ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI
(AUTONOMOUS)

Year: III **Semester: I** **Branch of Study: EEE**

COURSE CODE	COURSE TITLE	L	T	P	CREDITS
19APC0206	Power Systems - I	3	0	0	3

Course Outcomes:

CO1: Acquire knowledge on thermal, gas and nuclear power plants operation. CO2: Understand the operation of AC and DC distribution systems.
CO3: Understand the operation of Air Insulated & Gas Insulated (GIS) Substations.
CO4: Familiarize with voltage control and power factor improvement techniques.
CO5: Analyze economic aspects of power generation and different types of tariff methods.

UNIT-I:

Power Stations:

Thermal Power Station: Brief description of thermal power plant components - Line diagram of Thermal Power Station (TPS) showing paths of coal, steam, water, air, ash and flue gasses.

Nuclear Power Stations: Nuclear Fission and Chain reaction, nuclear fuels, Principle of operation of nuclear reactor, Reactor Components- Moderators, Control rods, Reflectors and Coolants, Radiation hazards- Shielding and Safety precautions, Types of Nuclear reactors and brief description of PWR, BWR and FBR.

Gas Power Stations: Principle of Operation and Components (Block Diagram Approach Only).

UNIT-II:

General Aspects of D.C & A.C Distribution Systems: Bulk Power Grids and Micro-grids. Transmission and Distribution Systems: Line diagrams, transmission and distribution voltage levels and topologies (meshed and radial systems). Synchronous Grids and Asynchronous (DC) interconnections. Classification of Distribution Systems - Comparison of DC vs. AC and Under-Ground vs. Over - Head Distribution Systems.

UNIT-III:

Air Insulated & Gas Insulated (GIS) Substations: Classification of substations: - Indoor & Outdoor substations: Sub-stations layout showing the location of all the substation equipment. Bus bar arrangements in the Sub-Stations: Simple arrangements like single bus bar, sectionalized single bus bar, main and transfer bus bar system with relevant diagrams. Advantages of Gas insulated substations, different types of gas insulated substations, single line diagram of gas insulated substations construction aspects of GIS, Installation and maintenance of GIS, Comparison of Air insulated substations and Gas insulated substations.

UNIT-IV:

Power Factor & Voltage Control: Causes of low power factor -Methods of Improving power factor

-Phase advancing and generation of reactive KVAR using static Capacitors-Most economical power factor for constant KW load and constant KVA type loads, Numerical Problems. Methods of Voltage Control: Shunt Capacitors, Series Capacitors, Synchronous Capacitors, Tap changing and Booster Transformers.

UNIT-V:

Economic Aspects of Power Generation & Tariff: Load curve, load duration and integrated load duration curves-load, demand, diversity, capacity, utilization and plant use factors-Numerical Problems. Costs of Generation and their division into Fixed, Semi-fixed and Running Costs.

Desirable Characteristics of a Tariff Method-Tariff Methods: Flat Rate, Block- Rate, two-part, three
–part, and power factor tariff methods and Numerical Problems.

TEXT BOOKS:

1. Principles of Power Systems by V. K Mehta and Rohit Mehta S. Chand Company Pvt. Ltd, New Delhi 2004.
2. Electrical Power Systems, PSR. Murty, BS Publications.

REFERENCE BOOKS:

1. A Text book of Power system Engineering, R. K. Rajput, Laxmi Publications (P) Limited.
2. Electrical Power Generation, Transmission and Distribution, S.N.Singh., PHI.
3. Electrical Power Systems by C.L.Wadhawa New Age International (P) Limited, Publishers.
4. Generation of Electrical Energy, Dr. B. R. Gupta, S. Chand.

CO No.	PO No. and keyword	Competency Indicator	Performance Indicator
CO1	PO1: Engineering knowledge	1.3	1.3.1
CO2	PO1: Engineering knowledge	1.3	1.3.1
CO3	PO2: Problem analysis	2.4	2.4.1
	PO4: Conduct investigations of complex problems	4.3	4.3.1
CO4	PO1: Engineering knowledge	1.3	1.3.1
		1.4	1.4.1
CO5	PO4: Conduct investigations of complex problems	4.3	4.3.1

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI

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Year: III **Semester: I** **Branch of Study: EEE**

COURSE CODE	COURSE TITLE	L	T	P	CREDITS
19APC0207	Electrical Machines - II	2	1	0	3

Course Outcomes:

1. Understand the fundamentals of windings, pulsating magnetic fields and revolving magnetic field.
2. Understand the fundamentals and performance analysis of three phase and single-phase induction.
3. Understand operation, various methods of starting, braking and speed control of induction motors.
4. Analyze the phasor diagrams, parallel operation of alternators, synchronization and load division of synchronous generators.
5. Analyze the phasor diagram, determination of V and inverted V curves and power circles of synchronous motor.

UNIT-I

Fundamentals of AC machine windings

Physical arrangement of windings in stator and cylindrical rotor; slots for windings; single-turn coil - active portion and overhang; full-pitch coils, concentrated winding, distributed winding, winding axis, Air-gap MMF distribution with fixed current through winding - concentrated and distributed, Sinusoidally distributed winding, winding distribution factors.

UNIT-II

Induction Machines

Operating principle, Construction, Types, Equivalent circuit, Phasor Diagram, Torque-Slip Characteristics, power flow in induction machines, Losses and Efficiency, No load and blocked rotor test, Circle diagram- performance characteristics, Numerical problems. Methods of starting, braking and speed control for induction motors, crawling and cogging.

UNIT-III

Single-phase induction motors

Constructional features, double revolving field theory, equivalent circuit, determination of parameters. Split-phase starting methods and its applications, capacitor start and run single phase motors, reluctance single phase motors, stepper motors, BLDC motors.

UNIT-IV

Synchronous generators

Constructional features, cylindrical rotor synchronous machine - generated EMF, equivalent circuit and phasor diagram, armature reaction, synchronous impedance, voltage regulation-EMF, MMF, ZPF and ASA methods. Operating characteristics of synchronous machines, Salient pole machine - two reaction theory, analysis of phasor diagram, power angle characteristics. Parallel operation of alternators - synchronization and load division.

UNIT-V

Synchronous motors

Principle of operation, methods of starting, Phasor diagram of synchronous motor, variation of current and power factor with excitation, Predetermination of V and inverted V curves, Hunting and use of damper bars, Synchronous condenser and power factor correction, Excitation and power circles.

Text Books:

1. A. E. Fitzgerald and C. Kingsley, "Electric Machinery", McGraw Hill Education, 2013.
2. P. S. Bimbhra, "Electrical Machinery", Khanna Publishers, 2011.

References:

1. M. G. Say, "Performance and design of AC machines", CBS Publishers, 2002.
2. I. J. Nagrath and D. P. Kothari, "Electric Machines", McGraw Hill Education, 2010.
3. A. S. Langsdorf, "Alternating current machines", McGraw Hill Education, 1984.
4. P. C. Sen, "Principles of Electric Machines and Power Electronics", John Wiley & Sons, 2007.

CO No.	PO No. and keyword	Competency Indicator	Performance Indicator
CO1	PO1: Engineering knowledge	1.3	1.3.1
CO2	PO1: Engineering knowledge	1.3	1.3.1
CO3	PO2: Problem analysis	2.4	2.4.1
	PO4: Conduct investigations of complex problems	4.3	4.3.1
CO4	PO1: Engineering knowledge	1.3	1.3.1
		1.4	1.4.1
CO5	PO4: Conduct investigations of complex problems	4.3	4.3.1

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI
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Year: III **Semester: I** **Branch of Study: EEE**

COURSE CODE	COURSE TITLE	L	T	P	CREDITS
19APC0208	CONTROL SYSTEMS	2	1	0	3

Course Outcomes:

1. Understand the basics of systems, modelling of various kind of systems, detection of transfer function from the pictorial representation.
2. Acquire knowledge of open loop and closed loop systems.
3. Learn to use block diagram to find the overall transfer function of first and second order systems.
4. Understand transient and steady state response, time domain specifications and the concept of Root loci.
5. Analyze frequency domain specifications, Bode diagrams and Nyquist plots.

UNIT - I
CONTROL SYSTEMS CONCEPTS

Basic elements of control systems- open and close loop systems – Differential equation - Transfer function – Modelling of Electrical systems, translational and rotational mechanical systems – Block diagram reduction techniques – Signal flow graphs.

UNIT-II
TIME RESPONSE ANALYSIS

Step Response - Impulse Response - Time response of first order systems - Characteristic Equation of Feedback control systems, Transient response of second order systems - Time domain specifications - Steady state response - Steady state errors and error constants, P, PI, PID Controllers.

UNIT- III
STABILITY ANALYSIS IN TIME DOMAIN

The concept of stability - Routh's stability criterion - Stability and conditional stability - limitations of Routh's stability. The Root locus concept - construction of root loci-effects of adding poles and zeros to G(s)H(s) on the root loci.

UNIT- IV
FREQUENCY RESPONSE ANALYSIS

Introduction, Frequency domain specifications-Bode Diagrams-Determination of Frequency domain specifications and transfer function from the Bode Diagram-Stability Analysis from Bode Plots. Polar Plots-Nyquist Plots- Phase margin and Gain Margin-Stability Analysis.
Compensation techniques - Lag, Lead, Lag-Lead Compensator design in frequency Domain.

UNIT- V
STATE SPACE ANALYSIS OF CONTINUOUS SYSTEMS

Concepts of state, state variables and state model, state models - differential equations & Transfer function models - Block diagrams. Diagonalization, Transfer function from state model- State Transition Matrix and it's Properties-System response through State Space models-The concepts of controllability and observability, Duality between controllability and observability.

TEXT BOOKS:

1. Katsuhiko Ogata, "Modern Control Engineering", 5th edition, Prentice Hall of India Pvt. Ltd., 2010.
2. I. J. Nagrath and M. Gopal, "Control Systems Engineering" 5th edition, New Age International (P) Limited Publishers, 2007.

REFERENCE BOOKS:

1. M. Gopal, "Control Systems Principles & Design" 4th Edition, Mc Graw Hill Education, 2012.
2. B. C. Kuo and Farid Golnaraghi, "Automatic Control Systems" 8th edition, John wiley and sons, 2003.
3. Joseph J Distefano III, "Feedback and Control Systems", Allen R Stubberud & Ivan Williams, 2nd Edition, Schaum's outlines, Mc Graw Hill Education, 2013.
4. Graham C. Goodwin, "Control System Design" Stefan F. Graebe and Mario E. Salgado, Pearson, 2000.
5. Gene F. Franklin, "Feedback Control of Dynamic Systems", J.D. Powell and Abbas Emami- Naeini, 6th Edition, Pearson, 2010.

CO No.	PO No. and keyword	Competency Indicator	Performance Indicator
CO1	PO1: Engineering knowledge	1.3	1.3.1
CO2	PO1: Engineering knowledge	1.3	1.3.1
CO3	PO2: Problem analysis	2.4	2.4.1
	PO4: Conduct investigations of complex problems	4.3	4.3.1
CO4	PO1: Engineering knowledge	1.3	1.3.1
		1.4	1.4.1
CO5	PO4: Conduct investigations of complex problems	4.3	4.3.1

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI
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Year: III **Semester: I** **Branch of Study: EEE**

COURSE CODE	COURSE TITLE	L	T	P	CREDITS
19APC0209	Power Electronics	3	0	0	3

Course Outcomes:

1. Understand the basic operating principles of power semiconductor switching devices.
2. Analyze the operation of AC-DC and DC to DC converters and their control.
3. Analyze the operation of DC-AC and AC to AC converters and their control.
4. Understand the operation of cycloconverters.

UNIT-I
POWER SEMICONDUCTOR DEVICES

Basic structure and switching characteristics of Power Diode, Power Transistor, Power MOSFET, IGBT and GTO.SCR-Basic Operation, VI characteristics, Turn-on, Turn-off methods, Switching characteristics, Combination of SCRs, Snubber circuits, Ratings and Protection circuits.

UNIT-II
AC-DC CONVERTERS

Principles of Phase control, Natural commutation, Operation of single-phase half wave-controlled converters with R, RL, RL+FWD, RLE Loads, fullwave-controlled converters with R, RL load, RL+FWD for bridge type converters. Operation of three phase half wave-controlled converters and full wave-controlled converters with R, RL, Effect of source inductance on single phase and three phase-controlled converters - Operation of dual converters.

UNIT-III
DC-DC CONVERTERS

Voltage, Current and Load commutation, Principles of chopper, Control strategies, step-up, step-down, Step-up-down choppers, Classification and operation of Choppers (A,B,C,Dand E). Introduction to Resonant converters – Effect of EMI on converters.

UNIT-IV
DC-AC CONVERTERS

Inverters - Single Phase Inverter - Basic Series Inverter - Basic Parallel Capacitor Inverter Bridge Inverter - Waveforms - Simple Forced Commutation Circuits for Bridge Inverters - Single Phase Half and Full Bridge Inverters-Pulse Width Modulation Control-Harmonic Reduction Techniques-Voltage Control Techniques for Inverters -Numerical Problems, Three Phase VSI in 120° and 180° Modes of Conduction.

UNIT-V
AC-AC CONVERTERS

Types of control (phase & Integrated cycle control), Operation of single-phase voltage regulator with R, RL Loads.Operation of three phase AC voltage controls (with Anti parallel SCR configuration) with R load operation.Cyclo-converters: single phase - step up & step down cyclo-converters, three phase cyclo-converter with R, RL loads.

Text Books:

1. M. H. Rashid, Power Electronics: Circuits, Devices and Applications, Prentice Hall of India 3rd Edition, 2014.
2. Theory of Power Electronics, "K.L.Rao, C.H.SaiBabu - S.Chand& Company Ltd.", New Delhi.-2006

References:

1. M. D. Singh & K. B. Kanchandhani, "Power Electronics", Tata McGraw – Hill Publishing Company, 2nd Edition, 2010.
2. N.Mohan, T.M.Undeland, W.P.Robbins, "Power Electronics, Converters and Applications & Design",3rd Edition John Wiley & sons.
3. Dr P S Bimbhra "Power Electronics ", Khanna Publishers, New Delhi, Edition 2012.

CO No.	PO No. and keyword	Competency Indicator	Performance Indicator
CO1	PO1: Engineering knowledge	1.3	1.3.1
CO2	PO1: Engineering knowledge	1.3	1.3.1
CO3	PO2: Problem analysis	2.4	2.4.1
CO4	PO1: Engineering knowledge	1.3	1.3.1
		1.4	1.4.1

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI
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AK19 Regulations

Year: III **Semester: I** **Branch of Study: EEE**

Course Code	Course Title	L	T	P	Credits
19APC0403	SIGNALS AND SYSTEMS	3	1	0	3

Course Outcomes: Students will be able to
CO1. Understand mathematical description and representation of continuous time and discrete time signals.
CO2: Resolve signals in frequency domain using Fourier series and Fourier Transforms.
CO3: Apply sampling theorem to convert continuous-time signals to discrete-time signal and reconstruct back.
CO4: Understand the properties of systems, response of LTI systems and filters.
CO5: Able to analyz**e** LTI systems using Laplace and Z-Transforms.

Unit I: Signals
Introduction: Definition of Signals, classification of signals: continuous time and discrete time signals, standard signals: impulse function, step function, ramp function complex exponential and sinusoidal signals, signum and sinc functions. Operations on signals and sequences. Analogy between vectors and signals, orthogonal signal space, Signal approximation using orthogonal functions, mean square error, orthogonality of complex functions. Representation of signals using Fourier series: Trigonometric Fourier series (TFS) and complex exponential Fourier series (CEFS). Illustrative problems.

Unit II: Fourier Transforms
Continuous Time Fourier Transform, definition, properties, Fourier Transforms of standard signals, complex Fourier spectrum, inverse Fourier Transform. Discrete Time Fourier Transform, definition, properties of Discrete Time Fourier Transform transforms of standard signals. Introduction to Hilbert Transform. Illustrative problems.

Unit III: Sampling Theorem
Definition of sampling, types: impulse and pulse sampling. Sampling theorem for band limited signals-Graphical and analytical proof, Nyquist criterion, Reconstruction of signal from its samples, effect of under sampling – Aliasing. Sampling theorem for bandpass signals. Illustrative problems.

Unit IV: Systems
Definition of Systems, Classification of Systems, impulse response, response of a linear time invariant system, Convolution and correlation: time domain, frequency domain and Graphical representation. Transfer function of a LTI system. Filter characteristics of linear systems. Distortion less transmission through a system, signal bandwidth, system bandwidth, Ideal LPF, HPF and BPF characteristics, Causality and Poly-Wiener criterion for physical realization, relationship between bandwidth and rise time. Illustrative problems.

Unit V: Laplace Transforms & Z Transform
Laplace transforms: Review of Laplace transforms, concept of region of convergence (ROC) for Laplace transforms, inverse Laplace transform, constraints on ROC for various classes of signals, properties of Laplace Transforms. Analysis of CT-LTI systems using Laplace transforms: causality and stability.
Z-Transforms: Review of Z-Transforms, concept of region of convergence (ROC) for Z- transforms inverse Z- transform, partia and constraints on ROC for various classes of signals, properties of Z-Transforms. Analysis of DT-LTI systems using Z- transforms: causality and stability. Illustative problems.

Text Books:

1. B.P. Lathi, Signals, Systems & Communications, BS Publications, 2003.
2. A.V. Obppenheim, A.S. Willsky and S.H. Nawab, Signals and Systems PHI, 2nd Edition. 2009.

References:

1. Simon Haykin and Van Veen, Signals & Systems, Wiley, 2nd Edition.
2. John G. Proakis, Dimitris G. Manolakis, Digital Signal Processing, Principles, Algorithms,and Applications, 4 th Edition, PHI, 2007.
3. BP Lathi, Principles of Linear Systems and Signals Oxford University Press, 2015.

CO No.	PO No. and Keyword	Competency Indicator	Performance Indicator
CO1	PO 1: Engineering knowledge	1.3	1.3.1
	PO 3: Design/Development of Solutions	3.3	3.3.1
			3.3.2
	PO 4: Conduct investigations of complex problems	4.3	4.3.1
			4.3.2
			4.3.3.
			4.3.4
	PO 5: Modern tool usage	5.2	5.2.1
			5.2.2
CO2	PO 1: Engineering knowledge	1.3	1.3.1
	PO 2: Problem analysis	2.4	2.4.1
			2.4.2
			2.4.3
	PO 5: Modern tool usage	5.2	5.2.1
			5.2.2
CO3	PO 5: Modern tool usage	5.2	5.2.1
			5.2.2
	PO 10: Communication	10.3	10.3.1
			10.3.2
CO4	PO 4: Conduct investigations of complex problems	4.2	4.2.1
			4.2.2
		4.3	4.3.1
			4.3.2
			4.3.3
			4.3.4
CO5	PO 3: Design/Development of solutions	3.3	3.3.1
			3.3.2
	PO 5: Modern tool usage	5.2	5.2.1
			5.2.2

CO No.	PO No. and keyword	Competency Indicator	Performance Indicator
CO1	PO1: Engineering knowledge	1.3	1.3.1
CO2	PO1: Engineering knowledge	1.4	1.4.1
	PO2: Problem analysis	2.4	2.4.2
CO3	PO1: Engineering knowledge	1.3	1.3.1
	PO4: Conduct investigations of complex problems	4.3	4.3.1
CO4	PO1: Engineering knowledge	1.3	1.3.1
	PO4: Conduct investigations of complex problems	4.3	4.3.1
CO5	PO1: Engineering knowledge	1.4	1.4.1
	PO2: Problem analysis	2.4	2.4.2

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES:TIRUPATI
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AK19 Regulations

Year: III **Semester**: **I** **Branch of Study: EEE**

Course Code	Course Title	L	T	P	Credits
19APC0425	ANALOG AND DIGITAL IC APPLICATIONS	3	1	0	3

Course Outcomes:

CO1: Understand the basic building blocks of linear integrated circuits and its characteristics.
CO2: Design the Multivibrator circuits using IC555 and determine the frequency of oscillation and time delay, and understand the concept of A/D and D/A Converters.
CO3: Understand the concept of active filters and oscillators.
CO4: Design of CMOS logic circuits and analysis of performance characteristics.
CO5: Implementation of digital logic circuits with the estimation of power and speed.

UNIT I

OP-AMP CHARACTERISTICS: Basic information of Op-amp, ideal and practical Op-amp, internal circuits, Op-amp characteristics - DC and AC characteristics, 741 Op-amp and its features, modes of operation-inverting, non-inverting, differential. Basic applications of Op-amp, instrumentation amplifier, AC amplifier, V to I and I to V converters, sample & Hold circuits, multiplier and divider, Differentiator and Integrator, Comparators, Schmitt trigger, multivibrator.

UNIT II

TIMERS, D-A AND A-D CONVERTERS: Introduction to 555 timer, functional diagram, monostable and astable operations and applications, Schmitt Trigger. Basic DAC techniques, Weighted resistor DAC, R-2R ladder DAC, inverted R-2R DAC, and IC 1408 DAC, Different types of ADCs – parallel comparator type ADC, Counter type ADC, successive approximation ADC and dual slope ADC, DAC and ADC specifications.

UNIT III

ACTIVE FILTERS & OSCILLATORS: Introduction, 1st order LPF, HPF filters, Band pass, Band reject and all pass filters. Oscillator types and principle of operation- RC, Wien, and quadrature type, waveform generators-triangular, sawtooth, square wave and VCO.

UNIT IV

CMOS LOGIC: introduction to logic families, CMOS logic, CMOS steady state electrical behavior, CMOS dynamic electrical behavior, CMOS logic families.

UNIT V

INTIGRATED CIRCUITS: Classification, Chip size and circuit complexity, Classification of integrated circuits, comparison of various logic families, standard TTL NAND Gate-Analysis & characteristics, TTL open collector o/ps, Tristate TTL, MOS & CMOS open drain and tri- state outputs, CMOS transmission gate, IC interfacing-TTL driving CMOS & CMOS driving TTL.

Text Books:

1. Linear Integrated Circuits – D.RoyChowdhury, New Age International (p) Ltd, 2nd Edition., 2003.
2. Digital Design Principles & Practices – John F. Wakerly, PHI/ Pearson Education Asia, 3rd Ed., 2005.

Reference Books:

1. Operational Amplifiers & Linear Integrated Circuits: Theory & Applications – Denton J.Daibey, TMH.
2. Design with Operational amplifiers & Analog Integrated circuits-Sergio Franco, Mc Graw Hill, 3rd Edition , 2002.
3. Digital Fundamentals – Floyd and Jain, Pearson Education, 8th Edition 2005.
4. Op-amps & Linear ICs – RamakanthA.Gayakwad, PHI, 1987.

List of Cos	PO no. and keyword	Competency Indicator	Performance Indicator
CO: 1	PO 1: Engineering knowledge	1.3	1.3.1
CO: 2	PO 2: Problem analysis	2.1	2.1.2
CO: 3	PO 3: Design/Development of Solutions	3.4	3.4.2
CO: 4	PO 4: Conduct investigations of complex problems	4.3	4.3.2
CO: 5	PO 4: Conduct investigations of complex problems	4.3	4.3.3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI
(AUTONOMOUS)
R19 Regulations

Year: III **Semester: I** **Branch of Study: EEE**

Course Code	Course Title	L	T	P	Credits
19APC0426	LINEAR SYSTEM ANALYSIS	3	0	0	3

Course Outcomes: Students will be able to

CO1: Analyse the spectral characteristics of continuous-time periodic and a periodic signals using Fourier analysis
CO2: Represent CT and DT systems in the Frequency domain using CTFT, DTFT
CO3: Apply the Laplace transform for analyze of continuous-time signals and systems
CO4: Apply the Z- transform for analyze discrete-time signals and systems
CO5: Understand the process of sampling and the effects of under sampling

UNIT–I FOURIER SERIES REPRESENTSATION AND ITS APPLICATIONS

Introduction, Trigonometric form of Fourier series, Exponential form of Fourier series, Wave symmetry, Introduction, Effective value and average values of non sinusoidal periodic waves, currents, Power Factor, Effects of harmonics, Application in Circuit Analysis, Circuit Analysis using Fourier Series.

UNIT–II FOURIER TRANSFORM REPRESENTSATION AND ITS APPLICATIONS

Fourier integrals and transforms, Fourier transform of a periodic function , Properties of Fourier Transform , Parseval's theorem , Fourier transform of some common signals, Fourier transform relationship with Laplace Transform.

UNIT – III LAPLACE TRANSFORM REPRESENTSATION AND ITS APPLICATIONS

Applications of Laplace transform Methods of Analysis – Response of RL, RC, RLC Networks to Step, Ramp, and impulse functions, Shifting Theorem – Convolution Integral – Applications.

UNIT-IV Z-TRANSFORMS

Fundamental difference between continuous and discrete time signals, discrete time complex, exponential and sinusoidal signals, periodicity of discrete time complex exponential, concept of Z Transform of a discrete sequence. Distinction between Laplace, Fourier and Z-Transforms. Region of convergence in Z-Transforms, constraints on ROC for various classes of signals, Inverse Z-Transform properties of Z-Transforms.

UNIT-V SAMPLING

Sampling theorm – Graphical and Analytical proof for Band Limited Signal impulse sampling, natural and Flat top Sampling, Reconstruction of signal from its samples, effect of under sampling – Aliasing, introduction to Band Pass sampling, Cross correlation and auto correlation of functions, properties of correlation function, Energy density spectrum, Power density spectrum, Relation between auto correlation function and Energy / Power spectral density function.

TEXT BOOKS:

1. Signals, Systems and Communications by B.P. Lathi, BS Publications 2003.
2. Network Analysis and Synthesis – Umesh Sinha- Satya Prakashan Publications

REFERENCE BOOKS:

1. Linear System Analysis – A N Tripathi, New Age International
2. Network and Systems – D Roy Chowdhary, New Age International
3 Engineering Network Analysis and Filter Desgin- Gopal G Bhisk & Umesh
4. Linear system anlysis by A.Cheng, Oxford publishers.

CO No.	PO No. and Keyword	Competency Indicator	Performance Indicator
CO1	PO 1: Engineering knowledge	1.3	1.3.1
CO2	PO 2: Problem analysis	2.3	2.3.1
CO3	PO 2: Problem analysis	2.3	2.3.1
CO4	PO 2: Problem analysis	2.3	2.3.1
CO5	PO 2: Problem analysis	2.3	2.3.1

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI (AUTONOMOUS)

Course Code	MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS	L	T	P	C
19AHSMB01		3	0	0	3
	(Common to All branches of Engineering)				

Course Outcomes (CO):

CO1: Understand the fundamentals of Economics and Managerial economics viz., Demand, Production, cost, revenue and markets.
CO2: Apply the Concept of Production cost and revenues for effective Business decision
CO3: Analyze how to invest their capital and maximize returns.
CO4: Evaluate the capital budgeting techniques.
CO5: Define the concepts related to financial accounting and management and able to develop the Accounting statements and evaluate the financial performance of business entity.

UNIT - I	**Managerial Economics**

Introduction – meaning, nature, significance, functions, and advantages, ME and its role in other fields. Demand - Concept, Function,Law of Demand - Demand Elasticity- Types – Measurement. Demand Forecasting- Factors governing forecasting, Methods.

UNIT - II	**Production and Cost Analysis**

Introduction – Nature, meaning, significance, functions and advantages. Production Function– Least-cost combination– Short run and Long run Production Function- Isoquants and 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 - III	**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 - IV	**Capital Budgeting**

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

UNIT - V	**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: Managerial Economics, Sultan Chand, 2013.
2. Aryasri: Business Economics and Financial Analysis, 4/e, MGH, 2019

Reference Books:

1. Ahuja Hl Managerial economics Schand,3/e,2013
2. S.A. Siddiqui and A.S. Siddiqui: Managerial Economics and Financial Analysis, New Age International, 2013.
3. Joseph G. Nellis and David Parker: Principles of Business Economics, Pearson, 2/e, New Delhi.
4. Domnick Salvatore: Managerial Economics in a Global Economy, Cengage,2013.

Online Learning Resources:

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

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI
(AUTONOMOUS)

B.Tech III Year **I Semester**

COURSE CODE	COURSE TITLE	L	T	P	CREDITS
19APC0510	COMPUTER NETWORKS	3	0	0	3

Course Objectives:

The students will be able to

- run and manage the Internet, part of the Internet, or an organization's network that is connected to the Internet.
- understand the basics of data communications and networking
- the protocols used in the Internet communication

Course Outcomes:

Student will be able to

- understand the basics of data communications and networking
- classify the functionalities of two sub layers of Data link Layer
- know briefly about Network Layer through algorithms and protocols
- distinguish the services provided by Transport Layer
- recognize the services offered by Application Layer to the user

Unit I

Introduction: Data Communications, Networks, Network Types, Internet History, Standards and Administration.

Network Models: Protocol Layering, TCP/IP Protocol Suite, The OSI Model

Introduction to Physical Layer: Data and Signals, Transmission Impairment, Data Rate Limits, Performance.

Transmission Media: Introduction, Guided Media, Unguided Media, Switching: Introduction, Circuit Switched Networks, Packet Switching

Unit II

The Data Link Layer: Introduction, Link layer addressing, Error detection and Correction: Cyclic codes, Checksum, Forward error correction, Data link control: DLC Services, Data link layer protocols, HDLC, Point to Point Protocol.

Media Access control: Random Access, Controlled Access, Channelization, Connecting devices and virtual LANs: Connecting Devices.

Unit III

The Network Layer: Network layer design issues, Routing algorithms, Congestion control algorithms, Quality of service, Internetworking.

The network layer in the Internet: IPV4 Addresses, IPV6, Internet Control protocol, OSPF, BGP, IP, ICMPv4, IGMP.

Unit IV

The Transport Layer: The Transport Service, Elements of Transport Protocols, Congestion Control, The internet transport protocols: UDP, TCP, Performance problems in computer networks, Network performance measurement.

Unit V

The Application Layer: Introduction, Client-Server Programming, WWW and HTTP, FTP, e-mail, TELNET, Secure Shell, Domain Name System, SNMP.

Text Books:

1. "Data communications and networking", Behrouz A. Forouzan, Mc Graw Hill Education, 5th edition, 2012.
2. "Computer Networks", Andrew S. Tanenbaum, Wetherall, Pearson, 5th edition, 2010.

References:

1. Data Communication and Networks, Bhushan Trivedi, Oxford

2. “Internetworking with TCP/IP – Principles, protocols, and architecture - Volume 1, Douglas E. Comer, 5th edition, PHI
3. “Computer Networks”, 5E, Peterson, Davie, Elsevier.
4. “Introduction to Computer Networks and Cyber Security”, Chawan- Hwa Wu, Irwin, CRC Publications.
5. “Computer Networks and Internets with Internet Applications”, Comer.

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B. Tech III Year **I Semester**

COURSE CODE	COURSE TITLE	L	T	P	CREDITS
19APC0412	ANALOG AND DIGITAL COMMUNICATIONS	3	0	0	3

Course Outcomes:

Upon completing this course, the student will be able to

CO1. Describe of various amplitude modulation and demodulation techniques.
CO2. Understand various angle modulation and demodulation techniques.
CO3. Explain AM, FM Transmitters and Receivers.
CO4. Analyze and design the various pulse modulation techniques.
CO5. Design various digital carrier modulation techniques and baseband transmission.

UNIT-I:

Amplitude Modulation: Modulation, Amplitude Modulation, Limitations and Modifications of Amplitude Modulation-switching modulator, detection of AM waves: envelope detector, DSB-SC modulation- Time and frequency domain description, Balanced modulators, Synchronous Detector, Costas Receiver, Quadrature Carrier Multiplexing, SSB modulation Generation - frequency and phase discrimination methods , Detection methods, VSB modulation, generation and detection method

UNIT-II:

Angle Modulation: Angle modulation, FM, PM, Relationship between FM and PM, NBFM, WBFM, Transmission bandwidth of FM waves, Generation of FM: Direct, Indirect Demodulation of FM signals : Balanced slope detector, PLL, Noise in AM and FM

UNIT III:

Transmitters & Receivers: AM Transmitters, FM Transmitters, Radio Receivers-types, RF Section and Characteristics, Mixer, IF section, AGC, Frequency Tracking , RF receivers

Pulse Modulation: PAM, Pulse time modulation –PWM and PPM, Generation and detection, Time Division Multiplexing.

UNIT–IV

Digital Modulation: Block diagram of Digital communication system, Advantages of Digital Communication Systems, PCM Generation and Reconstruction, Quantization, Quantization Noise, Non-Uniform Quantization and Companding, DPCM, Adaptive DPCM, DM and Adaptive DM, Noise in PCM and DM

UNIT-V

Digital Carrier Modulation Schemes: ASK, FSK, PSK –Modulator and detector, Comparison of digital carrier modulation schemes, M-ary Signaling Schemes, QAM.

Baseband Transmission: Signal Receiver, Probability of error-ASK, FSK, PSK, Optimum Receiver, Coherent reception, ISI, Eye Diagrams

Text Books:

1. Simon Haykin, Introduction to Analog & Digital Communications, Second edition, Wiley Publications, 2014
2. K. Sam Shanmugam, Digital and Analog Communication Systems, Wiley Publications, 2007

Reference Books:

1. Principles of Communication Systems - Herbert Taub, Donald L Schiling, Goutam Saha, 3rd Edition, Mcgraw-Hill, 2008.
2. B.P.Lathi, Modern Digital and Analog Communication Systems, 4/e, Oxford University Press, 2017.
3. Electronics & Communication System – George Kennedy and Bernard Davis, TMH Electronic Communications – Dennis Roddy and John Coolean , 4th Edition , PEA, 2004

List of COs	PO no. and keyword	Competency Indicator	Performance Indicator
CO1	PO2: Problem analysis	2.1	2.1.2
CO2	PO2: Problem analysis	2.1	2.1.2
CO3	**PO1: Engineering knowledge**	1.4	1.4.1
CO4	PO3: Design/Development of Solutions	3.3	3.3.1
CO5	PO3: Design/Development of Solutions	3.4	3.4.1

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::TIRUPATI
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AK 19 Regulations

B.Tech- II,III Year **Semester: I** **Branch: Common to all**

Subject Code	Subject Name	L	T	P	Credits: 0
19AMC9902	CONSTITUTION OF INDIA	3	0	0	

Course Outcomes:

Students will be able to:

1. Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
2. Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
3. Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.
4. Discuss the Powers and functions of Governor, President, Judiciary.
5. Discuss the functions of local administration bodies.

Syllabus

Unit:1 **4 hrs**

History of Making of the Indian Constitution - History Drafting Committee, (Composition & Working)

Unit:2 **8 hrs**

Philosophy of the Indian Constitution - Preamble Salient Features

Unit:3 **8hrs**

Contours of Constitutional Rights & Duties - Fundamental Rights - Right to Equality - Right to Freedom - Right against Exploitation - Right to Freedom of Religion - Cultural and Educational Rights - Right to Constitutional Remedies - Directive Principles of State Policy - Fundamental Duties.

Unit:4 **8hrs**

Organs of Governance - Parliament – Composition - Qualifications and Disqualifications - Powers and Functions - Executive, President, Governor - Council of Ministers -Judiciary, Appointment and Transfer of Judges, Qualifications - Powers and Functions.

Unit:5 **8hrs**

Local Administration - District's Administration head: Role and Importance - Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation - Pachayati raj: Introduction, PRI: ZillaPachayat - Elected officials and their roles, CEO Zilla Panchayat: Position and role - Block level: Organizational Hierarchy (Different departments) - Village level: Role of Elected and Appointed officials - Importance of grass root democracy.

Suggested books for reading:

1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
3. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

List of COs	PO no. and keyword	Competency Indicator	Performance Indicator
CO 1	PO 6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the Professional Engineering Practice	6.2.	6.2.1
CO 2	PO 6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the Professional Engineering Practice	6.2.	6.2.1
CO 3	PO 6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the Professional Engineering Practice	6.2.	6.2.1
CO 4	PO 6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the Professional Engineering Practice	6.2.	6.2.1
CO 5	PO 6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the Professional Engineering Practice	6.2	6.1.1

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Year: III **Semester: I** **Branch of Study: EEE**

COURSE CODE	COURSE TITLE	L	T	P	CREDITS
19APC0210	Electrical Machines – II Lab	0	0	2	1

Course outcomes:

1. Analyze and apply load test, no-load and blocked-rotor tests for construction ofcircle diagram and equivalent circuit determination in a single-phase induction motor.
2. Predetermine regulation of a three-phase alternator by synchronous impedance & m.m.f methods.
3. Predetermine the regulation of Alternator by Zero Power Factor method X_d and X_q determination of salient pole synchronous machine.
4. Evaluate and analyze V and inverted V curves of 3 phase synchronous motor

List of experiments:

1. No-load & Blocked-rotor tests on Squirrel cage Induction motor.
2. Load test on three phase slip ring Induction motor.
3. Speed control of three phase induction motor
4. Rotor resistance starter for slip ring induction motor
5. Load test on single phase induction motor.
6. Determination of Equivalent circuit of a single-phase induction motor.
7. Predetermination of Regulation of a three-phase alternator by synchronous impedance & m.m.f methods.
8. Predetermination of Regulation of three-phase alternator by Z.P.F. method.
9. Determination of X_d and X_q of a salient pole synchronous machine.
10. V and inverted V curves of a 3-phase synchronous motor.

Reference Book:

1. D. P.Kothari and B. S. Umre, "Laboratory Manual for Electrical Machines" I.K International Publishing House Pvt. Ltd, 2017.
2. D.R. Kohli and S.K. Jain, "A Laboratory Course in Electrical Machines" NEM Chand & Bros.

CO No.	PO No. and keyword	Competency Indicator	Performance Indicator
CO1	PO1: Engineering knowledge	1.3	1.3.1
		1.4	1.4.1
CO2	PO2: Problem analysis	2.3	2.3.1
			2.3.2
CO3	PO1: Engineering knowledge	1.3	1.3.1
	PO4: Conduct investigations of complex problems	4.3	4.3.1
CO4	PO4: Conduct investigations of complex problems	4.3	4.3.1

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Year: III **Semester: I Branch of Study: EEE**

COURSE CODE	COURSE TITLE	L	T	P	CREDITS
19APC0211	Control Systems Lab	0	0	2	1

Course Outcomes:

1. Acquire knowledge of feedback control and transfer function of DC servo motor.
2. Familiarize mathematical modelling of systems and design controllers and compensators.
3. Get the knowledge on transient and steady state behaviour of second order systems.
4. Determine the performance and time domain specifications of first and second order systems.
5. Implement MATLAB analysis to real life systems.

Any Eight of the following experiments are to be conducted:

1. Time response of Second order system
2. Characteristics of Synchros.
3. Programmable logic controller - Study and verification of truth tables of logic gates, simple Boolean expressions and application of speed control of motor.
4. Effect of feedback on DC servo motor
5. Transfer function of DC Machine
6. Effect of P, PD, PI, PID Controller on a second order system
7. Lag and lead compensation - Magnitude and phase plot
8. Temperature controller using PID
9. Characteristics of magnetic amplifiers
10. Characteristics of AC servo motor

Any two simulation experiments are to be conducted:

1. PSPICE simulation of Op-Amp based Integrator and Differentiator circuits.
2. Linear system analysis (Time domain analysis, Error analysis) using MATLAB.
3. Stability analysis (Bode, Root Locus, Nyquist) of Linear Time Invariant system using MATLAB
4. State space model for classical transfer function using MATLAB - Verification.

REFERENCE BOOKS:

1. M.H.Rashid, “Simulation of Electrical and electronics Circuits”, using PSPICE ,M/s PHI Publications.
2. PSPICE A/D user’s manual - Microsim, USA.
3. PSPICE reference guide - Microsim, USA.
4. MATLAB and its Tool Books user’s manual and - Mathworks, USA.

CO No.	PO No. and keyword	Competency Indicator	Performance Indicator
CO1	PO1: Engineering knowledge	1.3	1.3.1
		1.4	1.4.1
CO2	PO1: Engineering knowledge	1.4	1.4.1
	PO2: Problem analysis	2.3	2.3.1
			2.3.2
CO3	PO1: Engineering knowledge	1.3	1.3.1
	PO4: Conduct investigations of complex problems	4.3	4.3.1
CO4	PO1: Engineering knowledge	1.3	1.3.1
		1.4	1.4.1
CO5	PO5: Modern tool usage	5.1	5.1.1
		5.2	5.2.1

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Year: III **Semester: I** **Branch of Study: EEE**

COURSE CODE	COURSE TITLE	L	T	P	CREDITS
19APC0212	Power Electronics Lab	0	0	2	1

Course Outcomes:

1. Understand and analyze various characteristics of power electronic devices with gate firing circuits and forced commutation techniques.
2. Analyze the operation of single-phase half & fully-controlled converters and inverters with different types of loads.
3. Analyze the operation of DC-DC converters, single-phase AC Voltage controllers, cyclo-converters with different loads.
4. Create and analyze various power electronic converters using MATLAB software.

Any Eight of the Experiments in Power Electronics Lab

1. Study of Characteristics of SCR, MOSFET & IGBT
2. Gate firing circuits for SCR's: (a) R triggering (b) R-C triggering
3. Single Phase AC Voltage Controller with R and RL Loads
4. Single Phase fully controlled bridge converter with R and RL loads
5. Forced Commutation circuits (Class A, Class B, Class C, Class D & Class E)
6. DC Jones chopper with R and RL Loads
7. Single Phase Parallel, inverter with R and RL loads
8. Single Phase Cycloconverter with R and RL loads
9. Single Phase Half controlled converter with R load
10. Three Phase half-controlled bridge converter with R-load
11. Single Phase series inverter with R and RL loads
12. Single Phase Bridge converter with R and RL loads
13. Single Phase dual converter with RL loads

Any two simulation experiments with MATLAB

14. Simulation of single-phase full converter using RLE loads and single-phase AC voltage controller using RLE loads.
15. Simulation of resonant pulse commutation circuit and Buck converters and chopper.
16. Simulation of single-phase Inverter with PWM control.

REFERENCE BOOKS:

1. O.P. Arora, "Power Electronics Laboratory: Theory, Practice and Organization (Narosa series in Power and Energy Systems)", Alpha Science International Ltd., 2007.
2. M.H.Rashid, "Simulation of Electric and Electronic circuits using PSPICE", M/s PHI Publications.
3. MATLAB and its Tool Books user's manual and - Math works, USA.

CO No.	PO No. and keyword	Competency Indicator	Performance Indicator
CO1	PO1: Engineering knowledge	1.3	1.3.1
CO2	PO1: Engineering knowledge	1.4	1.4.1
	PO2: Problem analysis	2.4	2.4.2
CO3	PO1: Engineering knowledge	1.3	1.3.1
	PO4: Conduct investigations of complex problems	4.3	4.3.1
CO4	PO5: Modern tool usage	5.1	5.1.1
		5.2	5.2.1