Scheme of Instruction & Examination
B.E. SECOND YEAR , III SEMESTER
ELECTRICAL AND ELECTRONICS ENGINEERING

Semester - III									
S. No	**Course Code**	**Course Title**	**Scheme of Instruction**				**Scheme of Examination**		**Credits**
							Maximum Marks		
			Hours Per week				**CIE**	**SEE**	
			L	**T**	**P/D**	**Duration in Hrs**			
Theory Courses									
1	4BS303HS	Engineering Mathematics - III	3	1	0	4	40	60	4
2	4PC301EE	Electro Magnetic Fields	3	0	0	3	40	60	3
3	4PC302EE	Electrical Circuits-I	3	0	0	3	40	60	3
4	4ES304CS	Programming for Problem Solving	3	0	0	3	40	60	3
5	4PC303EE	Analog and Digital Electronics	3	0	0	3	40	60	3
6	4HS302HS	Human Values & Professional Ethics	2	0	0	2	40	60	2
7	4MC302HS	Essence of Indian traditional knowledge	2	0	0	2	40	60	-
Laboratories									
8	4PC351EE	Analog and Digital Electronics Lab	0	0	2	2	40	60	1
9	4ES354CS	Programming for Problem Solving Lab	0	0	2	2	40	60	1
		Total	19	1	5	25	360	540	20

HS: Humanities and Social Sciences BS: Basic Science ES: Engineering Science
MC: Mandatory Course PC: Professional Core
L:Lecture T:Tutorial P:Practical D:Drawing
CIE: Continuous Internal Evaluation SEE: Semester End Evaluation (Univ.Exam) EE: Electrical Engg.

Note:

1. Each contact hour is a clock hour.
2. The duration of the practical class is two hours, however it can be extended wherever necessary, to enable the student to complete the experiment.

Course code	Course Title	Core/ Elective					
		Core					
		L	T	P/D	Credits	CIE	SEE
4BS303HS	ENGINEERING MATHEMATICS - III	3		0	3	40	60

Prerequisite: Basic Differentiation, Integration and Trigonometric results.

Course Objectives: The objective of this course is to make the student

1. To learn an alternative methods and analytical methods in mathematical concepts.
2. To apply numerical techniques in solving ordinary differential equations.
3. To study Interpolation and numerical methods to fit a curve
4. To study Fourier series and its applications to partial differential equations.

Course Outcomes: After completion of the course, the student will be able to

1. Find the solution of algebraic and transcendental equations using numerical methods.
2. Apply numerical techniques to solve ordinary differential equations and definite integrals.
3. Apply numerical methods to interpolate values and fit different curves from given data.
4. Expand function as a Fourier series.
5. Apply the solution of partial differential equations to physical problems.

Unit- I:

Numerical Solutions of Algebraic and Transcendental Equations: Introduction, Bisection Method, Regula-False method, Iteration method and Newton Raphson method. Solving linear system of equations by Gauss-Jacobi and Gauss-Seidel method.

Unit- II:

Numerical integration: Trapezoidal Rule, Simpson‟s 1/3rd and 3/8th Rule.

Numerical solutions of Ordinary Differential Equations: Solution of ordinary differential equations by Taylor's Series, Picard‟s method of Successive approximations, Euler‟s and Modified Euler‟s methods, Fourth Order Runge-Kutta Method.

Unit- III :

Interpolation: Lagrange’s interpolation, Newton’s divided difference interpolation, Newton’s Forward and Backward difference interpolations

Curve Fitting: Fitting a linear, second degree, exponential curve by method of least squares for the discrete data.

Unit- IV :

Fourier Series: Fourier series, Fourier series expansions of even and odd functions, convergence of Fourier series, and Fourier half range series.

Unit- V:

Applications to Partial Differential Equations: Classification of linear second order partial differential equations, separation of variables method (Fourier method) , Fourier series solution of one dimensional heat and wave equations, Two dimensional Laplace’s equation.

TEXT BOOKS :

1. Dr.B.S Grewal, Higher Engineering Mathematics, 45th Edition, Khanna Publishers. (Unit 1-5)
2. B.V.Ramana,Higher Engineering Mathematics,3rd Edition 2015
3. Computation, 6th Edition, New Age International Publishers. 2020-2021 (Unit 1-3)
4. S.S.Sastry, Introductory Methods of Numerical Analysis, 5th Edition, PHI Learning Pvt. Ltd. (Unit 1-3)

REFERENCES/ SUGGESTED READING:

1. R K Jain & S R K Iyengar, Advanced Engineering Mathematics, 5th Edition, Narosa Publishers,6th Edition, 2021
2. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, 2012.

Course code	Course Title	Core/ Elective					
		Core					
		L	T	P/D	Credits	CIE	SEE
4PC301EE	ELECTROMAGNETIC FIELDS	3		0	3	40	60

Prerequisite: Basics of electric field theory, magnetic field theory and electromagnetic waves.

Course Objectives: The objective of this course is to make the student

1. To gain conceptual and basic mathematical understanding of electric and magnetic fields in free space and in materials
2. To understand the coupling between electric and magnetic fields through Faraday's law, displacement current and Maxwell's equations
3. To understand wave propagation in lossless and in lossy media
4. To be able to solve problems based on the above concepts.

Course Outcomes: After completion of the course, the student will be able to

1. Understand the vector calculus for electromagnetism
2. Apply the electric fields for simple configurations under static conditions
3. Analyze the static magnetic fields
4. Analyze Electrical Circuits with the concept of magnetic field
5. Understand Maxwell's equation in different forms and different media
6. Understand the propagation of EM wave

Unit-I

Review of Vector Analysis

Vector algebra-addition, subtraction, components of vectors, scalar and vector multiplications, triple products, three orthogonal coordinate systems (rectangular, cylindrical and spherical). Vector calculus-differentiation, partial differentiation, integration, vector operator del, gradient, divergence and curl, integral theorems of vectors. Conversion of a vector from one coordinate system to another, stokes theorem

Unit-II

Electrostatics-I: Coulomb's law, Electric field intensity, Electrical field due to point charges. Line, Surface and Volume charge distributions. Gauss law and its applications. Absolute Electric potential, potential difference, Calculation of potential differences for different configurations. Electric dipole, Electrostatic Energy and Energy density, dipole, dipole moment, potential due to dipole, polarization, numerical problems

Unit-III

Electrostatics-II: Current and current density, Ohms Law in Point form, Continuity of current, Boundary conditions of perfect dielectric materials. Permittivity of dielectric materials, Capacitance, Capacitance of a two wire line, Poisson's equation, Laplace's equation, Solution of Laplace and Poisson's equation, Application of Laplace's and Poisson's equations with single variable, numerical problems.

Unit-IV

Magneto statics-I: Biot-Savart Law, Ampere Law, Magnetic flux and magnetic flux density, Scalar and Vector Magnetic potentials. Steady magnetic fields produced by current carrying conductors, Force on a moving charge, Force on a differential current element, Force between differential current elements, Nature of magnetic materials, Magnetization and permeability, Magnetic boundary conditions, Magnetic circuits, inductances and mutual inductances, Faraday's law for Electromagnetic induction, numerical problems

Unit-V

Magneto statics-II & Electromagnetic waves: Integral & differential form of Maxwell's equations, Motional Electromotive forces. Electrical and Magnetic boundary conditions, Derivation of Wave Equation, Uniform Plane Waves, Maxwell's equation in Phasor form Wave equation in Phasor form, Plane waves in free space and in a homogenous material. Wave equation for a conducting medium, Plane waves in lossy dielectrics, Propagation in good conductors, Skin effect. Poynting theorem

TEXT BOOKS :

5. M. N. O. Sadiku, "Elements of Electromagnetics", Oxford University Publication, 2014..(Unit 1-5)
6. Pramanik, "Electromagnetism - Theory and applications", PHI Learning Pvt. Ltd, New Delhi,2009 (Unit 1-5)
7. W.J. Duffin, "Electricity and Magnetism", McGraw Hill Publication, 1980.(Unit 1-5).
8. W. Hayt, "Engineering Electromagnetics", McGraw Hill Education, 2012 (Unit 1-5)

REFERENCES/ SUGGESTED READING:

3. A. Pramanik, "Electromagnetism-Problems with solution", Prentice Hall India, 2012.
4. G.W. Carter, "The electromagnetic field in its engineering aspects", Longmans
5. W.J. Duffin, "Advanced Electricity and Magnetism", McGraw Hill, 1968.
6. E.G. Cullwick, "The Fundamentals of Electromagnetism", Cambridge University
7. B. D. Popovic, "Introductory Engineering Electromagnetics", Addison-Wesley Educational Publishers, International Edition, 1971.

Course code	Course Title	Core/ Elective					
4PC302EE	ELECTRICAL CIRCUITS -I	Core					
		L	T	P/D	Credits	CIE	SEE
		3		0	3	40	60

Prerequisite: Basics of networks, circuits, and Semiconductors devices.

Course Objectives: The objective of this course is to make the student

1. Familiarize with AC fundamentals and solve electrical circuits when excited by AC Supply.
2. Understand the concept of electrical resonance and network theorems for reducing complex networks.
3. Familiarize with three phase AC fundamentals and measure active and reactive power.
4. Understand the concept of transients and its analysis in electrical circuits.
5. Familiarize with the concept of network parameters and its calculations.

Course Outcomes: After completion of the course, the student will be able to

1. Understand and analyze the electrical circuit when excited with AC supply
2. Explain electrical resonance and analyze complex electrical circuits with the help of different network theorems
3. Understand and explain the fundamentals of three phase AC supply
4. Apply the concepts of Magnetic circuits and Analyze them
5. Analyze electrical circuits under transient conditions

Unit-I

Single Phase A.C. Circuits: R.M.S. and Average values for different periodic wave forms, J-notation, Complex and Polar forms of representation, Steady State Analysis of R, L and C (in Series, Parallel and Series Parallel Combinations) with Sinusoidal Excitation, Concept of Reactance, Impedance, Susceptance and Admittance, Phase and Phase difference, Concept of Power Factor, Real and Reactive powers, Complex power.

Unit-II

Resonance & Network Theorems for AC Excitations: Resonance-Series and Parallel Resonance, Bandwidth and Q-factor, Theorems-Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum Power Transfer theorems.

Unit-III

Three-Phase AC Circuits: Phase sequence- Star and delta connection, Relation between line and phase voltages and currents in balanced systems, Analysis of balanced and unbalanced 3 phase circuits-Measurement of active and reactive power.

Unit-IV

Magnetic Circuits: Introduction, Self and Mutual Inductance, Dot Convention, Coefficient of coupling, Analysis of magnetic circuits, comparison of Electrical and Magnetic circuits, numerical.

Unit-V

D.C & A.C Transient Analysis: Transient response of R-L, R-C, R-L-C circuits (Series and parallel combination) for D.C and A.C excitation-Initial conditions, solution method using differential equation and Laplace transforms.

TEXT BOOKS :

1. Fundamentals of Electric Circuits, Charles k. Alexander and Matthew N. O. Sadiku, Tata McGraw Hills Education, Edition 3, 2013.(Unit 1-3)
2. Electrical Circuit Analysis, William H Hayt and Jack Kemmerly , 8th Edition, 2014 (Unit 1-3)
3. Circuit Theory Analysis and Synthesis by Abhijit Chakrabarti, Dhanpat Raj & Co., 2018.(Unit 1-3

REFERENCES/ SUGGESTED READING:

1. Fundamentals of Electrical Engineering and Electronics", J.B. Gupta, S. K. Kataria & Sons Publications, 2002.

Course code	Course Title	Core/ Elective					
4ES304CS	PROGRAMMING FOR PROBLEM SOLVING	Core					
		L	T	P/D	Credits	CIE	SEE
		3		0	3	40	60

Prerequisite: Mathematical Knowledge, Logical and Analytical Thinking.

Course Objectives: The objective of this course is to make the student

1. To introduce the basic concepts of Computing environment, algorithms and flowcharts
2. To acquire knowledge about the basic concept of writing a program
3. To understand modular and structured programming constructs in C
4. To learn the usage of structured data types, data handling and memory management using pointers

Course Outcomes: After completion of the course, the student will be able to

1. Formulate algorithms and learn fundamental program methodologies of C programming.
2. Understand control statements and interpret derived data types with mathematical and engineering problems.
3. Develop modular programming techniques to solve searching, sorting and file system problems
4. Recognize pre-processor directives and user defined usage.

Unit – I

Introduction to Computers: Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.). Algorithm, Flowchart / Pseudo code with examples **Introduction to C Language:** History of C, Features, Structure of C program, Character set, Tokens ,Variables, Data types, I/O statements, Type conversion Syntax and Logical Errors in compilation, object and executable code.

Unit – II

Operators and Control Structures: Operators, Operator precedence, Arithmetic expressions, Conditional Branching and Loops, Writing and valuation of conditionals and consequent branching

Arrays: Arrays (1-D, 2-D), Strings and its library functions.

Unit – III

Basic Algorithms: Searching, Basic Sorting Algorithms (Bubble and Selection).

Functions: Functions, storage classes, Parameter passing techniques Passing arrays to functions, Recursion Concept, Command line arguments.

Unit – IV

Pointers: Idea of pointers, Defining pointers, array of pointers, pointer arithmetic, dynamic memory allocation, **Structure**: Structures, Defining structures and Array of Structures, self – referential structures, Unions concept, Functions and structures, Enum, Bit fields.

Unit – V

Pre-processor Directives: File Inclusion, Macros Substitutions, Conditional Compilation.

File Handling: Introduction to File Handling, Types of files, File operations, File input/output statements.

TEXT BOOKS:

1. Computer Science A structured programming approach using C, Behrouz A. Forouzan and Richard F. Gilberg , Cengage Learning , 2007 ,Third Edition(Unit 1-5)
2. Schaum's Outline of Programming with C, Byron Gottfried, McGraw-Hill ,2019, Fourth Edition\
3. Data Structures and Program Design in C, Robert Kruse, Bruce Leung, Tondo, Pearson, II Edition

REFERENCES/ SUGGESTED READING

1. C Programming Language, Brian W Kenningham, Dennis M Ritchie, Pearson, II Edition
2. How to solve it by Computer, R G Dromey, Pearson Edition

Course code	Course Title	Core/ Elective					
4PC303EE	ANALOG AND DIGITAL ELECTRONICS	Core					
		L	T	P/D	Credits	CIE	SEE
		3		0	3	40	60

Prerequisite: Basics of networks, number systems

Course Objectives: The objective of this course is to make the student

1. Understand the concept of transistors and analyze the feedback oscillators
2. Study and understand the various power amplifiers, operation of OPAMP and its applications
3. Apply combinational digital circuits for logic functions
4. Analyze Logic gates, memory flip-flops, arrays, and programmable logic.
5. Design tools, both manual and computerized, for design, optimization, and test of logic circuits.

Course Outcomes: After completion of the course, the student will be able to

1. Illustrate the characteristics of various power amplifiers, operation of OPAMP and its applications
2. Understand the concept of transistors and feedback oscillators
3. Apply combinational digital circuits for logic functions
4. Analyze of sequential logic circuits
5. Understand various A/D and D/A converters
6. Understand various logic gates starting from simple ordinary gates to complex programmable logic devices and arrays.

Unit-I

Transistors: BJT VI characteristics**,** JFET VI characteristics small signal model of BJT and JFET , analysis of BJT as amplifier, estimation of voltage gain, current gain, input resistance, output resistance . **Transistor biasing:** fixed bias, collector bias, self-bias, thermal stability, heat sinks. **Concept of feedback:** positive negative feedback, feedback topologies: voltage series, current series, voltage shunt, current shunt, effect of feedback on gain bandwidth etc., concept of stability only qualitative treatment.

Unit-II

Oscillators: Bark hausen criterion, RC oscillators (phase shift, weinbridge), L oscillators (Hartley, colpitts), crystal oscillators (qualitative treatment only), **power amplifiers** : various classes of operation, efficiency and distortion (qualitative treatment only), **OP AMP:** block diagram, ideal OP AMP, DC and AC characteristics, inverting and non-inverting amplifiers **Applications**: peak detector, sample and hold circuit and precision rectifiers clipping and clamping circuits, wave generation and basic compensators.

Unit-III

Combinational circuits: Number systems**,** AND, OR, NOT, NAND, NOR and Exclusive-OR operations, K-map representation, simplification of logic functions using K-map, minimization of logical functions. Don t care conditions. **circuits:** Multiplexer, De-Multiplexer, Adders, Subtractors, BCD arithmetic, carry look ahead adder, serial adder, digital comparator, parity checker/generator, code converters, encoders, decoders

Unit-IV

Sequential circuits and systems: Introduction , SR latch, the clocked SR flip flop, J, K, T and D-type flip flops, **applications of flip flops:** shift registers, applications of shift registers: serial to parallel converter, parallel to serial converter, ring counter, sequence generator, **counters**: ripple(Asynchronous) counters, synchronous counters, mod n counters design , applications of counters

Unit-V

A/D and D/A Converters: Digital to analog converters: weighted resistor/converter, R-2R Ladder D/A converter, specifications for D/A converters, examples of D/A converter , analog to digital converters: quantization and encoding, parallel comparator A/D converter, successive approximation A/D converter, counting A/D converter, dual slope A/D converter, example of A/D converter

Semiconductor memories and Programmable logic devices: Memory organization and operation, expanding memory size, classification and characteristics of memories, sequential memory, read only memory (ROM), read and write memory (RAM), ROM as a PLD, Programmable logic array, Programmable array logic, **introduction to :** complex Programmable logic devices (CPLDS), Field Programmable Gate Array (FPGA)

TEXT BOOKS :

1. Jacob Millman, Christos C. Halkias, and Satyabrata Jit, Electronic Devices and Circuits, 3rd ed., McGraw Hill
2. Education, 2010. 2. David A. Bell, Electronic Devices and Circuits, 5th ed., Oxford University Press, 2009. 3. S
3. Salivahanan, N Kumar, and A Vallavaraj, Electronic Devices and Circuits , 2nd ed., McGraw Hill Education, 2007
4. M. M. Mano, Digital logic and Computer design, Pearson Education India, 2016.
5. A. Kumar, Fundamentals of Digital Circuits, Prentice Hall India, 201

REFERENCES/ SUGGESTED READING:

1. Jacob Millman, Christos Halkias, Chetan Parikh, Integrated Electronics, 2nd ed., McGraw Hill Education (India) Private Limited, 2011.
2. Donald L Schilling & Charles Belove, Electronics Circuits, Discrete & Integrated , 3rd ed., McGraw Hill Education (India) Private Limited, 2002
3. R. P. Jain, Modern Digital Electronics, McGraw Hill Education, 2009.

Course code	Course Title	Core/ Elective					
		Core					
4HS302HS	HUMAN VALUES & PROFESSIONAL ETHICS	L	T	P/D	Credits	CIE	SEE
		3		0	3	40	60

Prerequisite: **Adaptive**

Course Objectives: The objective of this course is to make the student

1. To create an awareness on Human Values and Engineering Ethics.
2. To move from discrimination to commitment.
3. To understand social responsibility of an engineer.
4. To appreciate ethical dilemma while discharging duties in professional life.
5. To encourage students to discover what they consider valuable in life.

Course Outcomes: After completion of the course, the student will be able to

1. Understand the significance of value inputs in a classroom and start applying them in their life and profession
2. Assess their own ethical values and the social context of problems
3. Distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc.
4. Understand the role of a human being in ensuring harmony in society and nature.
5. Distinguish between ethical and unethical practices, and start working out the strategy to actualize a harmonious environment wherever they work.

Unit-I: Introduction to Value Education

1. Value Education, Definition, Concept and Need for Value Education
2. The Content and Process of Value Education
3. Self-Exploration as a means of Value Education
4. Happiness -Sukh, Suvidha, Sanyam &Swasthya.

Unit-II: Harmony in the Human Being

1. Human Being is more than just the Body
2. Harmony of the Self ('I') with the Body
3. Understanding Myself as Co-existence of the Self and the Body
4. Understanding Needs of the Self and the Needs of the Body

Unit-III: Harmony in the Family and Society and Harmony in Nature

1. Family as a basic unit of Human Interaction and Values in Relationships
2. The Dynamics of Mutual respect in Today's World – Affection, Care, Guidance, Reverence, Gratitude and Love.
3. Comprehensive Human Goals: The Five dimensions of Human Endeavour – Justice, Trust, Competence, Right Attitude and Mutual Tolerance

Unit-IV: Social Ethics

1. The Basics for Ethical Human conduct
2. Challenges to ethical conduct in existence
3. Holistic perception of Harmony in existence
4. Social Hierarchy - Ethical Conduct and Mutual Co-existence

Unit-V: Professional Ethics

1. Sanctity of Human values
2. Definitiveness of Ethical Human Conduct
3. Basics for Humanistic Education

TEXT BOOKS :

1. A.N Tripathy, "Human Values", New Age International Publishers, 2003.
2. Bajpai. B. L., Indian Ethos and Modern Management, New Royal Book Co., Lucknow, Reprinted, 2004
3. Bertrand Russell Human Society in Ethics & Politics, Taylor and Francis, 2007

REFERENCES/ SUGGESTED READING:

1. Corliss Lamont, Philosophy of Humanism, Humanist Press, 1997
2. Gaur. R.R. , Sangal. R, Bagaria. G.P, A Foundation Course in Value Education, Excel Books, 2009.
3. Gaur. R.R. , Sangal. R , Bagaria. G.P, Teachers Manual Excel Books, 2009.
4. Mortimer. J. Adler, – Whatman has made of man, Hardcover,2007.

Course code	Course Title	Core/ Elective					
4PC351EE	ANALOG AND DIGITAL ELECTRONICS LAB	Core					
		L	T	P/D	Credits	CIE	SEE
				2	1	40	60

Prerequisite: Basics of Analog and digital electronics theory

Course Objectives: The objective of this course is to make the student

1. Designing of wave shaping circuits using diodes
2. Designing of single and multistage amplifier circuits
3. Demonstrate negative feedback in amplifiers circuits and positive feedback in oscillators
4. Explain the principle concepts of Digital Logic Design.
5. Distinguish between the Sequential and Combinational Logic Circuits.
6. Design the Logic Circuit using Combinational and Sequential Circuits

Course Outcomes: After completion of the course, the student will be able to

1. Understand the characteristics of electronics devices
2. Analyze feedback amplifiers and op amp oscillators
3. Design single and multi-stage amplifier, wave shaping and controller circuits
4. Understand working of logic gates.
5. Understand Combinational and Sequential logic circuits and its applications using Multisim
6. Understand the process of Analog to Digital conversion and Digital to Analog conversion. And also Use PLCs to implement the given logical problem

LIST OF EXPERIMENTS

ANALOG

1. Static characteristics of MOSFET in CS configuration
2. Frequency response of single and two stage BJT amplifier in CE configuration
3. Inverting and non -inverting amplifier using OP AMP
4. RC phase oscillator and Wein Bridge oscillator using OP AMP
5. Clipping and clamping circuits
6. Generation of triangular and square wave using OP AMP
7. Design of lead lag compensator using OP AMP

DIGITAL

1. Realization of different logic gates.
2. Verification of multiplexer operation
3. Half adder, full adder and subtractor and realization of combinational logic
4. Synchronous counters and Asynchronous counters
5. A / D converters and D / A converters
6. Simulation of error detecting codes using VHDL/Verilog/Multisim
7. Simulation of flip/flops using VHDL/Verilog/Multisim
8. Simulation of encoders and decoders using VHDL/Verilog/Multisim
9. Experiment on programmable logic devices (ROM/RAM/PLA/PAL/FPG)

NOTE: AT LEAST 5 EXPERIMENTS FROM EACH SECTION SHOULD BE CONDUCTED

SUGGESTED READING:

1. Paul B. Zbar, Albert P. Malvino, Michael A. Miller, Basic Electronics, A text- Lab Manual, 7 thEdition. Mc- Graw- Hill Higher Education 2001.
2. R. P. Jain, Modern Digital Electronics, McGraw Hill Education, 2009.
3. M. M. Mano, Digital logic and Computer Design, Pearson Education India, 2016

Course code	Course Title	Core/ Elective					
4ES354CS	PROGRAMMING FOR PROBLEM SOLVING LAB	Core					
		L	T	P/D	Credits	CIE	SEE
				2	1	40	60

Prerequisites: Mathematical Knowledge, Logical and Analytical Thinking

Course Objectives: The objective of this course is to make the student

1. Understand the fundamentals of programming in C Language.
2. Write, compile and debug programs in C.
3. Formulate solution to problems and implement in C.
4. Effectively choose programming components to solve computing problems

Course Outcomes: After completion of the course, the student will be able to

1. Choose appropriate data type for implementing programs in C language
2. Design and implement modular programs involving input output operations, decision making and looping constructs
3. Apply derived data types and implement programs to store data in structures and files
4. Develop confidence for self-education and ability towards lifelong learning need of computer languages

LIST OF EXPERIMENTS

1. Finding maximum and minimum of given set of numbers, finding roots of quadratic equation.
2. Sin x and Cos x values using series expansion.
3. Generating Pascal triangle, pyramid of numbers.
4. Factorial, Fibonacci, GCD recursive and non-recursive procedures
5. Linear search and binary search using recursive and non-recursive procedures.
6. Bubble sort and selection sort.
7. Matrix addition and multiplication using arrays,
8. Programs on pointers: pointer to arrays, pointer to functions.
9. Programs on structures, union, enum and string manipulations.
10. File handling programs (Reading, Writing, Copying files)
11. Program illustrating using Command Line Arguments

NOTE: AT LEAST 10 EXPERIMENTS SHOULD BE CONDUCTED

Scheme of Instruction & Examination
B.E. SECOND YEAR , IV SEMESTER
ELECTRICAL AND ELECTRONICS ENGINEERING

Semester - IV									**Credits**
S. No	Course Code	Course Title	Scheme of Instruction				Scheme of Examination		
							Maximum Marks		
			Hours Per week				CIE	SEE	
			L	T	P/D	Duration in Hrs			
Theory Courses									
1	4HS403BM	Managerial Economics & Financial Accounts	3	0	0	3	40	60	3
2	4PC404EE	Power Systems-I	3	0	0	3	40	60	3
3	4PC405EE	Electrical Machines-I	3	0	0	3	40	60	3
4	4PC406EE	Control Systems	3	0	0	3	40	60	3
5	4PC407EE	Electrical Circuits-II	3	1	0	3	40	60	4
6	4ES405CS	Python Programming	3	0	0	3	40	60	3
7	4MC403HS	Indian Constitution	2	0	0	2	40	60	-
Laboratories									
8	4PC452EE	Electrical Circuits Lab	0	0	2	2	40	60	1
9	4PC453EE	Control Systems Lab	0	0	2	2	40	60	1
10	4ES455CS	Python Programming Lab	0	0	2	2	40	60	1
		Total	20	0	8	28	400	600	22

HS: Humanities and Social Sciences BS: Basic Science ES: Engineering Science
MC: Mandatory Course PC: Professional Core
L:Lecture T:Tutorial P:Practical D:Drawing
CIE: Continuous Internal Evaluation SEE: Semester End Evaluation (Univ. Exam) EE: Electrical Engg.

Note:
1. Each contact hour is a clock hour.
2. The duration of the practical class is two hours, however it can be extended wherever necessary, to enable the student to complete the experiment.

Course code	Course Title	Core/ Elective					
4HS403BM	MANAGERIAL ECONOMICS & FINANCIAL ACCOUNTS	Core					
		L	T	P/D	Credits	CIE	SEE
		3		0	3	40	60

Prerequisite: Basics of Managerial Economics & Financial Accountancy.

Course Objectives: To understand responsibilities of a manager of a business undertaking

1. To analyze various determinants influencing demand and price
2. To understand the principles of accounting and prepare Journal, Ledger, Trial Balance & Final accounts
3. To understand Financial statement Analysis
4. To evaluate &analyze the long term investments

Course Outcomes: After completion of the course, the student will be able to

1. Determine the responsibilities & decision making in the Organization
2. Understand various factors influencing demand & market structure
3. Understand the principles of Accounting & solve the problems
4. Analyze the Financial performance
5. Understand the capital structure& to take decision on selection of projects

UNIT-I

Introduction to Managerial Economics its Scope, Importance and relation to other sciences, its usefulness to Engineers- Basic concepts of Managerial Economics - Theory of firm.

UNIT-II

Demand Analysis: Introduction to demand, determinants, law of demand, its assumptions, Elasticity of demand-price, income and cross elasticity, demand forecasting, Market competitive structure, price & output determination under perfect competition and Monopoly.

UNIT-III

Basics of Accounting: Financial Accounting–Definition- Accounting Cycle - Journal - Ledger and Cash book - Trial Balance Book- Preparation of final accounts with simple adjustments (including Problems)

UNIT-IV

Financial statement Analysis: - Importance-Users-Ratio Analysis-liquidity, solvency, turnover and profitability ratios.

UNIT-V

Capital management: Significance determinates and estimation of fixed and working capital requirements, sources of capital. Introduction to capital budgeting, Time Value of money - Methods : Non-Discounted cash flow methods(pay back, ARR) , Discounted (NPV, PI, IRR) with problems.

Text Books:

1. Mehta P.L., Managerial Economics, Sultan Chand & Sons Publishers
2. Managerial Economics - **A Problem Solving Approach** , by Luke M Froeb
3. I.M.Panday Financial Management, Vikas Publishing House.
4. Maheswari S.N. Introduction to Accountancy. Vikas Publishing House

References/ Suggested Reading

1. **C** .L.Varshney, K.L.Maheshwari, Managerial Economics, Sultan Publishers
2. D.M.Mithani, Managerial Economics, Himalaya Publishing House
3. Mukherjee, Hanif, Financial Accounting, Tata McGraw Hill
4. Ramachandran , Kakani, Financial Accounting for Management , Tata McGraw Hill

Course code	Course Title	Core/ Elective					
4PC404EE	POWER SYSTEMS-I	Core					
		L	T	P/D	Credits	CIE	SEE
		3		0	3	40	60

Prerequisite: Thermal, Hydel, Nuclear and Gas, Insulators, and Distribution Systems.

Course Objectives: The objective of this course is to make the student

1. Have a fair knowledge about the fundamentals of various conventional power plants like Thermal, Hydel, Nuclear and Gas.
2. Acquire the knowledge of different types of Non conventional energy generation methods like Solar, Wind, Ocean Thermal Energy Conversion (OTEC), Tidal and Geo thermal.
3. Understand the Economics of Power Generation, Types of costs, Depreciation, methods of P.f. improvement, Tariffs
4. Have the knowledge of construction of Over head lines, materials, Supports, insulators and Underground cables.
5. General aspects of AC & DC distribution systems.

Course Outcomes: After completion of the course, the student will be able to

1. Analyze economic aspects of power generation.
2. Demonstrate the Layout and operation of Hydel and Thermal power plants
3. Explain the layout, operation and importance of renewable energy sources and Nuclear power plants
4. Understand the different types of DC and AC distribution and its calculations.
5. Analyze the mechanical design of transmission lines and concept of underground cables Analyze the Inductance and Capacitance calculations of Transmission lines

Unit-I:

Steam Power Stations: Selection of site, operation, Layout & various parts of station: Economizer, super heater, Air pre-heater, Electrostatic precipitator, turbine, cooling towers, Coal handling and ash handling, Types of Boilers. Advantages and disadvantages of Steam power generation.

Hydro-Electric Power plants: Selection of site, Types of hydro-electric plants and layouts, Hydrograph, Flow duration curve, Mass curve. Advantages and disadvantages of Hydro electric power generation.

Unit-II:

Alternate Power sources: Nuclear power: Fissile materials, Nuclear Fission and Chain reaction Layout and types of nuclear reactors, Advantages and disadvantages, **Solar power:** selection of site, working principle, types of solar collectors. **Wind power:** selection of site, working principle and layout. **Gas power plants:** working principle and layout, waste to energy.

Unit-III:

Economics of Power Generation: Load Curve, Load Duration curve, Average load, Load factor, Demand factor, Diversified factors, plant capacity factor and plant use factor - **Numerical problems.** Base Load and Peak load operation, Types of costs and types of tariffs, Methods of power factor improvement, Most economical p.f. for constant KW load and constant KVA type loads.

Distribution: General aspects of AC and DC distribution systems.

DC Systems: ring main, Radial, Voltage drop calculations, Distributor fed at one end, Distributor fed at both ends. **Numerical problems**

Unit-IV:

Inductance and Capacitance of Transmission Lines: Calculation of resistance, inductance and capacitance of transmission lines, single phase and 3-phase lines with symmetrical and asymmetrical spacing, composite conductors, GMR and GMD Spacing, transposition, bundled conductors, Numerical problems

Unit-V:

Over-Head Lines: Construction of Overhead lines - Overhead line materials, Equation of Sag for equal and unequal supports, sag and tension calculations, Effect of wind and ice on sag - **Numerical problems.**

Insulators: Types of insulators, Potential distribution over a string of suspension insulators, Methods of equalizing the potential, Testing of insulators. **Numerical problems**

Underground Cables: Conductors for cables, Insulating materials, Mechanical protection, LV, HV and EHV cables, Grading of cables, Capacitance of three-core cables.

TEXT BOOKS :

1. .L. Wadhwa, Electrical Power Systems, Wiley Eastern Ltd. 5thEdition, 2005.(Unit 1-4)
2. C.L.Wadhwa,Generation,DistributionandUtilizationofElectricalEnergy,Wiley Eastern Ltd., 5thEdition,2005.(Unit 1,2)
3. S.N.Singh- Electrical Power Generation, Transmission andDistribution- Prentice Hall pvt.ltd.New-2003.(Unit 1-5)
4. Principles of Power Systems - V.K Mehta and Rohit Mehta S. Chand& Company Ltd, New Delhi 2004. (Unit 1-5)

REFERENCES/ SUGGESTED READING:

1. Power System Engineering - R. K. Rajput
2. Power System Engineering - Kothari & Nagrath

Course code	Course Title	Core/ Elective					
4PC405EE	ELECTRICAL MACHINES-I	Core					
		L	T	P/D	Credits	CIE	SEE
		3		0	3	40	60

Prerequisite: Elements of Electrical and Electronics Engineering, Electro Magnetic Fields, Electrical Circuits

Course Objectives: The objective of this course is to make the student

1. To introduce the concepts of magnetic circuits.
2. To impart knowledge on working and applications of DC machines.
3. To gain an understanding on analysis and performance of DC Machines and Transformers.

Course Outcomes: After completion of the course, the student will be able to

1. Analyze the concepts of energy conversion principles.
2. Analyze the operation and control of DC machines.
3. Analyze single phase transformers circuits.
4. Identify proper type of motors suitable for given application.
5. Understand the configurations of auto transformers and 3-phase transformers.

UNIT-I

Electromechanical Energy Conversion Principles: Principles of energy conversion, single excited and doubly excited magnetic systems, singly excited electric field systems, Faraday's law, Lenz's law

UNIT- II

DC Machines: Constructional features and principle of operation of DC machines as Generator and Motor , Simplex and multiplex lap and wave windings; Separately excited, series and shunt, cumulatively and differentially compound excited motoring and generating mode of operation and their characteristics, applications of DC machines; Armature reaction, demagnetizing and cross magnetizing ampere-turns, compensating windings, commutation process and methods of commutation, role of inter poles and compensating winding. Problems on emf equation, torque equation and armature reaction.

UNIT-III

Speed Control of DC Motors: Speed control of shunt & series motors, losses in DC machines and calculation of efficiency. Need for starters and Starters for DC series shunt and compound motors. **Testing of DC Motors:** No-load test, load tests and regenerative tests such as Swinburne's Test, Direct load test, Hopkinson's test, Field's test and Retardation test. Calculation of efficiency based on all the above tests.

UNIT-IV

Single-Phase Two Winding Transformers: Construction, principle of operation, E.M.F. equation, phasor diagrams; Equivalent circuit, determination of equivalent circuit parameters, Predetermination of performance equivalent circuit parameters and Sumpner's test. Losses, separation of no-load losses, calculation of efficiency and regulation by direct and indirect methods, conditions for maximum efficiency. Concept of all-day efficiency. Parallel operation of transformers and Load sharing.

UNIT -V

Auto Transformers and 3-Phase Transformers: Principle of operation of Auto Transformers, saving of copper compared to two-winding transformer and its application. **Three-Phase Transformers:** Merits of three phase Transformers over three phase transformer bank Type of connections such as Delta-Delta, Delta-Star, Star-Delta, Delta-Star, V-V connection and T-T Connections.

TEXT BOOKS :

1. Electrical Machinery, Theory: Performance & Applications, Dr. P. S. Bimbhra, Khanna Publishers, 2021.
2. Fitzgerald and Kingsley's electric machinery by Stephen D. Umans–TMH Publishers, 7th Edition, 2020.
3. Nagarath & D.P.Kothari: ElectricalMachines,TMHPublishers,5th edition 2017.
4. Theory& Performance of Electrical Machines by J.B. Gupta, S.K. Kataria & Sons, 5th Edition, 2013.
5. The Performance and Design of Direct Current Machines, A.E .Clayton & NN Hancock, CBS Publishers, 2004. 3. Electric Machines, P. S Bimbhra- 2nd Edition, Khanna Publishers,2017.

REFERENCES/ SUGGESTED READING:

1. A. E. Fitzgerald and C. Kingsley, Electric Machinery, McGraw HillEducation, 6th Edition, 2005.
2. M. G. Say, Performance and design of AC machines, CBS Publishers,2002.
3. A. S. Langsdorf, Theory of Alternating current machinery, 2nd Edition,McGraw Hill Education, 1984.

Course code	Course Title	Core/ Elective					
4PC406EE	CONTROL SYSTEMS	Core					
		L	T	P/D	Credits	CIE	SEE
		3		0	3	40	60

Prerequisite: Basics of circuits, Laplace transform, Inverse Laplace transform and partial fractions.

Course Objectives: The objective of this course is to make the student

1. Efficient in modeling of electrical and mechanical systems, using differential equations, transfer functions, block diagrams, and state variables.
2. Analyze of properties of control systems, such as sensitivity, stability, controllability, tracking, in time and frequency domains.
3. Design of feedback controllers, such as PID, lead and lag compensation.
4. Understand and develop the state space representation of control systems.

Course Outcomes: After completion of the course, the student will be able to

1. Analyze the concept of control systems, feedback, Mathematical modeling of Electrical and Mechanical systems
2. Analyze the time domain and frequency response analysis of control systems
3. Apply the knowledge of various analytical techniques used to determine the stability of control systems and Analyze the stability of systems and understand the importance of compensators
4. Demonstrate controllability and observability of modern control systems

Unit-I

Introduction to Control Systems: Classification of control systems, Feed-Back Characteristics, Effects of feedback, Error sensing devices -Transfer function-Potentiometers, F-I and F-V analogous systems, synchros, AC-DC servo motors- Block diagram reduction technique, Transfer function and impulse response, Signal flow graph, Mason's gain formula.

Unit-II

Time Response Analysis: Standard test signals - Time response of first order systems - Transient response of second order system for unit step input, Time domain specifications- Types of system- Order of a system-Steady state response –Steady state errors and error constants – PID controllers

Unit-III

Stability Analysis in S-Domain: The concept of stability - Routh's stability Criterion, Absolute stability and relative stability, Limitations of Routh's stability, Nyquist stability criterion, Principle of argument.

Root Locus Technique: The root locus concept, Construction of root loci, Effects of adding poles and zeros on the root loci.

Unit-IV:

Frequency Response Analysis: Introduction to frequency response - Frequency domain specifications - Bode plot - Stability analysis from Bode plots - Determination of transfer function from the Bode Diagram - Polar Plots, Gain margin and phase margin, Compensation: Lead, Lag, Lead – Lag Compensation using bode plot

Unit-V

State Space Analysis: Concepts of state, State variables and state model, Derivation of state models from transfer functions and differential equations. Controllable, Observable and Diagonal state models - State transition matrix - Solution of state equations by time domain method - Concepts of Controllability and Observability

TEXT BOOKS :

1. Control System Engineering, I.J. Nagrath, M. Gopal, New Age International (P) Limited publishers, 2008. (Unit 1-5)
2. Control System Principles and Design, M. Gopal, Tata McGraw Hill, 2nd Edition, 2003 (Unit 1-5).
3. Control systems, A.NagoorKani, RBA publications, 3rd Edition, 2015. (Unit 1-5).
4. Automatic control systems, S.Hasan saeed, KATSON Books, 8th Revised Edition, 2014. (Unit 1-5)

REFERENCES/ SUGGESTED READING:

1."Modern Control Systems", K. Ogata Prentice Hall of India, 4th Edition,2002.
2. "Automatic control systems", B.C.Kuo, Wiley India, 7th Edition, 2002.
3. "Control systems", N.C.Jagan, B.S Publications, 2nd Edition, 2008.

Course code	Course Title	Core/ Elective					
4PC407EE	ELECTRICAL CIRCUITS-II	Core					
		L	T	P/D	Credits	CIE	SEE
		3			3	40	60

Prerequisite: Circuit concepts, Electrical Circuits -I

Course Objectives: The objective of this course is to make the student

1. To understand Magnetic Circuits, Network Topology.
2. To evaluate Network parameters of given Electrical network.
3. To analyze various types of filters and attenuators.
4. To study the aspects of network synthesis and analysis of two port networks.

Course Outcomes: After completion of the course, the student will be able to

1. Knowledge about different network parameters and their relations.
2. Analyze the Electrical Circuits with the concept of Network topology.
3. Determine the parameters for the design of various filters
4. Find network functions and two port parameters.
5. Represent the transfer function for the given network

Unit-I:

Network Parameters: Two port network parameters – Z, Y, ABCD and hybrid parameters and their relations. Cascaded networks, concept of transformed network – two-port network parameters using transformed variables.

Unit-II:

Network Functions: The concept of Complex Frequency, Physical Interpretation of Complex Frequency, Transform Impedance and Transform Circuits, Series and parallel Combination of Elements, Terminal Pairs or Ports, Networks Functions for the One-port and Two-port, Poles and Zeros of Network Functions, Significance of poles and Zeros, Properties of Driving Point Functions, Properties of Transfer Functions, Necessary Conditions for Driving Point Functions, Necessary Conditions for Transfer Functions, Time Domain Response from Pole Zero Plot.

Unit-III:

Network Synthesis: Hurwitz polynomials, Positive Real Functions, Frequency Response of Reactive One-ports, Synthesis of Reactive One-ports by Foster's Method, Synthesis of Reactive One-ports by Cauer Method, Synthesis of RL network by Foster's Method, Synthesis of RL network by Cauer's Method, Synthesis of RC network by Foster's Method, Synthesis of RC network by Cauer's Method.

Unit-IV:

Graph Theory: Definitions, Incidence matrix, Properties of Incidence matrix, Incidence matrix and KCL, Tie-Set matrix, Tie-Set matrix and link currents, Cut-Set matrix, Cut-Set matrix and Branch Voltages, Mesh Analysis, Nodal Analysis.

Unit-V:

Filters and Attenuators: Classification of filters- Low Pass, High Pass, Band Pass, Band Elimination filters, Filter networks, equation of filter networks, Prototype filter design. Attenuators- classification.

TEXT BOOKS :

1. M E Van Valkenberg, "Network Analysis", PHI, 3rd Edition, 2014.
2. Fundamentals of electric circuits by Charles K.Alexander and N.O.Sadiku, Fifth Edition

REFERENCES/ SUGGESTED READING:

1. John Bird, "Electrical Circuit Theory and Technology", Newnes, 2nd Edition, 2003.
2. C L Wadhwa, "Electrical Circuit Analysis including Passive Network Synthesis", New Age International, 2 nd Edition, 2009.
3. David A Bell, "Electric circuits", Oxford University Press, 7th Edition, 2009.
4. E Hughes, "Electrical and Electronics Technology", Pearson Education, 2010.
5. A Chakrabarthy, "Electric Circuits", Dhanipat Rai & Sons, 6th Edition, 2010

Course code	Course Title	Core/ Elective					
4ES405CS	PYTHON PROGRAMMING	Core					
		L	T	P/D	Credits	CIE	SEE
		3			3	40	60

Prerequisite: Experience with a high level language (C/C++, Java, MATLAB) is suggested.

Course Objectives: The objective of this course is to make the student

1. To be able to introduce core programming basics and program design with functions using Python programming language.
2. To understand a range of Object-Oriented Programming, as well as in-depth data and information processing techniques.
3. To understand the high-performance programs designed to strengthen the practical expertise.

Course Outcomes: After completion of the course, the student will be able to

1. Examine Python syntax and semantics and be fluent in the use of Python flow control andfunctions.
2. Demonstrate proficiency in handling Strings and File Systems.
3. Create, run and manipulate Python Programs using core data structures like Lists, Tuples and Dictionaries.
4. Interpret the concepts of Object-Oriented Programming as used in Python.
5. Create and animate a variety of shapes and develop an application with graphical user interface (GUI).
6. Implement exemplary applications related to Network Programming, Web Services and Databases in Python

UNIT -I:

Introduction to Python: installing Python, basic syntax, interactive shell, editing, saving, and running a script. The concept of data types, variables, assignments, immutable variables, numerical types, arithmetic operators and expressions, comments in the program, understanding error messages. Conditions, Boolean logic, logical operators, ranges, Control statements.

UNIT -II:

Strings and Files: Strings and text files, manipulating files and directories, os and sys modules, text files: reading/writing text and numbers from/to a file, creating and reading a formatted file (csv or tab-separated). String manipulations: subscript operator, indexing, slicing a string, strings and number system: converting strings to numbers and vice versa.

Lists, tuples, and dictionaries

basic list operators, replacing, inserting, removing an element, searching and sorting lists, dictionary literals, adding and removing keys, accessing and replacing values, traversing dictionaries

UNIT –III:

Design with functions: Hiding redundancy, complexity, arguments and return values, formal vs actual arguments, named arguments. Program structure and design. Recursive functions.

Classes and OOP: Classes, objects, attributes and methods, defining classes, design with classes, data modeling, persistent storage of objects, inheritance, polymorphism, operator overloading (_eq_, _str_, etc), abstract classes, exception handling, try block.

UNIT- IV:

Simple Algorithms and Data structures: Search Algorithms, Sorting Algorithms, Hash Tables

Simple Graphics and Image Processing: "turtle" module, simple 2d drawing - colors, shapes, digital images, image file formats, image processing Simple image manipulations with 'image' module (convert to bw, greyscale, blur, etc).

UNIT -V:

Graphical user interfaces: Event-driven programming paradigm, tkinter, module, creating simple GUI, buttons, labels, entry fields, dialogs, widget attributes - sizes, fonts, colors layouts, nested frames

Multithreading, Networks, and Client/Server Programming: Introduction to HTML, interacting with remote HTML server, running html-based queries, downloading pages, CGI programming, programming a simple CGI form

TEXT BOOKS :

1. Kenneth A. Lambert, The Fundamentals of Python: First Programs, 2nd Edition, 2017, Cengage Learning
2. John V Guttag. "Introduction to Computation and Programming Using Python", Prentice Hall of India

REFERENCES/ SUGGESTED READING:

1. Mark Summerfield. —Programming in Python 3: A Complete introduction to the Python Language, Addison-Wesley Professional, 2009.
2. Allen B. Downey, ``Think Python: How to Think Like a Computer Scientist,,,,, 2nd edition, Updated for Python 3, Shroff/O,,Reilly Publishers, 2016
3. NPTEL Course, Programming, Data Structures and Algorithms using Python, Link: https://nptel.ac.in/courses/106106145
4. NPTEL Course, The Joy of Computing using Python, Link: https://nptel.ac.in/courses/106106182
5.FOSSEE, Python, Link: https://python.fossee.in/

Course code	Course Title	Core/ Elective					
4MC403HS	INDIAN CONSTITUTION	Core					
		L	T	P/D	Credits	CIE	SEE
		3			3	40	60

Prerequisite: Elementary Civics-School level

Course Objectives: The objective of this course is to make the student

1. To create awareness and relevance of the Indian Constitution, its directive principles.
2. To impart understanding of the role, powers and functions of administration at the Central, State and local levels.
3. To create awareness and understanding of Fundamental Rights, State Policy and Duties of Ideal citizen
4. To expose students to the relations between Central/Federal, State and Provincial units, divisions of executive, legislative and judiciary in them.
5. To impart knowledge about the statutory institutions and their role.

Course Outcomes: After completion of the course, the student will be able to

1. Have a general knowledge and back ground about the Constitution of India and its importance.
2. Will distinguish and understand the working of the Central, state and provincial levels of administration.
3. Will be conscious about the fundamental duties, responsibilities and rights as an ideal citizen of India
4. Will be able to perceive and interpret the functioning and distribution of resources between centre and state.
5. Have awareness and relate to the existing hierarchy of the social structure, election.

Unit-I:

Introduction to Constitution- Meaning, reasons for having a constitution. **Evolution of the Indian Constitution:** History, 1909 Act,1919 Act and 1935 Act and Permeable **Constituent Assembly**: Composition and Functions;

Unit-II:

Government vs Governance:

Union Government: Political Executive-President, Prime Minister, Council of Ministers,

Bureaucratic Executive.

State Government: Executive: Governor, Chief Minister, Council of Ministers

Local Government: Panchayat Raj Institutions, Rural and Urban local bodies-composition

Unit-III:

Rights and Duties: Fundamental Rights, Directive principles of State Policy, Fundamental Dutiesof a good citizen

Public Interest Litigation

Unit-IV:

Relation between Federal and Provincial units:

Union-State relations: Administrative, Legislative and Financial, Inter-State council, NITI Ayog, Finance Commission of India.

Unit-V:

Constitutional and Statutory Bodies:

- Election Commission and Electoral Reforms

- National Human Rights Commission, National Commission for Women, National Commission for Minorities, National Commission for Protection

TEXT BOOKS :

1. Durga Das Basu, "Introduction to the Constitution of India", English- Hardcover –:Lexis Nexis, New Delhi.
2. Dr. B.L. Fadia, Dr. Kuldeep Fadia , "Indian Government and Politics", Sahithya Bhavan Publications, Agra.
3. M . Lakshmikanth, "Indian polity', Tata McGraw Hill.

REFERENCES/ SUGGESTED READING:

1. M.V. Pylee, " Indian Constitution"
2. Khattar, "Indian Political System".
3. Constitution of India, Telugu Academy

Course code	Course Title	Core/ Elective					
4PC452EE	ELECTRICAL CIRCUITS LAB	Core					
		L	T	P/D	Credits	CIE	SEE
		0		2	1	40	60

Prerequisite: Basic Electrical and Electronics Engineering, Electrical Circuits

Course Objectives: The objective of this course is to make the student

1. Apply the theoretical knowledge in doing practical experiments and acquire skills to handleinstruments.
2. Understand the behavior of electrical elements, circuits.
3. Understand the practical verification of different laws and theorems.
4. Understand the behavior of electrical circuits Using MATLAB/SIMULINK/PYTHON

Course Outcomes: After completion of the course, the student will be able to

1. Explain common electrical components and their ratings
2. Understand and apply basic laws to analyze an electrical circuit
3. Apply the concepts of theorems to analyze the electrical circuits
4. Analyze performance of DC and AC electrical circuits
5. Design and analyze the behavior of circuits in MATLAB/SIMULINK/PYTHON

LIST OF EXPERIMENTS

1. CRO- applications, measurements of R, L, C using LCR meter, color coding method.
2. Verification of KVL and KCL
3. Verification of Superposition and Reciprocity theorem.
4. Verification of Thevinin's and Norton's thoerem.
5. Verification of Maximum power transfer theorem.
6. Verification of Milliman's and Tellegen's theorem.
7. Analysis of series RL & RC Circuits with AC excitation.
8. Calculation of Z and Y parameters for a given two port network.
9. Calculation of h and ABCD parameters for a given two port network.
10. Verification of Phase and Line relations for voltages and currents in a three-phase network.
11. Series Resonance- Calculation of Bandwidth and Q-Factor.
12. Simulation of series RL and RC Circuits to analyze transient behavior using MATLAB/SIMULINK/PYTHON
13. Simulation of series and parallel resonance circuit using MATLAB/SIMULINK/PYTHON
14. Simulation of electrical circuits for Mesh and Nodal analysis using MATLAB/SIMULINK/PYTHON

Note: A minimum of Ten experiments to be performed.

Course code	Course Title	Core/ Elective					
4PC453EE	CONTROL SYSTEMS LAB	Core					
		L	T	P/D	Credits	CIE	SEE
		0		2	1	40	60

Prerequisite : Basics of circuits, Laplace transform Inverse Laplace transform and partial fractions

Course Objectives: The objective of this course is to make the student

1. Develop transfer function of various control system plants practically by conducting the experiments.
2. Understand the various controllers.
3. Programming and control system concepts using MATLAB/PYTHON

Course Outcomes: After completion of the course, the student will be able to

1. To develop transfer function of various control system plants practically by conducting the experiments.
2. Study the Performance of P, PI and PID Controllers and Analyze the concepts to A.C and D.C position control system.
3. Design lag and lead compensation networks.
4. Apply the concepts of control systems in developing Program using MATLAB/PYTHON
5. Determine the time response of second order system and Determine frequency response of compensating networks.

LIST OF EXPERIMENTS

1. Characteristics of D.C. and AC. Servomotors.
2. Characteristics of synchro's.
3. Frequency response of compensating networks.
4. Step response of second order system.
5. D.C. Position control system.
6. A.C. Position control system.
7. Performance of P, PI and PID Controller on system response.
8. Design of lag and lead compensation for the given plant.
9. Temperature control systems.
10. Simulation of Root locus, Nyquist plot, Bode plot using MATLAB/SIMULINK/PYTHON.
11. Time response of Second order system using MATLAB//SIMULINK/PYTHON.
12. Conversion of state to transfer function and transfer function state space using MATLAB//SIMULINK/PYTHON.
13. Design of lead and lag compensators using MATLAB/SIMULINK/PYTHON.
14. Frequency response characteristics and relative stability analysis using MATLAB//SIMULINK/PYTHON.

Note: A minimum of Ten experiments to be done.

References:

1. Automatic control systems, S.Hasan saeed, KATSON Books, 8th Revised Edition, 2014.
2. R2. Control System Principles and Design, M. Gopal, Tata McGraw Hill, 2nd Edition, 2003.
3. Control System Engineering, I.J. Nagrath, M. Gopal, New Age International (P) Limited publishers, 2008.
4. Control systems, A.NagoorKani, RBA publications, 3rd Edition, 2015.

Course code	Course Title	Core/ Elective					
4ES455CS	PYTHON PROGRAMMING LAB	Core					
		L	T	P/D	Credits	CIE	SEE
		0		2	1	40	60

Prerequisite: Basic Electrical and Electronics Engineering, Electrical Circuits

Course Objectives: The objective of this course is to make the student

1. To learn how to design and program using lists, tuples, and dictionaries.
2. To learn how to use indexing and slicing to access data in Python programs.
3. To learn structure and components of a Python and to read and write files.
4. To learn how to design object-oriented programs with Python classes and Exception handling techniques.
5. To learn how to design and build the GUI applications using python.

Course Outcomes: After completion of the course, the student will be able to

1. Develop solutions to simple computational problems using Python programs.
2. Solve problems using conditionals and loops in Python.
3. Develop Python programs by defining functions and calling them.
4. Use Python lists, tuples and dictionaries for representing compound data.
5. Develop Python programs for GUI applications

LIST OF EXPERIMENTS

1. Develop program to demonstrate different number data types in python
2. Develop program to understand the control structures of python
3. Develop program on String manipulation
4. Develop program to perform various operations on files
5. Develop programs to learn different types of structures (list, dictionary, tuples) in python
6. Develop programs to learn concept of functions scoping, recursion and list mutability
7. Develop program to demonstrate classes and OOP principles
8. Develop programs for data structure algorithms using python – searching, sorting and hash tables
9. Develop programs to understand working of exception handling and assertions
10. Draw graphics using Turtle
11. Develop event driven GUI programs
12. Develop Program for demonstration client server communication

Note: A minimum of Ten experiments to be done.

TEXT BOOKS

1. Kenneth A. Lambert, The Fundamentals of Python: First Programs, 2nd Edition, 2017, Cengage Learning
2. John V Guttag. “Introduction to Computation and Programming Using Python”, Prentice Hall of India