B.Tech

ELECTRONICS AND COMMUNICATION ENGINEERING
(Industry Integrated)
(B.Tech 2ndYear Syllabus)

Department of Electronics and Communication Engineering
(Industry Integrated)

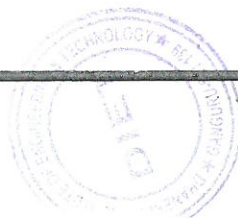## (B.Tech-ECE Program, Accredited by NBA)

DHANEKULA INSTITUTE OF ENGINEERING AND TECHNOLOGY

(Approved by AICTE, Accredited by NBA, Affiliated to JNTUK, Kakinada)

Ganguru, Vijayawada,
Andhra Pradesh-521139,
INDIA.
www.diet.ac.in

Principal
DHANEKULA INSTITUTE
OF ENGINEERING AND TECHNOLOGY
Ganguru, Vijayawada-521 139

DHANEKULAINSTITUTEOFENGINEERING&TECHNOLOGY

Department of Electronics and Communications Engineering (Industry Integrated)

VISION–MISSION-PEOs

Institute Vision	Pioneering Professional Education through Quality
Institute Mission	Providing Quality Education through state-of-art infrastructure ,laboratories and committed staff. Moulding Students as proficient, competent, and socially responsible engineering personnel with ingenious intellect. Involving faculty members and students in research and development works for betterment of society.
Department Vision	Pioneering Electronics and Communication Engineering Education & Research to elevate rural Community
Department Mission	Imparting professional education endowed with ethics and human values to transform students to be competent and committed electronics engineers. · Adopting best pedagogical methods to maximize knowledge transfer. · Having adequate mechanisms to enhance understanding of theoretical concepts through practice. · Establishing an environment conducive for lifelong learning and entrepreneurship development. · To train as effective innovators and deploy new technologies for the service of society.
Program Educational Objectives(PEOs)	**PEO1**: Graduates will demonstrate a strong foundation in electronics and communication engineering, applying theoretical knowledge to analyze and solve real-world industry problems. **PEO2**: Graduates will exhibit creativity and innovation in the design, development, and implementation of electronic systems and communication solutions to meet industry needs through research and development. **PEO3**: Graduates will seamlessly integrate into the electronics and communication engineering industry, adapting to emerging technologies, methodologies, and business practices throughout their careers. **PEO4**: Graduates will engage in continuous learning, pursuing advanced degrees, certifications, and professional development opportunities to stay abreast of evolving industry trends and technologies.

List of Program Outcomes

1	**Engineering knowledge :** Apply the knowledge of mathematics ,science ,engineering fundamentals,andanengineeringspecializationtothesolutionofcomplexengineering problems.
2	**Problem analysis:** Identify ,formulate, review research literature, and analyze complexengineeringproblemsreachingsustainedconclusionsusingfirstprinciplesof mathematics ,natural sciences, and engineering sciences
3	**Design/development of solutions:** Design solutions for complex engineering problems and design system components or process that meet the specified needs with appropriate consideration for the public health and safety, and the cultural ,societal ,and environmental considerations
4	**Conductinvestigationsofcomplexproblems:**Useresearch-basedknowledgeand Research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5	**Modern tool usage:** Create, select, and apply appropriate techniques, resources, andmodernengineeringandITtoolsincludingpredictionandmodelingtocomplex engineering activities with an understanding of the limitations.
6	**Theengineerandsociety:**Applyreasoninginformedbythecontextualknowledgeto assesssocietal,health,safety,legalandculturalissuesandtheconsequentresponsibilities relevant to the professional engineering practice.
7	**Environment And Sustainability:** understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8	**Ethics:** apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9	**Individual And Team Work:** function effectively as an individual, and as a member or a leader in diverse teams, and in multidisciplinary settings
10	**Communication:**communicateeffectivelyoncomplexengineeringactivitieswiththeengineeringco mmunityandwithsocietyatlarge,suchas,beingabletocomprehendandwrite effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11	**Project Management And Finance:** demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12	**Life- Long Learning:** Recognize the need for, and have the preparation and ability to engage in independent and life- long learning in broadest context of technological change.

List Program Specific Outcomes

PSO1: An ability to Exhibit the design principles and knowledge in the state of art tools and apply them to develop reliable and efficient VLSI circuits and systems.
PSO2: Proficiency in using modern tools for simulation, modeling, and prototyping in the development of electronic systems.

B.Tech.–II Year I Semester

S.No.	Category	Title	L/D	T	P	Credits
1	BS&H	Probability theory and stochastic process	3	0	0	3
2	HSMC	Universal Human Values– Understanding Harmony and Ethical Human Conduct	2	1	0	3
3	Engineering Science	Signals and Systems	3	0	0	3
4	Professional Core	Electronic Devices and Circuits	3	0	0	3
5	Professional Core	Switching Theory and Logic Design	3	0	0	3
6	Professional Core	Electronic Devices and Circuits Lab	0	0	3	1.5
7	Professional Core	Switching Theory and Logic Design Lab	0	0	3	1.5
8	Skill Enhancement Course	• Soft Skills • Digital IC design and verification using verilog	0	1	2	2
9	Audit Course	Environmental Science	2	0	0	-
		Total	**16**	**02**	**08**	**20**

B.Tech.–II Year II Semester

S.No.	Category	Title	L	T	P	Credits
1	Management Course-I	Managerial Economics and Financial Analysis	2	0	0	2
2	Engineering Science/Basic Science	Basics of UAV	3	0	0	3
3	Professional Core	Electromagnetic Waves and Transmission Lines	3	0	0	3
4	Professional Core	Electronic Circuit Analysis	3	0	0	3
5	Professional Core	Analog Communications	3	0	0	3
6	Professional Core	Signals and Systems Lab	0	0	3	1.5
7	Professional Core	Electronic Circuit Analysis lab	0	0	3	1.5
8	Skill Enhancement Course	• Drone Technology • Soft Skills	0	1	2	2
9	Engineering Science	Design Thinking & Innovation / NPTEL	1	0	2	2
		Total	**15**	**01**	**10**	**21**

II B.TECH
ECE (Industry Integrated)–I SEM

Course Code:

Name of the Course: **PROBABILITY THEORY AND STOCHASTIC PROCESS**

Course Category:	BS	Credits:3		
Course Type:	Theory	Lecture-Tutorial-Practice:	3 0 0	
	-	Continuous Evaluation	30M	
Prerequisites		Semester End Evaluation	70M	
		Total Marks	100M	

Course Outcomes:

After Successful Completion of course, the student will be able to:

CO No:	Course Outcome Description	K-Level
CO1	Understand the Probability theory and Describe the probability distribution & density functions of various single random variables.	K1
CO2	Analyze the probability distribution & density functions of multiple random variables, and compute the statistical properties like mean, variance, characteristic functions and transformations of single and multiple random variable.	K3
CO3	Understand the classification of random processes. Analyze the time domain properties like stationary and ergodicity of random processes.	K3
CO4	Examine the relationship between PSD and correlation function of RP. Analyze the LTI sytems with random inputs.	K3
CO5	Understand the basic concepts of noise sources, information theory and its representation for understanding its characteristics	K1

Note: K-Level is defined From Blooms Taxonomy

Contribution of Course Outcomes mapping with Pos & PSOs (**1**-Low,**2**–Moderate,**3**–High)

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	-	-	-	-	-	-	-	-	-	3	-	3
CO2	3	3	-	-	-	-	-	-	-	-	-	3	-	3
CO3	3	3	-	3	-	-	-	-	-	-	-	3	-	3
CO4	3	3	-	3	-	-	-	-	-	-	-	3	3	3
CO5	3	3	-	-	-	-	-	-	-	-	-	3	-	3

COURSECONTENT:

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 propertie
s. 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, 4 th Ed, TMH, 2001.
2. 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.

WEB LINKS

1. https://archive.nptel.ac.in/courses/117/105/117105085/
2. https://www.classcentral.com/course/probability-purdue-university-probability-basic-c-6989

Course Code:

Name of the Course: **UNIVERSAL HUMAN VALUES – UNDERSTANDING HARMONY& ETHICAL HUMAN CONDUCT**

Course Category:	HSMC	Credits:3	
Course Type:	Theory	Lecture-Tutorial-Practice:	2 1 0
		Continuous Evaluation	30M
Prerequisites	-	Semester End Evaluation	70M
		Total Marks	100M

Course Outcomes:

After Successful Completion of course, the student will be able to:

CO No:	Course Outcome Description	K-Level
CO1	Define the terms like Natural Acceptance, Happiness and Prosperity	K2
CO2	Identify one's self, and one's surroundings(family, society nature)	K2
CO3	Applywhattheyhavelearnttotheirownselfindifferentday-to-daysettingsinreallife	K3
CO4	Relate human values with human relationship and human society.	K4
CO5	Justify the need for universal human values and harmonious existence	K5
CO6	Develop associally and ecologically responsible engineers	K6

Note: K-Level is defined From Blooms Taxonomy

Contribution of Course Outcomes mapping with Pos & PSOs(1-Low,2–Moderate,3–High)

CONo.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1						3	3	3	3	3				
CO2						3	3	3	3	3				
CO3						3	3	3	3	3				
CO4						3	3	3	3	3				
CO5						3	3	3	3	3				
CO6						3	3	3	3	3				

COURSE CONTENT:

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
Lecture4: 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

 utorial 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: JFET: Implications of the Holistic Understanding – a Look at Professional Ethics (6 lectures 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

 ecture 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

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.

READINGS:
   Textbook and Teachers Manual
   a. **The Textbook**
      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
   b. **The Teacher's Manual**
      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. *HumanValues*, A.N.Tripathi, NewAgeIntl.Publishers, NewDelhi, 2004.
3. *TheStoryofStuff* (Book).
4. *TheStoryofMyExperimentswithTruth*-byMohandasKaramchandGandhi
5. *SmallisBeautiful*-E.FSchumacher.
6. *SlowisBeautiful*-CecileAndrews
7. *EconomyofPermanence*-JCKumarappa

8. *BharatMeinAngrejiRaj*–PanditSunderlal
9. *RediscoveringIndia*-byDharampal
10. *HindSwarajorIndianHomeRule*-byMohandasK.Gandhi
11. *IndiaWinsFreedom*-MaulanaAbdulKalamAzad
12. *Vivekananda*-RomainRolland(English)
13. *Gandhi*-RomainRolland(English)

E-Resources:

1. https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%201-Introduction%20to%20Value%20Education.pdf
2. https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%202-Harmony%20in%20the%20Human%20Being.pdf
3. https://fdp-si.aicte-india.org/UHV-II%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%202023.pdf
5. https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%205-Harmony%20in%20the%20Nature%20and%20Existence.pdf
6. https://fdp-si.aicte-india.org/download/FDPTeachingMaterial/3-days%20FDP-SI%20UHV%20Teaching%20Material/Day%203%20Handouts/UHV%203D%20D3-S2A%20Und%20Nature-Existence.pdf
7. https://fdp-si.aicte-india.org/UHV%20II%20Teaching%20Material/UHV%20II%20Lecture%202023-25%20Ethics%20v1.pdf
8. https://www.studocu.com/in/document/kiet-group-of-institutions/universal-human-values/chapter-5-holistic-understanding-of-harmony-on-professional-ethics/62490385
9. https://onlinecourses.swayam2.ac.in/aic22_ge23/preview

Course Code:
Name of the Course: **SIGNALS AND SYSTEMS**

Course Category:	**ES(Engineering Science)**	Credits:3
Course Type:	Theory	Lecture-Tutorial-Practice: 3 0 0
	-	Continuous Evaluation 30M
Prerequisites		Semester End Evaluation 70M
		Total Marks 100M

Course Outcomes:

After Successful Completion of course, the student will be able to:

CO No:	Course Outcome Description	K-Level
CO1	Understand various types of signals and systems mathematically and relate with vectors and signals.	K1
CO2	Analyze the continuous-time signals and continuous-time systems using Fourier series &Fourier transforms.	K3
CO3	Interpret the systems based on their properties and determine the response of LTI system.	K3
CO4	Make use of sampling theorem to convert continuous-time signals to discrete-time signal and reconstruct the original signal from samples.	K3
CO5	Apply Laplace transforms, Z-transform on continuous time and discrete time signals and systems and solve the problems on region of convergence.	K2

Note: K-Level is defined From Blooms Taxonomy

Contribution of Course Out comes mapping with POs& PSOs (1-Low,**2**–Moderate,**3**–High)

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2	2	-	-	-	-	-	-	3	-	3
CO2	3	3	2	2	2	-	-	-	-	-	-	3	-	3
CO3	3	3	2	2	2	-	-	-	-	-	-	3	-	3
CO4	3	2	3	3	2	-	-	-	-	-	-	3	-	3
CO5	3	2	2	3	2	-	-	-	-	-	-	3	-	3
CO6	3	2	2	2	2	-	-	-	-	-	-	3	-	3

COURSE CONTENT:

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 band width, system band width, 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.

Sampling Theorem: 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 B and 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 transforms of certain signals using waveform synthesis.

Z–Transforms: Concepts 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.

Textbooks:
1. Signals, Systems &Communications-B.P.Lathi, BS Publications,2003.
2. Signals and Systems-A.V. Oppenheim, A.S. Willsky and S.H. Nawab,PHI,2ndEdn,1997
3. Signals&Systems-SimonHaykinandVanVeen,Wiley,2ndEdition,2007

Reference Books:
1. Principles of Linear Systems and Signals–BP Lathi, Oxford University Press,2015
2. Signals and Systems–TK Rawat, Oxford University press,2

Online Learning Resources:

1. https://www.digimat.in/nptel/courses/video/108104100/L01.html
2. https://archive.nptel.ac.in/courses/108/106/108106163/
3. https://onlinecourses.nptel.ac.in/noc23_ee14/preview

Course Code
Name of the Course: **ELECTRONIC DEVICES AND CIRCUITS**

Course Category:	**PC(Professional Core)**	Credits:3	
Course Type:	Theory	Lecture-Tutorial-Practice:	3 0 0
		Continuous Evaluation	30M
Prerequisites	-	Semester End Evaluation	70M
		Total Marks	100M

Course Outcomes:

After Successful Completion of course, the student will be able to:

CO No:	Course Outcome Description	K-Level
CO1	Apply the basic concepts of semiconductor physics.	K3
CO2	Understand the formation of p-n junction and how it can be used as a p-n junction as diode in different modes of operation.	K2
CO3	Analyze the construction, working principle of Semiconductor Devices and Diode Circuits	K4
CO4	Know the need of transistor biasing, various biasing techniques for BJT and FET and stabilization concepts with necessary expressions	K1
CO5	Apply small signal low frequency transistor amplifier circuits using BJT and FET in different configurations	K3

Note: K-Level is defined From Blooms Taxonomy

Contribution of Course Outcomes mapping with Pos & PSOs(1-Low,2–Moderate,3–High)

CONo.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	2	-	2	-	-	-	-	-	2	3	3
CO2	3	3	3	2	-	2	-	-	-	-	-	2	3	3
CO3	3	3	3	2	-	2	-	-	-	-	-	2	3	3
CO4	3	3	3	2	-	2	2	-	-	-	-	2	2	3
CO5	3	3	3	2	-	2	-	-	-	-	-	2	3	3

COURSE CONTENT:

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, Solar cell, 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, and 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 in V_{BE}, I_C, 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: JFET: 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, IOS trans conductance, MOS capacitor, MOS device models: MOS small signal model, PMOS Transistor, introduction to 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 Loui Nashelsky,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, 5th Edition, 2022.

WEB RESOURCE REFERENCES:

1. Students Resources provided in http://www.electronics-tutorials.ws/ for basic electronic circuits
2. http://nptel.ac.in/cources/117105080/ on electronics and communication Engineering
3. http://www2.ece.ohio-state.edu/ee327/Electronics Devices and circuit Laboratory
4. https://searchworks.stanford.edu/view/11352963 for fundamentals of Electronics available in Digital library
5. https://electronicsforu.com/ for news on electronics and for projects
6. https://archive.org/details/ElectronicDevicesciruits
7. https://www.sanfoundary.com/1000-electronics-devices-circuits-questions-answers/ Question and Answers available on total EDC.

Course Code

Name of the Course **SWITCHING THEORY AND LOGIC DESIGN**

Course Category:	**PC(Professional Core)**	Credits:3
Course Type:	Theory	Lecture-Tutorial-Practice: 3 0 0
		Continuous Evaluation 30M
		Semester End Evaluation 70M
Prerequisites	-	Total Marks 100M

Course Outcomes:

After Successful Completion of course, the student will be able to:

CO No:	Course Outcome Description	K-Level
CO1	Classify different number systems, codes and realize Boolean functions using logic gates.	K4
CO2	Minimize switching functions using Boolean theorems and design arithmetic circuits using K-maps.	K5
CO3	Design combinational logic circuits using LSI, MSI ICs and PLD's.	K5
CO4	Design sequential logic circuits in synchronous and Asynchronous modes of operation using flip-flops.	K5
CO5	Design innovative sequential circuits using Finite state machines.	K5

Note:K-Level is defined From Blooms Taxonomy

ContributionofCourseOutcomesmappingwithPOs&PSOs(**1**-Low,**2**–Moderate,**3**–High)

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	-	-	-	-	-	-	-	-	-	-	2	2
CO2	3	3	3	-	-	-	-	-	-	-	-	-	2	2
CO3	2	3	3	-	-	-	-	-	-	-	-	-	3	3
CO4	3	3	3	-	-	-	-	-	-	-	-	-	3	3
CO5	2	3	3	2	-	-	-	-	-	-	-	-	3	3
Level of Mapping	3	3	3	2	-	-	-	-	-	-	-	-	3	3

COURSECONTENT:

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 flipflop. Design of 5 ripple 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.

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 over lapping).

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 edition PHIpublication,2008
3. Switching theory and logic design by Hill and Peterson,Mc-Graw Hill TMH edition, 2012.

REFERENCES:
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 Learning pvtltd,2016.
4. Digital logic applications and design by John M Yarbough, Cengage learning,2006.
5. TTL 74-Series databook

WEB LINKS:
1. https://onlinecourses.nptel.ac.in/noc24_ee147/preview
2. https://onlinecourses.nptel.ac.in/noc24_ee86/preview?user_email=csekhar.savalam@gmail.com
3. https://www.geeksforgeeks.org/digital-electronics-logic-design-tutorials/

Course Code:

Name of the Course: ELECTRONIC DEVICES AND CIRCUITS LAB

Course Category:	**PC(Professional Core)**	Credits: 1.5	
Course Type:	Practical	Lecture-Tutorial-Practice:	0 0 3
		Continuous Evaluation	30M
Prerequisites	-	Semester End Evaluation	70M
		Total Marks	100M

Course Outcomes:

After Successful Completion of course, the student will be able to:

CO No:	Course Outcome Description	K-Level
CO1	Evaluate the Clipper and Clamping circuits using diodes	K5
CO2	Design half wave and full wave rectifiers with and without filters using diodes	K6
CO3	Evaluate the performance of characteristics of BJT, FET and UJT	K5
CO4	Analyze the signal parameters of given signal using CRO	K4
CO5	Analyze the frequency response of amplifiers	K4

Note:K-Level is defined From Blooms Taxonomy

Contribution of Course Out comes mapping with POs&PSOs(1-Low,2–Moderate,3–High)

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3	2	3	-	-	-	2	3	2	-	2	3	3
CO2	2	3	2	3	-	-	-	2	3	2	-	2	3	3
CO3	2	3	2	3	-	-	-	2	3	2	-	2	3	3
CO4	2	3	2	3	-	-	-	2	3	2	-	2	3	3
CO5	2	3	2	3	-	-	-	2	3	2	-	2	3	3
Level of Mapping	2	3	2	3	-	-	-	2	3	2	-	2	3	3

Any 10 of the following experiments are to be conducted:

List of Experiments:

1.Clipper Circuits using Diode

2.Clamping Circuits using Diode

3.Rectifiers (without and with c-filter)
   Part A:Half-wave Rectifier
   Part B: Full-wave Rectifier

4.BJT Characteristics (CE Configuration)
   Part A:Input Characteristics
   Part B: Output Characteristics

5.FET Characteristics(CS Configuration)
   Part A:Drain Characteristics
   Part B:TransferCharacteristics

6.SCR Characteristics

7.UJT Characteristics

8.Transistor Biasing

9.CRO Operation and its Measurements

10.BJT-CE Amplifier

Additional Experiments

1.Emitter Follower-CC Amplifier

2.FET-CS Amplifier

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.

TEXTBOOKS:

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.

REFERENCES:

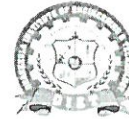1. Basic Electronics-Priciples and Applications, Chinmoy Saha,Arindam Halder, Debarati Ganguly,Cambridge University Press.
2. Electronics devices & circuit theory- Robert L.Boylestad and Loui Nashelsky,Pearson,11th edition, 2015.
3. Electronic Devices and Circuits - David A. Bell, Oxford University Press,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

WEB LINKS

1. Students Resources provided in http://www.electronics-tutorials.ws/ for basic electronic circuits
2. http://nptel.ac.in/cources/117105080/ on electronics and communication Engineering
3. http://www2.ece.ohio-state.edu/ee327/Electronics Devices and circuit Laboratory
4. https://searchworks.stanford.edu/view/11352963 for fundamentals of Electronics available in Digital library
5. https://electronicsforu.com/ for news on electronics and for projects
6. https://archive.org/details/ElectronicDevicesciruits
7. https://www.sanfoundary.com/1000-electronics-devices-circuits-questions-answers/ Question and Answers available on total EDC.

Course Code:

Name of the Course: **SWITCHING THEORY AND LOGIC DESIGN LAB**

Course Category:	**PC(Professional Core)**	Credits:1.5	
Course Type:	Practical	Lecture-Tutorial-Practice:	0 0 3
		Continuous Evaluation	30M
Prerequisites	-	Semester End Evaluation	70M
		Total Marks	100M

Course Outcomes:

After Successful Completion of course, the student will be able to:

CO No:	Course Outcome Description	K-Level
CO1	Examine the functionality of Logic gates.	K4
CO2	Design combinational circuits using Logic gates and verify the functionality of combinational circuits available in IC form.	K5
CO3	Design sequential circuits using logic gates and flip-flops. Verify the functionality of sequential circuits available in IC form.	K5

Note: K-Level is defined From Blooms Taxonomy

Contribution of Course Outcomes mapping with Pos & PSOs(**1**-Low,**2**–Moderate,**3**–High)

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	3	-	-	3	2	2
CO2	3	3	3	-	-	-	-	-	3	-	-	3	3	3
CO3	3	3	3	-	-	-	-	-	3	-	-	3	3	3

Any 10 of the following experiments are to be conducted:

List of Experiments

1. Verification of truth tables of Logic gates. Two input (i) OR (ii) AND (iii) NOR (iv) NAND (v) Exclusive OR (vi) Exclusive NOR
2. Design a simple combinational circuit with four variables and obtain minimal SOP expression and verify the truth table using Digital Trainer Kit
3. Verification of functional table of 3 to 8 line Decoder /De-multiplexer
4. 4 variable logic function verification using 8 to 1multiplexer
5. Design full adder circuit and verify its functional table.
6. Verification of functional tables of
   (i) J K Edge triggered Flip –Flop
   (ii) J K Master Slave Flip – Flop (iii) D Flip -Flop.
7. Design a four bit ring counter using D Flip – Flops / JK Flip Flop and verify output.
8. Design a four bit Johnson's counter using D Flip-Flops / JK Flip Flops and verify output
9. Verify the operation of 4-bit Universal Shift Register for different Modes of operation.
10. 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
11. Design MOD – 8 synchronous counter using T Flip-Flop and verify the result and Sketch the output waveforms
12. (a)Draw the circuit diagram of a single bit comparator and test the output
    (b) Construct 7 Segment Display Circuit Using Decoder and 7 Segment LED and test it.

Additional Experiments
1. Design BCD Adder Circuit and Test the Same using Relevant IC
2. Design excess-3 to 9-Complement converter using only four full adders and test the circuit.
3. Design an Experimental model to demonstrate the operation of 74154 De-Multiplexer using LEDs for outputs.
4. Design any combinational circuit using Hardware Description Language
5. Design any sequential circuit using Hardware Description Language

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 edition PHIpublication,2008
3. Switching theory and logic design by Hill and Peterson,Mc-Graw Hill TMH edition, 2012.

REFERENCES:
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 Learning pvtltd,2016.
4. Digital logic applications and design by John M Yarbough, Cengage learning,2006.
5. TTL 74-Series databook

WEB LINKS:
1. https://cse15-iiith.vlabs.ac.in/

Course Code:
Name of the course: SOFT SKILLS

Course Category:	Skill Enhancement course (SEC)	Credits: 2.0			
Course Type:	Practical	Lecture-Tutorial-Practice:	0	1	2
Prerequisites	-	Continuous Evaluation	30M		
		Semester End Evaluation	70M		
		Total Marks	100M		

Course Outcomes:

After Successful Completion of course, the student will be able to:

CO No:	Course Outcome Description	K-Level
CO1	Assimilate and understood the meaning and importance of soft skills and learn how to develop them.	1
CO2	Understand the significance of soft skills in the working environment for professional excellence.	2
CO3	Prepare to undergo the placement process with confidence and clarity.	3
CO4	Ready to face any situation in life and equip themselves to handle them effectively.	6
CO5	Understand and learn the importance of etiquette in both professional and personal life	2

Note:K-Level is defined From Blooms Taxonomy

Contribution of Course Outcomes mapping with POs&PSOs(1-Low,2–Moderate,3–High)

CONo.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1								3	3	3				
CO2								3	3	3				
CO3								3	3	3				
CO4								3	3	3				
CO5								3	3	3				

COURSE CONTENT

UNIT – 1: INTRODUCTION
Introduction- Emergence of life skills, 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:
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:
Importance-Communications skills-Functions of language, Group discussions,Debate, Team Work, managerial skills,Negotiation skills- Leadership skills, corporate etiquettes.

UNIT – IV: Verbal communication:
Listening skills, need- types, advantages, Importance-Improving Tips for Listening, Speaking, need- types, advantages, Importance- Improving Tips, Reading-Short passages,Reading comprehension Writing Skills, Report, Resume, statement of purpose, need- types, advantages, Importance-Improving Tips .

UNIT – V: Non Verbal communication & Interview skills
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.

TEXT BOOKS:

1. Sherfield,M.Robertatal,CornerstoneDevelopingSoftSkills,4/e,PearsonPublication,NewDelhi,2014.
2. AlkaWadkar,LifeSkillsforSuccess,1/e,SagePublicationsIndiaPrivateLimited,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/DIGITAL MATERIAL:

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 Code:

Name of the course: DIGITAL IC DESIGN AND VERIFICATION USING VERILOG

Course Category:	Skill Enhancement course (SEC)		Credits: 2.0			
Course Type:	Practical		Lecture-Tutorial-Practice:	0	1	2
Prerequisites	-		Continuous Evaluation	30M		
			Semester End Evaluation	70M		
			Total Marks	100M		

Course Outcomes:

After Successful Completion of course. the student will be able to:

CO No:	Course Outcome Description	K-Level
CO1		
CO2		
CO3		
CO4		
CO5		

Note:K-Level is defined From Blooms Taxonomy

Contribution of Course Outcomes mapping with POs&PSOs(**1**-Low,**2**–Moderate,**3**–High)

CONo.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1														
CO2														
CO3														
CO4														
CO5														

COURSE CONTENT: Basics of digital design, VHDL/Verilog coding
- o Simulation and verification techniques
- o Synthesis and timing analysis

Skills Acquired: Proficiency in HDL (Hardware Description Languages), understanding of design flow, and ability to verify digital circuits.

1: Introduction to HDL (VHDL/Verilog)
2: Combinational Circuit Design
3: Sequential Circuit Design
4: FSM (Finite State Machine) Design
5: Synthesis and Timing Analysis
6: Test bench Creation
7: Verification using System Verilog
8: Introduction to UVM (Universal Verification Methodology)
9: Gate-Level Simulation
10: FPGA Prototyping
11: Power Analysis and Optimization
12: Design for Testability (DFT)

Tools and Software

1. **HDL Simulators**: ModelSim, Vivado
2. **Synthesis Tools**: Synopsys Design Compiler, Xilinx Vivado
3. **FPGA Tools**: Xilinx Vivado, Altera Quartus
4. **Verification Tools**: Cadence Incisive, Synopsys VCS

Recommended Resources

1. **Books**: "Digital Design and Computer Architecture" by David Harris and Sarah Harris, "CMOS VLSI Design: A Circuits and Systems Perspective" by Neil H. E. Weste and David Harris
2. **Online Courses**: Coursera, edX, Udemy courses on Digital IC Design and Verification
3. **Industry Certifications**: Certifications from Cadence, Synopsys, or Xilinx.

Course Code
Name of the Course **ENVIRONMENTAL SCIENCE**

Course Category:	Audit Course	Credits:-		
Course Type:	Theory	Lecture-Tutorial-Practice:	2 0 0	
		Continuous Evaluation	30M	
		Semester End Evaluation	-	
Prerequisites	-			
		Total Marks	30M	

Course Outcomes:

After Successful Completion of course, the student will be able to:

CO No:	Course Outcome Description	K-Level
CO1	Understandmultidisciplinarynatureofenvironmentalstudiesandvarious Renewable and non-renewable resources	K-2
CO2	Understand flow and bio-geo-chemical cycles and ecological pyramids.	K-2
CO3	Understand various causes of pollution and solid waste management and related preventive measures.	K-2
CO4	Understand the concepts of rain water harvesting, water shed management, Ozone layer depletion, and wastes and reclamation.	K-2
CO5	Illustrate the causes of population explosion, value education, and welfare programs.	K-3

Note: K-Level is defined From Blooms Taxonomy

Contribution of Course Outcomes mapping with Pos & PSOs(**1**-Low,**2**–Moderate,**3**–High)

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	3	3
CO2	3	-	-	-	-	-	-	-	-	-	-	-	3	3
CO3	3	-	-	-	-	-	-	-	-	-	-	-	3	3
CO4	-	3	-	-	-	-	-	-	-	-	-	-	3	3
CO5	-	3	-	-	-	-	-	-	-	-	-	-	3	3

COURSECONTENT:

UNIT–1

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 groundwater – 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 to fan 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. Grass land ecosystem
c. Desert ecosystem
d. Aquatic ecosystems(ponds, streams, lakes, rivers, oceans, estuaries)

Biodiversity And Its Conservation: Introduction Definition: genetic, species, and ecosystem diversity– Bio-geographical classification of India–Value of biodiversity: consumptive use, Productive use, social, ethical, aesthetic and option values – Biodiversity at global,National and local levels – India as a mega-diversity nation – Hot-spots of biodiversity –Threats to biodiversity: habitat loss, poaching of wild life, man-wild life conflicts–Endangered and endemic species ofIndia –Conservation of bio diversity: 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, rainwater 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 –Waste land 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–5

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..

Textbooks:

1. Textbook of Environmental Studies for Under graduate Courses Erach Bharucha for University Grants Commission, Universities Press.
2. Palaniswamy, "Environmental Studies", Pearson education
3. S.Azeem Unnisa,"Environmental Studies" Academic Publishing Company
4. K. Raghavan Nambiar, "Textbook of Environmental Studies for Undergraduate Courses as per UGC model syllabus", Scitech Publications (India), Pvt. Ltd.

Reference Books:

1. DeekshaDaveandE.SaiBabaReddy,"TextbookofEnvironmentalScience",CengagePublications.
2. M.AnjiReddy,"TextbookofEnvironmentalSciencesandTechnology",BSPublication.
3. J.P.Sharma, Comprehensive Environmental studies, Laxmi publications.
4. J.Glynn Henryand GaryW. Heinke, "Environmental Sciences and Engineering", Prentice Hall of India Private limited
5. G.R. Chatwal, "A Text Book of Environmental Studies" Himalaya Publishing House Gilbert M. Masters and Wendell P. Ela, "Introduction to Environmental Engineering and Science, Prentice Hall of India Private limited.

II B.TECH
ECE (Industry Integrated) – IISEM

Course Code:

Name of the Course: **MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS**

Course Category:	Management Course-I	Credits:2	
Course Type:	Theory	Lecture-Tutorial-Practice: 2 0 0	
Prerequisites	Basic microeconomics, fundamental financial and management accounting principles.	Continuous Evaluation	30M
		Semester End Evaluation	70M
		Total Marks	100M

Course Outcomes:

After Successful Completion of course, the student will be able to:

CO No:	Course Outcome Description	K-Level
CO1	Understanding the concept of managerial economics, Demand function, and different Demand fore casting methods.	2
CO2	Discusstheconceptsofproductionfunction,economiesofscale,optimumsizeofthe firm, and cost & break-even analysis.	2
CO3	Describe market structure and pricing under varied market conditions, Classify the types of business organizations and business cycles.	2
CO4	Evaluate the projects by applying tools and techniques of capital budgeting to accept or reject the new projects in business.	3
CO5	Prepare financial statements for analysis by using accounting tools	3

Note:K-Level is defined From Blooms Taxonomy

Contribution of Course Outcomes mapping with Pos & PSOs(**1**-Low,**2**–Moderate,**3**–High)

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	3	3	3	3	-	-	-
CO2	-	-	-	-	-	-	-	3	3	3	3	-	-	-
CO3	-	-	-	-	-	-	-	3	3	3	3	-	-	-
CO4	-	-	-	-	-	-	-	3	3	3	3	-	-	-
CO5	-	-	-	-	-	-	-	3	3	3	3	-	-	-

COURSECONTENT:

UNIT-1:

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-2:

Production and Cost Analysis: Introduction – Nature, meaning, significance, functions, and advantages. Production Function– Least-cost combination– Short run and long run Production Function- Iso quants and Isocosts, MRTS -Cobb-Douglas Production Function - Laws of Returns - Internal and External Economies of scale, Cost & Break-Even Analysis – Cost concepts and Cost behavior- Break-Even Analysis (BEA) – Determination of Break Even Point (Simple Problems)-Managerial significance and limitations of Break-Even Analysis.

UNIT-3:

Business Organizations and Markets: Introduction–Nature, meaning, significance, functions and advantages. 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-4:

Capital Budgeting: Introduction – Nature, meaning, significance, functions and advantages. 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 (simple problems)

UNIT-5:

Financial Accounting and Analysis: Introduction – Nature, meaning, significance, functions, and advantages. Concepts and Conventions-Double-Entry Book Keeping, Journal, Ledger, Trial Balance-Final Accounts(Trading Account, Profit and Loss Account, and Balance Sheet with simple adjustments).Financial Analysis-Analysis and Interpretation of Liquidity Ratios, Activity Ratios and Capital Structure Ratios, and Profitability.

Textbooks:

1. Varshney & Maheswari: Manageria lEconomics,SultanChand,2013.

Reference Books:

1. Managerial Economics: Principles andWorldwideApplications,9E(Adaptation)by Dominick Salvatore and Siddhartha Rastogi.
2. Managerial Economics: Principles and World wide Applications by Dominick Salvatore.

E-Resources:

1.https://nptel.ac.in/courses/110101005

Websites:

* https://www.geeksforgeeks.org/principles-and-types-of-managerial-economics
* https://www.tutorialspoint.com/managerial_economics/index.htm

Course Code:
Name of the Course: **BASICS OF UAV**

Course Category:	Engineering Science	Credits:3	
Course Type:	Theory	Lecture-Tutorial-Practice:	3 0 0
		Continuous Evaluation	30M
Prerequisites		Semester End Evaluation	70M
		Total Marks	100M

Course Outcomes:
After Successful Completion of course, the student will be able to:

CO No:	Course Outcome Description	K-Level
CO1	Explain the types and characteristics of UAVs and their applications.	Applying
CO2	Identify and explain the components, sensors and payload of UAVs, their navigation and guidance.	Applying
CO3	Navigate the UAV certification process, preparing UAVs for type certification and operational approvals.	Applying
CO4	Design and perform structural, aerodynamic analysis of UAV components	Applying
CO5	Explain the types and characteristics of UAVs and their applications.	Applying

Note:K-Level is defined From Blooms Taxonomy

Contribution of Course Outcomes mapping with POs&PSOs(**1**-Low,**2**–Moderate,**3**–High)

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	3	3
CO2	3	-	-	-	-	-	-	-	-	-	-	-	3	3
CO3	3	-	-	-	-	-	-	-	-	-	-	-	3	3
CO4	3	-	-	-	-	-	-	-	-	-	-	-	3	3
CO5	3	-	-	-	-	-	-	-	-	-	-	-	3	3

COURSE CONTENT:
UNIT-1:
Introduction to UAV
UAV: Definition, History; Difference between aircraft and UAV; DGCA Classification of UAVs; Types and Characteristics of Drones: Fixed, Multi-rotor, and Flapping Wing; Applications: Defense, Civil, Environmental monitoring.

UNIT-2:
Basics of Flight
Different types of flight vehicles; Components and functions of an airplane; Forces acting on Airplane: Physical properties and structure of the atmosphere; Aerodynamics - aerofoil nomenclature, aerofoil characteristics, Angle of attack, Mach number, Lift and Drag, Propulsion and airplane structures.

UNIT-3:
UAV Elements: Arms, motors, propellers, electronic speed controller (ESC), flight controller; Propulsion:Data Link; Sensors and Payloads: GPS, IMU, Light Detection and Ranging (LiDAR), Imaging cameras,

UNIT-4:
Navigation and Guidance Components:
Classification of payload based on applications; Hyper-spectral sensors; Laser Detection and Range (LADAR); Synthetic Aperture Radar (SAR); Thermal cameras; ultra-sonic detectors; Case study on payloads. Introduction to navigation systems and types of guidance; Mission Planning and Control.

UNIT-5:
Design & Simulation of UAV
Introduction to CAD; Design of UAV components; Structural Analysis using CAE; Aerodynamic Analysis using CFD; Manufacturing of the components of UAVs: 3D printing; Case studies.

TEXT BOOKS:
1. Andey Lennon, "Basics of R/C Model Aircraft Design" Model Airplane News Publication
2. John Baichtal, Building Your Own Drones: A Beginners' Guide to Drones, UAVs, and ROVs.
3. K Valavanis, George J Vachtsevanos, Handbook of Unmanned Aerial Vehicles, New York,
4. Springer, Boston, Massachusetts: Credo Reference, 2014. 2016.
5. DGCA RPAS Guidance Manual, Revision 3- 2020

REFERENCE BOOKS:

1. "Unmanned Aircraft Systems: UAVs Design, Development and Deployment" by Reg Austin
2. FAA, EASA, and other regulatory body publications on UAV standards and certification
3. Industry white papers and case studies on UAV testing and certification

Regulation D23		

Course Code:

Name of the Course **ELECTROMAGNETIC WAVES AND TRANSMISSION LINES**

Course Category:	**PC (Professional Core)**	Credits:3			
Course Type:	Theory	Lecture-Tutorial-Practice:	3	0	0
		Continuous Evaluation	30M		
Prerequisites		Semester End Evaluation	70M		
		Total Marks	100M		

Course Outcomes:

After Successful Completion of course, the student will be able to:

CO No:	Course Outcome Description	K-Level
CO1	Determine electric field intensity using coulomb's law and Gauss law	K5
CO2	Determine magnetic field intensity using Biot-Savarts Law and Ampere's Circuital Law.	K5
CO3	Analyze the electromagnetic wave propagation in dielectric and conducting media	K4
CO4	Understand the primary and secondary constants of different types of transmission lines	K4
CO5	Derive the expressions for input impedance, reflection coefficient, and VSWR of transmission lines and calculate these parameters using smith chart	K4

Note:K-Level is defined From Blooms Taxonomy

Contribution of Course Outcomes mapping with POs&PSOs(**1**-Low,**2**–Moderate,**3**–High)

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	-	2	-	3	3	-	2	-	3	3	-	2
CO2	3	3	-	2	2	3	3	-	2	2	3	3	-	2
CO3	3	3	-	3	2	3	3	-	3	2	3	3	-	3
CO4	3	3	-	2	2	3	3	-	2	2	3	3	-	2
CO5	3	3	-	2	2-	3	3	-	2	2-	3	3	-	2

COURSECONTENT:

UNIT 1

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 'ements, Smith Chart – Construction and Applications, Quarter wave transformer, Single Stub Matching, Illustrative Problems.

TEXTBOOKS:

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.

REFERENCES:

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 Sasi Bhushana Rao, Wiley India 2013.
4. Networks, Lines and Fields John D. Ryder, Second Edition, Pearson Education, 2015.

E- Sources

1. https://onlinecourses.nptel.ac.in/noc21_ee83/preview

Course Code:
Name of the Course **ELECTRONIC CIRCUIT ANALYSIS**

Course Category:	**PC (Professional Core)**	Credits:3	
Course Type:	Theory	Lecture-Tutorial-Practice:	3 0 0
		Continuous Evaluation	30M
		Semester End Evaluation	70M
Prerequisites		Total Marks	100M

Course Outcomes:

After Successful Completion of course, the student will be able to:

CO No:	Course Outcome Description	K-Level
CO1	Analyze the high frequency model of BJT and FET amplifiers using hybrid π model.	K4
CO2	Design multistage amplifiers using BJT and FET.	K3
CO3	Analyze feedback topologies based on their input & output resistances, gain and bandwidth.	K2
CO4	Design RC and LC oscillators using BJT and FET.	K4
CO5	Analyze large signal amplifiers based on operating point, power dissipation, distortion and efficiency and also design tuned amplifiers based on bandwidth, gain and quality factor.	K3

Note:K-Level is defined From Blooms Taxonomy

Contribution of Course Outcomes mapping with POs&PSOs(**1**-Low,**2**–Moderate, **3** –High)

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1		3												
CO2			3											
CO3		3												
CO4			3											
CO5		3												

COURSECONTENT:

UNIT–1
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, cascaded 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-phaseshiftandWienbridgeoscillatorswithBJTandFETandtheiranalysis.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.

TEXTBOOKS:
1. Integrated Electronics- J.Millman and C.C.Halkias, Tata McGraw-Hill, 1972.
2. Electronic Devices and CircuitsTheory –Robert L.Boylestad and Louis Nashelsky, Pearson/PrenticeHall, TenthEdition, 2009.
3. Electronic Devices and Integrated Circuits – B.P. Singh, Rekha, Pearson publications, 2006
   and Filter Design by Gopal –G. Bhise & Prem Chadha, Umesh Publications, 2000.

REFERENCES:
1. Electronic Circuit Analysis and Design –Donald A.Neaman, McGrawHill, 2010.
2. Microelectronic 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, PearsonPublications.

E- Sources

1. en.wikipedia.org/wiki/Digital_electronics
2. www.modernelectronics.org
3. www.electronicsforyou.com
4. www.npteliitm.ac.in

Course Code

Name of the Course **ANALOG COMMUNICATIONS**

Course Category:	PC (Professional Core)	Credits:3		
Course Type:	Theory	Lecture-Tutorial-Practice:	3	0	0
Prerequisites		Continuous Evaluation	30M	
		Semester End Evaluation	70M	
		Total Marks	100M	

Course Outcomes:

After Successful Completion of course, the student will be able to:

CO No:	Course Outcome Description	K-Level
CO1	Explain the Modulation and Demodulation techniques of standard AM. (Understanding)	K2
CO2	Differentiate between different types of Amplitude Modulation and Demodulation techniques. (Analyzing)	K4
CO3	Analyze the concepts of generation and detection of Angle Modulated signals. (Analyzing)	K4
CO4	Evaluate the components and operation of Radio Transmitters. (Evaluating)	K5
CO5	Illustrate the noise performance in Analog Modulation techniques and demonstrate the concepts of Pulse Analog Modulation and Demodulation techniques. (Illustrate)	K3

Note: K-Level is defined From Blooms Taxonomy

Contribution of Course Out comes mapping with POs&PSOs(1-Low,2–Moderate,3–High)

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	-	-	-	-	-	-	-	-	-	-		
CO2	3	3	-	-	-	-	-	-	-	-	-	-		
CO3	3	3	-	-	-	-	-	-	-	-	-	-		
CO4	3	3	-	-	-	-	-	-	-	-	-	-		
CO5	3	3	-	-	-	-	-	-	-	-	-	-		
Level of mapping	3	3	-	-	-	-	-	-	-	-	-	-		

COURSECONTENT:

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.

Reference Books:
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

Web Links:
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.

Regulation **D23**		

Course Code:
Name of the Course: **SIGNALS AND SYSTEMS LAB**

Course Category: Professional Core (**PC**)   Credits:1.5

Course Type: Practical   Lecture-Tutorial-Practice: 0   0   3

Continuous Evaluation

Prerequisites   -   Semester End Evaluation

Total Marks

Course Outcomes:

After Successful Completion of course, the student will be able to:

CO No: Course Outcome Description   K-Level

Note:K-Level is defined From Blooms Taxonomy

Contribution of Course Outcomes mapping with POs&PSOs(**1**-Low,**2**–Moderate,**3**–High)

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO

COURSECONTENT:

Any 10 of the following experiments are to be conducted:

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

TEXTBOOKS:

1.   Signals, Systems&Communications-B.P.Lathi,BSPublications,2003.
2.   Signals and Systems-A.V. Oppenheim, A.S. Willsky and S.H. Nawab,PHI,2ndEdn,1997
3.   Signals&Systems-SimonHaykinandVanVeen,Wiley,2ndEdition,2007

REFERENCEBOOKS:

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

Course Code:

Name of the course: **ELECTRONIC CIRCUIT ANALYSIS LAB**

Course Category:	Professional Core (PC)	Credits:1.5	
Course Type:	Practical	Lecture-Tutorial-Practice:	0 0 3
		Continuous Evaluation	30M
Prerequisites	-	Semester End Evaluation	70M
		Total Marks	100M

Course Outcomes:

After Successful Completion of course, the student will be able to:

CO No:	Course Outcome Description	K-Level
CO1	Design amplifier circuits using BJTs in different configurations and determine f_L and f_H from the frequency response characteristics.	K4
CO2	Analyze and Design feedback amplifiers and sinusoidal oscillator circuits.	K5
CO3	Analyze and Design various power amplifiers and tuned voltage amplifiers.	K5

Note:K-Level is defined From Blooms Taxonomy

Contribution of Course Outcomes mapping with POs&PSOs(**1**-Low,**2**–Moderate,**3**– High)

CONo.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	
CO1	1	3	2					2	3	2				
CO2	1	2	3		3			2	3	2				
CO3	1	3						2	3	2				
CO4	1	3			2			2	3	2			2	
CO5	1	2			3			2	3	2			3	

Content:
List of Experiments:
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

TEXTBOOKS:
1. Integrated Electronics- J.Millman and C.C.Halkias, Tata McGraw-Hill, 1972.
2. Electronic Devices and CircuitsTheory –Robert L.Boylestad and Louis Nashelsky, Pearson/PrenticeHall. TenthEdition, 2009.
3. Electronic Devices and Integrated Circuits – B.P. Singh, Rekha, Pearson publications, 2006 and Filter Design by Gopal –G. Bhise & Prem Chadha, Umesh Publications, 2000.

REFERENCES:
1. Electronic Circuit Analysis and Design –Donald A.Neaman, McGrawHill, 2010.
2. Microelectronic 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, PearsonPublications.

WEB LINKS
1. Students Resources provided in http://www.electronics-tutorials.ws/ for basic electronic circuits
2. http://nptel.ac.in/cources/117105080/ on electronics and communication Engineering
3. http://www2.ece.ohio-state.edu/ee327/Electronics Devices and circuit Laboratory
4. https://searchworks.stanford.edu/view/11352963 for fundamentals of Electronics available in Digital library
5. https://electronicsforu.com/ for news on electronics and for projects
6. https://archive.org/details/ElectronicDevicesciruits
7. https://www.sanfoundary.com/1000-electronics-devices-circuits-questions-answers/ Question and Answers available on total EDC.

Course Code:
Name of the Course: DRONE TECHNOLOGY

Course Category:	**Skill Enhancement Course**	Credits:2			
Course Type:	Practical	Lecture-Tutorial-Practice:	0	1	2
Prerequisites		Continuous Evaluation	30M		
		Semester End Evaluation	70M		
		Total Marks	100M		

Course Outcomes:

After Successful Completion of course, the student will be able to:

CO No:	Course Outcome Description	K-Level
CO1		
CO2		
CO3		
CO4		
CO5		

Note: K-Level is defined From Blooms Taxonomy

Contribution of Course Outcomes mapping with Pos & PSOs (**1**-Low,**2**–Moderate,**3**–High)

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1														
CO2														
CO3														
CO4														
CO5														

COURSE CONTENT:

1: Introduction to Drones and UAV Basics
2: Drone Safety and Pre-flight Procedures
3: Drone Flight Controls and Maneuvering
4: Emergency Procedures and Recovery
5: Flight Planning and Navigation
6: Advanced Flight Techniques
7: Aerial Photography and Videography
8: Legal and Regulatory Compliance
9: Mission Planning and Execution
10: Night Operations and Low-Light Conditions
11: Data Analysis and Reporting
12: Simulation and Scenario-Based Training

Textbooks/Reference Materials

1. "Introduction to UAV Systems" by Paul Fahlstrom.
2. Drone Technology and Applications" by Richard R. LaPierre

3. Remote Pilot - Small Unmanned Aircraft Systems Study Guide" by Federal Aviation Administration (FAA)\

4. Drones: Their Many Civilian Uses and the U.S. Laws Surrounding Them" by Emeline Lebow. manufacturer's flight manuals and guidelines.

5. Drones: Their Many Civilian Uses and the U.S. Laws Surrounding Them" by Emeline Lebow Industry reports and white papers on drone applications.

6. Drone Entrepreneurship: 30 Businesses You Can Start" by Justin Foster

7. Aerial Robotics and Unmanned Aerial Vehicles" edited by Kimon P. Valavanis

Tools and Resources

1. **Mission Planning Software**: Mission Planner, QGround Control, Pixhawk
2. **Simulators**: PX4 SITL (Software-in-the-Loop), Gazebo, AirSim
3. **Hardware**: Drones equipped with GPS, sensors (LiDAR, cameras), and flight controllers

By pursuing these skill courses, individuals can prepare themselves for diverse and lucrative opportunities in the fast-growing drone industry.

Regulation D23		Course Code: Name of the course: SOFT SKILLS				

Course Category:	Skill Enhancement course (SEC)	Credits: 2.0			
Course Type:	Practical	Lecture-Tutorial-Practice:	0	1	2
Prerequisites	-	Continuous Evaluation	30M		
		Semester End Evaluation	70M		
		Total Marks	100M		

Course Outcomes:

After Successful Completion of course, the student will be able to:

CO No:	Course Outcome Description	K-Level
CO1	Assimilate and understood the meaning and importance of soft skills and learn how to develop them.	1
CO2	Understand the significance of soft skills in the working environment for professional excellence.	2
CO3	Prepare to undergo the placement process with confidence and clarity.	3
CO4	Ready to face any situation in life and equip themselves to handle them effectively.	6
CO5	Understand and learn the importance of etiquette in both professional and personal life	2

Note:K-Level is defined From Blooms Taxonomy

Contribution of Course Outcomes mapping with POs&PSOs(1-Low.2–Moderate.3–High)

CONo.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1								3	3	3				
CO2								3	3	3				
CO3								3	3	3				
CO4								3	3	3				
CO5								3	3	3				

COURSE CONTENT

UNIT – 1: INTRODUCTION
Introduction- Emergence of life skills, 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:
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:
Importance-Communications skills-Functions of language, Group discussions.Debate, Team Work, managerial skills,Negotiation skills- Leadership skills, corporate etiquettes.

UNIT – IV: Verbal communication:
Listening skills, need- types, advantages, Importance-Improving Tips for Listening. Speaking, need- types, advantages Importance- Improving Tips, Reading-Short passages,Reading comprehension Writing Skills, Report, Res statement of purpose, need- types, advantages, Importance-Improving Tips .

UNIT – V: Non Verbal communication & Interview skills
Importance- Facial Expressions- Eye Contact – Proxemics- Haptics -Posture, cross cultural body 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.

TEXT BOOKS:

- Sherfield,M.Robertatal,CornerstoneDevelopingSoftSkills,4/e,PearsonPublication,NewDelhi,2014.
- AlkaWadkar,LifeSkillsforSuccess,1/e,SagePublicationsIndiaPrivateLimited,2016.

REFERENCE BOOKS:

- Sambaiah.M. Technical English, Wiley publishers India. New Delhi. 2014.
- Gangadhar Joshi, From Campus to Corporate, SAGE TEXT.
- Alex.K, Soft Skills, 3rd ed. S. Chand Publication, New Delhi, 2014.
- Meenakshi Raman and Sangita Sharma, Technical Communication: Principle and Practice, Oxford University Press, 2009.
- Shalini Varma, Body Language for Your Success Mantra, 4/e, S. Chand Publication, New Delhi, 2014.
- Stephen Covey, Seven Habits of Highly Effective People, JMD Book, 2013.

E-RESOURCES/DIGITAL MATERIAL:

- https://onlinecourses.nptel.ac.in/noc20_hs60/preview
- http://www.youtube.com/@softskillsdevelopment6210
- https://youtube.com/playlist?list=PLLy_2iUCG87CQhELCytvXh0E_ybOO1_q&si=Fs05Xh8ZrOPsR8F4
- https://www.coursera.org/learn/people-soft-skills-assessment?language=English
- https://www.edx.org/learn/soft-skills

Course Code:
Name of the course: **DESIGN THINKING & INNOVATION**

Course Category:	**Engineering Science(ES)**	Credits:2			
Course Type:	Practical	Lecture-Tutorial-Practice:	1	0	2
Prerequisites	-	Continuous Evaluation	30M		
		Semester End Evaluation	70M		
		Total Marks	100M		

Course Outcomes:

After Successful Completion of course,the student will be able to:

CO No:	Course Outcome Description	K-Level
CO1	Define the concepts related to design thinking.	1
CO2	Explain the fundamentals of Design Thinking and innovation.	2
CO3	Apply the design thinking techniques for solving problems in various sectors.	3
CO4	Analyze to work in a multidisciplinary environment.	4
CO5	Evaluate the value of creativity.	5

Note:K-Level is defined From Blooms Taxonomy

Contribution of Course Outcomes mapping with POs&PSOs(1-Low,2–Moderate,3–High)

CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	3	2	-	-	2	2	-	2	-	-
CO2	3	3	3	3	3	2	-	-	2	2	-	2	-	-
CO3	3	3	3	3	3	2	-	-	2	2	-	2	-	-
CO4	3	3	3	3	3	2	-	-	2	2	-	2	-	-
CO5	3	3	3	3	3	2	-	-	2	2	-	2	-	-

Content:

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.CreativitytoInnovation.Teamsforinnovation,Measuringthe impact and value of creativity..

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.Designthinkingtomeetcorporateneeds.DesignthinkingforStartups.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. TimBrown,Changebydesign,1/e, HarperBollins,2009.
2. Idris Mootee, Design Thinking for Strategic Innovation, 1/e,Adams Media, 2014.

REFERENCEBOOKS:

1. David Lee, Design Thinking in the Classroom, Ulysses press,2018.
2. Shrrutin N Shetty,Design the Future,1/e,NortonPress,2018.
3. Williamlidwell, Kritinaholden,&Jillbutter,Universalprinciplesofdesign,2/e,RockportPublishers, 2010.
4. Chesbrough. H, Theera of open innovation,2003.

E-RESOURCES/DIGITALMATERIAL:

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

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