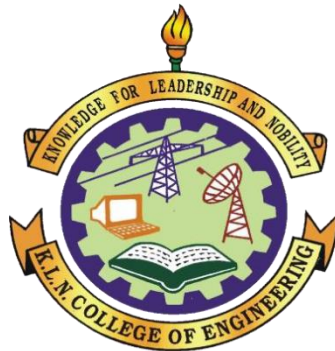


K.L.N. COLLEGE OF ENGINEERING

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. ELECTRONICS AND COMMUNICATION ENGINEERING

CHOICE BASED CREDIT SYSTEM

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



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 promote as a center of excellence in educational and research activities related to electronics and communication engineering and its allied areas.

MISSION OF THE DEPARTMENT

To create educational and research environment to meet ever changing and ever demanding needs of electronics and communication industry along with IT and other interdisciplinary fields.

To mould the students to become ethically upright and recognized as responsible engineers



K.L.N. COLLEGE OF ENGINEERING, POTTAPALAYAM

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



PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PEO 1: To prepare graduates with a strong foundation in Engineering science and Technology with more emphasis in Electronics and Communication Engineering and its allied areas.

PEO 2: To prepare the students to pursue successful career in industry and to motivate them for higher education.

PEO 3: To prepare the graduates to sustain as good professional, researcher and to practice them in emerging technologies through lifelong learning.

PEO 4: To impart students with ethical standards, professional excellence through effective communication skills, team work, multi disciplinary projects and social responsibility.

PROGRAM SPECIFIC OUTCOMES (PSOs):

PSO 1: Design and analyse the basic analog and digital electronic circuits.

PSO 2: Design and analyse the spectral components of communication signals and systems.

PSO 3: Develop the modules in VLSI and embedded systems.



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KNOWLEDGE AND ATTITUDE PROFILE

- 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)

PO 1: Engineering Knowledge: Apply knowledge of mathematics, natural science, computing, and engineering fundamentals, and an engineering specialization as specified in WK1 to WK4, respectively, to develop solutions to complex engineering problems.

PO 2: Problem Analysis: Identify, formulate, research literature, and analyze complex engineering problems, reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences with holistic considerations for sustainable development* (WK1 to WK4).

PO3: Design/development of solutions: Design creative solutions for Complex engineering problems and design systems, components, or processes to meet identified needs with appropriate consideration for public health and safety, whole-life cost, net zero carbon, as well as resource, cultural, societal, and environmental considerations as required (WK5).

PO 4: Investigation: Conduct investigations of complex engineering problems using research methods, including research-based knowledge, design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions (WK8).

PO 5: Tool Usage: Create, select and apply, and recognize limitations of appropriate techniques, resources, and modern engineering and IT tools, including prediction and modeling, to complex engineering problems (WK2 and WK6).

PO 6: The Engineer and the World: When solving complex engineering problems, analyze and evaluate sustainable development impacts to society, the economy, sustainability, health and safety, legal frameworks, and the environment (WK1, WK5, and WK7).

PO 7: Ethics: Apply ethical principles and commit to professional ethics and norms of engineering practice and adhere to relevant national and international laws. Demonstrate an understanding of the need for diversity and inclusion (WK9).

PO 8: Individual and Collaborative Team work: Function effectively as an individual and as a member or leader in diverse and inclusive teams and in multidisciplinary, face- to-face, remote, and distributed settings (WK9).

PO 9: Communication: Communicate effectively and inclusively 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, taking into account cultural, language, and learning differences.

PO 10: 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.

PO 11: Lifelong 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. ELECTRONICS AND COMMUNICATION 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 physics, Basics of Electrical / Electronics / Mechanical / Computer Engineering / Instrumentation etc.
- iv. **Professional Core (PC) Courses** include the core courses relevant to the chosen programme of study.
- v. **Professional Elective (PE) Courses** include the elective courses relevant to the chosen programme 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 (MC) Courses** include Personality and Character development and the courses recommended by the regulatory bodies such as AICTE, UGC, etc



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REGULATIONS 2024
CHOICE BASED CREDIT SYSTEM
B.E. ELECTRONICS AND COMMUNICATION ENGINEERING
CURRICULUM AND SYLLABUS
SEMESTER IV

| S.No. | COURSE CODE | COURSE TITLE | CATEGORY | CONTACT PERIODS | L | T | P | C |
|-----------------------------|-------------|---|----------|-----------------|-----------|----------|-----------|-----------|
| THEORY | | | | | | | | |
| 1. | 24EC401 | Random Process and Communication Systems | PC | 4 | 3 | 1 | 0 | 4 |
| 2. | 24EC402 | Electromagnetic Fields | PC | 4 | 3 | 1 | 0 | 4 |
| 3. | 24EC403 | Analog Integrated Circuits | PC | 3 | 3 | 0 | 0 | 3 |
| 4. | 24EC404 | Control System Engineering | PC | 3 | 3 | 0 | 0 | 3 |
| 5. | 24EC405 | Microprocessor and Microcontroller | PC | 3 | 3 | 0 | 0 | 3 |
| THEORY CUM PRACTICAL | | | | | | | | |
| 6. | 24EC406 | Communication Networks and Security | PC | 4 | 2 | 0 | 2 | 3 |
| PRACTICAL | | | | | | | | |
| 7. | 24EC4L1 | Analog Integrated Circuits Laboratory | PC | 3 | 0 | 0 | 3 | 1.5 |
| 8. | 24EC4L2 | Microprocessor and Microcontroller Laboratory | PC | 3 | 0 | 0 | 3 | 1.5 |
| 9. | 24EC4L3 | Micro Project | EEC | 2 | 0 | 0 | 2 | 1 |
| 10. | 24HS4L1 | Aptitude and Soft Skills – III (Common to all B.E./B.Tech. programmes) | EEC | 2 | 0 | 0 | 2 | 1* |
| TOTAL | | | | 31 | 17 | 2 | 12 | 24 |

***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**

| | | | | | |
|----------------|---|----------|----------|----------|----------|
| 24EC401 | RANDOM PROCESS AND COMMUNICATION SYSTEMS | L | T | P | C |
| | | 3 | 1 | 0 | 4 |

OBJECTIVES:

- To develop a strong foundation in probability, random variables, and random processes to enable students to analyze and model communication systems effectively.
- To equip students with the skills to apply modulation techniques (both amplitude and angle modulation) in real-world communication systems, ensuring optimal performance and noise reduction.
- To enable students to understand and apply information theory principles for efficient data transmission, source coding, and maximizing communication channel capacity.

UNIT - I PROBABILITY AND RANDOM VARIABLES 9+3

Probability – Axioms of Probability - Baye’s theorem - Conditional probability – Discrete and continuous Random variables – Moments – Moment Generating functions - Binomial, Poisson and Normal distributions - Joint distributions - Marginal and conditional distributions.

UNIT - II RANDOM PROCESS 9+3

Random Process: Basic Concepts-Stationary Processes - Mean Correlation and Covariance Functions - Ergodic Processes - Transmission of Random - Process over LTI Systems Random Processes in the Frequency Domain - Power spectral density –Properties Cross spectral density Gaussian Processes – Properties-Central limit theorem.

UNIT - III NOISE 9+3

Noise sources and types - White Noise - Narrow band Noise - Representation of Narrow band noise – in-phase and quadrature Phase components - Envelope and phase Components - Sine wave plus narrow band noise.

UNIT - IV AMPLITUDE MODULATION 9+3

Generation and detection of AM wave – spectra - DSBSC, Hilbert Transform, Pre-envelope & complex envelope - SSB and VSB – comparison - Performance analysis in Amplitude Modulation. Super heterodyne Receiver.

UNIT - V ANGLE MODULATION 9+3

Phase and frequency modulation - Narrow Band and Wide band FM - Spectrum - FM modulation and demodulation – FM Discriminator - PLL as FM Demodulator - Transmission bandwidth - Performance analysis in Frequency Modulation.

TOTAL: 60 PERIODS

TEXT BOOKS:

1. O.C.Ibe, “Fundamentals of Applied Probability and Random Processes”, Elsevier, 1st Indian Reprint, 2007.
2. Simon Haykin, “Communication Systems”, Wiley, 5th Edition, 2021.Press, 3rd Edition, 2018

REFERENCES:

1. J.G.Proakis and M.Salehi, "Fundamentals of Communication Systems", Pearson Education 2014.
2. P.Z.Peebles, "Probability, Random Variables and Random Signal Principles", Tata McGraw Hill, 4th Edition, New Delhi, 2002.
3. Hwei Hsu, "Schaum's Outline of Theory and Problems of Probability, Random Variables and Random Processes", Tata McGraw Hill Edition, New Delhi, 2004.
4. B.P.Lathi, "Modern Digital and Analog Communication Systems" Oxford University Press, 4th Edition, 2017.
5. H.P.Hsu, "Schaum Outline Series - Analog and Digital Communications", TMH 2006.

OUTCOMES:

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

| Course Name : RANDOM PROCESS AND COMMUNICATION SYSTEMS | | Course code: 24EC401 | |
|---|---|-----------------------------|--------------|
| CO | COURSE OUTCOMES | UNIT | K- CO |
| C209.1 | Apply the concepts of probability and standard distributions with real life phenomenon. | I | K3 |
| C209.2 | Apply the concept of random processes to the design of communication systems | II | K3 |
| C209.3 | Apply noise concepts to analyze white and narrowband noise and their effects on signals. | III | K3 |
| C209.4 | Apply the concepts of amplitude modulation to generate and detect AM, DSB-SC, SSB and VSB signals, compare their characteristics, and analyze the performance of a super heterodyne receiver. | IV | K3 |
| C209.5 | Apply the concepts of phase and frequency modulation to perform FM modulation and demodulation, determine bandwidth, analyze performance, and examine the operation of a super heterodyne receiver. | V | K3 |



**Dr.V.KEJALAKSHMI,
PROFESSOR & HEAD
DEPARTMENT OF ECE**

| | | | | | |
|----------------|-------------------------------|----------|----------|----------|----------|
| 24EC402 | ELECTROMAGNETIC FIELDS | L | T | P | C |
| | | 3 | 1 | 0 | 4 |

OBJECTIVES:

- To introduce students with different coordinate systems.
- To familiarize the students with the different concepts of electrostatic, magneto static and time varying electromagnetic systems.
- To expose the students to the ideas of electromagnetic waves.

UNIT - I INTRODUCTION 9+3

Coordinate systems and transformation – Introduction - Cartesian Coordinates - Circular Cylindrical Coordinates - Spherical Coordinates - Constant-Coordinate Surfaces. Vector calculus - Introduction - Differential Length, Area, and Volume - Line, Surface, and Volume Integrals - Del Operator - Gradient of a Scalar - Divergence of a Vector and Divergence Theorem - Curl of a Vector and Stokes’s Theorem - Laplacian of a Scalar -Classification of Vector Fields.

UNIT - II ELECTROSTATICS 9+3

Electrostatic fields- Introduction - Coulomb’s Law and Field Intensity - Electric Fields due to Continuous Charge Distributions - Electric Flux Density - Gauss’s Law - Applications - Electric Potential - Relationship between E and V - An Electric Dipole and Flux Lines - Energy Density in Electrostatic Fields - Application - Electrostatic Discharge – MATLAB simulation.

Electrostatic Boundary Conditions – Introduction - Poisson’s and Laplace’s Equations - Uniqueness Theorem - General Procedures for Solving Poisson’s or Laplace’s Equation - Resistance and Capacitance.

UNIT - III MAGNETOSTATICS 9+3

Magnetostatic Fields-Introduction - Biot–Savart’s Law - ampere’s circuit law - Maxwell’s equation - applications of ampere’s law - magnetic flux density – magnetic scalar and vector potentials - derivation of Biot–savart’s law and Ampere’s law.

Magnetic Forces, Materials, and Devices - Introduction -forces due to magnetic fields - magnetic torque and moment - a magnetic dipole - magnetization in materials - classification of materials - magnetic boundary conditions - inductors and inductances -magnetic energy - magnetic circuits - force on magnetic materials.

UNIT - IV MAXWELL’S EQUATIONS 9+3

Introduction - Faraday’s Law - Transformer and Motional Electromotive Forces -Displacement Current – Maxwell’s Equation - Final Forms - Time-Varying Potentials - Time-Harmonic Fields.

UNIT - V ELECTROMAGNETIC WAVE PROPAGATION 9+3

Introduction - Waves in General - Wave Propagation in Lossy Dielectrics - Plane Waves in Lossless Dielectrics - Plane Waves in Free Space - Plane Waves in Good Conductors - Wave Polarization - Power and the Poynting Vector - Reflection of a Plane Wave at Normal Incidence - Reflection of a Plane Wave at Oblique Incidence - Case study on Wi Fi wave Propagation.

TOTAL:45+15 = 60 PERIODS

TEXT BOOKS:

1. Mathew N.O. Sadiku, "Elements of Electromagnetics", 7th Edition, Oxford University Press, 2018.
2. W.H.Hayt and J.A.Buck, "Engineering Electromagnetics", 8th Edition, McGraw-Hill (India), 2011.

REFERENCES:

1. Edward C. Jordan and Keith G. Balmain, "Electromagnetic waves and Radiating Systems", 2nd Edition, Prentice-Hall Electrical Engineering Series, 2012.
2. D.K.Cheng, "Field and wave electromagnetics", 2nd Edition, Pearson (India), 1989.
3. Griffiths, "Introduction to electrodynamics", 4th Edition, Pearson (India), 2013.
4. K.A.Gangadhar and P.M.Ramanathan, "Electromagnetic Field Theory", 8th Edition, Khanna Publishers, 2015.
5. Nannapaneni Narayana Rao, "Elements of Engineering Electromagnetics" 6th Edition, Pearson Education, 2004.

OUTCOMES:

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

| Course Name : ELECTROMAGNETIC FIELDS | | Course Code: 24EC402 | |
|--------------------------------------|--|-------------------------|-------|
| CO | COURSE OUTCOMES | UNIT | K- CO |
| C210.1 | Apply coordinate systems and vector calculus operations (gradient, divergence, curl, and integrals) to analyze and interpret vector fields. | I | K3 |
| C210.2 | Explain fundamental laws governing electric fields and Apply Gauss's Law and Coulomb's Law to compute electric fields and potentials for various charge distributions. | II | K3 |
| C210.3 | Apply Biot-Savart's Law and Ampere's Circuital Law to calculate magnetic fields for different current distributions and magnetic materials. | III | K3 |
| C210.4 | Apply Maxwell's equations to analyze time-varying electromagnetic fields and predict the behavior of electromagnetic wave propagation. | IV | K3 |
| C210.5 | Apply principles of electromagnetic wave propagation to determine wave behavior in various media and calculate reflection and transmission at interfaces. | V | K3 |



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|----------------|-----------------------------------|----------|----------|----------|----------|
| 24EC403 | ANALOG INTEGRATED CIRCUITS | L | T | P | C |
| | | 3 | 0 | 0 | 3 |

OBJECTIVES:

- To introduce the basic building blocks of Linear Integrated Circuits.
- To learn the linear and non-linear applications of Operational Amplifiers.
- To introduce the theory and applications of PLL and data converters.
- To learn the fundamentals of voltage regulators and 555 timers.

UNIT - I BASICS OF OPERATIONAL AMPLIFIER 9

Introduction and classification of IC – Basic information about Op-amp – Internal circuit diagram of IC 741 - General operational amplifier stages - Differential amplifier - Low frequency small signal analysis - Constant Current mirror and Current sources - Ideal op-amp characteristics – open and closed loop configurations – DC and AC characteristics, Slew rate.

UNIT - II LINEAR AND NONLINEAR APPLICATIONS OF OPAMP 9

Basic op-amp circuits: Sign changer, Scale changer, Phase shift circuits, voltage follower, adder, subtractor, Differential amplifier Linear Applications: Instrumentation amplifier, V-to-I and I-to-V converters Integrator, Differentiator Non-linear Applications: Precision rectifier, peak detector, clipper and clamper, Active filters: Low pass, High pass.

UNIT - III COMPARATORS AND WAVEFORM GENERATORS 9

Comparator: Open loop Op-amp configuration – Inverting and Non-inverting comparator – Applications of comparator - Regenerative comparator (Schmitt trigger) Waveform generators: Sine wave generators – Square / Triangle / RC phase shift and Wein bridge oscillator, Multivibrators – Astable and Monostable multivibrator.

UNIT - IV DATA CONVERTERS AND PLL 9

Data converters: D/A converters – Specifications – Weighted Resistor type, R-2R ladder - Inverted R-2R ladder – A/D converters – Specifications – Flash type – Successive Approximation type – Counter type – Dual slope type - PLL: Operation of basic PLL, Closed loop analysis - Voltage controlled oscillator – Monolithic PLL IC 565 – Applications of PLL - FSK modulation and demodulation.

UNIT - V 555 TIMER AND VOLTAGE REGULATORS 9

555 timer: Monostable Multivibrators – Astable Multivibrators – Application. Voltage regulators: Linear mode power supply - Rectifiers - Half-Wave Rectifier – Full Wave Rectifiers - Filters - Voltage regulation - Linear series and shunt Voltage Regulators - IC723 general purpose regulator - LDO-Buck and Boost Converter.

TOTAL: 45 PERIODS**TEXT BOOKS:**

1. D.Roy Choudhry and Shail Jain, "Linear Integrated Circuits", 5th Edition, New Age International Pvt. Ltd., 2018.
2. Sergio Franco, "Design with Operational Amplifiers and Analog Integrated Circuits", 4th Edition, Tata McGraw-Hill, 2016.

REFERENCES:

1. J.B.Gupta, "Electronic Devices and Circuits", S.K. Kataria & Sons, 6th Edition, 2016.
2. S.Salivahanan and V.S.Kanchana Bhaskaran, "Linear Integrated Circuits", Tata McGraw Hill, 2nd Edition (4th reprint), 2016.
3. Ramakant A. Gayakwad, "Op-amp and Linear ICs", Prentice Hall / Pearson Education, 4th Edition, 2015.
4. Robert F. Coughlin and Frederick F. Driscoll, "Operational amplifiers and linear integrated circuits", PHI, 6th Edition, 2001.
5. B.S.Sonde, "System design using Integrated circuits", New Age publications, 2nd Edition, 2001.

OUTCOMES:

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

| Course Name : ANALOG INTEGRATED CIRCUITS | | Course Code: 24EC403 | |
|--|--|-------------------------|-------|
| CO | COURSE OUTCOMES | UNIT | K- CO |
| C211.1 | Summarize the fundamental features of ICs and op-amps including the structure and characteristics of the IC 741. | I | K2 |
| C211.2 | Design the operational amplifier circuits for various linear and non-linear applications | II | K3 |
| C211.3 | Use comparator and waveform-generator circuits to create essential switching and oscillating outputs. | III | K3 |
| C211.4 | Apply the principles and specifications of DACs, ADCs, and PLL systems to solve basic signal conversion and frequency control applications. | IV | K3 |
| C211.5 | Analyze the operation of the 555 timer in monostable and astable modes and examine the performance of linear power supplies for various electronic applications. | V | K4 |



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DEPARTMENT OF ECE**

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|----------------|-----------------------------------|----------|----------|----------|----------|
| 24EC404 | CONTROL SYSTEM ENGINEERING | L | T | P | C |
| | | 3 | 0 | 0 | 3 |

OBJECTIVES:

- To introduce the components and their representation of control systems.
- To study various methods for analyzing the time response, frequency response and stability of the systems.
- To learn the various approach for the state variable analysis.

UNIT - I CONTROL SYSTEM MODELING 9

Basic Elements of Control System - Open loop and Closed loop systems - Differential equation - Transfer function, Modeling of Electric systems, Translational and rotational mechanical systems - Block diagram reduction Techniques - Signal flow graph.

UNIT - II TIME RESPONSE ANALYSIS 9

Transient response - steady state response – standard test signals- step and ramp response of first order - step and impulse Response of second order system – Time domain Specifications - Steady state errors - P, PI, PD and PID Compensation.

UNIT - III FREQUENCY RESPONSE ANALYSIS 9

Frequency Response - Bode Plot, Polar Plot - Frequency Domain specifications from the plots - Constant M and N Circles – Compensators - Lead, Lag and Lead Lag Compensators.

UNIT - IV STABILITY ANALYSIS 9

Stability, Routh-Hurwitz Criterion, Root Locus Technique, Construction of Root Locus, Stability, Dominant Poles, Application of Root Locus Diagram - Nyquist Stability Criterion - Relative Stability.

UNIT - V STATE VARIABLE ANALYSIS 9

State space representation of Continuous Time systems - State equations - Transfer function from State Variable Representation - Solutions of the state equations - concepts of controllability and observability - State feedback controller design.

TOTAL: 45 PERIODS**TEXT BOOKS:**

1. J.Nagrath and M.Gopal, "Control System Engineering", New Age International Publishers, 5th Edition, 2017.
2. Norman S. Nise, "Control Systems Engineering", Wiley, 2018.

REFERENCES:

1. Benjamin C. Kuo, "Automatic control systems", McGraw Hill Education, 2018.
2. Schaum's Outline Series, "Feedback and Control Systems", McGraw Hill Education, 2017.
3. Richard C. Dorf and Robert H. Bishop, "Modern Control Systems", Pearson Education India, 2013.
4. M.Gopal, "Control System – Principles and Design", Tata McGraw Hill, 4th Edition, 2012.
5. K.Ogata, "Modern Control Engineering", PHI, 5th Edition, 2012.

OUTCOMES:

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

| Course Name : CONTROL SYSTEM ENGINEERING | | Course code: 24EC404 | |
|---|--|---------------------------------|--------------|
| CO | COURSE OUTCOMES | UNIT | K- CO |
| C212.1 | Develop a transfer function for a given electrical and mechanical system and derive the transfer function using block diagram reduction and signal flow graph. | I | K3 |
| C212.2 | Derive the transient and steady state response of first and second order control systems for standard input signals. | II | K3 |
| C212.3 | Determine the frequency response parameters for the given open loop system using Bode and Polar plots. | III | K3 |
| C212.4 | Analyze the stability of a system using Routh Hurwitz, Root locus, Nyquist criterion. | IV | K4 |
| C212.5 | Develop a state space model and analyze its stability for a system. | V | K3 |



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|----------------|---|----------|----------|----------|----------|
| 24EC405 | MICROPROCESSORS AND MICROCONTROLLERS | L | T | P | C |
| | | 3 | 0 | 0 | 3 |

OBJECTIVES:

- To study the architecture of 8086 microprocessor.
- To learn the working of peripherals and its communication with 8086
- To learn the architecture of 8051 microcontroller.
- To understand the different protocols used to interface peripherals with microcontroller
- To design a microcontroller based system for various applications.

UNIT - I 8086 MICROPROCESSOR 9

8085 Architecture, 8086 Architecture- Minimum and Maximum mode configurations, Instruction set, Addressing modes, Assembly Language Programming, Bus timing, Memory and I/O interfacing.

UNIT - II PERIPHERALS AND INTERFACING 9

Programmable Peripheral Interface (8255), Keyboard Display Controller (8279), Programmable Timer Controller (8254), Programmable Interrupt Controller (8259), Serial Communication Interface (8251), ADC0808 and DAC0808 Interface.

UNIT - III MICROCONTROLLER 9

8051 – Architecture, Special Function Registers (SFRs), I/O Ports, Timers / Counters, Interrupts, Serial communication, Instruction set, Addressing modes, Assembly language programming.

UNIT - IV PERIPHERAL INTERFACE PROTOCOLS 9

Introduction to synchronous and Asynchronous communication. UART with RS232 and RS485 signal scheme, SPI, I²C and CAN. Interfacing RTC and interfacing EEPROM using I2C protocol. Case Studies: Data logger, Smart Home system.

UNIT - V MICROCONTROLLER BASED SYSTEM DESIGN 9

Interfacing - DAC, ADC, matrix display, (16x2) LCD, Sensor, Actuators and Relay, Interfacing Stepper Motor, DC Motor with Speed Control using PWM

TOTAL: 45 PERIODS**TEXT BOOKS:**

1. Krishnakant, "Microprocessors and Microcontrollers: Architecture, programming and system design 8085, 8086, 8051, 8096", PHI Learning, 2014.
2. Mohamed Ali Mazidi, Janice Gillispie Mazidi and Rolin McKinlay, "The 8051 Microcontroller and Embedded Systems: Using Assembly and C", 2nd Edition, Pearson Education, 2011.

REFERENCES:

1. J. Kenneth. J. Ayala, "The 8051 Microcontroller", Cengage Learning, 3rd Edition, 2004.
2. Douglas V. Hall, "Microprocessors and Interfacing, Programming and Hardware", TMH, 2012.

OUTCOMES:

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

| Course Name : MICROPROCESSORS AND MICROCONTROLLERS | | Course code: 24EC405 | |
|--|--|-------------------------|-------|
| CO | COURSE OUTCOMES | UNIT | K- CO |
| C213.1 | Develop the assembly language programs of 8086 microprocessor. | I | K3 |
| C213.2 | Apply the functionalities of peripheral devices to interface and control microprocessor-based systems. | II | K3 |
| C213.3 | Develop the assembly language programs of 8051 microcontroller. | III | K3 |
| C213.4 | Apply synchronous and asynchronous communication protocols to develop simple embedded applications. | IV | K3 |
| C213.5 | Apply appropriate interfacing techniques to operate displays, motors, and sensors through ADC, DAC, and PWM control. | V | K3 |



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|----------------|--|----------|----------|----------|----------|
| 24EC406 | COMMUNICATION NETWORKS AND SECURITY | L | T | P | C |
| | | 2 | 0 | 2 | 3 |

OBJECTIVES:

- To understand the division of network functionalities into layers.
- To be familiar with the components required to build different types of networks.
- To be exposed to the required functionality at each layer.
- To learn the flow control and congestion control algorithms.

UNIT - I FUNDAMENTALS OF COMPUTER NETWORKS AND LINK LAYER 6

Overview of Data Communications - Networks - Building Network and its types - Overview of Internet - OSI Mode - Physical Layer - Overview of Data and Signals - introduction to Data Link Layer - Link layer Addressing - Error Detection and Correction.

LAB COMPONENT

1. Implementation of Error Detection / Error Correction Techniques **6**

UNIT - II MEDIA ACCESS AND INTERNETWORKING 6

Overview of Data link control and Media access control - Ethernet (802.3) - Wireless LANs – HDLC Protocols - Bluetooth - Packet switching - IPv4 address - Network layer protocols (IP, ICMP).

LAB COMPONENT

1. Implementation of Bit Stuffing. **6**
 2. Implementation of stop and wait protocol.

UNIT - III NETWORK LAYER 6

Routing - Unicast Routing - Algorithms - Protocols - Multicast Routing and its basics - Overview of Intra-domain and inter-domain protocols - Overview of IPv6 addressing - Transition from IPv4 to IPv6.

LAB COMPONENT

1. Implementation of distance vector routing algorithm. **6**
 2. Implementation of Link state routing algorithm.

UNIT - IV TRANSPORT LAYER 6

Introduction to Transport layer – Protocols - User Datagram Protocols (UDP) and Transmission Control Protocols (TCP) Congestion Control - Congestion avoidance (DEC bit, RED) - QoS - Application requirements.

LAB COMPONENT

1. Implementation of Sliding Window - Go back-N and selective repeat protocols **6**

UNIT - V APPLICATION LAYER 6

Application Layer Paradigms - HTTP - DNS - Electronic Mail (SMTP, POP3, IMAP, MIME) - Need for Cryptography and Network Security - Layers of Network Security – Firewalls.

LAB COMPONENT

1. Encryption and decryption. **6**

TOTAL:60 PERIODS

TEXT BOOKS:

1. Behrouz A. Forouzan, "Data communications and Networking", McGraw Hill Education, 5th Edition, 2017.
2. Larry L. Peterson and Bruce S. Davie, "Computer Networks: A Systems Approach", Morgan Kaufmann Publishers, 5th Edition, 2011.

REFERENCES:

1. James F. Kurose and Keith W. Ross, "Computer Networking: A Top-Down Approach Featuring the Internet", Pearson Education, Seventh Edition, 2016.
2. Nader. F. Mir, "Computer and Communication Networks", Pearson Prentice Hall Publishers, Second Edition, 2014.
3. Ying-Dar Lin, Ren-Hung Hwang and Fred Baker, "Computer Networks: An Open Source Approach", McGraw Hill Publisher, 2011.
4. William Stallings, Data and Computer Communications, Tenth Edition, Pearson Education, 2013.

OUTCOMES:

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

| Course Name: COMMUNICATION NETWORKS AND SECURITY | | Course Code: 24EC406 | |
|---|---|-----------------------------|--------------|
| CO | COURSE OUTCOMES | UNIT | K- CO |
| C214.1 | Identify the components required to build different types of networks and implement Error control algorithms. | I | K3 |
| C214.2 | Implement and demonstrate data link layer algorithms. | II | K3 |
| C214.3 | Construct routing and forwarding solutions for packet switching networks. | III | K3 |
| C214.4 | Choose the required functionality at transport layer for a given application. | IV | K3 |
| C214.5 | Identify how network security is implemented in different layers. | V | K3 |



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| | | | | | |
|----------------|--|----------|----------|----------|------------|
| 24EC4L1 | ANALOG INTEGRATED CIRCUITS LABORATORY | L | T | P | C |
| | | 0 | 0 | 3 | 1.5 |

OBJECTIVES:

- To apply operational amplifiers in linear and nonlinear applications.
- To acquire the basic knowledge of special function IC.
- To use SPICE software for circuit design.

LIST OF EXPERIMENTS:

1. Inverting Amplifier, Non-Inverting Amplifier.
2. Clipper, Clamper and Full wave rectifier.
3. Integrator and Differentiator.
4. Active – Low pass and High Pass filter.
5. Phase shift oscillator.
6. Astable multivibrator using op-amp IC 741
7. Monostable multivibrator using NE555 timer.
8. Schmitt trigger.
9. DC power supply using LM 317.

SIMULATION USING SPICE:

10. Simulation of Wein bridge oscillator.
11. Simulation of Monostable multivibrator using IC741.
12. Simulation of R-2R ladder type D-A converter and Successive approximation type A-D converter.

LAB REQUIREMENT FOR A BATCH OF 30 STUDENTS:

1. CRO/DSO – 15 Nos.
2. Signal Generator / Function Generators – 15 Nos.
3. Dual Regulated Power Supplies – 15 Nos.
4. Digital Multimeter – 15 Nos.
5. IC Tester – 5 Nos.
6. Desktop PC with SPICE Circuit Simulation Software – 15 Nos.
7. Components and Accessories: Resistors, Capacitors, Diodes, Bread Boards.

Note: Op-Amps uA741, LM317, NE555 may be used.

TOTAL: 45 PERIODS

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

| Course Name: ANALOG INTEGRATED CIRCUITS LABORATORY | | Course Code: 24EC4L1 | |
|---|--|---------------------------------|--------------|
| CO | COURSE OUTCOMES | Exp. No | K- CO |
| C215.1 | Construct fundamental amplifier circuits and waveform-shaping circuits such as clippers, clampers, and full-wave rectifiers. | 1,2 | K3 |
| C215.2 | Analyze the behavior of integrator, differentiator, and active low-pass/high-pass filter circuits. | 3,4 | K4 |
| C215.3 | Examine the operation of phase-shift oscillators, Astable multivibrators using IC 741 and Monostable multivibrators using the NE555 timer. | 5,6,7 | K4 |
| C215.4 | Build a Schmitt trigger circuit and a DC power supply using LM317. | 8,9 | K3 |
| C215.5 | Evaluate the operation of oscillators, monostable multivibrators and data converters through simulation. | 10,11,12 | K4 |



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| | | | | | |
|----------------|--|----------|----------|----------|------------|
| 24EC4L2 | MICROPROCESSOR AND MICROCONTROLLER LABORATORY | L | T | P | C |
| | | 0 | 0 | 3 | 1.5 |

OBJECTIVES:

- To write ALP for arithmetic and logical operations in 8086
- To interface 8086 with peripherals using 8255,8279,8254
- To write ALP for arithmetic and logical operations in 8051
- To write programs to interface I/Os with 8051.

LIST OF EXPERIMENTS:

8086 Programs using MASM

1. Basic arithmetic and Logical operations.
2. Sorting, searching and string manipulations.

Programs using Kits

3. 8086 interfacing with parallel interface 8255
4. 8086 interfacing with keyboard display controller 8279
5. 8086 interfacing with ADC and DAC.
6. 8086 interfacing with programmable interval timer 8254

8051 Programs using Kits

7. Basic arithmetic and Logical operations.
8. Searching and Code conversion.
9. Stepper motor interface using 8051
10. Traffic light interface using 8051
11. 8051 interfacing with ADC and DAC
12. Serial communication between two 8051 kits

LAB REQUIREMENT FOR A BATCH OF 30 STUDENTS:

1. PCs with MASM, Keil, any equivalent software- 15 Nos.
2. 8086 trainer Kits – 15 Nos.
3. 8051 trainer Kits – 15 Nos.
4. Interfacing units – Each 5 Nos.
5. RS232 cable

TOTAL: 45 PERIODS

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

| Course Name: MICROPROCESSOR AND MICROCONTROLLER LABORATORY | | Course Code: 24EC4L2 | |
|---|---|-----------------------------|--------------|
| CO | COURSE OUTCOMES | Exp.No. | K- CO |
| C216.1 | Develop ALPs for Arithmetic and logical operations using 8086 microprocessors. | 1,2 | K3 |
| C216.2 | Develop ALPs to interface 8086 microprocessor with different peripherals. | 3,4,5,6 | K3 |
| C216.3 | Develop ALPs for Arithmetic and logical operations using 8051 microcontrollers. | 7,8 | K3 |
| C216.4 | Develop ALPs to interface 8051 microcontroller for different applications. | 9,10,11 | K3 |
| C216.5 | Develop an ALP to configure the serial port of the 8051 microcontroller and establish serial communication with another 8051 kit. | 12 | K3 |



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24EC4L3

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 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.

LIST OF EXPERIMENTS

The mini project will be in the area of basic electronic and basic communication engineering. The projects may be fabricated to address any of the following SDGs.

SDG 1 - No Poverty: All forms of poverty must be eradicated worldwide.

SDG 2 - Zero Hunger: eliminate hunger, increase food security, improve nutrition, and promote sustainable agriculture.

SDG 3 - Good Health and Well-Being: Ensure healthy lifestyles and promote well-being for people of all ages.

SDG 4 - Quality Education: Ensure that all students receive an inclusive and equitable education, as well as opportunities for lifelong learning.

SDG 5 - Gender Equality: Ensure gender equality and empower all women and girls.

SDG 6 - Clean Water and Sanitation: Ensure that water and sanitation are available to everyone and managed sustainably.

SDG 7 - Affordable and Clean Energy: Ensure that everyone has access to affordable, reliable, sustainable, and modern energy sources.

SDG 8 - Decent Work and Economic Growth: Encourage long-term, inclusive, and sustainable economic growth, full and productive employment, and decent jobs for all.

SDG 9 - Industry, Innovation, and Infrastructure: Create resilient infrastructure, encourage inclusive and sustainable industrialisation and foster innovation.

SDG 10 - Reduced Inequality: Reduce inequality within and between countries.

SDG 11- Sustainable Cities and Communities: Create cities and human settlements that are inclusive, safe, resilient, and sustainable.

SDG 12 - Responsible Consumption and Production: Ensure your consumption and production patterns are sustainable.

SDG 13 - Climate Action: Take immediate steps to combat climate change and its consequences.

SDG 14 - Life below Water: Conserve and sustainably use the oceans, seas, and marine resources to promote sustainable development.

SDG 15 - Life on Land: Protect, restore, and promote the sustainable use of terrestrial ecosystems, manage forests sustainably, combat desertification, and stop biodiversity loss.

SDG 16 - Peace, Justice, and Strong Institutions: Encourage peaceful and inclusive societies, ensure equal access to justice for all, and establish effective, accountable, and inclusive institutions.

SDG 17 - Partnerships for the Goals: Strengthen implementation mechanisms and revitalize global partnerships for sustainable development..

TOTAL: 30 PERIODS

Micro Project Guidelines:

The micro-project is a team activity having 3-4 students in a team. This is electronic circuit building and testing for developing real life small electronic applications. The micro-project may be a complete hardware or hardware with small programming aspect. It should encompass electronics components, devices, analog or digital ICs, micro controller 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.

OUTCOMES:

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

| Course Name: MICRO PROJECT | | Course Code: 24EC4L3 |
|----------------------------|---|-------------------------|
| CO | COURSE OUTCOMES | K- CO |
| C217.1 | Identify and define a problem statement from the requirements raised from literature survey /need analysis. | K2 |
| C217.2 | Build and Test electronic circuits/prototype for developing real life small electronic applications. | K3 |
| C217.3 | Work in teams, write comprehensive report and effective presentation of the project work. | K3 |
| C217.4 | Demonstrate prototyping which will lead them towards entrepreneurship | K4 |
| C217.5 | Deliver a compelling presentation of the academic project. | K3 |



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24HS4L1

APTITUDE AND SOFT SKILLS - III

| L | T | P | C |
|---|---|---|---|
| 0 | 0 | 2 | 1 |

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