115ENT01 **TECHNICAL ENGLISH - I**

Common for all branches [Non Circuit and Circuit]

L	T	P	C
3	0	0	3

Objective :

- To facilitate students widen proper listening skills for academic and professionalpurposes:
- To inculcate and develop strategies to understand and to increase students' efficiency in their academic and general reading:
- To train the students in the techniques of acquiring the ability to speak effectively inEnglish with received pronunciation in real-life situations
- To strengthen students' vocabulary power
- To familiarize students with different functions of technical and scientific English:
- To coach the students in augmenting the technical writing skills like writing lettersin formal and business situations

Prerequisite: Nil

Unit – I **Periods: 09**

General Vocabulary – definition, synonyms - antonyms – parts of speech – nouns, pronouns, verbs, adjectives, adverbs, articles, preposition & conjunction, - prefixes & suffixes - reading - skimming and scanning – writing - formal letter writing – complaint letter relating tobusiness - general essay writing – listening and practicing short speeches.

Suggested Activities: Matching words & meanings - using words in context – making sentences, changing words from one form to other forms - nouns - adjectives, -verb- adverb, same words as different parts of speech, intensifiers, articles, prepositions, parallelism, word building with prefixes & suffixes - identifying the right usage of tenses, reading comprehension – skimming - scanning - cloze exercises, essay writing argumentative essays, letter to the editor / business concerns

Unit – II **Periods: 09**

Jumbled words - verbal analogy - single sentence definition – one word substitute - types of sentences, determiners, demonstratives - tenses - active and passive voice - reading for understanding contextual meaning – formal letter writing – permission letter – descriptive essay writing - listening and practicing short presentations.

Suggested activities: Jumbled words - verbal analogy - expanding a word - nominal compound (noun + noun), numerical adjectives - tag questions - gap filling exercises with suitable tense forms, transformation of sentences from active to passive voice & vice

versa, permission letter - asking permission for Industrial visit/In – plant training, reading comprehension - identifying key points of a text - essay writing – descriptive type

Unit – III **Periods: 09**

Compound nouns – abbreviations and acronyms - editing - intensive reading - formal letter writing - transfer of information from graphical to written – transcoding - listening and transfer of information – paragraph writing - (cause and effect – compare and contrast)

Suggested Activities: Singular and plural of nouns, exercises - compound nouns, connecting sentences with apt conjunctions - common error exercise, making reading comprehension, requisition (OD)/acceptance/declining letter, writing conclusive ideas convincingly, pie charts and tables, exercises using questions – asking & answering questions, listening guided note-taking - writing paragraphs using notes

Unit – IV **Periods: 09**

Modal verbs and probability – concord – phrasal verbs - cause and effect expressions – extended definition – transfer of information – reading comprehension - contrasting and comparative essays – check list – creating blogs – e-mail writing

Suggested activities: Making sentences using modal verbs to express probability, gap filling using relevant grammatical form of words, identifying the meaning of phrasal verbs, connecting sentences showing cause and effect relationship, flow charts and bar diagrams, reading comprehension, check list, extempore and paragraph writing (analytical and narrative)

Unit – V **Periods: 09**

'If ' conditionals – gerunds – idioms and phrases – punctuation - intensive reading – listening - formal letter writing – invitation letter — error correction - writing instructions and recommendations - speaking – short presentations on topics (technical and non- technical)

Suggested activities: Sentence completion exercises using 'if ' conditionals, correcting sentences (punctuation), essay writing, writing instructions and recommendations, role play, discussion, debating, discussing, etc..

Total Periods: 45

Course Outcome:

1. The ability to comprehend facets of grammar, wide range of vocabulary so as to beequipped to present opinions and ideas in a convincing manner.
2. The ability to be proactively read, listen, speak and present facts in a persuasivemanner in both oral and written medium.
3. The ability to interact, translate and delegate information.
4. The ability to carry out extempore discussions, document and elucidate ideas.

	Programme Outcomes												Programme Specific Outcomes		
	a	b	c	d	e	f	g	h	i	j	k	l	PSO1	PSO2	PSO3
CO1	3								2					3	1
CO2	3	3							2					1	
CO3	2	3							2					2	1
CO4	3	3							2					1	

Text Books:

1. A.EdwinJeevaraj & Priya Philip, "Technical English", (with work book), Coimbatore, Sahana Publications, Coimbatore, 2011.

References:

1. Department of English, Anna University. Mindscapes: English for Technologists and Engineers Orient Blackswan, Chennai. 2012
2. Dhanavel, S.P. English and Communication Skills for Students of Science and Engineering. Orient Blackswan, Chennai. 2011
3. English for Engineers and Technologists "Combined Edition (Volumes 1 & 2)", Chennai:Orient Longman Pvt. Ltd., 2006. Themes 1 – 4 (Resources, Energy, Computer, Transport).
4. Andrea, J. Rutherford, "Basic Communication Skills for Technology", Second Edition, Pearson Education, 2007.
5. Extensive Reading: 1. A.P.J.AbdulKalam with Arun Tiwari, "Wings of Fire" An
5. Autobiography, University Press (India) Pvt. Ltd.,1999, 30th Impression 2007.
6. Note: The book given under Extensive Reading is meant for inculcating the reading habit of the students. They need not be used for testing purposes.

115FPT05 **FUNDAMENTALS OF COMPUTING& C PROGRAMMING**

[For Circuit Branches]

L	T	P	C
3	0	0	3

OBJECTIVE(S):

- To enable the student to learn about the basics of computer and problem solving methods.
- To learn the basics of C language.
- To learn the various features of C programming language.

Prerequisite: Nil

UNIT - I INTRODUCTION 9+3

Introduction - Characteristics of Computers - Basic Computer organization- Number System– Computer Software –Types - Problem-Solving Techniques-Program Control Structures- Programming Paradigms – Characteristics of Good Program-programming Language - Compiler, Interpreter, Linker, Loader - Internet Basics.

UNIT - II C LANGUAGE BASICS 9+3

Introduction to C Programming – Fundamentals – Structure of a C Program – Compilation and Linking Processes – Constants, Variables – Data Types – Expressions Using Operators In C – Managing Input and Output Operations – Decision Making and Branching – Looping Statements – Solving Simple Scientific and Statistical Problems.

UNIT - III ARRAYS AND STRINGS 9+3

Arrays – Initialization – Declaration – One Dimensional and Two Dimensional Arrays - Strings- String Operations – String Arrays. Simple Programs - Sorting- Searching – Matrix Operations- Preprocessor Directives.

UNIT - IV FUNCTIONS, STORAGE CLASSES AND POINTERS 9+3

Functions: Definition of function – Declaration of function – Pass by value – Pass byreference – Recursion.

Storage classes – auto, static, extern, register- scope rules.

Pointers: Definition – Initialization – Pointers arithmetic – Pointers and arrays - Dynamicmemory allocation - Example Problems

UNIT-V STRUCTURES, UNIONS AND FILES 9+3

Structures and Unions: Introduction – Need for structure data type – Structure definition – Structure declaration – Structure within a structure - Union - Programs using Structuresand Unions.

Files: Introduction – Using files in C - Working with text files.

L : 45, T : 15TOTAL: 60

COURSE OUTCOMES:

- Able to acquire knowledge in Computer, Internet basics and problem solving methods.
- Able tounderstand and implement the programs in C using arrays, functions and structures.
- Able to design and develop applications using pointer concepts and file handling mechanism.

	Programme Outcomes												Programme Specific Outcomes		
	a	b	c	d	e	f	g	h	i	j	k	l	PSO1	PSO2	PSO3
CO1		3	2		2					2		2			
CO2			2							2		2			1
CO3	3	3	2		2					3		2			1

TEXT BOOKS:

1. Ashok.N.Kamthane, Computer Programming, Pearson Education (India), 2008.
2. E.Balagurusamy, Computing fundamentals and C Programming, Tata McGraw-Hill Publishing Company Limited, 2008.

REFERENCES:

1. PradipDey, ManasGhoush, Programming in , Oxford University Press, 2012.
2. Byron Gottfried, Programming with C, 2nd Edition, (Indian Adapted Edition), TMH publications, 2006.
3. Stephen G.Kochan, Programming in C, Third Edition, Pearson Education India, 2005.
4. Brian W.Kernighan and Dennis M.Ritchie, The C Programming Language, Pearson Education Inc., 2005.
5. Behrouz A.Forouzan and Richard.F.Gilberg, A Structured Programming ApproachUsing C, II Edition, Brooks-Cole Thomson Learning Publications, 2007.

115EST09 **ELECTRON DEVICES** (For Circuit Branches)

L	T	P	C
3	0	0	3

OBJECTIVES:

The student should be made to:

- Be exposed to basic electronic devices
- Be familiar with the theory, construction, and operation of Basic electronic devices.

UNIT I SEMICONDUCTOR DIODE 9

Basics of Energy level Diagram of Semiconductor,PN junction diode, Current equations, Diffusion and drift current densities, forward and reverse bias characteristics,applications-half wave rectifier and full wave rectifier, clamper and clipper circuits.

UNIT II BIPOLAR JUNCTION 9

NPN -PNP -Junctions-Current equations – Input and Output characteristics of CE, CB CC-Hybrid - ð model - h-parameter model.

UNIT III FIELD EFFECT TRANSISTORS 9

JFETs – Drain and Transfer characteristics,-Current equations-Pinch off voltage and its significance- MOSFET- Characteristics- Threshold voltage -Channel length modulation, D-MOSFET, E-MOSFET-,Current equation - Equivalent circuit model and its parameters.

UNIT IV SPECIAL SEMICONDUCTOR DEVICES 9

Construction and characteristics: Schottky barrier diode-Zener diode-Varactor diode – Tunnel diode- PIN diode-LASER diode.

UNIT V POWER DEVICES AND DISPLAY DEVICES 9

Construction and characteristics: UJT, SCR, Diac, Triac, IGBT,GTO, LED, LCD, Photo transistor, Opto Coupler, Solar cell and Charge Coupled Device(CCD).

TOTAL: 45 PERIODS

OUTCOMES:

At the end of the course, the student should be able to:

- Explain the theory, construction, and operation of basic electronic devices.
- Use the basic electronic devices

	Programme Outcomes												Programme Specific Outcomes		
	a	b	c	d	e	f	g	h	i	j	k	l	PSO1	PSO2	PSO3
CO1		2	3	2	1	3						2		2	1
CO2	2	2	1	3	1	2						3	1	2	

TEXT BOOKS

1. David A. Bell, "Electronic Devices and Circuits", 5Edition,Oxford University Press, 2009.
2. Donald A Neaman, "Semiconductor Physics and Devices", Third Edition, Tata Mc GrawHill Inc. 2007.

REFERENCES:

1. Yang, "Fundamentals of Semiconductor devices", McGraw Hill International Edition, 1978.
2. Robert Boylestad and Louis Nashelsky, "Electron Devices and Circuit Theory" Pearson Prentice Hall, 10th edition,July 2008.
3. Sedha R.S, "A text book of Applied Electronics", S.Chand& Company Ltd.,2004.

Chairman, Board of Studies
Faculty of Electrical and Electronics Engineering (UG & PG)
Adhiyamaan College of Engineering (Autonomous)
Hosur - 635 109
Krishnagiri (Dt), Tamil Nadu.

215PHP07 **ENGINEERING PHYSICS LAB** [For Circuit Branches]

L	T	P	C
0	0	4	2

OBJECTIVES:

1. To understand the practical concepts of Interference and diffraction.
2. To understand the concept of velocities of sound in different liquids.
3. To get better knowledge of modulus of elasticity.
4. To understand the concepts of thermal conductivity.
5. To understand the concepts of viscosities of liquid.

LIST OF EXPERIMENTS:

1. (a) Determination of laser parameters – Wavelength.
   (b) Particle size determination using Diode Laser.
2. Determination of thickness of a thin wire-Air wedge method.
3. Determination of velocity of sound and compressibility of liquid- Ultrasonicinterferometer.
4. Determination of wavelength of mercury spectrum-Spectrometer grating.
5. Determination of thermal conductivity of a bad conductor-Lee's disc method.
6. Determination of Young's modulus of the material –Non uniform bending.
7. Determination of viscosity of liquid – Poiseuille's method.
8. Spectrometer- Dispersive power of prism.
9. Determination of Young's modulus of the material - Uniform bending.
10. Torsional pendulum- Determination of Rigidity modulus.

COURSE OUTCOMES:

CO1 : Understanding the moduli of elasticity by determining Young's modulus andRigidity modulus of a beam and cylinder respectively

CO2 : Understanding the phenomenon of diffraction, dispersion and interference of lightusing optical components

CO3 : Acquiring knowledge of viscosity by determining coefficient of viscosity of a liquidand measuring the parameters of ultrasound propagating through a liquid

CO4 : Understanding the phenomenon of heat transfer through conductors and bad conductors by determining thermal conductivity

Chairman, Board of Studies
Faculty of Electrical and Electronics Engineering (UG & PG)
Adhiyamaan College of Engineering (Autonomous)
Hosur - 635 109
Krishnagiri (Dt), Tamil Nadu.

	Programme Outcomes												Programme Specific Outcomes		
	a	b	c	d	e	f	g	h	i	j	k	l	PSO1	PSO2	PSO3
CO1	3	2													
CO2	3	2		2											
CO3	3	2		3											
CO4	1	1													

Chairman, Board of Studies
Faculty of Electrical and Electronics Engineering (UG & PG)
Adhiyamaan College of Engineering (Autonomous)
Hosur - 635 109
Krishnagiri (Dt), Tamil Nadu.

215EPP08 **ENGINEERING PRACTICES LABORATORY**

[For Circuit Branches]

L	T	P	C
0	0	4	2

OBJECTIVES:

1. To provide exposure to the students with various basic engineering practices inmechanical engineering.
2. To provide exposure to the students with various basic engineering practices inmechanical engineering.

LIST OF EXPERIMENTS

WELDING:

Study of Electric Arc welding and Gas welding tools and equipments.

Preparation of Arc welding and Gas welding models :

i) Butt joint ii) Lap joint iii) T - joint.

FITTING:

Study of fitting tools and operations.

Preparation of fitting models: i) V-fitting ii) Square fitting

SHEET METAL WORK:

Study of sheet metal tools and operations Preparation of sheet metal models : i) Tray ii) Funnel

PLUMBING WORKS:

Study of pipeline joints and house hold fittings. \

Preparation of plumbing models: Basic pipe connections with PVC and GI pipe fittings.

CARPENTRY:

Study of wooden joints and tools used in roofs, doors, windows, furniture. Preparation of carpentry models : i) Lap joint ii) Dovetail joint iii) T-Joint

DEMONSTRATION ON:

ELECTRICAL ENGINEERING PRACTICE

Study of Electrical components and equipments

Residential house wiring using switches, fuse, indicator, lamp and energy meter.

ELECTRONICS ENGINEERING PRACTICE

Study of Electronic components –Resistor, color coding, capacitors etc

Soldering practice – components soldering in simple electric circuit & testing continuity

COMPUTER HARDWARE AND SOFTWARE PRACTICE

Study of PC Hardware, Internet & World Wide Web and Productivity tools includingWord, Excel,

Total Periods : 45

COURSE OUTCOMES:

The students will be able to

1. Prepare simple Lap, Butt and T- joints using arc welding equipments.
2. Prepare the pipe connections and identify the various components used in plumbing.
3. Prepare simple wooden joints using wood working tools.
4. Demonstrate basic electrical, electronic and computer components based on theirphysical parameters and dimensions.

	Programme Outcomes												Programme Specific Outcomes		
	a	b	c	d	e	f	g	h	i	j	k	l	PSO1	PSO2	PSO3
CO1		3			2					2		2			
CO2			2							2		2		2	
CO3	3	3	2							2		2		2	
CO4			2		2					2		2			

TEXT BOOKS:

1. Ranganath. G, & Channankaiah, "Engineering Practices Laboratory Manual" S.S.Publishers, 2014.
2. Jeyapoovan.T &, Gowri S "Engineering Practice Lab Manual" Vikas publishing house pvt.ltd, 2014.

REFERENCE BOOKS:

1. Ramesh Babu V, "Engineering Practices Laboratory Manual", VRB Publishers Private Limited, Chennai, Revised Edition, 2014.
2. Bawa. H.S, "Workshop Practice", Tata McGraw – Hill Publishing Company Limited,2009.
3. Kannaiah.P & Narayana.K.L, "Manual on Workshop Practice", Scitech Publications,2004.
4. Peter Norton, "Introduction to Computers", 6/e Mc Graw Hill, 2006.
5. David Anfinson and Ken Quamme, "IT Essentials PC Hardware and SoftwareCompanion Guide", CISCO Press, Pearson Education, Third Edition, 2008.

115ESP09 **ELECTRON DEVICES LAB**

[For Circuit Branches]

L	T	P	C
0	0	4	2

Course Objectives:

- The student should be made to Be exposed to the characteristics of basic electronicdevices
- To enhance the students about the areas where the simple electronic components are being used
- To give a practical idea about doing circuit connections and finding the result

LIST OF EXPERIMENTS

1. Characteristics of PN Junction Diode
2. Clipper and Clamper & FWR
3. Zener diode Characteristics & Regulator using Zener diode
4. Common Emitter input-output Characteristics
5. Common Base input-output Characteristics
6. FET Characteristics
7. SCR Characteristics
8. Study of biasing circuits
9. Differential amp – CMRR and determination of Gain
10. Feedback amplifiers
11. Oscillators

TOTAL: 45 PERIODS

Course Outcomes:

- The student should be able to learn the characteristics of basic electronic devices
- Ability to understand the practical application of various electronic circuits

	Programme Outcomes												Programme Specific Outcomes		
	a	b	c	d	e	f	g	h	i	j	k	l	PSO1	PSO2	PSO3
CO1	2	3					2				1	2	2		1
CO2	1	3					2			1		2		1	

Chairman, Board of Studies
Faculty of Electrical and Electronics Engineering (UG & PG)
Adhiyamaan College of Engineering (Autonomous)
Hosur - 635 109
Krishnagiri (Dt), Tamil Nadu.

215ENT01 **TECHNICAL ENGLISH II**

Common for all branches [Non Circuit and Circuit]

L	T	P	C
3	0	0	3

Objective :

- To facilitate students amplify suitable language skills for academic and professional purposes
- To inculcate and develop strategies to understand and to increase students' efficiency in their academic and general reading
- To strengthen students' vocabulary power
- To familiarize students with different functions of technical and scientific English
- To coach the students in augmenting the technical writing skills for writing lettersand reports in formal and business contexts
- To strengthen students' creative skill

Unit – I: Basics of Technical Communication **09**

Technical Communication – features - Distinction between General and Technical communication - Language as a tool of communication - Levels of communication: Interpersonal, Organizational, Mass communication - The flow of Communication: Downward, Upward, Horizontal, Diagonal - Importance of technical communication - Barriers to Communication.

Unit – II: Constituents of Technical Written Communication **09**

Word formation - Synonyms and Antonyms – Acronyms – Homonyms - Word Power - Select vocabulary of about 500- 1000 New words – Odd man Out – Jumbled Words and Sentences- Creative and Critical Thinking - Requisites of Sentence Construction - Paragraph Development: Techniques and Methods - Inductive, Deductive, Spatial, Linear, Chronological etc; Essay Writing – Narrative – Argumentative - Reading and Interpretation.

Unit – III: Forms of Technical Communication **09**

Business Letters: - Letter of Sales and Credit, Letter of Quotation, Order, Letter of Enquiry - Job application and Resumes - Reports: Types – Significance – Structure - Style& Writing of Reports – Agenda – Minutes of Meeting – Advertisement – Fliers – Brochures – Faxes – Internet Websites – Intranet Websites – Extranet Websites – Blog writing.

Unit – IV: Presentation Strategies **09**

Defining Purpose, Analyzing Audience & Locale - Organizing Contents - Modes of Delivery: Extemporaneous, Manuscript, Impromptu, Memorization - Kinesics – proxemics – Paralinguistics – Chronemics.

Unit – V: Value- Based Text Readings **09**

My vision of India 2020 AD by A P J Abdul KalamOf
Truth by Francis Bacon
Of Innovations by Francis Bacon
Dream Children by Charles Lamb

Total Periods: 45

Course Outcome:

1. The ability to strengthen technical writing and speaking
2. The ability to be proactively read, listen, speak and present facts in a persuasivemanner in both oral and written medium
3. The ability to interact, translate and delegate information,
4. The ability to face various levels of competitive examinations to upgrade educationaland career options

	Programme Outcomes												Programme Specific Outcomes		
	a	b	c	d	e	f	g	h	i	j	k	l	PSO1	PSO2	PSO3
CO1	3	2							1				2	2	
CO2	3	2			1				1	1		1			
CO3	2	1	2	1	1				1	1		2			1
CO4	2	1	2	1					1	1		2			

Text Books:

1. A. Edwin Jeevaraj & Priya Philip, "Technical English", (with work book), Sahana Publications, Coimbatore, 2011.
2. Improve Your Writing ed. V.N. Arora and Laxmi Chandra, Oxford Univ. Press, NewDelhi.
3. Technical Communication – Principles and Practices by Meenakshi Raman & SangeetaSharma, Oxford Univ. Press, 2007, New Delhi.

References:

1. Effective Technical Communication by Barun K. Mitra, Oxford Univ. Press, 2006,New Delhi.
2. Business Correspondence and Report Writing by Prof. R.C. Sharma & Krishna Mohan,Tata McGraw Hill & Co. Ltd., New Delhi.
3. How to Build Better Vocabulary by M.Rosen Blum, Bloomsbury Pub. London.
4. Word Power Made Easy by Norman Lewis, W.R.Goyal Pub. & Distributors; Delhi.
5. Developing Communication Skills by Krishna Mohan, Meera Banerji- Macmillan IndiaLtd. Delhi.
6. Manual of Practical Communication by L.U.B. Pandey & R.P. Singh; A.I.T.B.S. Publications India Ltd., Krishan Nagar, Delhi.

215ESE10 **CIRCUIT THEORY** [For Circuit Branches]

L	T	P	C
3	0	0	3

Objectives:

To enable the student to learn the major components of a circuit theory. To know thecorrect and efficient ways of handling electrical circuits.

UNIT – I BASIC CIRCUITS CONCEPTS AND ANALYSIS 9

Circuit elements, ideal sources (independent and dependent), linear passive element R, L and C; V-I relationship of circuit elements; sinusoidal voltage and current- RMS value, Average value, form factor, power and power factor; Ohm's Law – Kirchoff 's Laws; analysis of series and parallel circuits: Network reduction; voltage and current division, source transformation, star/delta transformation.

UNIT - II MULTI DIMENSIONAL CIRCUIT ANALYSIS & NETWEORK THEOREMS 9

Node voltage analysis of multi node circuit with current sources and Mesh-current analysis of multi node circuits with voltage sources for DC and AC circuits. Network Theorems for DC and AC circuits: Thevenin's theorem- Norton's theorem – Superposition theorem – Maximum power transfer theorem –Reciprocity theorem-compensation theorem – substitution theorem- Millman's theorem-Tellegen's theorem.

UNIT - III RESONANCE AND COUPLED CIRCUITS 9

Series and parallel resonance – their frequency response – Quality factor and Bandwidth. Magnetically coupled circuits- Self and mutual inductance –Coefficient of coupling-Dot conversion; Tuned circuits – Single tuned circuits.

UNIT - IV TRANSIENT RESPONSE FOR DC CIRCUITS 9

Source free response of RL and RC circuits; forced response of RL and RC circuits; source free response of RLC series circuit; forced response of RLC series circuit; forced response of RL, RC and RLC series circuit to sinusoidal excitation; time constant and natural frequency of oscillation of circuits. Laplace Transform application to the solution of RL,RC & RLC circuits: Initial and final value theorems and applications.

UNIT - V ANALYSING THREE PHASE CIRCUITS 9

Three phase balanced and unbalanced voltage sources – analysis of three phase 3-wire and 4-wire circuits with star and delta connected loads, balanced and unbalanced – phasor diagram of voltages and currents – power and power factor measurements in three phase circuits.

Lecture: 45, TOTAL: 45

Course Outcomes:

CO1 Recognizing the different combinations of circuit elements and solving the circuit by applying basic circuital laws irrespective of the type of steady state source given.

CO2 Analyzing electrical circuits by applying theorems.

CO3 Recall the basic concepts of Laplace transform and thus analyses the transient behavior of electrical circuits

CO4 Explaining the way of generation of alternating voltage and the response of single phase circuits and three phase circuits employing balanced and unbalanced loads.

	Programme Outcomes												Programme Specific Outcomes		
	a	b	c	d	e	f	g	h	i	j	k	l	PSO1	PSO2	PSO3
CO1	3	3											2		1
CO2	3	3							2				2		1
CO3	3	3											2	1	
CO4	3	3							2					1	

TEXT BOOKS

1. William H. HaytJr, Jack E. Kemmerly and Steven M. Durbin, "Engineering Circuits Analysis", TMH publishers, 6th edition, New Delhi, 2002.
2. Sudhakar A and Shyam Mohan SP, "Circuits and Network Analysis and Synthesis",Tata McGraw Hill, 2007.
3. Ravish R Singh, "Network Analysis and Synthesis", McGraw Hill, 2013.

REFERENCE BOOKS

1. Paranjothi SR, "Electric Circuits Analysis," New Age International Ltd., NewDelhi,1996.
2. Joseph A. Edminister, MahmoodNahri, "Electric circuits", Schaum'sseries,TataMcGraw-Hill, New Delhi 2001.
3. Chakrabati A, "Circuits Theory (Analysis and synthesis), DhanpathRai& Sons, NewDelhi, 1999.
4. Charles K. Alexander, Mathew N.O. Sadik, "Fundamentals of Electric Circuits", Second Edition, McGraw Hill, 2003.

Chairman, Board of Studies
Faculty of Electrical and Electronics Engineering (UG & PG)
Adhiyamaan College of Engineering (Autonomous)
Hosur - 635 109
Krishnagiri (Dt), Tamil Nadu.

215CYP07 **ENGINEERING CHEMISTRY LAB** [For Circuit Branches]

L	T	P	C
0	0	4	2

Objectives:

Students will be conversant with the estimation of various compounds using volumetricand instrumental analysis.

LIST OF EXPERIMENTS

1. Estimation of Total hardness by EDTA
2. Determination of percentage of calcium in Lime Stone by EDTA
3. Estimation of chloride in water sample
4. Estimation of alkalinity of Water sample
5. Determination of DO in Water (Winkler's Method)
6. Determination of Rate of Corrosion of the given steel specimen by weight loss method (Without inhibitor)
7. Determination of Rate of Corrosion of the given steel specimen by weight loss method(With inhibitor)
8. Conduct metric titration (Simple acid base)
9. Conduct metric titration (Mixture of weak and strong acids)
10. Conduct metric titration using $BaCl_2$vs Na_2SO_4
11. Potentiometric Titration (Fe^{2+} / $KMnO_4$ or $K_2Cr_2O_7$)
12. PH titration (acid & base)
13. Determination of water of crystallization of a crystalline salt -Copper sulphate
14. Preparation of Bio-Diesel by Trans etherification method.

A minimum of TEN experiments shall be offered.

Course Outcomes:

1. Carry out the volumetric experiments and improve the analytical skills.
2. Understand the maintenance and usage of analytical instruments and thereby developtheir skills in the field of engineering.
3. Understand the principle and handling of electrochemical instruments and Spectrophotometer.
4. Apply their knowledge for protection of different metals from corrosion by using different inhibitors

Chairman, Board of Studies
Faculty of Electrical and Electronics Engineering (UG & PG)
Adhiyamaan College of Engineering (Autonomous)
Hosur - 635 109
Krishnagiri (Dt), Tamil Nadu.

	Programme Outcomes												Programme Specific Outcomes		
	a	b	c	d	e	f	g	h	i	j	k	l	P2SO1	PSO2	PSO3
CO1	3	3		3	2	1			2	1			2	1	
CO2	3	2		3	2				2	1			2	1	
CO3	3	3		3					2	1			2	1	
CO4	3	2												2	1

Reference(s) :

1. Arthur I. Vogel's, "Quantitative Inorganic Analysis including Elementary Instrumental Analysis",ELBS, Group, 7th Edition, 2000.
2. Dr. K .Sivakumar, "Engineering Chemistry lab manual", S.S publishers, 2016.

Chairman, Board of Studies
Faculty of Electrical and Electronics Engineering (UG & PG)
Adhiyamaan College of Engineering (Autonomous)
Hosur - 635 109
Krishnagiri (Dt), Tamil Nadu.

215ESP07 **ELECTRIC CIRCUITS LAB**

[For Circuit Branches]

L	T	P	C
0	0	4	2

Objectives:

To provide exposure to the students with hands on experience on various electrical circuitlaws and experiments.

LIST OF EXPERIMENTS

1. Verification of kirchoff's laws.
2. Verification of Thevenin's Theorem.
3. Verification of Norton's Theorem.
4. Verification of superposition Theorem.
5. Verification of maximum power transfer theorem.
6. Verification of reciprocity theorem
7. Verification of mesh analysis.
8. Verification of node analysis.
9. Transient response of RL circuits for DC input.
10. Transient response of RC circuits for DC input.
11. Frequency response of series resonance circuit.
12. Frequency response of parallel resonance circuit.

PRACTICAL HOURS : 60

Course Outcomes:

CO1 Selecting the suitable range of meters and rheostats for the given circuit and set the appropriate values of circuit elements and energy sources as per the requirement.

CO2 Applying basic circuital laws to confirm the practical values of the current through and voltage across different elements of the circuit with that of the theoretical values.

CO3 Applying theorems to simplify the electric circuits.

CO4 Illustrating the transient response and frequency response of RLC circuits.

	Programme Outcomes												Programme Specific Outcomes		
	a	b	c	d	e	f	g	h	i	j	k	l	PSO1	PSO2	PSO3
CO1	3	2	3		2		1								1
CO2	3	2	3		2		1							2	
CO3	2	3	2									2	1		2
CO4	2	3	2									2	2	3	

215HSP11 **LANGUAGE LAB** [For Circuit Branches]

L	T	P	C
0	0	4	2

AIM:

To equip students of engineering and technology with effective speaking, listening, reading and writing skills in English, specifically, presentation, group discussion and report writingskills.

Objectives:

- To equip students of engineering and technology with effective speaking and listeningskills in English.
- To help them develop their soft skills and interpersonal skills, which will make the transition from college to workplace smoother and help them excel in their career.

To enhance the performance of the students at Placement Interviews, Group Discussionsand other recruitment exercises.

Globalization has brought in numerous opportunities for the teeming millions, with more focus on the students' overall capability apart from academic competence. Many students, particularly those from non-English medium schools, find it difficult to enter corporate world due to their inadequacy of communication skills and soft skills, despite possessing sound knowledge in their subject area along with technical capability. Keeping this necessity of pre-employment coaching for career developments of the students in view, this course on Communication Skills Laboratory is designed to prepare the students to adapt themselves with ease to the industry environment, and make them rendering as prospective assets to industries. The course will equip the students with the necessary communication skills that would go a long way in helping them in their profession.

Lecture – Practice – PC based (45 hours)

A. English Language Lab

1. **Listening:** **(3+3)**

   Listening - Barriers to listening – Types of listening – Fill in the blanks – Listening Comprehension – Note taking.

2. **Reading:** **(1+6)**

   Reading – Techniques – Skimming and Scanning – Note makingReview (book – journal – essay – movie etc.,)
   Newspaper Reading
   Cloze Reading

3. **Speaking:** **(5+15)**

   Practicing Short Dialogues – Speeches – Interpreting pictures – objects – cartoons – Telephone etiquette Tongue twister

Chairman, Board of Studies
Faculty of Electrical and Electronics Engineering (UG & PG)
Adhiyamaan College of Engineering (Autonomous)
Hosur 635 109
Krishnagiri (Dt), Tamil Nadu.

Presentation skills – Elements of effective presentation – Structure of presentation- Presentation tools – Voice Modulation – Audience analysis - Body language – Videosamples Group discussion – Structure of GD – Strategies in GD - Moderator – led and other GDs — Team work - Body Language - Mock GD -Video samples Phonetics – Stress and intonation - Common Errors in Spoken English

4. Writing: **(2+4)**

Jumbled words
Jumbled Paragraph
Preposition Concord
Error Spotting
Editing
Letter writing (Covering letter – Follow up letter - Letter of thanks giving - appreciation – gratitude) E-mail Etiquettes

5. Soft Skills **(2+4)**

Team building – strategies - stages- blocks of an assertive teamAssertiveness,
Articulateness
Time management
Stress management
Psychometrics

	Programme Outcomes												Programme Specific Outcomes		
	a	b	c	d	e	f	g	h	i	j	k	l	PSO1	PSO2	PSO3
CO1		2									3			2	
CO2								2					3	1	2
CO3			2								2			2	
CO4			1					2			3				
CO5											3				1

Text Books:

1. Anderson, P.V, *Technical Communication*, Thomson Wadsworth, 6th Edition, New Delhi,2007.
2. Prakash, P, *Verbal and Non-Verbal Reasoning*, Macmillan India Ltd., 2nd Edition, NewDelhi, 2004.

References:

1. Dhanavel S. P., *English and Soft Skills,* Orient BlackSwan Pvt. Ltd. Hydrabad, 2010.
2. Evans, D, *Decision maker*, Cambridge University Press, 1997.
3. John Seely, *The Oxford Guide to Writing and Speaking*, Oxford University Press, NewDelhi, 2004.
4. Thorpe, E, and Thorpe, S, *Objective English*, Pearson Education, Second Edition,New Delhi, 2007.
5. Turton, N.D and Heaton, J.B, *Dictionary of Common Errors*, Addison Wesley LongmanLtd., Indian reprint 1998.

Lab Requirements:

1. Teacher console and systems for students.
2. English Language Lab Software
3. Career Lab Software

315MAT01 ENGINEERING MATHEMATICS – III **L T P C 3 1 0 4 100**

(Common to all branches of B.E. / B.Tech. Degree Programmes) - Regulation 2015

Course Objectives

- To develop z-transform techniques which analyze the discrete time signals.
- To solve certain linear differential equations using the Laplace transform technique which has applications in control theory and circuit theory.
- To introduce Fourier series analysis which is central to many applications in engineering.
- To understand the boundary value problems and to obtain the solution using partial differential equations.
- To acquaint the student with Fourier transform techniques used in wide variety of situations in which the functions used are aperiodic.

UNIT I Z – TRANSFORM **9+3**

z-transform - Elementary properties and applications - Inverse z-transform – Convolution theorem (statement and applications only) - Initial and final value theorems (Statement and applications only) - Solution of difference equations by applying z-transform using partial fractions, residue theorem and convolution theorem methods only.

UNIT-II LAPLACE TRANSFORM **9+3**

Laplace transform – Conditions for existence –Basic properties (without proof) – Laplace Transform of elementary functions, derivatives and integrals, unit step function and impulse functions, periodic functions. Definition of Inverse Laplace transform – Convolution theorem (Statement and applications only) – Initial and final value theorems (Statement and applications only) – Solution of linear ordinary differential equations of second order with constant coefficients using Laplace transform techniques.

UNIT III FOURIER SERIES **9+3**

Dirichlet's conditions – General Fourier series – Change of scale - Odd and even functions – Half-range Sine and Cosine series – Parseval's identity – Harmonic Analysis.

UNIT IV BOUNDARY VALUE PROBLEMS **9+3**

Classification of Partial Differential Equations – Method of separation of Variables – Solutions of one dimensional wave equation and One-dimensional heat equations – Applications using Fourier series solutions in Cartesian coordinates - Steady state solution of two-dimensional heat equation.

UNIT V FOURIER TRANSFORM **9+3**

Fourier integral theorem – Fourier transform pair - Sine and Cosine transforms – Properties – Fourier Transform of simple functions – Convolution theorem applications – Parseval's identity applications.

TOTAL: 45+15=60 PERIODS

Course Outcomes

CO 1: Gaining the concept of analysis of linear discrete system using Z-transform approach.
CO2: Applying Laplace transform techniques to solve ordinary differential equations which have an application in many engineering fields.
CO 3: Describing an oscillating function which appear in a variety of physical problems by Fourier series helps them to understand its basic nature deeply. Acquiring the knowledge to construct partial differential equations for various physical and engineering real time problems and obtaining solution using Fourier series methods.
CO 4: Understanding the effect of Fourier transform techniques and their applications.

	Programme Outcomes												Programme Specific Outcomes		
	a	b	c	d	e	f	g	h	i	j	k	l	PSO1	PSO2	PSO3
CO1	2				3		1				2		2		
CO2	2	1			2								2	1	
CO3	2	2			1		1						2	1	1
CO4	2	3			1						2		2		

TEXT BOOK

1. B.S. Grewal, "Higher Engineering Mathematics", Khanna Publications, 43rd edition , 2016.

REFERENCES

1. T.Veerarajan,"Engineering Mathematics-III", Tata McGraw-Hill Publishing company, New Delhi,2015.
2. V.Prameelakaladharan and G.Balaji ,"Engineering Mathematics-III", Amrutha marketing, Chennai,2016.
3. P.Kandasamy, K.Thilagavathy, K.Gunavathy, " Engineering Mathematics-III", S.Chand Publishe

Chairman, Board of Studies
Faculty of Electrical and Electronics Engineering (UG & PG)
Adhiyamaan College of Engineering (Autonomous)
Hosur - 635 109
Krishnagiri (Dt), Tamil Nadu.

Course Code	Course Name	Hours/week			Credit	Maximum Marks		
		L	T	P	C	CA	EA	TOTAL
315GET02	**ENVIRONMENTAL SCIENCE AND SUSTAINABILITY**	**3**	**0**	**0**	**3**	**50**	**50**	**100**

Objectives

- To impart knowledge on components of ecosystem.
- To impart knowledge on natural resources on biodiversity.
- To impart knowledge on type of pollution, causes & effect on environment.
- To impart knowledge on social issues & components of sustainability.

UNIT 1 INTRODUCTION TO ENVIRONMENT AND ECOSYSTEM **9**

Definition, scope and importance of environment – need for public awareness. Atmosphere – composition of atmosphere (troposphere, stratosphere, mesosphere and thermosphere) Biosphere – Hydrosphere – Lithosphere. Concept of ecosystem – structure and functions of ecosystem- producers, consumers and decomposers - Energy flow –Ecological succession-Food chains-Food webs- Ecological pyramids-Introduction, types, characteristic features -structures and function of forest, grassland and aquatic ecosystems (ponds and rivers) - Case Studies in current scenario.

UNIT 2 NATURAL RESOURCES AND BIODIVERSITY **9**

Forest resources-Water resources-Mineral resources-Food resources-Energy resources-Land resources. Introduction to biodiversity definition: genetic, species and ecosystem diversity – biogeographically classification of India – value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – Biodiversity at global, national and local levels – India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ conservation of biodiversity.

UNIT 3 ENVIRONMENTAL POLLUTION **9**

Definition – causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards – solid waste management: causes, effects and control measures of municipal solid wastes – role of an individual in prevention of pollution – pollution case studies – disaster management: floods, earthquake, cyclone and landslides.

UNIT 4 SOCIAL ISSUES, HUMAN POPULATON AND THE ENVIRONMENT **9**

From unsustainable to sustainable development – urban problems related to energy – water conservation, rain water harvesting, watershed management – resettlement and rehabilitation of people; its problems and concerns, case studies role of non-governmental organization environmental ethics: Issues and possible solutions – climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies. – Wasteland reclamation – consumerism and waste products – environment protection act –-environmental legislation-central and state pollution control boards.

UNIT 5 CONCEPT OF SUSTAINABLE DEVELOPMENT **9**

Definition of sustainability -Components of sustainability History and emergence of the concept of sustainable development – Our Common Future - Objectives of Sustainable Development - Millennium Development Goals - Environment and Development linkages – Globalization and environment -Sustainability indicators-Hurdles to Sustainability.

Lecture: 45, TOTAL: 45

Chairman, Board of Studies
Faculty of Electrical and Electronics Engineering (UG & PG)
Adhiyamaan College of Engineering (Autonomous)
Hosur - 635 109
Krishnagiri (Dt), Tamil Nadu.

COURSE OUTCOMES:

1 To understand & appropriate the structure of ecosystem and its impact on environment.
2 To understand the various natural resources and biodiversity
3 To recognize the environmental problems caused due to pollution.
4 To understand the concept of sustainable development

	Programme Outcomes												Programme Specific Outcomes		
	a	b	c	d	e	f	g	h	i	j	k	l	PSO1	PSO2	PSO3
CO1	2			3									2		
CO2	1				2				2				2	1	
CO3	1	2		3						1			2	1	1
CO4		2							2				2		

TEXT BOOKS:

1. Gilbert M.Masters, 'Introduction to Environmental Engineering and Science', 2nd edition, Pearson Education (2004).
2. Benny Joseph, 'Environmental Science and Engineering', Tata McGraw- Hill, New Delhi, (2006).

REFERENCES:

1. R.K. Trivedi, 'Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards', Vol. I and II, Enviro Media.
2. Cunningham, W.P. Cooper, T.H. Gorhani, 'Environmental Encyclopedia', Jaico Publ., House, Mumbai, 2011.
3. Dharmendra S. Sengar, 'Environmental law', Prentice hall of India PVT LTD, New Delhi, 2007.
4. Rajagopalan, R, 'Environmental Studies-From Crisis to Cure', Oxford University Press (2005)

Chairman, Board of Studies
Faculty of Electrical and Electronics Engineering (UG & PG)
Adhiyamaan College of Engineering (Autonomous)
Hosur - 635 109
Krishnagiri (Dt), Tamil Nadu.

Course Code	Course Title	Hours/week			Credits	Maximum Marks		
315EET03	Network Analysis and Synthesis	L	T	P	C	CA	EA	TOTAL
		3	0	0	3	50	50	100

Prerequisite: Basic knowledge in Circuit Theory is required

Objectives:

To study about

- Time response of RL,RC and RLC circuits for different sources
- Complex frequency, Pole -Zero concepts and Fourier analysis
- One and Two port network parameters
- Design of various filters
- Synthesis of networks

UNIT – I DUALITY AND TOPOLOGY **09**

Concept of duality, Dual network, Graphs of a network, Trees, Chords and branches,Tie set and cut set of a graph, Application to network analysis.

UNIT - II S- DOMAIN ANALYSIS AND FOURIER ANALYSIS **09**

Concept of complex frequency - Significance of poles and zeros -Necessary conditions for driving point function – Time domain response from pole-zero configurations - Fourier series representation of different waveforms - Trigonometric and complex forms - Fourier integral and Fourier transforms.

UNIT - III ONE PORT AND TWO PORT NETWORKS **09**

Driving point impedance and admittance of one port networks - Two port networks: Z, Y, ABCD and h parameters -Inter relationships of two port network parameters - Image parameters - Interconnection of two port networks - T and π representation- Impedance matching.

UNIT - IV FILTERS AND ATTENUATORS 09

Filters: Characteristics of ideal filters - Low pass, High pass and Band pass filters– Constant –k and m – derived filters.Attenuators: T-Type, π-Type, Lattice, Bridged-T and L-Type Attenuator.

UNIT - V ELEMENTS OF NETWORK SYNTHESIS **09**

Hurwitz polynomials - PR function - Necessary and sufficient conditions of PR function - Properties of driving point impedance - Synthesis of LC,RL and RC networks by Foster I ,II and Cauer I , II methods.

Lecture: 45, TOTAL: 45 HRS

Course Outcomes:

CO1 Gained the knowledge of network topology.
CO2 Learnt about apply fourier transforms to analyze electrical networks.
CO3 Learnt network functions and two-port parameters.
CO4 Able to design k and m filters and exposure to synthesis techniques.

Chairman, Board of Studies
Faculty of Electrical and Electronics Engineering (UG & PG)
Adhiyamaan College of Engineering (Autonomous)
Hosur - 635 109
Krishnagiri (Dt), Tamil Nadu.

	Programme Outcomes												Programme Specific Outcomes		
	a	b	c	d	e	f	g	h	i	j	k	l	PSO1	PSO2	PSO3
CO1	2		1		2										
CO2	3		2		2				1					1	
CO3	1						2			2			2		1
CO4		1			2										

TEXT BOOKS

1 Sudhakar A and Shyam Mohan SP, "Circuits and Network Analysis and Synthesis", TataMcGraw HillPublishers, 4th Edition, 2010.
2 Ravish R Singh, "Network Analysis and Synthesis", Tata McGraw Hill Publishers, 2013.
3 Arumugam .M and Premkumar .N, Electric circuit theory, Khanna Publishers, New Delhi,2006.
4 G.K. Mithal, "Network Anlaysis", Khanna Publishers, New Delhi, 2011.

REFERENCE BOOKS

1 Umesh Sinha, "Network Analysis And Synthesis,"Sathya Prakasan Publishers Limited, NewDelhi, Fifth edition, 1992.
2 Soni M.L and Gupta J.C, "Electrical circuit Analysis", Dhanpat Rai and Sons, Delhi, 1990
3 Edminister, J.A., 'Theory and Problems of Electric Circuits', Schaum's outline seriesMcGraw Hill Book Company, 5thEdition, 2010.
4 Network Analysis- Vanverkimbark.

Chairman, Board of Studies
Faculty of Electrical and Electronics Engineering (UG & PG)
Adhiyamaan College of Engineering (Autonomous)
Hosur 635 109
Krishnagiri (Dt), Tamil Nadu.

Course Code	Course Title	Hours/week			Credits	Maximum Marks		
		L	T	P	C	CA	EA	Total
315EET04	ELECTRO MAGNETIC THEORY	3	0	0	3	50	50	100

Prerequisite: Nil

Objectives: To enable the students to have a fair knowledge about the theory and problems in Electromagnetic Fields.

1. To introduce the basic mathematical concepts related to electromagnetic fields.
2. To understand the concepts of Electrostatics.
3. To understand the concepts of Magneto statics.
4. To understand the concept of Electromagnetic Fields,
5. To understand the concepts of waves and wave propagation.

UNIT – I INTRODUCTION 9

Introduction: Co-ordinate systems and transformation, Cartesian coordinates, Circul cylindrical coordinates, Spherical coordinates & their transformation. Differential length, are and volume in different coordinate systems. Numerical problems.
Vector calculus: DEL operator, Gradient of a scalar, Divergence of a vector & Divergence theorem, Curl of a vector & Stokes theorem, Classification of vector fields, Numerical problems.

UNIT - II ELECTROSTATIC FIELD 9

Coulomb's law, field intensity, Gauss's lawand applications, Electric potential and Potential gradient, Relation between E and V, Electric dipole and flux lines. Energy density in electrostatic field. Boundary conditions: Dielectric-dielectric, Conductor –dielectric, Conductor-free space. Poisson's and Laplace's equation. Numerical problems.

UNIT - III MAGNETO STATIC FIELDS 9

Biot- savart law, Ampere's circuital law, Magnetic flux density, Magnetio static and Vector potential, Forces due to magnetic field, Magnetic torque, Magnetic material, Magnetic boundary condition, Inductor and Inductances, Magnetic energy density. Numerical problems.

UNIT - IV ELECTROMAGNETIC FIELDS 9

Faraday's law of electromagnetic induction, Transformer and motional emf, Displacement current, Maxwell's equations, Maxwell's equations in differential and integral form. Relation between field theory and circuit theory Numerical problems.

UNIT - V ELECTROMAGNETIC WAVE PROPAGATION 9

Wave equation, Wave propagation in lossy dielectric, Plane waves in loss less dielectric, Plane wave in free space, Plane wave in good conductor, Skin effect, Skin depth, Power &Poynting vector, Reflection of a plane wave at normal incidence, reflection of a plane wave at oblique incidence, Polarization. Numerical problems

Total Hours: 45

Chairman, Board of Studies
Faculty of Electrical and Electronics Engineering (UG & PG)
Adhiyamaan College of Engineering (Autonomous)
Hosur - 635 109
Krishnagiri (Dt), Tamil Nadu.

Course Outcomes:

CO1 Learnt mathematical operations related to fields and laws related to electrostatic fields.

CO2 Gained the knowledge of Poisson's and Laplace's equations

CO3 Acquired the knowledge of Biot-Savart's Law and Ampere's Circuital law.

CO4 Gained the understanding of the Maxwell's equations and principles of propagation of uniform plane waves

	Programme Outcomes												Programme Specific Outcomes		
	a	b	c	d	e	f	g	h	i	j	k	l	PSO1	PSO2	PSO3
CO1	2				2										
CO2		3		1				1					2		
CO3													2	1	
CO4	2		2		1		2								1

TEXT BOOKS:

1. Elements of Electromagnetic, Mathew N.O. Sadiku, 4th edition, Oxford university press. 2007
2. Engineering Electromagnetic, William.H. Hayt& J.A. Buck, 7th Edition, TMH, 2001
3. Theory and problems of Electromagnetic, Edminister, 2nd Edition, TMH, 1993
4. Electromagnetic field theory fundamentals, Guru &Hizroglu, 2nd edition, Cambridge University Press.2000.

REFERENCES

1. Electromagnetic with application, Krause, 5th Edition, TMH. 1999.
2. Elements of Engineering Electromagnetic, N.N. Rao, 6th Edition, Pearson Education 2000.
3. K. A. Gangadhar and P. M. Ramanathan, 'Electromagnetic Field Theory', Khanna Publishers, Delhi 2009.

Chairman, Board of Studies
Faculty of Electrical and Electronics Engineering (UG & PG)
Adhiyamaan College of Engineering (Autonomous)
Hosur - 635 109
Krishnagiri (Dt), Tamil Nadu.

Course Code	Course Title	Hours/week			Credits	Maximum Marks		
		L	T	P	C	CA	EA	Total
315EET05	LINEAR INTEGRATED CIRCUITS AND APPLICATIONS	3	0	0	3	50	50	100

Prerequisite: Basic knowledge in Electron Devices and Circuits is required

Objectives:

i. To study the IC fabrication procedures.

ii. To study characteristics; realize circuits; design for signal analysis using Op-amp ICs.

iii. To study the applications of Op-amp.

iv. To study internal functional blocks and the applications of special ICs like Timers, PLL circuits, regulator Circuits.

UNIT – I IC FABRICATION 9

Fundamentals of Integrated Circuits, IC classifications, fundamentals of monolithic IC technology, Basic Planar Processes, Realisation of monolithic ICs and packaging. Fabrication of diodes, capacitance, resistance, transistor and FETs.

UNIT - II CHARACTERISTICS OF OP AMP 9

OP-AMP -block diagram, Ideal OP-AMP characteristics, virtual ground concept, differential amplifiers , DC characteristics, AC characteristics; frequency response of OP-AMP circuits; summer, differentiator and integrator.

UNIT - III APPLICATIONS OF OP AMP 9

Precision rectifier, half wave and full wave rectifiers, clippers, clampers, peak detectors, Instrumentation amplifier, V/I and I/V converters, S/H circuit, comparators and their applications, monostable&astablemultivibrators, sine and triangular wave generators, first-and second-order active filters,log and antilog amolifier.

UNIT - IV SPECIAL ICs 9

555 Timer Functional block diagram and description – Monostable and Astable operation, Applications, 566 Voltage Controlled Oscillator, 565 PLL Functional Block diagram – Principle of operation, Building blocks of PLL, Characteristics, Derivations of expressions for Lock and Capture ranges, Applications of PLL: Frequency synthesis, AM and FM detection, FSK demodulator, Motor speed control.

UNIT - V APPLICATION ICs 9

IC voltage regulators – 78xx, 79xx, LM317, 723 regulators, switching regulator: SMPS, 78S40. LM 380 power amplifier, ICL 8038 function generator IC, isolation amplifiers, opto coupler IC.

Total Hours: 45

Chairman, Board of Studies
Faculty of Electrical and Electronics Engineering (UG & PG)
Adhiyamaan College of Engineering (Autonomous)
Hosur 635 109
Krishnagiri (Dt), Tamil Nadu.

Course Outcomes:

CO1 Obtained the knowledge of ICs and their applications

CO2 Ability to fabricate and design the circuits using ICs.

CO3 Able to analyze and describe the characteristics of Op amps.

CO4 Learnt about Timers, PLL circuits and regulator Circuits

	Programme Outcomes												Programme Specific Outcomes		
	a	b	c	d	e	f	g	h	i	j	k	l	PSO1	PSO2	PSO3
CO1	2														
CO2	2	1						2					2	1	
CO3		1				1				1			1		1
CO4	2			1											

TEXT BOOKS:

1. RamakantA.Gayakward, 'Op-amps and Linear Integrated Circuits', IV edition, Pearson Education, 2003/ PHI. (2000)
2. D.RoyChoudhary, SheilB.Jain, 'Linear Integrated Circuits', II edition, New Age, 2003

REFERENCES

1. Jacob Millman, Christos C.Halkias, 'Integrated Electronics - Analog and Digital circuits system', Tata McGraw Hill, 2003.
2. Robert F.Coughlin, Fredrick F.Driscoll, 'Op-amp and Linear ICs', Pearson Education, 4th edition, 2002 / PHI.
3. David A.Bell, 'Op-amp & Linear ICs', Prentice Hall of India, 2nd edition, 1997.
4. Sedra and Smith, "Microelectronic Circuits", Oxford University Press, Fifth Edition, 2004.

Chairman, Board of Studies
Faculty of Electrical and Electronics Engineering (UG & PG)
Adhiyamaan College of Engineering (Autonomous)
Hosur - 635 109
Krishnagiri (Dt), Tamil Nadu.

Course Code	Course Title	Hours/week			Credits	Maximum Marks		
		L	T	P	C	CA	EA	Total
315EEE06	MEASUREMENTS AND INSTRUMENTATION	3	0	0	3	50	50	100

Prerequisite: Nil

Objectives:

1. To make the student have a clear knowledge of the basic laws governing the operation of the instruments, relevant circuits and their working.
2. Introduction to general instrument system, error, calibration etc.
3. Emphasis is laid on analog and digital techniques used to measure voltage, current and power etc.
4. To have an adequate knowledge of comparison methods of measurement.
5. Elaborate discussion about storage & display devices and exposure to various transducers and data acquisition systems.

UNIT – I INTRODUCTION 9

Functional elements of an instrument – Static and dynamic characteristics – Errors in measurement – Statistical evaluation of measurement data – Standards and calibration.

UNIT - II ELECTRICAL AND ELECTRONICS INSTRUMENTS 9

Principle and types of analog and digital voltmeters, ammeters, multimeters – Single and three phase wattmeter's and energy meters– Magnetic measurements –Determination of B-H curve and measurements of iron loss – Instrument transformers – Instruments for measurement of frequency and phase.

UNIT - III COMPARISON METHODS OF MEASUREMENTS 9

D.C & A.C potentiometers, D.C & A.C bridges, transformer ratio bridges, self-balancing bridges. Interference & screening –Electrostatic and electromagnetic interference.

UNIT - IV STORAGE AND DISPLAY DEVICES 9

Magnetic disk and tape – Recorders, digital plotters and printers, CRT display, digital CRO, LED, LCD & dot matrix display – Data Loggers.

UNIT - V TRANSDUCERS AND DATA ACQUISITION SYSTEMS 9

Classification of transducers – Selection of transducers – Resistive, capacitive & inductive transducers – Piezoelectric, optical and digital transducers – Elements of data acquisition system – A/D, D/A converters – Smart sensors.

Lecture : 45, TOTAL : 45

Course Outcomes:

CO1 Learnt the concept of instrumentation system.

CO2 Obtained knowledge of operation of instruments, relevant circuits and working

CO3 Gained the knowledge of analog and digital techniques to measure voltage, current, energy and power.

CO4 Understood about storage, display devices and various transducers.

	Programme Outcomes												Programme Specific Outcomes		
	a	b	c	d	e	f	g	h	i	j	k	l	PSO1	PSO2	PSO3
CO1	2												2		
CO2	2			2		2	1						2		1
CO3		1	1		1		3				3		3	2	1
CO4		2												2	

TEXT BOOKS

1 E.O. Doebelin, 'Measurement Systems – Application and Design', Tata McGraw Hill publishing company, 2003

2 A.K. Sawhney, 'A Course in Electrical & Electronic Measurements & Instrumentation', DhanpatRai and Co, 2004

REFERENCE BOOKS

1 A.J. Bouwens, 'Digital Instrumentation', Tata McGraw Hill, 1997

2 D.V.S. Moorthy, 'Transducers and Instrumentation', Prentice Hall of India Pvt Ltd, 2007.

3 H.S. Kalsi, 'Electronic Instrumentation', Tata McGraw Hill, II Edition 2004

4 Martin Reissland, 'Electrical Measurements', New Age International (P) Ltd., Delhi, 2001.

5 J. B. Gupta, 'A Course in Electronic and Electrical Measurements', S. K. Kataria& Sons, Delhi, 2003.

Course Code	Course Title	Hours/week			Credits	Maximum Marks		
		L	T	P	C	CA	EA	Total
315EEP07	LINEAR INTEGRATED CIRCUITS LABORATORY	0	0	4	2	50	50	100

Prerequisite: Nil

Objectives:

1. To understand the basics of linear integrated circuits and available ICs
2. To understand characteristics of operational amplifier
3. To apply operational amplifiers in linear and nonlinear applications
4. To acquire the basic knowledge of special function ICs

LIST OF EXPERIMENTS

1	Inverting and Non inverting amplifiers.
2	Differential amplifiers and precision rectifier(either half wave (or)full wave)
3	Integrator and Differentiator.
4	Active low-pass and High-pass filters.
5	Astable&Monostablemultivibrators using op-amp.
6	Schmitt Trigger and VCO 566.
7	RC Phase shift oscillator using op-amp.
8	Wien bridge oscillators using op-amp.
9	Astable and monostablemultivibrators using 555 Timer.
10	DC power supply using LM317 and LM723.
11	Voltage controlled oscillator (VCO).
12	Measurement of slewrate characteristics of op-amp.

Practical= 45 Total = 45

Course Outcomes:

CO1	Learnt about the characteristics of op-amp
CO2	Gained the knowledge to analyze basic applications using op-amps.
CO3	Acquired knowledge to design power supply and multi-vibrator circuits.
CO4	Obtained knowledge to design and construct waveform generators

	Programme Outcomes												Programme Specific Outcomes		
	a	b	c	d	e	f	g	h	i	j	k	l	PSO1	PSO2	PSO3
CO1	3	2										3	2		1
CO2	3	2	2				2						2	2	1
CO3	3	2								2			3		
CO4	3												3	2	

Chairman, Board of Studies
Faculty of Electrical and Electronics Engineering (UG & PG)
Adhiyamaan College of Engineering (Autonomous)
Hosur - 635 109
Krishnagiri (Dt), Tamil Nadu.

Course Code	Course Title	Hours/week			Credits	Maximum Marks		
		L	T	P	C	CA	EA	Total
315EEP08	ELECTRICAL AND ELECTRONICS CIRCUITS SIMULATION LAB	0	0	4	2	50	50	100

Prerequisite: Knowledge of Electronic Devices is needed

Objectives:

1. To understand the basics of simulation software.
2. To simulate the characteristics of amplifier circuits.
3. To simulate the filter circuits
4. To simulate and test the various oscillators.

LIST OF EXPERIMENTS

1	Introduction to simulation software
2	Rectifiers
3	BJT Switch
4	BJT Amplifiers I
5	BJT Amplifiers II
6	MOS Amplifiers
7	Operational amplifiers I
8	Operational amplifiers II
9	Instrumentation amplifiers
10	Active low-pass, High-pass and band-pass filters.
11	Astable&Monostablemultivibrators and Schmitt Trigger using op-amp.
12	Phase shift and Wien bridge oscillators using op-amp.
13	Astable and monostablemultivibrators using NE555 Timer.

Practical= 45 Total = 45

Course Outcomes:

CO1	Learnt about the basics of simulation software.
CO2	Gained the knowledge to simulate and to analyze the characteristics of amplifier circuits.
CO3	Acquired knowledge to simulate filter circuits.
CO4	Obtained knowledge to simulate and test the various oscillators.

	Programme Outcomes												Programme Specific Outcomes		
	a	b	c	d	e	f	g	h	i	j	k	l	PSO1	PSO2	PSO3
CO1	3								3						
CO2	3	2	2										1		2
CO3	3	2					2					2		3	
CO4	3	2											1		
CO5	3	2										2			1

Chairman, Board of Studies
Faculty of Electrical and Electronics Engineering (UG & P
Adhiyamaan College ...ering (Autonomous)

Course Code	Course Title	Hours/week			Credits	Maximum Marks		
		L	T	P	C	CA	EA	Total
315EEP09	MEASUREMENTS AND INSTRUMENTATION LAB	0	0	4	2	50	50	100

Prerequisite: Nil

Objectives:

1. To train the students in the measurement of displacement, resistance, inductance and capacitance
2. To give exposure to A/D and D/A converters.
3. To Calibrate single-phase energy meter
4. To measure the three phase power and power factor

LIST OF EXPERIMENTS

1	AC bridges - Measurement of inductance, capacitance – Maxwell Bridge – Schering bridge – Anderson bridge
2	DC bridges - Wheatstone bridge – Kelvin double bridge.
3	Instrumentation amplifiers
4	A/D and D/A converters
5	Characteristics of LVDT
6	Calibration of single-phase energy meter
7	Calibration of current transformer
8	Measurement of three phase power and power factor
9	Measurement of iron loss
10	Characteristic of pressure transducers
11	Characteristic of LDR

Practical= 45 Total = 45

Course Outcomes:

CO1 Gained knowledge to measure displacement, resistance, inductance and capacitance
CO2 Learnt about A/D and D/A converters.
CO3 Acquired knowledge to calibrate single-phase energy meter
CO4 Understood measurement of three phase power and power factor

	Programme Outcomes												Programme Specific Outcomes		
	a	b	c	d	e	f	g	h	i	j	k	l	PSO1	PSO2	PSO3
CO1	3	2								2			2	2	2
CO2	3	2								2			2	2	1
CO3		2			2					2				2	
CO4	2												2		1

Chairman, Board of Studies
Faculty of Electrical and Electronics Engineering (UG &
Adhiyamaan College of Engineering (Autonomous)
Hosur - 635 109
Krishnagiri (Dt), Tamil Nadu.

Course Code	Course Title	Hours/week			Credits	Maximum Marks		
		L	T	P	C	CA	EA	Total
415NMT01	NUMERICAL METHODS	3	1	0	4	50	50	100

Objectives

- To solve equations using direct and iterative methods.
- To introduce interpolation techniques to determine the intermediate values of a function from a given set of values in ordered pairs.
- To study the principle of numerical differentiation and integration using interpolation.
- To learn some of the methods of numerical solutions of ordinary differential equations with initial conditions.
- To determine the solutions of boundary value problems using numerical iterative processes

UNIT I SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS **12**

Solution of algebraic and transcendental equations - Fixed point iteration method – Newton-Raphson method- Solution of linear system of equations - Gauss Elimination method - Gauss-Jordan methods – Iterative methods of Gauss-Jacobi and Gauss-Seidel - Eigenvalues of a matrix by Power method.

UNIT II INTERPOLATION AND APPROXIMATION **12**

Interpolation with equal intervals - Newton's forward and backward difference formulae - Interpolation with unequal intervals - Lagrange interpolation – Newton's divided difference interpolation.

UNIT III NUMERICAL DIFFERENTATION AND INTEGRATION **12**

Approximation of derivatives using interpolation polynomials - Numerical integration using Trapezoidal, Simpson's 1/3 and Simpson's 3/8 rules – Two point and three point Gaussian quadrature formulae – Evaluation of double integrals by Trapezoidal and Simpson's rules.

UNIT IV INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS **12**

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

UNIT V BOUNDARY VALUE PROBLEMS IN ORDINARY AND PARTIAL DIFFERENTIALEQUATIONS **12**

Finite difference techniques for the solution of two dimensional Laplace's and Poisson's equations on rectangular domain – One dimensional heat-flow equation by explicit and implicit (Crank-Nicholson) methods - One dimensional wave equation by explicit method.

Lecture:45, Tutorial:15, TOTAL:60

Chairman, Board of Studies
Faculty of Electrical and Electronics Engineering (UG & PG)
Adhiyamaan College of Engineering (Autonomous)
Hosur - 635 109
Krishnagiri (Dt), Tamil Nadu.

Course Outcomes

At the end of the course the student will be able to

CO1 Apply numerical methods such as direct iterative and interpolation to solve algebraic or transcendental equations and system of equations.

CO2 Appreciate numerical solutions for differential and integral calculus as a handy tool to solve problems.

CO3 Implement numerical algorithms to find solutions for intial value problems for ordinary differential equations.

CO4 Demonstrate algorithms using finite differences to obtain solutions to boundary value problems.

	Programme Outcomes												Programme Specific Outcomes		
	a	b	c	d	e	f	g	h	i	j	k	l	PSO1	PSO2	PSO3
CO1	3	2											2		2
CO2	3	2				1		3					2		
CO3	2	2	1									2		2	2
CO4	3		1					2							

TEXT BOOKS

1. Grewal, B.S. and Grewal,J.S., " Numerical methods in Engineering and Science", 6th Edition, Khanna Publishers, New Delhi, 2012.

2. Kandasamy.P,Thilagavathy,K.,&Gunavathi.K., "Numerical Methods"., S.Chand & Company Ltd., New Delhi, 2014.

REFERENCES

1. Richard L.Burden and J.Dougles Faires, "Numerical Analysis", Ninth Edition, BROOKS/COLE, Cengage.com.,2012. Visit www.cengage.com/international.
2. S.S.Sastry, "Introductory Methods of Numerical Analysis", 5th Edition, Prentice Hall of India Private Ltd., New Delhi, 2012.
3. Sankara Rao, K. "Numerical methods for Scientists and Engineers', 2nd Edition Prentice Hall of India Private Ltd., New Delhi, 2005.

Course Code	Course Title	Hours/week			Credits	Maximum Marks		
		L	T	P	C	CA	EA	Total
415EET02	CONTROL SYSTEMS	3	1	0	4	50	50	100

Prerequisite: Electric Circuits, Engineering Mathematics-III

Objectives:

1. To make the student to understand the methods of obtaining the open-loop and closed–loop systems.
2. To make them understand the methods of representation of systems and to derive their transfer function.
3. To make them gain knowledge in the time-domain and frequency domain response of systems
4. To make them analyze the stability of the systems
5. To design the compensators that can be used to stabilize control systems

UNIT I CONTROL SYSTEM MODELING 12

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

UNIT II TIME RESPONSE ANALYSIS 12

Time response analysis - First Order Systems - Impulse and Step Response analysis of second order systems - Steady state errors - P, PI, PD and PID Compensation, Analysis using MATLAB

UNIT III FREQUENCY RESPONSE ANALYSIS 12

Frequency Response-Bode Plot, Polar Plot, Nyquist Plot - Frequency Domain specifications from the plots - Constant M and N Circles - Nichol's Chart - Use of Nichol's Chart in Control System Analysis. Lead, Lag, and Lead Lag Compensators, Analysis using MATLAB.

UNIT IV STABILITY ANALYSIS 12

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

UNIT V STATE VARIABLE ANALYSIS 12

State space representation of Continuous Time systems - State equations - Transfer function from State Variable Representation - Solutions of the state equations - Concepts of Controllability and Observability, Analysis using MATLAB.

Lecture : 45, Tutorial : 15, TOTAL : 60

Chairman, Board of Studies
Faculty of Electrical and Electronics Engineering (UG & PG)
Adhiyamaan College of Engineering (Autonomous)
Hosur - 635 109
Krishnagiri (Dt), Tamil Nadu.

Course Outcomes:

CO1 Ability to Understand the basic concepts of open-loop and closed–loop of systems

CO2 Ability to understand the basic concept of systems and to derive their transfer function models.

CO3 Analyzing the time-domain and frequency response of systems and steady state error analysis

CO4 Ability to analyze the concept of stability of control systems and design compensator.

	Programme Outcomes												Programme Specific Outcomes		
	a	b	c	d	e	f	g	h	i	j	k	l	PSO1	PSO2	PSO3
CO1	3			2									2		2
CO2	2	2										2	2	2	
CO3	3	2	2					2					2		
CO4	3	3									2	3	1		2

TEXT BOOKS:

1. Nagrath I J and Gopal M, "Control System Engineering ", New Age International Pvt Ltd, Fifth Edition, 2008.
2. Ogata K, "Modern Control Engineering", Prentice-Hall of India Pvt Ltd., New Delhi, 2010.

REFERENCE BOOKS:

1. Norman S. Nise, Control Systems Engineering, 4th Edition, John Wiley, New Delhi, 2007.
2. Samarajit Ghosh, Control systems, Pearson Education, New Delhi, 2004.
3. Benjamin C. Kuo, Automatic Control systems, Pearson Education, New Delhi, 2003.

Chairman, Board of Studies
Faculty of Electrical and Electronics Engineering (UG & PG)
Adhiyamaan College of Engineering (Autonomous)
Hosur - 635 109
Krishnagiri (Dt), Tamil Nadu.

Course Code	Course Title	Hours/week			Credits	Maximum Marks		
		L	T	P	C	CA	EA	Total
415EET03	DIGITAL ELECTRONIC CIRCUITS	3	0	0	3	50	50	100

Prerequisite: Basic Knowledge in Electron Devices

Objectives:

1. To study various number systems and to simplify the mathematical expressions using Boolean functions –simple problems
2. To study the implementation of combinational circuits
3. To study the design and analysis of various synchronous sequential circuits.
4. To study the design and analysis of various asynchronous sequential circuits.
5. To expose the students to various memory devices.

UNIT – I BOOLEAN ALGEBRA AND LOGIC GATES **9**

Review of number systems; types and conversion, Codes- BCD, Gray,EX-3code, Error detection and correction codes, Code conversion, Logic Gates, Boolean algebra – Basic Postulates and theorems, Switching functions, Canonical forms and simplification using K-maps and Quine McCluskey method.

UNIT - II COMBINATIONAL CIRCUITS **9**

Implementing Combinational Logic - Design of half adder and full adder, half and full-subtractor, magnitude comparators, code converters, encoders, decoders, multiplexers and demultiplexers. Function realization using gates and multiplexers.

UNIT - III SYNCHRONOUS SEQUENTIAL CIRCUITS **9**

Basic Concepts, Flip-Flops, Analysis of RS, JK, Master Slaves, T and D Flip-Flop, Controlled Registers, Registers and their applications, Synchronous and asynchronous counters, Controlled Counters, Up/Down counters, Ring counter. Analysis of synchronous sequential circuits; design of synchronous sequential circuits – Completely and incompletely specified sequential circuits - state diagrams, state reduction, state assignment.

UNIT - IV ASYNCHRONOUS SEQUENCTIAL CIRCUITS **9**

Mealy and Moore models, analysis procedure - circuit with latches - design procedure reduction of state and flow tables- race free state assignment- Hazards - Design problems.

UNIT – V MEMORY DEVICES, PROGRAMMABLE LOGIC DEVICES AND LOGIC FAMILIES **9**

Memories: Read only memories, PROMs, EPROMs, EEPROMs, RAMs: Static RAM, Dynamic RAM, Magnetic memories, CD-ROM, Flash memories.
Introduction to Programmable Logic Devices: PLA, PAL, Generic array logic, EPLD, FPGA.
Introduction to Various Logic Families: TTL, CMOS, ECL.

TOTAL : 45

Chairman, Board of Studies
Faculty of Electrical and Electronics Engineering (UG & PG)
Adhiyamaan College of Engineering (Autonomous)
Hosur - 635 109
Krishnagiri (Dt), Tamil Nadu.

Course Outcomes:

CO1 Gained the knowledge of fundamental concept of various number systems

CO2 Ability to Implement simple combinational logic circuits using logic gates, multiplexers and decoders.

CO3 Able to design of various synchronous sequential circuits.

CO4 Able to design of various asynchronous sequential circuits

CO5 Understood about semiconductor memories, PLDs and digital logic families.

	Programme Outcomes												Programme Specific Outcomes		
	a	b	c	d	e	f	g	h	i	j	k	l	PSO1	PSO2	PSO3
CO1		2											3	2	2
CO2	3	2													
CO3	3	2	2	3								3			2
CO4	3				3				3				2	3	
CO5	3												2	2	2

TEXT BOOKS

1 M. Morris Mano, 'Digital Design', Pearson Education, 2013.
2 Raj Kamal, ' Digital systems-Principles and Design', Pearson education 2nd edition, 2007
3 John M.Yarbrough, 'Digital Logic, Application & Design', Thomson, 2002.

REFERENCE BOOKS

1 Charles H.Roth, 'Fundamentals Logic Design', Jaico Publishing, IV edition, 2002.
2 Floyd and Jain, 'Digital Fundamentals', 8th edition, Pearson Education, 2003.
3 John F.Wakerly, 'Digital Design Principles and Practice', 3rd edition, Pearson Education, 2002.
4 Tocci, "Digital Systems : Principles and applications, 8th Edition" Pearson Education.

Chairman, Board of Studies
Faculty of Electrical and Electronics Engineering (UG & PG)
Adhiyamaan College of Engineering (Autonomous)
Hosur - 635 109
Krishnagiri (Dt), Tamil Nadu.

Course code	Course name	Hours/week			Credit	Maximum mark		
		L	T	P	C	CA	EA	Total
415EET04	**Power Generation Systems**	3	0	0	3	50	50	100

Course Objective(s)

1. To understand the generation of electric power by steam and gas Power Station.
2. To understand the generation of electric power by hydro power station.
3. To understand the generation of electric power by nuclear and diesel power station.
4. To understand the various types of wind energy conversion system.
5. To understand the generation of electric power by solar energy

Prerequisites: Nil

UNIT I STEAM AND GAS POWER PLANT 9

Introduction: Generation of electric power from Conventional and non-conventional sources of energy.

Steam Power Station: Schematic arrangement, advantages and disadvantages, choice of site selection, Types of prime movers, Environmental aspects.

Gas Turbine Power Plant: Schematic arrangement, advantages and disadvantages of Gas turbine power plant. Open cycle and Closed cycle gas turbine power plant, Combined cycle power plant, Comparison of various power plants

UNIT II HYDRO POWER STATION 9

Schematic arrangement, advantages and disadvantages, choice of site constituents of hydro power plant, Hydro turbine. Types of hydro power station- pumped storage plant-Environmental aspects for selecting the sites and locations of hydro power stations

UNIT III NUCLEAR AND DIESEL POWER STATION 9

Nuclear power station: Schematic arrangement, advantages and disadvantages, selection of site, types of reactors, Hazards, Environmental aspects for selecting the sites and locations of nuclear power stations.

Diesel power station: Introduction, Schematic arrangement, advantages and disadvantages, Choice and characteristic of diesel engines-auxiliaries.

.

UNIT IV WIND ENERGY 9

Introduction-Basic principles of wind energy conversion-site selection considerations-basic components of WECS (wind energy conversion system)-Classification of WECS-Advantages and disadvantages-Energy storage-Applications.

UNIT V SOLAR ENERGY 9

Photovoltaic Power Conversion systems: Solar radiation spectrum, Radiation measurement-Applications of solar thermal systems- Solar Photovoltaic(SPV) systems- Block diagram of general SPV system -Applications of Solar Photovoltaic systems

Course Outcomes:

CO1 Understanding the working of steam and gas power plant thermal power station (TPS) using single line diagram and state the functions of the major equipment and auxiliaries of a Steam power plant.

CO2 Understanding the working of hydro energy conversion process with block diagrams and identify the appropriate site for it.

CO3 Understanding the working of Nuclear and Diesel power station

CO4 Understanding the various components of Wind Energy Conversion system

CO5 Understanding the performance analysis of Solar cell

	Programme Outcomes												Programme Specific Outcomes		
	a	b	c	d	e	f	g	h	i	j	k	l	PSO1	PSO2	PSO3
CO1	3											1	1		2
CO2		2											2	2	
CO3	3	2	2					1					1	2	
CO4	3		2		2						1		2	2	2
CO5	2												2		

TEXT BOOKS:

1. Renewable Energy Technologies, Solanki, Chetan S. , PHI Learning, New Delhi, 2011
2. A Text book of Power System Engineering, A Chakrabarti, M. L Soni, P. V. Gupta, U. S. Bhatnagar, Dhanpat Rai Publication
3. Wind Power Technology, Earnest, Joshua, PHI Learning, New Delhi, 2013
4. Electric Power Generation: Transmission and Distribution, S. N. Singh, PHI Learning,

REFERENCE BOOKS:

1. Electrical Power, Dr. S.L. Uppal, Khanna Publishers, 13th Edition 2009
2. Renewable Energy Sources for Sustainable Development, N.S. Rathore and N. L. Panwar, New India Publishing Agency, New Delhi
3. Wind Power in Power System, Thomas Ackermann, John Willey &Sons, 2005

Chairman, Board of Studies
Faculty of Electrical and Electronics Engineering (UG & PG)
Adhiyamaan College of Engineering (Autonomous)
Hosur - 635 109
Krishnagiri (Dt), Tamil Nadu.

Course Code	Course Title	Hours/week			Credits	Maximum Marks		
		L	T	P	C	CA	EA	Total
415EET05	ELECTRICAL MACHINES –I	3	0	0	3	50	50	100

Prerequisite: Basic knowledge in Electromagnetic Theory is required

Objectives:

1. To introduce the concept of rotating machines and the principle of electromechanical energy conversion in single and multiple excited systems.
2. To understand the working principle generation of D.C. voltages by using different types of generators.
3. To study the working principles of D.C. motors and their load characteristics, starting and methods of speed control. and study their performance
4. To study the starting and methods of speed control of D.C. motors.
5. To study the working principles of transformers, autotransformer and the different testing methods to estimate their performance.

UNIT – I BASIC CONCEPTS IN ENERGY CONVERSION AND ROTATING MACHINES **12**

Principle of energy conversion-Energy in magnetic systems-singly excited system: Electrical input energy, magnetic field energy stored and co-energy. multiply excited system, Generated EMF - MMF of distributed windings: MMF space wave of single coil– magnetic fields in rotating machines.

UNIT- II DC GENERATORS **12**

Principle of operation, Constructional details, Armature Windings, EMF equation, Methods of Excitation –Types of DC Generators: Separate, shunt, series and compound. Armature reaction, Commutation, Interpoles, Compensating windings- losses -Numerical problems-Applications.

UNIT- III DC MOTORS **12**

Principle of operation – Torque equation- Lenz's law-Back EMF- Types of DC Motors: shunt, series and compound-Electrical and Mechanical characteristics of DC shunt series and compound motors. Starters: 2 point, 3 point and 4 point. Losses and efficiency- Numerical problems –Applications.

UNIT- IV TESTING AND SPEED CONTROL OF DC MACHINES **12**

Testing: O.C.C. and load test on separately and self-excited DC Generators - Brake test – Swinburne's test –Hopkinson's test on motor - advantages and dis advantages.

Speed control: Armature and field control on Shunt motor - Ward-Leonard control system - advantages and dis advantages - Applications.

UNIT – V TRANSFORMER **12**

Principle of operation – Constructional details, Classification of Transformers, EMF equation, Transformation ratio, Transformer on no-load and load. Equivalent circuit - Voltage regulation, Losses, Efficiency, All day efficiency-Ideal transformers – Open circuit and short circuit tests, Sumpner's test. Separation of no load losses – condition of Parallel operation-Numerical problems -Applications.

Auto-Transformer – Principle of operation – Saving of copper –Three phase Transformer connections – Applications.

Lecture : 45, Tutorial : 15, TOTAL : 60

Chairman, Board of Studies
Faculty of Electrical and Electronics Engineering (UG & PG)
Adhiyamaan College of Engineering (Autonomous)
Hosur - 635 109
Krishnagiri (Dt), Tamil Nadu.

Course Outcomes:

CO1 Learning the basic concepts of rotating machines and electromechanical energy conversion systems .

CO2 Learning the working principles, performance, as well as to identify, formulate and solve machine related problems on DC Generators.

CO3 Learning the working principles, performance, as well as to identify, formulate and solve machine related problems on DC Motors.

CO4 Gained knowledge in testing and speed control on DC machines.

CO5 Understood the functions of transformer and autotransformer.

	Programme Outcomes												Programme Specific Outcomes		
	a	b	c	d	e	f	g	h	i	j	k	l	PSO1	PSO2	PSO3
CO1	3												2	2	2
CO2	3				3		3					2			
CO3	2	2			3		3						2	2	
CO4	2	2			3							2			2
CO5	2													1	

TEXT BOOKS

1 Nagrath I. J and Kothari D. P. 'Electric Machines', Tata McGraw Hill Publishing Company Ltd, 1990.

2 P.S. Bimbhra, 'Electrical Machinery', Khanna Publishers, 2003.

3 B.L. Theraja, 'A text book of Electrical Technology', Volume II , S. Chand Limited. 2008.

REFERENCE BOOKS

1 Fitzgerald.A.E. Charles Kingsely Jr, Stephen D.Umans, 'Electric Machinery', McGraw Hill Books Company, 1992.

2 P. C. Sen., 'Principles of Electrical Machines and Power Electronics', John Wiley&Sons, 1997

3 K. Murugesh Kumar, 'Electric Machines', Vikas publishing house Pvt Ltd, 2002.

4 Cotton H, "Advanced Electrical Technology", A H Wheeler and Company Publications, London, 1990.

Chairman, Board of Studies
Faculty of Electrical and Electronics Engineering (UG & PG)
Adhiyamaan College of Engineering (Autonomous)
Hosur 635 109
Krishnagiri (Dt), Tamil Nadu.

		L	T	P	C	CA	EA	TOTAL
415EOE06	OBJECT ORIENTED PROGRAMMING AND DATA STRUCTURES	3	0	0	3	50	50	100

(Common to EIE and EEE)

COURSE OBJECTIVE:

- To comprehend the fundamentals of object oriented programming in C++.
- To implement the linear and non-linear data structures.
- To introduce sorting and searching techniques.
- To familiarize with the applications of various data structures.

Prerequisite: Fundamentals of Computing and C Programming

UNIT-I DATA ABSTRACTION & OVERLOADING 9

Introduction to C++ programming – Class Scope and Accessing Class Members – Constructors – Destructors – Object and Member Functions – Friend Function –this pointer - Dynamic Memory Management with operators new and delete – Static Class Members – Data abstraction and Information binding - Container Classes and Iterators – Proxy Classes.

UNIT-II INHERITANCE & POLYMORPHISM 9

Base Classes and Derived Classes – Protected Members – Protected members – Constructors and Destructors in derived Classes – Public, Protected and Private inheritance - Polymorphism Examples - Function Overloading and Operator Overloading – Abstract Classes and Pure Virtual functions – Dynamic Binding – Virtual Destructors.

UNIT-III LINEAR DATA STRUCTURES 9

Abstract Data Types - Arrays and its representations – Stacks and Queues – Linked lists – Linked list based implementation of Stacks and Queues – Evaluation of Expressions – Linked list based polynomial addition – Applications of stacks & queues.

UNIT-IV NON-LINEAR DATA STRUCTURES 9

Trees – Binary Trees – Binary tree representation and traversals – Threaded binary trees – Binary Search tree – Application of trees: Set representation and Union-Find operations – Graph and its representations – Graph Traversals – Connected components.

UNIT-V SORTING & SEARCHING 9

Insertion sort – Merge sort – Quick sort – Heap sort – Hashing - Hash function - Static hashing - Dynamic hashing - Linear Search – Binary Search.

TOTAL: 45

COURSE OUTCOMES

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

CO1: Understand the fundamentals of object oriented programming concepts, particularlyin C++.

CO2: Design applications using inheritance and polymorphism.

CO3: Apply object oriented programming concepts to implement Linear Data Structures.

CO4: Implement Non-linear Data Structures using C++.

CO5: Design applications using sorting and searching techniques.

	Programme Outcomes												Programme Specific Outcomes		
	a	b	c	d	e	f	g	h	i	j	k	l	PSO1	PSO2	PSO3
CO1	3	2								2			3	2	
CO2	3	2											2	2	2
CO3	3	2						2					2	2	
CO4	3	2	2										1		2
CO5	3		2									2	1		

TEXT BOOk

1. Deitel and Deitel, - "C++, How To Program", Sixth Edition, Prentice Hall of India Pvt. Ltd, 2008.
2. Ellis Horowitz, SartajSahni and Dinesh Mehta, "Fundamentals of Data Structures in C++", Universities Press (India) Pvt. Ltd., 2008.

REFERENCE BOOKS:

1. Mark Allen Weiss, - "Data Structures and Algorithm Analysis in C++", Third Edition, Addison-Wesley, 2007.
2. Bhushan Trivedi, - "Programming with ANSI C++, A Step-By-Step approach", Oxford University Press, 2010.
3. Goodrich, Michael T., Roberto Tamassia, -"David Mount. Data Structures and Algorithms in C++ ", 7th Edition, Wiley. 2004.
4. Yedidyah, Augestein, Tannenbaum, "Data Structures Using C and C++ "Pearson Education India; Second Edition, 2015.

Chairman, Board of Studies
Faculty of Electrical and Electronics Engineering (UG & PG)
Adhiyamaan College of Engineering (Autonomous)
Hosur - 635 109
Krishnagiri (Dt), Tamil Nadu.

E-REFERENCE(S):

1. http://nptel.ac.in/courses/106105085/
2. http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-01sc-introduction-to-electrical-engineering-and-computer-science-i-spring-2011/unit-1-software-engineering/object-oriented-programming/
3. http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-006-introduction-to-algorithms-fall-2011/lecture-videos/.

Chairman, Board of Studies
Faculty of Electrical and Electronics Engineering (UG & PG)
Adhiyamaan College of Engineering (Autonomous)
Hosur - 635 109
Krishnagiri (Dt), Tamil Nadu.

415EEP07 **CONTROL SYSTEMS LABORATORY**

L	T	P	C	M
0	0	3	2	100

AIM

To provide a platform for understanding the basic concepts of linear control theory and its application to practical systems.

OBJECTIVE

To impart knowledge on transfer function of various machines, stability analysis, digital simulation of first order and second order systems and stepper motor control.

LIST OF EXPERIMENTS

1. Transfer function of separately excited DC Generator.
2. Transfer function of self-excited DC Generator
3. Transfer function of Armature controlled DC Motor.
4. Transfer function of Field controlled DC Motor.
5. Transfer function of AC Servomotor.
6. DC and AC position control systems.
7. Stepper motor control system.
8. Digital simulation of first order and second order system using MATLAB.
9. P, PI and PID Controllers (First Order).
10. Design of Lag network.
11. Design of Lead network.
12. Design of Lag-Lead network.

Practical Total = 60

Course Outcomes:

CO1 Analyzing the Transfer function of separately excited DC generators.
CO2 Analyzing and Transfer function of self-excited DC generators.
CO3 Able to analyzing speed of DC motor.
CO4 Understanding the various position control systems.
CO5 Learning the various controllers and networks.

	Programme Outcomes												Programme Specific Outcomes		
	a	b	c	d	e	f	g	h	i	j	k	l	PSO1	PSO2	PSO3
CO1	3										2		2		
CO2	3				1									2	2
CO3	3	3							3				2	1	
CO4	3	2			1						2	2		1	2
CO5		1											2		1

Chairman, Board of Studies
Faculty of Electrical and Electronics Engineering (UG & PG)
Adhiyamaan College of Engineering (Autonomous)
Hosur
Krishnagiri (D) Nadu.

Course Code	Course Title	Hours/week			Credits	Maximum Marks		
	ELECTRICAL	L	T	P	C	CA	EA	Total
415EEP08	MACHINES LABORATORY – I	0	0	3	2	50	50	100

Objectives:

To study the various characteristics of DC machines and transformer experimentally

LIST OF EXPERIMENTS

1 Open circuit and load characteristics of a separately excited DC Generator
2 Open circuit and load characteristics of self-excited DC shunt generator.
3 Load characteristics of DC compound generator with differential and cumulative connection.
4 Load characteristics of DC shunt motor
5 Load characteristics of DC series motor.
6 Load characteristics of DC compound motor
7 Speed control of DC shunt motor.
8 Swinburne's test.
9 Hopkinson's test on DC motor – generator set.
10 Load test on single-phase transformer.
11 Open circuit and short circuit tests on single phase transformer
12 Separation of no-load losses in single phase transformer

Practical Total = 60

Course Outcomes:

CO1 Analyzing the characteristics of DC generators.
CO2 Analyzing and test of different DC motors.
CO3 Able to analyzing speed and efficiency of DC machines.
CO4 Understanding the various tests on transformers.
CO5 Learning the various connections of transformers

	Programme Outcomes												Programme Specific Outcomes		
	a	b	c	d	e	f	g	h	i	j	k	l	PSO1	PSO2	PSO3
CO1		2		1					2				3		
CO2	3		2	1				2				3	2	2	
CO3	3	2	2					1					2	3	2
CO4	3										3				
CO5	3	2												2	

Chairman, Board of Studies
Faculty of Electrical and Electronics Engineering (UG & PG)
Adhiyamaan College of Engineering (Autonomous)
Hosur - 635 109
Krishnagiri (Dt), Tamil Nadu.

		L	T	P	C	CA	EA	TOTAL
415EOP09	DATA STRUCTURES LABORATORY	0	0	3	2	50	50	100

(Common to EIE and EEE)

OBJECTIVE(S):

- To learn object oriented programming concepts.
- To implement various data structures using C++.
- To illustrate the concepts of infix, prefix and postfix.
- To implement the sorting techniques.

Prerequisite: Fundamentals of Computing and C Programming.

LIST OF EXPERIMENTS:

Implement the following programs using C++.

1. Basic Programs using C++.

i. Constructors & Destructors,

ii. Function overloading,

iii. Operator Overloading

iv. Types of Inheritance

2. Array Implementation of List Abstract Data Type (ADT).
3. Linked List Implementation of List Abstract Data Type (ADT).
4. Stack ADT – Array and Linked list Implementations.
5. Implementation of Stack to convert Infix Expressions to Postfix Expressions.
6. Queue ADT - Array and Linked list Implementations.
7. Binary Search Tree Implementations.
8. Implementation of Graph Traversals and Finding shortest path using Graph.
9. Hash Table –Separate chaining.
10. Implementation of Searching

    i. Linear Search.

    ii. Binary Search.

11. Implementation of Sorting – Quick sort **Total: 60**

COURSE OUTCOMES

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

CO1: Develop programs using oops concept.

CO2: Design and implement C++ programs for manipulating stacks, queues, linked lists.

CO3: Apply the different data structures for implementing solutions to practical problems

CO4: Demonstrate the Infix. Prefix and Postfix notations using C++ programs.

CO5: Implement sorting techniques using C++ programs.

	Programme Outcomes												Programme Specific Outcomes		
	a	b	c	d	e	f	g	h	i	j	k	l	PSO1	PSO2	PSO3
CO1	3		2							2			3		3
CO2	3	2						2				2	2		
CO3	2	2								2			2	2	2
CO4	3	3	2										2	3	
CO5	3		2							2					2

Chairman, Board of Studies
Faculty of Electrical and Electronics Engineering (UG & PG)
Adhiyamaan College of Engineering (Autonomous)
Hosur - 635 109
Krishnagiri (Dt), Tamil Nadu.

Course Code	Course Title	Hours/week			Credits	Maximum Marks		
		L	T	P	C	CA	EA	Total
515EET01	MICROPROCESSORS AND MICROCONTROLLERS	3	0	0	3	50	50	100

Pre – Requisite: Knowledge of Linear Integrated Circuits and Applications is required

COURSE OBJECTIVES:

- To get familiarized with architecture, addressing modes and instruction of 8085 & 8086 microprocessor
- To get exposed to high Performance and advanced architectures
- To gain knowledge on essential peripherals and the associated interfacing ICs
- To get acquainted with 8-bit microcontroller and be able to program in assembly language
- To design microcontroller based system/application

UNIT I ARCHITECTURE OF 8085 AND 8086 PROCESSOR 9

Evolution of Microprocessors – Introduction to 8085 – Architecture – Addressing Modes – Timing diagrams – Introduction to 8086 – Architecture –Maximum mode – Minimum mode – Addressing Modes and Programming

UNIT II ADVANCED ARCHITECTURES 9

Pipeline concepts and Performance – Superscalar Processing – Hardware Accelerators – Multiprocessor – RISC and CISC Processors – Nano Programming – Case.

UNIT III PERIPHERALS AND THEIR INTERFACING 9

Programmable Peripheral Interface (8255) - keyboard display controller (8279) – ADC – DAC Interface – Programmable Timer Controller (8254) – Programmable interrupt controller (8259)– Serial Communication Interface (8251) – DMA Controller(8257).

UNIT IV MICROCONTROLLER ARCHITECTURE & PROGRAMMING 9

8051 Microcontroller- Architecture - Instruction Set –Addressing modes –Interrupts – Assembly Language Programming - Programming 8051 Timers- Serial Port Programming – Interrupts Programming - 8051 Programming.

UNIT V 8051: INTERFACING AND SYSTEM DESIGN 9

LCD and Keyboard Interfacing- ADC, DAC interfacing - External Memory interfacing – Sensor Interfacing - Motor Control- Relay – PWM - DC motor and Stepper Motor - Design of traffic light control and Washing machine control.

Lecture: 45, TOTAL: 45

Chairman, Board of Studies
Faculty of Electrical and Electronics Engineering (UG & PG)
Adhiyamaan College of Engineering (Autonomous)
Hosur - 635 109
Krishnagiri (Dt), Tamil Nadu.

Course Outcomes:

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

CO1 Ability to understand the architecture of any advanced Processor to be in pace with technological challenges.

CO2 Apply the acquired Programming skills and relate to any Processor/microcontroller in a multidisciplinary. project.

CO3 Able to utilize the IT tools like TASM, MASM and Proteus to develop electronic prototyping and thereby establishing real time control.

CO4 Ability to develop/design microcontroller based system paving way for automation and continuous Development.

	Programme Outcomes												Programme Specific Outcomes		
	a	b	c	d	e	f	g	h	i	j	k	l	PSO1	PSO2	PSO3
CO1	3											2		2	2
CO2	3	2						2				2	2	2	
CO3	3	2			2								2		1
CO4	3	3	2									2	2		

TEXT BOOKS:

1. Ramesh S. Gaonkar, Microprocessor Architecture Programming and Applications with 8085. Sixth edition, Penram International Publishing, 2013.

2. Douglas V.Hall, Microprocessor and Interfacing, Programming and Hardware. Revised second Edition, Indian edition 2007, Eleventh Reprint 2010, Tata McGraw Hill.

REFERENCE BOOKS:

1. Muhammad Ali Mazidi, Janice Gillispie Mazidi, Rolin D.MCKinlay, The 8051 Microcontroller and Embedded Systems, Second Edition 2008, Fifth Reprint 2010, Pearson Education.
2. Krishna Kant, Microprocessor and Microcontroller Architecture, programming and system design using 8085, 8086, 8051, 8096, PHI, Seventh Reprint 2011.
3. A.K. Ray, K.M .Bhurchandi, Advanced Microprocessor and Peripherals, second Edition, Tata McGrawHill, 2007.
4. Kenneth J.Ayala, The 8051 Microcontroller, 3rd Edition, Thompson Delmar Learning,2007, New Delhi.
5. Dogan Ibrahim, Microcontroller Based Applied Digital Control, John Wiley & Sons Ltd, 2006.

E-REFERENCE(S):

1. http://nptel.ac.in/courses/108107029/

Chairman, Board of Studies
Faculty of Electrical and Electronics Engineering (UG & PG)
Adhiyamaan College of Engineering (Autonomous)
Hosur - 635 109
Krishnagiri (Dt), Tamil Nadu.

Course Code	Course Title	Hours/week			Credits	Maximum Marks		
		L	T	P	C	CA	EA	Total
515EET02	ELECTRICAL MACHINES – II	3	1	0	4	50	50	100

Prerequisite: Electrical Machines – I

Objectives:

To impart knowledge on

i. Construction and performance of salient and non – salient type synchronous generators.
ii. Principle of operation and performance of synchronous motor.
iii. Construction, principle of operation and performance of induction machines.
iv. Starting and speed control of three-phase induction motors.
v. Construction, principle of operation and performance of single phase induction motors and special machines.

UNIT – I **ALTERNATOR**

Constructional details – Types of rotors – EMF equation – Synchronous reactance –Armature reaction – Voltage regulation – EMF, MMF– Synchronizing and condition of parallel operation – Synchronizing power - Change of excitation and mechanical input – Blondel's theory – Determination of Xd and Xq using slip test.

UNIT - II **SYNCHRONOUS MOTOR** **12**

Principle of operation – Torque equation – Starting methods -Operation on infinite bus bars – V and inverted V curves – Power input and power developed equations – Power/power angle relations – Hunting - synchronous condenser - Applications.

UNIT – III **THREE PHASE INDUCTION MOTOR** **12**

Constructional details – Types of rotors – Principle of operation – Slip – Equivalent circuit – Torque equations -Slip-torque characteristics – Losses and efficiency – Load test - No load and blocked rotor tests - Circle diagram – Separation of no load losses –Crawling and cogging –Induction generator.

UNIT - IV **STARTING AND SPEED CONTROL OF THREE PHASE INDUCTION MOTOR** **12**

Starters – Types of starters – Direct On Line, Stator resistance, rotor resistance, autotransformer and star-delta starters Applications. Speed control: changes of voltage, frequency, poles and rotor resistance – Cascaded connection. Applications.

UNIT - V **SINGLE PHASE INDUCTION MOTORS AND SPECIAL MACHINES** **12**

Constructional details – Double revolving field theory – Starting methods and applications – Working principles of shaded pole induction motor, Linear Induction motors, repulsion motor, Hysteresis motor, Working principles of stepper motor , universal motor. Applications.

Lecture: 45, Tutorial: 15, TOTAL: 60

Chairman, Board of Studies
Faculty of Electrical and Electronics Engineering (UG & PG)
Adhiyamaan College of Engineering (Autonomous)
Hosur - 635 109
Krishnagiri (Dt), Tamil Nadu

Course outcomes

CO1 Constructional details, principles of operation, performance of Alternators

CO2 Ability to calculate torque, starting methods of AC motor

CO3 Employ different starting and speed control methods to three phase induction motors.

CO4 Emphasis knowledge in basic concepts and principles of special machines.

	Programme Outcomes												Programme Specific Outcomes		
	a	b	c	d	e	f	g	h	i	j	k	l	PSO1	PSO2	PSO3
CO1	3								3			1		2	
CO2	3	2			3						1		3	2	2
CO3	3	2					3		2		1		2	2	
CO4	2	2											2		

TEXT BOOK

1 D.P. Kothari and I.J. Nagrath, 'Electric Machines', Tata McGraw Hill Publishing Company Ltd, 2002

2 Theraja B L., Theraja A K., "A Text Book of Electrical Technology Vol.II AC & DC Machines"
S Chand and Company Limited, 2007.

3 J.B. Gupta, 'Theory and Performance of Electrical Machines', S.K.Kataria and Sons, 2002.

4 K.Murugesh Kumar, 'Induction & Synchronous Machines', Vikas Publishing House Pvt. Ltd, 2000.

REFERENCE BOOK

1 A.E. Fitzgerald, Charles Kingsley, Stephen.D.Umans, 'Electric Machinery', Tata McGraw Hill Publishing Company Ltd, 2003.

2 P.S. Bhimbhra, 'Electrical Machinery', Khanna Publishers, 2003.

Chairman, Board of Studies
Faculty of Electrical and Electronics Engineering (UG & PG)
Adhiyamaan College of Engineering (Autonomous)
Hosur 635 109
Krishnagiri (Dt), Tamil Nadu

Course Code	Course Title	Hours/week			Credits	Maximum Marks		
	ADVANCED	L	T	P	C	CA	EA	Total
515EET03	CONTROL THEORY	3	0	0	3	50	50	100

AIM

To gain knowledge in analysis of non-linear system and digital control of linear system

OBJECTIVE

i. To study the description and stability of non-linear system.

ii. To study the conventional technique of non-linear system analysis.

iii. To study the analysis discrete time systems using conventional techniques.

iv. To analyze the stability of the systems using different techniques.

v. To study the design of optimal controller.

UNIT - I STATE VARIABLE DESIGN 9

Introduction to state variable -Design by state feedback – output feedback – Pole placement technique – Design of state and output feedback controllers – Design of reduced and full order observers – PI feedback – Dynamic state feedback.

UNIT – II SAMPLED DATA CONTROL SYSTEM 9

Introduction to Sample data control systems –Sampling process, signal reconstruction, difference equation, Z-transform, Z-transfer function – Inverse Z transform, Z-transform analysis of sampled data control system, Z and S-domain Relationship.

UNIT - III NON-LINEAR SYSTEMS 9

Typesof non-linearity – Typical examples – Equivalent linearization - Phase plane analysis – Limit cycles – Describing functions- Analysis using Describing functions.

UNIT –IV STABILITY ANALYSIS 9

Introduction – Equilibrium points – BIBO and asymptotic stability – Direct method of Liapunov – Application to non-linear problems – Frequency domain stability criteria – Popov's method and its extensions.

UNIT – V OPTIMAL CONTROL 9

Introduction -Decoupling - Time varying optimal control – LQR steady state optimal control– Optimal estimation – Multivariable control design.

Lecture: 45, TOTAL: 45

Chairman, Board of Studies
Faculty of Electrical and Electronics Engineering (UG & PG)
Adhiyamaan College of Engineering (Autonomous)
Hosur - 635 109
Krishnagiri (Dt), Tamil Nadu.

Course Outcomes:

CO1 Identify state variables and poles to find the stability of non-

CO2 Ability to formulate differential equation, Z-transform, Z-transfer function

CO3 Identify the analysis of discrete time systems using

CO4 Analyze optimal control theory and design.

	Programme Outcomes												Programme Specific Outcomes		
	a	b	c	d	e	f	g	h	i	j	k	l	PSO1	PSO2	PSO3
CO1	3		2				2				2		3		
CO2	3	2						2				1	2	2	2
CO3	3	2	3	2					2			1	2		
CO4	3													2	

TEXT BOOKS

1 Benjamin C. Kuo, 'Digital Control Systems', Oxford University Press, 1992.

2 M. Gopal, " Modern Control System Theory", New Age International

3 B.C. Kuo, "Automatic Control systems", Pearson Education, 1995.

REFERENCE BOOKS

1 J. Nagrath and M. Gopal, 'Control Systems Engineering', New Age International Publishers, 2003.

2 K. Ogata - Digital control systems - Prentice Hall of India Pvt. Ltd,1997.

3 George J. Thaler, 'Automatic Control Systems', Jaico Publishers, 1993.

Chairman, Board of Studies
Faculty of Electrical and Electronics Engineering (UG & PG)
Adhiyamaan College of Engineering (Autonomous)
Hosur - 635 109
Krishnagiri (Dt), Tamil Nadu

Course Code	Course Title	Hours/week			Credits	Maximum Marks		
		L	T	P	C	CA	EA	Total
515EET04	PROTECTION AND SWITCHGEAR	3	0	0	3	50	50	100

Prerequisite: Basic knowledge in Transmission and Distribution and Electrical Machines are required

Objectives:

- Study of Relays and Study of protection schemes and solid state relays.
- To understand instrument transformer and accuracy.
- To understand the methods of circuit breaking, various arc theories and Arcing phenomena – capacitive and inductive breaking, Types of circuit breakers, Protection against over voltages.

UNIT – I PROTECTIVE RELAYS 9

Need for power system protection schemes – nature and causes of faults – types of faults –Power system earthing - Zones of protection and essential qualities of protection – Protection scheme – construction and characteristics of relays – over current relays – directional, distance and differential relays – under frequency relays – negative sequence relays – static relays – microprocessor based relays.

UNIT - II APPARATUS PROTECTION 9

Apparatus protection – generator and transformer protection – protection of bus bars, transmission lines, CT's , PT's and their application in protective schemes.

UNIT - III THEORY OF CIRCUIT INTERRUPTION 9

Physics of arc phenomena and arc interruption. restriking voltage and Recovery voltage, rate of rise of recovery voltage, current chopping, interruption of capacitive current, resistance switching – DC circuit breaking.

UNIT - IV CIRCUIT BREAKERS 9

Switch gear – fault clearing process – interruption of current – Types of Circuit Breakers – Air blast, oil, SF6 and Vacuum circuit breakers – comparative merits of different circuit breakers – Testing of circuit breakers – Circuit breaker ratings.

UNIT – V PROTECTION AGAINST OVER VOLTAGES 9

Causes of over voltages – methods of protection against over voltages – ground wires, Peterson coil, surge absorbers, surge diverters – relay co-ordination – selection of protective system – Insulation co-ordination.

Lecture: 45, TOTAL: 45

Course Outcomes:

CO1 Knowledgeable in the field of power system protection and switchgear.
CO2 Ability to demonstrate and design the relevant protection systems for the elements in power systems.
CO3 Emphasis knowledge in the field of over voltages.
CO4 Implement the theory of circuit breakers in power system network.

	Programme Outcomes												Programme Specific Outcomes		
	a	b	c	d	e	f	g	h	i	j	k	l	PSO1	PSO2	PSO3
CO1	3												2	3	1
CO2	3	3				2			3				2	2	
CO3	3	3	2			2			3				3	3	3
CO4	3	2									3			1	

TEXT BOOKS

1 Sunil S.Rao, Switchgear and Protection, Khanna publishers, New Delhi, 2008.

2 Y.G.Paithankar and S.R.Bhide, Fundamentals of power system protection, Second Edition, Prentice Hall of India Pvt. Ltd., New Delhi , 2010.

3 Badri ram and Vishwakarma D N , "Power System Protection and Switchgear" Tata McGraw Hill Publishing Company Ltd. New Delhi , 2001.

REFERENCE BOOKS

1 B. Ravindranath, and N. Chander, 'Power System Protection & Switchgear', New Age Publishers, 1977.
2 M.L. Soni, P.V. Gupta, V.S. Bhatnagar, A. Chakrabarti, 'A Text Book on Power System Engineering', Dhanpat Rai & Co., 2008.
3 RavindraP.Singh, " Switchgear and Power System Protection " PHI Learning Private Ltd., New Delhi 2009.
4 C.L. Wadhwa, 'Electrical Power Systems', New Age International (P) Ltd., 2005.

Chairman, Board of Studies
Faculty of Electrical and Electronics Engineering (UG & PG)
Adhiyamaan College of Engineering (Autonomous)
Hosur - 635 109
Krishnagiri (Dt), Tamil Nadu.

Course Code	Course Title	Hours/week			Credits	Maximum Marks		
		L	T	P	C	CA	EA	Total
515EET05	TRANSMISSION AND DISTRIBUTION	3	0	0	3	50	50	100

Prerequisite Nil

OBJECTIVE

- To study the description and structure of power systems.
- To study the conventional technique transmission line parameters.
- To study the performance of transmission lines.
- To study the different types of cables and insulators
- To study the mechanical design of transmission line and distribution system

UNIT – I INTRODUCTION 9

Structure of electric power systems – Types of transmission systems: AC systems - DC systems- Advantages and disadvantages of AC and DC System-EHV AC transmission systems: Necessity for EHV Transmission-Merits and Demerits of EHV Transmission system-HVDC Transmission: Principle-Types of HVDC System- Merits and Demerits of HVDC Transmission system-comparison of HVDC and HVAC systems – Terminal equipment of HVDC Transmission line-FACTS (qualitative treatment only): TCSC, SVC, STATCOM, UPFC.

UNIT - II TRANSMISSION LINE PARAMETERS 9

Parameters of single and three phase transmission lines with single and double circuits: Resistance, inductance and capacitance– stranded and bundled conductors – symmetrical and unsymmetrical spacing – Transposition of conductors – self and mutual GMD – Skin and Proximity effect –Inductive interference with neighboring circuits.

UNIT – III PERFORMANCE OF TRANSMISSION LINES 9

Classification of lines: Short line, medium line and long line; equivalent circuits, Attenuation constant, phase constant, surge impedance; Transmission Efficiency and Voltage Regulation-Active and Reactive power flow in lines: Power-angle diagram; surge impedance loading, Ferranti effect - Factors Affecting corona loss -Advantages and Disadvantages of Corona-Methods of reducing corona effect.

UNIT - IV CABLES AND INSULATORS 9

Underground cables: General Construction of cable – Types of cables- Advantages of Underground cables- Insulation resistance of a cable – Capacitance of a single core and three core cables- Grading of cables– Capacitance and inter sheath grading

Insulators: Properties of insulators-Types of insulators for overhead lines – Voltage distribution in insulator string and grading -String Efficiency – Calculating string efficiency-Methods of improving string efficiency.

UNIT – V SUBSTATION AND DISTRIBUTION SYSTEMS 9

Calculations of Sag and Tension — Supports at different levels – Factor of Safety-Effect of wind and ice –Requirements of a Tower-Type of Towers.
Distribution system: Requirements of distribution system-Types of DC distribution system – Radial and Ring main system-Types of distributors with concentrated and distributed loads--Classification of Substations- selection of site and location for a substation- Equipment's for substations-Comparison between indoor and outdoor substation.

Lecture: 45, TOTAL: 45

Course Outcomes:

CO1 Understood the difference between the higher capacity AC and DC Lines
CO2 Ability to compare the different types of conductors and characteristics
CO3 Identify the transmission line systems for various ranges.
CO4 Gained the knowledge of the cables, the insulators and study of distribution system.

	Programme Outcomes												Programme Specific Outcomes		
	a	b	c	d	e	f	g	h	i	j	k	l	PSO1	PSO2	PSO3
CO1	3		2										1		2
CO2	3	2							2		1		3	2	
CO3	3				2		3						3	2	2
CO4	3	2											3		

TEXT BOOKS

1 Wadwa. C.L., "Electric Power Systems, Wiley Eastern Ltd", New Delhi 2001.
2 Metha.V.K, and RohitMetha, "Principles of Power System", S.Chand, 2005.

REFERENCE BOOKS

1 Luces M. Fualkenberry, Walter Coffer,"Electrical Power Distribution and Transmission",Pearson Education, 1996.
2 Despande.M.V, "Electrical Power Systems Design" , Tata McGraw Hill PublishingCompany, New Delhi, 1990
3 Stevenson.W.L., "Elements of Power System Analysis", McGraw Hill, New Delhi, 1999

Course Code	Course Name	Hours/Week			Credit	Maximum Marks		
		L	T	P	C	CA	EA	Total
515EOE01	COMMUNICATION THEORY	3	0	0	3	50	50	100

Prerequisite Nil

Course Objectives

- Understand working of various Amplitude modulation and demodulation systems.
- Explain about various Angle modulation and demodulation systems.
- Discuss transmitters and receivers of AM and FM
- Understand the mathematical representation of noise.
- Understand the effect of noise on the performance of AM and FM receivers.

Chairman, Board of Studies
Faculty of Electrical and Electronics Engineering (UG & PG)
Adhiyamaan College of Engineering (Autonomous)
Hosur - 635 109
Krishnagiri (Dt), Tamil Nadu.

UNIT I AMPLITUDE MODULATION 9

Analysis of an AM Signal Spectrum –Generation and Detection of DSB-FC waves- Square law Modulator, Square law detector, Envelope Detector- Generation and Detection of DSB-SC waves- Balanced Modulator, Ring Modulator, Coherent detection, Costas loop, Generation and Detection of SSB-SCwaves– Phase discrimination method, coherent detection, Generation and Detection of VSB Signals, Comparison of Amplitude modulation systems.

UNIT II ANGLE MODULATION 9

Phase modulation, Frequency modulation, Analysis of FM Signal Spectrum–Narrowband and wideband FM, Transmission Bandwidth of FM signals- Generation of FM signal – Direct FM ,Indirect FM, Demodulation of FM signals-Balanced slope Detector, Foster-Seeley Discriminator, PLL –Linear and non-linear model of PLL,FM stereo multiplexing .

UNIT III TRANSMITTERS AND RECEIVERS 9

Classification of Transmitters- Block diagram of AM broadcasting transmitters- Low level and high level transmitters- FM transmitters.

Classification of Receivers- Receiver Characteristics- Tuned Radio frequency receiver- Super heterodyne receiver- Block diagram of FM receiver- Automatic frequency control- Automatic gain control.

UNIT IV NOISE THEORY 9

Gaussian Process. Noise – Shot noise, Thermal noise and white noise; Noise temperature; Noise Figure- Noise Bandwidth –mathematical representation of noise-Frequency Domain Representation of Noise, Power Spectral Density -Effect of a Filter on the Power spectral density of noise- Narrow band representation of noise and its PSD.

UNIT V NOISE PERFORMANCE IN AM AND FM RECEIVERS 9

Noise in AM Systems: Calculation of Signal Power and Noise Power in SSB-SC, DSB-SC and DSB-C. Figure of Merit of Square law and Envelope Detection. Noise in FM system: Mathematical Representation of the operation of the Limiter, Discriminator, Calculation of SNR- Threshold in FM– Pre-emphasis and De-emphasis.

Lecture: 45, TOTAL: 45

Chairman, Board of Studies
Faculty of Electrical and Electronics Engineering (UG & PG)
Adhiyamaan College of Engineering (Autonomous)
Hosur - 635 109
Krishnagiri (Dt), Tamil Nadu.

Course Outcomes

CO 1 : Understand the modulation and its significance
CO 2: Analyze the different modulation systems
CO 3: Understand the working principle of AM and FM transmitters and receivers.
CO 4: Understand the frequency characteristics of noise and Calculate and analyze noise performance in various receivers.

	Programme Outcomes												Programme Specific Outcomes		
	a	b	c	d	e	f	g	h	i	j	k	l	PSO1	PSO2	PSO3
CO1	3	2						1		2			3		
CO2	3	2											3	3	2
CO3	3	3				3		1		2			3	3	2
CO4		2		2									3	2	
CO5	3					3		2				2			

Text Books

1. Herbert Taub& Donald L Schilling – Principles of Communication Systems (3rd Edition) Tata McGraw Hill, 2008.
2. Simon Haykin, "Communication systems", Willey Publication, New Delhi, 2011.
3. Kennedy G, "Electronic communication systems" Tata McGraw Hill, New Delhi, 2009.

Reference Books

1. John G. Proakis, MasoudSalehi, Fundamentals of Communication Systems, Pearson Education, 2006.
2. B.P.Lathi, Modern Digital and Analog Communication Systems, Third Edition, Oxford Press,2007.
3. P.Ramakrishnarao, "Communication Systems", Published by McGraw Hill Education, 2013

Chairman, Board of Studies
Faculty of Electrical and Electronics Engineering (UG & PG)
Adhiyamaan College of Engineering (Autonomous)
Hosur - 635 109
Krishnagiri (Dt), Tamil Nadu.

Course Code	Course Title	Hours/week			Credits	Maximum Marks		
		L	T	P	C	CA	EA	Total
515EEP07	ELECTRICAL MACHINES LABORATORY – II	0	0	4	2	50	50	100

Prerequisite: Nil

Objectives:

To study the various characteristics of AC machines experimentally.

LIST OF EXPERIMENTS

1 Regulation of three-phase alternator by EMF and MMF methods.

2 Load test on three-phase alternator.

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 squirrel cage induction motor.

6 Load test on three-phase slip ring induction motor.

7 No load and blocked rotor test on three-phase induction motor.

8 Separation of No-load losses of three-phase induction motor.

9 Load test on single-phase induction motor

10 Determination of Equivalent circuit of single-phase induction motor

Practical= 60 Total = 60

Course Outcomes

CO1 Ability to interpret and connect circuits of synchronous generators and motors.

CO2 Develops a knowledge and ability to analyze and specify motors for use in varying applications.

CO3 Gaining practical experience in starting, speed control and testing of three-phase induction motors.

CO4 Interpret the performance of single phase induction motor.

	Programme Outcomes												Programme Specific Outcomes		
	a	b	c	d	e	f	g	h	i	j	k	l	PSO1	PSO2	PSO3
CO1	3	3											1	1	
CO2	2	3			3	3						1	3	2	2
CO3	2	3	3		3					1			2	2	1
CO4		3										1	2	1	

Chairman, Board of Studies
Faculty of Electrical and Electronics Engineering (UG & PG)
Adhiyamaan College of Engineering (Autonomous)
Hosur - 635 109
Krishnagiri (Dt), Tamil Nadu

Course Code	Course Title	Hours/week			Credits	Maximum Marks		
		L	T	P	C	CA	EA	Total
515EEP08	MICROPROCESSORS AND MICROCONTROLLERS LABORATORY	0	0	4	2	50	50	100

Pre – Requisite: Knowledge of Microprocessor and Microcontrollers is required

COURSE OBJECTIVE:

- To study the 8085 microprocessor, 8051 microcontroller kit
- To perform the arithmetic operation, code conversion of 8085 using microprocessor kit .
- To acquire the knowledge about Interfacing Experiments
- To acquire the knowledge about Programming with control instructions.
- To explore the Programming in 8051.

LIST OF EXPERIMENTS

1. Programming for 8/16 bit Arithmetic operations Using 8085 Addition / subtraction / multiplication / division.
2. Programming with control instructions Using 8085 Increment / Decrement,Ascending / Descending.
3. Programming with control instructions Using Maximum / Minimum of numbers.
4. Code conversions using 8085: Hex. / ASCII / BCD code conversions.
5. Interface Experiments: - A/D Interfacing.
6. Interface Experiments: - D/A Interfacing.
7. Key board interfacing using 8279 with 8085.
8. Programming for 8/16 bit Arithmetic operations Using 8051 Addition / subtraction / multiplication / division.
9. Programming- Arithmetic operations Using 8086 Addition / subtraction / multiplication / division.
10. Programming with control instructions Using 8086 Increment / Decrement, Ascending / Descending order, Maximum / Minimum of numbers, Rotate instructions, Hex. / ASCII / BCD code conversions.
11. Interfacing and Programming of Traffic light controller using 8085.
12. Interfacing and Programming of Stepper Motor control using 8085.

Practical= 60 Total = 60

Chairman, Board of Studies
Faculty of Electrical and Electronics Engineering (UG & PG)
Adhiyamaan College of Engineering (Autonomous)
Hosur 635 109
Krishnagiri (Dt), Tamil Nadu.

COURSE OUTCOMES:

CO1 Develop the code for simple arithmetic circuits in assembly language.

CO2 Implement the developed code using 8085 processors and 8051 controllers.

CO3 Interface the peripherals with microprocessor and micro controller.

CO4 Acquire the knowledge about direct addressing, Bit addressing and Implement the Programming in 8051.

	Programme Outcomes												Programme Specific Outcomes		
	a	b	c	d	e	f	g	h	i	j	k	l	PSO1	PSO2	PSO3
CO1	3	2	1						2				2		
CO2	2								2				2	3	1
CO3	2	1							2			2	2	2	
CO4	2	1										2	2		

Chairman, Board of Studies
Faculty of Electrical and Electronics Engineering (UG & PG)
Adhiyamaan College of Engineering (Autonomous)
Hosur - 635 109
Krishnagiri (Dt), Tamil Nadu.

Course Code	Course Title	Hours/week			Credits	Maximum Marks		
		L	T	P	C	CA	EA	Total
515EEP09	DIGITAL ELECTRONICS LABORATORY	0	0	4	2	50	50	100

Objectives:

1. To design an experiment, to produce various logical outputs
2. To study the output of code converters, shift registers, counters
3. To study the output of multiplexers and De-multiplexers
4. To study the output of synchronous sequential circuits

LIST OF EXPERIMENTS

1. (a).Verification of truth table for logic gates AND, OR, EXOR, NOT, NOR, NAND

   (b).Verification of Characteristic table for Flip-flops JK FF, RS FF, T FF
2. Design and Implementation of Half/Full Adder and Subtractor using basic logic gates.
3. Design and Implementation of 4 bit binary adder / Subtractor and BCD Adder.
4. Design and Implementation of 16 bit even parity generator and checker.
5. Design and Implementation of 2 bit magnitude comparator using logic gates.
6. Design and Implementation of Code converters using logic gates
   (a).BCD to Excess – 3 Code and vice-versa
   (b).Binary to Gray codes and vice-versa
7. Design and Implementation of Encoders and Decoders using logic gates and study of IC7445 and IC74147.
8. Design and implementation of BCD to 7 segment display using decoder IC.
9. Design and Implementation of Multiplexers and Demultiplexers using logic gates and study of IC7474150 and IC74154.
10. Construction and Verification of 4 bit 4-bit modulo synchronous Counters.
11. Design and Implementation of 3-bit synchronous up-counter, down-counter using MSI circuits.
12. Shift Registers: Design and implementation of 4-bit shift registers in SISO, SIPO, PISO, PIPO modes using suitable IC's.

Practical= 60 Total = 60

Course Outcomes:

CO1: Verification of digital logic circuits using digital IC's
CO2: Simplification of Boolean function and implementing those circuits practically.
CO3: Implementation of different combinational logic circuits using logic gates.
CO4: Implementation of synchronous and asynchronous sequential logic circuits using digital IC's

	Programme Outcomes												Programme Specific Outcomes		
	a	b	c	d	e	f	g	h	i	j	k	l	PSO1	PSO2	PSO3
CO1	3	2					3					1	3		2
CO2	3	2			2					1			2	2	
CO3	3	2							1			1	2		2
CO4	3						1								

Chairman, Board of Studies
Faculty of Electrical and Electronics Engineering (UG &
Adhiyamaan College of Engineering (Autonomous)
Hosur - 635 109
Krishnagiri (Dt), Tamil Nadu.

Course Code	Course Title	Hours/week			Credits	Maximum Marks		
		L	T	P	C	CA	EA	Total
615EET01	ELECTRICAL MACHINE DESIGN	3	1	0	4	50	50	100

Prerequisite: Electrical Machines – I, & Electrical Machines – II

Objectives:

- To provide sound knowledge about Reluctance and MMF calculations.
- To study the design calculations of armature and field systems for D.C. machines.
- To design core, yoke, windings and cooling systems of transformers.
- To design stator and rotor of induction machines and synchronous machines.

UNIT – I INTRODUCTION **12**

Major considerations in Electrical Machine Design – Limitations in design- Choice of Specific Electrical and Magnetic loadings – Fundamentals of magnetic circuit – Reluctance and MMF calculation for air gap and tooth – real and apparent flux density of rotating machines- Standard specifications.

UNIT - II DESIGN OF D.C. MACHINES **12**

Review of Constructional details - Output Equation – Main Dimensions – Selection of number of poles – Design of Armature – Design of commutator and brushes – design of field pole and coils – Design problems.

UNIT-III DESIGN OF TRANSFORMERS **12**

Review of Constructional details – Main Dimensions - KVA output equation for single and three phase transformers – Overall dimensions – design of yoke, core and winding for core and shell type transformers – Optimum designs - Temperature rise in Transformers – Design of Tank and cooling tubes of Transformers- Design problems.

UNIT-IV DESIGN OF THREE PHASE INDUCTION MOTORS **12**

Review of Constructional details - Output equation of Induction motor – Main dimensions – choice of specific loadings – Design of Length of air gap – Design of stator - Design of squirrel cage rotor and wound rotor – Depth of stator and rotor core- Design problems.

UNIT – V DESIGN OF SYNCHRONOUS MACHINES **12**

Review of Constructional details -Output equation – Main Dimensions -choice of specific loadings – Design of salient pole machines – Short circuit ratio – shape of pole face – Armature design – Slot dimensions – Estimation of air gap length – Design of rotor –Design of damper winding – Design of field winding – Design of turbo alternators- Design problems.

Lecture: 45, Tutorial: 15, TOTAL: 60

Course Outcomes:

CO1 Gain knowledge in the design procedures of various electrical machines.

CO2 Apply the concept of specific electric and magnetic loadings for the armature design of rotating machine.

CO3 Gain knowledge in design of various parameters of DC motors and transformers.

CO4 Gain knowledge in design of various parameter of AC machines

	Programme Outcomes												Programme Specific Outcomes		
	a	b	c	d	e	f	g	h	i	j	k	l	PSO1	PSO2	PSO3
CO1	3									3		1	2		
CO2	3	2								3			2	2	
CO3	3	2	3		2			1				1	3		
CO4		2					2						3		

Chairman, Board of Studies
Faculty of Electrical and Electronics Engineering (UG & PG)
Adhiyamaan College of Engineering (Autonomous)
Hosur - 635 109
Krishnagiri (Dt). Tamil Nadu.

TEXT BOOKS

1. Sawhney, A.K., 'A Course in Electrical Machine Design', Dhanpat Rai & Sons, New Delhi, Sixth Edition, 2009.

2. Sen, S.K., 'Principles of Electrical Machine Designs with Computer Programmes', Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi, Second Edition, 2011.

3. R.K. Agarwal, 'Principles of Electrical Machine Design', S.K.Kataria and Sons, Delhi, Fourth Edition, 2005.

REFERENCE BOOKS

1. V.N. Mittle and A. Mittle, 'Design of Electrical Machines', Standard Publications Distributors, Delhi, Fifth Edition, 2012.

2. Shanmugasundaram, A., Gangadharan G. and Palani R., "Electrical Machine Design Data Book", Wiley Eastern Ltd., New Delhi, 1979.

Chairman, Board of Studies
Faculty of Electrical and Electronics Engineering (UG & PG)
Adhiyamaan College of Engineering (Autonomous)
Hosur - 635 109
Krishnagiri (Dt), Tamil Nadu.

Course Code	Course Title	Hours/week			Credits	Maximum Marks		
		L	T	P	C	CA	EA	TOTAL
615EET02	POWER ELECTRONICS	3	0	0	3	50	50	100

Prerequisite: Electron Devices and circuits

Objectives:

1. To get an overview of different types of power semi-conductor devices and theirswitching characteristics.
2. To understand the operation, characteristics and performance parameters ofcontrolled rectifiers.
3. To study the operation, switching techniques and basic topologics of DC-DCswitching regulators.
4. To learn the different modulation techniques of pulse width modulated invertersand to understand the harmonic reduction methods.

UNIT – I POWER SEMI-CONDUCTOR DEVICES **09**

Construction, Principle of operation - Static and dynamic characteristics of Power diodes, SCR,TRIAC, GTO, power BJT, power MOSFET and IGBT – Types of power diodes – Two Transistor model of a thyristor – Turn on methods of thyristor-series and parallel operation of thyristor-Applications.

UNIT - II PHASE CONTROLLED CONVERTERS **09**

AC to DC converters: single phase and three phase converter with R, RL and RLE load – Estimation of RMS load voltage, RMS load current and input power factor – Dual converters –Effect of source impedance on the performance of converter: single phase and three phase converter-Applications.

UNIT - III DC TO DC CONVERTER **09**

DC to DC converters: Principle of Chopper operation – Time ratio control -step up choppers–classification of chopper configuration: Type A, B, C, D, E - Voltage, Current and load- commutated chopper- Forced Commutation and load Commutation-Applications.

UNIT - IV INVERTERS **09**

DC to AC converters: Inverters– Types: voltage source and current source inverters – singlephase bridge inverters – three phase bridge inverters :120 and 180 mode of operation-current source inverters : single phase capacitor commutated CSI - single phase Auto Sequentialcommutated CSI –PWM Inverter- Harmonic reduction – Applications.

UNIT - V CYCLOCONVERTER AND AC VOLTAGE REGULATOR **09**

Single phase to single phase cycloconverter - Step up and step down cycloconverter - three phase to single phase and three phase to three phase cycloconverter-AC voltage controller:Single phase voltage controller with R,RL Load-Three phase voltage controller- Applications: UPS – HVDC systems.

Lecture: 45, TOTAL: 45 HRS

Chairman, Board of Studies
Faculty of Electrical and Electronics Engineering (UG & PG)
Adhiyamaan College of Engineering (Autonomous)
Hosur - 635 109
Krishnagiri (Dt), Tamil Nadu.

Course Outcomes:

CO1 Gain knowledge on principles of operation on power semiconductordevices.
CO2 Understand the function of single phase and three phase converters.
CO3 Recognize the operation of choppers and inverters and.
CO4 Gain knowledge on principles of operation on cyclo converters and AC voltage regulators

	Programme Outcomes												Programme Specific Outcomes		
	a	b	c	d	e	f	g	h	i	j	k	l	PSO1	PSO2	PSO3
CO1	3								2				3	2	
CO2	3	2										2	1		3
CO3	3	2			2				2			2	2	2	
CO4	3	2										2	1		

TEXT BOOKS:

1 Rashid, M.H., 'Power Electronics - Circuits Devices and Applications', Prentice Hall ofIndia, 2001.
2 Singh.M.D and Kanchandani-'Power Electronics'-Tata McGraw-Hill & Hillpublication Company Ltd New Delhi-2002.
3 Vedam Subrahmanyam, "Power Electronics", New Age International (P) Limited, NewDelhi, 1996.

REFERENCE BOOKS:

1 Joseph Vithayathil, "Power Electronics", Mc Graw Hill series in electrical andComputer Engineering , USA., 1995
2 Dubey, G.K., Doradia, S.R., Joshi, A. and Sinha, R.M., 'Thyristorised PowerControllers', Wiley Eastern Limited, 1986.
3 Dr.P.S.Bimbhra, "Power Electronics", khanna Publishers.2010.
4 Philip T Krein, "Elements of Power Electronics", Oxford University Press, Inc., New York,2003

Chairman, Board of Studies
Faculty of Electrical and Electronics Engineering (UG & PG)
Adhiyamaan College of Engineering (Autonomous)
Hosur - 635 109
Krishnagiri (Dt), Tamil Nadu.

Course Code	Course Title	Hours/week			Credits	Maximum Marks		
615EET03	POWER SYSTEM ANALYSIS AND STABILITY	L	T	P	C	CA	EA	TOTAL
		3	1	0	4	50	50	100

Prerequisite: Numerical Methods &Transmission and Distribution

Objectives:

- To model the power system under steady state operating condition.
- To apply numerical methods to solve the power flow problem.
- To model and analyze the system under faulted conditions.
- To model and analyze the transient behavior of power system when it is subjected to afault.

UNIT – I INTRODUCTION **09**

Need for system planning and operational studies – basic components of a power system:- Single line diagram per unit analysis – Generator - transformer – transmission line and load representation for different power system studies.- Primitive network - construction of Y-bus using inspection and singular transformation methods – construction of Z-bus using building algorithm- Introduction to restructuring of power system.

UNIT - II POWER FLOW ANALYSIS **09**

Importance of power flow analysis in planning and operation of power systems - statement of power flow problem - classification of buses - development of power flow model in complex variables form and polar form - iterative solution using Gauss-Seidel method-Newton- Raphson method and Decoupled method –comparisons of three methods

UNIT - III FAULT ANALYSIS – BALANCED FAULTS **09**

Importance of short circuit analysis - assumptions in fault analysis - analysis using Thevenin's theorem –Z-bus building algorithm - fault analysis using Z-bus – computations of short circuit capacity, post fault voltage and currents.

UNIT - IV FAULT ANALYSIS – UNBALANCED FAULTS **09**

Introduction to symmetrical components – sequence impedances – sequence circuits of synchronous machine, transformer and transmission lines - sequence networks analysis of single line to ground, line to line and double line to ground faults using Thevenin's theorem and Z-bus matrix.

UNIT - V STABILITY ANALYSIS **09**

Importance of stability analysis in power system planning and operation - classification of power system stability - angle and voltage stability – Single Machine Infinite Bus (SMIB) system: Development of swing equation - equal area criterion - determination of critical clearing angle and time – solution of swing equation by modified Euler method and Runge-Kutta fourth order method.

Lecture: 45, TOTAL: 45 HRS

Course Outcomes:

CO1 Develop the knowledge about power System under steady state operating condition.
CO2 To apply efficient numerical methods to solve the power flow problem.
CO3 Understand the analysis of power systems under abnormal (or) fault conditions.
CO4 Analyze the transient behavior of power system when it is subjected to a fault.

Chairman, Board of Studies
Faculty of Electrical and Electronics Engineering (UG &
Adhiyamaan Colle

	Programme Outcomes												Programme Specific Outcomes		
	a	b	c	d	e	f	g	h	I	j	k	l	PSO1	PSO2	PSO3
CO1	3	2											1		
CO2	3	2						2		3		1	2	3	2
CO3	3	2		2		2							1	3	
CO4	3									3			3		

TEXT BOOKS:

1 John J. Grainger and Stevenson Jr. W.D., 'Power System Analysis', Tata McGraw Hill, 1st Edition, 2003.

2 Nagrath. I.J, Kothari. D.P, "Modern Power system Analysis", Tata McGraw Hill Pub. Co. Ltd., 4th Edition, 2011.

3 Hadi Saadat, 'Power System Analysis', Tata McGraw Hill Education Pvt. Ltd., Ne Delhi, 21st reprint 2010.

REFERENCE BOOKS:

1 Kundur P., 'Power System Stability and Control, Tata McGraw Hill Education Pvt. Ltd.,New Delhi, 10th reprint 2010.

2 Pai M A, 'Computer Techniques in Power System Analysis', Tata McGraw-Hill Publishing Company Ltd., New Delhi, Second Edition, 2007.

3 C.L. Wadhwa-Electrical Powersystems, Second edition, Wiley Eastern Limited, 1993.

4 Stagg, G.W. and El-Abaid, A. H. 'Computer Methods in Power System Analysis', McGraw-Hill International Book Company 1993.

Chairman, Board of Studies
Faculty of Electrical and Electronics Engineering (UG & PG)
Adhiyamaan College of Engineering (Autonomous)
Hosur - 635 109
Krishnagiri (Dt), Tamil Nadu.

Course Code	Course Title	Hours/week			Credits	Maximum Marks		
		L	T	P	C	CA	EA	Total
615EET04	HIGH VOLTAGE ENGINEERING	3	0	0	3	50	50	100

Prerequisite: Transmission and Distribution &Power Electronics

Objectives:

1. To understand the various types of over voltages in power system and protection methods.
2. Generation of over voltages in laboratories, Measurement of over voltages.
3. Nature of Breakdown mechanism in solid, liquid and gaseous dielectrics.
4. Discussion on commercial insulations and Testing of power apparatus and insulation coordination, testing of impulse, insulator, circuit breakers and productive devices.

UNIT – I **TRANSIENT OVERVOLATGES IN ELECTRIC POWER SYSTEMS** **9**

Natural causes of over voltages - Lightning phenomena - Over voltages due to switching surges –Characteristics of switching surges- control of over voltage due to switching- System faults and other abnormal conditions – Traveling waves on transmission lines.

UNIT - II **ELECTRICAL BREAKDOWN IN GASES, SOLIDS AND LIQUIDS** **9**

Ionization processes – Townsend's Criterion - Paschen's law - Streamer theory - Breakdown in non-uniform fields and corona discharges – Practical considerations in using gases for insulation purposes - Vacuum insulation. Conduction and breakdown in pure and commercial liquids. Intrinsic breakdown in solids - Electromechanical breakdown - Thermal breakdown - Breakdown in composite dielectrics.

UNIT – III **GENERATION OF HIGH VOLTAGES AND HIGH CURRENTS** **9**

Generation of high DC voltage, alternating voltages, impulse voltages and impulse currents – Tripping and control of Impulse Generators

UNIT - IV **MEASUREMENT OF HIGH VOLTAGES AND HIGH CURRENTS** **9**

Measurement of high DC voltages, high AC voltages and impulse voltages - Measurement of high DC currents, high AC currents and impulse currents - CRO for impulse voltage and current measurement - Digital techniques in high voltage measurement.

UNIT – V **HIGH VOLTAGE TESTING OF ELECTRICAL POWER APPARATUS** **9**

Testing of Insulator, Bushings, Isolators, Circuit breakers, Cables, Transformers, Surge Arresters – Partial Discharge measurement – Radio interference measurement – International and Indian Standards.

Lecture: 45, TOTAL: 45

Course Outcomes:

CO1 Gain knowledge in the fundamental concept of electric breakdown in liquids, solids and gases.

CO2 Extrapolate the production of various types of high voltages.

CO3 Familiar in non-destructive test techniques in high voltage engineering.

CO4 Outline the Indian and international standards for high voltage equipment testing.

Chairman, Board of Studies
Department of Electrical and Electronics Engineering (UG & PG)
Adhiyamaan College of Engineering (Autonomous)
Hosur - 635 109
Krishnagiri (Dt), Tamil Nadu.

	Programme Outcomes												Programme Specific Outcomes		
	a	b	c	d	e	f	g	h	i	j	k	l	PSO1	PSO2	PSO3
CO1	3	3	3	3	2		2					1	3	3	2
CO2	3	3	2	3	2							1	3	3	2
CO3	3	3	2	3	2							1	3	3	2
CO4	2	3	3	3	3							1	3	3	2

TEXT BOOKS

1. M.S. Naidu andV.Kamaraju, 'High Voltage Engineering', McGraw Hill, 5th Edition, 2013.
2. Kuffel, E , Zaengl, W.S and Kuffel.J, 'High Voltage Engineering Fundamentals', Pergamon Press, Oxford, London, 2nd Edition ,2000.

REFERENCE BOOKS

1. Kuffel, E and Abdullah, M., 'High Voltage Engineering', Pergamon Press, Oxford, 1970.
2. C.L. Wadhwa, "High voltage Engineering" New Age Publishers, 2010.

Course Code	Course Title	Hours/week			Credits	Maximum Marks		
		L	T	P	C	CA	EA	Total
615EEE04	ADVANCED POWER SEMICONDUCTOR DEVICES	3	0	0	3	50	50	100

OBJECTIVES :

1. To learn the overview of the power electronic devices and the operation of the Power diode.
2. To analyze and comprehend the various operating modes of different configurations of current controlled converters.
3. To understand the static and dynamic characteristics of voltage controlled power semiconductor devices
4. To enable the students for the selection of devices for different power electronics applications

UNIT I INTRODUCTION 9

Power switching devices overview – Attributes of an ideal switch, application requirements, circuit symbols; Power handling capability – (SOA); Device selection strategy – On-state and switching losses – EMI due to switching - Power diodes - Types, forward and reverse characteristics, switching characteristics – rating. Shottky Diode.

UNIT II CURRENT CONTROLLED DEVICES 9

BJT's – Construction, Device Physics, static characteristics, switching characteristics; Negative temperature co -efficient and secondary breakdown; Power Darlington -Thyristors – Physical and electrical principle underlying operation, Gate and switching characteristics; converter grade and inverter grade and other types; series and parallel operation; comparison of BJT and Thyristor –steady state and dynamic models of BJT & Thyristor- Comparisons of various thyristors

UNIT III VOLTAGE CONTROLLED DEVICES 9

Power MOSFETs and IGBTs – Principle of voltage controlled devices, construction, types, static and switching characteristics, steady state and dynamic models of MOSFET and IGBTs.

UNIT IV SPECIAL POWER DEVICES 9

Thyristors: GTOs – Construction, operation, steady state characteristics and switching characteristics. Construction and operation: BCTs, TRIAC, FET – CTHs, ETOs, IGCTs, MCTs, SITHs, ASCR, RCT, SCS and light activated thyristor– COOLMOS and SITs.

UNIT V THERMAL PROTECTION 9

Heat transfer – conduction, convection and radiation; Cooling – liquid cooling, vapour – phase cooling; Guidance for heat sink selection – Thermal resistance and impedance -Electrical analogy of thermal components, heat sink types and design – Mounting types.

Lecture : 45, TOTAL: 45

Chairman, Board of Studies
Faculty of Electrical and Electronics Engineering (UG & PG)
Adhiyamaan College of Engineering (Autonomous)
Hosur - 635 109
Krishnagiri (Dt), Tamil Nadu.

Course Outcomes:

CO1 Gained the knowledge of the power diodes and its types
CO2 Constructional details, static and switching characteristics of current controlled devices
CO3 Constructional details, static and dynamic model of voltage controlled devices
CO4 Elaborate knowledge about firing, protecting circuits and thermal protection

	Programme Outcomes												Programme Specific Outcomes		
	a	b	c	d	e	f	g	h	i	j	k	l	PSO1	PSO2	PSO3
CO1	3												3		2
CO2	2	2	1		3	2							3		2
CO3	2	2			3	3						1		3	
CO4	3	2						2					2		1

TEXT BOOKS

1. B.W Williams 'Power Electronics Circuit Devices and Applications' by McGrew Hill Publishers, Second edition, 1992

2. Rashid M.H., " Power Electronics Circuits, Devices and Applications ", Prentice Hall India, Fourth Edition, New Delhi, 2014.

REFERENCES

1 Kassakian J G et al, Principles of Power Electronics, Addison Wesley, 1991

2. MD Singh and K.B Khanchandani, "Power Electronics", Tata McGraw Hill, 2006.

3. Ned Mohan,T.MUndeland and W.P Robbin, "Power Electronics: converters, Application And design" John Wiley and sons. Wiley India edition, 2006

Chairman, Board of Studies
Faculty of Electrical and Electronics Engineering (UG & PG)
Adhiyamaan College of Engineering (Autonomous)
Hosur - 635 109
Krishnagiri (Dt), Tamil Nadu.

Course code	Course Title	Hours/week			Credits	Maximum Marks		
		L	T	P	C	CA	EA	Total
615EEE05	ELECTRICAL SAFETY,OPERATION REGULATIONS	3	0	0	3	50	50	100

OBJECTIVES

1. To bring general understanding of various electrical systems.
2. To understand practical considerations in their design and various roles of an Electrical Engineer in industry.
3. To learn aboput the safety and protection of various electrical systems.
4. To involve project feasibility, planning. Preparing and reading electrical drawings.

UNIT I CONCEPTS AND STATUTORY REQUIREMENTS 9

Introduction – electrostatics, electro magnetism, stored energy, energy radiation and electromagnetic interference – Working principles of electrical equipment-Indian electricity act and rules-statutory requirements from electrical inspectorate-international standards on electrical safety – first aid-cardio pulmonary resuscitation(CPR).

UNIT II ELECTRICAL HAZARDS 9

Primary and secondary hazards-shocks, burns, scalds, falls-human safety in the use of electricity. Energy leakage-clearances and insulation-classes of insulation-voltage classifications-excess energy- current surges-Safety in handling of war equipments-over current and short circuit current-heating effects of current-electromagnetic forces-corona effect-static electricity –definition, sources, hazardous conditions, control, electrical causes of fire and explosion-ionization, spark and arc ignition energy-national electrical safety code ANSI. Lightning, hazards, lightning arrestor, installation – earthing, specifications, earth resistance, earth pit maintenance.

UNIT III PROTECTION SYSTEMS 9

Fuse, circuit breakers and overload relays – protection against over voltage and under voltage – safe limits of amperage – voltage –safe distance from lines-capacity and protection of conductor-joints-and connections, overload and short circuit protection-no load protection-earth fault protection. FRLS insulation-insulation and continuity test-system grounding-equipment grounding-earth leakage circuit breaker (ELCB)-cable wires-maintenance of ground-ground fault circuit interrupter-use of low voltage-electrical guards-Personal protective equipment – safety in handling hand held electrical appliances tools and medical equipments.

UNIT IV SELECTION, INSTALLATION, OPERATION AND MAINTENANCE 9

Role of environment in selection-safety aspects in application - protection and interlock-self diagnostic features and fail safe concepts-lock out and work permit system-discharge rod and earthing devices- safety in the use of portable tools-cabling and cable joints-preventive maintenance-study of various level of authorized certificate for maintenance work.

UNIT V HAZARDOUS ZONES 9

Classification of hazardous zones-intrinsically safe and explosion proof electrical apparatus-increase safe equipment-their selection for different zones-temperature classification-grouping of gases-use of barriers and isolators-equipment certifying agencies.

Lecture:45, TOTAL: 45

Chairman, Board of Studies
Faculty of Electrical and Electronics Engineering (UG & PG)
Adhiyamaan College of Engineering (Autonomous)
Hosur - 635 109
Krishnagiri (Dt), Tamil Nadu.

Course Outcomes

CO1 Understand concept and statutory requirements

CO2 Elaborate knowledge about electrical hazards

CO3 Gained the knowledge of protection system

CO4 Understand selection, installation, operation and maintenance, hazardous zones.

	Programme Outcomes												Programme Specific Outcomes		
	a	b	c	d	e	f	g	h	i	j	k	l	PSO1	PSO2	PSO3
CO1	3	2											1		
CO2	2				2	1						2			2
CO3	3	2		2				1			3	2	2	2	
CO4	3		2												

TEXT BOOKS

1. Fordham Cooper, W., "Electrical Safety Engineering" Butterworth and Company, London, 1998.
2. Accident prevention manual for industrial operations, N.S.C., by Relink books Publishers, New Edition 2017.
3. Indian Electricity Act and Rules, Government of India-2013.

REFERENCES

1. Power Engineers – Handbook of TNEB, Sixth Edition, and Re printed 2011.
2. Martin Glov Electrostatic Hazards in powder handling, Research Studies Pvt.LTd., England, 1988.

Chairman, Board of Studies
Faculty of Electrical and Electronics Engineering (UG & PG)
Adhiyamaan College of Engineering (Autonomous)
Hosur - 635 109
Krishnagiri (Dt), Tamil Nadu

Course Code	Course Title	Hours/week			Credits	Maximum Marks		
		L	T	P	C	CA	EA	Total
615EEP07	POWER ELECTRONICS LABORATORY	0	0	4	2	50	50	100

Prerequisite: Nil

Objectives:

To study the characteristics and applications of power switching devices through experimentally

LIST OF EXPERIMENTS

1. VI and Switching characteristics of SCR and TRIAC.
2. VI and Switching characteristics of MOSFET and IGBT.
3. Single phase and Three phase half controlled Rectifiers.
4. Single phase and Three phase fully controlled Rectifiers
5. Step up and step down chopper.
6. Single phase IGBT inverter.
7. Three phase IGBT inverter.
8. Voltage and current commutated chopper.
9. Single phase AC voltage controllers.
10. Single-phase cycloconverter.
11. Simulation of Single phase and Three phases fully controlled Rectifiers.
12. Simulation of Single phase and Three phase half controlled Rectifiers

Practical= 60 Total = 60

Course Outcomes:

CO1 Ability to describe about modern power semiconductors and their control.

CO2 Measure and experimentally quantify steady state and transient characteristics of power converters.

CO3 Design and build complete converters, choppers and inverters.

CO4 Obtain the variable output voltage using AC voltage controller.

	Programme Outcomes												Programme Specific Outcomes		
	a	b	c	d	e	f	g	h	i	j	k	l	PSO1	PSO2	PSO3
CO1	3				3								1	2	
CO2	3	2						2			2		3	2	
CO3	3	2	2		2		2					2	2		3
CO4	3	2			2					2			2		

Chairman, Board of Studies
Faculty of Electrical and Electronics Engineering (UG & PG)
Adhiyamaan College of Engineering (Autonomous)
Hosur - 635 109
Krishnagiri (Dt), Tamil Nadu.

Course Code	Course Name	L	T	P	C	CA	EA	Total
615EEP08	EMPLOYABILITY SKILLS LABORATORY	0	0	4	2	50	50	100

Pre – Requisite: Technical English - I&Technical English - II

COURSE OBJECTIVE:

- To enhance the employability skills of students with a special focus on Presentation skills, Group discussion skills and Interview skills
- To help them improve their soft skills, including report writing, necessary for the workplace situations

LIST OF EXPERIMENTS

1. Making presentations – introducing oneself – introducing a topic – answering questions – individual presentation practice
2. Creating effective PPTs – presenting the visuals effectively
3. Using appropriate body language in professional contexts – gestures, facial expressions, etc.
4. Preparing job applications - writing covering letter and résumé
5. Applying for jobs online - email etiquette
6. Participating in group discussions – understanding group dynamics – brainstorming the topic
7. Training in soft skills - persuasive skills – People skills - questioning and clarifying skills – mock GD
8. Writing Project proposals – collecting, analyzing and interpreting data / drafting the final report
9. Attending job interviews – answering questions confidently
10. Interview etiquette – dress code – body language – mock interview

TOTAL:60

COURSE OUTCOMES:

1. Enhancing the employability skills of students with a special focus on Presentation skills, Group discussion skills and Interview skills
2. Improving their soft skills, including report writing, necessary for the workplace situations
3. Creating effective PPTs and presenting the visuals effectively
4. Writing Project proposals – collecting, analyzing and interpreting data / drafting the final report

REQUIREMENTS FOR A CLASS OF STUDENTS

1. A PC or a lap top with one or two speakers
2. A Collar mike and a speaker
3. An LCD projector and a screen
4. CD's and DVD's on relevant topic

Chairman, Board of Studies
Faculty of Electrical and Electronics Engineering (UG & PG)
Adhiyamaan College of Engineering (Autonomous)
Hosur - 635 109
Krishnagiri (Dt), Tamil Nadu.

Course Code	Course Title	Hours/week			Credits	Maximum Marks		
		L	T	P	C	CA	EA	Total
615EEP09	ELECTRONIC SYSTEM DESIGN LABORATORY	0	0	4	2	50	50	100

AIM

To design & fabricate electrical and electronics circuits

OBJECTIVE

To make the students to learn the design procedures and fabrication techniques of small electrical & electronics circuits.

LIST OF EXPERIMENTS

1. Design and Fabrication of 5V Constant Voltage Power supply
2. Design and Fabrication of 0-12 V, 1A Variable Power Supply
3. Design and Fabrication of Driver Circuit to drive an Electromagnetic relay using Microprocessor with required Protection.
4. Design and Fabrication of an isolation circuit using opto coupler which is required for Microcontroller interfacing
5. Design and Fabrication of Domestic UPS
6. Sound operated timer circuit
7. Motion Detector Using NE555 Timer
8. Smart Cellphone Guard
9. Optical smoke alarm
10. Automatic Anchor Light
11. Generating PWM Using 555 Timer IC

PRACTICAL: 60 TOTAL : 60

Course Outcomes:

CO1	Able to design power supply units.
CO2	Able to design driver circuit for relay.
CO3	Able to design and fabricate opto-coupler and timer IC based circuits.
CO4	Capable of designing domestic Kits for different applications.

	Programme Outcomes												Programme Specific Outcomes		
	a	b	c	d	e	f	g	h	i	j	k	l	PSO1	PSO2	PSO3
CO1	3												2		2
CO2	3	2							2				3	1	2
CO3	3		2			3		2			2		3	1	2
CO4	3	2											2	1	

Chairman, Board of Studies
Faculty of Electrical and Electronics Engineering (UG & PG)
Adhiyamaan College of Engineering (Autonomous)
Hosur - 635 109
Krishnagiri (Dt), Tamil Nadu.

Department of Electrical and Electronics Engineering

Course Code	Course Title	Hours/week			Credits	Maximum Marks		
		L	T	P	C	CA	EA	Total
711EET01	POWER SYSTEM OPERATION AND CONTROL	3	1	0	3	50	50	100

Prerequisite: Transmission and Distribution & Power System Analysis and Stability

Objectives:

1. To get an overview of system operation and control.
2. To understand & model power-frequency dynamics and to design power-frequency controller.
3. To understand & model reactive power-voltage interaction and different methods of control for maintaining voltage profile against varying system load.

UNIT – I **INTRODUCTION** **12**

System load variation: System load characteristics, load curves - daily, weekly and annual, load-duration curve, load factor, diversity factor. Reserve requirements: Installed reserves, spinning reserves, cold reserves, hot reserves. Overview of system operation: Load forecasting, unit commitment, load dispatching. Overview of system control: Governor control, LFC, EDC, AVR, system voltage control, security control.

UNIT – II **SYSTEM CONTROL – REAL POWER – FREQUENCY CONTROL** **12**

MW – frequency interaction – load-frequency mechanism – load frequency control – Q- IVI control – interaction between P – f and Q - IVI channels – Basic control loops Fundamentals of speed governing – Transfer function model – speed governing system – Turbo generator - Static response – Feedback control – static and dynamic response of ALFC – secondary ALFC loop AGC in isolated power systems - AGC in interconnected power systems – Two area system – modeling of tie line – representation of two area system – static and dynamic response – tie line bias control - Frequency bias tie line control - Basis for selection of bias

UNIT – III **SYSTEM CONTROL – REACTIVE POWER – VOLTAGE CONTROL** **12**

Reactive power and voltage control - Production and absorption of reactive power - Methods of voltage control - Shunt reactors, Shunt capacitors, Series capacitors, synchronous condensers - Static VAR Systems - Types of SVC - Application of Static VAR compensators Excitation systems requirements - Elements of an excitation system - Types of excitation systems - DC, AC, Static and recent developments and future trends – Modeling of exciter, generator – static performance – dynamic performance – AVR root loci

UNIT – IV **SYSTEM OPERATION** **12**

System load forecasting – components of system load – classification of base load - forecasting the base load – forecasting procedure Economic dispatch – Incremental cost curve, co-ordination equations without loss and with loss, solution by direct method and λ-iteration method. (No derivation of loss coefficients.) Base point and participation factors. Economic dispatch controller added to LFC.

Statement of Unit Commitment (UC) problem; constraints in UC: spinning reserve, thermal unit constraints, hydro constraints, fuel constraints and other constraints; UC solution methods: Priority-list methods, forward dynamic programming approach, numerical problems only in priority-list method using full-load average production cost.

UNIT – V **COMPUTER CONTROL OF POWER SYSTEMS** **12**

Energy control center: Functions – Monitoring, data acquisition and control. System hardware configuration – SCADA and EMS functions: Network topology determination, state estimation, security analysis and control. Various operating states: Normal, alert, emergency, in-extremis and restorative.

Lecture : 45, Tutorial : 15, TOTAL : 60

Chairman, Board of Studies
Faculty of Electrical and Electronics Engineering (UG & P
Adhiyamaan College of Engineering (Autonomous)
Hosur - 635 109
Krishnagiri (Dt), Tamil Nadu.

Course Outcomes:

CO1 Outline the planning and control of power system.
CO2 Develop the mathematical model of single area and two area load frequency control for static and dynamic analysis.
CO3 Determine the economic dispatch of the generating units with loss and without loss case.
CO4 Use SCADA and EMS for monitor and controlling the power system.

TEXT BOOKS

1 O.I.Elgerd - Electrical Energy System Theory : An introduction - Tata McGraw Hill Publication, 2003 second Edition.
2 PrabhaKundur - Power System stability and control - EPRI Series - McGraw Hill Inc., 2004

REFERENCE BOOKS

1 PSR Moorthy - Power System Operation & Control, Tata McGraw Hill publication,1992
2 Dr S Mukhopadhyaya - Modern power system control and operation, Roorkee Publishing House, Roorkee, 1983Edition
3 HadiSaadat, Power system analysis, WCB, McGraw Hill International Edition, 2002

Chairman, Board of Studies
Faculty of Electrical and Electronics Engineering (UG & PG)
Adhiyamaan College of Engineering (Autonomous)
Hosur - 635 109
Krishnagiri (Dt), Tamil Nadu.

Department of Electrical and Electronics Engineering

Course Code	Course Title	Hours/week			Credits	Maximum Marks		
		L	T	P	C	CA	EA	Total
711EET02	ELECTRIC DRIVES AND CONTROL	3	1	0	3	50	50	100

Prerequisite: Microprocessors and Microcontrollers & Power Electronics

Objectives:

1. To understand the stable steady-state operation and transient dynamics of a motor-load system and analyze the operation of the converter / chopper fed dc drive and to solve simple problems.
2. To study and understand the operation of both classical and modern induction motor drives and synchronous motor drive
3. To learn the basics of permanent magnet synchronous motor drives and to analyze digital control for a drive and various applications.

UNIT – I CHARACTERISTICS OF ELECTRIC DRIVES 12

Electric drives: introduction, types, advantage, choice. Speed - Torque characteristics of various types of drive motors- dynamics of electric drives. Selection of power rating for drive motors with regard to thermal overloading and load variation factors – Classes of duty and selection of motor-load equalization – Starting, braking, and reversing operations.

UNIT - II DC DRIVES 12

Speed control of DC motors - Ward - Leonard scheme - drawbacks - Thyristor converter fed dc drives: - Single, two and four quadrant operations - Chopper fed DC drives : - Time ratio control and current limit control - Single, two and four quadrant operations - Effect of ripples on the motor performance.

UNIT - III THREE PHASE INDUCTION MOTOR DRIVES 12

Speed control of three phase Induction Motors - Stator control: Stator voltage and frequency control - AC chopper, Inverter and cycloconverter fed Induction Motor drives, rotor control - Rotor resistance control and slip power recovery schemes - Static control of rotor resistance using DC chopper - Static Krammer and Scherbius drives – Introduction to Vector Controlled Induction Motor Drives

UNIT - IV THREE PHASE SYNCHRONOUS MOTOR DRIVES 12

Speed control of three phase Synchronous Motors - True synchronous and self-controlled modes of operation - Inverter fed Synchronous Motors – Commutator-less DC motors - cycloconverter fed Synchronous Motor - Effect of harmonics on the performance of AC motors

UNIT - V DIGITAL CONTROL AND DRIVE APPLICATIONS 12

Digital techniques in speed control - Advantages and limitations – Microprocessor/ Microcontroller based separately excited dc motor drive and field oriented control of a CSI fed induction motor and PLC based control of drives - Selection of drives and control schemes for Steel rolling mills, Paper mills, Lifts and Cranes.

Lecture : 45, Tutorial : 15, TOTAL : 60

Course Outcomes:

CO1 Understand the stable steady-state operation and transient dynamics of a motor-load system.
CO2 Analyse the steady state behaviour of converter fed DC drive.
CO3 Explain the speed control of induction motor drives.
CO4 Justify the relevant drive system for a given application with given specifications.

TEXT BOOKS

Chairman, Board of Studies
Faculty of Electrical and Electronics Engineering (UG & PG)
Adhiyamaan College of Engineering (Autonomous)
Hosur - 635 109
Krishnagiri (Dt), Tamil Nadu.

1 VedamSubramanyam, "Electric Drives: Concepts and Applications", Tata McGraw hill Pvt. Ltd, New Delhi, 2002.
2 Dubey G.K., "Fundamentals of Electrical Drives", Narosa Publishing House, New Delhi, 2003.

REFERENCE BOOKS

1 Bose, B.K., "Power Electronics and Variable frequency Drives – Technology and Applications", IEEE, Press, Inc. New York, 1997.
2 Bose, B.K., "Modern Power Electronics and AC Drives", Pearson Education (Singapore) Pvt.. Ltd, New Delhi, 2003
3 Ion Boldea and S. A. Nasar", Electric Drives", CRC Press LLC, New York, 1999.
4 Krishnan R, "Electric Motor Drives: Modeling, Analysis and Control, Prentice Hall of India, Pvt. Ltd, New Delhi, 2002.

Chairman, Board of Studies
Faculty of Electrical and Electronics Engineering (UG & PG)
Adhiyamaan College of Engineering (Autonomous)
Hosur - 635 109
Krishnagiri (Dt), Tamil Nadu.

Department of Electrical and Electronics Engineering

Course Code	Course Title	Hours/week			Credits	Maximum Marks		
	SPECIAL	L	T	P	C	CA	EA	Total
711EET03	ELECTRICAL MACHINES	3	0	0	3	50	50	100

Prerequisite: Microprocessors and Microcontrollers & Electrical Machines – I & II

Objectives:

To impart knowledge on

1. Construction, principle of operation and performance of permanent magnet synchronous motors.
2. Construction, principle of operation and performance of permanent magnet brushless D.C. motors and synchronous reluctance motors
3. Construction, principle of operation and performance of switched reluctance motors and stepping motors.

UNIT – I **PERMANENT MAGNET SYNCHRONOUS MOTORS** **09**

Permanent Magnet Motors – Classifications – PMSM - Principle of operation – EMF and torque equations – Reactance – Phasor diagram – Power controllers - Converter - Volt- ampere requirements – circle diagram and torque / speed characteristics - Microprocessor based control. Slotless motors. Numeric problems.

UNIT - II **PERMANENT MAGNET BRUSHLESS D.C. MOTORS** **09**

Necessity for brushless DC. Principle of operation – Types. Three phase unipolar and bipolar driven motors. Rotor position detection. Elimination of dead points. Magnetic circuit analysis – EMF and torque equations – Power controllers – torque /speed characteristics and control. Computer simulation. Numeric problems.

UNIT – III **SYNCHRONOUS RELUCTANCE MOTORS** **09**

Constructional features – Types –rotor design. Operating principle – Reluctance – Phasor diagram - torque /speed characteristics. Vernier motor- constructional features, working principle and characteristics- design of vernier motor.

UNIT - IV **SWITCHED RELUCTANCE MOTORS** **09**

Constructional features – Principle of operation – poles, phases and winding- static torque production – Analysis - converter circuits. Control: current regulation, commutation. Torque / speed characteristics Microprocessor based control. Numeric problems.

UNIT - V **STEPPING MOTORS** **09**

Constructional features – Principle of operation – Variable reluctance motor – Hybrid motor – Single and multi stack configurations – Theory of torque production – Linear and non-linear analysis – static and dynamic characteristics – Drive circuits – Microprocessor based control. Numeric problems.

Lecture: 45,Tutorial : 0, TOTAL: 45

Course Outcomes:

CO1 Classify and explain the working of PMSM.
CO2 Apply control techniques to permanent magnet brushless DC motors.
CO3 Analyse the performance of switched reluctance motor and synchronous reluctance motor.
CO4 Categorise the stepping motors and analyse their performance.

TEXT BOOKS

1 T.J.E. Miller, 'Brushless Permanent Magnet and Reluctance Motor Drives', Clarendon Press, Oxford, 1989.

2 T. Kenjo and S. Nagamori, 'Permanent Magnet and Brushless DC Motors', Clarendon Press, London, 1988.

REFERENCE BOOKS

1 P.P. Aearnley, 'Stepping Motors – A Guide to Motor Theory and Practice', Peter Perengrinus, London, 1982.

2 T. Kenjo, 'Stepping Motors and Their Microprocessor Controls', Clarendon Press London, 1984.

Chairman, Board of Studies
Faculty of Electrical and Electronics Engineering (UG & PG)
Adhiyamaan College of Engineering (Autonomous)
Hosur - 635 109
Krishnagiri (Dt), Tamil Nadu.

Department of Electrical and Electronics Engineering

Course Code	Course Title	Hours/week			Credits	Maximum Marks		
		L	T	P	C	CA	EA	Total
711EET04	HIGH VOLTAGE ENGINEERING	3	0	0	3	50	50	100

Prerequisite: Transmission and Distribution & Power Electronics

Objectives:

1. To understand the various types of over voltages in power system and protection methods.
2. Generation of over voltages in laboratories, Measurement of over voltages.
3. Nature of Breakdown mechanism in solid, liquid and gaseous dielectrics – discussion on commercial insulants and Testing of power apparatus and insulation coordination

UNIT – I **TRANSIENT OVERVOLATGES IN ELECTRIC POWER SYSTEMS** **09**

Natural causes of over voltages - Lightning phenomena - Over voltages due to switching surges - System faults and other abnormal conditions – Traveling waves on transmission lines (lines terminated with open end, short circuited end, apparatus and cables)

UNIT - II **ELECTRICAL BREAKDOWN IN GASES, SOLIDS AND LIQUIDS** **09**

Classical gas laws - Ionization processes – Townsend's Criterion - Paschen's law - Streamer theory - Breakdown in non-uniform fields and corona discharges – Practical considerations in using gases for insulation purposes - Vacuum insulation. Conduction and breakdown in pure and commercial liquids. Intrinsic breakdown in solids - Electromechanical breakdown - Thermal breakdown - Breakdown in composite dielectrics.

UNIT - III **GENERATION OF HIGH VOLTAGES AND HIGH CURRENTS** **09**

Generation of high DC voltage, alternating voltages, impulse voltages and impulse currents – Tripping and control of Impulse Generators

UNIT - IV **MEASUREMENT OF HIGH VOLTAGE AND HIGH CURRENTS** **09**

Measurement of high DC voltages, high AC voltages and impulse voltages - Measurement of high DC currents, high AC currents and impulse currents - CRO for impulse voltage and current measurement - Digital techniques in high voltage measurement.

UNIT – V **HIGH VOLTAGE TESTING OF ELECTRICAL POWER APPARATUS** **09**

Testing of Insulator, Bushings, Isolators, Circuit breakers, Cables, Transformers, Surge Arresters – Tan Delta measurement – Partial Discharge measurement – Radio interference measurement – International and Indian Standards.

Lecture: 45, Tutorial: 0, TOTAL: 45

Course Outcomes:

CO1 Gain knowledge in the fundamental concept of electric breakdown in liquids, solids and gases.
CO2 Extrapolate the production of various types of high voltages.
CO3 Familiar in non-destructive test techniques in high voltage engineering.
CO4 Outline the Indian and international standards for high voltage equipment testing.

TEXT BOOKS

1 M.S. Naidu andV.Kamaraju, 'High Voltage Engineering', McGraw Hill, 2nd Edition, 1996.

2 Kuffel, E and Zaengl, W.S, 'High Voltage Engineering Fundamentals', Pergamon Press, Oxford, London, 1986.

REFERENCE BOOKS

1 Kuffel, E and Abdullah, M., 'High Voltage Engineering', Pergamon Press, Oxford, 1970.
2 C.L. Wadhwa, "High voltage Engineering" New Age Publishers, 2007.

Chairman, Board of Studies
Faculty of Electrical and Electronics Engineering (UG & PG)
Adhiyamaan College of Engineering (Autonomous)
Hosur - 635 109
Krishnagiri (Dt), Tamil Nadu.

Department of Electrical and Electronics Engineering

Course Code	Course Title	Hours/week			Credits	Maximum Marks		
		L	T	P	C	CA	EA	Total
711EEE01	VLSI DESIGN	3	0	0	3	50	50	100

Prerequisite: Nil

Objectives:

1. To introduce MOS theory / Manufacturing Technology, inverter / counter logic / stick / machine diagram / sequential circuits.
2. To study address / memory / arithmetic circuits and To introduce FPGA architecture / principles / system design
3. To get familiarised with VHDL programming behavioural/Structural/concurrent/ process

UNIT – I **MOS TRANSISTOR THEORY** **09**

Basic MOS Transistor- MOSFET Threshold Voltage-Enhancement and Depletion mode operation- Saturation and linear mode operation-CMOS Fabrication: P well, N Well and Twin Tub process – Sub micron technology

UNIT – II **MOS CIRCUIT DESIGN PROCESS** **09**

MOS Layers- Stick Diagrams- Design rules and layout –Sheet resistance –Area capacitance of layers –NMOS Inverter –CMOS inverter -Switching characteristics. Rise time. Fall time – Latch-up problem in CMOS Circuits.

UNIT – III **CMOS CIRCUIT AND LOGIC DESIGN** **09**

Pass Transistor and Transmission gates- NMOS and CMOS Logic gates- CMOS Combinational Logic Design-Clocked Sequential Logic Circuits

UNIT – IV **PROGRAMMABLE LOGIC DEVICES** **09**

Read Only Memory (ROM)- PLA, PAL- Complex Programmable Logic Devices (CPLD)- Field Programmable Logic Devices(FPGA)- Xilinx 4000 Series FPGA:CLB,I/O Blocks – FPGA Design Flow

UNIT – V **CIRCUIT DESIGN USING VHDL** **09**

EDA Tools – VHDL Code structures – Data types – concurrent code – sequential code – signals and variables – simple design examples

Lecture : 45, Tutorial : 0, TOTAL : 45

Course Outcomes:

CO1 Understand the fundamental principles of VLSI Design.
CO2 Understand the characteristics of MOS and CMOS circuits.
CO3 Demonstrate the design of Xilinx and FPGA.
CO4 Use EDA tools for circuit design using VHDL.

TEXT BOOKS

1 Douglas a. Pucknell andK.Eshragian., "Basic VLSI Design" 3rd Edition. Printice Hall India Pvt Ltd, 2000.
2 Volnei A Pedroni,"Circuit design with VHDL",Printice Hall India Pvt Ltd, 2005

REFERENCE BOOKS

1 Charles H Roth,"Digital System Design Using VHDL", PWS Publishing company.
2 Amar Murkherjee, "Introduction to NMOS and CMOS VLSI system design", Prentice Hall, 1986.
3 Navabi.Z., "VHDL analysis and modeling of digital systems", McGraw-Hill, 1983.
4 Randall L.Geiger and P.E.Allen, "VLSI design techniques for analog and digital circuits", McGraw-Hill Int., Co., 1990.

Chairman, Board of Studies
Faculty of Electrical and Electronics Engineering (UG & PG)
Adhiyamaan College of Engineering (Autonomous)
Hosur - 635 109
Krishnagiri (Dt), Tamil Nadu.

Department of Electrical and Electronics Engineering

Course Code	Course Title	Hours/week			Credits	Maximum Marks		
		L	T	P	C	CA	EA	Total
711EEP07	ELECTRIC DRIVES AND CONTROL LABORATORY	0	0	3	2	50	50	100

Prerequisite: Nil

Objectives:

1. To be familiar with the simulation of DC & AC drives,
2. To get the speed control and closed loop control of different machines using DSP processor.

LIST OF EXPERIMENTS

1	Simulation of closed loop control of converter fed dc motor
2	Simulation of closed loop control of chopper fed dc motor
3	Simulation of single phase full controlled bridge rectifier fed separately excited dc motor
4	Simulation of single phase semi controlled bridge rectifier fed separately excited dc motor
5	Simulation of three phase rectifier fed dc motor.
6	Simulation of VSI fed 3ϕ induction motor
7	Simulation of Closed Loop PWM Inverter Fed IM Drive
8	Simulation of Closed Loop Control Of PMSM By V/F/ Method
9	Simulation of speed control of BLDC motor
10	Simulation of switched reluctance motor drive
11	Simulation of stepper motor drive
12	Simulation of 3ϕ synchronous motor drive

Practical= 45 Total = 45

Course Outcomes:

CO1	Demonstrate the software tools used for simulation of drives.
CO2	Design and apply the speed control for converter/chopper fed DC motor.
CO3	Design and apply the speed control for stepper motor.
CO4	Simulate the performance of three phase induction motor.

Chairman, Board of Studies
Faculty of Electrical and Electronics Engineering (UG & PG)
Adhiyamaan College of Engineering (Autonomous)
Hosur - 635 109
Krishnagiri (Dt), Tamil Nadu.

Department of Electrical and Electronics Engineering

Course Code	Course Title	Hours/week			Credits	Maximum Marks		
		L	T	P	C	CA	EA	Total
711EEP08	POWER SYSTEM SIMULATION LABORATORY	0	0	3	2	50	50	100

Prerequisite: Nil

Objectives:

1. To develop simple C programs for the following basic requirements:
   Formation of bus admittance and impedance matrices and network solution, Power flow solution of small systems using simple method, Gauss-Seidel

   P.F. method, Unit Commitment and Economic Dispatch.

2. To acquire experience in the usage of standard packages for the following analysis / simulation / control functions.
   Steady-state analysis of large system using NRPF and FDPF methods and Quasi steady-state (Fault) analysis for balanced and unbalanced faults.

   Transient stability simulation of multimachine power system and Simulation of Load-Frequency Dynamics and control of power system.

LIST OF EXPERIMENTS

1 Computation of Parameters and Modeling of Transmission Lines
2 Formation of Bus Admittance Matrices and Solution of Networks.
3 Formation of Bus Impedance Matrices and Solution of Networks.
4 Load Flow Analysis - I : Solution of Load Flow And Related Problems Using Gauss-Seidel Method
5 Solution of Load Flow and Related Problems Using Newton-Raphson
6 Solution of Load Flow and Related Problems Using Fast-Decoupled Methods
7 Fault Analysis
8 Transient and Small Signal Stability Analysis: Single-Machine Infinite Bus System
9 Transient Stability Analysis of Multi-machine Power Systems
10 Load – Frequency Dynamics of Single- Area and Two-Area Power Systems
11 Economic Dispatch in Power Systems.
12 Unit commitment using priority list method

Practical= 45 Total = 45

Course Outcomes:

CO1 Acquire experience in the usage of standard packages for the following analysis / simulation / control functions.
CO2 Ability to develop computer programs to perform load flow analysis on the power system.
CO3 Compute and model the transmission lines and analyze the generation control on power system using simulation tools.
CO4 Solve the transient stability problem in single machine infinite bus system.

Chairman Board of Studies
Faculty of Electrical and Electronics Engineering (UG & PG)
Adhiyamaan College of Engineering (Autonomous)
Hosur - 635 109
Krishnagiri (Dt), Tamil Nadu.

Department of Electrical and Electronics Engineering

Course Code	Course Title	Hours/week			Credits	Maximum Marks		
		L	T	P	C	CA	EA	Total
711EEP09	MINI PROJECT	0	0	3	2	50	50	100

Prerequisite: Nil

Objectives:

To make the students to learn the design procedures and fabrication techniques of small electrical & electronics circuits.

LIST OF AREAS

a. Power System

b. Power electronics

c. Electrical Machines

d. Instrumentation and control.

The mini project are implemented with following steps

- Problem Identification
- Project specifications
- Implementation (Hardware / Software / both)
- Testing and validation of the developed system.
- Consolidated report preparation

Practical= 45 Total = 45

Course Outcomes:

CO1 Identification of real time problems
CO2 Awareness of design methodologies & its implementation.
CO3 Implementing advanced simulation software techniques.
CO4 Able to produce a comprehensive report covering background information, literature survey, problem statement, project work details and conclusion.

Chairman, Board of Studies
Faculty of Electrical and Electronics Engineering (UG & PG)
Adhiyamaan College of Engineering (Autonomous)
Hosur - 635 109
Krishnagiri (Dt), Tamil Nadu.

Department of Electrical and Electronics Engineering

Course Code	Course Title	Hours/week			Credits	Maximum Marks		
		L	T	P	C	CA	EA	Total
811EET01	Electric Power Utilization and Energy Auditing	3	0	0	3	50	50	100

Prerequisite: Electrical Machines – I, II

Objectives:

To impart knowledge on

1. Principle and design of illumination systems and methods of heating and welding.
2. Electric traction systems and their performance.
3. Electrolytic process and storage of electricity.
4. Electrical energy conservation, energy auditing and power quality

UNIT – I ILLUMINATION **09**

Nature-of radiation –definition – laws of photometry – polar curves – lighting calculations-design of illumination systems (for residential, industrial, commercial and street lightings) - types of lamps-energy efficiency lamps – comparison with CFL and LED.

UNIT - II ELECTRIC HEATING AND WELDING **09**

Advantages of electric heating – Types of Heating - Resistance heating – Temperaturecontrol, Induction heating – induction furnace - Dielectric heating - Choice of voltage and frequencies for Dielectric heating –Welding - Equipment's for Welding - Resistance welding - Arc welding - Laser welding – Ultrasonic Welding-Introduction to TIG, MIG Welding.

UNIT - III ELECTRIC TRACTION **09**

Introduction – requirements of an ideal traction system – supply systems – mechanics of train movement – tractive effort – Specific energy consumption – traction motors and control – multiple units – braking methods - current collection systems-recent trends in electric traction-Introduction to EMU and metro railways.

UNIT - IV ELECTROLYTIC PROCESS AND STORAGE OF ELECTRICITY **09**

Electrolysis – Polarization factor – Preparation of work for electroplating – tanks and other equipment – Method of charging and maintenance – Nickel iron, Nickelcadmium and lithium ion batteries – components and materials – capacity rating of batteries – battery chargers.

UNIT - V ENERGY CONSERVATION **09**

Economics of generation – definitions – load curves – number and size of units – cost of electrical energy – tariff – need for electrical energy conservation-methods – energy efficient equipment – energy management – energy auditing – case study. Economics of power factor improvement – design for improvement of power factor using power capacitors – power quality – effect on conservation.

Lecture: 45, Tutorial: 0, TOTAL: 45

Course Outcomes:

CO1 Impart knowledge on Generation of electrical power by conventional, non–conventional methods.
CO2 Understand the principle and design of illumination systems and methods of heating and welding.
CO3 Attain the knowledge about Electric traction systems and their performance.
CO4 Determine the needs of energy conservation and implement conservation techniques.

TEXT BOOKS

1 S.L. Uppal, "Electrical Power", Khanna Publishers, 1988
2 E. Openshaw Taylor, "Utilization of Electrical Energy in SI Units" Orient Longman Private Limited, 2003.

REFERENCE BOOKS

1 M.L. Soni, P.V. Gupta, V.S. Bhatnagar, A. Chakrabarti, 'A Text Book on Power System Engineering', DhanpatRai& Co., 1998.
2 Utilization of Electrical Energy by JB Gupta, Kataria Publications, Ludhiana.
3 Albert Thumann, William J. Younger, "Hand Book of Energy Audits", The Fairmont Press, Inc., 2003.

Chairman, Board of Studies
Faculty of Electrical and Electronics Engineering (UG & PG)
Adhiyamaan College of Engineering (Autonomous)
Hosur - 635 109
Krishnagiri (Dt), Tamil Nadu.

Department of Electrical and Electronics Engineering

Course Code	Course Title	Hours/week			Credits	Maximum Marks		
		L	T	P	C	CA	EA	Total
811EEE01	ADVANCED POWER SEMICONDUCTOR DEVICES	3	0	0	3	50	50	100

Prerequisite: Nil

Objectives:

1. To impart knowledge on dynamic characteristics of power diode, BJT and FET devices.
2. To study about firing and protecting circuits of all power switches.

UNIT - I INTRODUCTION **(9)**

Power switching devices overview – Attributes of an ideal switch, application requirements, circuit symbols – Power handling capability – (SOA); Device selection strategy – On-state and switching losses – EMI due to switching – Power diodes – Types, forward and reverse characteristics, switching characteristics – rating.

UNIT - II CURRENT CONTROLLED DEVICES **(9)**

BJTs – Construction, static characteristics, switching characteristics- Negative temperature coefficient and secondary breakdown – Power Darlington – Thyristors – Physical and electrical principle underlying operating mode – Two transistor analogy– Effect of α and i_{co} on i_a – concept of latching – Gate and switching characteristics – Converter grade and inverter grade and other types; series and parallel operation – Comparison of BJT and Thyristor – Steady state and dynamic models of BJT and Thyristor.

UNIT - III VOLTAGE CONTROLLED DEVICES **(9)**

Power MOSFETs and IGBTs – Principle of voltage controlled devices, construction, types, static and switching characteristics – Steady state and dynamic models of MOSFET and IGBTs; Basics of GTO, MCT, FCT, RCT, TRIAC and IGCT.

UNIT - IV FIRING AND PROTECTING CIRCUITS **(9)**

Necessity of isolation – pulse transformer – opto-coupler; Gate drive circuit for SCR, MOSFET, IGBTs and base driving for power BJT, Gate drive circuits using microcontroller and PLL – overvoltage, over current and gate protections, Design of snubbers.

UNIT - V THERMAL PROTECTION **(9)**

Heat transfer – conduction, convection and radiation – Cooling – liquid cooling, vapour – phase cooling; Guidance for heat sink selection – Thermal resistance and impedance – Electrical analogy of thermal components, heat sink types and design – Mounting types.

Lecture: 45, Tutorial: 0, TOTAL: 45

Course Outcomes:

CO1 Analyse the characteristics of power semiconductor devices and identify their rating.
CO2 Identify the characteristics of voltage controlled devices.
CO3 Recognize the importance of over voltage, current and gate protections in power semiconductor devices.
CO4 Design and select the heat sink and mounting types.

TEXT BOOKS

Chairman, Board of Studies
Faculty of Electrical and Electronics Engineering (UG & PG)
Adhiyamaan College of Engineering (Autonomous)
Hosur - 635 109
Krishnagiri (Dt), Tamil Nadu.

1 B.W. Williams, "Power Electronics – Devices, Drivers, Applications and passive components", Macmillan, (2/e), 1992.

2 Rashid M.H., "Power Electronics circuits, Devices and Applications", Prentice Hall India, Third Edition, Newdelhi, 2004.

REFERENCE BOOKS

1. M.D. Singh and K.B.Khanchandani, "Power Electronics", Tata McGraw Hill, 2001.

2. Mohan, Undeland and Robins, "Power Electronics – Concepts, applications and design", John Wiley and sons, Singapore, 2000.

Chairman, Board of Studies
Faculty of Electrical and Electronics Engineering (UG & PG)
Adhiyamaan College of Engineering (Autonomous)
Hosur - 635 109
Krishnagiri (Dt), Tamil Nadu.

Department of Electrical and Electronics Engineering

Course Code	Course Title	Hours/week			Credits	Maximum Marks		
		L	T	P	C	CA	EA	Total
811EEE03	MEDICAL INSTRUMENTATION	3	0	0	3	50	50	100

Prerequisite: Nil

Objectives:

1. To provide an acquaintance of the physiology of the heart, lung, blood circulation and circulation respiration. Methods of different transducers used.
2. To introduce the student to the various sensing and measurement devices of electrical origin.
3. To provide the latest ideas on devices of non-electrical devices.
4. To bring out the important and modern methods of imaging techniques.
5. To provide latest knowledge of medical assistance / techniques and therapeutic equipment.

UNIT – I **BIO-POTENTIAL ELECTRODES AND RECORDERS** **09**

Introduction- Design of Medical instruments-Components of the bio-medical instrument system-Bio-potential Micro electrodes- Recording set up and Analysis: ECG, EEG, EMG and ERG-Recorders with high accuracy- recording devices.

UNIT - II **BIO-MEDICAL INSTRUMENTATION** **09**

Introduction - Blood cell counter- Radiation Detectors - colorimeter and photometer- Digital thermometer – X-Ray machine - Audio meter - Radiography and fluoroscopy – Image intensifier – Angiography – Applications of X-Ray examination.

UNIT – III **PHYSIOLOGICAL ASSIST DEVICES** **09**

Introduction – Pacemaker –Pacemaker batteries – Artificial heart valves - DC Defibrillators - Nerves and muscle stimulator -Heart lung machine, Artificial heart valves and kidney machine.

UNIT - IV **SPECIALISED MEDICAL EQUIPEMENT** **09**

Introduction – Electromagnetic blood flow meter- Ultrasonic blood flow meters – laser based Doppler blood flow meters – Cardiac output measurements – pulmonary function Analysers - Oxymeters.

UNIT – V **ADVANCES IN BIO-MEDICAL INSTRUMENTATION** **09**

Computer in medicine- Laser in medicine – Endoscopes – Thermograph - cryogenic surgery – Basic ideas: CT scanner, MRI and ultra scanner, Ultrasonic imaging system – Biofeedback Instrumentation.

Lecture: 45, Tutorial: 0, TOTAL: 45

Course Outcomes:

CO1 Identify the physiological parameters of various systems of human body.
CO2 Recognise the transducers used for the measurement of physiological parameters.
CO3 Design the different types of lead systems to record the waveforms.
CO4 Demonstrate the usage of assisting and therapeutic equipment

TEXT BOOKS

1 Leslie Cromwell, "Biomedical Instrumentation and measurement", Prentice hall of India, New Delhi, 1997.
2 John G. Webster, "Medical Instrumentation Application and Design", John Wiley and sons, New York, 1998.

REFERENCE BOOKS

1 Khandpur R.S, "Handbook of Biomedical Instrumentation", Tata McGraw-Hill, New Delhi, 1997.
2 Joseph J.carr and John M. Brown, "Introduction to Biomedical equipment technology", John Wiley and sons, New York, 1997.

Chairman, Board of Studies
Faculty of Electrical and Electronics Engineering (UG & PG)
Adhiyamaan College of Engineering (Autonomous)
Hosur - 635 109
Krishnagiri (Dt), Tamil Nadu.

Department of Electrical and Electronics Engineering

Course Code	Course Title	Hours/week			Credits	Maximum Marks		
		L	T	P	C	CA	EA	Total
811EEE10	RENEWABLE ENERGY SOURCES	3	0	0	3	50	50	100

Prerequisite: Nil

Objectives:

1. To understand the principle of working and the components of different non-conventional sources of energy and their utilization.
2. To get an exposure on the power plants working with non-conventional energy.

UNIT – I **INTRODUCTION** **07**

Energy Conservation and Energy Efficiency – Needs and Advantages, Different types of Renewable Energy Sources - Energy Resources Availability in World –Environmental aspects of energy utilization – Energy Conservation Act 2003 - Statistical Report on Renewable energy scenario in India - Applications.

UNIT - II **SOLAR ENERGY** **09**

Introduction to solar energy: solar radiation, availability, measurement and estimation – Solar thermal conversion devices and storage – solar cells and photovoltaic conversion – PV systems – MPPT. Applications of PV Systems – solar energy collectors and storages.

UNIT - III **WIND ENERGY** **09**

Introduction – Basic principles of wind energy conversion – wind data and energy estimation – site selection consideration – basic components of wind energy conversion system –Types of wind machines -Schemes for electric generations – generator control, energy storage – applications of wind energy – Inter connected systems

UNIT - IV **BIOMASS ENERGY** **11**

Biomass: Introduction, Biomass conversion technologies, photosynthesis, classification of biogas plants. Biomass direct combustion – Biomass gasifier Advantages & Drawbacks - Biogas plant – Ethanol production – Bio diesel. Cogeneration: steam turbine cogeneration systems, gas turbine cogeneration systems, reciprocating IC engine cogeneration systems, combined cycle cogeneration systems – Applications of Cogeneration in utility sector – Biomass applications.

UNIT - V **OTHER RENEWABLE ENERGY SOURCES** **09**

Tidal energy : Energy from tides: Basic principles of tidal power, component of tidal power plants, operation methods of utilization of tidal energy – Wave energy- Ocean waves, energy and power from the waves, wave energy conversion devices. Introduction, ocean thermal electric conversion (OTEC), methods of ocean thermal electric power generation, open cycle OTEC system, closed OTEC cycle. Geothermal energy and Fuel cells.

Lecture: 45, Tutorial: 0, TOTAL: 45

Course Outcomes:

CO1 Create awareness about the scenario of energy consumption and energy availability in India and world.

CO2 Understand the necessity and potential advantages of renewable energy resources like solar thermal and PV system over fossil fuels.

CO3 Understand the process of power generation using bio gas, wind energy and biomass.

CO4 Analyze the functioning of Geo thermal, ocean and small hydro plants.

TEXT BOOKS

1 G.D. Rai, Non-Conventional Energy Sources, Khanna Publishers, New Delhi, 2011.

2 S.P. Sukhatme, Solar Energy, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2003.

REFERENCE BOOKS

1 G.N. Tiwari, Solar Energy – Fundamentals Design, Modeling and applications, Narosa Publishing House, New Delhi, 2011.

Chairman, Board of Studies
Faculty of Electrical and Electronics Engineering (UG & PG)
Adhiyamaan College of Engineering (Autonomous)
Hosur - 635 109
Krishnagiri (Dt), Tamil Nadu.

Department of Electrical and Electronics Engineering

Course Code	Course Title	Hours/week			Credits	Maximum Marks		
		L	T	P	C	CA	EA	Total
811EEP04	PROJECT VIVA-VOCE	0	0	9	11	50	50	100

Prerequisite: Nil

Objectives:

1. To enable the students to work in convenient groups of not more than four members in a group, on a project involving some design and fabrication work or theoretical and experimental studies related to the Electrical and Electronics Engineering discipline.

Every project work shall have a Guide who is a member of the faculty. Twelve periods per week shall be allotted in the time table for this important activity and this time shall be utilized by the students to receive directions from the Guide, on library reading, laboratory work, computer analysis, or field work as assigned by the Guide and also to present in periodical seminars or viva to review the progress made in the project.

Each student shall finally produce a comprehensive report covering background information, literature – survey, problem statement, project work details, estimation of cost and conclusions. This final report shall be in typewritten form as specified in the guidelines.

The continuous assessment and semester evaluation is to be carried out as specified in the guidelines to be issued from time to time.

Practical= 135 Total = 135

Course Outcomes:

CO1 Identification of real time problems.
CO2 Awareness of design methodologies & its implementation.
CO3 Implementing advanced simulation software techniques.
CO4 Able to produce a comprehensive report covering background information, literature survey, problem statement, project work details and conclusion.

Chairman, Board of Studies
Faculty of Electrical and Electronics Engineering (UG & PG)
Adhiyamaan College of Engineering (Autonomous)
Hosur - 635 109
Krishnagiri (Dt), Tamil Nadu.