

# **K.L.N. COLLEGE OF ENGINEERING**

**Pottapalayam - 630612, Sivagangai District**

**(An Autonomous Institution, Affiliated to Anna University, Chennai)**



**Estd: 1994**

## **FOURTH SEMESTER CURRICULUM AND SYLLABUS REGULATIONS 2024**

**For Under Graduate Program**

## **B.E. ELECTRICAL AND ELECTRONICS ENGINEERING CHOICE BASED CREDIT SYSTEM**

**(For the students admitted from the academic year 2024-2025 onwards)**

**Dr.S.M.KANNAN,**  
Professor & Head,  
Department of Electrical & Electronics Engineering,  
K.L.N. College of Engineering,  
Pottapalayam, Sivagangai District – 630612



**K.L.N. COLLEGE OF ENGINEERING, POTTAPALAYAM**  
(An Autonomous Institution, Affiliated to Anna University, Chennai)



**VISION OF THE INSTITUTION**

To become a Centre of Excellence in Technical Education and Research in producing Competent and Ethical professionals to the society.

**MISSION OF THE INSTITUTION**

To impart Value and Need based curriculum to the students with enriched skill development in the field of Engineering, Technology, Management and Entrepreneurship and to nurture their character with social concern and to pursue their career in the areas of Research and Industry.

**VISION OF THE DEPARTMENT**

To become a high standard of excellence in Education, Training and Research in the field of Electrical & Electronics Engineering and allied applications.

**MISSION OF THE DEPARTMENT**

1. To create graduates possessing excellent knowledge and skill in Electrical and Electronics Engineering fundamentals.
2. To provide employable graduates for industry and to do high quality research;
3. To Emphasis on Ethics, professional conduct for Societal development.



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**PROGRAM EDUCATIONAL OBJECTIVES (PEOs)**

- PEO 1** To excel in industrial or graduate work in Electrical and Electronics Engineering and allied fields.
- PEO 2** To practice their Professions conforming to Ethical Values and Environmentally friendly policies.
- PEO 3** To work in international and multi-disciplinary Environments.
- PEO 4** To successfully adapt to evolving Technologies and stay current with their Professions.

**PROGRAM SPECIFIC OUTCOMES (PSOs)**

- PSO 1** Apply the fundamentals of Mathematics, Science and Engineering knowledge to identify, formulate, design and investigate complex engineering problems of Electric Circuits, Analog and Digital Electronic Circuits, Electrical Machines and Power Systems.
- PSO 2** Apply appropriate techniques and modern Engineering hardware and software tools in Power Systems to engage in life- long learning and to successfully adapt in multidisciplinary environments.



### **Knowledge and Attitude Profile (WK)**

- WK1:** A systematic, theory-based understanding of the natural sciences applicable to the discipline and awareness of relevant social sciences.
- WK2:** Conceptually-based mathematics, numerical analysis, data analysis, statistics and formal aspects of computer and information science to support detailed analysis and modelling applicable to the discipline.
- WK3:** A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline.
- WK4:** Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline.
- WK5:** Knowledge, including efficient resource use, environmental impacts, whole-life cost, re- use of resources, net zero carbon, and similar concepts, that supports engineering design and operations in a practice area.
- WK6:** Knowledge of engineering practice (technology) in the practice areas in the engineering discipline.
- WK7:** Knowledge of the role of engineering in society and identified issues in engineering practice in the discipline, such as the professional responsibility of an engineer to public safety and sustainable development.
- WK8:** Engagement with selected knowledge in the current research literature of the discipline, awareness of the power of critical thinking and creative approaches to evaluate emerging issues.
- WK9:** Ethics, inclusive behavior and conduct. Knowledge of professional ethics, responsibilities, and norms of engineering practice. Awareness of the need for diversity by reason of ethnicity, gender, age, physical ability etc. with mutual understanding and respect, and of inclusive attitudes



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**Program Outcomes (POs)**

- PO1: Engineering Knowledge:** Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.
- PO2: Problem Analysis:** Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4)
- PO3: Design/Development of Solutions:** Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)
- PO4: Conduct Investigations of Complex Problems:** Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions. (WK8).
- PO5: Engineering Tool Usage:** Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6)
- PO6: The Engineer and The World:** Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7).
- PO7: Ethics:** Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)
- PO8: Individual and Collaborative Team work:** Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.
- PO9: Communication:** Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences
- PO10: Project Management and Finance:** Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.
- PO11: Life-Long Learning:** Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change. (WK8)



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## **REGULATIONS 2024**

**For Under Graduate Program**

**B.E. ELECTRICAL AND ELECTRONICS ENGINEERING**

**CHOICE BASED CREDIT SYSTEM**

### **CATEGORY OF COURSES**

- i. **Humanities and Social Sciences (HS) Courses** include Technical English, Environmental Science and Engineering, Engineering Ethics and human values, Communication Skills and Management courses.
- ii. **Basic Sciences (BS) Courses** include Mathematics, Physics, and Chemistry.
- iii. **Engineering Sciences (ES) Courses** include Engineering Practices, Engineering Graphics, Basics of Electrical / Electronics / Mechanical / Computer Engineering / Instrumentation etc.
- iv. **Professional Core (PC) Courses** include the core courses relevant to the chosen program of study.
- v. **Professional Elective (PE) Courses** include the elective courses relevant to the chosen program of study.
- vi. **Open Elective (OE) Courses** include courses from other departments which a student can choose from the list specified in the curriculum of the students B.E. / B.Tech. Programmes.
- vii. **Employability Enhancement Courses (EEC)** include Project Work and/or Internship, Seminar, Professional Practices, Case Study and Industrial/Practical Training.
- viii. **Mandatory Courses (MC)** include Personality and Character development and the courses recommended by the regulatory bodies such as AICTE, UGC, etc.,



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**CHOICE BASED CREDIT SYSTEM**  
**CURRICULUM AND SYLLABUS**

**SEMESTER IV**

S. NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
<b>THEORY</b>								
1.	24BS401	Probability, Statistics and Numerical Methods <small>(Common to B.E Mech &amp; EEE programmes)</small>	BS	4	3	1	0	4
2.	24EE401	Synchronous and Asynchronous Machines	PC	4	3	1	0	4
3.	24EE402	Transmission and Distribution	PC	3	3	0	0	3
4.	24EE403	Linear Integrated Circuits	PC	3	3	0	0	3
5.	24EE404	Measurements and Instrumentation	PC	3	3	0	0	3
6.	24EE405	Artificial Intelligence and Applications	PC	3	3	0	0	3
<b>PRACTICAL</b>								
7.	24EE4L1	Electrical Machines Laboratory – II	PC	3	0	0	3	1.5
8.	24EE4L2	Linear and Digital Integrated Circuits Laboratory	PC	3	0	0	3	1.5
9.	24EE4L3	Micro Project	EEC	2	0	0	2	1
10.	24HS4L1	Aptitude and Soft Skills – III <small>(Common to all B.E./B.Tech. programmes)</small>	EEC	2	0	0	2	1*
<b>TOTAL</b>				<b>30</b>	<b>18</b>	<b>2</b>	<b>10</b>	<b>24</b>

\* The grades earned by the students will be recorded in the grade sheet, however the same shall not be considered for the computation of CGPA

<b>24BS401</b>	<b>PROBABILITY, STATISTICS AND NUMERICAL METHODS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>

**OBJECTIVES:**

- To understand the basic concepts of Probability and Statistics.
- To introduce the numerical methods for solving algebraic and transcendental equations and interpolation in various intervals.
- To acquaint the knowledge of various Numerical methods of solving ordinary differential equations.

**UNIT - I PROBABILITY AND RANDOM VARIABLES 9+3**

Probability –Axioms of probability- conditional probability – Baye’s theorem (Without Proof). Discrete and continuous random variables- Moments-Moment generating function – Binomial, Poisson and Normal distributions (Except derivations).

**UNIT - II INTRODUCTION TO STATISTICS, CORRELATION AND REGRESSION 9+3**

Measures of Central tendency- Mean-Median-Mode- Measures of Dispersion- Standard deviation -Coefficient of Variation- Correlation – Coefficient of correlation –Rank Correlation- Regression –Estimation of Regression line.

**UNIT - III SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS 9+3**

Solution of algebraic and transcendental equations - Fixed point iteration method – Newton Raphson method - Solution of linear system of equations - Gauss elimination method – Gauss Jordan method – Iterativemethods of Gauss Jacobi and Gauss Seidel - Eigen values of a matrix by Power method.

**UNIT - IV INTERPOLATION, NUMERICAL DIFFERENTIATION AND NUMERICAL INTEGRATION 9+3**

Lagrange’s and Newton’s divided difference interpolations – Newton’s forward and backward difference interpolations – Approximation of derivatives using interpolation polynomials – Numerical single and double integrations using Trapezoidal and Simpson’s 1/3 rules.

**UNIT - V NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS 9+3**

Single step methods : Taylor’s series method - Euler’s method - Modified Euler’s method - Fourth order Runge-Kutta method for solving first order equations - Multi step methods : Milne’s and Adams - Bash forth predictor corrector methods for solving first order equations.

**TOTAL: 45+15 = 60 PERIODS**

**TEXT BOOKS:**

1. Gupta.S.C., Kapoor.V.K., "Fundamental of Mathematical Statistics", Sultan chand & Sons Educational Publishers ,New Delhi, Reprint 2013
2. Grewal.B.S., "Numerical Methods in Engineering and Science", Khanna Publishers, New Delhi, 10<sup>th</sup> Edition, 2015.

**REFERENCES:**

1. Johnson. R.A., Miller, I and Freund J., "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 8<sup>th</sup> Edition, 2015.
2. Veerarajan.T., "Probability, Statistics and Random Processes", Tata McGraw Hill, New Delhi , 2006.
3. Sastry. S.S, "Introductory Methods of Numerical Analysis", PHI Learning Pvt. Ltd, 5th Edition, 2018.
4. Sankara Rao. K., "Numerical Methods for Scientists and Engineers", Prentice Hall of India Pvt. Ltd, 5<sup>th</sup> Edition, New Delhi, 2007.
5. Veerarajan.T , Ramachandran. T, "Numerical Methods With Programs In C", Tata McGraw Hill Publishing Company Limited, 8<sup>th</sup> Edition, Reprint 2011.

**OUTCOMES:**

**AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:**

<b>Course Name: PROBABILITY, STATISTICS AND NUMERICAL METHODS</b>		<b>Course Code: 24BS401</b>	
<b>CO</b>	<b>Course Outcomes</b>	<b>Unit</b>	<b>K- CO</b>
<b>C209.1</b>	Build the parameters of statistical distributions using basic probability theory concepts.	I	K3
<b>C209.2</b>	Compute the measures of central tendency, measures of dispersion to locate the central points and to know the amount of diversity in the distribution.	II	K3
<b>C209.3</b>	Solve algebraic and transcendental equations.	III	K3
<b>C209.4</b>	Solve numerical differentiation and integration using numerical techniques.	IV	K3
<b>C209.5</b>	Apply numerical techniques to solve the ordinary differential equations with initial and boundary conditions with engineering applications.	V	K3

<b>24EE401</b>	<b>SYNCHRONOUS AND ASYNCHRONOUS MACHINES</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>

**OBJECTIVES:**

- To learn the construction, calculation of voltage regulation in different methods and sharing of real and reactive power of synchronous generators.
- To analyze the operation and performance of synchronous motor.
- To learn the construction, principle of operation and performance of induction machines.
- To learn the starting methods and speed control of three-phase induction motors.
- To analyze the operation and performance of single-phase induction motors and special electrical machines.

**UNIT - I SYNCHRONOUS GENERATOR 9+3**

Constructional Details — Types of Rotors — EMF Equation — Synchronous Reactance — Armature Reaction – Voltage Regulation – EMF, MMF and ZPF Methods – Synchronizing and Parallel Operation — Synchronizing Power - Output Equations - Change of Excitation and Mechanical Input.

**UNIT - II SYNCHRONOUS MOTOR 9+3**

Principle of Operation – Torque Equation – Starting Methods -Operation on Infinite Bus bars – V and Inverted V Curves – Input and Output Power Equations – Power Angle Relations – Hunting - Synchronous Condenser - Applications.

**UNIT - III THREE PHASE INDUCTION MOTOR 9+3**

Constructional Details — Types of Rotors — Squirrel Cage and Slip Ring — Principle of Operation – Slip –Torque Equations -Slip-Torque Characteristics – Losses and Efficiency – Load Test - No Load and Blocked Rotor Tests - Equivalent Circuit- Separation of No-Load Losses – Crawling and Cogging – Double Cage Rotors – Induction Generator.

**UNIT – IV STARTING AND SPEED CONTROL OF THREE PHASE INDUCTION MOTOR 9+3**

Need for Starters — Types of Starters — Stator Resistance, Rotor Resistance, Autotransformer, Star-Delta Starters and DOL Starters - Speed Control by Varying Voltage, Frequency, Poles and Rotor Resistance — Solid State starter -VFD controller.

**UNIT – V SINGLE PHASE INDUCTION MOTOR AND SPECIAL MACHINES 9+3**

Constructional Details –Types of single phase induction motors– Double Revolving Field Theory – No Load and Blocked Rotor Tests - Equivalent Circuit – Starting Methods – Applications. Special machines: Linear Induction Motor, Hysteresis motor, Brushless DC Motor.

**TOTAL: 45+15 = 60 PERIODS**

**TEXT BOOKS:**

1. Nagrath.I. J and Kothari. D. P., 'Electric Machines', 5<sup>th</sup> Edition, Tata McGraw Hill Publishing Company, New Delhi, 2017.

**REFERENCES:**

1. Bimbra P.S. - Electrical Machinery, 1st Edition, Khanna Book Publishing co(P) Ltd, New Delhi, 2021
2. S.K. Bhattacharya, 'Electric Machines' McGraw - Hill education, New Delhi, 3<sup>rd</sup> edition, 2009.
3. Sahdev. S.K., 'Electrical Machines', Cambridge University Press, 2018.

**OUTCOMES:**

**AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:**

<b>Course Name : SYNCHRONOUS AND ASYNCHRONOUS MACHINES</b>		<b>Course Code : 24EE401</b>	
<b>CO</b>	<b>Course Outcomes</b>	<b>Unit</b>	<b>K –CO</b>
<b>C211.1</b>	Explain the construction details of alternator, determine the power sharing and voltage regulation of alternators.	I	K3
<b>C211.2</b>	Explain the construction and working principle of synchronous motor and determine the torque angle	II	K3
<b>C211.3</b>	Explain the construction and working principle of three phase induction motor and calculate the efficiency using equivalent circuit.	III	K3
<b>C211.4</b>	Explain the working of starters, calculate the starting torque and full load torque and explain the speed control of three phase induction motor.	IV	K3
<b>C211.5</b>	Explain the construction and working principle of single-phase induction motor and calculate the efficiency using equivalent circuit.	V	K3

<b>24EE402</b>	<b>TRANSMISSION AND DISTRIBUTION</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**OBJECTIVES:**

- To study the structure of electric power system and to develop expressions for the Computation of transmission line parameters
- To obtain the equivalent circuits for the transmission lines based on distance and to determine voltage regulation and efficiency.
- To understand the mechanical design of transmission lines and to analyze the voltage distribution in insulator strings to improve the efficiency.
- To study the types, construction of cables and methods to improve the efficiency.
- To study about distribution systems, types of substations, methods of grounding.

**UNIT - I TRANSMISSION LINE PARAMETERS 9**

Structure of Power System - Parameters of single and three phase transmission lines with single and double circuits -Resistance, inductance and capacitance of solid, stranded and bundled conductors, Symmetrical and unsymmetrical spacing and transposition — application of self and mutual GMD; skin and proximity effects

**UNIT - II MODELLING AND PERFORMANCE OF TRANSMISSION LINES 9**

Performance of Transmission lines - short line, medium line and long line — equivalent circuits, phasor diagram, attenuation constant, phase constant, surge impedance - transmission efficiency and voltage regulation, real and reactive power flow in lines — Formation of Corona — Critical Voltages — Effect on Line Performance.

**UNIT - III MECHANICAL DESIGN OF LINES 9**

Mechanical design of OH lines — Line Supports –Types of towers — Stress and Sag Calculation — Effects of Wind and Ice loading. Insulators: Types, voltage distribution in insulator string, improvement of string efficiency, testing of insulators.

**UNIT - IV UNDER GROUND CABLES 9**

Underground cable - Types of cables — Construction of single core and Three core Cables - Insulation Resistance — Potential Gradient - Capacitance of Single-core and Three core cables- Grading of cables - Power factor and heating of cables.

**UNIT - V DISTRIBUTION SYSTEMS 9**

Distribution Systems — AC distribution System — Connection schemes-radial and ring main-Interconnected system-Techniques of Voltage Control and Power factor improvement – Distribution Loss –Types of Substations - Methods of Grounding – Introduction to Smart Grid.

**TOTAL: 45 PERIODS**

**TEXT BOOKS:**

1. D.P.Kothari, I.J. Nagarath, 'Power System Engineering', Tata McGraw-Hill Publishing Company limited, New Delhi, Third Edition, 2019.

**REFERENCES:**

1. C.L.Wadhwa, 'Electrical Power Systems', New Academic Science Ltd, 2018.
2. Soni M L, Gupta P V, Bhatnagar U S and Chakrabarathi A, "A Text Book on Power System Engineering", Dhanpat Rai & Co., New Delhi, 2016.

**OUTCOMES:**

**AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:**

<b>Course Name : TRANSMISSION AND DISTRIBUTION</b>		<b>Course Code : 24EE402</b>	
<b>CO</b>	<b>Course Outcomes</b>	<b>Unit</b>	<b>K –CO</b>
<b>C212.1</b>	Calculate the transmission network parameters for various configuration	I	K3
<b>C212.2</b>	Determine the performance of transmission line.	II	K3
<b>C212.3</b>	Calculate the sag of transmission line, the voltage distribution in insulator strings and determine the string efficiency of insulator.	III	K3
<b>C212.4</b>	Compute the electrical parameter of underground cable.	IV	K3
<b>C212.5</b>	Explain the distribution system, substation and grounding.	V	K2

<b>24EE403</b>	<b>LINEAR INTEGRATED CIRCUITS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**OBJECTIVES:**

- To discuss the IC fabrication procedure.
- To learn the characteristics of Op-Amp.
- To design and construct the basic applications of Op-amp.
- To interpret the internal functional blocks and the applications of special ICs.
- To illustrate the operation of application ICs.

**UNIT - I IC FABRICATION 9**

IC classification - fundamentals of monolithic IC technology – basic planar processes - fabrication of typical circuit - Fabrication of diodes, resistors, capacitors, FETs and PV Cell

**UNIT - II CHARACTERISTICS OF OP-AMP 9**

Ideal Op-Amp - DC and AC characteristics - Basic applications of Op-Amp – Inverting and Non-inverting Amplifiers, summer, differential amplifier, differentiator and integrator – V to I and I to V converters

**UNIT - III APPLICATIONS OF OP-AMP 9**

Instrumentation amplifier - First order Low pass and high pass active filters  
 - Sample and Hold circuit – Op-Amp circuits using Diodes - peak detector, clippers, clampers  
 - Comparators - Multivibrators - Waveform generators – D/A converters - A/D converters.

**UNIT - IV SPECIAL ICs 9**

555 Timer - Functional block, characteristics – IC NE/SE 566 Voltage Controlled Oscillator - IC NE/SE 565 Phase Locked Loop – AD633 Analog multiplier and Divider

**UNIT - V APPLICATION ICs 9**

IC voltage regulators – LM78XX, LM79XX series voltage regulator - 723 Variable voltage regulators – switching regulator - LM 380 power amplifier - ICL 8038 function generator IC.

**TOTAL: 45 PERIODS**

**TEXT BOOKS:**

1. D. Roy Choudhury, Shail B. Jain, “Linear Integrated Circuits”, Sixth edition, New Age International Private Limited, 2021.

**REFERENCES:**

1. David A. Bell, “Operational Amplifiers and Linear ICs”, Third edition, Oxford University Press, 2011
2. Ramakant A. Gayakward, “Op–Amps and Linear Integrated Circuits”, 4th Edition, PHI, 2015.

**OUTCOMES:****AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:**

<b>Course Name : LINEAR INTEGRATED CIRCUITS</b>		<b>Course Code : 24EE403</b>	
<b>CO</b>	<b>Course Outcomes</b>	<b>Unit</b>	<b>K –CO</b>
<b>C213.1</b>	Explain the IC fabrication process and discuss the fabrication of active and passive components.	I	K2
<b>C213.2</b>	Compute the gain and output voltage of the given Op-Amp circuits.	II	K3
<b>C213.3</b>	Determine the oscillating frequency of waveform generators, cutoff frequency of filters and also discuss the operation of Op-Amp circuits using diodes.	III	K3
<b>C213.4</b>	Discuss the internal functional blocks and applications of special ICs 555, 566, 565, and AD633 ICs.	IV	K2
<b>C213.5</b>	Explain the operation of voltage regulator ICs namely LM78XX, LM79XX, LM317, LM723, $\mu$ A78S40 switching regulator, LM 380 power amplifier and ICL 8038 function generator IC.	V	K2

<b>24EE404</b>	<b>MEASUREMENTS AND INSTRUMENTATION</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**OBJECTIVES:**

- To understand the concepts of measurement technology.
- To learn different types of measuring instruments and its operation
- To learn the different types of Potentiometer and bridge circuits.
- To learn the different types of display devices and transducers
- To learn the various sensors and data acquisition system.

**UNIT - I INTRODUCTION 9**

Functional elements of an instrument – Static and dynamic characteristics – Errors in measurement – Statistical evaluation of measurement data – Standards and calibration - Classification of measuring instruments-Essential requirements of an instrument.

**UNIT - II ELECTRICAL AND ELECTRONIC INSTRUMENTS 9**

Construction, working principle and Torque equation of Permanent Magnet Moving Coil instruments - Attraction type and Repulsion type Moving iron instruments-Extension of Voltmeter and Ammeter range - Construction, working principle of Instrument transformers-Wattmeter - Energy meter – Power Factor Meter.

**UNIT - III COMPARISON METHODS OF MEASUREMENTS 9**

D.C potentiometers - Crompton Potentiometer, D.C Bridges (Wheatstone, Kelvin, Kelvin double) & A.C Bridges (Maxwell, Anderson, Wein & Schering).

**UNIT - IV DISPLAY DEVICES AND TRANSDUCERS 9**

Digital CRO, LED, LCD & Dot matrix display – Classification of transducers – Selection of transducers – Resistive Transducer – Strain gauge, Measurement of Temperature - RTD, thermistor & thermocouple, Capacitive transducer - Inductive Transducers – Linear Variable Differential Transducer, Piezoelectric, Hall effect, optical and digital transducers

**UNIT - V SENSORS AND DATA ACQUISITION SYSTEMS 9**

Classification of sensors – Sensor calibration techniques – Sensor Output Signal Types. — Smart sensors - GPS, Bluetooth, Laser Range Sensor (LIDAR), Motion Sensors, Load Cell -Thermal Imagers - Elements of data acquisition system - Data Loggers – Smart Energy Meter.

**TOTAL: 45 PERIODS**

**TEXT BOOK:**

1. Sawney A K and Puneet Sawney, “A Course in Electrical and Electronics Measurements and Instrumentation”, Revised edition, Dhanpat Rai & Co, New Delhi, 2021.

**REFERENCES:**

1. Patranabis D, “Sensors and Transducers”, 2nd Edition, PHI, New Delhi, 2010.
2. Er. R K Rajput “Electrical and Electronic Measurements and Instrumentation” S Chand, 2016

**OUTCOMES:  
AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:**

<b>Course Name : MEASUREMENTS AND INSTRUMENTATION</b>		<b>Course Code : 24EE404</b>	
<b>CO</b>	<b>Course Outcomes</b>	<b>Unit</b>	<b>K –CO</b>
<b>C214.1</b>	Explain the functional elements of instrumentation and calculate the errors in measurement.	I	K3
<b>C214.2</b>	Explain the working of PMMC and MI meters and Derive the Torque equation.	II	K2
<b>C214.3</b>	Calculate the resistance, inductance and capacitance values using bridges and potentiometers.	III	K3
<b>C214.4</b>	Explain the working of various types of display devices and transducers.	IV	K2
<b>C214.5</b>	Discuss the DAQ systems with different sensors for real time applications.	V	K2

<b>24EE405</b>	<b>ARTIFICIAL INTELLIGENCE AND APPLICATIONS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**OBJECTIVES:**

- To learn the basic AI approaches
- To develop problem solving agents
- To perform logical reasoning
- To understand various search problems
- To learn various applications of AI

**UNIT - I INTELLIGENT AGENTS****9**

Introduction to AI – Agents and Environments – concepts of rationality – nature of environments – structure of agents, problem solving agents – search algorithms – uninformed search strategies

**UNIT - II PROBLEM SOLVING METHODS****9**

Heuristic search strategies – heuristic functions. Local search and optimization problems – local search in continuous space – search with non-deterministic actions – search in partially observable environments – online search agents and unknown environments

**UNIT - III CONSTRAINT SATISFACTION PROBLEMS****9**

Alpha-Beta search – Monte - Carlo tree search –. Constraint satisfaction problems - Types of CSP – constraint propagation – backtracking search for CSP – local search for CSP – structure of CSP.

**UNIT - IV LOGICAL REASONING****9**

Knowledge-based agents – propositional logic – propositional theorem proving – propositional model checking – agents based on propositional logic. First-order logic – syntax and semantics – knowledge representation and engineering – inferences in first-order logic – forward chaining – backward chaining - resolution.

**UNIT - V APPLICATIONS OF AI****9**

Language models - Information retrieval – Information Extraction - Natural Language Processing, Machine Translation, Speech recognition, Robot-Hardware perception-planning-Moving.

**TOTAL: 45 PERIODS****TEXT BOOKS:**

1. S. Russell and P. Norvig, Artificial Intelligence: A Modern Approach Prentice Hall, 4<sup>th</sup> Edition, 2021.
2. M. Tim Jones, Artificial Intelligence: A Systems Approach (Computer Science), Jones and Bartlett Publishers, Inc.; First Edition, 2008

**REFERENCES:**

1. Anamitra Deshmukh-Nimbalkar, Artificial Intelligence, Technical Publications, 2<sup>nd</sup> Edition, July 2025.
2. Gerhard Weiss, Multi Agent Systems, 2<sup>nd</sup> Edition, MIT Press, 2013.
3. I. Bratko, Prolog: Programming for Artificial Intelligence, 4<sup>th</sup> edition, Addison-Wesley Educational Publishers Inc., 2011.

**OUTCOMES:**

**AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:**

<b>Course Name : ARTIFICIAL INTELLIGENCE AND APPLICATIONS</b>		<b>Course Code : 24EE405</b>	
<b>CO</b>	<b>Course Outcomes</b>	<b>Unit</b>	<b>K –CO</b>
<b>C215.1</b>	Develop fundamental search strategies to solve simple goal-based problems by explaining the characteristics of intelligent agents	I	K3
<b>C215.2</b>	Make use of heuristic search, local search, and optimization techniques for solving deterministic and non-deterministic search problems in known and partially observable environments.	II	K3
<b>C215.3</b>	Analyze and compare various CSP techniques including backtracking, constraint propagation, and local search to select appropriate methods for solving structured constraint problems.	III	K4
<b>C215.4</b>	Apply propositional and first-order logic inference methods to design knowledge-based agents for logical reasoning tasks.	IV	K3
<b>C215.5</b>	Demonstrate real-world intelligent system applications with AI techniques such as NLP, machine translation, information retrieval, and robotic perception-planning.	V	K3





24EE4L3

MICRO PROJECT

L	T	P	C
0	0	2	1

**OBJECTIVES:**

- To allow the students to explore the breadth of research that is being performed within the college.
- To implement electrical/electronic hardware by learning PCB artwork design, soldering techniques, testing, and troubleshooting, etc.
- To set the students apply the programming knowledge into a real-world situation/problem.
- To work as an individual or in a team in development of technical projects.
- To communicate and report effectively project related activities and findings.

**MICRO PROJECT GUIDELINES:**

The micro-project is a team activity having 3-4 students in a team. This is electrical/electronic circuit building and testing for developing real life small electrical/electronic applications. The micro-project may be a complete hardware or hardware with small programming aspect. It should encompass electrical/electronic components, devices, analog or digital ICs, etc. Micro- Project should cater to a small system required in laboratory or real-life application. Based on comprehensive literature survey/ need analysis, the student shall identify the title and define the aim and objectives of Micro-project.

**TOTAL: 30 PERIODS**

**OUTCOMES:**

**AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:**

Course Name: MICRO PROJECT		Course Code: 24EE4L3
CO	COURSE OUTCOMES	K- CO
C218.1	Identify and define a problem statement from the requirements raised from literature survey /need analysis.	K2
C218.2	Build and Test electronic circuits/prototype for developing real life small electronic applications.	K3
C218.3	Work in teams, organize and write comprehensive report and effective presentation of the project work.	K3
C218.4	Construct prototyping which will lead them towards entrepreneurship	K6
C218.5	Demonstrate the compelling presentation of the academic project.	K3

<b>24HS4L1</b>	<b>APTITUDE AND SOFT SKILLS -III</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>

**Module I LOGICAL REASONING SKILLS 10**

Logical Reasoning, Letter and Symbol series, Number series, Analyzing arguments, Making judgments, Logical Reasoning, Direction Sense test, Venn diagrams, Seating arrangements, Cause and effect, Blood relation test, Dice Logical, verbal puzzles, Analytical puzzles and sudoku.

**Module II BEHAVIOURAL SKILLS 5**

Interview Etiquettes - Body language, Dress code, Eye contacts, Handshakes for Interview - Interview handling – Mock Interview Videos - High Frequency words in resume and interviews - Visual Interpretation – HR Interview question – Sell yourself - Interpersonal and intrapersonal communication

**Module III VERBAL SKILLS 15**

Vocabulary basics, Grammar basics, Critical Reasoning, Reading comprehension, Synonyms, Antonyms, Idioms and phrases - sentence completion, Spotting errors, Error correction, Sentence correction, Writing Resume, Letter writing, Official mail correspondence - Ways to communicate in different scenarios-job interview, business meeting, project proposal submission, informal gathering, speech for a large audience and debate.

**TOTAL: 30 PERIODS**

**REFERENCES:**

1. Quantitative aptitude for competitive examinations , R.S.Agarwal, S.Chand publications
2. Quantitative Aptitude – AbijithGuha, TMH
3. Quantitative Aptitude for Cat – ArunSharma,TMH
4. Gulati. S., (2006) “Corporate Soft Skills”, New Delhi, India: Rupa& Co.
5. Prasad, HariMohan,A Handbook of Spotting Errors, Mcgraw Hill Education, 2010