PAAVAI ENGINEERING COLLEGE, NAMAKKAL – 637018
(AUTONOMOUS)
REGULATIONS 2019
CHOICE BASED CREDIT SYSTEM
B.E. – ELECTRICAL AND ELECTRONICS ENGINEERING

CURRICULUM

(Applicable to the candidates admitted during the academic year 2020-2021 onwards)

SEMESTER III

S. No	Category	Course Code	Course Title	L	T	P	C
Theory							
1	BS	MA20301	Transforms and Boundary Value Problems	3	1	0	4
2	ES	IT20305	Object Oriented Programming with C++	3	0	0	3
3	PC	EE20301	Analog Electronic Circuits	3	0	0	3
4	PC	EE20302	Electromagnetic Theory	3	0	0	3
5	PC	EE20303	Electrical Machines I	3	1	0	4
6	MC	MC20301	Value Education	2	0	0	0
Practical							
7	ES	IT20308	C++ Programming Laboratory	0	0	2	1
8	PC	EE20304	Analog Electronics Laboratory	0	0	2	1
9	PC	EE20305	Electrical Machines I Laboratory	0	0	4	2
			Total	**17**	**2**	**8**	**21**

SEMESTER IV

S. No	Category	Course Code	Course Title	L	T	P	C
Theory							
1	BS	MA20404	Numerical Methods	3	1	0	4
2	ES	EE20401	Signals and Systems	3	1	0	4
3	PC	EE20402	Electrical Machines II	3	0	0	3
4	PC	EE20403	Digital Logic Circuits	3	0	0	3
5	PC	EE20404	Transmission and Distribution	3	0	0	3
6	PC	EE20405	Measurements and Instrumentation	3	0	0	3
Practical							
7	PC	EE20406	Electrical Machines II Laboratory	0	0	4	2
8	EE	EN20401	English Proficiency Course Laboratory	0	0	2	1
			Total	**18**	**2**	**6**	**23**

SEMESTER III

MA20301 **TRANSFORMS AND BOUNDARY VALUE PROBLEMS** **3 1 0 4**

(Common to all branches)

COURSE OBJECTIVES

To enable the students to

- introduce Fourier series analysis which is central to many applications in engineering apart from its use in solving boundary value problems
- acquaint the students with Fourier transform techniques used in wide variety of situations in which the functions used are not periodic
- formulate partial differential equations and use mathematical tools for the solution of PDE that model several physical processes
- develop the modeling of one dimensional equation of heat conduction, wave equation and two dimensional Laplace equation
- develop Z- transform techniques which will perform the same task for discrete time systems as Laplace Transform does for continuous systems, a valuable aid in analysis of continuous time systems

UNIT I FOURIER SERIES 12

Dirichlet's conditions; General Fourier series; Odd and even functions; Half range series; Complex form of Fourier Series; Parseval's identity; Harmonic Analysis.

UNIT II FOURIER TRANSFORMS 12

Fourier integral theorem (without proof); Fourier transform pair; Convolution theorem; Parseval's identity; Sine and Cosine transforms - Properties; Transforms of elementary functions.

UNIT III PARTIAL DIFFERENTIAL EQUATIONS 12

Formation of partial differential equations ; Lagrange's linear equation ; Solutions of four standard types of first order partial differential equations ; Linear partial differential equations of second order with constant coefficients.

UNIT IV FOURIER SERIES SOLUTION TO PARTIAL DIFFERENTIAL EQUATIONS 12

Solutions of One-dimensional wave and heat equation ; Steady state two-dimensional heat equation.

UNIT V Z - TRANSFORMS AND DIFFERENCE EQUATIONS 12

Z-transforms - Elementary properties ; Inverse Z-transform - Convolution theorem ; Formation of difference equations ; Solution of difference equations using Z-transform.

TOTAL PERIODS: 60

COURSE OUTCOMES

At the end of this course, students will be able to

- derive Fourier series, their possible forms of representations of periodic functions
- identify and formulate a function in frequency domain whenever the function is defined in time domain
- formulate and solve partial differential equations that occur in many engineering applications
- model wave and heat equations, solve certain boundary value problems and use the solution methods in engineering applications.
- demonstrate the use of Z-transform to convert discrete functions into complex frequency domain representation

TEXT BOOKS

1. Veerarajan T., "Transforms and Partial Differential Equations", Tata McGraw Hill Education Pvt. Ltd., New Delhi, Second reprint, 2012.
2. Grewal. B.S, "Higher Engineering Mathematics", 41th Edition, Khanna Publications, Delhi,(2011).

REFERENCES

1. Narayanan S., Manickavasagam Pillai.T.K and Ramanaiah.G "Advanced Mathematics for Engineering Students" ,Vol. II & III, S.Viswanathan Publishers Pvt Ltd. 1998.
2. Larry C. Andrews, Bhimsen K. Shivamoggi, "Integral Transforms for Enginears", SPIE Optical Engineering press, Washington USA (1999).
3. Ramana. B.V., "Higher Engineering Mathematics", Tata Mc;GrawHill Publishing Company limited, New Delhi (2010).
4. Glyn James, "Advanced Modern Engineering Mathematics", 3rd Edition, Pearson Education (2007).
5. Erwin Kreyszig., "Advanced Engineering Mathematics" 10th Edition,Wiley Publications.

CO-PO MAPPING:

Mapping of Course Outcome (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes PSO's
(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

CO's	Programme Outcomes PO's												PSO's	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	2	2	-	-	-	-	-	-	-	1	3	2
CO2	3	3	2	1	-	-	-	-	-	-	-	1	3	2
CO3	3	2	3	2	-	-	-	-	-	-	-	1	3	2
CO4	3	2	2	2	-	-	-	-	-	-	-	1	3	2
CO5	3	3	2	2	-	-	-	-	-	-	-	1	3	2

IT20305 OBJECT ORIENTED PROGRAMMING WITH C++ 3 0 0 3

COURSE OBJECTIVES

To enable the students to

- introduction to C++ and its variables, data type, operators.
- acquire the knowledge about object oriented programming (OOP)
- study about operator overloading and inheritance in C++.
- understand the concepts of polymorphism and templates.
- familiarize the students with templates and generic programming.

UNIT I INTRODUCTION TO C++ 9

Object oriented programming concepts - Introduction to C++, tokens, keywords, identifiers and constants; Basic data types - User defined data types, derived data types, symbolic constants; Declaration of variables - Dynamic initialization of variables, reference variables; Operators in C++ - Scope resolution operator , manipulators , expressions and their types ;Control structures -The main function, function prototyping ,call by value , call by reference, inline functions, default arguments, function overloading.

UNIT II CLASSES AND OBJECTS 9

Specifying a class – Defining member functions, private member functions, arrays within a class, memory allocation for objects, static data members, static member functions, arrays of objects, objects as function arguments, friend functions, returning objects; Constructors - Parameterized constructors, multiple constructors in a class, constructors with default arguments, dynamic initialization of objects, copy constructor, dynamic constructors, destructors.

UNIT III OPERATOR OVERLOADING AND INHERITANCE 9

Defining operator overloading - Overloading unary, binary operators; Manipulation of strings using operators – Rules for overloading operators; Type Conversions; Inheritance - Defining derived classes, single inheritance, multilevel inheritance, multiple inheritance, hierarchical inheritance, hybrid inheritance; Virtual base classes – Abstract classes.

UNIT IV POLYMORPHISM AND TEMPLATES 9

Introduction to pointers to objects - This pointer, pointers to derived classes, virtual functions, pure virtual functions; Templates - Function templates, user defined template arguments, class templates.

UNIT V EXCEPTION HANDING AND GENERIC PROGRAMMING 9

Exception Handling - Exception handling mechanism, multiple catch, nested try, rethrowing the exception; Namespaces – Std namespace, standard template library.

TOTAL PERIODS: 45

COURSE OUTCOMES

At the end of this course, students will be able to

- summarize the basic concepts of object oriented programming with C++.
- analyze a problem and identify classes, objects and the relationships among them.
- make use of overloading and inheritance concepts to solve real world problems.
- develop application using polymorphism and templates.
- apply the features of exception handling and generic programming.

TEXT BOOKS

1. E.Balagurusamy, "Object Oriented Programming with C++", Tata McGraw Hill, Sixth Edition, 2013.
2. Herbert Schildt "C++: The Complete Reference", Tata McGraw Hill,4th Edition, 2003.

REFERENCES

1. Ira Pohl, "Object Oriented Programming using C++", Pearson Education, Second Edition Reprint 2004.
2. S. B. Lippman, Josee Lajoie, Barbara E. Moo, "C++ Primer", Fourth Edition, Pearson Education, 2005.
3. B. Stroustrup, "The C++ Programming language", Third edition, Pearson Education, 2004.
4. Paul Deitel, Harvey Deitel, "C++ How to Program", Tenth Edition, Pearson Education, 2017.

CO-PO MAPPING

Mapping of Course Outcome (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes PSO's
(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

CO's	Programme Outcomes PO's												PSO's	
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CO1	2	2	3	2	2	-	-	-	-	-	-	2	2	2
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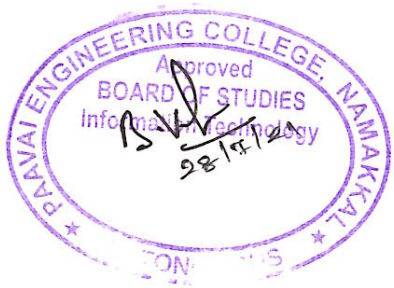
CO3	2	2	3	2	3	-	-	-	-		2	3	3	2
CO4	2	2	3	2	2	-	-	2	-	-	-	3	-	2
CO5	3	1	2	3	2	-	-	1	-	-	-	3	2	1



EE20301 **ANALOG ELECTRONIC CIRCUITS** **3 0 0 3**

COURSE OBJECTIVES

To enable the students to

- know the structure of basic electronic devices.
- understand the operation and application of electronic devices and their amplifier circuits.
- analyse the circuit characteristics using Op-amp ICs.
- recognize the application circuits with ICs as Op-amp.
- study the applications of special ICs like Timers, PLL circuits and regulator ICs

UNIT I ELECTRONIC DEVICES AND THEIR CHARACTERISTICS **9**

PN junction diodes – structure, operation and VI characteristics; diffusion capacitance and transient capacitance; zener diode – Bipolar junction transistor (BJT), Junction field effect transistor (JFET) - structure, operation and characteristics – Unijunction transistor (UJT) based relaxation oscillator.

UNIT II AMPLIFIER CIRCUITS **9**

BJT small signal model – Analysis of CE amplifier, gain and frequency response; Differential amplifier - Common mode and Differential mode; Feedback amplifier - Voltage-series feedback and voltage-shunt feedback.

UNIT III OP-AMP AND CHARACTERISTICS **9**

Ideal OP-AMP characteristics, DC characteristics, AC characteristics, frequency response of OP-AMP, basic applications; Inverting, non-inverting and differential amplifier circuits; Adder, subtractor circuits; Differentiator and integrator circuits.

UNIT IV APPLICATION OF OP-AMPS **9**

Waveform generators - Wein bridge, RC phase shift oscillator; square wave, triangular wave generation clippers and clampers, Peak detector; D/A converters - Weighted resistance type , R-2R ladder type; A/D converters -Flash type, dual slope type and successive approximation types.

UNIT V SPECIAL IC's **9**

555 Timer circuit- Functional block diagram; Astable and monostable multivibrator ; 566 Voltage controlled oscillator (VCO) circuits; Phase locked loop (PLL) ; ICL 8038 Function generator IC; Regulator IC's - LM78XX, LM79XX fixed voltage regulator, LM317.

TOTAL PERIODS: 45

COURSE OUTCOMES

At the end of this course, students will be able to

- apply the concepts of various semiconductor devices.
- design the circuit for electronic devices.

- comprehend the characteristics of operational amplifier.
- implement the concept of Op-amp IC in various waveform generators and converters.
- identify the special ICs for voltage, frequency control applications.

TEXT BOOKS

1. S.Salivahanan and N.Suresh Kumar "Electronic Devices and Circuits" , Tata McGraw Hill Education Private Limited, New Delhi 2016.
2. D. Roy Choudary, S.B. Jain, " Linear Integrated Circuits", Third edition, New Age publishers,2014.

REFERENCES

1. David A bell, " Electronic circuits" Oxford University Press, 2011
2. Millman and Halkias, " Integrated Electronics", McGraw Hill Publications.
3. Muhammad H. Rashid, " Linear Integrated Circuits", Cengage Learning, 2014.

CO-PO MAPPING

Mapping of Course Outcome (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes PSO's
(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

CO's	Programme Outcomes PO's												PSO's	
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CO3	3	2	3	1	-	-	-	-	-	-	2	2	3	3
CO4	3	2	3	1	-	-	-	-	-	-	2	2	3	3
CO5	3	2	3	1	-	-	-	-	-	-	2	2	3	3

EE20302 **ELECTROMAGNETIC THEORY** **3 0 0 3**

COURSE OBJECTIVES

To enable the students to

- impart the knowledge on the concepts of electrostatics, electric potential, energy density and their applications.
- acquire information about the concepts of conductors, dielectrics and capacitance.
- observe the magnetic force on steadily moving charged particles.
- distinguish the concepts of force between various elements and inductance.
- understand the concepts of field equations and electromagnetic waves.

UNIT I STATIC ELECTRIC FIELDS **9**

Introduction-Coulomb's law , Electric field intensity, electric field due to infinite conductors and circular disc, electrical field due to point charges; Line, surface and volume charge distributions; Electric flux density, Gauss law and its applications; Concept of divergence and curl; Electric potential – Potential field due to different types of charges ,potential gradient ,dipole, potential due to dipole.

UNIT II CONDUCTORS, DIELECTRICS AND CAPACITANCE **9**

Current density – continuity of current, conductor properties; Nature of dielectric materials; Boundary conditions; Capacitance – Capacitance in different dielectric medium, capacitance of a two wire line; Energy density in electrostatic field – Poisson's and Laplace equations, Solution of Laplace and Poisson's equation ,application of Laplace's and Poisson's equations.

UNIT III STATIC MAGNETIC FIELDS **9**

Biot- Savart Law and applications , Ampere's circuital law and applications; Curl of magnetic field intensity -Magnetic flux and magnetic flux density, magnetic field intensity due to straight conductors and circular disc, scalar and vector magnetic potentials; Magnetic boundary conditions.

UNIT IV FORCE, TORQUE AND INDUCTANCE **9**

Lorentz force equation – force between differential current elements, force and torque on a closed circuit; Nature of magnetic materials – magnetization and permeability; Inductance and mutual inductance – inductance of solenoid and toroid; Energy density in magnetic field.

UNIT V MAXWELLS EQUATIONS AND ELECTROMAGNETIC WAVES **9**

Concept of displacement and conduction current; Modified Ampere's circuital law; Maxwell's equations in point and integral forms; Comparison between field theory and circuit theory; Wave equations – Plane waves in free space; Poynting theorem and Poynting vector and its significance.

TOTAL PERIODS: 45

COURSE OUTCOMES

At the end of this course, students will be able to

- analyze electrostatic fields in line, surface and volume charge distributions.
- implement the concepts of electrostatic fields in capacitance.
- evaluate the magnetic field of moving charges in different spaces and develop the boundary condition for different medium.
- apply magnetic field concepts in various engineering field.
- use the Maxwell's equations and analyze the propagation of electromagnetic waves and their parameters in different media.

TEXT BOOKS

1. William H.Hayt,Jr., "Engineering Electromagnetics", Tata McGraw-Hill Publishing Ltd, New Delhi,2016.
2. Gangadhar.K.A, "Field theory", Khanna Publication Limited, New Delhi, 2015.

REFERENCES

1. Muthusubramanian R and Senthilkumar N, "Electromagnetic field theory", Anuradha publications, 2016.
2. Joseph A.Edminister , "Theory and Problems of electromagnetics Schaum's outline series"2014.
3. David J.Griffite , "Introduction to electro dynamics" , Prentice Hall of India Private Limited,2017.
4. S.Salivahanan and S.Karthie, "Electromagnetic field theory", Tata Mcgraw hill publisher, 2nd edition 2018.

CO-PO MAPPING

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CO's	Programme Outcomes PO's												PSO's	
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CO1	2	3	2	2	-	1	-	-	-	-	1	2	3	3
CO2	3	3	1	1	-	-	-	-	-	-	1	2	3	3
CO3	3	3	2	2	-	2	-	-	-	-	1	2	3	3
CO4	3	3	2	2	-	-	-	-	-	-	2	2	3	3
CO5	2	3	1	2	-	-	-	-	-	-	1	2	3	3

EE20303 **ELECTRICAL MACHINES I** **3 1 0 4**

COURSE OBJECTIVES

To enable the students to

- understand the concepts of rotating machines and the principles of excitation systems.
- acquire knowledge about the working principles, types and characteristics of DC generators.
- know the working principle, characteristics, methods of speed control of DC motors.
- understand the principle of operation and performance of transformer.
- identify the types of testing in DC machines and transformers.

UNIT I BASIC CONCEPTS OF ROTATING MACHINES **12**

Introduction to magnetic circuits – Magnetomotive force(MMF), flux, reluctance, inductance, magnetically induced e.m.f and force ; AC operation of magnetic circuits ; Hysteresis and Eddy current losses; Energy in magnetic systems – Principles of electromechanical energy conversion , Single and multiple excited systems; MMF of distributed A.C. windings; Rotating magnetic field – Generated voltage ;Torque in round rotor machine.

UNIT II DC GENERATORS **12**

DC Generators - Constructional details, emf equation, methods of excitation, self and separately excited generators; Characteristics - series, shunt and compound generators; Armature reaction and commutation; Parallel operation of DC shunt and compound generators.

UNIT III DC MOTORS **12**

DC motors - Principle of operation, back emf and torque equation; Characteristics - Series, shunt and compound motors; Starting of DC motors; Types of starters; Speed control of DC series and shunt motors.

UNIT IV TRANSFORMERS **12**

Transformer - Constructional details of core and shell type transformers, types of windings ,principle of operation, emf equation ,Transformation ratio; Transformer on no-load – Parameters referred to HV / LV windings, Equivalent circuit, Transformer on load, Regulation; Parallel operation of single phase transformers; Three phase transformers – construction, types of connections; Auto transformer-construction, principle, applications and comparison with two winding transformer ;All day efficiency.

UNIT V TESTING OF DC MACHINES AND TRANSFORMERS **12**

Losses and efficiency in DC machines and transformers; Condition for maximum efficiency; Testing of DC machines – brake test, swinburne's test, retardation test and hopkinson's test; Testing of transformers-Polarity test, load test, open circuit and short circuit tests.

TOTAL PERIODS: 60

COURSE OUTCOMES

At the end of this course, students will be able to

- explain the working principles of electrical machines and its concepts.
- describe the construction of D.C machines, operation of DC Generator, types and characteristics of DC generators.
- implement the concept of DC Motor for real time applications.
- explain the constructional details, the principle of operation of transformers.
- estimate the various losses in D.C. machines, transformers.

TEXT BOOKS

1. A.E. Fitzgerald, Charles Kingsley, Stephen. D.Umans, "Electric Machinery", Tata McGraw Hill publishing Company Ltd, Reprint 2016.
2. I.J. Nagrath and D.P. Kothari, "Electric Machines", Tata McGraw Hill Publishing Company Ltd, 2017.

REFERENCES

1. B.L.Theraja, A.K.Theraja, "Electrical Technology", Volume 2, S.Chand Publishers, 2016.
2. Smarajit Ghosh, "Electrical Machines", Pearson Education, 2016.
3. Parkar Smith, N.N., "Problems in Electrical Engineering" CBS Publishers and Distributers, 2017.
4. J.B. Gupta, "Theory and Performance of Electrical Machines", S.K.Kataria and Sons, 2016.

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CO1	3	2	2	1	-	1	-	-	-	-	2	2	3	3
CO2	3	2	2	1	-	1	-	-	-	-	2	2	3	3
CO3	3	2	2	1	-	1	-	-	-	-	2	2	3	3
CO4	3	2	2	1	-	1	-	-	-	-	2	2	3	3
CO5	3	2	2	1	-	1	-	-	-	-	2	2	3	3

MC20301 **VALUE EDUCATION** **2 0 0 0**

COURSE OBJECTIVES

To enable the students to

- develop the individual multi-dimensionally in physical, intellectual, emotional and spiritual dimensions.
- facilitate individuals think about and reflect on different values.
- understand their responsibility in making choices and the practical implications of expressing them.
- instigate to choose their personal, social, moral and spiritual values.
- design and chisel the overall personality of an individual.

UNIT I PERSONAL VALUES **6**

Value Education – Definition, Types of values; Human values - Respect, Acceptance, Consideration, Appreciation, Listening, Openness, Affection, Patience, Honesty, Forgiveness, Sacrifice, Authenticity, Self Control, Altruism, Tolerance and Understanding, Wisdom, Decision making, Self –actualization, Character formation towards positive Personality, Contentment; Religious Values -Humility, Sympathy and Compassion, Gratitude. Peace, Justice, Freedom, Equality.

UNIT II COMMUNAL VALUES **6**

Social Values - Pity and probity - Self control - Respect to - Age, Experience, Maturity, Family members, Neighborhood - Universal Brotherhood - Flexibility -Peer pressure - Sensitization towards Gender Equality, Physically challenged, Intellectually challenged - Reliability - Unity - Modern Challenges of Adolescent Emotions and behavior - Comparison and Competition- Positive and Negative thoughts- Arrogance, Anger and Selfishness.

UNIT III ENGINEERING ETHICS **6**

Professional Values -Knowledge thirst - Sincerity in profession- Regularity, Responsibility, Punctuality and Faith - Perseverance - Courage - Competence - Co-operation- Curbing unethical practices - Integrity, Social Consciousness and Responsibility. Global Values - Computer Ethics – Moral Leadership - Code of Conduct - Corporate Social Responsibility.

UNIT IV SPIRITUAL VALUES **6**

Developing Spirituality - Thinking process, Moralization of Desires - Health benefits- Physical exercises- Mental peace; Meditation - Objectives, Types, Effects on body, mind and soul; Yoga - Objectives, Types, Asanas; Family values -family's structure, function, roles, beliefs, attitudes and ideals, Family Work Ethic, Family Time, Family Traditions.

UNIT V HUMAN RIGHTS 6

Classification of Human Rights - Right to Life, Liberty and Dignity- Right to Equality - Right against Exploitation - Cultural and Educational Rights- Physical assault and Sexual harassment - Domestic violence.

TOTAL PERIODS: 30

COURSE OUTCOMES

At the end of this course, students will be able to

- cultivate the values needed for peaceful living in the existing society.
- comprehend humanistic values to develop peace in the world.
- foster ethics in profession and usage of Technology.
- orient with the importance of value education towards personal, group and spiritual attributes.
- nurture physical, mental, spiritual growth to face the competitive world.

TEXT BOOKS

1. Little, William, An introduction of Ethics. Allied publisher, Indian Reprint 1955.
2. Sharma, S.P. Moral and Value Education; Principles and Practices, Kanishka publishers, 2013.

REFERENCES

1. "Values (Collection of Essays)". Sri Ramakrishna Math. Chennai. 1996.

CO-PO MAPPING

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CO2	-	-	-	2	-	2	-	1	3	2	1	3	-	-
CO3	-	-	3	2	2	3	2	3	3	1	3	3	-	-
CO4	-	-	3	1	-	2	-	-	1	-	-	3	-	-
CO5	-	-	-	-	-	1	-	-	-	-	-	3	-	-

IT20308 **C++ PROGRAMMING LABORATORY** **0 0 2 1**

COURSE OBJECTIVES

To enable the students to

- know fundamental knowledge of object-oriented programming.
- demonstrate C++ syntax and semantics
- solve simple engineering problems.
- development of solution for complex problems in the real world.

LIST OF EXPERIMENTS

1. Write C++ programs using classes and objects.
2. Design C++ classes with static members, methods with default arguments, friend functions.
3. Develop C++ programs using constructor, destructor, and copy constructor.
4. Develop C++ programs operator overloading and inheritance.
5. Develop C++ programs using virtual function and function templates.
6. Develop C++ programs using exceptions handling.

TOTAL PERIODS: 30

COURSE OUTCOMES

At the end of this course, students will be able to

- understand object-oriented concepts and how they are supported by C++
- demonstrate the ability to analyze, use, and create functions, classes, to overload operators.
- develop a application using polymorphism and templates.
- apply the concepts of data encapsulation and inheritance to develop large scale software.

RECOMMENDED SYSTEM/SOFTWARE REQUIREMENTS

Software: Turbo C++.

Hardware: Flavor of any WINDOWS or LINUX and Standalone desktops 30 Nos.

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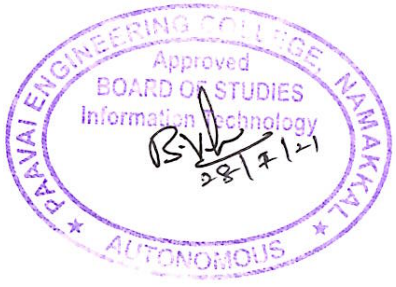
CO2	2	2	3	2	3	-	-	-	-	-	-	2	2	3
CO3	2	2	3	2	3	-	-	-	-		2	2	3	2
CO4	2	2	3	2	2	-	-	2	-	-	-	3	2	3



EE20304 **ANALOG ELECTRONICS LABORATORY** **0 0 2 1**

COURSE OBJECTIVES

To enable the students to

- understand the characteristics of basic electronic devices.
- obtain the characteristics of amplifier circuits.
- analyse the circuit characteristics of an Op-amp ICs.
- acquire the knowledge on the working of IC 555 and voltage regulator.

LIST OF EXPERIMENTS

1. PN junction characteristics
2. JFET characteristics.
3. Transistor (CE conf) characteristics
4. Transistorized Differential amplifier
5. OP-AMP based Wien bridge oscillator
6. OP-AMP based RC –phase shift oscillator
7. Inverting amplifier and Non-inverting amplifier
8. Differentiator and Integrator
9. 555 – timer IC based astable multi-vibrator
10. LM78XX Fixed voltage regulator

TOTAL PERIODS: 30

COURSE OUTCOMES

At the end of this course, students will be able to

- analyze circuit characteristics of basic electronic devices of PN junction, JFET and BJT.
- develop and measure the waveform generation using Op-amp ICs.
- design and construct the application circuits with Op-amp.
- construct the circuits using IC 555 and voltage regulator for square wave generator and regulating the input voltage.

CO-PO MAPPING

Mapping of Course Outcome (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes PSO's
(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

CO's	Programme Outcomes PO's												PSO's	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	2	2	1	2	-	1	-	-	-	-	2	2	3	3
CO2	2	2	1	2	-	2	-	-	-	-	2	2	3	3
CO3	2	2	1	2	-	2	-	-	-	-	2	2	3	3
CO4	2	2	1	2	-	1	-	-	-	-	2	2	3	3

EE20305 ELECTRICAL MACHINES I LABORATORY 0 0 4 2

COURSE OBJECTIVES

To enable the students to

- perform various test on DC motors
- do test on DC generators
- acquire knowledge on transformer connections, open circuit and short circuit test.
- gain ideas in testing of transformer to analyse the performance

LIST OF EXPERIMENTS

1. Load test on DC shunt motor and compound motor.
2. Load test on DC Series motor.
3. Speed Control of DC Shunt Motor and Swinburne"s test.
4. Load test on DC shunt generator, DC compound generator.
5. Load test on single phase transformer.
6. Open circuit and Short circuit test on single phase transformer.
7. Open circuit characteristics of DC generator (Self and Separately Excited)
8. Hopkinson's test
9. Sumpner's test on 1-phase transformers
10. 3-phase transformer connections
11. Separation of no-load losses in single phase transformer

TOTAL PERIODS: 60

COURSE OUTCOMES

At the end of this course, students will be able to

- demonstrate various test on DC motors
- determine the performance of DC generators.
- perform open circuit and short circuit test on transformers.
- calculate the equivalent circuit parameters and performance of transformers

CO-PO MAPPING

Mapping of Course Outcome (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes PSO's
(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

CO's	Programme Outcomes PO's												PSO's	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	2	2	-	1	-	-	-	-	1	2	3	3
CO2	3	3	2	2	-	1	-	-	-	-	1	2	3	3
CO3	3	3	2	2	-	1	-	-	-	-	1	2	3	3
CO4	3	3	2	2	-	1	-	-	-	-	1	2	3	3

SEMESTER IV

MA20404 **NUMERICAL METHODS** **3 1 0 4**

COURSE OBJECTIVES

To enable the students to

- apply various numerical techniques for solving algebraic/transcendental equations and system of linear equations
- analyse the knowledge of interpolation using numerical data
- develop the knowledge of numerical differentiation and numerical integration techniques
- solve numerically non-linear differential equations that cannot be solved by conventional analytical methods.
- apply finite difference methods of solving boundary value problems

UNIT I SOLUTION OF EQUATIONS AND EIGEN VALUE PROBLEMS 12

Solution of equation; Iteration method - Newton Raphson method; Solution of linear system by Gaussian elimination and Gauss - Jordon method, Gauss-Seidel method, Inverse of a matrix by Gauss Jordon method; Eigenvalue of a matrix by power method.

UNIT II INTERPOLATION AND APPROXIMATION 12

Lagrangian Polynomials; Divided differences - Newton's Divided Difference; Hermite Interpolation Polynomial and Interpolating with a cubic spline; Newton's forward and backward difference formulas.

UNIT III NUMERICAL DIFFERENTIATION AND INTEGRATION 12

Differentiation using interpolation formulae ; Numerical integration by trapezoidal , Simpson's 1/3 , Romberg's method , Two and Three point Gaussian quadrature formulas ; Double integrals using trapezoidal and Simpsons rule

UNIT IV INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS 12

Single step methods - Taylor series method , Modified Euler method for first order equation , Fourth order Runge - Kutta method for solving first and second order equations ; Multistep methods - Milne's and Adam's predictor and corrector methods.

UNIT V BOUNDARY VALUE PROBLEMS IN ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS 12

Finite difference solution of second order ordinary differential equation; Finite difference solution of one-dimensional heat equation by explicit and implicit methods; One dimensional wave equation and two dimensional Laplace and Poisson equations.

TOTAL PERIODS: 60

COURSE OUTCOMES

At the end of this course, students will be able to

- comprehend the basics of algebraic and transcendental equations and their numerical solutions.
- apply the interpolation methods for constructing approximate polynomials
- demonstrate the knowledge of numerical differentiation and integration in computational and simulation processes
- utilize the numerical methods of solving initial value problems occurring in various fields of science and engineering
- describe the computational methods of solving various boundary value problems

TEXT BOOKS

1. Erwin Kreyszig., "Advanced Engineering Mathematics" 10th edition, Wiley Publications, 2010.
2. 2. T. Veerarajan. and T .Ramachandran, "Numerical Methods with programming in C", 2nd Ed., Tata McGraw-Hill, 2006.
3. Sankar Rao K " Numerical Methods For Scientisits And Engineers –3rd Edition Princtice Hall of India Private, New Delhi, 2007.

REFERENCES

1. P. Kandasamy, K. Thilagavathy and K. Gunavathy, "Numerical Methods", S.Chand Co. Ltd., New Delhi, 2003
2. Gerald C.F. and Wheatley, P.O., "Applied Numerical Analysis" 6th Edition, Pearson Education Asia, New Delhi, 2002.
3. M.K.Jain , S.R.K. Iyangar , R.K.Jain , "Numerical Methods For Scientific & Engineering Computation" New Age International (P) Ltd , New Delhi , 2005.
4. M.B.K. Moorthy and P.Geetha, "Numerical Methods" , Tata McGraw Hill Publications company, New Delhi, 2011.

CO-PO MAPPING

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(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

CO's	Programme Outcomes PO's												PSO's	
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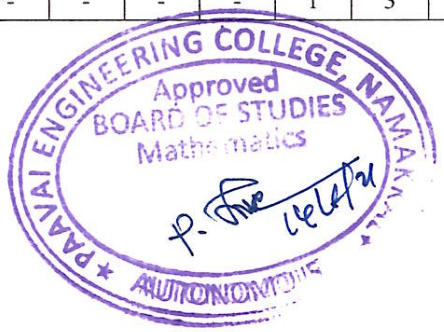
CO3	3	3	2	3	-	-	-	-	-	-	-	1	3	2
CO4	3	3	2	3	-	-	-	-	-	-	-	1	3	2
CO5	3	3	3	2	-	-	-	-	-	-	-	1	3	2



EE20401 **SIGNALS AND SYSTEMS** **3 1 0 4**

COURSE OBJECTIVES

To enable the students to

- understand the fundamentals and classifications of signals and systems.
- get familiarized with system representation and stability study with Laplace transform
- analyze the continuous time signals, Fourier series and learn to apply frequency analysis
- impart knowledge on discrete time signals and discretised systems.
- acquire knowledge on the importance of sampling, sampling theorem and its implications

UNIT I INTRODUCTION TO SIGNALS AND SYSTEMS **12**

Signals- Continuous time signals, discrete time signals; Representation of signals – Step, ramp, pulse, impulse, sinusoidal, exponential signals; Operations on the signals – Classification of continuous and discrete time signals; Systems- Continuous time and discrete time systems, classification of systems, properties of systems.

UNIT II BEHAVIOR OF CONTINUOUS AND DISCRETE-TIME LTI SYSTEMS **12**

Impulse response and step response, convolution, input-output behavior with a periodic convergent input, cascade interconnections; LTI continuous time systems- Differential equations, characterization of causality and stability of LTI systems; Laplace transforms – Properties, ROC transfer function and impulse response; Block diagram representation and reduction – Convolution integral, state variable techniques, state equations.

UNIT III FOURIER TRANSFORMS **12**

Fourier series- Representation of periodic signals, waveform symmetries, calculation of Fourier coefficients; Fourier transform- convolution/multiplication and their effect in the frequency domain, magnitude and phase response; Discrete-time Fourier transform (DTFT) -properties; Discrete Fourier transform (DFT) –properties, linear and circular convolution.

UNIT IV Z- TRANSFORMS **12**

Z-Transform- Discrete time signals and systems, system functions; Laplace Transforms to Z-transformation, poles and zeros of systems and sequences, Z-domain analysis, properties; Z Transformation- Properties, different methods of finding inverse Z-transformation.

UNIT V SAMPLING AND RECONSTRUCTION **12**

Sampling theorem and its implications; Spectra of sampled signals; Reconstruction- Ideal interpolator, zero-order hold, first-order hold; Aliasing and its effects- applications,filtering, feedback control systems.

TOTAL PERIODS: 60

COURSE OUTCOMES

At the end of this course, students will be able to

- explain the concepts of continuous time and discrete time systems to analyse systems in time domain.
- analyze the system stability
- enumerate the concepts of continuous time and discrete time systems to analyse systems in frequency domain.
- perform z-Transform in digitizing in system analysis
- implement sampling theorem and its implications in signal reconstruction.

TEXT BOOKS

1. V. Oppenheim, A. S. Willsky and S. H. Nawab, "Signals and systems", Prentice Hall India, reprint 2016.
2. B. P. Lathi, "Linear Systems and Signals", Oxford University Press, 2014.
3. Ingle and Proakis Digital signal Processing using MATLAB-A problem solving Companion", 4th Edition, Cengage Learning, 2018.

REFERENCES

1. Simon Haykins and Barry Van Veen,, "Signals and Systems", John Wiley and Sons, 2014
2. H. P. Hsu, "Signals and systems", Schaum's series, McGraw Hill Education, 2015
3. M. J. Robert "Signals and Systems-Analysis using Transform Methods and MATLAB", McGraw Hill Education,2014
4. M. J. Robert "Fundamentals of Digital signal Processing using MATLAB", Cengage Learning, 2015.

CO-PO MAPPING

Mapping of Course Outcome (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes PSO's
(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

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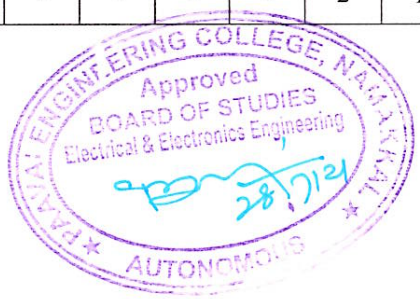
CO3	3	3	2	2	-	2	-	-	-	-	1	2	3	3
CO4	3	3	2	2	-	2	-	-	-	-	2	1	3	3
CO5	3	3	2	1	-	2	-	-	-	-	2	1	3	3



EE20402 **ELECTRICAL MACHINES II** **3 0 0 3**

COURSE OBJECTIVES

To enable the students to

- acquire the knowledge on operation of synchronous generators and methods for determining regulation of synchronous generator.
- analyse the performance characteristics of synchronous motors.
- evaluate the performance characteristics of induction motor and predetermination of parameters of induction motor.
- acquire the knowledge on speed control and starting methods of AC machines.
- understand the operation of single-phase induction motors and special machines.

UNIT I SYNCHRONOUS GENERATOR **9**

Constructional details - Types of rotors , EMF equation ,synchronous reactance; Armature reaction; Voltage regulation - E.M.F, M.M.F, Z.P.F and A.S.A methods ;Synchronizing and parallel operation; Synchronizing torque; Change of excitation and mechanical input; Two reaction theory - Determination of direct and quadrature axis synchronous reactance using slip test.

UNIT II SYNCHRONOUS MOTOR **9**

Introduction -Principle of operation, torque equation, operation on infinite bus bars ; V and inverted V curves; Power input and power developed equations; Starting methods; Current loci - Constant power input, constant excitation and constant power developed.

UNIT III THREE PHASE INDUCTION MOTOR **9**

Constructional details - Types of rotors ,principle of operation , slip, equivalent circuit, slip torque characteristics, condition for maximum torque , losses and efficiency; Load test - No load and blocked rotor tests; Circle diagram; Separation of no load losses; Double cage rotors; Induction generator; Synchronous induction motor.

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

Starters- Need for starting; Types of starters - Stator resistance and reactance, rotor resistance, autotransformer and star-delta starters ; Speed control - Change of voltage, torque, number of poles and slip ; Cascaded connection ; Slip power recovery scheme.

UNIT V SINGLE PHASE INDUCTION MOTORS AND SPECIAL MACHINES **9**

Constructional details of single phase induction motor; Double revolving field theory and operation; Equivalent circuit; No load and blocked rotor test; Performance analysis; Starting methods of single-

phase induction motors; Special machines - Shaded pole induction motor, reluctance motor, repulsion motor, hysteresis motor, stepper motor and AC series motor.

TOTAL PERIODS: 45

COURSE OUTCOMES

At the end of this course, students will be able to

- explain the constructional details and principle of operation of synchronous generator.
- calculate the performance of synchronous motor and staring methods.
- develop the equivalent circuit of three phase Induction motor.
- identify the types of starters and speed controlling techniques.
- describe the operation of single-phase induction motor.

TEXT BOOKS

1. A.E. Fitzgerald, Charles Kingsley, Stephen. D.Umans, "Electric Machinery", Tata McGraw Hill publishing Company Ltd, Reprint 2016.
2. I.J. Nagrath and D.P. Kothari, "Electric Machines", Tata McGraw Hill Publishing Company Ltd, 2017.

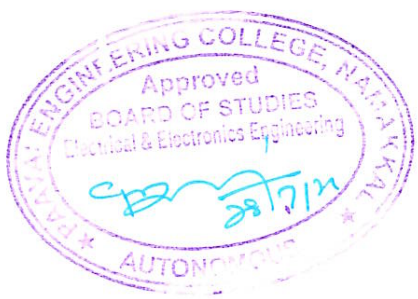
REFERENCES

1. B.L.Theraja, A.K.Theraja, "Electrical Technology", Volume 2, S.Chand Publishers, 2016.
2. J.B. Gupta, "Theory and Performance of Electrical Machines", S.K.Kataria and Sons, 2015, International Publishers, 2012.
3. K. Murugesh Kumar, "Electric Machines", Vikas publishing house Pvt Ltd, 2002.
4. Mehta. V.K and Rohit Mehta, "Principle of Electrical Machines", S.Chand Publishers, 2009.

CO-PO MAPPING

Mapping of Course Outcome (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes PSO's
(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

CO's	Programme Outcomes PO's												PSO's	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	2	3	3	-	2	-	-	-	1	2	1	3	3
CO2	3	2	3	3	-	2	-	-	-	1	2	2	3	3
CO3	3	2	3	3	-	2	-	-	-	1	2	1	3	3
CO4	3	2	3	3	-	2	-	-	-	1	2	2	3	3
CO5	3	2	3	3	-	2	-	-	-	1	2	2	3	3



EE20403 **DIGITAL LOGIC CIRCUITS** **3 0 0 3**

COURSE OBJECTIVES

To enable the students to

- familiar with the fundamentals of digital systems and logic families.
- understand the concepts of combinational circuits.
- design synchronous sequential circuits.
- model asynchronous sequential circuits.
- classify memory devices and logic families.

UNIT I FUNDAMENTALS OF DIGITAL SYSTEMS AND LOGIC FAMILIES **9**

Digital circuits; Logic gates- AND, OR, NOT, NAND, NOR and Exclusive-OR operations; Review of number system- types and conversion of codes; Boolean algebra- De-Morgan's theorem, switching functions and simplification using K-maps and Quine McCluskey method.

UNIT II COMBINATIONAL CIRCUITS **9**

Design of adder- Half adder, Full adder; Subtractor- Half subtractor, Full subtractor; Comparators, code converters, encoders, decoders, multiplexers and demultiplexers; Function realization using logic gates.

UNIT III SYNCHRONOUS SEQUENTIAL CIRCUITS **9**

Flip flops - SR, D, JK and T; Analysis and design of synchronous sequential circuits, state diagram, state reduction, state assignment; Synchronous counters.

UNIT IV ASYNCHRONOUS SEQUENTIAL CIRCUITS **9**

Analysis and design of asynchronous sequential circuits- Transition table, flow table, state assignment techniques, races and hazards; Asynchronous counters.

UNIT V MEMORIES AND LOGIC FAMILIES **9**

Memories- ROM, PROM, EPROM, EEPROM, PLA, PAL and FPGA; Digital logic families- RTL, TTL, ECL, CMOS.

TOTAL PERIODS: 45

COURSE OUTCOMES

At the end of this course, students will be able to

- construct circuits using gates, perform code conversion, K-map simplification and state theorems.
- design the combinational logic circuits using gates.
- construct finite state machines using synchronous sequential circuits.
- design asynchronous sequential circuits.
- develop combinational logic circuits using memory devices.

TEXT BOOKS

1. M. M. Mano, "Digital logic and Computer design", Pearson Education India, 2016.
2. A. Kumar, "Fundamentals of Digital Circuits", Prentice Hall India, 2016.

REFERENCES

1. R. P. Jain, "Modern Digital Electronics", McGraw Hill Education, 2015.
2. Thomas L Floyd, 'Digital fundamentals', Pearson Education Limited, 11th Edition, 2015.
3. Tocci R.J, Neal S. Widmer, 'Digital Systems: Principles and Applications', Pearson Education Asia, 2014.
4. Donald P Leach, Albert Paul Malvino, Goutam Sha, 'Digital Principles and Applications', Tata McGraw Hill, 7th Edition, 2014.

CO-PO MAPPING

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CO's	**Programme Outcomes PO's**												**PSO's**	
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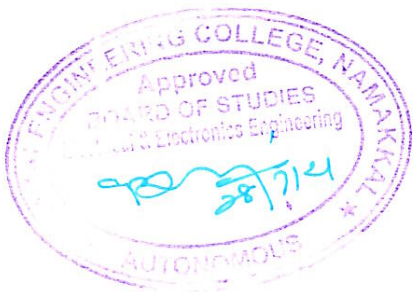
CO2	2	3	3	2	-	1	-	-	-	2	2	1	3	3
CO3	2	3	3	2	-	1	-	-	-	2	2	1	3	3
CO4	2	3	3	2	-	1	-	-	-	2	2	1	3	3
CO5	2	3	3	2	-	1	-	-	-	2	2	1	3	3



EE20404 **TRANSMISSION AND DISTRIBUTION** **3 0 0 3**

COURSE OBJECTIVES

To enable the students to

- impart knowledge about the configuration of the electrical power system
- study the line parameters and interference with neighbouring circuits
- analyse the modelling and performance of power system transmission lines.
- gain knowledge on different insulators and underground cables.
- understand mechanical designs of lines, grounding and sag calculations.

UNIT I STRUCTURE OF POWER SYSTEM **9**

Structure of electric power system- Generation, transmission and distribution; Overhead and underground systems; Types of AC and DC distributors, distributed and concentrated loads; Voltage tolerances, interconnection; EHVAC and HVDC transmission; Introduction to FACTS.

UNIT II TRANSMISSION LINE PARAMETERS **9**

Introduction to capacitance on transmission line ; Parameters of single and three phase transmission lines with single and double circuits; Resistance, inductance and capacitance of solid ,stranded and bundled conductors, conductor types; Symmetrical and unsymmetrical spacing and transposition; Application of self and mutual GMD; Skin and proximity effects; Effects of earth on the capacitance of the transmission line , interference with neighbouring communication circuits, corona discharge, factors affecting corona.

UNIT III MODELLING AND PERFORMANCE OF TRANSMISSION LINES **9**

Classification of lines- short line, medium line and long line, evaluation of A,B,C,D constants, equivalent circuits, phasor diagram, attenuation constant, phase constant, surge impedance and surge impedance loading; Transmission efficiency and voltage regulation, real and reactive power flow in lines; Power-circle diagrams, methods of voltage control ;Ferranti effect.

UNIT IV INSULATORS AND CABLES **9**

Insulators-Types, voltage distribution in insulator string, improvement of string efficiency; Underground cables -Types of cables, parameters of cable, grading of cables, power factor and heating of cables; Capacitance of 3-core belted cable, D.C cables.

UNIT V MECHANICAL DESIGN OF LINES AND GROUNDING **9**

Mechanical design of transmission line - sag and tension calculations for different weather conditions; Tower spotting- Types of towers; Sub-station Layout- Air insulated substation and gas insulated substation, methods of grounding.

TOTAL PERIODS: 45

COURSE OUTCOMES

At the end of this course, students will be able to

- explain the structure of power system with different voltage levels of transmission.
- calculate line parameters in order to design conductors for transmission line.
- evaluate the parameters of transmission line to determine the performance of line.
- choose various insulators and cables for transmission and distribution.
- compute sag and conductor length, tower types and spotting for different weather conditions.

TEXT BOOKS

1. S.N.Singh, 'Electric Power Generation ,Transmission and Distribution', Prentice Hall of India Pvt.Ltd, New Delhi, 2018.
2. C.L.Wadhwa, 'Electrical Power Systems', New Academic Science Ltd, Reprint 2016
3. R.K.Rajput, 'Power System Engineering' Laxmi Publications (P) Ltd, New Delhi, 2016

REFERENCES

1. D.P.Kothari, I.J.Nagarath, 'Power System Engineering' Tata Mc Graw -Hill Publishing Company limited, New Delhi, Reprint 2017.
2. B.R.Gupta,' Power System Analysis and Design', S.Chand, New Delhi, Fifth Edition Reprint 2017.
3. Luces M.Fualkenberry ,Walter Coffer, 'Electrical Power Distribution and Transmission', Pearson Education, Reprint 2017.
4. HadiSaadat, 'Power System Analysis, 'PSA Publishing; Third Edition, 2017.

CO-PO MAPPING

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CO4	3	3	2	2	-	1	-	-	-	-	2	2	3	3
CO5	3	3	2	2	-	1	1	-	-	-	2	2	3	3

EE20405 MEASUREMENTS AND INSTRUMENTATION 3 0 0 3

COURSE OBJECTIVES

To enable the students to

- acquire the basic functional elements of instrument and bridges.
- learn the use of different types of meters for measuring electrical and electronics quantities using measuring instruments.
- gain knowledge on instrumentational equipment concepts such as signal generators and analyzer.
- study about the working of transducer and devices used for display.
- attain basic ideas about digital measuring instrument.

UNIT I BASIC MEASUREMENT CONCEPTS AND BRIDGES 9

Functional elements of an instrument; Static and dynamic characteristics; Standards and Calibration of measurements; Errors in measurement; Statistical evaluation of measurement data; Bridges- Wheatstone bridge, Kelvin double bridge, Maxwell's bridge, Anderson bridge, Schering bridge, Wien bridge and Hay's Bridge.

UNIT II ELECTRICAL AND ELECTRONIC INSTRUMENTS 9

Classification of instruments; Working Principle of potentiometer; Design of analog voltmeter, ammeter using permanent magnet moving coil (PMMC)and moving iron (MI) and its loading effect; Principle of working power factor meter; Single phase wattmeter, analog energy meter; Use of Instrument transformers.

UNIT III SIGNAL GENERATORS AND ANALYZERS 9

Function generators – pulse and square wave generators, RF signal generators ; Sweep generators ; Frequency synthesizer- wave analyzer, harmonic distortion analyzer, spectrum analyzer, digital spectrum analyzer; Digital L, C, R Measurements and Digital RLC Meters.

UNIT IV TRANSDUCERS AND DISPLAY DEVICES 9

Classification of transducers – Selection of transducers, Resistive, capacitive, and inductive transducers, Piezoelectric and digital transducers; Working principle and specifications of the analog and digital cathode ray oscilloscope (CRO), light emitting diode (LED) and liquid crystal display (LCD).

UNIT V DIGITAL INSTRUMENTS 9

Comparison of analog and digital techniques , digital voltmeter, millimeter's , Energy meter , frequency counters; Measurement of frequency and time interval , extension of frequency range; Automation in digital instruments, automatic polarity indication, automatic ranging, automatic zeroing, fully automatic digital instruments; Computer controlled test systems; Virtual instruments.

TOTAL PERIODS: 45

COURSE OUTCOMES

At the end of this course, students will be able to

- analyze the measurement parameters and bridges.
- use different types of meters for measuring electrical and electronics quantities.
- implement the concepts of signal generators and analyzer.
- handle different types of transducer and display devices.
- use digital measuring instruments.

TEXT BOOKS

1. Albert D. Helfrick and William D. Cooper - Modern Electronic Instrumentation and Measurement Techniques, Pearson / Prentice Hall of India, Reprint 2018
2. Sawhney A K, "A Course in Electrical and Electronic Measurement and Instrumentation", Dhanpat Rai&Sons, New Delhi, 18th Edition, Reprint 2019.

REFERENCES

1. D.V.S. Moorthy, "Transducers & Instrumentation",2nd edition Reprint, Prentice Hall of India Pvt Ltd, 2017.
2. H.S. Kalsi, „Electronic Instrumentation", 3rd edition, Tata McGraw Hill, 2015.
3. Golding E.W and Widdis F.G., "Electrical Measurements and Measuring Instruments", Fifth Edition, AH Wheeler and Co., New Delhi, Reprint 2017.
4. David A. Bell, "Electronic Instrumentation, and measurements", Prentice Hall of India Pvt Ltd, 2016.

CO-PO MAPPING

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CO3	3	-	1	-	2	1	-	-	-	-	-	2	3	3
CO4	3	-	1	-	1	1	-	-	-	-	2	2	3	3
CO5	3	-	1	-	2	1	-	-	-	-	2	2	3	3

EE20406 ELECTRICAL MACHINES II LABORATORY 0 0 4 2

COURSE OBJECTIVES

To enable the students to

- conduct relevant experiments for determining the performance characteristics of AC machines.
- calculate the regulation of three phase alternator using various methods.
- attain the V and inverted V curves of synchronous motors.
- estimate the parameters of equivalent circuit of induction motors.

LIST OF EXPERIMENTS

1. Regulation of three phase alternator by EMF and MMF methods
2. Regulation of three phase alternator by ZPF and ASA methods
3. Regulation of three phase salient pole alternator by slip test
4. V and Inverted V curves of three phase synchronous motor.
5. Load test on three-phase induction motor.
6. No load and blocked rotor test on three-phase induction motor
7. Separation of No-load losses of three-phase induction motor.
8. Load test on single-phase induction motor
9. No load and blocked rotor test on single-phase induction motor.
10. Load test on three phase alternators.

TOTAL PERIODS 60

COURSE OUTCOMES

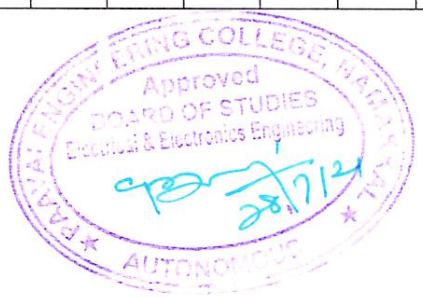
At the end of this course, students will be able to

- determining the performance characteristics of AC machines.
- compute the regulation of three phase alternator using various methods.
- obtain the V and inverted V curves of synchronous motors.
- draw the equivalent circuit of induction motors.

CO-PO MAPPING

Mapping of Course Outcome (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes PSO's
(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

CO's	Programme Outcomes PO's												PSO's	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	2	2	2	-	1	-	-	-	2	1	2	3	3
CO2	3	2	2	2	-	1	-	-	-	2	1	2	3	3
CO3	3	2	2	2	-	1	-	-	-	2	1	2	3	3
CO4	3	2	2	2	-	2	-	-	-	2	1	2	3	3



EN20401 ENGLISH PROFICIENCY COURSE LABORATORY 0 0 2 1

COURSE OBJECTIVES

To enable the students to

- familiarize with the reading skills such as skimming and scanning.
- practise writing tasks to the level expected.
- develop listening strategies such as listening for key words, making inferences and identifying main ideas.
- speak well without inhibition and to assist the students in improving their vocabulary, pronunciation and comprehension of grammar.

LIST OF EXPERIMENTS

1. Listening Exercises from TOEFL
    a. Conversations, Lectures
2. Listening Exercises from IELTS
    a. Places and directions
    b. Actions and processes
3. Reading Exercises from PTE
    a. Re-order paragraphs
4. Reading Exercises from IELTS
    a. Opinions and attitudes
    b. Locating and matching information
    c. Identifying information
5. Reading Exercises from BEC Vantage & BEC Higher
    a. Error identification
    b. Gap filling
6. Writing Exercises from PTE
    a. Summarize written text
7. Writing Exercises from IELTS
    a. Describing maps
    b. Describing diagrams
8. Speaking IELTS format
    a. Talking about familiar topics
    b. Giving a talk
    c. Discussion on a topic

TOTAL PERIODS : 30

COURSE OUTCOMES

At the end of this course, students will be able to

- skim, scan and infer the given texts and attend the tasks successfully.
- write coherently using appropriate vocabulary and grammar.
- listen to speeches and conversations and answer the questions.
- communicate fluently and effectively on any given topics.
- appear with confidence for on-line tests.

TEXT BOOKS

1. Cambridge IELTS 12 Academic Student's Book with Answers: Authentic Examination Papers (IELTS... by Cambridge University Press. New Delhi.2016
2. TOEFL iBT Prep Plus 2018-2019 4 Practice Tests) Kaplan Publishing. Newyork.2017.

REFERENCES

1. Cambridge University Press India Pvt. Ltd, New Delhi.2016.
2. PTE Academic Test builder. Macmillan Education. London. 2012.

CO-PO MAPPING

Mapping of Course Outcome (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes PSO's
(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

CO's	PO's												PSO's	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	-	-	-	2	3	-	-	-	3	2	-	-	-	-
CO2	-	-	2	2	-	-	1	1	3	2	-	2	-	-
CO3	-	-	-	-	-	3	1	2	3	2	2	3	-	-
CO4	-	-	2	-	-	2	2	3	3	2	2	1	-	-