III Semester

S. No.	Subject Code	Subject	Category	L	T	P	IM	EM	Credits
1	1821301	Mathematics- III	BS	3	1	0	30	70	4
2	1824302	Managerial Economics and Financial Analysis	HS	3	0	0	30	70	3
3	1804303	Electronic Devices and Circuits	EC	3	0	0	30	70	3
4	1804304	Digital System Design	EC	3	0	0	30	70	3
5	1804305	Signals and Systems	EC	3	0	0	30	70	3
6	1804306	Network Theory	EC	3	0	0	30	70	3
7	1805307	Python Programming	ES	0	0	3	50	50	1.5
8	1804308	Electronic Devices and Circuits Lab	EC	0	0	3	50	50	1.5
9	18993M1	Environment Science	MC	2	0	0	30	0	0
Total:									22

Course Title	MATHEMATICS – III				B. Tech. ECE III Sem		
Course Code	Category	Hours/Week			Credits	Maximum Marks	
1821301	PC	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		3	1	--	4	30	70	100
Mid Exam Duration: 2Hrs					End Exam Duration: 3Hrs		

Course Objectives:

The objective of this course is to familiarize the students Bessel functions, Legendre's equations and the concepts of complex variables to equip the students to solve application problems in their disciplines.

Course Outcomes: On successful completion of this course, the students will be able to	
CO 1	**Solve** Bessel and Legendre's equations in terms of polynomials.
CO 2	**Define** analytic function, singularities, poles and residues
CO 3	**Determine** the differentiation of complex functions used in engineering problems and analyze images from z-plane to w-plane.
CO 4	**Discuss** the various special transformations.
CO 5	**Analyze** real definite integrals in definite regions.

UNIT I

Bessel functions –Introduction – Recurrence formulae for $J_n(x)$ – Generating function for $J_n(x)$ – Jacobi series – Orthogonality of Bessel functions – Legendre's equation – Rodrigue's formula, Legendre Polynomials – Generating function for $P_n(x)$ - Recurrence formulae for $P_n(x)$ – Orthogonality of Legendre polynomials.

UNIT II

Functions of a complex variable – Limit – Continuity -Differentiability – Analytic function – Properties – Cauchy – Riemann equations in cartesian and polar coordinates – Harmonic and Conjugate harmonic functions. Construction of analytic function using Milne's Thomson method.

UNIT III

Conformal Mapping: Some standard transforms – translation, rotation, magnification, inversion and reflection. Bilinear transformation – invariant points. Special conformal transformations: $w = e^z$, z^2, sinz and cosz.

UNIT IV

Complex integration: Line integral - Evaluation along a path – Cauchy's theorem – Cauchy's integral formula – Generalized integral formula. Singular point – Isolated singular point – Simple pole, Pole of order *m* – Essential singularity.

UNIT V

Residues: Evaluation of residues by formula. Cauchy's residue theorem – Evaluation of the real definite integrals of the type (i) Integration around the unit circle $\int_0^{2\pi} f(cos\theta, sin\theta)d\theta$ (ii) integration around a small semi circle $\int_{-\infty}^{\infty} f(x)dx$

Text Books:

1. Higher Engineering Mathematics, Dr. B.S Grewal, Khanna Publishers-42 edition.
2. Advanced Engineering Mathematics, Erwin Kreyszig, Willey Publications, 9th edition- 2013.

Reference Books:

1. Higher Engineering Mathematics, B.V.Ramana, Mc.Graw Hill Education (India) Private Limited.
2. Advanced Engineering Mathematics by N. Bali, M Goyal, Firewall Media 7th edition.
3. Engineering Mathematics, Volume – III, E. Rukmangadachari & E. Keshava Reddy, Pearson Publisher.

Course Title	MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS				B. Tech. ECE III Sem		
Course Code	**Category**	**Hours/Week**			**Credits**		
1825301	**Humanities and social sciences**	**L**	**T**	**P**	**C**	**Continuous Internal Assessment**	**End Exams**	**Total**
		3	--	--	3	30	70	100
Mid Exam Duration: 2Hrs					**End Exam Duration: 3Hrs**			

Course Objectives:

- To equip the budding engineering student with an understanding of concepts and tools of economic analysis.
- Provide knowledge of managerial economics through differential economics concepts, accounting concepts are necessary to analyze and solve complex problems relating financial related matters in bog industries.
- An understanding of professional and ethical responsibility and ability to communicate effectively.
- The broad education necessary to understand the impact of engineering solutions in a global and societal context.
- Recognition of the need for, and an ability to engage in life-long learning and to meet contemporary issues.

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	**Acquire knowledge** in principles and concepts of Managerial Economics and Accountancy
CO 2	**Understand** the Economic theories i.e., Demand, Production, Cost, Markets and Price.
CO 3	**Describe** different types of Markets and competition, forms of organization and Methods of Pricing.
CO 4	**Examine** the profitability of various Projects.
CO 5	**Utilize** tools and techniques to analyze and interpret the key parameters of financial performance.

UNIT – I

INTRODUCTION TO MANAGERIAL ECONOMICS

Definition, nature and scope of Managerial Economics –Demand analysis – Determinants, Law of Demand and its exceptions – Elasticity of Demand – Types and Measurement of Elasticity of Demand – Methods of Demand Forecasting (Statistical mehtods) – Supply Analysis.

UNIT – II

THEORY OF PRODUCTION AND COST ANALYSIS

Production Functions: Law of variable proportion, Isoquants and Isocost, least cost combination of inputs, Returns to Scale and Cobb- Douglas production function. Internal and external economies of scale.

Cost Analysis: Cost concepts – Break-Even Analysis (BEA) – Break Even Point – significance and limitations of BEA.

UNIT – III

INTRODUCTION TO MARKETS AND PRICING

Markets structures: Perfect and Imperfect competition – Features of Perfect Competition, Monopoly, Monopolistic Competition and Oligopoly. Price- Output determination under perfect competition, monopoly and monopolistic competition – Price rigidity in Oligopoly.

Methods of pricing – cost plus pricing, marginal cost pricing, skimming pricing, penetration pricing, differential pricing and administrative pricing.

UNIT – IV

BUSINESS ORGINATIONS AND CAPITAL BUDGETING

Business Organizations: Types of business organizations- Sole Proprietorship, Partnership, Joint Stock Company, Public Ltd and Private Ltd companies, Public Private Partnership (PPP).

Capital Budgeting: Types of capital, methods and sources of raising Capital. Capital Budgeting Techniques: Payback Period Method, Accounting Rate of return (ARR) and Net Present Value Method (NPV) (simple problems).

UNIT – V

FINANCIAL ACCOUNTING AND ANALYSIS

Double Entry Book keeping, Journal, Ledger, Trail Balance – Final Accounts (Preparation of Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments). Analysis and interpretation of financial statements through ratios (Liquidity, Profitability and Activity Ratios) (Simple problems).

TEXT BOOKS:

1. Varshney & Maheswari: Managerial Economics, Sultan Chand Publishers, 2009.
2. Prasad and K.V.Rao: Financial Accounting, jaibharth Publishers, Vijayawada.

REFERENCES:

1. P.L Mehtha: Managerial Economics, Sulthan Chand Publishers
2. K K Dewett - Managerial Economics ,S. Chand Publishers
3. S.P Jain & K.L Narang: Financial Accounting, Kalyani publishers.
4. M.Sugunatha Reddy: Managerial Economics and Financial Analysis, Research India Publication, New Delhi, 2013.
5. Paul A Samuleson and William nordhaus : Economics, Oxford University Publications.
6. M L Jhingan : Micro Economics & Macro Economics, Vrinda Publacations (P) Ltd.

Course Title	ELECTRONIC DEVICES AND CIRCUITS				B. Tech. ECE III Sem		
Course Code	Category	Hours/Week			Credits	Maximum Marks	
1804303	PC	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		3	--	--	3	30	70	100
Mid Exam Duration: 2Hrs					End Exam Duration: 3Hrs		

Course Objectives:

- To teach principles of semiconductor Physics
- To introduce electronic devices, including diodes, bipolar junction transistors and FET.
- To understand basic circuits of the electronic devices.
- To learn the biasing of BJT and FET.
- To teach small signal analysis of BJT and FET.

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	**Describe** the operation of various Diodes, transistors and their applications
CO 2	**Understand** the operation of transistor circuits under different configurations
CO 3	**Analyze** the small signal analysis of BJT Amplifiers and of FET amplifiers
CO 4	**Illustrate** the Biasing of BJT and FET.
CO 5	**Classify** the family of MOS devices.

UNIT-I

PN Junction Diode: Construction and operation of PN Junction Diode, V-I characteristics, Temperature Dependence, Static and dynamic resistance, Transition and Diffusion capacitance, Zener diode.

Diode Applications: Diode clippers and Clampers, Half wave, Full wave and Bridge Rectifiers with and without filters, Ripple factor and regulation characteristics. Applications of Zener Diode.

UNIT-II

Bipolar Junction Transistors: NPN and PNP Junction Transistors, Current components, CB, CE & CC configurations and their Input & Output Characteristics, Comparison of CE, CB and CC configurations, Saturation, Cutoff and Active regions, α, β and γ parameters and relation between them.

FET: JFET, JFET characteristics and configurations, Pinch off voltage, Drain saturation current,

Parameters of JFET, FET as Voltage Variable Resistor, Comparison between FET and BJT. MOSFET- Depletion and Enhancement types.

UNIT-III

BJT Biasing: Operating point, biasing stability, Various biasing circuits, thermal runaway, stabilization and compensation, Thermal stability, Transistor as an amplifier.
FET Biasing: Fixed bias, Self bias and voltage divider bias.

UNIT-IV

Low frequency Analysis of Transistors: Hybrid model (h-parameters), small signal analysis of a single stage BJT amplifiers, comparison of CE, CB and CC amplifiers, Approximate model analysis, effects of coupling and bypass capacitors on low frequency response.
Small signal models and analysis of JFET and MOSFET. CS, CD and CG Amplifiers and their comparison.

UNIT-V

Special Semiconductor Devices: LED, Photo diode, Photo Transistor, SCR, UJT, Tunnel diode.
Introduction to CMOS: NMOS, PMOS and CMOS-construction, operation, characteristics, advantages and comparison

Text Books:

1. Jacob Millman, Christos C. Halkias, "Integrated electronics" Tata McGraw Hill Publication
2. K. R. Botkar, "Integrated Circuits" 5 th edition, Khanna Publications
3. A. Anand Kumar, "Pulse and Digital Circuits", PHI, 2005.

Reference Books:

1. Y. Tsividis and M. Colin, "Operation and Modeling of the MOS Transistor," Oxford Univ.Press, 2011.
2. D. Neamen , D. Biswas "Semiconductor Physics and Devices," McGraw-Hill Education
3. S. M. Sze and K. N. Kwok, "Physics of Semiconductor Devices," 3rd edition, John Wiley &Sons, 2006.
4. C.T. Sah, "Fundamentals of solid state electronics," World Scientific Publishing Co. Inc, 1991.

Course Title	DIGITAL SYSTEM DESIGN					B. Tech. ECE III Sem		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
1804304	EC	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		3	--	--	3	30	70	100
Mid Exam Duration: 2Hrs					End Exam Duration: 3Hrs			

Course Objectives:

- To provide fundamentals of number systems and Boolean Algebra.
- To learn the design of combinational and sequential circuits.
- To teach various memories and PLDs.

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	**Identify** various number systems and binary codes.
CO 2	**Understand** the postulates, theorems and properties of Boolean algebra.
CO 3	**Show** the correlation between the Boolean expression and their corresponding logic diagram.
CO 4	**Analyze** Combinational & sequential logic circuits.
CO 5	**Solve** Switching functions using Programmable Logic Devices

UNIT-I

Number Systems & Codes: Overview of number systems –complement representation of negative numbers- binary arithmetic, binary codes, code conversion, error detecting & error correcting codes –Hamming codes.

UNIT-II

Boolean Algebra and Minimization of Switching Functions: Fundamental postulates of Boolean Algebra - Basic theorems and properties –Canonical and Standard forms- Minimal SOP and POS forms ,Algebraic simplification, digital logic gates –universal gates-Multilevel NAND/NOR realizations. The K- map method, tabulation method.

UNIT-III

Combinational Logic Design: Design using conventional logic gates, Half and Full Adders, Subtractors, Serial and Parallel Adders, Encoder, Decoder, Multiplexer, De-Multiplexer, Realization of switching functions using multiplexer, Parity bit generator, Code-converters, Hazards and hazard free realizations.

UNIT-IV

Sequential Logic Design: Synchronous and Asynchronous sequential circuits, Flip-flops-Triggering and excitation tables, Flip flop conversions, shift registers, Design of Synchronous and Asynchronous counters, Ring and Johnson counters. Finite state machines (Mealy Model, Moore Model) and their representation, Designing synchronous Sequential circuits like Serial Binary adder, Sequence detector.

UNIT-V

Semiconductor Memories and Programmable Logic Devices: ROM- Internal structure, Static RAM and Dynamic RAM. Basic PLD‟s-ROM, PROM, PLA, and PAL, Realization of Switching functions using basic PLD‟s. Concept of PLD‟s like CPLDs and FPGAs.

Text Books:

1. ZVI Kohavi, Switching & Finite Automata theory –, TMH, 2nd Edition.
2. Morris Mano, “Digital Design”, PHI, 3rd Edition, 2006.
3. A. Anand Kumar, “Switching Theory & Logic Design”, 2008, PHI

Reference Books:

1. R.P. Jain, “Modern digital Electronics”, Tata McGraw Hill, 4th edition, 2009.
2. W.H. Gothmann, “Digital Electronics- An introduction to theory and practice”, PHI, 2nd edition ,2006.
3. D.V. Hall, “Digital Circuits and Systems”, Tata McGraw Hill, 1989
4. William I. Fletcher, “An Engineering Approach to Digital Design”, PHI.
5. Charles H. Roth, “Fundamentals of Logic Design”, Thomson Publications, 5th Edition, 2004.
6. John M. Yarbrough, “Digital Logic Applications and Design”, Thomson Publications,

Course Title	SIGNALS AND S YSTEMS				B. Tech. ECE III Sem		
Course Code	Category	Hours/Week		Credits	Maximum Marks		
1804305	EC	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		3	--	--	3	30	70	100
Mid Exam Duration: 2Hrs					End Exam Duration: 3Hrs		

Course Objectives:

- To introduce terminology of signals and systems.
- To present Fourier tools through the analogy between vectors and signals.
- To teach concept of sampling and reconstruction of signals.
- To present linear systems in time and frequency domains.
- To teach Laplace and z-transform as mathematical tool to analyze continuous and discrete- time signals and systems.

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	**Identify** the various signals and operations on signals.
CO 2	**Describe** the spectral characteristics of signals.
CO 3	**Illustrate** signal sampling and its reconstruction.
CO 4	**Apply** convolution and correlation in signal processing.
CO 5	**Analyze** continuous and discrete time systems.

UNIT-I

Introduction: Definition and Classification of Signals, Elementary signals, Basic operations on signals.

Fourier series representation of periodic signals: 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. Representation of function by a set of mutually orthogonal functions, Dirichlet‟s conditions, Trigonometric Fourier series and Exponential Fourier series, Spectrum and its significance, Amplitude and Phase spectra, bandwidth of a signal.

UNIT-II

Fourier transforms: Fourier transform, Fourier transform of standard signals, properties of Fourier transforms, Fourier transforms involving impulse function, Fourier transform of periodic signals.

UNIT-III

Discrete Time Signals: Sampling of continuous time signals, Sampling theorem, Reconstruction of signal from its samples, effect of under sampling – Aliasing. Elementary sequences- Unit impulse, step, ramp, and exponential sequences, Periodicity of Discrete-time signals, Operations on Discrete-time signals.

Signal transmission through LTI systems: Systems, Classification of Systems, Linear time invariant (LTI) system, Transmission of signals through LTI systems, Transfer function of a LTI system, Causality & Stability. Distortion less transmission through LTI system, Bandwidth of systems, relation between bandwidth and rise time.

UNIT-IV

Discrete Time Systems: Definition, classification, Linear Shift Invariant(LSI) system, Stability, Causality, Linear constant coefficient difference equation, Impulse response, Discrete time Fourier transform, Properties, Transfer function, System analysis using DTFT.
Convolution and correlation: Graphical method of convolution, auto correlation and Cross correlation of functions, properties of correlation function, Energy density spectrum, Power density spectrum, Relation between convolution and correlation, Applications of convolution and correlation.

UNIT-V

Laplace Transform: Definition , ROC , Properties , Inverse Laplace transform , The S-plane and BIBO stability , Transfer functions , System response to standard signals.
Z–Transforms: Definition, ROC and its properties, analysis of LTI system using Z-transform, The Inverse Z-transform using, Z-transform properties, Unilateral Z- Transform, solution of linear constant coefficient difference equations using Z-transforms.

Text Books:

1. Simon Haykin, "Communication Systems", 2nd Edition, Wiley-Eastern, 2003.
2. Oppenheim AV and Willisky, "Signals and Systems", 2nd Edition, Pearson Ed, 1997.
3. B.P. Lathi, "Principles of Linear systems and signals," Oxford Univ. Press, Second Edition International version, 2009.

Reference Books:

1. Simon Haykin, Van Veen, and Wiley, "Signals & Systems", 2nd Edition, 2003.
2. Luis F. Chaparro, "Signals and Systems using MATLAB," Academic Press, 2011.
3. P. Ramesh Babu, R. Ananda Natarajan, "Signals and Systems", 2nd edition, SciTech Publications, 2006.
4. John G. Proakis, Dimitris G. Manolakis, Digital Signal Processing, Principles, Algorithms,and Applications, 4 th Edition, PHI, 2007.

Course Title	NETWORK THEORY					B. Tech. ECE III Sem		
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
1804306	**EC**	**L**	**T**	**P**	**C**	**Continuous Internal Assessment**	**End Exams**	**Total**
		3	--	--	3	30	70	100
Mid Exam Duration: 2Hrs						**End Exam Duration: 3Hrs**		

Course Objectives:

- To learn network theorems,
- To teach application of resonance, transients applied for ac and dc circuits
- To study necessary conditions for network functions, various parameters and its relationships.

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	**Understand** the basic concepts of magnetic circuits,resonance and network functions.
CO 2	**Solve** DC and AC circuits by using various theorems.
CO 3	**Analyze** RL,RC and RLC for DC and AC transient response.
CO 4	**Analyze** two port networks for Z,Y,ABCD,H parameters and its relationship between them

UNIT - I

Network Theorems: Superposition theorem, Thevenin & Norton theorems, Maximum power transfer theorem, Reciprocity, Millman's and Compensation Theorems applied to DC and sinusoidal excitations.

UNIT – II

DC Transient Analysis: Determination of initial conditions – transient response of R-L, R-C & R-L-C circuits for dc–solution method using differential equation and Laplace transforms.

AC Transient Analysis: Transient response of R-L, R-C and R-L-C series circuits for sinusoidal excitations, solution method using differential equation and Laplace transforms

UNIT – III

Resonance: Series, parallel circuits, concept of half power frequencies, bandwidth and Q factor. simple problems.

Magnetic Circuits: Concept of self and mutual inductances, dot conventions, coefficient of coupling, series and parallel magnetic circuits, composite magnetic circuits.

UNIT – IV

Single port and multiport networks, immittance functions of two port parameters, necessary conditions for driving point and transfer functions, complex frequencies, poles and zeros, time domain response from pole zero plots, restrictions from pole zero locations.

UNIT – V

Two port Networks: Two port networks, impedance parameters, admittance parameters, transmission parameters, hybrid and inverse hybrid parameters, relationship between parameters, conditions for symmetry and reciprocity, interconnected two port networks, terminated two port parameters and image parameters.

Text Books

1. Network Analysis – Van Valkenburg - 3rd edition, PHI.
2. Circuit Theory -A.Chakrabarti, Dhanapat Rai & Co publications.
3. Electrical Circuits - N.Sreenivasulu, Reem publications.
4. Engineering circuit analysis -Hayt and Kimmerly-7th edition

Reference Books

1. Circuits & Networks – A. Sudhakar, Shayammohan. S. Pillai, 4th Edition –. TMH
2. Networks and Systems – D. Roy Chowdari – New Age International
3. Network Analysis with applications – Stanely - Pearson education 4th edition
4. Network Analysis by G.K.Mittal, Khanna Publishers.
5. Network Analysis by G.K.Mittal,Khanna Publisher

Course Title	PYTHON PROGRAMMING				B. Tech. ECE III Sem		
Course Code	Category	Hours/Week			Credits	Maximum Marks	
1805307	ES	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		--	--	3	1.5	50	50	100
						End Exam Duration: 3Hrs		

Course Objectives:

- To write, test, and debug simple Python programs.
- To implement Python programs with conditionals and loops.
- Use functions for structuring Python programs.
- Represent compound data using Python lists, tuples, dictionaries.
- Read and write data from/to files in Python.

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	**Demonstrate** the functions in Python programming.
CO 2	**Illustrate** Python programs with conditionals and loops.
CO 3	**Test** functions for structuring Python programs.
CO 4	**Design** functions for structuring Python programs.
CO 5	**Evaluate** compound data using Python lists, tuples, dictionaries.

LIST OF PROGRAMS

1. Compute the GCD of two numbers.
2. Find the square root of a number (Newton‟s method)
3. Exponentiation (power of a number)
4. Find the maximum of a list of numbers
5. Linear search and Binary search
6. Selection sort, Insertion sort
7. Merge sort
8. First n prime numbers
9. Multiply matrices
10. Programs that take command line arguments (word count)
11. Find the most frequent words in a text read from a file
12. Simulate elliptical orbits in Pygame
13. Simulate bouncing ball using Pygame

PLATFORM NEEDED

Python 3 interpreter for Windows/Linux

Course Title	ELECTRONIC DEVICES AND CIRCUITS LAB				B. Tech. ECE III Sem		
Course Code	Category	Hours/Week			Credits	Maximum Marks	
1804308	EC	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		--	--	3	1.5	50	50	100
							End Exam Duration: 3Hrs	

Course Objectives:

- To verify the characteristics of different diodes and transistors.
- To verify the performance of circuits with diodes and transistors.

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	**Verify** the V-I Characteristics of various diodes.
CO 2	**Examine** the load characteristics of rectifiers.
CO 3	**Verify** the Input and Output characteristics of various transistors.
CO 4	**Experiment** clipper and clamper circuits.

LIST OF EXPERIMENTS:

1. V-I Characteristics of Pn Junction Diode
2. V-I Characteristics o Zener Diode
3. Zener Regulator Characteristics
4. V-I Characteristics of LED
5. Half-Wave Rectifier With and Without Filter
6. Full-Wave Rectifier With and Without Filter
7. Bridge Rectifier With and Without Filter
8. Clipper Circuits
9. Clamper Circuits
10. Input & Output Characteristics of Transistor In CB Configuratio
11. Input & Output Characteristics of Transistor In CE Configuration
12. FET Characteristics
13. SCR
14. UJT Characteristics

Course Title	ENVIRONMENTAL SCIENCE				B. Tech.ECE III Sem		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
18994M1	MC1	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		2	--	--	0	30	--	--
Mid Exam Duration: 2Hrs								

Course Objectives:

- To make the students to get awareness on importance of environment in our life.
- To understand the importance of protecting natural resources, ecosystems for future generations and pollution causes due to the day to day activities of human life to save earth from the inventions by the engineers.

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	**Recall** environmental concepts for the sustainable developmental activities towards the society.
CO 2	**Summarize** the interconnection of human dependence on this ecosystem.
CO 3	**Solve** environmental problems by gaining a higher level of knowledge and personal involvement.
CO 4	**Outline** the impact of developmental activities on environment and proper utilization of natural resources.

UNIT-I

Introduction to Environmental Studies- Natural Resources

Multidisciplinary nature of environmental studies. Scope and Importance.

Natural resources and associated problems – Renewable and non renewable Resources

(a) Forest resources –Deforestation: Causes and impacts due to mining, dams – benefits and problems

(b) Water resources – Use and over utilization of surface and ground water – Floods, drought, and conflicts over water

(c) Energy resources –Renewable and Non Renewable energy resources, use of alternate energy resource

(d) Land resources -Soil erosion and desertification, Land degradation.

Role of an individual in conservation of natural resources.

UNIT-II

Ecosystem

Ecosystem- Definition – Structure and function of an ecosystem – Energy flow in the ecosystem –Food chains, food webs, Ecological succession.

Introduction, types, characteristic features of the following ecosystem:

(a)Forest ecosystem, (b)Grassland ecosystem,(c)Desert ecosystem,(d)Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

UNIT-III

Biodiversity and its conservation

Levels of Biodiversity: genetic, species and ecosystem diversity – Bio-geographical classification of India – Hotspots .Value of biodiversity: consumptive use, Productive use, social, ethical, aesthetic and option values – India as a mega-diversity nation – Endangered and endemic species. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT-IV

Environmental Pollution

Definition, Cause, effects and control measures of (a) Air Pollution,(b)Water pollution,(c)Soil pollution (d)Noise pollution. Nuclear hazards –Risks to human health .Solid waste management: Control measures of urban and industrial wastes. Pollution case studies. Global Warming, Ozone layer depletion, acid rains and impacts on human communities and environment .Disaster management: floods, earthquakes, cyclones

UNIT-V

Environmental policies

Environment Protection Act – Air (Prevention and Control of Pollution) Act. – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act .International agreements: Montreal and Kyoto protocols and conservation on Biological Diversity (CBD).

Human communities and Environment

Human population and growth: impacts on environment, human health and welfares.
Environmental movements: chipko, silent valley.
Environmental Ethics: Role of individual in environmental conservation. Public awareness

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, birds – Study of simple ecosystems-pond, river, hill slopes, etc..

Text Books:

1. Text book of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission, Universities Press.
2. Environmental studies by Benny Joseph, Mc, Graw Hill Publications.
3. Principles and a basic course of Environmental science for under graduate course by Kousic,KouShic.
4. Text book of Environmental science and Technology by M. Anji Reddy,BS Publication.

Reference Books:

1. Environmental sciences and engineering – J. Glynn Henry and Gary W. Heinke – Printice hall of India Private limited.
2. Environmental Studies by Anindita Basak – Pearson education.
3. Introduction to Environmental engineering and science by Gilbert M. Masters and Wendell P. Ela - Printice hall of India Private limited.

IV Semester

S. No.	Subject Code	Subject	Category	L	T	P	IM	EM	Credits
1	1823401	Biology for Engineers	BS	2	0	0	30	70	2
2	1804402	Probability Theory and Stochastic Processes	EC	3	0	0	30	70	3
3	1804403	Analog and Digital Circuits	EC	3	0	0	30	70	3
4	1802404	Control Systems	EC	3	0	0	30	70	3
5	1804405	Linear IC Applications	EC	3	0	0	30	70	3
6	1804406	Electromagnetic Theory and Transmission lines	EC	3	0	0	30	70	3
7	1804407	LabView Programming	ES	0	0	3	50	50	1.5
8	1804408	Analog and Digital Circuits Lab	EC	0	0	3	50	50	1.5
9	1824409	Advanced English Communication Skills	HS	0	0	4	50	50	2
		Total:							22

Course Title	Biology for Engineers					B. Tech. ECE IV Sem		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
1823401	BS	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		3	1	--	4	30	70	100
Mid Exam Duration: 2Hrs					End Exam Duration: 3Hrs			

Course Objectives:

- Introduction to Basics of Biology which includes cell, the unit of life, Different types of cells and classification of living organisms.
- Understanding what are bio molecules present in a cell, their structure function and their role in a living organism. Application of certain bio molecules in Industry.
- Brief introduction to human physiology, which is essential for bioengineering field.
- Understanding the hereditary units, that is genes and genetic materials (DNA and RNA) present in living organisms and how they replicate and pass and preserve vital information in living organisms.
- How biology can be applied in our daily life using different technology, for production of medicines to transgenic plants and animals to designing new biotechnological products.

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	Understand the difference between lower organisms (prokaryotes) from higher organisms (eukaryotes).
CO 2	Interpret the relationship between the structure and function of nucleic acids.
CO 3	Understand the mechanism and process of important human functions
CO 4	Describe the proteins synthesization, recombinant DNA technology and its application in different fields.
CO 5	Apply biology for production of useful products for mankind

Unit I

Introduction to Basic Biology

Cell: What is a Cell, Cell theory, Cell shapes, structure of a Cell, Cell cycle chromosomes The Plant Cell and animal Cell, protoplasm, prokaryotic and eukaryotic Cell, Plant Tissue and Animal Tissue. Brief introduction to five kingdom of classification.

Learning Outcomes:

After completing this unit, the student will be able to

- Summarize the basis of life. (L2)
- Understand the difference between lower organisms (prokaryotes) from higher organisms (eukaryotes). (L3)
- Understand how organisms are classified based. (L2)

Unit II

Introduction to Bio-molecules

Carbohydrates, proteins, Amino acid, nucleic acid (DNA and RNA) and their types.
Enzymes and their application in Industry. Large scale production of enzymes by Fermentation.

Learning Outcomes:

After completing this unit, the student will be able to

- Understand what are bio molecules? Their role in living cells their structure function and how they are produced. (L2)
- Interpret the relationship between the structure and function of nucleic acids. (L2)
- Summarize the applications of enzymes in industry. (L2)
- Understand what is fermentation and its applications of fermentation in industry. (L2)

Unit III

Human Physiology

Nutrition (Classes of nutrients or food substances), Digestive systems

Respiratory system (two kinds of respiration – aerobic and anaerobic) Respiratory organs, respiratory cycle. Excretory system

Learning Outcomes:
After completing this unit, the student will be able to

- Understand the mechanism and process of important human functions

Unit IV

Genes, Replication of DNA, And Introduction to recombinant DNA Technology:

Prokaryotic gene and Eukaryotic gene structure, gene replication, Transcription and Translation in Prokaryote and Eukaryote and synthesis of protein in Eukaryotes. Recombinant DNA technology and cloning introduction.

Learning Outcomes:
After completing this unit, the student will be able to

- Understand and explain about gene structure and replication in prokaryotes and Eukaryotes
- How genetic material is replicated and also understands how proteins are synthesized.
- Understand about recombinant DNA technology and its application in different fields.
- Explain what is cloning.

Unit V

Application of Biology

Brief introduction to Production of vaccines, Enzymes, antibodies, Cloning in microbes, plants and animals, Basics of biosensors, biochips, Bio fuels, and Biosensors. What is Tissue engineering? And its application, transgenic plants and animals, Bio engineering (production of artificial limbs, joints and other parts of body).

Learning Outcomes:
After completing this unit, the student will be able to Understand.

- How biology is applied for production of useful products for mankind.

Text books:

1. Cell and Molecular Biology-P.K.Gupta
2. Cell Biology-Verma and Agarwal
3. Cell Biology-Rastogi
4. N. A. Campbell, J. B. Reece, L. Urry, M. L. Cain and S. A. Wasserman, "Biology: A global approach", Pearson Education Ltd, 2018.
5. T Johnson, Biology for Engineers, CRC press, 2011 Molecular Biology and Biotechnology 2nd ed. J.M. Walker and E.B. Gingold. Panima Publications. PP 434.

Reference Books:

1. Alberts Et.Al. The molecular biology of the cell, 6/e, Garland Science, 2014
2. De Robertis EDP & EMF De Robertis. 2001. Cell and Molecular biology. Lippincott Williams & Wilkins.Bombay.
3. E. E. Conn, P. K. Stumpf, G. Bruening and R. H. Doi, "Outlines of Biochemistry", John Wiley and Sons, 2009.
4. John Enderle and Joseph Bronzino Introduction to Biomedical Engineering, 3/e, 2012 Principles of Biochemistry. 2nd ed. 1993. A.L. Lehninger, D.L.Nelson.M.Cox. Paniama Publications. PP. 1090.
5. Harper's biochemistry. 1988. R.K. Murray. D.K. Granner, P.A. Mayes. Printice Hall International.
6. Introductory Microbiology. 1995, by Trevor Gross.
7. Molecular Biology by G. Padmanabhan, K. Sivaram Sastry, C. Subramanyam, 1995, Mac Millan.
8. Biochemistry of Nucleic Acids.1992.11th ed.R.L.P.Adams.J.T.Knowler.D.P Leader.Chapman and Hall.
9. Genetic Engineering –Sandhya Mitra.
10. Molecular Biology and Biotechnology by Meyers, RA, A comprehensive Desk reference (VCH Publishers).

Course Title	Probability Theory and Stochastic Processes				B. Tech. ECE IV Sem		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	Continuous Internal Assessment	End Exams	Total
1804402	EC	3	1	--	4	30	70	100
Mid Exam Duration: 2Hrs					End Exam Duration: 3Hrs			

Course Objectives:

- The Objective of this course is to provide the students with knowledge about the random variable, random process.
- To model the random processes in the communication system such as receiver performance, interference, thermal noise, and multipath phenomenon.
- The Objective of this course is to provide the students with knowledge about the random variable, random process.
- To model the random processes in the communication system such as receiver performance, interference, thermal noise, and multipath phenomenon.

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	Interpret probability by modeling sample spaces.
CO 2	Apply various random processes like Gaussian, Exponential, Uniform and Poisson processes experimentally.
CO 3	Compute PSD of Random process.
CO 4	solve complex engineering problems involving random processes

UNIT-I

Probability: Probability definition, Event, Sample space, Axioms, Joint and conditional probability, Independent events, Total probability theorem, Baye's theorem, Bernoulli trials. **Random Variable**: Concept, Distribution function, Density function, Conditional distribution and density functions.

UNIT –II

Operations on Single random variables: Expectation, Conditional expected value, Moments, Chebyshev, Markov‟s and Chernoff‟s inequalities, Characteristics and moment generating functions, Transformation of continuous and discrete random variable.

UNIT-III

Multiple Random Variables: Vector random variables, Joint distribution & Density functions , Conditional density & Distribution functions, Statistical independence, pdf and cdf for sum of random variables, Central limit theorem, Operations on multiple random variables, Expected value of function of random variables, Joint characteristic function, Joint by Gaussian random variables, Transformations of multiple random variables.

UNIT – IV

Random Processes : Concept, Stationarity, Independence, Time averages, Ergodicity, Correlation functions and its properties, Gaussian, Poisson, and Markov processes, Power spectral density and its properties, Relation between power spectral density and auto-correlation, Cross power spectral density and its properties, Power spectrum for discrete time processes and sequences, Definition of white and colored noise.

UNIT-V

Linear Systems with Random Inputs: Random signal response of linear system, System evaluation using random noise, Spectral characteristics of system response, Noise bandwidth, Band pass, Band limited, and Narrow band processes, Properties of band limited processes.

Text Books:

1. P.Z. Peebles Jr., "Probability Random Variables and Random Signal Principles", Tata McGraw-Hill, 4th Edition, 2001.
2. A. Papoulis and S. Unnikrishna Pillai, "Probability Random Variables and Stochastic Processes", 4th Edition, PHI, 2007
3. B.P. Lathi, " Modern Digital and Analog Communication Systems," Third Edition, OXFORD University press, 1998.
4. Hwei P. Hsu, Ph.D., "Theory and Problems of Probability, Random Variables, and Random Processes", Schaum's Outline Series, McGraw Hill, New York, 1968.

Reference Books:

1. S.P. Eugene Xavier, "Statistical Theory of Communication", New Age Publications, 2003.
2. G.R. Babu and K. Pushpa, "Probability Theory and Stochastic Processes", Premier Publishing House.
3. D. G. Childer, "Probability and Random Processes", McGraw Hill, 1997.

Course Title	Analog and Digital Circuits					B. Tech. ECE IV Sem		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
	EC	L	T	P	C	Continuous	End	Total

1804403						Internal Assessment	Exams	
		3	1	--	4	30	70	100
Mid Exam Duration: 2Hrs						**End Exam Duration: 3Hrs**		

Course Objectives:

- To learn about multistage amplifiers, Feedback amplifiers and power amplifiers.
- To provide knowledge about working and design of oscillators.
- To teach multivibrators and time base generators.
- To know the fundamentals of logic families.

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	Analyze the multistage amplifiers, feedback amplifiers and power amplifiers.
CO 2	Design sinusoidal and non-sinusoidal oscillators
CO 3	Design different multi-vibrator circuits
CO 4	Illustrate time base generators
CO 5	Understand the operation of various digital circuits

UNIT-I:

High frequency analysis of transistors: The Hybrid-pi (π)- Common Emitter Transistor Model, CE short Circuit Current gain, Current gain with Resistive Load, Single Stage CE Transistor Amplifier response, Emitter follower at higher frequencies. High frequency analysis of FET-CS and CD amplifiers.

UNIT-II:

Frequency Response of Amplifier: RC Low Pass Filter - RC Integrator, RC High Pass Filter - RC Differentiator, Frequency Response of BJT Amplifier, Analysis at Low and High Frequencies, Bandwidth, Gain-Bandwidth Product, Step response of an amplifier- rise time ,tilt.

Multi Stage Amplifiers: Types of coupling- RC, transformer and direct, choice of amplifier configurations, overall gain and bandwidth of n-stage amplifier, analysis of two-stage RC coupled amplifier, Darlington and Bootstrap circuits.

UNIT-III:

Feedback Amplifiers: Feedback concept, classification, effects of negative feedback on gain, stability, noise, distortion, bandwidth, input and output resistances. Different types of feedback circuits.

Oscillators: Review of the basic concept, Barkhausen criterion, RC oscillators (phase shift, Wien bridge etc.), LC oscillators (Hartley, Colpitt, Clapp etc.), non-sinusoidal oscillators.

UNIT-IV

Power amplifiers: Classification of power amplifiers, Distortion in amplifiers, efficiency of class-A, class-B, class-C and class-D power amplifiers, complementary symmetry push pull power amplifier.

Tuned Amplifiers: Introduction, Q-Factor, Small Signal Tuned Amplifiers, Effect of Cascading Single Tuned Amplifiers on Bandwidth, Effect of Cascading Double Tuned Amplifiers on Bandwidth, Stagger Tuned Amplifiers, Stability of Tuned Amplifiers.

UNIT-V:

Digital Logic Circuits: AND, OR & NOT gates using Diodes and transistors, Analysis of DCTL, RTL, DTL, TTL, ECL, IIL, MOS, CMOS Logic families and Comparison between the logic families.

Text Books:

1. J Jacob Millman, Christos C. Halkias, "Integrated electronics" Tata McGraw Hill Publication
2. J.Millman, H.Taub and Mothiki S. Prakash Rao, " Pulse, Digital and Switching Waveforms",TMH ,2nd Edition, 2008.
3. K. R. Botkar, "Integrated Circuits" 5 th edition, Khanna Publications

Reference Books:

1. P. Horowitz and W. Hill, The Art of Electronics, 2nd edition, Cambridge University Press, 1989.
2. Paul R. Gray and Robert G. Meyer, Analysis and Design of Analog Integrated Circuits, John Wiley, 3rd Edition
3. A.S. Sedra and K.C.Smith, Microelectronic Circuits, Saunder's College Publishing, Edition IV

Course Title	Control Systems					B. Tech. ECE IV Sem		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
1802404	EC	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		3	1	--	4	30	70	100

Mid Exam Duration: 2Hrs	End Exam Duration: 3Hrs

Course Objectives:

- To learn mathematical modeling of physical system, electrical systems.
- To teach time response of first order and second order Systems.
- To learn stability analysis using time domain and frequency domain.
- To learn design compensator in frequency domain to improve the performance.

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	Classify the types of control systems
CO 2	Choose the method to solve the problems for time and frequency domain input systems
CO 3	Compare the system stability for different inputs
CO 4	Design lag, lead, lag-lead compensators in frequency domain

UNIT - I

Control System Concepts: Introduction to control systems, classification, transfer function, effect of feedback, mathematical modeling of physical systems, block diagram, reduction techniques, signal flow graphs and mason's gain formula, transfer function of simple electrical systems.

UNIT - II

Time Domain Analysis: Standard test signals, time response of first and second order systems- time response specifications , steady state error and error constants, response of P, PI, and PID controllers.

UNIT – III

Concept of Stability and Root Locus: The concept of stability, necessary conditions for stability – routh hurwitz's criterion – limitations of routh's stability – root locus concept – construction of root loci, effect of poles & zeros on stability.

UNIT – IV

Frequency Domain Analysis: Introduction, correlation between time and frequency response, frequency domain specifications, bode plots, nyquist stability criterion - gain and phase margin.

UNIT – V

Compensation Techniques: System design and compensation – realization of basic lead, lag and lead – lag cascade compensations in frequency domain.

Text Books

1. "Control Systems Engineering" by I. J. Nagrath and M. Gopal, New Age International (P) Limited, Publishers, 5th edition, 2007.
2. "Automatic Control Systems" by B. C. Kuo and Farid Goinaraghi – John Wiley and Son's, 8th edition, 2003.
3. "Control Systems" by A. Anand Kumar, Prentice Hall of India Pvt. Ltd.
4. Control System Engineering by A.Nagoor Kani , RBA PUB.

Reference Books

1. "Modern Control Engineering" by Katsuhiko Ogata, Prentice Hall of India Pvt. Ltd., 5th edition, 2010.
2. "Control Systems Engineering" by NISE, 5th edition, John Wiley.

Course Title	Linear IC Applications				B. Tech. ECE IV Sem		
Course Code	Category	Hours/Week		Credits	Maximum Marks		
		L	T	P	C	Continuous Internal Assessment	End Exams	Total
1804405	EC	3	1	--	4	30	70	100
Mid Exam Duration: 2Hrs					End Exam Duration: 3Hrs		

Course Objectives:

- To introduce Operational Amplifiers (Op-Amps)
- To give the concepts of design and analysis related to Op-Amp Applications as

- Timers
- Phase Locked Loops (PLLs)
- Waveform Generators
- Analog Filters
- Data Converters

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	Understand characteristics of Op-Amps and 555 timers
CO 2	Compare DC and AC characteristics of Op-Amps in the design and simulation of analog systems and subsystems
CO 3	Apply Op-Amps and 555 Timers in various applications.
CO 4	Analyze Data Converters and Active Analog Filter circuits in the development of Instrumentation and Control Systems

UNIT-I

Differential amplifiers: Definition, DC and AC analysis of Dual input-Balanced output Differential Amplifier, Properties of other three differential amplifier configurations, Transfer characteristics of Differential Amplifier, Level Translator.

Operational Amplifiers: Ideal op-amp Characteristics, Internal circuit of Op-Amp, Block diagram of Commercial IC Op-Amp, FET input op-amp, DC and AC characteristics of Op-Amp, Frequency Compensation.

UNIT-II

Basic Op-Amp Applications: Ideal Inverting and Non-Inverting Amplifiers, Voltage Follower, Summer, Subtractor, Differentiator - Ideal Differentiator, Practical Differentiator, Integrator - Ideal Integrator, Practical Integrator, Instrumentation amplifier, DC and AC Amplifiers, V to I and I to V converters, Precision rectifiers, Sample and Hold Circuit.

UNIT-III

Comparators and waveform generators: Principle of Comparator, Schmitt Trigger, Astable Multivibrator, Monostable Multivibrators, Triangular Wave Generator.

Active Filters: Introduction to Analog Active Filters, Design and analysis of First Order Low Pass Filter and First Order High Pass Filter, Design and analysis of Second order Low pass Filter and Second Order High Pass Filter, Qualitative treatment of Band pass Filters and Band Reject Filters.

UNIT-IV

Sinusoidal Oscillators: Criterion for Oscillations, RC Phase Shift Oscillator and Wien Bridge Oscillator using OP-Amp.

555 Timers: Functional block diagram and Pin diagram of 555 Timer, 555 Timer in Monostable Mode, 555 Timer in Astable Mode

Phase Locked Loops (PLLs): Basic principle of PLL, Components used in PLL, IC PLL (565), PLL applications.

UNIT-V

Digital to Analog Converters (DACs): Introduction, Basic DAC Technique, Weighted Resistor DAC, R-2R Ladder DAC, Inverted R-2R DAC, IC 1408 DAC, DAC Specifications

Analog to Digital Converters (ADCs): Functional Diagram of ADC, 'Direct type' vs 'Integrating type' ADCs, Parallel Comparator (Flash) ADC, Successive Approximation ADC, Dual Slope ADC, ADC Specifications.

Text Books:

1. D. Roy Choudhury and Shail Jain, "Linear Integrated Circuits", 2nd Edition, New Age, 2003
2. Ramakant A. Gayakward, "Op-amps and Linear Integrated Circuits", 4th Edition, Pearson Education, 2003
3. David A. Bell, 'Op-amp & Linear ICs', Oxford, 2013

Reference Books:

1. James M. Fiore, "Opamps & Linear Integrated Circuits Concepts & Applications", Cengage, 2010.
2. Thomas L. Floyd and David M. Buchla, "Fundamentals of Analog Circuits", Pearson, 2013.
3. Jacob Millman and Christos C. Halkias, "Integrated Electronics - Analog and Digital Circuits and Systems", Tata McGraw-Hill, 2003
4. Robert F. Coughlin, Fredrick F. Driscoll, "Op-amp and Linear ICs", PHI Learning, 6th Edition, 2012.

Course Title	**Electromagnetic Theory and Transmission lines**				**B. Tech. ECE IV Sem**		
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
1804406	**EC**	**L**	**T**	**P**	**C**	**Continuous Internal Assessment**	**End Exams**	**Total**
		3	1	--	4	30	70	100

Mid Exam Duration: 2Hrs	End Exam Duration: 3Hrs
Course Objectives: 1. Understanding and increasing the ability to use vector algebra, and vector calculus. 2. Proficiency in the use of vector identities, and various Coordinate systems & transformations 3. Providing the basic education in static electromagnetic fields and time varying electromagnetic waves. 4. Developing analytical skills for understanding propagation of electromagnetic waves in different media. 5. Understanding the concepts of transmission lines & their applications.	
Course Outcomes: On successful completion of this course, the students will be able to	
CO 1	Understand the basics of Electro Statics and Magneto Statics.
CO 2	Apply Maxwells equations in the derivation of fields.
CO 3	Calculate Electric and magnetic fields due to various sources.
CO 4	Analyze the wave propagation in different media.
CO5	Design the single and double stub matching using Smith chart.

UNIT-I

Electrostatics: Review of Vector algebra, Co-ordinate systems & transformation, Vector calculus, Coulomb's Law, Electric Field Intensity – Fields due to Different Charge Distributions, Electric Flux Density, Gauss Law and Applications, Electric Potential, Relations between E and V, Maxwell's two Equations for Electrostatic Fields, Energy Density, Convection and Conduction Currents, Dielectric Constant, Isotropic and Homogeneous Dielectrics, Continuity Equation, Relaxation Time, Poisson's and Laplace's Equations, Capacitance – Parallel Plate, Coaxial, Spherical Capacitors, Illustrative Problems.

UNIT-II

Magneto statics: Biot-savart's law, Ampere's law and applications, Magnetic flux density, Maxwell's two equations for magneto static fields, magnetic scalar and vector potentials, Forces due to Magnetic fields, Ampere's force law, inductances and magnetic energy, illustrative problems.

UNIT-III

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 boundary surface: Dielectric-Dielectric and Dielectric-conductor interfaces, illustrative problems.

UNIT-IV

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 loss less and conducting media, conductors& dielectrics- characterization, wave propagation in good conductors and good dielectrics, polarization.

Reflection and Refraction of plane waves: Normal and Oblique incidences for both perfect conductors and dielectrics, Brewster angle, Critical angle and total internal reflection, Surface impedance, pointing vector and pointing theorem-applications, power losses in a plane conductor, illustrative problems.

UNIT-V

Transmission lines: Types, parameters, Transmission line equations, Primary & Secondary constants, Expression for characteristic impedance, Propagation constant, Phase and group velocities, Loss less and low loss characterization, Distortion- condition for Distortion less

and minimum attenuation, input impedance relations, SC and OC lines, Reflection coefficient, VSWR, Smith chart & its applications, illustrative problems.

Text Books:

1. Matthew N.O. Sadiku, "Elements of Electromagnetics," Oxford Univ. Press, 4th ed., 2008.
2. William H. Hayt Jr. and John A. Buck, "Engineering Electromagnetics," TMH, 7th ed., 2006.
3. E.C. Jordan and K.G. Balmain, "Electromagnetic Waves and Radiating Systems "PHI, 2nd Ed., 2000.

Reference Books:

1. John D. Krauss, "Electromagnetics", McGraw- Hill publications, 3rd ed., 1988.
2. John D. Ryder, "Networks, Lines, and Fields," PHI publications, Second Edition, 2012.
3. Schaum's out – lines, "Electromagnetics,", Tata McGraw-Hill publications, Second Edition, 2006.

Course Title	**LABVIEW PROGRAMMING LABORATORY**				**B. Tech. ECE IV Sem**		
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
1804407	**ES**	**L**	**T**	**P**	**C**	**Continuous Internal Assessment**	**End Exams**	**Total**
		3	1	--	4	30	70	100
Mid Exam Duration: 2Hrs					**End Exam Duration: 3Hrs**			

Course Objectives: • 1. To write, test, and debug simple LabView programs. • To implement LavView programs with conditional statements. • To perform operations on arrays and strings. • Use SubVi‟s for structuring LabView programs. • Read and write data from/to files in LabView.	
Course Outcomes: On successful completion of this course, the students will be able to	
CO 1	Write simple Lab view Programs
CO 2	Implement LavView programs with conditional statements.
CO 3	Perform operations on arrays and strings.
CO 4	Use SubVi‟s for structuring LabView programs.

LIST OF PROGRAMS

1. Basic arithmetic operations

(Add, mul, div, compound arithmetic, expression node, express formula and formula node)

2. Boolean operations

(truth table verification of logic gates, Half Adder and Full Adder, convert binary to decimal value, convert BCD to Gray and Vice-Versa)

3. String operations

(Length, concatenation, insert string, sub-string, replace string, reverse string, rotate string, etc)

4. Sum of „N‟ numbers using feedback loop (use „for „ loop and „while‟ loop)
5. Factorial of a give number using shift register (use „for‟ loop and „while‟ loop)
6. Generate Fibonacci series for N iteration (use „for‟ loop)
7. Create a VI to increase the tank level from 0 to 100 & decrease the value from 100 to 0 using while loop in a single process.
8. Create a VI to implement and, or & not gates(or arithmetic operations) using case structure

9. Build a VI that generates a 1D array of random numbers and sort the array in descending and ascending order and find the following:
    a) Maximum and min value of array elements
    b) Size of the array
    c) Sum and product of array elements
    d) Rotate array by 1 position
    e) Split the array after 2 elements
10. Build an array of cluster controls in which each cluster consists of a numeric control and 1D numeric array. This forms the database of students. The numeric control indicates the roll no and array indicates the test marks of 4 subjects. Build the logic to modify the mark in a particular subject of a particular student. Input the roll number, subject in which mark is to be changed and new mark. Display the database on a separate array indicator.
11. Create a VI to implement Full Adder circuit using SubVI.
12. Any application using Flat and stacked sequence

PLATFORM NEEDED

LABVIEW Software for Windows/Linux

Course Title	Analog and Digital Circuits Lab				B. Tech. ECE IV Sem			
Course Code	Category	Hours/Week			Credits	Maximum Marks		
1804408	EC	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		3	1	--	4	30	70	100
Mid Exam Duration: 2Hrs					End Exam Duration: 3Hrs			

Course Objectives:

- To study the performance of various amplifiers and oscillators using hardware and software.
- To study the performance of multivibrators.

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	Analyze the circuits including MOSFET, BJT.
CO 2	Design analog electronic circuits using discrete components.
CO 3	Obtain frequency responses of amplification circuits.
CO 4	Measure parameters of analog circuits to compare experimental results in the laboratory with theoretical analysis.
CO5	Verify the truth tables of various logic circuits.

LIST OF EXPERIMENTS:

Hardware:

1. CE AMPLIFIER
2. CC AMPLIFIER
3. VOLTAGE SHUNT FEEDBACK AMPLIFIER
4. TWO STAGE -RC COUPLED AMPLIFIER
5. RC PHASE - SHIFT OSCILLATOR
6. VRIFICATION OF LOGIC GATES, ADDERS AND SUBTRACTORS.
7. HARTLEY OSCILLATOR

Simulation (MULTISIM):

8. CLASS A POWER AMPLIFIER.
9. CURRENT SERIES FEEDBACK AMPLIFIER
10. RC PHASE - SHIFT OSCILLATOR
11. HARTLEY OSCILLATOR
12. COLPITT‟S OSCILLATOR

13. DESIGN OF COUNTERS USING FLIP FLOPS (DECADE, RING AND JHONSON)
14. EMITTER FOLLOWER