JIMS Engineering Management Technical Campus, Greater Noida

(Affiliated to GGSIP University, Dwarka, Delhi)

Department of Electrical Engineering

Academic Year 2018-19

VISION

To promote the Department of Electrical and Electronics Engineering as a pioneer in education and research by imparting quality education, creating and upgrading the academic facilities and inculcating professional values to the students to face the challenges in the dynamic global society.

MISSION

M1: To attain utmost qualities of teaching-learning process and provide a vibrant environment for the students to exhibit their fullest potential in the field of Electrical and Electronics Engineering.

M2: To improve research and development skills among students towards providing technical solutions with ethical values to meet social challenges.

M3: To develop the students to face the technological requirements of the industry with professional values and make them employable and to impart the spirit of entrepreneurship for their successful career.

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO-1: To provide strong foundation to students to have a successful career in Electrical Engineering and its related fields and to pursue higher education and research

PSO-2: To improve their mathematical and scientific knowledge to solve emerging real world problems related to power, electronics, control systems, field theory and signal processing and will use their communication and intellectual skills for execution of complex technological solutions

.

PSO-3: To fulfill the needs of society in solving technical problems using engineering principles, tools and practices, in an ethical and responsible manner, in service to the society.

.

PSO-4: To develop their self- learning capability and adaptability to encounter various complex practical problems in multi disciplinary engineering projects effectively and undertake leadership roles when appropriate.

.

PSO-5: To promote students awareness for life-long learning to enhance and maintain professional skills.

PSO TO MISSION STATEMENT MAPPING

MISSION STATEMENTS	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5
M1	3	3	3	2	3
M2	3	3	3	2	2
M3	3	3	2	3	3

[3=Highly Significant, 2=Moderate Significant, 1=Least Significant]

PROGRAM OUTCOMES (POs)/GRADUATE ATTRIBUTES

S. No.	Graduate Attributes	Program Outcomes (POs)
1	Managerial Knowledge	**PO1:**Demonstrate a strong base of general management and build strong pillars over it in a particular area of specialization (Marketing, Finance, I.T., H.R.M, and Entrepreneurship). Develop an ability to integrate knowledge of one area into other and understand management as a comprehensive concept.
2	Critical Thinking	**PO2:**Develop an eye to look out for changes, opportunities and threats in the business environment. Demonstrate ability to use various tools and techniques of research methodology to convert threats into opportunities and weaknesses into strengths.
3	Problem Solving	**PO3:**Critically analyze, evaluate and synthesize data into information relevant to taking business decisions. Improve the value delivery process.
4	Research Skill	**PO4:**Develop skill and expertise in problem solving. Gain experience in dealing with diverse business situations. Apply requisite research tools and techniques to solve business problems.
5	Usage of Modern Tools	**PO5:**Create, select, and apply appropriate techniques, resources, and modern IT tools including prediction and modeling to complex statistical information with an understanding of the limitations
6	Collaborative and Multidisciplinary work	**PO6:**Develop highest order of behavioral and interpersonal skills. Demonstrate initiative and lead by example. Practice effectively both as an individual and as a team member.
7	Project Management and Finance	**PO7:**Acquire all the necessary skill set to be a manager. Practice creativity. Analyze risks and explore opportunities to create new business propositions. Develop idea generation skills, risk taking ability and ability to convert ideas into business ventures.
8	Communication	**PO8:**Develop interpersonal skills and high degree of verbal non – verbal and written communication. Demonstrate business etiquettes. Interpret and apply principles of cross cultural difference in communication.
9	Life-long Learning	**PO9:**Recognize the need for and have preparation and ability to engage in lifelong learning in the domain of business management.

10	Ethical Practices and Social Responsibility	**PO10:** Apply ethical business practices to show case highest level of commitment to professional code of conduct in the arena of business management.
11	Independent and Reflective Learning	**PO11:**Assess business environment. Evaluate competitive frame of reference. Determine strategies to overcome challenges.
12	Individual and team work	**PO12:**Identify networking opportunities to improve the value chain. Make use of social media to reach out to stakeholders.

MAPPING OF POs TO PSOs

PEOs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
PSO-1	3	3	3	2	3	2	3	2	3	1	3	2
PSO-2	3	3	3	2	3	2	3	2	3	3	3	2
PSO-3	3	3	3	2	2	2	2	3	3	3	3	2
PSO-4	3	3	3	3	3	3	3	3	3	2	3	3
PSO-5	3	3	3	3	3	2	2	3	2	3	2	3

[3=Highly Significant, 2=Moderate Significant, 1=Least Significant]

Faculty: Mr. Gopal Pathak, AP/Maths

APPLIED MATHEMATICS-III

Course Code: ETMA-201	**Semester: 3rd Semester EE**
L:T:P: 3:1:0	**Credit: 4**

After course completion students will be able to:	
CO1	To get the knowledge about the Fourier series and Fourier transform
CO2	To understand the basic concept of difference equation and Z-transform
CO3	To study the numerical methods for solution of algebraic and transcendental equation, linear simultaneous equation, interpolation and extrapolation.
CO4	To study the numerical methods for numerical differentiation, numerical integration, numerical solution of ordinary differential equation.

MAPPING OF COURSE OUTCOMES TO PROGRAM OUTCOMES:

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	2	1	1	1	1	1	2	2
CO2	3	3	3	2	2	1	1	1	1	1	2	2
CO3	3	3	3	3	3	2	2	1	2	1	2	2
CO4	3	3	3	3	3	2	2	1	2	1	2	2

[3=Highly Significant, 2=Moderate Significant, 1=Least Significant]

S. NO.	COURSE CONTENT	HRS	COs
1	**UNIT-I** Fourier series: Definition, Euler's formula, conditions for Fourier expansion, functions having points of discontinuity, change of intervals, even and odd functions ,half range series, Harmonic analysis. Fourier Transforms: Definition, Fourier integral, Fourier transform, inverse Fourier transform, Fourier sine and cosine transforms, properties of Fourier transforms (linearity, scaling, shifting, modulation), Application to partial differential equations.	11	To get the knowledge about the Fourier series and Fourier transform
2	**UNIT-II** Difference equation: Definition, formation, solution of linear difference equation with constant coefficients ,simultaneous difference equations with constant coefficients, applications of difference equations .Z-transform: Definition, Z- transform of basic functions, properties of Z-transform (linearity, damping, shifting, multiplication),initial value theorem, final value theorem, convolution theorem, convergence of Z-transform, inverse of Z- transform, Application to difference equations.	11	To understand the basic concept of difference equation and Z-transform
3	**UNIT-III** Numerical Methods: Solution of algebraic and transcendental equations using bisection method, Regula-Falsi method and Newton – Raphson method. Solution of linear simultaneous equations using Gauss-Jacobi's iteration method and Gauss-Seidal's iteration methods. Finite differences: Forward differences, backward differences and Central differences. Interpolation: Newton's interpolation for equi-spaced values. Stirling's central difference interpolation formula, Divided differences and interpolation formula in terms of divided differences , Lagrange's interpolation formula for unequi-spaced values.	11	To study the numerical methods for solution of algebraic and transcendental equation, linear simultaneous equation, interpolation and extrapolation
4	**UNIT-IV** Numerical Differentiation, maxima and minima of a tabulated function. Numerical Integration: Newton-Cote's quadrature formula, Trapezoidal rule, Simpson's one-third rule and Simpson's three-eighth rule .Numerical solution of ordinary differential equations: Picard's method, Taylor's method, Euler's method, modified Euler's method, Runge-Kutta method of fourth order.	11	To study the numerical methods for numerical differentiation, numerical integration, numerical solution of ordinary differential equation

Text Books:

1. R.K. Jain and S.R.K. Iyengar," Numerical methods for Scientific and Engineering Computation", New Age Publishing Delhi-2014.
2. B. S. Grewal,"Higher Engineering Mathematics" Khanna Publications, 2014 Edition.

Reference Books:

1. E. kresyzig," Advance Engineering Mathematics", Wiley publications
2. P. B. Patil and U. P. Verma, " Numerical Computational Methods", Narosa
3. Partial Differential Equations" Schaum's Outline Series, McGraw Hill.
4. Michael Greenberg, " Advance Engineering mathematics" , Pearson.
5. Schaum's Outline on Fourier Analysis with Applications to Boundary Value Problem, Tata McGraw-Hill

ASSESSMENT PATTERN:

Continuous Internal Evaluation (25 Marks)

Bloom's Category Marks	Class Test (15)	Class Performance (10)
Remember	**4**	**3**
Understand	**3**	**2**
Apply	**2**	**2**
Analyze	**2**	**1**
Evaluate	**3**	**1**
Create	**1**	**1**

End Semester Examination (75 Marks)

Bloom's Category Marks	University Examination
Remember	
Understand	
Apply	
Analyze	
Evaluate	
Create	

Faculty: Ms. Gunjan Mittal Roy, AP/ECE

SUBJECT NAME- ANALOG ELECTRONICS	
Course Code: ETEL-203	**Semester: 3rd Semester EE**
L:T:P: 3:1:1	**Credit: 4**

After course completion students will be able to:	
CO1	Recall (REMEMBERING) the concept of diode, BJT, FET, MOSFET and explain (UNDERSTANDING) and analyse (ANALYSING) the different biasing techniques used in BJTs and FETs.
CO2	Describe (REMEMBERING)and analyse (ANALYSING) different amplifier circuits using AC equivalent models.
CO3	To discuss (UNDERSTANDING) the effect of negative feedback, high frequency response and Gain -bandwidth relationship for amplifier design and Analyze(ANALYSING), design (CREATING) feedback amplifiers
CO4	Classify (ANALYSING) MOSFET , Compare(ANALYSING) MOSFET , FET. Classify (ANALYSING) Power Amplifiers, Tuned amplifiers, Operational amplifier and its applications

MAPPING OF COURSE OUTCOMES TO PROGRAM OUTCOMES:

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	-	-	-	2	2	2	-	2	-	-
CO2	-	-	3	-	2	-	-	-	-	-	-	2
CO3	-	-	-	2	-	-	-	-	2	-	2	-
CO4	2	-	-	-	2	-	2	2	-	-	-	2

[3=Highly Significant, 2=Moderate Significant, 1=Least Significant]

S. NO.	COURSE CONTENT	HRS	Cos
1	**UNIT-I:** **Review of diode and BJT, Bias stabilization:** Need for stabilization, fixed Bias, emitter bias, self-bias, bias stability with respect to variations in Ico, VBE & β, Stabilization factors, thermal stability. Bias Compensation techniques. **Small signal amplifiers:** CB, CE, CC configurations, hybrid model for transistor at low frequencies, RC coupled amplifiers, mid band model, gain & impedance, comparisons of different configurations, Emitter follower, Darlington pair(derive voltage gain, current gain, input and output impedance.)Hybrid -model at high frequencies (π model	11	
2	**UNIT-II:** **Multistage Amplifiers:** Cascaded and cascoded amplifiers, Calculation of gain Impedance and bandwidth, Design of multistage amplifiers. **Feedback Amplifiers:** Feedback concept, Classification of Feedback amplifiers, Properties of negative Feedback amplifiers, Impedance considerations in different Configurations, Examples of analysis of feedback Amplifiers.	11	

3	**UNIT-III:** **Field Effect Transistor:** Introduction, Classification, FET characteristics, Operating point, Biasing, FET small signal Model, enhancement & Depletion type MOSFETS. **Power Amplifiers:** Power dissipations in transistors, Amplifiers Classification, (Class-A, Class-B, Class-C, Class-AB) Efficiency analysis, Push-pull and complementary Push-pull amplifiers, crossover distortion and harmonic distortion in push pull amplifier. Tuned amplifiers	11	
4	**UNIT-IV:** **Op-Amp and its applications:** Inverting and Non-inverting amplifiers, adder, sub-tractor, integrators, differentiator, instrumentation amplifiers, oscillators, and multi vibrators	11	

Text Books

1. B.Kumar ,Shail Bala Jain, "Electronic Devices and Circuits" PHI.
2. Salivahanan , Suresh Kumar, Vallavaraj, "Electronic Devices and Circuits" TMH, 1999

Reference Books

1. J. Millman and Halkias, "Integrated Electronics, Analog & Digital Circuits &Systems" TMH – 2000.
2. Boylestad & Nashelsky, "Electronic Devices & Circuit Theory" Pearson Publication.
3. Electronic devices and circuits,DAVID A BELL,Oxford University Press, 2000.
4. Problems and solutions in basic electronic ,Albert Malvino, David J.Bates,TMH.
5. Sedra & Smith, "Micro Electronic Circuits" Oxford University Press, 2000

ASSESSMENT PATTERN:

Continuous Internal Evaluation (25 Marks)

Bloom's Category Marks	Class Test (15)	Class Performance (10)
Remember	**4**	**3**
Understand	**3**	**2**
Apply	**2**	**2**
Analyze	**2**	**1**
Evaluate	**3**	**1**
Create	**1**	**1**

End Semester Examination (75 Marks)

Bloom's Category Marks	University Examination
Remember	
Understand	
Apply	
Analyze	
Evaluate	
Create	

Faculty: Ms. Samidha Garg, AP/EE

CIRCUITS & SYSTEMS	
Course Code: ETEE-207	**Semester: 3rd Semester EE**
L:T:P: 3:1:2	**Credit: 4**

After course completion students will be able to:	
CO1	Understand and explain the Continuous & Discrete, Fixed & Time varying, Linear & Nonlinear, Lumped & Distributed, Passive & Active networks and systems.
CO2	Formulate and then analyze the Transient analysis of different electrical circuits with and without initial conditions using Laplace Transform and also analysis of different types of waveforms
CO3	Solve two port networks analysis and analyze Graph theory and Networks equations
CO4	Estimate parameters for different types of attenuators and filters used in signal modulation for power systems and communication systems.

MAPPING OF COURSE OUTCOMES TO PROGRAM OUTCOMES:

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	3								2	
CO2		3	2	2	2							2
CO3	2	2	2							2	1	
CO4	3	3	2					1	2			

[3=Highly Significant, 2=Moderate Significant, 1=Least Significant]

S. NO.	COURSE CONTENT	HRS	COs
1	**UNIT-I:** Introduction to signals, their classification and properties, different types of systems, LTI systems and their properties, periodic waveforms and signal synthesis, properties and applications of Laplace transform of complex waveform.	10	CO1
2	**UNIT-II:** System modeling in terms of differential equations and transient response of R, L, C, series and parallel circuits for impulse, step, ramp, sinusoidal and exponential signals by classical method and using Laplace transform.	12	CO2
3	**UNIT-III:** Graph theory: concept of tree, tie set matrix, cut set matrix and application to solve electric networks. Two port networks – Introduction of two port parameters and their interconversion, interconnection of two 2-port networks, open circuit and short circuit impedances and ABCD constants, relation between image impedances and short circuit and open circuit impedances. Network functions, their properties and concept of transform impedance, Hurwitz polynomial	10	CO3

4	**UNIT-IV:** Positive real function and synthesis of LC, RC, RL Networks in Foster's I and II, Cauer's I& II forms, Introduction of passive filter and their classification, frequency response, characteristic impedance of low pass, high pass, Band Pass and Band reject prototype section.	10	CO4

Text Books

3. W H Hayt "Engineering Circuit Analysis" TMH Eighth Edition
4. Kuo, "Network analysis and synthesis" John Weily and Sons, 2nd Edition.

Reference Books

1. S Salivahanan "Circuit Theory " Vikas Publishing House 1st Edition 2014
2. Van Valkenburg, " Network analysis" PHI, 2000.
3. Bhise, Chadda, Kulshreshtha, " Engineering network analysis and filter design" Umesh publication,
4. 2000.
5. D. R. Choudhary, "Networks and Systems" New Age International,2001

ASSESSMENT PATTERN:

Continuous Internal Evaluation (25 Marks)

Bloom's Category Marks	Class Test (15)	Class Performance (10)
Remember		
Understand		
Apply		
Analyze		
Evaluate		
Create		

End Semester Examination (75 Marks)

Bloom's Category Marks	University Examination
Remember	
Understand	
Apply	
Analyze	
Evaluate	
Create	

Faculty: Mr. Krishan Kumar Saraswat, AP/CSE

DATA STRUCTURES	
Course Code: ETCS 209	**Semester: 3rd Semester EE**
L:T:P: 3:1:1	**Credit: 4**

After course completion students will be able to:	
CO1	Students develop knowledge of basic data structures for storage and retrieval of ordered or unordered data. Data structures include: arrays, linked lists, stacks, queues, binary trees, heaps, and hash tables.
CO2	Students develop knowledge of applications of data structures including the ability to implement algorithms for the creation, insertion, deletion, searching, and sorting of each data structure.
CO3	Students learn to analyze and compare algorithms for efficiency using Big-O notation.
CO4	Students implement projects requiring the implementation of the above data structures.

MAPPING OF COURSE OUTCOMES TO PROGRAM OUTCOMES:

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	2	3	1							
CO2	2	3	2	2	2							
CO3	1	2	2	1	1						2	
CO4	1	2	2	3	2	1	2	2				3

[3=Highly Significant, 2=Moderate Significant, 1=Least Significant]

S. NO.	COURSE CONTENT	HRS	COs
1	**UNIT-I:** Introduction to programm ing methodologies and design of algorithms. Abstract Data Type, array, array organization, sparse array. Stacks and Stack ADT, Stack Manipulation, Prefix, infix and postfix expressions, their interconversion and expression evaluation. Queues and Queue ADT, Queue manipulation. General Lists and List ADT, List manipulations, Single, double and circular lists.	12	1,2,3
2	**UNIT-II:** Trees, Properties of Trees, Binary trees, Binary Tree traversal, Tree manipulation algorithms, Expreession trees and their usage, binary search trees, AVL Trees, Heaps and their implementation.	12	1,2,4

3	**UNIT-III:** Multiway trees, B-Trees, 2-3 trees, 2-3-4 trees, B* and B+ Trees. Graphs, Graph representation, Graph traversal.	12	2,3,4
4	**UNIT-IV:** Sorting concept, order, stability, Selection sorts (straight, heap), insertion sort (Straight Insertion, Shell sort), Exchange Sort (Bubble, quicksort), Merge sort (only 2-way merge sort). Searching – List search, sequential search, binary search, hashing concepts, hashing methods (Direct, subtraction, modulo-division, midsquare, folding, pseudorandom hashing), collision resolution (by open addressing: linear probe, quadratic probe, pseudorandom collision resolution, linked list collision resolution), Bucket hashing.	12	2,3,4

Text Books

[T1] Donald Hearn and M.Pauline Baker, "Computer Graphics C version", Second Edition, Pearson Education.

[T2] Ralf Steinmetz & Klara Nahrstedt, "Multimedia Computing Communication & Applications", Pearson Education.

Reference Books

[R1] C, Foley, VanDam, Feiner and Hughes, "Computer Graphics Principles & practice", 2nd Edition

[R2] R. Plastock and G. Kalley, Schaum's Series, "Theory and Problems of Computer Graphics", McGraw Hill, 2nd edition.

[R3] Fred Halsall, "Multimedia Communications Applications, Networks, Protocols & Standards", Pearson Education.

[R4] David F. Rogers, "Procedural elements for computer graphics", McGraw- Hill.

ASSESSMENT PATTERN:

Continuous Internal Evaluation (25 Marks)

Bloom's Category Marks	Class Test (15)	Class Performance (10)
Remember		
Understand		
Apply		
Analyze		
Evaluate		
Create		

End Semester Examination (75 Marks)

Bloom's Category Marks	University Examination
Remember	
Understand	
Apply	
Analyze	
Evaluate	
Create	

Faculty: Mr. Jitender Kumar, AP/EE

ELECTRICAL MACHINE - I

Course Code: ETEE 211	**Semester: 3rd Semester EE**
L:T:P: 3 : 1 : 2	**Credit: 4**

After course completion students will be able to:	
CO1	Students will have the knowledge of Electrical Machine i.e. DC Machines and Transformer.
CO2	To understand the concept of DC Machines, Single Phase and Three Phase Transformer operation.
CO3	Students will be understand and analyze the application of Electrical Machines.
CO4	To understand the application based multiple combination of Electrical Machines.

MAPPING OF COURSE OUTCOMES TO PROGRAM OUTCOMES:

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	1	2		3		1			
CO2	3	2	3	2	2		3			1	1	
CO3	3	3	1	3	3	1	2	2	1	1	1	2
CO4	2	1	3	3	1	1	2	2				1

[3=Highly Significant, 2=Moderate Significant, 1=Least Significant]

S. NO.	COURSE CONTENT	HRS	COs
1	**UNIT-I: Principles of EMEC**: Energy in Electro-Magnetic Systems, Flow of Energy in Electro-Mechanical Devices, Energy and co-energy in Magnetic field, Singly and doubly excited systems, Electromagnetic and Reluctance Torque. **DC Generators**: Constructional features, Armature winding details, lap & wave connections, EMF equation, separately excited, shunt, series and compound connected D.C. generators process of voltage build up in shunt generators, Characteristics and applications of separately/self-excited generators.	11	CO1, CO2, CO3, and CO4
2	**UNIT-II: DC Generators (Contd.):** Armature Reaction, Demagnetizing and Cross-magnetizing armature MMF, Interpoles and compensating windings, commutation process and its improvement. **D.C. Motors:** Speed and Torque Equation of D.C. motors, Characteristics of D.C. series, shunt and compound motors and their applications, Starting and speed control of D.C. motors, Braking of D.C. motors, Efficiency and testing of D.C. Machines, Introduction of D.C. servo motor and permanent magnet / brushless D.C. motors.	11	CO1, CO2, and CO4
3	**UNIT-III: Single phase Transformers**: Transformer construction and practical considerations. Equivalent circuit(Exact and approximate), per unit values, Phasor diagram, Transformer testing : open circuit test, Short Circuit test, Sumpner's test, Efficiency and voltage regulation, All day efficiency.	11	CO1, CO2, CO3, and CO4
4	**UNIT-IV: 3 phase Transformers**: Three-phase Bank of Single-phase Transformers, Parallel operations of 1-phase and 3-phase transformers, load division between transformers in parallel. Three winding transformers, Zigzag connections, vector grouping with clock convention, tertiary winding, tap changing, phase conversions-3phase to 2 phase and 3phase to 6 phase. **Special Purpose Transformers**: Auto-transformers. Welding, Traction, Instruments and pulse Transformers.	11	CO1, CO2, CO3, and CO4

Text Books

1. Electric Machinery, A Fitzgerald, Charles Kingsley, Stephen Umans, Tata McGraw Hill Education, 6th edition, 2002.
2. Electrical Machines with MATLAB, Turan Gnen, CRC Press,Taylor&Francis, 2nd edition, 1998

Reference Books

1. The Performance and Design of Alternating Current Machines, M.G. Say, CBS Publishers, 2005 Electro-Mechanical Energy Conversion with Dynamics of Machines, Rakosh Das Begamudre, Wiley-Blackwell, 1988.
2. Performance and Design of Direct Current Machines: AE Clayton and NN Hancock, CBS Publishers, 2014
3. Problems in Electrical Engineering: Power engineering and electronics with answers Partly Solved in Units: Parker Smith , CBS Publishers, 9th edition, 2003
4. Electric Machines, I J Nagrath D P Kothari, Mc Graw-Hill Education, 3rd edition, 2011
5. Samarjit Ghosh, "Electrical Machines", Pearson

ASSESSMENT PATTERN:

Continuous Internal Evaluation (25 Marks)

Bloom's Category Marks	Class Test (15)	Class Performance (10)
Remember		
Understand		
Apply		
Analyze		
Evaluate		
Create		

End Semester Examination (75 Marks)

Bloom's Category Marks	University Examination
Remember	
Understand	
Apply	
Analyze	
Evaluate	
Create	

Faculty: Ms. Manasi Pattnaik, AP/EE

MATERIALS IN ELECTRICAL SYSTEMS

Course Code: ETEE-205	**Semester: 3rd Semester EE**
L:T:P: 3:0:0	**Credit: 3**

After course completion students will be able to:	
CO1	Understand Classification, Properties and application of Conducting Material
CO2	UnderstandThermal ,Chemical, Mechanical ,Electrical etc. properties ,Classification and Application of Insulating Material
CO3	UnderstandClassification, ,Application and Properties of Magnetic Material and B-H curve
CO4	UnderstandClassification, Properties and application of Special Materials and components,materials used in electrical systems, materials used in electromagnetic and electromechanicalsystems

MAPPING OF COURSE OUTCOMES TO PROGRAM OUTCOMES:

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	3	3	3	3	3	2	3	3
CO2	3	3	3	3	3	3	3	3	2	2	3	2
CO3	3	3	3	3	3	3	3	3	3	2	3	3
CO4	3	3	3	3	3	3	3	2	3	3	3	2

[3=Highly Significant, 2=Moderate Significant, 1=Least Significant]

S. NO.	COURSE CONTENT	HRS	COs
1	**UNIT-I:** **Conducting Materials:** Energy band diagram of conductors, semiconductors and insulators. Conductivity and Resistivity, factorsaffecting the resistivity, classification of conducting materials, electrical, mechanical and thermal properties andapplications of low resistance materials like copper, aluminum, steel, silver, gold, platinum, brass and bronze.Electrical, mechanical and thermal properties and applications of high resistance materials like manganin,constantan, nichrome, mercury, tungsten and carbon. Introduction of super conductors.	10	CO1
2	**UNIT-II:** **Insulating Materials:** Classification of insulating materials, electrical, physical, thermal, chemical, mechanical properties of insulatingmaterials. Thermoplastic and natural insulating materials, Gaseous and liquid insulating materials, properties andapplications of ceramics and synthetic insulating materials.	10	CO2
3	**UNIT-III:** **Magnetic Materials:** Introduction and classification of magnetic materials, permeability, B-H curve, magnetic saturation, hysteresisloop, coercive force and residual magnetism, concept of eddy current and hysteresis loss, curie temperature,magnetostriction effect. Soft and hard magnetic materials, ferro and ferri magnetic materials, special purposemagnetic materials.	10	CO3
4	**UNIT-IV:** **Special Materials and components:** Properties and applications of different materials used in electrical systems like – thermocouples, bimetallic,fusing, and soldering. Introduction to different types of materials used in electromagnetic and electromechanicalsystems, resistors, capacitors, inductors, special semiconductors used in electrical engineering.	10	CO4

Text Books

1. Electrical properties of materials by L. Solymer, Oxford University Press, 2014
2 An Introduction to Electrical Engineering Materials, C.S. Indulkar, S.Thiruvengadam, S. Chand Publishing, 4th edition, 2004

Reference Books

1.Electronic Engineering Materials and Devices,J. Allison, Tata McGraw Hill Education,1973
2. Electrical Materials, Rob Zachariason, Delmar Cengage Learning, 2nd Revised edition 2011
3. Electrical Engineering Materials, Dekker Adrianu., PHI,1st edition, 2011
4. A Course In Electrical Engineering Materials, Seth S P, Dhanpat Rai, 3rd edition, 2011
5.Electrical and Electronic Engineering Materials by S.K. Bhattacharya, Khanna Publishers, New Delhi

ASSESSMENT PATTERN:

Continuous Internal Evaluation (25 Marks)

Bloom's Category Marks	Class Test (15)	Class Performance (10)
Remember		
Understand		
Apply		
Analyze		
Evaluate		
Create		

End Semester Examination (75 Marks)

Bloom's Category Marks	University Examination
Remember	
Understand	
Apply	
Analyze	
Evaluate	
Create	

Faculty : Dr. Archana Rathore, AP/English

Communication Skills for Professionals	
Course Code: ETHS-301	**Semester: 5th Semester EE**
L:T:P: 2:0:2	**Credit: 1**

After course completion students will be able to:	
CO1	Students will monitor and model interpersonal **communication** competence. Capable of effectively monitoring, analyzing, and adjusting their own **communication** behavior. Demonstrate appropriate and effective conflict management strategies.
CO2	By the end of the course, the students will be able to: understand how speech sounds are used to create meaning. Apply their knowledge of English **phonetics and phonology** to improve their own **pronunciation**, in further studies of languages and **linguistics** and in **teaching**.
CO3	Participate actively in writing activities (individually and in collaboration) that model effective scientific and technical communication in the workplace. Recognize, explain, and use the rhetorical strategies and the formal elements of these specific genres of technical communication: technical abstracts, data based research reports, instructional manuals, technical descriptions, web pages, wikis, and correspondence
CO4	Modify prepared oral presentations by use of repeated practice, peer and instructor review Distinguish differences in stress, intonations, rhythm, and focused phonetic sounds Participate actively and lead a variety of class discussions

MAPPING OF COURSE OUTCOMES TO PROGRAM OUTCOMES:

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	3	3	2	3	3	3	3	3	3
CO2	2	3	3	2	3	3	2	2	3	3	3	3
CO3	3	2	3	3	3	2	3	3	3	3	3	3
CO4	2	3	3	2	3	3	2	2	3	3	3	3

[3=Highly Significant, 2=Moderate Significant, 1=Least Significant]

S. NO.	COURSE CONTENT	HRS	COs
1	**UNIT-I: Organizational Communication:** Meaning, importance and function of communication, Process of communication, Communication Cycle - message, sender, encoding, channel, receiver, decoding, feedback, Characteristics, Media and Types of communication, Formal and informal channels of communication, 7 C's of communication, Barriers to communication, Ethics of communication (plagiarism, language sensitivity) **Soft Skills:** Personality Development, Self Analysis through SWOT, Johari Window, Interpersonal skills -Time management, Team building, Leadership skills. Emotional Intelligence.Self Development and Assessment- Self assessment, Awareness, Perception and Attitudes, Values and belief, Personal goal setting, Career planning, Self esteem.	8	CO1
2	**UNIT-II: Introduction to Phonetics:** IPA system (as in Oxford Advanced Learner's Dictionary), Speech Mechanism, The Description of Speech Sounds, Phoneme, Diphthong, Syllable, Stress, Intonation, Prosodic Features; Pronunciation; Phonetic Transcription - Conversion of words to phonetic symbols and from phonetic symbols to words. British and American English (basic difference in vocabulary, spelling, pronunciation, structure) **Non-Verbal Language**: Importance, characteristics, types – Paralanguage (voice, tone, volume, speed, pitch, effective pause), Body Language (posture, gesture, eye contact, facial expressions), Proxemics, Chronemics, Appearance, Symbols.	8	CO2
3	**UNIT-III: Letters at the Workplace –** letter writing (hard copy and soft copy): request, sales, enquiry, order, complaint. Job Application -- resume and cover letter **Meeting Documentation**-- notice, memo, circular, agenda and minutes of meeting. **Report Writing** - Significance, purpose, characteristics, types of reports, planning, organizing and writing a report, structure of formal report. Writing an abstract, summary, Basics of formatting and style sheet (*IEEE Editorial Style Manual)*, development of thesis argument, data collection, inside citations, bibliography; Preparing a written report for presentation and submission. Writing a paper for conference presentation/journal submission.	8	CO3
4	**UNIT-IV: Listening and Speaking Skills**: Importance, purpose and types of listening, process of listening, difference between hearing and listening, Barriers to effective listening, Traits of a good listener, Tips for effective listening. Analytical thinking; Speech, Rhetoric, Polemics; Audience analysis. Telephone Skills - making and receiving calls, leaving a message, asking and giving information, etiquettes. **Presentations:** Mode, mean and purpose of presentation, organizing the contents, nuances of delivery, voice and body language in effective presentation, time dimension. **Group Discussion:** Purpose, types of GDs, strategies for GDs, body language and guidelines for group discussion. **Interview Skills:** Purpose, types of interviews, preparing for the interview, attending the interview, interview process, employers expectations, general etiquettes.	7	CO4

Text Books

5. Communication Skills for Professionals ,by DrMeenuDudeja, SatyaPrakashan Publication, Second Edition,2016-17

Reference Books

3. Masters, Ann and Harold R. Wallace. Personal Development for Life and Work, 10th Edition.Cengage Learning India, 2012.

ASSESSMENT PATTERN:

Continuous Internal Evaluation (25 Marks)

Bloom's Category Marks	Class Test (15)	Class Performance (10)
Remember		
Understand		
Apply		
Analyze		
Evaluate		
Create		

End Semester Examination (75 Marks)

Bloom's Category Marks	University Examination
Remember	
Understand	
Apply	
Analyze	
Evaluate	
Create	

Faculty Mr. Nitin Tyagi, AP/ECE

SUBJECT NAME	
Course Code: ETEE-309	**Semester: 5th Semester EE**
L:T:P: 3:1:2	**Credit: 4**

After course completion students will be able to:	
CO1	**Understand** the mathematical model of communication system and **classify and understand** the different types of random variables and process.
CO2	**Analysis** and **design** of various modulation and demodulation techniquesin AM, FM, PAM and PCM along with block diagram **description** and **illustrate** how the mathematical concepts bend the analog communication process.
CO3	**Classify** and **understand** digital modulation techniques and **explains** the spread spectrum techniques, Line Coding and source coding.
CO4	**Build** a basis for subsequent related courses such as wireless, cellular, optical fiber and mobile communications and **learn** about their mechanics of communication.

MAPPING OF COURSE OUTCOMES TO PROGRAM OUTCOMES:

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	2	2	2	2	2	3	2	1
CO2	3	3	3	3	2	2	2	2	2	3	2	1
CO3	3	3	3	3	2	2	2	2	2	3	2	1
CO4	3	2	2	3	1	2	3	2	2	3	2	1

[3=Highly Significant, 2=Moderate Significant, 1=Least Significant]

S. NO.	COURSE CONTENT	HRS	COs
1	**UNIT-I:** Introduction to communication system Overview of Communication system, Communication channels, Mathematical Models for Communication Channels Introduction of random Variables: Definition of random variables, PDF, CDF and its properties joint PDF, CDF, Marginalized PDF, CDF, WSS wide stationery, strict sense stationery, non stationery signals, UDF, GDF, RDF, Binomial distribution, White process, Poisson process, Wiener process.	8	CO1

2	**UNIT-II:** Analog Modulation: Modulation- Need for Modulation, Amplitude Modulation theory DSB-SC, SSB, VSB Modulators and Demodulators. Angle Modulation, Relation between FM and PM Wave. Generation of FM wave Direct and Indirect Methods Bandwidth of FM (NBFM, WBFM) Pulse Analog Modulation: Sampling-Natural and Flat top. Reconstruction TDM-Pulse Amplitude Modulation (TDM-PAM), Pulse Width Modulation (PWM), Pulse Position Modulation (PPM), Generation and Recovery. Pulse Digital Modulation: Pulse Code Modulation (PCM), Differential Pulse Code Modulation (DPCM), Delta Modulation (DM), ADPCM.	15	CO2
3	**UNIT-III:** Digital Modulation and Transmission: Advantages of digital communication. Modulation schemes: ASK, PSK, FSK. Spectral Analysis. Comparison. Digital Signaling Formats-Line coding. Information and Coding Theory: Entropy, Information, Channel Capacity Source Coding Theorem: Shannon Fano Coding, Huffman Coding.	12	CO3
4	**UNIT-IV:** Fiber Optical System: Basic Optical Communication System Optical fibers versus metallic cables, Light propagation through optical fibers Acceptance angle and acceptance cone, Fiber configurations Losses in optical fibers. Introduction to Lasers and light detectors. Applications: Military, Civil and Industrial applications. Advanced Communication Systems: Introduction to cellular radio telephones. Introduction to satellite Communication.	8	CO4

Text Books

6. George Kennedy, “Electronics Communication System”, TMH 1993

7. B.P. Lathi, “Analog& Digital Communication”, Oxford University Press 1999.

Reference Books

4. Simon Haykin, “Introduction to Analog & Digital Communication”, Wiley, 2000
5. Tannenbaum, “Computer networks”, PHI, 2003
6. K. Sam Shanmugam, “Digital & Analog Communication system”, John Wiley & Sons 1998.

ASSESSMENT PATTERN:

Continuous Internal Evaluation (25 Marks)

Bloom's Category Marks	Class Test (15)	Class Performance (10)
Remember		
Understand		
Apply		
Analyze		
Evaluate		
Create		

End Semester Examination (75 Marks)

Bloom's Category Marks	University Examination
Remember	
Understand	
Apply	
Analyze	
Evaluate	
Create	

Faculty : Mr. Jitender Kumar, AP/EE

POWER ELECTRONICS

Course Code: ETEE 303	**Semester:** 5th Semester EE
L:T:P: 3 : 1 : 2	**Credit:** 4

After course completion students will be able to:	
CO1	Students will have the knowledge of Basic components of Power Electronics devices and their requirement for design of applications.
CO2	To understand the concept of Phase Controlled Rectifier, Chopper, AC Regulator, AC Cycloconverter and Inverter.
CO3	Students will be understand and analyze the application of Power Electronics.
CO4	To understand the application based multiple combination of Power Electronics with Electrical Machines.

MAPPING OF COURSE OUTCOMES TO PROGRAM OUTCOMES:

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	1	1		1		1			
CO2	3	3	2	2	2		3			1	2	
CO3	3	3	1	3	3	2	2	2	1	1	1	2
CO4	3	3	3	3	3	3	2	2				1

[3=Highly Significant, 2=Moderate Significant, 1=Least Significant]

S. NO.	COURSE CONTENT	HRS	COs
1	**UNIT-I:** Characteristics and switching behaviour of Power Diode, SCR, UJT, TRIAC, DIAC, GTO, MOSFET, IGBT, MCT and power BJT, two-transistor analogy of SCR, firing circuits of SCR and TRIAC, SCR gate characteristics, SCR ratings. Protection of SCR against over current, over voltage, high dV/dt, high dI/dt, thermal protection, Snubber circuits, Methods of commutation, series and parallel operation of SCR, Driver circuits for BJT/MOSFET.	11	CO1, and CO2
2	**UNIT-II: A.C. to D.C. Converter**: Classification of rectifiers, phase controlled rectifiers, fully controlled and half controlled rectifiers and their performance parameters, .three phase half wave, full wave and half controlled rectifiers and their performance parameters, effect of source impedance on the performance of single phase and three phase controlled rectifiers, single-phase and three phase dual converter.	11	CO2, CO3, and CO4
3	**UNIT-III: D.C. to D.C. Converter**: Classification of choppers as type A, B, C, D and E, principle of operation, switching mode regulators: Buck, Boost, Buck-Boost, Cuk regulators. **A.C. to A.C. Converter**: AC voltage Controllers, Cyclo-converters : single phase to single phase, three phase to single phase, three phase to three phase Cyclo-converter circuit and their operation, Matrix converter.	11	CO2, CO3, and CO4
4	**UNIT-IV: D.C. to A.C. Converter**: single phase single pulse inverter: Square wave, quasi square. Three phase single pulse inverters (120° and 180° conduction) Modulation Techniques and reduction of harmonics, PWM techniques, SPWM techniques, SVM, Carrier less modulation. , PWM Inverter, Bidirectional PWM converters, voltage source inverters and current source inverter, Multi level Inverter: cascaded and NPC Inverters.	11	CO2, CO3, and CO4

Text Books

1. M.H. Rashid, “Power Electronics: Circuits, Devices and Applications” Pearson Publications.
2. Daniel W. Hart, “Power Electronics “Tata McGraw-Hill
3. H.C. Rai, “Power Electronics Devices, Circuits, Systems and Application”, Galgotia Publications, 3rd Edition

Reference Books

1. Singh, Kanchandani, “Power Electronics”, Tata McGraw-Hill.
2. Ned Mohan, Tore M. Undeland and Robbins, “Power Electronics: Converters, Applications and Design” Wiley India Publication
3. V R Moorthi, “Power Electronics: Devices, Circuits and Industrial Applications”, Oxford Publication.
4. Kassakian, Schlecht, Verghese, “Principles of Power Electronics” , Pearson Publications
5. M.S. Jamil Asghar, “Power Electronics” PHI Publication
6. P. S. Bimbhra “Power Electronics”, Khanna Publishing.

ASSESSMENT PATTERN:

Continuous Internal Evaluation (25 Marks)

Bloom’s Category Marks	Class Test (15)	Class Performance (10)
Remember		
Understand		
Apply		
Analyze		
Evaluate		
Create		

End Semester Examination (75 Marks)

Bloom’s Category Marks	University Examination
Remember	
Understand	
Apply	
Analyze	
Evaluate	
Create	

Faculty: Ms. Shilpa Sharma, AP/ECE

Signals & Systems	
Course Code: ETEL-305	**Semester: 5th Semester EE**
L:T:P: 3:1:2	**Credits: 4**

After course completion students will be able to:	
CO1	Discuss (UNDERSTANDING) the basic concepts of signals and systems and classify (ANALYSING) the various types of signals and systems along with examples.
CO2	Discuss (UNDERSTANDING) the physical significance of Fourier Series and Fourier Transform along with its mathematical formula and evaluate (EVALUATING) numerical examples.
CO3	Discuss (UNDERSTANDING) the physical significance of Laplace Transform along with this mathematical formula and evaluate (EVALUATING) numerical examples.
CO4	Discuss (UNDERSTANDING) sampling and compare (ANALYSING) between continuous and discrete domain, discuss (UNDERSTANDING) the mathematical formula of Z Transform and Inverse Z Transform and evaluate (EVALUATING) numerical examples

MAPPING OF COURSE OUTCOMES TO PROGRAM OUTCOMES:

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	1	2							
CO2	3	2	1	1	2			1				
CO3	3	2	1	1	2	1						
CO4	3	2	1	1	2	1		1				

[3=Highly Significant, 2=Moderate Significant, 1=Least Significant]

S. NO.	COURSE CONTENT	HRS	COs
1	**UNIT-I:** **Continuous And Discrete Time Signals:** Definition of signal**,** Classification of Signals: Periodic and Aperiodic, Even and Odd, Energy and Power signals**,** Deterministic and Random signals**.** **Singular Functions**: Unit impulse, unit step, unit ramp, complex and exponential, parabolic, Signum, Sinc etc. Properties of unit impulse in continuous and discrete domain, properties of basic functions w.r.t. orthogonality. **Transformation in independent variable of signals**: Time scaling, Time shifting, Amplitude scaling. Representation of signals in terms of singular function and orthogonal functions. **Systems:** Definition of system, types of systems: Linear and nonlinear, static and dynamic, causal and non-causal, time variant and invariant, invertible and non-invertible, stable and non-stable. System described by differential equation and difference equation. **LTI System:** Properties of LTI System, impulse response, convolution and its properties in continuous and discrete domain with proof. Linear convolution in continuous and discrete domain using graphical method, using general formula and matrix method.	12	CO1

2	**UNIT-II:** **Fourier series:** Need and application of Fourier series. Fourier series representation of continuous time and discrete time signals using exponential method and trigonometric method. Magnitude and Phase spectrum of signals. **Fourier Transform:** Properties of the Continuous time and discrete time Fourier Transform. Magnitude and Phase representations of frequency response of LTI systems Analysis and characterization of LTI systems using Differential Equations and Difference equation	11	CO2
3	**UNIT-III:** **Magnitude- Phase Representation of Frequency Response of LTI System:** Linear phase, concept of phase delay and group delay. All pass system. **Laplace Transform:** Properties of Laplace transform, concept of ROC and its properties. Computation of impulse response & transfer function using Laplace transform. Inverse-Laplace transforms. Computation of impulse response, total response (zero state and zero input response) & transfer function using Laplace transform**.**	11	CO3
4	**UNIT-IV:** **Sampling:** Sampling of low pass signals, ideal sampling, Aliasing effect, Nyquist rate, reconstruction of signal. Sampling of discrete time signals**.** **Z Transform:** Region of convergence – properties of ROC, Properties of Z-transform. **Inverse Z-transform** using contour integration - Residue theorem, Power series expansion and partial fraction expansion. Relationship between Z-transform, Fourier transform and Laplace transform. Computation of impulse response, total response (Zero state and Zero input response) & Transfer function using Z-Transform. Stability of discrete-time LTI System.	10	CO4

Text Books

8. AlanV.Oppenheim, Alan S.Willsky, S.Hamid Nawab, “Signals & Systems”, 2nd edition,
9. Pearson Education, 1997.
10. Simon Haykin and Barry Van Veen, “Signals and Systems”, John Wiley, 1999.

Reference Books

1. M.J.Roberts, “Signals and Systems Analysis using Transform Method and MATLAB”, TMH 2003.
2. Tarun kumar rawat “signals and systems “, Oxford University Press, Incorporated, 2010 Anand kumar, “signals and systems” 3rd edition , PHI
3. Ramesh Babu and R.Anandanatrajan ,”Signals and system”, 4th edition Sci Tech ,2013
4. [Moman .H. Hays, “Digital Signal Processing”, Schaum’s outlines, Tata McGraw-Hill2004.
5. John G.Proakis and Dimitris G.Manolakis, “Digital Signal Processing, Principles, Algorithms and Applications”, 3rd edition. PHI, 2000.

ASSESSMENT PATTERN:

Continuous Internal Evaluation (25 Marks)

Bloom's Category Marks	Class Test (15)	Class Performance (10)
Remember		
Understand		
Apply		
Analyze		
Evaluate		
Create		

End Semester Examination (75 Marks)

Bloom's Category Marks	University Examination
Remember	
Understand	
Apply	
Analyze	
Evaluate	
Create	

Faculty: Ms. Taruna Aggarwal, AP/ECE

Switching Theory and Logic Design

Course Code: ETEE 307 | **Semester: 5th Semester EE**

L:T:P 3:1:4 | **Credits: 4**

After course completion students will be able to:	
CO1	Explain (**UNDERSTANDING)** various number systems and codes and compute (**APPLYING)**conversions between different number systems and codes.
CO2	Use (**APPLYING**) logic theory to Analyse **(ANALYSING**) and deduce (**ANALYSING**) digital combinational circuits like decoders, encoders, multiplexers, and de-multiplexers including arithmetic circuits (half adder, full adder, and multiplier).
CO3	Deconstruct (**ANALYSING**) sequential digital circuits like flip-flops, registers, counters.
CO4	Construct (**CREATING**) asynchronous sequential circuits. Compare **(UNDERSTANDING**) the nomenclature and technology of memory devices: ROM, RAM, PROM, PLD, FPGAs, etc.

MAPPING OF COURSE OUTCOMES TO PROGRAM OUTCOMES:

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	1	2	2				1	1		3
CO2	1	3	3	2	2		2		1	1		3
CO3		3	3	3	2	1	1		1	1	1	3
CO4	1	2	3	1	1	1	1	1	1	1		2

[3=Highly Significant, 2=Moderate Significant, 1=Least Significant]

S. NO.	COURSE CONTENT	HRS	COs
1	**UNIT-I:** Number Systems and Codes:- Decimal, Binary, Octal and Hexadecimal Number systems, Codes- BCD, Gray Code, Excess-3 Code, ASCII, EBCDIC, Conversion between various Codes. Switching Theory: - Boolean Algebra-Postulates and Theorems, De' Morgan's Theorem, Switching FunctionsCanonical Forms- Simplification of Switching Functions- Karnaugh Map and Quine Mc-Clusky Methods. Combinational Logic Circuits:- Review of basic gates- Universal gates, Adder, Subtractor ,Serial Adder, Parallel Adder- Carry Propagate Adder, Carry Look-ahead Adder, Carry Save Adder, Comparators, Parity Generators, Decoder and Encoder, Multiplexer and De-multiplexer, ALU, PLA and PAL.	14	CO1, CO2 CO4
2	**UNIT-II:** Integrated circuits: - TTL and CMOS logic families and their characteristics. Brief introduction to RAM and ROM. Sequential Logic Circuits: - Latches and Flip Flops- SR, , D, T and MS-JK Flip Flops, Asynchronous Inputs. Counters and Shift Registers:- Design of Synchronous and Asynchronous Counters:- Binary, BCD, Decade and Up/Down Counters , Shift Registers, Types of Shift Registers, Counters using Shift Registers- Ring Counter and Johnson Counter.	10	CO2,CO3 CO4
3	**UNIT-III:** Synchronous Sequential Circuits:- State Tables State Equations and State Diagrams, State Reduction and State Assignment, Design of Clocked Sequential Circuits using State Equations. Finite state machine-capabilities and limitations, Mealy and Moore models-minimization of completely specified and incompletely specified sequential machines, Partition techniques and merger chart methodsconcept of minimal cover table.	10	CO3,CO4
4	**UNIT-IV:** Algorithmic State Machine: Representation of sequential circuits using ASM charts synthesis of output and next state functions, Data path control path partition-based design. Fault Detection and Location: Fault models for combinational and sequential circuits, Fault detection in combinational circuits; Homing experiments, distinguishing experiments, machine identification and fault detection experiments in sequential circuits.	10	CO4

Text Books

11. Zyi Kohavi, "Switching & Finite Automata Theory", TMH, 2nd Edition
12. R.P. Jain, "Modern Digital Electronics", TMH, 2nd Ed,
13. Morris Mano, Digital Logic and Computer Design", Pearson

Reference Books

7. A Anand Kumar, “Fundamentals of Digital Logic Circuits”, PHI
8. Taub ,Helbert and Schilling, “Digital Integrated Electronics”, TMH

ASSESSMENT PATTERN:

Continuous Internal Evaluation (25 Marks)

Bloom’s Category Marks	Class Test (15)	Class Performance (10)
Remember		
Understand		
Apply		
Analyze		
Evaluate		
Create		

End Semester Examination (75 Marks)

Bloom’s Category Marks	University Examination
Remember	
Understand	
Apply	
Analyze	
Evaluate	
Create	

Faculty: Mr. Ritesh Kumar Rai, AP/EE

Advanced Control Systems	
Course Code: ETEE 403	**Semester: 7th Semester EE**
L:T:P: 3:1:1	**Credit: 4**

After course completion students will be able to:	
CO1	Students will have the knowledge *of state space*, transfer function and state variables, transfer matrix, EIGEN values and EIGEN vectors, Solution of State equations & Related to numerical.
CO2	To understand the concept of Introduction to discrete time systems, sampling process, Z-transform and inverse Z-transforms and hold circuits, presentation by difference equation and its solution,
CO3	To solve problems DF of common non-linearities, Phase Plane Analysis, singular points, construction of phase portrait, phase plane analysis of linear/non-linear systems.
CO4	Students will be able to understand and analyze Introduction to basic approaches to adaptive control - Model reference adaptive control systems, self tuning regulators, Applications of adaptive control

MAPPING OF COURSE OUTCOMES TO PROGRAM OUTCOMES:

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	3	3	3	2	3	1	3	2
CO2	3	3	3	2	3	2	1	2	3	3	3	2
CO3	3	3	3	2	2	3	2	3	3	3	3	2
CO4	3	3	3	3	3	3	3	3	3	2	3	3

[3=Highly Significant, 2=Moderate Significant, 1=Least Significant]

S. NO.	COURSE CONTENT	HRS	COs
1	**UNIT-I:** Introduction, state space representation of continuous LTI systems, transfer function and state variables, transfer matrix, EIGEN values and EIGEN vectors, Solution of State equations, controllability and observability, canonical forms (CCF, OCF, DCF, JCF). **[T1,T2]**	10	CO1
2	**UNIT-II:** Introduction to discrete time systems, sampling process, Z-transform and inverse Z-transforms and hold circuits, presentation by difference equation and its solution, pulse transfer function, transient and steady state responses,	12	CO2

	Dead beat response, steady state error, Representation of discrete systems in state variable form and its solution, stability of digital control system, digital equivalent of conventional controller/compensator. **[T1,T2]**		
3	**UNIT-III:** Introduction, Non-linear system behavior and different types of non-linearities, Describing function analysis, assumptions and definitions, DF of common non-linearities, Phase Plane Analysis, singular points, construction of phase portrait, phase plane analysis of linear/non-linear systems, existence of limit cycles, jump phenomenon, stability analysis: **[T1,T2]**	10	CO3
4	**UNIT-IV:** Lyapunov direct method, positive definite functions and Lyapunov functions, existence of Lyapunov functions, Lyapunov analysis of LTI systems, variable gradient method, Krasvoskii method, performance analysis, Popov's stability criteria. Introduction to basic approaches to adaptive control - Model reference adaptive control systems, self tuning regulators, Applications of adaptive control. **[T1,T2]**	10	CO4

Text Books:

[T1] Dorf-State Space Analysis, Modern Control System, Pearson 4th edition, 2002
[T2] M. Gopal-Digital Control and State Variable Methods, TMH 4th Edition.

Reference Books

[R1] J. J. Stoline, Nonlinear Control System.
[R2] Brian D.O.Adnerson & John B. Moore, Optimal Control
[R3] R.C. Sukla – Control Stystems, Dhanpat Rai & Co. (P) Ltd.
[R4] Shastri & Badson, Adaptive Control, PHI
[R5] S. Das Gupta, Control System Theory, Khanna Publications.

ASSESSMENT PATTERN:

Continuous Internal Evaluation (25 Marks)

Bloom's Category Marks	Class Test (15)	Class Performance (10)
Remember		
Understand		
Apply		
Analyze		
Evaluate		
Create		

End Semester Examination (75 Marks)

Bloom's Category Marks	University Examination
Remember	
Understand	
Apply	
Analyze	
Evaluate	
Create	

Faculty: Ms. Manasi Pattnaik, AP/EE

ELECTRICAL DRIVES

Course Code: ETEE-401 | **Semester: 7th Semester EE**

L:T:P: 3:1:2 | **Credits: 4**

After course completion students will be able to:	
CO1	Understand Dynamics of Electric Drives
CO2	Understand DC Motor Drives
CO3	Understand Induction Motor Drives
CO4	Understand Drives with Special Machine

MAPPING OF COURSE OUTCOMES TO PROGRAM OUTCOMES:

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	3	3	3	3	3	2	3	3
CO2	3	3	3	3	3	3	3	3	3	3	3	2
CO3	3	3	3	3	3	3	3	3	3	2	3	3
CO4	3	3	3	3	3	3	3	2	3	3	3	3

[3=Highly Significant, 2=Moderate Significant, 1=Least Significant]

S. NO.	COURSE CONTENT	HRS	COs
1	**UNIT-I:** **:** Types of loads, quadrant diagram of speed time characteristics, Basic and modified characteristics of dc and ac motors, equalization of load, steady state stability, calculation of time and energy loss, control of electric drives, modes of operation, speed control and drive classifications, closed loop control of drives, selection of motor power rating, class of duty, thermal considerations	11	CO1
2	**UNIT-II:** **:** DC motor speed control, Methods of armature control, field weakening, semiconductorcontrolled drives, starting, braking, transient analysis, controlled rectifier fed dc drives, chopper controlled dc drives.	10	CO2
3	**UNIT-III:** **:** Three phase induction motor starting, braking, transient analysis, speed control fromstator and rotor sides, stator voltage control, variable frequency control from voltage sources and current sources, static rotor resistance control, slip power recovery, static Scherbius and static Kramer drive.	11	CO3
4	**UNIT-IV:** Introduction to permanent magnet machines, thermal properties ofPM, concept of BLDC motor, 120° and 180° operation, rotor position detection, open loop voltage control, closed loop current control, high speed single pulse operation, permanent magnet synchronous machines, rotor position detection and synchronization, sinusoidal PWM excitation, closed and open loop control, PMSG and its application to wind energy, stepper motor, current and voltage control, drive circuits, SRM drive, modeling and analysis of SRM, different configurations of converters, closed and open loop operation, high speed operation with angle of advance. .	12	CO4

Text Books

1.G K Dubey, “Principle of Electrical Drives”, Narosa Publishing House
2.VedamSubrahmanyam, “Electrical Drives”, Tata McGraw-Hill

Reference Books

1.R Krishnan, “Electrical Motor Drives” PHI Publications.
2. Ned Mohan, “Electrical Machines And Drives” Wiley India Publication
3.Bimal K Bose, “Modern Power Electronics and AC Drives”, PHI Publications.
4. De, Sen , “ Electric Drives” , PHI Publications.
5.Bimal K Bose, “Power Electronics and Variable Frequency Drives” Wiley India Publication

ASSESSMENT PATTERN:

Continuous Internal Evaluation (25 Marks)

Bloom's Category Marks	Class Test (15)	Class Performance (10)
Remember		
Understand		
Apply		
Analyze		
Evaluate		
Create		

End Semester Examination (75 Marks)

Bloom's Category Marks	University Examination
Remember	
Understand	
Apply	
Analyze	
Evaluate	
Create	

Faculty: Mr. Jitender Kumar, AP/EE

RENEWABLE ENERGY RESOURCES

Course Code: ETEE 419	**Semester: 7th Semester EE**
L:T:P: 3 : 0 : 0	**Credit: 3**

After course completion students will be able to:	
CO1	Describe the challenges and problems associated with the use of various energy sources, including fossil fuels, with regard to future supply and the environment. List and describe the primary renewable energy resources and technologies.
CO2	Describe/illustrate basic electrical concepts and system components.
CO3	Convert units of energy—to quantify energy demands and make comparisons among energy uses, resources, and technologies.
CO4	Collect and organize information on renewable energy technologies as a basis for further analysis and evaluation.

MAPPING OF COURSE OUTCOMES TO PROGRAM OUTCOMES:

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	1	1	1				1			2
CO2	3	3	2	2	2	1	2			1	2	
CO3	3	2	2	3	1		2	2		1	1	3
CO4	3	2	1	1	1	3		2	2	3	3	3

[3=Highly Significant, 2=Moderate Significant, 1=Least Significant]

S. NO.	COURSE CONTENT	HRS	COs
1	**UNIT-I: Solar Energy**: radiation – extra terrestrial, spectral distribution, solar constant, solar radiation on earth, measurements; solar thermal system – solar thermal power and its conversion, solar collectors, flat plate, solar concentrating collectors, - types and applications; **Photovoltaic (PV) technology** - photovoltaic effect, efficiency of solar cells, semi-conductor materials, solar PV system, standards and applications, tracking.	10	CO1, and CO4
2	**UNIT-II: Wind and Small Hydropower Energy**: wind data, properties, speed and power relation, power extracted, wind distribution and speed prediction, wind map of India; wind turbines and electric generators. fundamentals – types of machines and their characteristics, horizontal and vertical wind mills, elementary design principle, wind energy farms, off-shore plants; small, mini and micro hydro power plants and their resource assessment, plant layout with major components shown.	10	CO1, CO2, and CO4
3	**UNIT-III: Other Non-conventional Energy Sources**: biomass – photosynthesis and origin of biomass energy, resources, cultivated resources, waste to biomass, terms and definitions – incineration, wood and wood waste, harvesting super tree, energy forest, phyrolysis, thermo-chemical biomass conversion to energy, gasification, anaerobic digester, fermentation, gaseous fuel; geothermal – resources, hot spring, steam system, principle of working, site selection, associated problems in development; ocean and tidal energy – principle of ocean thermal energy conversion, wave energy conversion machines, problems and limitations, fundamentals of tidal power, conversion systems and limitations; hydrogen energy – properties of hydrogen, sources, production and storage, transportation, problems for use as fuel; fuel cells – introduction with types, principle of operation and advantages.	12	CO2, CO3, and CO4
4	**UNIT-IV: Grid Connectivity**: wind power interconnection requirement - low-voltage ride through (LVRT), ramp-rate limitations, supply of ancillary services for frequency and voltage control, load following, reserve requirement, impact of connection on stead-state and dynamic performance of power	10	CO3, and CO4

	system; interfacing dispersed generation of solar energy with the grid, protective relaying, islanding, voltage flicker and other power quality issues; role of non-conventional energy system in smart grid.		

Text Books

1. Tiwari and Ghosal, "Renewable Energy Resources: Basic Principle & Application", Narosa Pub.
2. S N Bhadra ,D, Kastha,'Wind Electrical Systems" Oxford Publication 2014

Reference Books

1. John Twidell, "Renewable Energy Sources", Taylor and Francis
2. Godfrey Boyle, "Renewable Energy: Power for a Sustainable Future", Oxford University Press
3. Ewald F. Fuchs, "Power Conversion of Renewable Energy Systems", Springer
4. B. H. Khan, "Non Conventional Energy", Tata McGraw Hill
5. D P kothari ,"Wind energy System and applications" Narosa Pub 2014

ASSESSMENT PATTERN:

Continuous Internal Evaluation (25 Marks)

Bloom's Category Marks	Class Test (15)	Class Performance (10)
Remember		
Understand		
Apply		
Analyze		
Evaluate		
Create		

End Semester Examination (75 Marks)

Bloom's Category Marks	University Examination
Remember	
Understand	
Apply	
Analyze	
Evaluate	
Create	

Faculty : Mr. Ritesh Kumar Rai

Electrical Technology	
Course Code: ETEE-107	**Semester: I**
L:T:P:3:0:3	**Credit: 3**

After course completion students will be able to:	
CO1	Students will have the knowledge of Introduction of Circuit parameters and energy sources (Dependent and Independent), Mesh and Nodal, Superposition, Thevenin's, Norton's, Reciprocity, Maximum Power Transfer and Millman's
CO2	To understand the concept Ac Circuits & solve numerical related to RL, RC , RLC , Series & Parallel Resonance.
CO3	Students will be able to understand and analyze measurements of voltage, current, power , energy .
CO4	Students will be able to understand and analyze Transformer & different type of electrical machine.

MAPPING OF COURSE OUTCOMES TO PROGRAM OUTCOMES:

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	3	2	3	2	3	1	2	1
CO2	3	3	3	2	3	2	1	2	3	3	3	2
CO3	3	3	3	2	2	2	2	3	3	3	2	1
CO4	3	3	3	3	3	3	3	3	3	2	1	2

[3=Highly Significant, 2=Moderate Significant, 1=Least Significant]

S. NO.	COURSE CONTENT	HRS	COs
1	**UNIT-I:** DC Circuits Introduction of Circuit parameters and energy sources (Dependent and Independent), Mesh and Nodal Analysis, Superposition, Thevenin's, Norton's, Reciprocity, Maximum Power Transfer and Millman's Theorems, Star-Delta Transformation and their Applications to the Analysis of DC circuits. [T1],[T2]	11	CO1
2	**UNIT-II:** A.C.Circuits A.C. Fundamentals, Phasor representation, Steady State Response of Series and Parallel R-L, R-C and R-L-C circuits using j-notation, Series and Parallel resonance of RLC Circuits, Quality factor, Bandwidth, Complex Power, Introduction to balanced 3-phase circuits with Star- Delta	14	CO2

	Connections. [T1],[T2]		
3	**UNIT-III:** Measuring Instruments Basics of measuring instruments and their types ,Working principles and applications of moving coil, moving iron (ammeter & voltmeter) and Extension of their ranges, dynamometer- type Wattmeter , induction-type Energy Meter , Two-wattmeter method for the measurement of power in three phase circuits, Introduction to digital voltmeter, digital Multimeter and Electronic Energy Meter. [T1],[T2],[R2]	11	CO3
4	**UNIT-IV:** Transformer and Rotating Machines Fundamentals of Magnetic Circuits, Hysteresis and Eddy current losses, working principle, equivalent circuit, efficiency and voltage regulation of single phase transformer and its applications. Introduction to DC and Induction motors (both three phase and single phase), Stepper Motor and Permanent Magnet Brushless DC Motor. [T1],[T2],[R2]	12	CO4

Text Books

[T1] S.N Singh, "Basic Electrical Engineering" PHI India Ed 2012
[T2] Chakrabarti, Chanda,Nath "Basic Electrical Engineering" TMH India", Ed 2012.

Reference Books

[R1] William Hayt "Engineering Circuit Analysis" TMH India Ed 2012
[R2] Giorgio Rizzoni "Principles and Application of Electrical Engineering" Fifth Edition TMH India

ASSESSMENT PATTERN:

Continuous Internal Evaluation (25 Marks)

Bloom's Category Marks	Class Test (15)	Class Performance (10)
Remember		
Understand		
Apply		
Analyze		
Evaluate		
Create		

End Semester Examination (75 Marks)

Bloom's Category Marks	University Examination
Remember	
Understand	
Apply	
Analyze	
Evaluate	
Create	