ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI
(AUTONOMOUS)

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

COURSE CODE	COURSE TITLE	L	T	P	CREDITS
19APC0213	POWER SYSTEMS - II	3	0	0	3

COURSE OUTCOMES:

1. Understand the classification and parameters of conductors, transmission lines.
2. Analyze power system transients and the effect on power systems.
3. Understand the factors governing the performance of transmission lines.
4. Analyze the properties of overhead lines and their types.
5. Understand the types and construction of underground cables.

UNIT-I: TRANSMISSION LINE PARAMETERS

Types of conductors - calculation of resistance for solid conductors - Calculation of inductance for single phase and three phase, single and double circuit lines, concept of GMR & GMD, symmetrical and asymmetrical conductor configuration with and without transposition, Numerical Problems. Calculation of capacitance for 2 wire and 3 wire systems, effect of ground on capacitance, capacitance calculations for symmetrical and asymmetrical single and three phase, single and double circuit lines, Numerical Problems.

UNIT-II: PERFORMANCE OF SHORT, MEDIUM AND LONG LENGTH TRANSMISSION LINES:

Classification of Transmission Lines - Short, medium and long line and their model representations - Nominal-T, Nominal-Pie and A, B, C, D Constants for symmetrical & Asymmetrical Networks.

Long Transmission Line-Rigorous Solution, evaluation of A, B, C, D Constants, Interpretation of the Long Line Equations -Surge Impedance and SIL of Long Lines, Wave Length and Velocity of Propagation of Waves.

UNIT – III POWER SYSTEM TRANSIENTS & FACTORS GOVERNING THE PERFORMANCE OF TRANSMISSION LINES

Types of System Transients - Travelling or Propagation of Surges - Attenuation, Distortion, Reflection and Refraction Coefficients - Termination of lines with different types of conditions - Open Circuited Line, Short Circuited Line, T-Junction, Lumped Reactive Junctions (Numerical Problems). Bewley's Lattice Diagrams (for all the cases mentioned with numerical examples). Skin and Proximity effects - Description and effect on Resistance of Solid Conductors -Ferranti effect - Charging Current - Effect on Regulation of the Transmission Line. Corona - Description of the phenomenon, factors affecting corona, critical voltages and power loss, Radio Interference.

UNIT-IV

OVERHEAD LINE INSULATORS & SAG, TENSION CALCULATIONS:

Types of Insulators, String efficiency and Methods for improvement, Numerical Problems - voltage distribution, calculation of string efficiency, Capacitance grading and Static Shielding. Sag and Tension Calculations with equal and unequal heights of towers, Effect of Wind and Ice on weight of Conductor, Numerical Problems - Stringing chart and sag template and its applications.

UNIT-V UNDERGROUND CABLES

Types of Cables, Construction, Types of Insulating materials, Calculations of Insulation resistance and stress. Capacitance of Single and 3-Core belted cables. Grading of Cables - Capacitance grading, Description of Inter-sheath grading, HV cables.

TEXT BOOKS:

1. Electrical power systems, C.L.Wadhwa, New Age International (P) Limited, Publishers.
2. Electrical Power Systems, PSR. Murty, BS Publications.

REFERENCE BOOKS:

1. A Text Book on Power System Engineering, M.L.Soni, P.V.Gupta, U.S.Bhatnagar, A.Chakrabarthy, Dhanpat Rai & Co Pvt. Ltd.
2. A Textbook of Power System Engineering, R. K. Rajput, Laxmi Publications (P) Limited.
3. Electrical Power Generation, Transmission and Distribution, S.N.Singh, PHI.
4. Principles of Power Systems**,** V. K Mehta and Rohit Mehta S. Chand Company Pvt. Ltd.
5. Power System Engineering, I.J.Nagarath & D.P Kothari , TMH.
6. Power System Analysis and Design, Dr. B. R. Gupta, S. Chand & Company Limited.
7. Power System Analysis, Operation and control, Abhijit Chakrpabarti, Sunitha Halder, PHI, 3/e, 2010
8. Electrical Power Transmission system engineering Analysis and design by Turan Gonen, CRC Press (Taylor & Francis Group) Special Indian Edition,2/e.

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
CO5	PO1: Engineering knowledge	1.3	1.3.1

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

COURSE CODE	COURSE TITLE	L	T	P	CREDITS
19APC0214	ELECTRICAL MEASUREMENTS AND INSTRUMENTATION	3	0	0	3

Course outcomes:

1. Understand different types of measuring instruments, their construction, operation and characteristics.
2. Identify the instruments suitable for typical measurements.
3. Apply the knowledge about transducers and instrument transformers to use them effectively.

UNIT- I INTRODUCTION TO MEASURING INSTRUMENTS:

Classification – deflecting, control and damping torques – Ammeters and Voltmeters – PMMC, moving iron type instruments – expression for the deflecting torque and control torque – Errors and compensations, extension of range using shunts and series resistance. Electrostatic Voltmeters-electrometer type and attracted disc type – extension of range of E.S. Voltmeters.

UNIT– II POTENTIOMETERS & INSTRUMENT TRANSFORMERS:

Principle and operation of D.C. Crompton's potentiometer – standardization – Measurement of unknown resistance, current, voltage. A.C. Potentiometers: polar and coordinate type's standardization – applications. CT and PT – Ratio and phase angle errors

UNIT –III MEASUREMENT OF POWER & ENERGY:

Single phase dynamometer wattmeter, LPF and UPF, Double element and three element dynamometer wattmeters, expression for deflecting and control torques – Measurement of active and reactive powers in balanced and unbalanced systems. Single phase induction type energy meter – driving and braking torques – errors and compensations – testing by phantom loading using R.S.S. meter. Three phase energy meter – tri-vector meter, maximum demand meters.

UNIT – IV DC & AC BRIDGES:

Method of measuring low, medium and high resistance – sensitivity of Wheat-stone's bridge – Carey Foster's bridge, Kelvin's double bridge for measuring low resistance, measurement of high resistance – loss of charge method.

Measurement of inductance- Maxwell's bridge, Hay's bridge, Anderson's bridge - Owen's bridge.

Measurement of capacitance and loss angle –Desaunty's Bridge - Wien's bridge – Schering Bridge.

UNIT-V TRANSDUCERS:

Definition of transducers, Classification of transducers, Principle operation of LVDT and capacitor transducers; LVDT Applications, Strain gauge and its principle of operation, gauge factor, Thermistors, Thermocouples, Piezo electric transducers, photovoltaic, photo conductive cells, and photo diodes.

Measurement of Non-Electrical Quantities: Measurement of strain, Displacement, Velocity, Angular Velocity, Acceleration, Force, Torque, Temperature, Pressure, Vacuum, Flow and Liquid level.

TEXT BOOKS:

1. "G. K. Banerjee", "Electrical and Electronic Measurements", PHI Learning Pvt. Ltd., 2nd Edition, 2016
2. "S. C. Bhargava", "Electrical Measuring Instruments and Measurements", BS Publications, 2012.

REFERENCE BOOKS:

1. "A. K. Sawhney", "Electrical & Electronic Measurement & Instruments", Dhanpat Rai & Co. Publications, 2005.
2. "R. K. Rajput", "Electrical & Electronic Measurement & Instrumentation", S. Chand and Company Ltd., 2007.
3. "Buckingham and Price", "Electrical Measurements", Prentice – Hall, 1988.
4. "Reissland, M.U", "Electrical Measurements: Fundamentals, Concepts, Applications", New Age International (P) Limited Publishers, 1st Edition 2010.
5. "E.W. Golding and F. C. Widdis", "Electrical Measurements and measuring Instruments", fifth Edition, Wheeler Publishing, 2011.

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

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

COURSE CODE	COURSE TITLE	L	T	P	CREDITS
19APC0215	POWER SYSTEM ANALYSIS	3	0	0	3

COURSE OUTCOMES:

1. Remember and understand the concepts of per unit values, Y_{Bus} and Z_{Bus} formation.
2. Apply the concepts of good algorithm for the given power system network and obtain the converged load flow solution.
3. Analyse the symmetrical faults and unsymmetrical faults.
4. Analyze algorithms for different networks and determine load flow studies and zero, positive and negative sequence impedances to find fault calculations.
5. Understand and select efficient Circuit Breakers to improve system stability.

UNIT –I Power flow analysis and Y_{BUS} formation:
Per-Unit representation of Power system elements. Formation of Bus Admittance Matrix. Real and reactive power balance equations at a node. Load and Generator Specifications. Application of numerical methods for solution of nonlinear algebraic equations – Gauss Seidel and Newton-Raphson methods for the solution of the power flow equations. Graph Theory: Definitions, Bus Incidence Matrix, Y_{Bus} formation by Direct and Singular Transformation Methods, Numerical Problems.

UNIT –II Formation of Z_{Bus}:
Formation of Z_{Bus}: Partial network, Algorithm for the Modification of Z_{Bus} Matrix for addition element for the following cases: Addition of element from a new bus to reference, Addition of element from a new bus to an old bus, Addition of element between an old bus to reference and Addition of element between two old busses - Modification of Z_{Bus} for the changes in network (Problems)

UNIT –III Power flow analysis
Static load flow equations - Load flow solutions using Gauss Seidel Method: Algorithm and Flowchart. Acceleration Factor, Load flow Solution for Simple Power Systems (Max. 3-Buses). Newton Raphson Method in Polar Co-Ordinates Form: Load Flow Solution- Jacobian Elements, Algorithm and Flowchart. Decoupled and Fast Decoupled Methods.

UNIT – IV Short Circuit Analysis
Symmetrical fault Analysis: Short Circuit Current and MVA Calculations, Fault levels, Application of Series Reactors. Unsymmetrical Fault Analysis: LG, LL, LLG and LLLG faults with and without fault impedance, Numerical Problems.

UNIT –V Stability Analysis
Elementary concepts of Steady State, Dynamic and Transient Stabilities. Derivation of Swing Equation, Power Angle Curve and Determination of Steady State Stability. Determination of Transient Stability by Equal Area Criterion, Application of Equal Area Criterion, Critical Clearing Angle Calculation. Numerical methods for solution of swing equation - Methods to improve Stability - Application of Auto Reclosing and Fast Operating Circuit Breakers.

TEXT BOOKS:

1. G.W.Stagg and A.H.El "Computer Methods in Power System Analysis", Abiad, Mc Graw-Hill, 2006.
2. I.J.Nagrath & D.P.Kothari, "Modern Power system Analysis", 4th Edition, Tata McGraw-Hill Publishing Company, 2011.

REFERENCE BOOKS:

1. Grainger and Stevenson, "Power System Analysis", McGraw Hill, 1994.
2. Hadi Saadat, "Power System Analysis", McGraw Hill, 1998.
3. B.R.Gupta, "Power System Analysis and Design", S. Chand & Company, 2005.

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	PO5: Modern tool usage	5.1	5.1.1
		5.2	5.2.1
CO5	PO1: Engineering knowledge	1.3	1.3.1
		1.4	1.4.1

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Year: III **Semester: II** **Branch of Study: CSE,EEE,ECE**

COURSE CODE	COURSE TITLE	L	T	P	CREDITS
19APC0216	NEURAL NETWORKS AND FUZZY LOGIC	3	0	0	3

COURSE OUTCOMES

1. Understand the basic architecture of artificial neural network terminologies and techniques.
2. Understand approaches and architectures of Artificial Intelligence.
3. Perform the training of neural networks using various learning rules.
4. Create different neural networks of various architectures both feed forward and feed backward.
5. Application of ANN to System Identification and Pattern recognition.

UNIT – I ARTIFICIAL NEURAL NETWORKS

Approaches to AI – Architectures of AI – Symbolic Reasoning System – Rule based Systems – Knowledge Representation – Expert Systems. Introduction and motivation: Neural Network, Human Brain, Structure of biological neuron, Memory, Comparison between Artificial and Biological Neural Networks – Basic Building Blocks of ANN – Artificial Neural Network Terminologies, Artificial Intelligence and Neural Networks.

UNIT – II

Learning Process: Layers, activation functions, learning methods: Error Correction Learning, Memory Based Learning, Hebbian Learning, Competitive, Boltzmann Learning, Memory, Adaption, Back Propagation and Differentiation, Supervised Learning, unsupervised learning.

UNIT – III NETWORKS

Basic Building Blocks of ANN – Artificial Neural Network Terminologies – McCulloch Pitts Neuron Model – Learning Rules – ADALINE and MADALINE Models – Perceptron Networks – Back Propagation Neural Networks – Associative Memories - Self-Organization Map – Hopfield models – ART networks.

UNIT – IV UNIT – IV FUZZYLOGIC

Classical Sets – Fuzzy Sets – Fuzzy Properties and Operations – Fuzzy Logic System – Fuzzification – Defuzzification – Membership Functions – Fuzzy Rule base – Fuzzy Logic Controller Design.

UNIT – V FUZZY LOGIC APPLICATIONS

Fuzzy pattern recognition – Fuzzy control system – Aircraft landing control problem - Statistical process control- Fuzzy cognitive mapping – Probability measures – Possibility and necessity measures.

TEXT BOOKS:

1. S. N. Sivanandam, S. Sumathi and S. N. Deepa, “Introduction to Neural Networks using MATLAB”, McGraw Hill Edition, 2006.
2. Timothy J. Ross, “Fuzzy Logic with Engineering Applications”, Third Edition, WILEY India Edition, 2012.

REFERENCES:

1. S. N. Sivanandam, S. Sumathi and S. N. Deepa, "Introduction to Fuzzy Logic using MATLAB", Springer International Edition, 2013.
2. Laurene V. Fausett "Fundamentals of Neural Networks: Architectures, Algorithms and Applications" United States Edition.
3. Yung C. Shin and Chengying Xu, "Intelligent System – Modeling, Optimization & Control, CRC Press, 2009.

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
CO5	PO1: Engineering knowledge	1.3	1.3.1

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R19 Regulations

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

COURSE CODE	COURSE TITLE	L	T	P	CREDITS
19APC0417	MICROPROCESSORS AND MICROCONTROLLERS	3	1	0	3

Course Outcomes:
After completion of this subject the students will be able to :
CO1: Understand concepts of Intel x86 series of processors
CO2: Do programming with 8086 microprocessors
CO3: Understand concepts of MSP 430 Controllers
CO4: Program MSP 430 for designing any basic Embedded System
CO5: Design and implement some specific real time applications Using MSP 430 low power microcontroller.

UNIT I

Introduction-8086 Architecture-Block Diagram, Register Organization, Flag Register, Pin Diagram, Timing and Control Signals, System Timing Diagrams, Memory Segmentation, Interrupt structure of 8086 and Interrupt Vector Table. Memory organization and memory banks accessing.

UNIT II
Instruction Formats -Addressing Modes-Instruction Set of 8086, Assembler Directives- Macros and Procedures.- Sorting, Multiplication, Division and multi byte arithmetic code conversion. String Manipulation instructions-Simple ALPs.

UNIT III
Low power RISC MSP430 – block diagram, features and architecture, Variants of the MSP430 family viz. MSP430x2x, MSP430x4x, MSP430x5x and their targeted applications, MSP430x5x series block diagram, Addressing modes, Instruction set Memory address space, on-chip peripherals (analog and digital), and Register sets. Sample embedded system on MSP430 microcontroller.

UNIT-IV
I/O ports pull up/down resistors concepts, Interrupts and interrupt programming. Watchdog timer. System clocks. Low Power aspects of MSP430: low power modes, Active vs Standby current consumption, FRAM vs Flash for low power & reliability.
Timer & Real Time Clock (RTC), PWM control, timing generation and measurements. Analog interfacing and data acquisition: ADC and Comparator in MSP430, data transfer using DMA.

UNIT-V:
Serial communication basics, Synchronous/Asynchronous interfaces (like UART, USB, SPI, and I2C). UART protocol, I2C protocol, SPI protocol. Implementing and programming UART, I2C, SPI interface using MSP430, Interfacing external devices. Implementing Embedded Wi-Fi using CC3100

Text Books:

1. "Microprocessor and Microcontrollers", N. Senthil Kumar, M. Saravanan, S. Jeevanathan, Oxford Publishers. 1st Edition, 2010
2. "The X86 Microprocessors , Architecture, Programming and Inerfacing" , Lyla B. Das, Pearson Publications, 2010
3. MSP430 microcontroller basics. John H. Davies, Newnes Publication, I st Edition, 2008

References:

1. http://processors.wiki.ti.com/index.php/MSP430_LaunchPad_Low_Power_Mode
2. http://processors.wiki.ti.com/index.php/MSP430_16-Bit_Ultra- Low_Power_MCU_Training

List of COs	PO no. and keyword	Competency Indicator	Performance Indicator
CO: 1	PO 3: Design/Development of Solutions	3.2	3.2.2
CO: 2	PO 4: Conduct investigations of complex problems	4.1	4.1.1
CO: 3	PO 5: Modern tool usage	5.1	5.1.2
CO: 4	PO 5: Modern tool usage	5.2	5.2.1
CO: 5	PO 5: Modern tool usage	5.2	5.2.2

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B.Tech III Year II Semester

COURSE CODE	COURSE TITLE	L	T	P	CREDITS
19AOE0511	Business Data Analytics	3	0	0	3

Course Objectives:

The students will be able to

- Introduce the Business intelligence concepts ,techniques and models
- understand the modeling process behind business analytics
- analyze different data analysis tools and techniques

Course Outcomes:

Student will be able to

- Understand the fundamental of Business Intelligence and to design a customized solution.
- Familiarize on the concepts, techniques and reporting methods of descriptive analytics and predictive analytics
- Explore the methods used to analyze speech and text and implement optimized search engines
- Design and implement Decision Support systems
- Familiarize on the processes needed to develop, report, and analyze business data

Unit I

Introduction to Business Intelligence – Designing Business Intelligence Application Requirements Gathering, Establishing the Technical Architecture, Designing a Business Intelligence Solution, Designing Dimensional Models, Designing the Physical Databases

Data Warehousing- Definitions and Concepts -- Data Warehousing Architectures - Data Integration and the Extraction, Transformation, and Load (ETL) Processes - Transaction processing- Data Warehouse Development Approaches - Data Warehousing Implementation Issues - Data Warehouse Administration, Security Issues, and Future Trends- Business Reporting, Visual Analytics, and Business Performance Management

Unit II

Data Mining Concepts- Definitions, Characteristics, and Benefits - How Data Mining Works - Data Mining Versus Statistics Data Mining Process - Data Mining Methods - Data Mining and Privacy Issues - Regression – Classification –Association Rules – clustering -Techniques for Predictive Modeling – ANN- SVM

Unit III

Text Analytics, Text Mining, and Sentiment Analysis - Natural Language Processing - Text Mining Process- tools - Sentiment Analysis -Overview, Process, Applications - Speech Analytics – Rule based, Multi, Layer, Hybrid Sentimental analysis – Machine Learning in Sentimental analysis

Web Mining Overview - Web Content and Web Structure Mining - Search Engines - Search Engine Optimization - Web Analytics Technologies, metrics - Web Analytics Maturity Model and Web Analytics Tools

Unit IV

Decision Support Systems Modeling - Mathematical Models for Decision Support - Certainty, Uncertainty, and Risk- Decision Modeling with Spreadsheets - Mathematical Programming Optimization - Decision Analysis with Decision Tables and Decision Trees - Problem-Solving Search Methods - Problem-Solving Search Methods

Unit V

Knowledge Management –Concepts, Definitions , Approaches, tools and techniques - Big Data and Analytics- Fundamentals of Big Data Analytics – Technologies - Data Scientist - Big Data and Data Warehousing - Automated Decision Systems and Expert Systems - Business Analytics: Emerging Trends and Future Impacts. Recent Trends and future impacts.

Text Books:

1. Efraim Turban, Ramesh Sharda, Dursun Delen, “Business Intelligence and Analytics”, 10th Edition, Pearson , 2015.

References:

1. S. Christian Albright, Wayne L. Winston, Business Analytics: Data Analysis & Decision Making, 6th Edition, CENGAGE INDIA , 2017
2. Dinabandhu Bag, Business Analytics, Routledge, 1st edition, 2016
3. Rick Sherman, Business Intelligence Guidebook: From Data Integration to Analytics, Morgan Kaufmann, 1st edition 2014

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AK19 Regulations

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

Subject Code	Subject Name	L T P	Credit: 3
19AHE9902	**Principles of Effective Public Speaking**	3 0 0	

Course Objectives:

1. Gain and demonstrate the basic skills of effective oral communication, for use throughout your academic career and beyond.
2. Learn and develop the skills necessary to maximize public speaking effectiveness, including effective research and organization of information, how to make the most of presentation aids (and not become reliant on them!), and understanding the speaker-audience relationship.
3. Develop critical thinking and listening skills, enabling you to maximize your own understanding as an audience member, and offer considered and constructive critiques of others' speeches.
4. Become more confident in public speaking arenas, whether as a formal speech giver or as a participant in group settings. Improvement will be valued over perfection.

Syllabus

Unit -1

Introduction to Public Speaking:

Basic communication concepts, processes, and models Communication concepts and principles and public speaking Steps and methods of speech preparation; Ethics in public speaking

Unit -2

Listening and Speech Criticism:

Effective listening, the listening process, and types of listening; Listening barriers; Identifying and improving listening styles; Evaluating speech and effective speech techniques.

Unit -3

Selecting Topic and Knowing your Audience:

Identifying sources; Tools and techniques for selecting and refining speech topics; Identifying speech purposes; Central idea statement; The central idea; Audience analysis techniques.

Unit – 4

Speaking with a Purpose:

Informative, persuasive, and ceremonial speeches

Unit:5

Delivering your speech and using Visual Aids.

The mechanics of verbal and nonverbal communication in speech delivery; Modes of speech delivery; Speaking style and language; Effective delivery techniques; Incorporating presentation aids

Course Outcomes:

Students will be able to:

1. Apply knowledge of principles, concepts and skills learned in speech preparation.
2. Develop skills in effective listening.
3. Evaluate the delivery of speeches.
4. Develop skills in speech composition.
5. Use supporting materials and presentation aids in speech preparation.

References:

1. DeVito, J.A. (2009). The Essential Elements of Public Speaking. (3rd ed.) Boston: Pearson Education, Inc.

2. Lucas, S.E. (2009). The Art of Public Speaking. (10th ed.) New York: McGraw - Hill Co.

3. Zarefsky, D. (2011). Public Speaking: Strategies for Success. (6th ed. Boston: Pearson Education, Inc).

List of COs	PO no. and keyword	Competency Indicator	Performance Indicator
CO1	PO10: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.	10.2	10.2.2
CO2	PO10: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.	10.2	10.2.1
CO3	PO9: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings..	9.2	9.2.1
CO4	PO10: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.	10.2	10.2.2
CO5	PO10: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.	10.3	10.3.1

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III B.Tech **AK 19 Regulations**

Common to II Sem ECE/EEE

SubjectCode:19AHE9907	Subject Name **OPTICS**	L T P **3 0 0**	Credits:3

Course Outcomes

1. Analyze the wave properties of light.
2. Interpret the interaction of energy with matter.
3. Analyze the semiconductor photo devices.
4. Interpret structural spectroscopic techniques.
5. Analyze NMR and ESR spectra.

UNIT I Polarization **10 Hours**

Polarization-Experimental observation-Polarization by reflection and refraction-Brewster angle-Pile of plates-Biot's polariscope- Malus laws, Double refraction - Optic axis, Uniaxial and biaxial crystals, Geometry of calcite crystals, Nicol prism, Nicol as analyzer and polarizer. Huygen's explanation of double refraction, Quarter wave and Half wave plates, Production and detection of plane, elliptical and circular polarization of light

UNIT II Semiconductor Optics **12 Hours**

Semiconductor light emitting diodes (LEDs)- Radiative and non-radiative recombination mechanisms in semiconductors-LED: device structure, materials and characteristics,- Review of laser physics-Rate equations for carrier- and photon-density, and their steady state solutions-Semiconductor laser: structure, materials, device characteristics, and figures of merit; DFB, DBR, and vertical-cavity surface-emitting lasers (VECSEL)- Tunable semiconductor lasers.

UNIT III Photo devices and their instrumentation **8 Hours**

Photodetectors -Types of semiconductor photodetectors -p-n junction, PIN, and Avalanche --- and their structure, materials, working principle and characteristics-Noise limits on performance- Solar cells. Low-dimensional optoelectronic devices -Quantum-well, -wire, and -dot based LEDs, lasers, and photodetectors.

UNIT IV Spectroscopic Techniques-I **9 Hours**

UV-visible Spectroscopy: principles- instrumentation- quantitative analysis by absorption measurements- simultaneous determinations- applications.

Raman Spectroscopy**:**Quantum theory of Raman effect –degree of depolarisation–FT Raman spectrometer- Instrumentation and sampling methods– construction of character table – calculation of normal modes of vibration - Raman and I.R activity.

UNIT V Spectroscopic Techniques-II **11 Hours**

NMR Spectroscopy **:** Theory of NMR method – Bloch equations- Steady state solution of Bloch

equations- Theory of chemical shifts- Experimental methods –Single coil and double coil methods – Pulse method –High resolution method –Application of NMR to quantitative measurements. ESR Spectroscopy: Quantum mechanical treatment of ESR- hyperfine structure-Basic principles of spectrographs-Application of ESR method.

Textbooks:

1. Optics by Ajay Ghotak.
2. A textbook of Optics by Brij Lal and Dr. M. Subhramanyam.
3. Optics by Dr. S. P. Singh and Dr. A.P. Agarwal.

References:

1. Fundamental of Optics by F.A. Jenkins and H. E. White.
2. The Feynman Lecture of Physics by Richard Feynman.
3. Optics by Eugene Hecht.

List of COs	**PO no. and keyword**	**Competency Indicator**	**Performance Indicator**
CO: 1	PO1 : Apply the knowledge of science	1.2	1.2.1
CO: 2	PO1: Apply the knowledge of science	1.2	1.2.1
CO: 3	PO1: Apply the knowledge of science	1.2	1.2.1
CO: 4	PO1: Apply the knowledge of science	1.2	1.2.1
CO: 5	PO1: Apply the knowledge of science	1.2	1.2.1

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III B.Tech **AK 19 Regulations**

Common to II Sem ECE & EEE

Subject Code:19AHE9909	Subject Name: **Quantum Mechanics**	L T P 3 0 0	Credits:3

Course Outcomes

1. Analyze the Classical theory of quantum mechanics and Different effects.
2. Illustrate the experimental evidence of matter waves.
3. Analyze Heisenberg's Uncertainty Principle and Experimental Verification.
4. Analyze the Time dependent and independent Schrodinger's Equation.
5. Evaluate the One Dimensional Potential Well and Barrier Potential.

UNIT I

Origin of Quantum Mechanics

Introduction, Black body radiation, Rayleigh-Jeans law of spectral distribution of energy, Planck's radiation law, Photoelectric effect, Experimental observations, Einstein theory for photoelectric effect Compton effect, Classical theory of specific heat Einstein theory of specific heat of solids.

UNITII

Basics of Wave Mechanics

Introduction, de Broglie Matter Wave, Derivation of deBroglie's Relation ,deBroglie wavelength of High Energy Electrons, Properties of deBroglie Waves (Matter Waves) , Experimental Evidence of Matter Wave: Proof of deBroglie's Hypothesis, Davisson and Germer Experiment, G.P. Thomson's Experiment, Electron Double Slit Experiment, Group and Wave Velocities , Wave Packet and its Formation , Relation between Group Velocity and Particle Velocity. , Relation between Phase Velocity and Group Velocity.

UNIT III

Heisenberg's Uncertainty Principle

Introduction, Heisenberg's Uncertainty Principle, Elementary Proof of Uncertainty Principle, Conclusions from Uncertainty Relation, Time-Energy Uncertainty Relation, Elementary Proof of Time Energy Uncertainty Relation ,Angular Position – Angular Momentum Uncertainty Principle. , Derivation of Uncertainty Principle from deBroglie's Wave Concept. Illustration (Experimental Verification) of Heisenberg's Uncertainty Principle. , Electron Diffraction through a Single Slit.

UNIT IV

Schrodinger Wave Equation

Introduction, Schrodinger's Equation, Time dependent Schrodinger's Equation, Validity of Schrodinger's Equation, Time dependent Schrodinger's Equation in three Dimensions, Time independent Schrodinger's Equation, One dimensional Time Independent Schrodinger's Equation , Three dimensional Time Independent Schrodinger's Equation, Wave function, Physical Significance of Wave function, Conditions on a Wave function, Probabilistic Interpretation of a Wave function, Eigen Values and Eigen Function and Operators.

UNIT- V

One Dimensional Potential Well and Barrier Potential

Introduction, Properties of one-dimensional motion, Bound States (Discrete Spectrum, Unbound States (Continuous Spectrum), One dimensional potential well,Energy levels for one-dimensional square well potential of finite depth (OR finite potential well), Potential step or a single step barrier, Boundary conditions.

Textbooks:

1. Introduction to Quantum Mechanics by J. Griffithis David.
2. A.K.Ghatak and S.Lokanathan – Quantum Mechanics – Theory and applications – 3rd edition – Macmillan Publisher (2012).[units 1-5]
3. S.N.Biswas - Quantum Mechanics - Books & Allied Ltd; 2nd Revised edition (2012)

References:

1. Quantum Mechanics by E. Mearzbacher
2. Quantum Mechanics: A textbook for Undergraduates by Jain Mahesh

List of COs	PO no. and keyword	Competency Indicator	Performance Indicator
CO: 1	PO1 : Apply the knowledge of science	1.2	1.2.1
CO: 2	PO1: Apply the knowledge of science	1.2	1.2.1
CO: 3	PO1: Apply the knowledge of science	1.2	1.2.1
CO: 4	PO1: Apply the knowledge of science	1.2	1.2.1
CO: 5	PO1: Apply the knowledge of science	1.2	1.2.1

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B.Tech II,III Year Semester: I Branch of Study: Common to all
MANDATORY COURSE

Subject Code 19AMC9904	Subject Name: Professional Ethics And Human Values	L: 3	T: 0	P: 0	Credits: 0

Course Outcomes:

1. It ensures students sustained happiness through identifying the essentials of human values and skills.
2. The students will understand the importance of Values and Ethics in their personal lives and professional careers.
3. The students will learn the rights and responsibilities as an employee, team member and a global citizen.
4. Students understand practically the importance of trust, mutually satisfying human behavior and enriching interaction with nature.
5. Students can able to develop appropriate technologies and management patterns to create harmony in professional and personal life.

Syllabus

UNIT - I: 12hrs

Introduction to Human Values: Need, basic Guidelines, Content and Process for Value Education, Self Exploration - 'Natural Acceptance' and Experiential Validation. Continuous Happiness and Prosperity - A look at basic Human Aspirations. Right understanding, Relationship and Physical Facilities. Understanding Happiness and Prosperity correctly.

UNIT - II: 12hrs

Understanding Harmony in the Family and Society: Harmony in Human - Human Relationship: Understanding harmony in the Family the basic unit of human interaction. Understanding values in human - human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay-tripti; Trust (Vishwas) and Respect (Samman) as the foundational values of relationship. Understanding the harmony in the society (society being an extension of family). Visualizing a universal harmonious order in society - Undivided Society (Akhand Samaj), Universal Order (Sarvabhaum Vyawastha) - from family to world family!

UNIT – III: 12hrs

Introduction to Professional Ethics: Basic Concepts, Governing Ethics, Personal & Professional Ethics, Ethical Dilemmas, Life Skills, Emotional Intelligence, Thoughts of Ethics, Value Education, Dimensions of Ethics, Profession and professionalism, Professional Associations, Professional Risks, Professional Accountabilities, Professional Success, Ethics and Profession.

UNIT – IV: **15hrs**

Professional Practices in Engineering: Work Place Rights & Responsibilities, Professions and Norms of Professional Conduct, Norms of Professional Conduct vs. Profession; Responsibilities, Obligations and Moral Values in Professional Ethics, Professional codes of ethics, the limits of predictability and responsibilities of the engineering profession. Central Responsibilities of Engineers – The Centrality of Responsibilities of Professional Ethics; lessons from 1979 American Airlines DC-10 Crash and Kansas City Hyatt Regency Walk away Collapse.

UNIT – V: **12hrs**

Global issues in Professional Ethics: Introduction – Current Scenario, Technology Globalization of MNCs, International Trade, World Summits, Issues, Business Ethics and Corporate Governance, Sustainable Development Ecosystem, Energy Concerns, Ozone Depletion, Pollution, Ethics in Manufacturing and Marketing, Media Ethics, War Ethics, Bio Ethics, Intellectual Property Rights.

Text Books:

1.R. R. Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Human Values and Professional Ethics.

2.Professional Ethics: R. Subramanian, Oxford University Press, 2015. 3.Ethics in Engineering Practice & Research, Caroline Whitbeck, 2e, Cambridge University Press 2015.

Reference Books:

1.Prof. K. V. Subba Raju, 2013, Success Secrets for Engineering Students, Smart Student Publications, 3rd Edition.

2.Ivan IIIich, 1974, Energy & Equity, The Trinity Press, Worcester, and HarperCollins, USA 3.Engineering Ethics, Concepts Cases: Charles E Harris Jr., Michael S PritchaMichael J Rabins, 4e , Cengage learning, 2015.

4.Business Ethics concepts & Cases: Manuel G Velasquez, 6e, PHI, 2008.

List of COs	PO no. and keyword	Competency Indicator	Performance Indicator
CO1	PO8: Ethics: Apply Ethical principles and commit to professional ethics and responsibilities and norms of the Engineering practice.	8.1	8.1.1
CO2	PO8:Ethics: Apply Ethical principles and commit to professional ethics and responsibilities and norms of the Engineering practice.	8.1	8.1.1
CO3	PO8: Ethics: Apply Ethical principles and commit to professional ethics and responsibilities and norms of the Engineering practice.	8.1	8.1.1
CO4	PO8: Ethics: Apply Ethical principles and commit to professional ethics and responsibilities and norms of the Engineering practice.	8.1	8.1.1
CO5	PO8: Ethics: Apply Ethical principles and commit to professional ethics and responsibilities and norms of the Engineering practice.	8.1	8.1.1

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

COURSE CODE	COURSE TITLE	L	T	P	CREDITS
19APC0217	POWER SYSTEMS LAB	0	0	2	1

Course Outcomes:

1. Acquire practical knowledge on calculation of sequence impedance, fault currents, voltages and sub transient reactance's. Get the practical knowledge on how to draw the equivalent circuit of three winding transformer.
2. Acquire knowledge on development of MATLAB program for formation of Y and Z buses.
3. Acquire knowledge on development of MATLAB programs for Gauss-Seidel and Fast Decouple Load Flow studies.
4. Acquire knowledge on development of SIMULINK model for single area load frequency problem.

List of Experiments

Conduct any 8 experiments (4 from S.Nos.1 to 7 & 4 from Sl.Nos.8 to 12)

1. Determination of Sequence Impedances of Cylindrical Rotor Synchronous Machine.
2. LG Fault Analysis on an un loaded alternator.
3. LL Fault Analysis on conventional phases.
4. LLG Fault Analysis.
5. LLLG Fault Analysis.
6. Determination of Sub transient reactance of silent pole synchronous machine
7. Equivalent circuit of three winding transformer.
8. Y_{Bus} formation using MATLAB
9. Z_{Bus} formation using MATLAB
10. Gauss-Seidel load flow analysis using MATLAB
11. Fast decoupled load flow analysis using MATLAB
12. Develop a Simulink model for a single area load frequency problem and simulate the same.

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	PO5: Modern tool usage	5.1	5.1.1
		5.2	5.2.1

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R19 Regulations

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

COURSE CODE	COURSE TITLE	L	T	P	CREDITS
19APC0420	MICROPROCESSORS AND MICROCONTROLLERS LAB	0	0	2	1

Course Outcomes :
After completion of this subject the students will be able to :
CO1: To apply the assembly language instructions of 8086 microprocessor to describe the concept of programming and its applications to real world.
CO2: To demonstrate the steps in executing an assembly language program using an assembler.
CO3: Understand concepts of MSP 430 Controllers
CO4: Program MSP 430 for designing any basic Embedded System
CO5: Design and implement some specific real time applications Using MSP 430 low power microcontroller.

Part A: 8086 Microprocessor Programs using MASM/8086 microprocessor kit.

1. Introduction to MASM Programming.
2. Programs using arithmetic operations
3. Programs using ASCII arithmetic operations
4. Programs using logical operation
5. Programs for code conversion
6. Sorting of the given numbers
7. String operations

Part B: Embedded C Experiments using MSP430 Microcontroller

1. Interfacing and programming GPIO ports in C using MSP430 (blinking LEDs, push buttons)
2. Usage of Low Power Modes: (Use MSPEXP430FR5969 as hardware platform and demonstrate the low power modes and measure the active mode and standby mode current)
3. Interrupt programming examples through GPIOs
4. PWM generation using Timer on MSP430 GPIO
5. Interfacing potentiometer with MSP430
6. Using ULP advisor in Code Composer Studio on MSP430
7. Low Power modes and Energy trace++:

Note : Any six experiment from Part A and Six experiments from Part B are to be conducted

List of COs	PO no. and keyword	Competency Indicator	Performance Indicator
CO: 1	PO 3: Design/Development of Solutions:	3.3	3.3.1
CO: 2	PO 4: Conduct investigations of complex problems:	3.3	3.3.2
CO: 3	PO 5: Modern tool usage:	5.1	5.1.2
CO: 4	PO 5: Modern tool usage:	5.2	5.2.1
CO: 5	PO 5: Modern tool usage:	5.3	5.3.2

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

COURSE CODE	COURSE TITLE	L	T	P	CREDITS
19APC0218	ELECTRICAL MEASUREMENTS LAB	0	0	2	1

Course outcomes:

1. Understand calibration of various electrical measuring instruments.
2. Accurately determine the values of inductance and capacitance using AC bridges.
3. Analyze coefficient of coupling between two coupled coils.
4. Accurately determine the values of very low resistances.
5. Understand the working principles of displacement transducers.

The following experiments are required to be conducted as compulsory experiments:

1. Calibration and Testing of single-phase energy Meter
2. Calibration of dynamometer power factor meter
3. Calibration of D.C. Potentiometer: PMMC ammeter and PMMC voltmeter.
4. Kelvin's double Bridge - Measurement of low resistance - Determination of Tolerance.
5. Determination of Coefficient of coupling between two mutually coupled coils
6. Schering Bridge & Anderson bridge
7. Measurement of 3-phase reactive power with single-phase wattmeter
8. Measurement of parameters of a choke coil using 3-voltmeter and 3-ammeter methods

In addition to the above eight experiments, at least any two of the experiments from the following list are required to be conducted:

9. Maxwell's bridge and DeSauty bridge
10. Calibration of LPF wattmeter - by Phantom loading
11. Wheatstone bridge - measurement of medium resistances
12. LVDT and capacitance pickup - characteristics and Calibration
13. Resistance strain gauge - strain measurement and Calibration
14. Measurement of Earth Resistance by Megger.

Reference Books:

1. Patranabis, ‘Sensors and Transducers’, Prentice Hall of India, 2004
2. Cooper W.D., “Electronic Instrumentation and Measurement Techniques”, Prentice Hall of India, New Delhi, 2003.Joseph J Carr, Elements of Electronic Instrumentation & Measurement, Pearson, 3rd Edition 1995.

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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