Session PS3 Exploring Natural Acceptance

**UNIT II- Harmony in the Human Being (6 lectures and 3 tutorials for practice**

**session)**

Lecture 7: Understanding Human being as the Co-existence of the self and the

body.

Lecture 8: Distinguishing between the Needs of the self and the body

Tutorial 4: Practice Session PS4 Exploring the difference of Needs of self and

body.

Lecture 9: The body as an Instrument of the self

Lecture 10: Understanding Harmony in the self

Tutorial 5: Practice Session PS5 Exploring Sources of Imagination in the self

Lecture 11: Harmony of the self with the body

Lecture 12: Programme to ensure self-regulation and Health

Tutorial 6: Practice Session PS6 Exploring Harmony of self with the body

**UNIT- III: Harmony in the Family and Society (6 lectures and 3 tutorials for**

**practice session)**

Lecture 13: Harmony in the Family – the Basic Unit of Human Interaction

Lecture 14: 'Trust' – the Foundational Value in Relationship

Tutorial 7: Practice Session PS7 Exploring the Feeling of Trust

Lecture 15: 'Respect' – as the Right Evaluation

Tutorial 8: Practice Session PS8 Exploring the Feeling of Respect

Lecture 16: Other Feelings, Justice in Human-to-Human Relationship

Lecture 17: Understanding Harmony in the Society

Lecture 18: Vision for the Universal Human Order

Tutorial 9: Practice Session PS9 Exploring Systems to fulfil Human Goal

**UNIT- IV: Harmony in the Nature/Existence (4 lectures and 2 tutorials for**

**Practice session)**

Lecture 19: Understanding Harmony in the Nature

Lecture 20: Interconnectedness, self-regulation and Mutual Fulfilment among

the Four Orders of Nature

Tutorial 10: Practice Session PS10 Exploring the Four Orders of Nature

Lecture 21: Realizing Existence as Co-existence at All Levels

Lecture 22: The Holistic Perception of Harmony in Existence

Tutorial 11: Practice Session PS11 Exploring Co-existence in Existence.

**UNIT-V: Implications of the Holistic Understanding – a Look at Professional**

**Ethics (6lectures and 3 tutorials for practice session)**

Lecture 23: Natural Acceptance of Human Values

Lecture 24: Definitiveness of (Ethical) Human Conduct

Tutorial 12: Practice Session PS12 Exploring Ethical Human Conduct

Lecture 25: A Basis for Humanistic Education, Humanistic Constitution and

Universal Human Order

Lecture 26: Competence in Professional Ethics

Tutorial 13: Practice Session PS13 Exploring Humanistic Models in Education

Lecture 27: Holistic Technologies, Production Systems and Management

Models-Typical Case Studies

Lecture 28: Strategies for Transition towards Value-based Life and Profession

Tutorial 14: Practice Session PS14 Exploring Steps of Transition towards

Universal Human Order

Practice Sessions for UNIT I – Introduction to Value Education

PS1 Sharing about Oneself

PS2 Exploring Human Consciousness

PS3 Exploring Natural Acceptance

Practice Sessions for UNIT II – Harmony in the Human Being

PS4 Exploring the difference of Needs of self and body

PS5 Exploring Sources of Imagination in the self

PS6 Exploring Harmony of self with the body

Practice Sessions for UNIT III – Harmony in the Family and Society

PS7 Exploring the Feeling of Trust

PS8 Exploring the Feeling of Respect

PS9 Exploring Systems to fulfil Human Goal

Practice Sessions for UNIT IV – Harmony in the Nature (Existence)

PS10 Exploring the Four Orders of Nature

PS11 Exploring Co-existence in Existence

Practice Sessions for UNIT V – Implications of the Holistic Understanding – a Look at Professional Ethics

PS12 Exploring Ethical Human Conduct

PS13 Exploring Humanistic Models in Education

PS14 Exploring Steps of Transition towards Universal Human Order

**TEXT BOOKS:**

1.R R Gaur, R Asthana, G P Bagaria, A Foundation Course in Human Values and

Professional Ethics,2nd Revised Edition, Excel Books, New Delhi, 2019.

ISBN 978-93-87034-47-1

2.R R Gaur, R Asthana, G P Bagaria,Teachers’ Manual for A Foundation Course in

Human Values and Professional Ethics, 2nd Revised Edition, Excel Books, New

Delhi, 2019. ISBN 978-93-87034-53-2

**REFERENCE BOOKS:**

1. JeevanVidya: EkParichaya, A Nagaraj, JeevanVidyaPrakashan, Amarkantak, 1999.

2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.

3. The Story of Stuff (Book).

4. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi

5. Small is Beautiful - E. F Schumacher.

6. Slow is Beautiful - Cecile Andrews

7. Economy of Permanence - J C Kumarappa

8. Bharat Mein Angreji Raj – PanditSunderlal

9. Rediscovering India - by Dharampal

10. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi

11. India Wins Freedom - Maulana Abdul Kalam Azad

12. Vivekananda - Romain Rolland (English)

13. Gandhi - Romain Rolland (English)

**Mode of Conduct:**

Lecture hours are to be used for interactive discussion, placing the proposals about the topics at hand and motivating students to reflect, explore and verify them.

Tutorial hours are to be used for practice sessions.

While analyzing and discussing the topic, the faculty mentor’s role is in pointing to essential elements to help in sorting them out from the surface elements. In other words, help the students explore the important or critical elements.

In the discussions, particularly during practice sessions (tutorials), the mentor encourages the student to connect with one’s own self and do self-observation, self-reflection and self-exploration.

Scenarios may be used to initiate discussion. The student is encouraged to take up ”ordinary” situations rather than” extra-ordinary” situations. Such observations and their analyses are shared and discussed with other students and faculty mentor, in a group sitting.

Tutorials (experiments or practical) are important for the course. The difference is that the laboratory is everyday life, and practical are how you behave and work in real life. Depending on the nature of topics, worksheets, home assignment and/or activity are included. The practice sessions (tutorials) would also provide support to a student in performing actions commensurate to his/her beliefs. It is intended that this would lead to development of commitment, namely behaving and working based on

basic human values.

It is recommended that this content be placed before the student as it is, in the form of a basic foundation course, without including anything else or excluding any part of this content. Additional content may be offered in separate, higher courses. This course is to be taught by faculty from every teaching department, not exclusively by any one department.

Teacher preparation with a minimum exposure to at least one 8-day Faculty Development Program on Universal Human Values is deemed essential.

**E-RESOURCES:**

1. https://fdp-si.aicte-india.org/UHVII%

20Class%20Notes%20&%20Handouts/UHV%20Handout%201-

Introduction%20to%20Value%20Education.pdf

2. https://fdp-si.aicte-india.org/UHVII%

20Class%20Notes%20&%20Handouts/UHV%20Handout%202-

Harmony%20in%20the%20Human%20Being.pdf

3. https://fdp-si.aicte-india.org/UHVII%

20Class%20Notes%20&%20Handouts/UHV%20Handout%203-

Harmony%20in%20the%20Family.pdf

4. https://fdp-si.aicte-india.org/UHV%201%20Teaching%20Material/D3-

S2%20Respect%20July%2023.pdf

5. https://fdp-si.aicte-india.org/UHVII%

20Class%20Notes%20&%20Handouts/UHV%20Handout%205-

Harmony%20in%20the%20Nature%20and%20Existence.pdf

**Course Outcomes:**

Upon completion of the Course, the students will be able to:

1.Define the terms like Natural Acceptance, Happiness and Prosperity (L1, L2)

2. Identify one’s self, and one’s surroundings (family, society nature) (L1, L2)

3. Apply what they have learnt to their own self in different day-to-day settings in

real life (L3)

4. Relate human values with human relationship and human society. (L4)

5. Justify the need for universal human values and harmonious existence (L5)

6. Develop as socially and ecologically responsible engineers (L3, L6)

**B.Tech. III Semester COURSE CODE: 23ES303C L T P C**

**3 0 0 3**

**SIGNALS AND SYSTEMS**

**Internal Marks: 30**

**External Marks: 70**

**Course Objectives:**

* 1. To study about signals and systems.
  2. ToanalyzethespectralcharacteristicsofsignalusingFourierseriesandFouriertransforms.
  3. To understand the characteristics of systems.
  4. To introduce the concept of sampling process
  5. To know various transform techniques to analyze the signals and systems.

**UNIT- I: INTRODUCTION:** Definition of Signals and Systems, Classification of Signals, Classification of Systems, Operations on signals : time-shifting, time-scaling, amplitude-shifting, amplitude-scaling. Problems on classification and characteristics of Signals and Systems. Complex exponential and sinusoidal signals, Singularity functions and related functions: impulse function, step function signum function and ramp function. 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. Related problems.

**UNIT–II:FOURIER SERIES AND FOURIER TRANSFORM:**

Fourier series representation of continuous time periodic signals, properties of Fourier series, Dirichlet’s conditions, Trigonometric Fourier series and Exponential Fourier series, Relation between Trigonometric and Exponential Fourier series, Complex Fourier spectrum. Deriving Fourier transform from Fourier series, Fourier transform of arbitrary signal, Fourier transform of standard signals, Fourier transform of periodic signals, properties of Fourier transforms, Fourier transforms involving impulse function and Signum function. Introduction to Hilbert Transform, Related problems.

**UNIT-III: ANALYSIS OF LINEAR SYSTEMS:** Introduction, Linear system, impulse response, Response of a linear system, Linear time invariant (LTI) system, Linear time variant(LTV) system, Concept of convolution in time domain and frequency domain, Graphical representation of convolution, Transfer function of a LTI system, Related problems. Filter characteristics of linear systems. Distortion less transmission through a system, Signal bandwidth, system bandwidth, Ideal LPF, HPF and BPF characteristics, Causality and Poly-Wiener criterion for physical realization, relationship between bandwidth and rise time.

**UNIT–IV:**

**CORRELATION:** Auto-correlation and cross-correlation of functions, properties of correlation function, Energy density spectrum, Parseval’s theorem, Power density spectrum, Relation between Convolution and correlation, Detection of periodic signals in the presence of noise by correlation, Extraction of signal from noise by filtering.

**SAMPLINGTHEOREM:** Graphical and analytical proof for Band Limited Signals, impulse sampling, Natural and Flat top Sampling, Reconstruction of signal from its samples, effect of under sampling –Aliasing, Introduction to Band Pass sampling, Related problems.

**UNIT–V:**

**LAPLACE TRANSFORMS:** Introduction, Concept of region of convergence (ROC) for Laplace transforms, constraints on ROC for various classes of signals, Properties of L.T’s, Inverse Laplace transform, Relation between L.T’s, and F.T. of a signal. Laplace transform of certain signals using waveform synthesis.

**Z–TRANSFORMS:** Concept of Z-Transform of a discrete sequence.Region of convergence in Z-Transform, constraints on ROC for various classes of signals, Inverse Z-transform, properties of Z-transforms.Distinction between Laplace, Fourier and Z-transforms.

**TEXT BOOKS:**

1. Signals, Systems &Communications-B.P.Lathi, BS Publications,2003.
2. Signal sand Systems-A.V. Oppenheim, A.S. Willsky and S.H. Nawab, PHI, 2ndEdn, 1997
3. Signals & Systems-Simon Haykin and VanVeen,Wiley,2ndEdition,2007

**REFERENCE BOOKS:**

1. Principles of Linear Systems and Signals–BP Lathi,OxfordUniversityPress,2015
2. Signals and Systems–TK Rawat, Oxford University press,2011

**E-RESOURCES:**

1. https://nptel.ac.in/courses/108/104/108104100/
2. https://nptel.ac.in/courses/108/106/108106163/

**Course Outcomes**

Upon successful completion of the course, the students will be able to

1. Differentiate the various classifications of signals and systems
2. Analyze the frequency domain representation of signals using Fourier concepts
3. Classify the systems based on their properties and determine the response of LTI Systems.
4. Know the sampling process and various types of sampling techniques.
5. Apply Laplace and z-transforms to analyze signals and Systems (continuous & discrete).
6. Know the properties of Correlation.

**B.Tech. III Semester COURSE CODE:** **23PCEC304 L T P C**

**3 0 0 3**

**ELECTRONIC DEVICES AND CIRCUITS**

**Internal Marks: 30**

**External Marks: 70**

**Course Objectives:**

1. To learn and understand the basic concepts of semiconductor physics.
2. Study the physical phenomena such as conduction, transport mechanism and electrical characteristics of different diodes.
3. To learn and understand the application of diodes as rectifiers with their operation and characteristics with and without filters are discussed.
4. Acquire knowledge about the principle of working and operation of Bipolar Junction Transistor and Field Effect Transistor and their characteristics.
5. To learn and understand the purpose of transistor biasing and its significance.
6. Small signal equivalent circuit analysis of BJT and FET transistor amplifiers and compare different configurations.

**UNIT-I: Review of Semiconductor Physics:** Mobility and Conductivity, Intrinsic and extrinsic semiconductors**,** Hall effect, continuity equation, law of junction, Fermi Dirac function, Fermi level in intrinsic and extrinsic Semiconductors.

**Junction Diode Characteristics :** energy band diagram of PN junction Diode, Open circuited p-n junction, Biased p-n junction, p-n junction diode, current components in p-n junction Diode, Diode equation, V-I Characteristics, temperature dependence on V-I characteristics, Diode resistance, Diode capacitance.

**UNIT-II:**

**Special Semiconductor Devices**: Zener Diode, Breakdown mechanisms, Zener diode applications, Varactor Diode, LED, Photodiode, Tunnel Diode, UJT, PNPN Diode, SCR, Construction, operation and V-I characteristics.

**Diode Circuits:** The Diode as a circuit element, The Load-Line concept, The Piecewise Linear Diode model, Clipping (limiting) circuits, Clipping at Two Independent Levels, Peak Detector, Clamping circuits, Comparators, Sampling Gate, Basic Rectifier setup**,** half wave rectifier, full wave rectifier, bridge rectifier, derivations of characteristics of rectifiers, Filters, Inductor filter, Capacitor filter, π-section Filter, comparison of various filter circuits in terms of ripple factors.

**UNIT- III:**

**Transistor Characteristics:** Junction transistor, transistor current components, transistor equation in CB configuration, transistor as an amplifier, characteristics of transistor in Common Base, Common Emitter and Common Collector configurations, Ebers-Moll model of a transistor, punch through/ reach through, Photo transistor, typical transistor junction voltage values.

**Transistor Biasing and Thermal Stabilization :** Need for biasing, operating point, load line analysis, BJT biasing- methods, basic stability, fixed bias, collector to base bias, self bias, Stabilization against variations in VBE, Ic, and β, Stability factors, (S,S',S'’), Bias compensation, Thermal runaway, Thermal stability.

**UNIT- IV: Small Signal Low Frequency Transistor Amplifier Models**

**BJT:** Two port network, Transistor hybrid model, determination of h-parameters, conversion of h-parameters, generalized analysis of transistor amplifier model using h-parameters, Analysis of CB, CE and CC amplifiers using exact and approximate analysis, Comparison of transistor amplifiers.

**UNIT- V: FET:** FET types, JFET operation, characteristics, small signal model of JFET.**MOSFET:** MOSFET Structure, Operation of MOSFET: operation in triode region, operation in saturation region, MOSFET as a variable resistor, derivation of V-I characteristics of MOSFET, Channel length modulation, MOS transconductance, MOS device models: MOS small signal model, PMOS Transistor, CMOS Technology, Comparison of Bipolar and MOS devices. **CMOS amplifiers:** General Considerations, Common Source Stage, Common Gate Stage, Source Follower, comparison of FET amplifiers.

**TEXT BOOKS:**

1. Millman’s Electronic Devices and Circuits- J. Millman, C. C. Halkias and Satyabrata Jit, Mc-Graw Hill Education, 4th edition, 2015.

2. Millman’s Integrated Electronics-J. Millman, C. Halkias, and Ch. D. Parikh, Mc-

Graw Hill Education, 2nd Edition, 2009.

3. Fundamentals of Microelectronics-Behzad Razavi, Wiley, 3rd edition, 2021.

**REFERENCE BOOKS:**

1. Basic Electronics-Priciples and Applications, Chinmoy Saha,Arindam Halder, Debarati Ganguly,Cambridge University Press.
2. Electronics devices & circuit theory- Robert L.Boylestad and LouiNashelsky, Pearson, 11th edition, 2015.
3. Electronic Devices and Circuits - David A. Bell, Oxford University Press, 5th edition, 2008.
4. Electronic Devices and Circuits- S. Salivahanan, N. Suresh Kumar, Mc-Graw Hill, 5thedition, 2022.

**E-RESOURCES:**

1 .https://nptel.ac.in/courses/117/103/117103063/

2. https://onlinecourses.nptel.ac.in/noc21\_ee55/preview

**Course Outcomes**

Upon completing this course, the student will be able to

1. Apply the basic concepts of semiconductor physics.
2. Understand the formation of p-n junction and how it can be used as a p-n junction as diode in different modesof operation.
3. Analyze the construction, working principle of Semiconductor Devices and Diode Circuits
4. Know the need of transistor biasing, various biasing techniques for BJT and FET and stabilization concepts with necessary expressions
5. Apply small signal low frequency transistor amplifier circuits using BJT in different configurations
6. Apply small signal low frequency transistor amplifier circuits using FET in different configurations

**B.Tech. III Semester COURSE CODE:** **23PCEC305 L T P C**

**3 0 0 3**

**SWITCHING THEORY AND LOGIC DESIGN Internal Marks: 30**

**External Marks: 70**

**Course Objectives:**

1. To solve a typical number base conversion and analyze new error coding techniques.
2. Theorems and functions of Boolean algebra and behavior of logic gates
3. To optimize logic gates for digital circuits using various techniques.
4. Boolean function simplification using Karnaugh maps and Quine-McCluskey methods
5. To understand concepts of combinational circuits.
6. To develop advanced sequential circuits.

**UNIT – I**

**REVIEW OF NUMBER SYSTEMS & CODES:**

Representation of numbers of different radix, conversation from one radix to another radix, r-1’s compliments and r’s compliments of signed members. Gray code ,4 bit codes; BCD, Excess-3, 2421, 84-2-1 code etc. Error detection & correction codes: parity checking, even parity, odd parity, Hamming code.

**BOOLEAN THEOREMS AND LOGIC OPERATIONS:**

Boolean theorems, principle of complementation & duality, De-morgan theorems. Logic operations ; Basic logic operations -NOT, OR, AND, Universal Logic operations, EX-OR, EX- NOR operations. Standard SOP and POS Forms, NAND-NAND and NOR-NOR realizations, Realization of three level logic circuits.

**UNIT – II**

**MINIMIZATION TECHNIQUES:**

Minimization and realization of switching functions using Boolean theorems, K-Map (up to 6 variables) and tabular method (Quine-mccluskey method) with only four variables and single function.

**COMBINATIONAL LOGIC CIRCUITS DESIGN:**

Design of Half adder, full adder, half subtractor, full subtractor, applications of full adders; 4-bit adder-subtractor circuit, BCD adder circuit, Excess 3 adder circuit and carry look-a- head adder circuit, Design code converts using Karnaugh method and draw the complete circuit diagrams.

**UNIT – III**

**COMBINATIONAL LOGIC CIRCUITS DESIGN USING MSI &LSI :**

Design of encoder ,decoder, multiplexer and de-multiplexers, Implementation of higher order circuits using lower order circuits . Realization of Boolean functions using decoders and multiplexers. Design of Priority encoder, 4-bit digital comparator and seven segment decoder. .

**INTRODUCTION OF PLD’s :**

PLDs: PROM, PAL, PLA -Basics structures, realization of Boolean functions, Programming table.

**UNIT – IV**

**SEQUENTIAL CIRCUITS I:**

Classification of sequential circuits (synchronous and asynchronous) , operation of NAND & NOR Latches and flip-flops; truth tables and excitation tables of RS flip-flop, JK flip- flop, T flip-flop, D flip-flop with reset and clear terminals. Conversion from one flip-flop to another flip- flop.Design of 5ripple counters, design of synchronous counters, Johnson counter, ring counter. Design of registers - Buffer register, control buffer register, shift register, bi-directional shift register, universal shift, register.

Study the following relevant ICs and their relevant functions

7474, 7475, 7476, 7490, 7493, 74121.

**UNIT – V**

**SEQUENTIAL CIRCUITS II :**

Finite state machine; state diagrams, state tables, reduction of state tables. Analysis of clocked sequential circuits Mealy to Moore conversion and vice-versa. Realization of sequence generator, Design of Clocked Sequential Circuit to detect the given sequence (with overlapping or without overlapping)

**TEXT BOOKS:**

1. Switching and finite automata theory Zvi.KOHAVI, Niraj.K.Jha 3rdEdition,

Cambridge UniversityPress,2009

2. Digital Design by M.MorrisMano, Michael D Ciletti,4th editionPHIpublication,2008

3. Switching theory and logic design by Hill and Peterson**,** Mc-Graw Hill TMH edition,

2012.

**REFERENCE BOOKS:**

1. Fundamentals of Logic Design by Charles H. Roth Jr,JaicoPublishers,2006

2. Digital electronics by R S Sedha.S.Chand &companylimited,2010

3. Switching Theory and Logic Design by A. AnandKumar,PHI Learningpvtltd,2016.

4. Digital logic applications and design by John M Yarbough, Cengagelearning,2006.

5. TTL 74-Seriesdatabook.

**E-RESOURCES:**

1. https://nptel.ac.in/courses/106/105/106105185/

2. https://onlinecourses.nptel.ac.in/noc19\_cs74/preview

**Course Outcomes**

Upon completing this course, the student will be able to:

1. Classify different number systems and apply to generate various codes.
2. Use the concept of Boolean algebra in minimization of switching functions
3. Design different types of combinational logic circuits.
4. Apply knowledge of flip-flops in designing of Registers and counters
5. The operation and design methodology for synchronous sequential circuits and algorithmic state machines.
6. Produce innovative designs by modifying the traditional design techniques.

**B.Tech. III Semester COURSE CODE: 23PCEC311**

**L T P C**

**0 0 3 1.5**

**ELECTRONIC DEVICES AND CIRCUITS LAB**

**Internal Marks: 30**

**External Marks: 70**

**Course Objectives:**

1.know the functionality of electronic components.

2.observe the characteristics of circuits designed based on electronic components.

**Note:**The students are required to perform the experiment to obtain the V-I characteristics and to determine the relevant parameters from the obtained graphs.

**List of Experiments (Minimum of Ten Experiments has to be performed)**

1. Clipper circuit using diode

2. Clamping circuit using diode

3. Rectifiers (without and with c-filter)

PartA: Half-wave Rectifier

PartB: Full-wave Rectifier

4. BJT Characteristics (CE Configuration)

PartA: Input Characteristics

PartB: Output Characteristics

5. FET Characteristics (CS Configuration)

PartA: Drain Characteristics

PartB: Transfer Characteristics

6. SCR Characteristics.

7. UJT Characteristics

8. Transistor Biasing

9. CRO Operation and its Measurements

10. BJT-CE Amplifier

11. Emitter Follower-CC Amplifier

12. FET-CSAmplifier

**Major Equipment required for Laboratories:**

1. Regulated Power supplies

2. Analog/ Digital Storage Oscilloscopes

3. Analog/ Digital Function Generators

4. Digital Multi-meters

5. Decade Resistance Boxes/Rheostats

6. Decade Capacitance Boxes

7. Ammeters(Analog or Digital)

8. Voltmeters(Analog or Digital)

9. Active& Passive Electronic Components.

**Note:** Minimum 10 experiments of duration 3 periods must be completed for the eligibility to appear for the semester end examinations. In case if the student fails to get eligibility for semester end exams in the current semester, he has to take the permission of HOD and complete the required number of experiments and appear for semester end exam as and when conducted.

**E-RESOURCES:**

1**.**https://nptel.ac.in/courses/122/106/122106025/

**Course Outcomes:**

Upon successful completion of the course, the students will be able to

1. Acquire the knowledge of various semiconductor devices and their use in real life.

2. Design aspects of biasing and keep them in active region of the device for functional

circuits

3. Acquire the knowledge about the role of special purpose devices and their

applications.

4.understand the Operation Characteristics of FET.

5. CRO Operation and its Measurements

6. Determine the Characteristics of SCR.

**B.Tech. III Semester COURSE CODE: 23PCEC312**

**L T P C**

**0 0 3 1.5**

**SWITCHING THEORY AND LOGIC DESIGN LAB**

**Internal Marks: 30**

**External Marks: 70**

**Course objectives:**

1. Acquire the knowledge on numerical information in different forms and Boolean

Algebra theorems.

2. Define Postulates of Boolean algebra and to minimize combinational functions, and

design the combinational circuits.

3. Design and analyze sequential circuits for various cyclic functions.

**List of Experiments (Ten experiments to be done):**

1. Verification of truth tables of the following Logic gates

Two input (i) OR (ii) AND (iii) NOR (iv) NAND (v) Exclusive-OR (vi) Exclusive-NOR

1. Design a simple combinational circuit with four variables and obtain minimal SOP expression and verify the truth table using Digital Trainer Kit.
2. Verification of functional table of 3 to 8-line Decoder /De-multiplexer
3. 4 variable logic function verification using 8 to1 multiplexer.
4. Design full adder circuit and verify its functional table.
5. Verification of functional tables of (i) JK Edge triggered Flip–Flop (ii) JK Master Slave Flip–Flop (iii) D Flip-Flop
6. Design a four-bit ring counter using D Flip–Flops/JK Flip Flop and verify output.
7. Design a four-bit Johnson’s counter using D Flip-Flops/JK Flip Flops and verify output
8. Verify the operation of 4-bit Universal Shift Register for different Modes of operation.
9. Draw the circuit diagram of MOD-8 ripple counter and construct a circuit using T-Flip-Flops and Test It with a low frequency clock and sketch the output waveforms.
10. Design MOD–8 synchronous counter using T Flip-Flop and verify the result and sketch the output waveforms.
11. (a) Draw the circuit diagram of a single bit comparator and test the output

(b) Construct 7 Segment Display Circuit Using Decoder and7 Segment LED and test it.

13. Design BCD Adder Circuit and Test the Same using Relevant IC

14. Design Excess-3 to 9- Complement convertor using only four Full Adders and test

the Circuit.

15. Design an Experimental model to demonstrate the operation of 74154 De-16.

Multiplexer using LEDs for outputs.

16. Design of any combinational circuit using Hardware Description Language

17. Design of any sequential circuit using Hardware Description Language

**Major Equipment required for Laboratories:**

1. 5 V Fixed Regulated Power Supply/ 0-5V or more Regulated Power Supply.

2. 20 MHz Oscilloscope with Dual Channel.

3. Bread board and components/ Trainer Kit.

4. Multimeter.

**Note:** Minimum 10 experiments of duration 3 periods must be completed for the eligibility to appear for the semester end examinations. In case if the student fails to get eligibility for semester end exams in the current semester, he has to take the permission of HOD and complete the required number of experiments and appear for semester end exam as and when conducted.

**E-RESOURCE:**

1. https://nptel.ac.in/courses/106/105/106105185/

**course outcomes:**

Upon successful completion of the course, the students will be able to

1. Acquire the knowledge on numerical information in different forms and Boolean

Algebra theorems.

2. Define Postulates of Boolean algebra and to minimize combinational functions, and

Design the combinational circuits.

3.Implement the given Boolean function using given Decoders

4. Design and analyze sequential circuits for various cyclic functions.

5. Characterize logic families and analyze them for the purpose of AC and DC

parameters.

6. Realize 2:1 MUX using the given gates and Design 8:1 using 2:1 MUX.

**B.Tech. III Semester COURSE CODE: 23SEC313C L T P C**

**0 1 2 2**

**DATA STRUCTURES USING PYTHON**

**Internal Marks: 30**

**External Marks: 70**

**Course objectives:**

1. Acquire the knowledge on Python program.

2. Develop an inheritance hierarchy based upon a Polygon class

**List of Experiments (Ten experiments to be done):**

1. Write a Python program for class, Flower, that has three instance variables of type str, int, and float that respectively represent the name of the flower, its number of petals, and its price. Your class must include a constructor method that initializes each variable to an appropriate value, and your class should include methods for setting the value of each type, and retrieving the value of each type.
2. Develop an inheritance hierarchy based upon a Polygon class that has abstract methods area( ) and perimeter( ). Implement classes Triangle, Quadrilateral, Pentagon, that extend this base class, with the obvious meanings for the area( ) and perimeter( ) methods. Write a simple program that allows users to create polygons of the various types and input their geometric dimensions, and the program then outputs their area and perimeter
3. Write a python program to implement Method Overloading and Method Overriding.
4. Write a Python program to illustrate the following comprehensions: a) List Comprehensions b) Dictionary Comprehensions c) Set Comprehensions d) Generator Comprehensions
5. Write a Python program to generate the combinations of n distinct objects taken from the elements of a given list. Example: Original list: [1, 2, 3, 4, 5, 6, 7, 8, 9] Combinations of 2 distinct objects: [1, 2] [1, 3] [1, 4] [1, 5] .... [7, 8] [7, 9] [8, 9].
6. Write a program for Linear Search and Binary search.
7. Write a program to implement Bubble Sort and Selection Sort.
8. Write a program to implement Merge sort and Quick sort.
9. Write a program to implement Stacks and Queues.
10. Write a program to implement Singly Linked List.
11. Write a program to implement Doubly Linked list.
12. Write a program to implement Binary Search Tree.

**Note-1:** Minimum 10 experiments of duration 3 periods must be completed for the eligibility to appear for the semester end examinations. In case if the student fails to get eligibility for semester end exams in the current semester, he has to take the permission of HOD and complete the required number of experiments and appear for semester end exam as and when conducted.

**Note-2:** Skill Oriented Course shall carry 100 marks and shall be evaluated through continuous assessments during the semester for 30 sessional marks and end examination shall be for 70 marks. Day-to-day work in the class / laboratory shall be evaluated for 30 marks by the concerned teacher based on the regularity/assignments/viva/mid semester test. The end examination similar to practical examination pattern shall be conducted by the concerned teacher and an expert in the subject nominated by the principal.

**E-RESOURCES:**

1. https://onlinecourses.nptel.ac.in/noc22\_cs26/preview
2. https://nptel.ac.in/courses/106106145

**Course Outcomes:**

Upon completing this course, the students will be able to

1. Examine Python syntax and semantics and apply Python flow control and

functions.

2. Create, run and manipulate Python Programs using core data structures like Lists

3. Apply Dictionaries.

4. Use Regular Expressions.

5. Interpret the concepts of Object-Oriented Programming as used in Python.

6. Master object-oriented programming to create an entire python project using objects

and classes

**B.Tech. III Semester COURSE CODE: 23MC300 L T P C**

**0 0 0 0**

**ENVIRONMENTAL SCIENCE**

**Internal Marks: 30**

**External Marks: 0**

**Semester End Exam: 70**

**Course Objectives:**

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

**UNIT - I**

Multidisciplinary Nature of Environmental Studies: – Definition, Scope and Importance – Need for Public Awareness. Natural Resources : Renewable and non-renewable resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case

studies. – Energy resources:

**UNIT - II**

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, characteristic features, structure and function of the following ecosystem:

a. Forest ecosystem.

b. Grassland ecosystem

c. Desert ecosystem

d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Biodiversity and Its Conservation : Introduction and Definition: genetic, species and

ecosystem diversity – Bio-geographical classification of India – Value of biodiversity:

consumptive use, Productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and local levels – India as a mega-diversity nation – Hot-sports of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

**UNIT - III**

Environmental Pollution: Definition, Cause, effects and control measures of:

a. Air Pollution.

b. Water pollution

c. Soil pollution

d. Marine pollution

e. Noise pollution

f. Thermal pollution

g. Nuclear hazards

Solid Waste Management: Causes, effects and control measures of urban and industrial wastes – Role of an individual in prevention of pollution – Pollution case studies – Disaster management: floods, earthquake, cyclone and landslides.

**UNIT - IV**

Social Issues and the Environment: From Unsustainable to Sustainable development – Urban problems related to energy – Water conservation, rain water harvesting, watershed management – Resettlement and rehabilitation of people; its problems and concerns. Case studies – Environmental ethics: Issues and possible solutions – Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies – Wasteland reclamation. – Consumerism and waste products. – Environment Protection Act. – Air (Prevention and Control of Pollution) Act. – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Issues involved in enforcement of environmental legislation – Public awareness.

**UNIT - V**

Human Population And The Environment: Population growth, variation among nations. Population explosion – Family Welfare Programmes. – Environment and human health – Human Rights – Value Education – HIV/AIDS – Women and Child Welfare – Role of information Technology in Environment and human health – Case studies.

Field Work: Visit to a local area to document environmental assets River/forest grassland/hill/mountain – Visit to a local polluted site-Urban/Rural/Industrial/Agricultural Study of common plants, insects, and birds – river, hill slopes, etc.

**TEXT BOOKS:**

1. Erach Bharucha, Text book of Environmental Studies for Undergraduate

Courses, Universities Press (India) Private Limited, 2019.

2. Palani swamy, Environmental Studies, 2/e, Pearson education, 2014.

3. S.Azeem Unnisa, Environmental Studies, Academic Publishing Company, 2021.

4. K.Raghavan Nambiar, “Text book of Environmental Studies for Undergraduate

Courses as per UGC model syllabus”, SciTech Publications (India), Pvt. Ltd, 2010.

**REFERENCE BOOKS:**

1. Deeksha Dave and E.Sai Baba Reddy, Textbook of Environmental Science, 2/e,

Cengage Publications, 2012.

2. M.Anji Reddy, “Textbook of Environmental Sciences and Technology”, BS

Publication, 2014.

3. J.P. Sharma, Comprehensive Environmental studies, Laxmi publications, 2006.

4. J. Glynn Henry and Gary W. Heinke, Environmental Sciences and Engineering,

Prentice Hall of India Private limited, 1988.

5. G.R. Chatwal, A Text Book of Environmental Studies, Himalaya Publishing House,

2018.

6. Gilbert M. Masters and Wendell P. Ela, Introduction to Environmental Engineering

and Science, 1/e, Prentice Hall of India Private limited, 1991.

### E-RESOURCE:

### 1.https://onlinecourses.nptel.ac.in/noc23\_hs155/preview

2.https://www.edx.org/learn/environmental-science/rice-university-ap-

renvironmental-science-part-3-pollution-andresources?

index=product&objectID=course-3a6da9f2-d84c-4773-8388-

1b2f8f6a75f2&webview=false&campaign=AP%C2%AE+Environmental+Science+

+Part+3%3A+Pollution+and+Resources&source=edX&product\_category=course& placement\_url=https%3A%2F%2Fwww.edx.org%2Flearn%2Fenvironmentalscience

3. http://ecoursesonline.iasri.res.in/Courses/Environmental%20Science-

I/Data%20Files/pdf/lec07.pdf

4. https://www.youtube.com/watch?v=5QxxaVfgQ3k

**Course Outcomes**

Upon completing this course, the student will be able to

1. know the natural resources, ecology, Biodiversity, and conservation of natural

resources

2. Grasp multi disciplinary nature of environmental studies and various renewable

and non-renewable resources.

3. Understand flow and bio-geo- chemical cycles and ecological pyramids.

4. Understand various causes of pollution and solid waste management and related

preventive measures.

5. Understand the rainwater harvesting, watershed management, ozone layer

depletion and waste land reclamation.

6. Illustrate the causes of population explosion, value education and welfare

programmes.

**B.Tech. IV Semester COURSE CODE:** **23HM401A L T P C**

**2 0 0 2**

**MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS**

**Internal Marks: 30**

**External Marks: 70**

**Course Objectives:**

1. To inculcate the basic knowledge of microeconomics and financial accounting

2. To make the students learn how demand is estimated for different products,

Input output relationship for optimizing production and cost

3. To Know the Various types of market structure and pricing methods and strategy

4. To give an overview on investment appraisal methods to promote the students to

Learn how to plan long-term investment decisions.

5. To provide fundamental skills on accounting and to explain the process of preparing

financial statements.

**UNIT – I: Managerial Economics**

Introduction – Nature, meaning, significance, functions, and advantages. Demand-Concept, Function, Law of Demand - Demand Elasticity- Types – Measurement. Demand Forecasting- Factors governing Forecasting, Methods. Managerial Economics and Financial Accounting and Management.

**UNIT – II: Production and Cost Analysis**

Introduction – Nature, meaning, significance, functions and advantages. Production

Function– Least- cost combination– Short run and long run Production Function- Isoquants and Is costs, Cost & Break-Even Analysis - Cost concepts and Cost behaviour- Break-Even Analysis (BEA) - Determination of Break-Even Point (Simple Problems).

**UNIT – III: Business Organizations and Markets**

Introduction – Forms of Business Organizations- Sole Proprietary - Partnership - Joint Stock Companies - Public Sector Enterprises. Types of Markets - Perfect and Imperfect Competition - Features of Perfect Competition Monopoly- Monopolistic Competition– Oligopoly-Price-Output Determination - Pricing Methods and Strategies

**UNIT – IV: Capital Budgeting**

Introduction – Nature, meaning, significance. Types of Working Capital, Components,

Sources of Short-term and Long-term Capital, Estimating Working capital requirements. Capital Budgeting– Features, Proposals, Methods and Evaluation. Projects – Pay Back Method, Accounting Rate of Return (ARR) Net Present Value (NPV) Internal Rate Return (IRR) Method (sample problems)

**UNIT – V: Financial Accounting and Analysis**

Introduction – Concepts and Conventions- Double-Entry Bookkeeping, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments). Introduction to Financial Analysis - Analysis and Interpretation of Liquidity Ratios, Activity Ratios, and Capital structure Ratios and Profitability.

**TEXT BOOK:**

1. Varshney & Maheswari: Managerial Economics, Sultan Chand.

2. Aryasri: Business Economics and Financial Analysis, 4/e, MGH.

**REFERENCES**

1. Ahuja Hl Managerial economics Schand.

2. S.A. Siddiqui and A.S. Siddiqui: Managerial Economics and Financial Analysis, New

Age International.

3. Joseph G. Nellis and David Parker: Principles of Business Economics, Pearson, 2/e,

New Delhi.

4. Domnick Salvatore: Managerial Economics in a Global Economy, Cengage..

**E-RESOURCES:**

1. https://www.slideshare.net/123ps/managerial-economics-ppt
2. https://www.slideshare.net/rossanz/production-and-cost-45827016
3. https://www.slideshare.net/darkyla/business-organizations-19917607
4. https://www.slideshare.net/balarajbl/market-and-classification-of-market
5. https://www.slideshare.net/ruchi101/capital-budgeting-ppt-59565396
6. https://www.slideshare.net/ashu1983/financial-accounting

**Course Outcomes:**

After undergoing the course, students will be able to

1. Define the concepts related to Managerial Economics, financial accounting and

management

1. Understand the fundamentals of Economics viz., Demand, Production, cost,

revenue and markets

1. Apply the Concept of Production cost and revenues for effective Business decision
2. Analyze how to invest their capital and maximize returns
3. Evaluate the capital budgeting techniques.
4. Develop the accounting statements and evaluate the financial performance of business entity

**B.Tech. IV Semester COURSE CODE: 23ES402B L T P C**

**3 0 0 3**

**LINEAR CONTROL SYSTEMS Internal Marks: 30**

**External Marks: 70**

**Course Objectives:**

1. To introduce the concepts of open loop and closed loop systems, mathematical models of mechanical and electrical systems, and concepts of feedback
2. To study the characteristics of the given system in terms of the transfer function and introducing various approaches to reduce the overall system for necessary analysis
3. To develop the acquaintance in analyzing the system response in time-domain and frequency domain in terms of various performance indices
4. To analyze the system in terms of absolute stability and relative stability by different approaches
5. To design different control systems for different applications as per given specifications
6. To introduce the concepts of state variable analysis, design and also the concepts of controllability and observability.

**UNIT I - INTRODUCTION**

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

**UNIT II – TRANSFER FUNCTION REPRESENTATION**

Transfer Function of DC Servo motor - AC Servo motor- Synchro-transmitter and Receiver, Block diagram representation of systems considering electrical systems as examples –Block diagram algebra–Representation by Signal flowgraph-Reduction using mason’s gain formula.

**TIME RESPONSE ANALYSIS**

Standard test signals – Time response of first order systems – Characteristic Equation of Feedback controlsystems, Transient response of second order systems – Time domain specifications – Steady state response - Steady stateerrors and error constants.

**UNIT III – STABILITY ANALYSIS IN S-DOMAIN**

The concept of stability – Routh’s stability criterion – qualitative stability and conditional stability – limitations of Routh’s stability

**Root Locus Technique:**

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

**UNIT IV**

**Frequency response analysis:** Introduction, Correlation between time and frequency response, Polar Plots, Bode Plots, Nyquist Stability Criterion

**UNIT V – CLASSICAL CONTROL DESIGN TECHNIQUES**

Compensation techniques – Lag, Lead, Lead-Lag Controllers design infrequency Domain, PID Controllers. State Space Analysis of Continuous Systems Concepts of state, state variables and state model, derivation of state models from block diagrams, Diagonalization- Solving the Time invariant state Equations- State Transition Matrix and it’s Properties – Concepts of Controllability and Observability.

**TEXT BOOKS:**

1. Automatic Control Systems 8th edition– by B.C.Kuo – Johnwiley and son’s, 2003.

2. Control Systems Engineering –by I. J.Nagrathand M.Gopal, New Age International

(P) Limited, Publishers, 2nd edition, 2007

3. Modern Control Engineering–by Katsuhiko Ogata–Pearson Publications, 5th edition,

2015.

**REFERENCE BOOKS:**

1. Control Systems by A.Nagoorkani, RB Apublications, 3 edition, 2017.

2. Control Systems by A.Anandkumar, PHI, 2 Edition, 2014.

**E-RESOURCES:**

1.https://archive.nptel.ac.in/courses/107/106/107106081/

2. https://onlinecourses.nptel.ac.in/noc20\_ee90/preview

**Course Outcomes:**

After completing this course, the student will be able to

1. Know the concepts of feedback and its advantages to various control systems
2. Design the control system in time-domain and frequency domain are introduced.
3. Control systems for various applications can be designed using time-domain and frequency domain analysis.
4. Get the knowledge on Stability Analysis, root Locus Technique
5. Understand the time response analysis, stability analysis, frequency response analysis of different ordered systems through their characteristic equation and time-domain specifications.
6. Get the knowledge on state space analysis of Continuous Systems.

**B.Tech. IV Semester COURSE CODE:** **23PCEC403 L T P C**

**3 0 0 3**

**ELECTROMAGNETIC WAVES AND TRANSMISSION LINES**

**Internal Marks: 30**

**External Marks: 70**

**Course Objectives:**

1. Understand the fundamentals of electric fields, coulomb’s law and gauss law
2. Familiar with of Biot-Savart Law, Ampere’s Circuital Law and Maxwell equations
3. Aware of electromagnetic wave propagation in dielectric and conducting media
4. Study the equivalent circuit of transmission lines and parameters of the transmission lines
5. Learn the working of smith chart and its usage in the calculation of transmission line parameters

**UNIT I:**

Review of Co-ordinate Systems, **Electrostatics:** Coulomb’s Law, Electric Field Intensity, Electric Flux Density, Gauss Law and Applications, Electric Potential, Maxwell’s Two Equations for Electrostatic Fields, Energy Density, Illustrative Problems. Convection and Conduction Currents, Dielectric Constant, Poisson’s and Laplace’s Equations; Capacitance – Parallel Plate, Coaxial Capacitors, Illustrative Problems.

**UNIT II:**

**Magnetostatics:** Biot-Savart Law, Ampere’s Circuital Law and Applications, Magnetic Flux Density, Maxwell’s Two Equations for Magnetostatic Fields, Magnetic Scalar and Vector Potentials, Forces due to Magnetic Fields, Ampere’s Force Law, Inductances and Magnetic Energy, Illustrative Problems**.**

**Maxwell’s Equations (Time Varying Fields):** Faraday’s Law and Transformer EMF, Inconsistency of Ampere’s Law and Displacement Current Density, Maxwell’s Equations in Different Final Forms and Word Statements, Conditions at a Boundary Surface, Illustrative Problems.

**UNIT III:**

**EM Wave Characteristics :** Wave Equations for Conducting and Perfect Dielectric Media, Uniform Plane Waves – Definition, All Relations Between E & H, Sinusoidal Variations, Wave Propagation in Lossy dielectrics, lossless dielectrics, free space, wave propagation in good conductors, skin depth, Polarization & Types, Illustrative Problems.

Reflection and Refraction of Plane Waves – Normal and Oblique Incidences, for both Perfect Conductor and Perfect Dielectrics, Brewster Angle, Critical Angle and Total Internal Reflection, Surface Impedance, Poynting Vector and Poynting Theorem, Illustrative Problems.

**UNIT IV:**

**Transmission Lines - I** : Types, Parameters, T & π Equivalent Circuits, Transmission Line Equations, Primary & Secondary Constants, Expressions for Characteristic Impedance, Propagation Constant, Phase and Group Velocities, Infinite Line, Lossless lines, distortion less lines, Illustrative Problems.

**UNIT V:**

**Transmission Lines – II:** Input Impedance Relations, Reflection Coefficient, VSWR, Average Power, Shorted Lines, Open Circuited Lines, and Matched Lines, Low loss radio frequency and UHF Transmission lines, UHF Lines as Circuit Elements, Smith Chart – Construction and Applications, Quarter wave transformer, Single Stub Matching, Illustrative Problems.

**TEXT BOOKS:**

1. Elements of Electromagnetic – Matthew N. O. Sadiku, Oxford University Press,

7th edition, 2018.

2. Electromagnetic Waves and Radiating Systems – E.C. Jordan and K.G. Balmain,

PHI, 2nd Edition, 2008.

**REFERENCE BOOKS:**

1. Engineering Electromagnetics – William H. Hayt, John A. Buck, Jaleel M. Akhtar,

TMH, 9th edition, 2020.

2. Electromagnetic Field Theory and Transmission Lines –G. S. N. Raju, Pearson

Education,2006

3. Electromagnetic Field Theory and Transmission Lines: G SasiBhushana Rao,Wiley

India,2013.

4. Networks, Lines and Fields John D. Ryder, Second Edition, Pearson Education,

2015.

**E-RESOURCES:**

1. https://archive.nptel.ac.in/courses/108/106/108106157/

2. https://nptel.ac.in/courses/117101056

**Course Outcomes:**

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

1. Determine electric field intensity using coulomb’s law and Gauss law.
2. Determine magnetic field intensity using Biot-Savarts Law and Ampere’s Circuital Law.
3. Analyze the electromagnetic wave propagation in dielectric and conducting media.
4. Examine the primary and secondary constants of different types of transmission lines.
5. Derive the expressions for input impedance, reflection coefficient, and VSWR of transmission lines and calculate these parameters using smith chart.
6. Calculate input impedance, reflection coefficient, and VSWR parameters using smith chart.

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| **B.Tech. IV Semester** | **COURSE CODE: 23PCEC404** | **L** | **T** | **P** | **C** |
|  |  | **3** | **0** | **0** | **3** |

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| **ELECTRONIC CIRCUIT ANALYSIS** |

**Internal Marks: 30**

**External Marks: 70**

**Course Objectives:**

1. To learn hybrid- π parameters a thigh frequency and compare with low frequency parameters.
2. Learn and understand the purpose of cascading of single stage amplifiers and derive the overall voltage gain.
3. Analyze the effect of negative feedback on amplifier characteristics and derive the characteristics.
4. Learn and understand the basic principle of oscillator circuits and perform the analysis of different oscillator circuits.
5. Compare and analyze different Power amplifiers like Class A, Class B, Class C, Class AB and other types of amplifiers.
6. Analyze different types of tuned amplifier circuits.

**UNIT-I Small Signal High Frequency Transistor Amplifier models:**

**BJT:** Transistor at high frequencies, Hybrid- π common emitter transistor model, Hybrid πconductance, Hybrid π capacitances, validity of hybrid π model, determination of high- frequency parameters in terms of low-frequency parameters , CE short circuit current gain, current gain with resistive load, cut-off frequencies, frequency response and gain bandwidth product.

**FET:** Analysis of common Source and common drain Amplifier circuits at high frequencies.

**UNIT-II**

**Multistage Amplifiers:** Classification of amplifiers, methods of coupling**, c**ascaded transistor amplifier and its analysis, analysis of two stage RC coupled amplifier, high input resistance transistor amplifier circuits and their analysis-Darlington pair amplifier, Cascode amplifier, Boot-strap emitter follower, Differential amplifier using BJT.

**UNIT-III**

**Feedback Amplifiers:** Feedback principle and concept, types of feedback, classification of amplifiers, feedback topologies, Characteristics of negative feedback amplifiers, Generalized analysis of feedback amplifiers, Performance comparison of feedback amplifiers, Method of analysis of feedback amplifiers.

**Unit-IV**

**Oscillators:** Oscillator principle, condition for oscillations, types of oscillators, RC- phase shift and Wien bridge oscillators with BJT and FET and their analysis, Generalized analysis of LC Oscillators, Hartley and Colpitt’s oscillators using BJT, Frequency and amplitude stability of oscillators.

**UNIT-V**

**Power Amplifiers:** Classification of amplifiers(A to H), Class A power Amplifiers, Class B Push-pull amplifiers, Complementary symmetry push pull amplifier, Class AB power amplifier, Class-C power amplifier, Thermal stability and Heat sinks.

**Tuned Amplifiers**: Introduction, Q-Factor, small signal tuned amplifier, capacitance single tuned amplifier, double tuned amplifiers, , staggered tuned amplifiers

**TEXT BOOKS:**

1. Integrated Electronics- J.Millman and C.C.Halkias, Tata McGraw-Hill, 1972.
2. Electronic Devices and Circuits Theory –Robert L.Boylestad and Louis Nashelsky, Pearson/Prentice Hall, Tenth Edition, 2009.
3. Electronic Devices and Integrated Circuits – B.P. Singh, Rekha, Pearson publications, 2006

**REFERENCE BOOKS:**

1. Electronic Circuit Analysis and Design –Donald A.Neaman, McGrawHill, 2010.
2. Micro electronic Circuits-Sedra A.S. and K.C. Smith, Oxford University Press, Sixth Edition, 2011.
3. Electronic Circuit Analysis-B.V.Rao, K.R.Rajeswari, P.C.R.Pantulu, K.B.R.Murthy, Pearson Publications.

**E-RESOURCES:**

1. <https://nptel.ac.in/courses/108/102/108102095/>
2. <https://nptel.ac.in/courses/108/102/108102097/>

**Course Outcomes**

Upon completing this course, the student will be able to

1. Design and analyze of small signal high frequency transistor amplifier using BJT
2. Design and analyze of small signal high frequency transistor amplifier using FET
3. Design and analyze of multistage amplifiers using BJT and FET
4. Design and analyze of Differential amplifier using BJT.
5. Derive the expressions for frequency of oscillation and condition for oscillation of RC and LC oscillators and their amplitude and frequency stability concept.
6. Know the classification of the power and tuned amplifiers and their analysis with performance comparison

**B.Tech. IV Semester COURSE CODE:** **23PCEC405 L T P C**

**3 0 0 3**

**ANALOG COMMUNICATIONS**

**Internal Marks: 30**

**External Marks: 70**

**Course Objectives:**

Students undergoing this course, are expected to

1. Familiarize with the fundamentals of analog communication systems

2. Familiarize with various techniques for analog modulation and demodulation of

signals

3. Distinguish the figure of merits of various analog modulation methods

**UNIT I**

**Amplitude Modulation:** Introduction to Fourier transform, Introduction to communication system, Need for modulation, Frequency Division Multiplexing, Amplitude Modulation, Time domain and Frequency domain descriptions, 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, Related problems.

**UNIT II**

**DSB & SSB Modulation:** Double sideband suppressed carrier modulator: Time domain and frequency domain description, Generation of DSBSC Waves: Balanced Modulator, Ring Modulator, Detection of DSBSC Waves: Coherent detection, Quadrature Null Effect, COSTAS Loop, Squaring Loop.

Single sideband suppressed carrier modulator: Time domain and Frequency domain description, Generation of SSBSC Waves: Frequency discrimination method, Phase discrimination method, Demodulation of SSB Waves: Coherent Detection.

Vestigial sideband modulation: Time domain description, Frequency domain description, Generation of VSB Modulated wave, Envelope detection of a VSB Wave pulse Carrier, Comparison of different AM Techniques, Applications of different AM Systems, Related problems.

**UNIT III**

**Angle Modulation:** Introduction, Basic concept of phase modulation, 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, Generation of FM Waves: Direct Method, Indirect Method, Detection of FM Waves: Balanced Frequency discriminator, Zero crossing detector, Phase locked loop, Comparison of FM & AM, Related problems.

**UNIT IV**

**Radio Transmitters:** Classification of Transmitters, AM Transmitter, Effect of feedback on performance of AM Transmitter, FM Transmitter: Variable reactance type and Phase modulated FM Transmitter, Frequency stability in FM Transmitter.

**Radio Receivers:** Receiver Types: Tuned radio frequency receiver, Super heterodyne receiver, RF section and Characteristics, Frequency changing and tracking, Intermediate frequency, AGC, FM Receiver, Amplitude limiting, Comparison of FM & AM Receivers, Communication Receivers, Extension of super heterodyne principle and additional circuits.

**UNIT V**

**Noise:** Review of noise and noise sources, Noise figure, Noise in Analog communication Systems: Noise in DSB & SSB Systems, Noise in AM System and Noise in Angle Modulation Systems, Threshold effect in Angle Modulation System, Pre-emphasis & De-emphasis.

**Pulse Analog Modulation:** Types of Pulse modulation, PAM (Single polarity, double polarity), PWM: Generation & Detection of PWM, PPM: Generation and Detection of PPM, Time Division Multiplexing, TDM Vs FDM.

**TEXT BOOKS:**

1. Communication Systems, Simon Haykin, Michael Moher, Wiley, 5th Edition, 2009.

2. Principles of Communication Systems, H Taub, D L Schilling, Gautam Sahe, TMH,

4th Edition, 2017.

3. Modern Digital and Analog Communication Systems, B.P.Lathi, Zhi Ding, Hari

Mohan Gupta, Oxford University Press, 4th Edition, 2017.

**REFERENCES:**

1. Electronics & Communication Systems, George Kennedy, Bernard Davis, S R M

Prasanna, TMH, 6th Edition, 2017.

2. Communication Systems, R P Singh, S D Sapre, TMH, 3nd Edition, 2017.

3. Communication Systems (Analog and Digital), Dr. Sanjay Sharma, Katson Books,

7th Reprint Edition, 2018

**E-RESOURCES:**

1. http://nptel.ac.in/courses/117102059/ Prof. Surendra Prasad.
2. https://ict.iitk.ac.in/wp-content/uploads/EE320A-Principles-Of-Communication-CommunicationSystems-4ed-Haykin.pdf.
3. https://www.scribd.com/document/266137872/sanjay-sharma-pdf.
4. http://bayanbox.ir/view/914409083519889086/Book-Modern-Digital-And-AnalogCommunication-Systems-4th-edition-by-Lathi.pdf.
5. https://soaneemrana.org/onewebmedia/ELECTRONICS%20COMMUNICATION%20SYSTEM%20BY%20GEORGE%20KENNEDY.pdf

**Course Outcomes:**

After undergoing the course, students will be able to

1. Describe the Modulation and Demodulation techniques of standard AM.

2. Compare different types of Amplitude Modulation and Demodulation techniques.

3. Analyse the concepts of generation and detection of Angle Modulated signals.

4. Outline the Radio Receivers with different sections.

5. Interpret the Radio Transmitters completely.

6.Illustrate the noise performance in Analog Modulation techniques.

**B.Tech. IV Semester COURSE CODE: 23PCEC411**

**L T P C**

**0 0 3 1.5**

**SIGNALS AND SYSTEMS LAB**

**Internal Marks: 30**

**External Marks: 70**

**Course objectives:**

1. Acquire the knowledge on Generation of Various Signals and Sequences.

2. Verification of Linearity and Time Invariance Properties of a given

Continuous/Discrete System.

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**Note:**

1. All the experiments are to be simulated using MATLAB or equivalent software
2. Minimum of 10 experiment are to be completed

**List of Experiments (Ten experiments to be done):**

1. Generation of Basic Signals (Analog and Discrete)

1. Unit step
2. Unit impulse
3. Unit Ramp
4. Sinusoidal
5. Signum

2. Operations on signals

1. Addition & Subtraction
2. Multiplication & Division
3. Maximum & minimum

3. Energy and power of signals ,even and odd signals

4. Transformation of the independent variable

1. Shifting (Delay & Advance)
2. Reversing
3. Scaling

5. Convolution & Deconvolution.

6. Correlation

7. Fourier Series Representation

8. Fourier Transform and Analysis of Fourier Spectrum

9. Laplace Transforms

10. Z-Transforms

11. Waveform Synthesis using Laplace Transform.

12. Verification of Sampling Theorem.

**Major Equipment required for Laboratories:**

1. Computer System with latest specifications connected

2. Window XP- or equivalent

3. Simulation software-MAT Lab or any equivalent simulation software

**Note:** Minimum 10 experiments of duration 3 periods must be completed for the eligibility to appear for the semester end examinations. In case if the student fails to get eligibility for semester end exams in the current semester, he has to take the permission of HOD and complete the required number of experiments and appear for semester end exam as and when conducted.

**E-RESOURCES:**

1. https://nptel.ac.in/courses/108/104/108104100/
2. https://nptel.ac.in/courses/108/106/108106163/

**Course Outcomes:**

Upon completing this course, the students will be able to

1. Generate, analyze and perform various operations on Signals/Sequences in time

domain

2. Generate, analyze and perform various operations on Signals/Sequences in

frequency domain

3. Analyze and Characterize Continuous and Discrete Time Systems in Time domain

along with the concept of Sampling

4. Analyze and Characterize Continuous and Discrete Time Systems in Frequency

domain along with the concept of Sampling

5. Generate different Random Signals and capable to analyze their Characteristics

6. Apply the Concepts of Deterministic and Random Signals for Noise removal

Applications and on other Real Time Signals

**B.Tech. IV Semester COURSE CODE: 23PCEC412**

**L T P C**

**0 0 3 1.5**

**ELECTRONIC CIRCUIT ANALYSIS LAB**

**Internal Marks: 30**

**External Marks: 70**

**Course objectives:**

1.To illustrate the students different analog electronic circuit and their application in

practice.

2. To impart knowledge on assessing performance of analog electronic circuit through

monitoring of sensitive parameters.

**Note:** The students are required to design the circuit and perform the simulation using Multisim/ Equivalent Industrial Standard Licensed simulation software tool**.** Further they are required to verify the result using necessary hardware equipment.

**List of Experiments (Ten experiments to be done):**

1. Determination of Ft of a given transistor.

2. Voltage-Series Feedback Amplifier

3. Current-Shunt Feedback Amplifier

4. RC Phase Shift/Wien Bridge Oscillator

5. Hartley/Colpitt’s Oscillator

6. Two Stage RC Coupled Amplifier

7. Darlington Pair Amplifier

8. Boots trapped Emitter Follower

9. Class A Series-fed Power Amplifier

10. Transformer-coupled Class A Power Amplifier

11. Class B Push-Pull Power Amplifier

12. Complementary Symmetry Class B Push-Pull Power Amplifier

13. Single Tuned Voltage Amplifier

14. Double Tuned Voltage Amplifier

**Major Equipment required for Laboratories:**

**Software:**

i. Multisim/Equivalent Industrial Standard Licensed simulation software tool.

ii.Computer Systems with required specifications

**Hardware Required:**

1. Regulated Power supplies

2. Analog/Digital Storage Oscilloscopes

3. Analog/Digital Function Generators

4. Digital Multimeters

5. Decade Résistance Boxes/Rheostats

6. Decade Capacitance Boxes

7. Ammeters (Analog or Digital)

8. Voltmeters (Analog or Digital)

9. Active & Passive Electronic Components

**Note:** Minimum 10 experiments of duration 3 periods must be completed for the eligibility to appear for the semester end examinations. In case if the student fails to get eligibility for semester end exams in the current semester, he has to take the permission of HOD and complete the required number of experiments and appear for semester end exam as and when conducted.

**E-RESOURCES:**

1.https://onlinecourses.nptel.ac.in/noc20\_ee45/preview

2. https://nptel.ac.in/courses/108106084

**Course Outcomes**:

Upon completing this course the students will be able to

1. Identify relevant information to supplement to the Analog Electronic Circuit

2. Set up testing strategies and select proper instruments to evaluate performance characteristics of analog electronic circuit.

3. Design amplifiers with required Q point and analyse amplifier characteristics

4. Examine the effect multistage amplification on frequency response

5. Investigate feedback concept in amplifiers and oscillator

6. Design a Tuned Voltage Amplifier.

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| **B.Tech. IV Semester** | **COURSE CODE:** **23ES413C** | **L** | **T** | **P** | **C** |
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**SOFT SKILLS**

**Internal Marks: 30**

**External Marks: 70**

**Course Objectives:**

1. To prepare to face global competition for employment and excellence in profession.

2. To help the students understand and build interpersonal and interpersonal skills

that will enable them to lead meaningful professional life.

**UNIT – 1: INTRODUCTION**

Introduction- Emergence of life skills, Definition & Meaning, Importance& need, reasons for skill gap, Analysis--Soft Skills vs Hard skills, Linkage between industry and soft skills, Challenges, Personality Developments. Soft Skills, Soft Skills vs English – Improving Techniques.

**UNIT – II: Intra-Personal:**

Definition-Meaning – Importance-SWOT analysis, Johari windows - Goal Setting- quotient skills - Emotional Intelligence- Attitudinal skills - Right thinking- Problem Solving-Time management, stress management.

**UNIT – III: Inter-Personal:**

Definition – Meaning – Importance-Communications skills- Team Work, managerial skills -Negotiation skills- Leadership skills, corporate etiquettes.

**UNIT – IV: Verbal Skills:**

Definition and Meaning-Listening skills, need- types, advantages, Importance-Improving Tips for Listening, Speaking, need- types, advantages, Importance- Improving Tips, Reading- Writing Skills, Report, Resume, statement of purpose, need- types, advantages, Importance-Improving Tips .

**UNIT – V: Non Verbal Skills& Interview skills**

Definition and Meaning – Importance- Facial Expressions- Eye Contact – Proxemics-

Haptics -Posture, cross cultural body language, body language in interview room, appearance and dress code – Kinetics- Para Language - tone, pitch, pause, neutralization of accent, use of appropriate language, Interview skills, interview methods and questions.

**Note:** Skill Oriented Course shall carry 100 marks and shall be evaluated through continuous assessments during the semester for 30 sessional marks and end examination shall be for 70 marks. Day-to-day work in the class / laboratory shall be evaluated for 30 marks by the concerned teacher based on the regularity/assignments/viva/mid semester test. The end examination similar to practical examination pattern shall be conducted by the concerned teacher and an expert in the subject nominated by the principal.

**TEXT BOOKS:**

1. Sherfield, M. Robert at al, Cornerstone Developing Soft Skills, 4/e, Pearson

Publication, New Delhi, 2014.

2.Alka Wadkar, Life Skills for Success, 1/e, Sage Publications India Private Limited,

2016.

**REFERENCE BOOKS:**

1. Sambaiah.M. Technical English, Wiley publishers India. New Delhi. 2014.

2. Gangadhar Joshi, From Campus to Corporate, SAGE TEXT.

3. Alex.K, Soft Skills, 3rd ed. S. Chand Publication, New Delhi, 2014.

4. Meenakshi Raman and Sangita Sharma, Technical Communication: Principle and

Practice, Oxford University Press, 2009.

5. Shalini Varma, Body Language for Your Success Mantra, 4/e, S. Chand

Publication, New Delhi, 2014.

6. Stephen Covey, Seven Habits of Highly Effective People, JMD Book, 2013.

**E-RESOURCES:**

1. https://onlinecourses.nptel.ac.in/noc20\_hs60/preview

2. http://www.youtube.com/@softskillsdevelopment6210

3. https://youtube.com/playlist?list=PLLy\_2iUCG87CQhELCytvXh0E\_ybOO1\_

q&si=Fs05Xh8ZrOPsR8F4

4.https://www.coursera.org/learn/people-soft-skills-assessment?language=English

5. https://www.edx.org/learn/soft-skills

**Course Outcomes**:

Upon completing this course the students will be able to

1. Assimilate and understood the meaning and importance of soft skills

2. learn how to develop soft skills.

3. Understand the significance of soft skills in the working environment for

professional excellence.

4. Prepare to undergo the placement process with confidence and clarity.

5. Ready to face any situation in life and equip themselves to handle them

effectively.

6. Understand and learn the importance of etiquette in both professional

and personal life

**B.Tech. IV Semester COURSE CODE:** **23BS414 L T P C**

**1 0 2 2**

**DESIGN THINKING & INNOVATION**

**Internal Marks: 30**

**External Marks: 70**

**Course Objectives:**

The objectives of the course are to

1. Bring awareness on innovative design and new product development.
2. Explain the basics of design thinking.
3. Familiarize the role of reverse engineering in product development.
4. Train how to identify the needs of society and convert into demand.
5. Introduce product planning and product development process.

**UNIT – I Introduction to Design Thinking**

Introduction to elements and principles of Design, basics of design - dot, line, shape, form as fundamental design components. Principles of design. Introduction to design thinking, history of Design Thinking, New materials in Industry.

**UNIT - II Design Thinking Process**

Design thinking process (empathize, analyze, idea & prototype), implementing the process in driving inventions, design thinking in social innovations. Tools of design thinking - person, costumer, journey map, brainstorming, product development

**Activity:** Every student presents their idea in three minutes, Every student can present design process in the form of flow diagram or flow chart etc. Every student should explain about product development.

**UNIT - III Innovation**

Art of innovation, Difference between innovation and creativity, role of creativity and innovation in organizations. Creativity to Innovation. Teams for innovation, Measuring the impact and value of creativity.

**Activity:** Debate on innovation and creativity, Flow and planning from idea to innovation, Debate on value-based innovation.

**UNIT - IV Product Design**

Problem formation, introduction to product design, Product strategies, Product value, Product planning, product specifications. Innovation towards product design Case studies.

**Activity:** Importance of modeling, how to set specifications, Explaining their own product design.

**UNIT – V Design Thinking in Business Processes**

Design Thinking applied in Business & Strategic Innovation, Design Thinking principles that redefine business – Business challenges: Growth, Predictability, Change, Maintaining Relevance, Extreme competition, Standardization. Design thinking to meet corporate needs. Design thinking for Startups. Defining and testing Business Models and Business Cases. Developing & testing prototypes.

**Activity:** How to market our own product, about maintenance, Reliability and plan for startup.

**Textbooks:**

1. Tim Brown, Change by design, 1/e, Harper Bollins, 2009.
2. Idris Mootee, Design Thinking for Strategic Innovation, 1/e, Adams Media, 2014.

**Reference Books:**

1. David Lee, Design Thinking in the Classroom, Ulysses press, 2018.
2. Shrrutin N Shetty, Design the Future, 1/e, Norton Press, 2018.
3. William lidwell, Kritinaholden, & Jill butter, Universal principles of design, 2/e, Rockport Publishers, 2010.
4. Chesbrough.H, The era of open innovation, 2003.

**E-RESOURCES:**

1. https://nptel.ac.in/courses/110/106/110106124/
2. https://nptel.ac.in/courses/109/104/109104109/
3. https://swayam.gov.in/nd1\_noc19\_mg60/preview
4. https://onlinecourses.nptel.ac.in/noc22\_de16/preview

**Course Outcomes:**

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

1. Define the concepts related to design thinking.
2. Explain the fundamentals of Design Thinking and innovation.
3. Apply the design thinking techniques for solving problems in various sectors.
4. Analyse to work in a multidisciplinary environment.
5. Evaluate the value of creativity.
6. Know How to market our own product.