SETHU INSTITUTE OF TECHNOLOGY

Pulloor, Kariapatti – 626 115

B.E. Degree Programme

CURRICULUM

Regulations 2013

Bachelor of Engineering in Electrical and Electronics Engineering

OVERALL COURSE STRUCTURE

Category	Total No. of Courses	Credits	Percentage
Science & Humanities	**15**	**40**	**21**
Basic Engineering	**10**	**28**	**15**
Professional Subjects – CORE	**35**	**104**	**55**
Professional Subjects – ELECTIVE	**6**	**18**	**9**
TOTAL	**66**	**190**	**100**

COURSE CREDITS – SEMESTER WISE

BRANCH	I	II	III	IV	V	VI	VII	VIII	TOTAL
EEE	26	27	25	27	27	24	22	12	190

Semester I

Course Code	Course Title	L	T	P	C
THEORY					
01UEN101	Technical English – I	3	1	0	4
01UMA102	Engineering Mathematics I	3	1	0	4
01UPH103	Engineering Physics	3	0	0	3
01UCY105	Applied Chemistry *(common to **CSE, ICE, ECE, EEE, IT & EIE** branches)*	3	0	0	3
01UCS106	Computer Programming	3	0	0	3
01UME107	Engineering Graphics	2	0	3	4
PRACTICAL					
01UCS108	Computer Practice Laboratory –I	0	0	3	2
01UME109	Engineering Practices Laboratory	0	0	3	2
01UGS110	Physics & Chemistry Laboratory	0	0	2	1
	TOTAL	**17**	**2**	**11**	**26**
Total No. of Credits - 26					

Semester II

Course code	Course Title	L	T	P	C
THEORY					
01UEN201	Technical English – II	3	1	0	4
01UMA202	Engineering Mathematics – II	3	1	0	4
01UPH204	Applied Physics *(common to **CSE, ICE, ECE, EEE, IT & EIE** branches)*	3	0	0	3
01UCY204	Environmental Science	3	0	0	3
01UME205	Basic Civil and Mechanical Engineering	4	0	0	4
01UEE207	Electric Circuits	3	1	0	4
PRACTICAL					
01UEE208	Electric Circuits Laboratory	0	0	3	2
01UCS209	Computer Practice Laboratory – II	0	0	3	2
01UGS210	Physics & Environmental Science Laboratory	0	0	2	1
	TOTAL	**19**	**3**	**8**	**27**
Total No. of Credits - 27					

Semester III

Course Code	Course Title	L	T	P	C
THEORY					
01UMA321	Transforms and Partial Differential Equations (Common to ALL Branches)	3	1	0	4
01UEE302	DC ach nes and Tra sforme s	3	1	0	
01UEE303	Field Theory	3	0	0	3
01UEE304	Power Plant Engineering	3	0	0	3
01UEE305	Semiconductor Devices and Circuits	3	0	0	3
01UEE306	Digital Logic Circuits	3	1	0	4
PRACTICAL					
01UEE307	DC Machines and Transformers Laboratory	0	0	3	2
01UEE308	Semiconductor Devices and Circuits Laboratory	0	0	3	2
VALUE ADDED COURSE					
01UGS331	Value Education and Human Rights (Common to ALL Branches)	2	0	0	P/F
	TOTAL	**20**	**3**	**6**	**25**
Total No. of Credits - 25					

Semester IV

ourse code	Course Title	L	T	P	C
THEORY					
01UMA422	Numerical Methods (Common to ICE, EEE, CIVIL & EIE)	3	1	0	4
01UEE402	AC Machines	3	1	0	4
01UEE403	Transmission and Distribution	3	0	0	3
01UEE404	Analog Integrated Circuits (Common to ICE & EEE)	3	0	0	3
01UEE405	Electrical Measurements and Instrumentation	3	0	0	3
01UIT424	Data Structures and Algorithms (Common to ICE, EEE & EIE)	3	0	0	3
01UGS431	Qualitative and Quantitative Aptitude (Common to ALL Branches)	1	0	0	1
PRACTICAL					
01UEE408	AC achines Labo atory	0		3	2
01UIT429	Data Structures and Algorithms Laboratory (Common to ICE, EEE & EIE)	0	0	3	2
01UEE410	Digital and Analog Integrated Circuits Laboratory	0	0	3	2
	TOTAL	**19**	**2**	**9**	**27**
Total No. of Credits - 27					

Semester V

Course code	Course Title	L	T	P	C
THEORY					
01UEE501	Power Electronics	3	0	0	3
01UEE502	Control Systems	3	1	0	4
01UEE503	Power System Analysis	3	1	0	4
01UEE504	Microprocessors and Microcontroller Programming	3	0	0	3
01UEE505	Protection and Switch Gear	3	0	0	3
01UEC523	Communication Engineering (Common to ICE, EEE & EIE)	3	0	0	3
PRACTICAL					
01UEE507	Power Electronics Laboratory	0	0	3	2
01UEE508	Control and Instrumentation Laboratory	0	0	3	2
01UEE509	Microprocessors and Microcontroller Programming Laboratory	0	0	3	2
01UGS531	Soft Skills and Communication Laboratory (Common to CSE,ECE, EEE & IT)	0	0	2	1
		18	**2**	**11**	**27**
Total No. of Credits - 27					

Semester VI

Course code	Course Title	L	T	P	C
THEORY					
01UEE601	Electric Drives and Control	3	0	0	3
01UEE602	Electrical Machine Design	3	1	0	4
01UEE603	High Voltage Engineering	3	0	0	3
01UEC624	Applied Digital Signal Processing (Common to ICE , EEE & EIE)	3	0	0	3
	Elective I	3	0	0	3
	Elective II	3	0	0	3
PRACTICAL					
01UEE607	Electric Drives and Control Laboratory	0	0	3	2
01UEC628	Applied Digital Signal Processing Laboratory	0	0	3	2
01UEE608	Technical Seminar / Mini Project	0	0	2	1
	TOTAL	**18**	**1**	**8**	**24**
Total No. of Credits - 24					

Semester VII

Course code	Course Title	L	T	P	C
THEORY					
01UME701	Project Management and Finance (Common to MECH, ICE, ECE, EEE & EIE)	3	0	0	3
01UEE702	Power System Operation and Control	3	1	0	4
01UEE703	Special Electrical Machines	3	0	0	3
01UEE704	Electric Power Utilization and Energy Conservation	3	1	0	4
	Elective III	3	0	0	3
	Elective IV	3	0	0	3
PRACTICAL					
01UEE707	Power System Simulation Laboratory	0	0	3	2
	TOTAL	**18**	**2**	**3**	**22**
Total No. of Credits - 22					

Semester VIII

Course Code	Course Title	L	T	P	C
THEORY					
	Elective V	3	0	0	3
	Elective VI	3	0	0	3
PRACTICAL					
01UEE803	Project Work	0	0	12	6
	TOTAL	**6**	**0**	**12**	**12**
Total No. of Credits - 12					

LIST OF ELECTIVES

Course Code	Course Title	L	T	P	C
01UEE901	Advanced Control Theory	3	0	0	3
01UEE902	Biomedical Engineering	3	0	0	3
01UEE903	Non-Conventional Energy Resources	3	0	0	3
01UEE904	Programmable Logic Controller and SCADA	3	0	0	3
01UEE905	VLSI Design and Architecture	3	0	0	3
01UEE906	Adaptive Control	3	0	0	3
01UEE907	Operation and Maintenance of Electrical Equipments	3	0	0	3
01UEE908	Power System Transients	3	0	0	3
01UEE909	Solid State Relays	3	0	0	3
01UEE910	FUZZY Logic and Neural Network	3	0	0	3
01UEE911	Computer Aided Design of Electrical Apparatus	3	0	0	3
01UEE912	HVDC Transmission	3	0	0	3
01UEE913	Embedded Systems	3	0	0	3
01UEE914	Power Quality	3	0	0	3
01UEE915	Flexible AC Transmission System	3	0	0	3
01UEE916	Evolutionary Computation	3	0	0	3
01UEE917	Introduction to Micro Electro Mechanical Systems	3	0	0	3
01UEE918	Power System Dynamics	3	0	0	3
01UEE919	Software Circuit for Simulation	3	0	0	3
01UEE920	Visual Languages and Applications	3	0	0	3
01UEE921	Power Electronics for Renewable Energy Systems	3	0	0	3
01UCS952	PC Hardware and Troubleshooting	3	0	0	3
01UIT952	Computer Communication Networks	3	0	0	3
01UPH851	Fundamentals of Nanoscience	3	0	0	3
The students may choose any one of the electives offered by the other branches of study.					

I SEMESTER SYLLABUS

01UEN101	TECHNICAL ENGLISH - I (COMMON TO ALL BRANCHES)	L	T	P	C
		3	1	0	4

COURSE OBJECTIVE:

- To improve the language proficiency of students
- To enhance the vocabulary of students
- To strengthen the language competency through grammar

UNIT I **9+3**

Listening-Conversation Practice; Speaking-Observing the diagram and speaking on the topic, Explaining daily routines; **Reading**- Reading Comprehension, Referring to the Dictionary and identifying the functions of words; **Writing**- Paragraph Writing(Writing for a given situation); Grammar- Parts of Speech, Introduction of Present Tense and its four sub divisions; **Vocabulary**- Prefix and Suffix, Synonyms and Antonyms

UNIT II **9+3**

Listening- Listening to Inspiring Speeches and Instructions; **Speaking**- Narrating Stories, Self Introduction; **Reading**-Reading Short Stories, Newspaper Articles, Skimming; **Writing**- Summary Writing, Hints Developing, Letter Writing-Informal Letters; **Gramma**r- Introduction of Past Tense and its four sub divisions, Voice- Active and Passive-Conversion of Assertive Sentences; Punctuation & Spelling, **Vocabulary** - Homonyms and Homophones, Idioms and Phrases

UNIT III **9+3**

Listening- Completing the task of drawing a diagram based on instructions; **Speaking**- Review of a Movie, Seeking Permission, **Reading**- Note Making Skills, **Writing**- Letter Writing-Formal Letters-Letter to the Editor; **Gramma**r- Introduction of Future Tense and its four sub divisions, Subject-Verb Agreement, Voice- Active and Passive-Conversion of Interrogative and Imperative Sentences; **Vocabulary**- British and American Words.

UNIT IV **9+3**

Listening- Comprehension Passage, Tracing geographical locations through instructions; **Speaking**- Explaining Pictures of their choice, Making Requests; **Reading**- Reading Profiles of Leading Companies and Personalities; **Writing**- Writing Review of a Book/ Movie/ Journal, Report Writing; **Grammar**- Regular and Irregular Verbs, Instructions, Connectives-Discourse Markers; **Vocabulary**- Foreign Words

UNIT V **9+3**

Listening- Listening to informal conversations and participating; **Speaking-** Expressing Opinions , Asking for directions using polite expressions, Giving directions by using imperative sentences; **Reading**- Reading Job Advertisements, Skimming and Scanning; **Writing**- Process Description; Grammar- Numerical Adjectives, Sequencing Words, Spelling; **Vocabulary**- One Word Substitutions

Total: 45+15 Periods

LEARNING OUTCOMES:

After successful completion of this course the students will be able to:

- Understand and respond in various formal and informal situations
- Demonstrate improved oral fluency
- Exhibit improved reading comprehension, vocabulary and interpretation skills
- Effectively use standard grammar in writing meaningful sentences and paragraphs

TEXT BOOKS:

1. Humanities and Social Sciences Division, Anna University. “English for Engineers and Technologists”, Vol. 1, Orient Longman, Chennai, 2002.
2. Meenakshi Raman and Sangeeta Sharma, “Technical Communication: Prinicples and Practice”, Second Edition, Oxford University Press, India, 2012.
3. Ashraf Rizvi M., “Effective Technical Communication”, Tata McGraw-Hill, New Delhi ,2005.

SUGGESTED BOOK FOR READING:

1. Shanta Rameshwar Rao, “Perceptions”, Orient Longman Pvt. Ltd., Chennai, 2002

REFERENCE BOOKS:

1. Curriculum Development Centre, TTTI, “Communication in English for Technical Students” Orient Longman, Calcutta, 1984.
2. Sidney Greenbaum, “The Oxford English Grammar(H)” Oxford University Press, 1996.

01UMA102	ENGINEERING MATHEMATICS – I (COMMON TO ALL BRANCHES)	L	T	P	C
		3	1	0	4

COURSE OBJECTIVE:

- To identify algebraic eigen value problems from practical areas and obtain the eigen solutions in certain cases
- To study three dimensional analytical geometry, the properties of lines and planes in space
- To understand effectively the geometrical aspects of curvature, involutes and evolutes of plane curves, essential concepts for an engineer, as elegant applications of differential calculus
- To learn the method of solving differential equations of certain types, including systems of differential equations that they might encounter in their studies of other subjects in the same or higher semesters.

UNIT I MATRICES **8+3**

Eigenvalue and eigenvector of a real matrix – Characteristic equation – Properties – Cayley - Hamilton theorem (excluding proof) – Orthogonal transformation of a symmetric matrix to diagonal form – Quadratic form – Reduction of quadratic form to canonical form by orthogonal transformation

UNIT II THREE DIMENSIONAL ANALYTICAL GEOMETRY **9+3**

Equation of a sphere – Plane section of a sphere – Tangent Plane – Equation of a cone – Right circular cone – Equation of a cylinder – Right circular cylinder

UNIT III DIFFERENTIAL CALCULUS **8+3**

Curvature in Cartesian co-ordinates – Centre and radius of curvature – Circle of curvature – Evolutes – Envelopes – Evolute as envelope of normals

UNIT IV FUNCTIONS OF SEVERAL VARIABLES **8+3**

Partial derivatives – Euler's theorem for homogenous functions – Total derivatives – Differentiation of implicit functions – Jacobians – Taylor's expansion – Maxima and Minima – Method of Lagrangian Multipliers

UNIT V MULTIPLE INTEGRALS **9+3**

Double integration – Cartesian and polar coordinates – Change of order of integration – Change of variables between Cartesian and polar coordinates – Triple integration in Cartesian co-ordinates – Area as double integral – Volume as triple integral

SUPPLEMENT TOPIC: **3**

Evocation / Application of Mathematics, Quick Maths – Speed Multiplication and Division (for internal evaluation only)

Total: L + T: 45 + 15 = 60 Periods

LEARNING OUTCOMES:

After successful completion of this course the students will be able to:

- Analyze structures, signal processing and image processing using Eigen values.
- Apply the concept of curvature in automobiles, signal transmissions and communication.
- Use double and triple integrals in the field of fluid dynamics, design of experiments and structural designing.
- Measure the stress in semi-conductor structures and also the bending of beams using radius of curvature.
- Acquire knowledge and analytical skills necessary for entry level placement

TEXT BOOKS:

1. Bali N.P. and Manish Goyal, "Text book of Engineering Mathematics", Third edition, Laxmi Publications(P) Ltd., 2008.
2. Grewal. B.S., "Higher Engineering Mathematics", 42 nd Edition, Khanna Publications, Delhi, 2012.

REFERENCE BOOKS:

1. Ramana B.V., "Higher Engineering Mathematics", 11 th Reprint, Tata McGraw Hill Publishing Company, New Delhi, 2010.
2. Glyn James, "Advanced Engineering Mathematics", Seventh Edition, Pearson Education, 2007.
3. Jain R.K. and Iyengar S.R.K., "Advanced Engineering Mathematics", Third Edition, Narosa Publishing House Pvt. Ltd., 2007.

01UPH103	**ENGINEERING PHYSICS** (COMMON TO ALL BRANCHES)	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

COURSE OBJECTIVE:

- To have a clear knowledge of principles and applications of ultrasonics
- To understand the working method of different kinds of laser
- To learn the types of fibre and communication applications
- To know the basic principles of Quantum theory
- To develop the fundamental research interest in crystal physics

UNIT I ULTRASONICS **9**

Introduction – Production – magnetostriction effect – magnetostriction generator piezoelectric effect - piezoelectric generator- Detection of ultrasonic waves - properties – Cavitations -Velocity measurement – acoustic grating - Industrial applications – drilling, welding, soldering and cleaning – SONAR - Non Destructive Testing – pulse echo system through transmission and reflection modes - A,B and C –scan displays, Medical applications – Sonograms

UNIT II LASERS **9**

Introduction – Principle of Spontaneous emission and stimulated emission. Population inversion, pumping. Einsteins A and B coefficients -derivation. Types of lasers –, Nd-YAG- CO2 and Semiconductor lasers (homo-junction & hetero-junction) - Qualitative Industrial Applications - Lasers in welding, heat treatment, cutting – Medical applications - Holography (construction & reconstruction)

UNIT III FIBER OPTICS AND APPLICATIONS **9**

Introduction – Structure of optical fibre- Principle and propagation of light in optical fibres – Numerical aperture and Acceptance angle - Types of optical fibres (material, refractive index, modes)-Double crucible technique of fibre drawing - Splicing, Loss in optical fibre – attenuation, dispersion, bending Fibre optical communication system (Block diagram) – fibre optic sensors- Endoscope

UNIT IV QUANTUM PHYSICS **9**

Black body radiation – Planck's theory (derivation) – Wien's displacement law and Rayleigh – Jeans' Law – Compton effect. Theory and experimental verification – Matter waves - Schrödinger's wave equation – Time independent and time dependent equations – Physical significance of wave function – Particle in a one dimensional box - Electron microscope Scanning electron microscope - Transmission electron microscope

UNIT V CRYSTAL PHYSICS **9**

Lattice – Unit cell – Bravais lattice – Lattice planes – Miller indices – d spacing in cubic lattice – Calculation of number of atoms per unit cell – Atomic radius – Coordination number – Packing factor for SC, BCC, FCC and HCP structures – NaCl, ZnS, diamond and graphite structures – Polymorphism and allotropy - Crystal defects – point, line and surface defects- Burger vector

Total: 45 Periods

LEARNING OUTCOMES:

After successful completion of this course the students will be able to:

- Understand the concept of different production methods, applications, merits and demerits of Ultrasonics
- Obtain the knowledge, basic properties, mechanism, terminology, types and principle of Laser.
- Learn the principle, structure, and propagation mechanism of fiber optics communication and their industrial application
- Familiarize the concepts of Quantum theory and its origin
- Understand the basics of crystal structure and its parameter

TEXT BOOKS:

1. Dr. Mani P.A., “Text Book of Engineering Physics”, Dhanam Publications, Ninth Edition, Chennai, 2011.
2. Rajendran V., “Engineering Physics”, Tata Mc-Graw Hill Publishing company limited, New Delhi, 2011.
3. Gaur R.K. and Gupta S.L., “Engineering Physics”, Dhanapat Rai Publications, New Delhi, 2011.

REFERENCE BOOKS:

1. Raghuvenshi G.S., “Engineering Physics”, PHI Learning Private Limited, New Delhi, 2010.
2. Arul doss G., “Engineering Physics”, PHI Learning Private Limited, New Delhi, 2010.
3. Marikani A., “Engineering Physics”, PHI Learning Private Limited, New Delhi, 2009.
4. Sankar B.N., and Pillai.S.O., “A Text Book of Engineering Physics”, New Age International Publishers Private Limited, New Delhi, 2007.
5. Dr. Avadhanulu M.N. and Mulajkar D.D., “Engineering Physics”, S. Chand and company Ltd., New Delhi, 2009.
6. Vanchana Singh and Sheetal Kumar, “Engineering Physics”, Cengage Learning India Pvt. Ltd., New Delhi, 2010.

01UCY105	APPLIED CHEMISTRY (common to CSE, ICE, ECE, EEE, IT & EIE branches)	L	T	P	C
		3	0	0	3

COURSE OBJECTIVE:

- To know about the principles of electrochemistry, emf and applications of emf measurements
- To understand the basics of photochemistry
- To learn about corrosion control methods
- To know about the industrial applications of surface chemistry
- To learn the analytical techniques and their importance

UNIT I ELECTRO CHEMISTRY 9

Electrode – single electrode potential, Nernst equation (problem), reference electrodes - standard hydrogen electrode – calomel electrode, glass electrode, measurement of pH; cells – EMF – measurement of emf, reversible and irreversible cells, electrolyte concentration cells and applications, electrochemical series – significance, potentiometeric titrations (redox - Fe^{2+}vs dichromate and precipitation – Ag^{+} vs. CI^{-} titrations) and Conductometric titrations (HCI vs. NaOH).

UNIT II PHOTO CHEMISTRY 9

Photochemical reaction: classification - thermal and photochemical reactions; laws of photochemistry - Grothus –Droper Law, Stark Einstein Law (problems); Quantum yield and determination (problems); photochemical synthesis of HCl and HBr – Jablonski diagram; fluorescence and phosphorescence, chemiluminescence, photosensitisation, applications; photosynthesis, photoinhibitors; applications in chemical synthesis, photo lithography and thin film coating.

UNIT III CORROSION AND CORROSION CONTROL 9

Corrosion: Types - Chemical and electrochemical – mechanisms; different forms – galvanic, pitting, stress corrosion cracking and differential aeration corrosion; factors influencing corrosion; corrosion control – sacrificial anode and impressed cathodic current methods, corrosion inhibitors; protective coatings: paints – constituents and functions; metallic coatings – electroplating of Au and electroless plating of Ni.

UNIT IV SURFACE CHEMISTRY 9

Adsorption: types – physical and chemical adsorption, adsorption of gases on solids; adsorption isotherms – Freundlich and Langmuir isotherms; adsorption of solutes from solution; ion -exchange adsorption; adsorption in pollution abatement (Granular activated carbon and powdered activated carbon); removal of heavy metals from effluents-coagulation, sedimentation and filtration; catalysis-characteristics, autocatalysis, catalytic poisoning and promoters

UNIT V INSTRUMENTAL METHODS OF CHEMICAL ANALYSIS 9

Beer-Lambert's law: definition, derivation and simple problems– UV-visible – types of transitions, chromophores and auxochromes, Instrumentation (block diagram only), applications-Estimation of iron, AAS - principle - Instrumentation- (block diagram only)- applications-Estimation of nickel, Flame photometry- principle - Instrumentation- (block diagram only)- applications-Estimation of sodium; XRD: principle and applications

Total: 45 Periods

LEARNING OUTCOMES:

After successful completion of this course the students will be able to:

- Understand emf and its measurements, electrodes etc, which boost up their skill in circuit development for different applications.
- Gain knowledge about the materials that can be used to protect the electronic devices.
- Treat complex electrical/electronic systems and signals through modeling, simulation, experimentation and interpretation and analysis of data.

TEXT BOOKS:

1. Jain P.C. and Monica Jain, "Engineering Chemistry", DhanpatRai Pub., Co., New Delhi, 2002.
2. Kannan P. and Ravikrishnan A., "Engineering Chemistry**",** Sri Krishna Hitech Publishing Company Pvt. Ltd**,** Chennai**,** 2009.
3. Dara S.S., "A text book of engineering chemistry", S.Chand & Co. Ltd., New Delhi, 2006.
4. Rohatgi K.K. and Muherjee, "Fundamentals of Photochemistry", New Age International Publications, New Delhi, 2006.

REFERENCE BOOKS:

1. Sharma B.K., "Engineering Chemistry", Krishna Prakasan Media (P) Ltd., 2001.
2. Sivasankar B., "Engineering Chemistry", Tata McGraw-Hill Pub. Co. Ltd., New Delhi, 2008.
3. Sharma B.K., "Instrumental Methods of Chemical Analysis", Goel Publishing House, Meerut, 2005.
4. Gurdeep Chatwal, "Surface Chemistry", Goel Publishers, Meerut, 2002.
5. The Fu Yen, "Surface Chemistry for Engineers", Imperial College Press, London, 2008.

01UCS106 **COMPUTER PROGRAMMING**

(COMMON TO ALL BRANCHES)

L	T	P	C
3	0	0	3

COURSE OBJECTIVE:

- To enable the students to read and write C programs
- To understand the organization of computers
- To learn about the programming constructs of C

UNIT I INTRODUCTION **8**

Generation and Classification of Computers- Basic Organization of a Computer –Number System – Binary – Decimal – Conversion – Problems. Need for logical analysis and thinking – Algorithm – Pseudo code – Flow Chart.

UNIT II C PROGRAMMING BASICS **10**

Problem formulation – Problem Solving - 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**

Arrays – Initialization – Declaration – One dimensional and Two dimensional arrays. String- String operations – String Arrays. Simple programs- sorting- searching – matrix operations.

UNIT IV FUNCTIONS AND POINTERS **9**

Function – definition of function – Declaration of function – Pass by value – Pass by reference – Recursion – Pointers - Definition – Initialization – Pointers arithmetic – Pointers and arrays- Dynamic Memory allocation– Example Problems.

UNIT V STRUCTURES ,UNIONS AND FILE HANDLING **9**

Introduction – need for structure data type – structure definition – Structure declaration – Structure within a structure - Union - Programs using structures and Unions – Storage classes, Pre-processor directives –File handling.

Total: 45 Periods

LEARNING OUTCOMES:

After successful completion of this course the students will be able to:

- Develop computerized applications using 'C' language

TEXT BOOKS:

1. Anita Goel and Ajay Mittal, "Computer Fundamentals and Programming in C", Dorling Kindersley (India) Pvt. Ltd, Pearson Education in South Asia, 2011.
2. Pradip Dey and Manas Ghosh, "Fundamentals of Computing and Programming in C", Oxford University Press, First Edition, 2009.
3. Yashavant P. Kanetkar. "Let Us C", BPB Publications, 2011.

REFERENCE BOOKS:

1. Byron S.Gottfried, “Programming with C”, Schaum’s Outlines, Tata McGraw-Hill, Second Edition, 2006.
2. Dromey R.G., “How to Solve it by Computer”, Pearson Education, Fourth Reprint, 2007.
3. Kernighan B.W. and Ritchie.D.M., “The C Programming language”, Pearson Education, Second Edition, 2006.
4. Balagurusamy E., “Computing fundamentals and C Programming”, Tata McGraw-Hill Publishing Company Limited, 2008.
5. Stephen G.Kochan, “Programming in C”, Pearson Education India, Third Edition, 2005.

01UME107	ENGINEERING GRAPHICS (COMMON TO ALL BRANCHES)	L	T	P	C
		2	0	3	4

COURSE OBJECTIVE:

- To develop in students graphic skill for communication of concepts, ideas and design of engineering products and expose them to existing national standards related to technical drawings

CONCEPTS AND CONVENTIONS (NOT FOR EXAMINATION) **1**

Importance of Graphics in Engineering Applications – Use of Drafting Instruments – BIS Conventions and Specifications – Size, Layout and Folding of Drawing Sheets – Lettering and Dimensioning

UNIT I PLANE CURVES AND FREE HAND SKETCHING **15**

Curves used in engineering practices: (Not for Examination)

Conics – Construction of ellipse, Parabola and hyperbola by eccentricity method – Construction of cycloid – construction of involutes of squad and circle – Drawing of tangents and normal to the above curves.

Orthographic Projection:

Representation of Three Dimensional objects – General principles of orthographic projection – Need for importance of multiple views and their placement – First angle projection – layout views – Developing visualization skills through free hand sketching of multiple views from pictorial views of objects.

UNIT II PROJECTION OF POINTS, LINES AND PLANE SURFACES **14**

Projection of points and straight lines located in the first quadrant – Determination of true lengths and true inclinations – Projection of polygonal surface and circular lamina inclined to both reference planes.

UNIT III PROJECTION OF SOLIDS **15**

Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one reference plane by change of position method.

UNIT IV SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES **15**

Sectioning of above solids in simple vertical position by cutting planes inclined to one reference plane and perpendicular to the other – Obtaining true shape of section.

Development of lateral surfaces of simple and truncated solids – Prisms, pyramids, cylinders and cones.

UNIT V ISOMETRIC AND PERSPECTIVE PROJECTIONS 15 ISOMETRIC PROJECTIONS

Principles of isometric projection – isometric scale – isometric projections of simple solids, truncated prisms, pyramids, cylinders and cones.

PERSPECTIVE PROJECTIONS (Not for Examination)

Perspective projection of prisms, pyramids and cylinders by visual ray method.

Total: 75 Periods

LEARNING OUTCOMES:

After successful completion of this course the students will be able to:

- Understand the basics of orthographic and isometric projections
- Generate engineering drawing and relate it to day to day life
- Apply this basic knowledge throughout the carrier

TEXT BOOKS:

1. Seeni Kannan P., Pitchayya Pillai G., and Arun Balasubramanian K., "Engineering Graphics", Little Moon Publication, 2012.
2. Bhatt N.D., "Engineering Drawing", 46th Edition, Charotar Publishing House, 2003.

REFERENCE BOOKS:

1. Natarajan K.V., "A Text book of Engineering Graphics", Dhanalakshmi Publishers, 2006.
2. Venugopal K., and Prabhu Raja V., "Engineering Graphics", New Age International (P) Limited, 2008.
3. Gopalakrishnana K.R., "Engineering Drawing" (Vol.I&II), Subhas Publications,1998.
4. Dhananjay A.Jolhe, "Engineering Drawing with an introduction to AutoCAD", Tata McGraw Hill Publishing Company Limited, 2008.
5. Basant Agarwal and Agarwal C.M., "Engineering Drawing", Tata Mc-Graw Hill Publishing Company Limited, New Delhi,2008.

Publication of Bureau of Indian Standards:

1. IS 10711 – 2001: Technical products Documentation – Size and lay out of drawing sheets.
2. IS 9609 (Parts 0 & 1) – 2001: Technical products Documentation – Lettering.
3. IS 10714 (Part 20) – 2001 & SP 46 – 2003: Lines for technical drawings.
4. IS 11669 – 1986 & SP 46 – 2003: Dimensioning of Technical Drawings.
5. IS 15021 (Parts 1 to 4) – 2001: Technical drawings – Projection Methods.

Special points applicable to End Semester Examinations on Engineering Graphics:

1. There will be five questions, each of either or type covering all units of the syllabus.
2. All questions will carry equal marks of 20 each making a total of 100.
3. The answer paper shall consist of drawing sheets of A3 size only. The students will be permitted to use appropriate scale to fit solution within A3 size.
4. Whenever the total number of candidates in a college exceeds 150, the End Semester Examination in that college will be conducted in two sessions (FN and AN on the same day) for 50 percent of student (approx) at a time.

01UCS108	**COMPUTER PRACTICE LABORATORY – I** (COMMON TO ALL BRANCHES)	**L**	**T**	**P**	**C**
		0	**0**	**3**	**2**

LIST OF EXPERIMENTS

a) Word Processing 15

1. Document creation, Text manipulation with Scientific notations.
2. Table creation, Table formatting and Conversion.
3. Mail merge and Letter preparation.
4. Drawing - flow Chart

b) Spread Sheet

5. Chart - Line, XY, Bar and Pie.
6. Formula - formula editor.
7. Spread sheet - inclusion of object, Picture and graphics, protecting the document and sheet.
8. Sorting and Import / Export features.

c) Power point

9. Simple presentation using power point

d) Simple C Programming 30

10. Data types, Expression Evaluation, Condition Statements.
11. Arrays
12. Structures and Unions
13. Functions
14. Files

Total: 45 Periods

01UME109	ENGINEERING PRACTICES LABORATORY (COMMON TO ALL BRANCHES)	L	T	P	C
		0	0	3	2

LIST OF EXPERIMENTS

GROUP A (CIVIL & MECHANICAL)

I CIVIL ENGINEERING PRACTICE **9**

BUILDINGS:

a) Study of plumbing and carpentry components of residential and industrial buildings. Safety aspects.

PLUMBING WORKS:

(a) Study of pipeline joints, its location and functions: valves, taps, couplings, unions, reducers, elbows in household fittings.

(b) Study of pipe connections requirements for pumps and turbines.

(c) Preparation of plumbing line sketches for water supply and sewage works.

d) Hands-on-exercise:

Basic pipe connections–Mixed pipe material connection Pipe connections with different joining components.

(e) Demonstration of plumbing requirements of high-rise buildings.

CARPENTRY USING POWER TOOLS ON

(a) Study of the joints in roofs, doors, windows and furniture.

(b) Hands-on-exercise:

Wood work, joints by sawing, planning and cutting.

II MECHANICAL ENGINEERING PRACTICE **13**

Welding:

(a) Preparation of arc welding of butt joints, lap joints and tee joints.

(b) Gas welding practice.

Basic Machining:

(a) Simple Turning and Taper turning.

(b) Drilling Practice

Sheet Metal Work:

(a) Forming & Bending.

(b) Model making – Trays, funnels, etc.

(c) Different type of joints.

Machine assembly practice:

(a) Study of centrifugal pump

(b) Study of air conditioner

Demonstration on:

(a) Smithy operations, upsetting, swaging, setting down and bending.
Example – Exercise – Production of hexagonal headed bolt.

(b) Foundry operations like mould preparation for gear and step cone pulley.

(c) Fitting – Exercises – Preparation of square fitting and vee – fitting models.

GROUP B (ELECTRICAL & ELECTRONICS)

III ELECTRICAL ENGINEERING PRACTICE 10

(a) Residential house wiring using switches, fuse, indicator, lamp and energy meter.
(b) Fluorescent lamp wiring.
(c) Stair case wiring.
(d) Measurement of electrical quantities – voltage, current, power & power factor in RLC circuit.
(e) Measurement of energy using single phase energy meter.
(f) Measurement of resistance to earth of electrical equipment.

IV ELECTRONICS ENGINEERING PRACTICE 13

(a) Study of Electronic components and equipments – Resistor, colour coding measurement of AC Signal parameter (peak-peak, rms, period, frequency) using CRO.
(b) Study of logic gates
(c) Generation of Clock Signal.
(d) Soldering practice – Components, Devices and Circuits – Using general purpose PCB.
(e) Measurement of ripple factor of HWR and FWR.

Total: 45 Periods

01UGS110	PHYSICS & CHEMISTRY LABORATORY (COMMON TO ALL BRANCHES)	L	T	P	C
		0	0	2	1

PHYSICS LABORATORY

List of Experiments

1. Semiconductor Laser - Particle size determination using Diode Laser.
2. Determination of thickness of a thin wire – Air wedge method.
3. Determination of wavelength of mercury spectrum – Spectrometer grating.
4. Determination of Young's modulus of the material – Uniform bending.
5. Torsional pendulum – Determination of rigidity modulus of a given wire and Moment of inertia of a metallic disc.
6. Determination of Young's modulus of the material –Non uniform bending.

- **A minimum of five experiments shall be offered**

CHEMISTRY LABORATORY

List of Experiments

1. Estimation of Copper in brass by EDTA
2. Conductometric titration (simple acid base)
3. Conductometric titration (Mixture of weak and strong acids)
4. Conductometric titration ($BaCl_2$ Vs Na_2SO_4)
5. Potentiometric titration (Fe^{2+} / $KMnO_4$ or $K_2Cr_2O_7$)
6. pH titration (acid & base)
7. Determination of molecular weight of a Polyvinyl Alcohol by Viscometry method

- **A minimum of five experiments shall be offered**

Total: 30 Periods

II SEMESTER SYLLABUS

01UEN201	**TECHNICAL ENGLISH – II** (COMMON TO ALL BRANCHES)	**L**	**T**	**P**	**C**
		3	**1**	**0**	**4**

COURSE OBJECTIVE:

- To help the students acquire listening and speaking skills in their real life situations
- To develop professional skills for emancipation of students' Personality

UNIT I **9+3**

Listening- Listening to Telephonic Conversations; Speaking- Offering Suggestions, Introducing others; Reading- Skimming, Scanning and Skipping; Writing-Formal Letters-Writing letters to Head of the Institution; Grammar-Prepositions, Conjunctions, Infinitives; Vocabulary-Prepositional Phrases.

UNIT II **9+3**

Listening- Performing Various Tasks Based on Audio Tracks; Speaking- Role Play Practice, Jargons - Expression used to Define Technical Vocabulary; Reading- Fast Reading; Writing-Minutes of the Meeting, Preparing Agenda; Grammar- Direct and Indirect Speech, Conditional Clauses, Gerunds and Participles, Vocabulary- Collocations.

UNIT III **9+3**

Listening- Introduction to Phonetic Symbols ; Speaking- Speaking sentences with Stress and Intonations; Reading-Cloze Test ; Writing- Writing a Lab Report, Persuasive Paragraph writing; Grammar-Framing Questions, Types of Sentences; Vocabulary- Compound Nouns, Matching Words with meanings

UNIT IV **9+3**

Listening- Listening and Guided Note Taking; Speaking- Persuasive Strategies, Presentations of Problems and Solutions, Reading- Contextual Reading, Anthology of Short Stories and poems; Writing- Letter Writing (Inviting, Accepting and Declining), ; Grammar- Modal verbs, Articles; Sentence Completion; Vocabulary- Derivatives of Root Words.

UNIT V **9+3**

Listening- Critical Analysis of Presentation and Group Discussion; Speaking- Interview Skills; Reading- Editing the E-mail after Reading the Context; Writing-Writing Recommendations and Job Application with Resume; Grammar- Simple, Compound and Complex sentences, Vocabulary- Words Often Confused and Misused

Total: 45+15 Periods

LEARNING OUTCOMES:

After successful completion of this course the students will be able to:

- Read, understand, analyse and discuss technical papers
- Participate confidently and effectively in group discussion
- Write clear and concise technical paper, resume, report and email.
- Demonstrate comprehension of content and vocabulary

TEXT BOOKS:

1. Humanities and Social Sciences Division, Anna University, “English for Engineers and Technologists. Vol. 1”, Orient Longman, Sixth Edition, Chennai, 2002.
2. Meenakshmi Raman and Sangeeta Sharma, “Technical Communication: English Skills for Engineers”, Oxford University press, 2008.
3. Ashraf Rizvi M., “Effective Technical Communication”, Tata McGraw-Hill, Ninth Edition, New Delhi, 2005.

SUGGESTED BOOK FOR READING:

1. Mark Twain, “The Adventures of Tom Sawyer”, Penguin Classics, 2006.

REFERENCE BOOKS:

1. Curriculum Development Centre, TTTI, “Communication in English for Technical Students”, Orient Longman, Calcutta, 1984.
2. Sidney Greenbaum, “Oxford English Grammar”, Oxford University Press, First Edition, New Delhi, 2008.

01UMA202	ENGINEERING MATHEMATICS – II (COMMON TO ALL BRANCHES)	L	T	P	C
		3	1	0	4

COURSE OBJECTIVE:

- To study the basics of vector calculus comprising of gradient, divergence and curl, and line, surface and volume integrals and the classical theorems involving them
- To understand analytic functions and their interesting properties which could be concentrated in a few engineering areas, and be introduced to the host of conformal mappings with a few standard examples that have direct application
- To acquire knowledge of Laplace transform and its properties and sufficient exposure to solution of certain linear differential equations using the laplace transform technique

UNIT I ORDINARY DIFFERENTIAL EQUATIONS 8+3

Higher order linear differential equations with constant coefficients – Method of variation of parameters – Cauchy's and Legendre's linear equations – Simultaneous first order linear equations with constant coefficients.

UNIT II VECTOR CALCULUS 8+3

Gradient Divergence and Curl – Directional derivative – Irrotational and solenoidal vector fields – Vector integration – Green's theorem in a plane, Gauss divergence theorem and stokes' theorem (excluding proofs) – Simple applications involving cubes and rectangular parallelopipeds.

UNIT III ANALYTIC FUNCTIONS 8+3

Functions of a complex variable – Analytic functions – Necessary conditions, Cauchy – Riemann equation and Sufficient conditions (excluding proofs) – Harmonic and orthogonal properties of analytic function – Harmonic conjugate – Construction of analytic functions – Conformal mapping: w = z+c, cz, 1/z, and bilinear transformation.

UNIT IV COMPLEX INTEGRATION 9+3

Statement and applications of Cauchy's integral theorem and Cauchy's integral formula – Taylor and Laurent expansions – Singular points – Residues – Residue theorem –Application of residue theorem to evaluate real integrals – Unit circle and semi-circular contour(excluding poles on boundaries).

UNIT V LAPLACE TRANSFORM 9+3

Existence conditions – Transform of elementary functions – Basic properties – Transform of derivatives and integrals – Transform of unit step function and impulse functions – Transform of periodic functions. Definition of Inverse Laplace transform as contour integral – Convolution theorem (excluding proof) – Initial and Final value theorems – Solution of linear ODE of second order with constant coefficients using Laplace transformation techniques.

SUPPLEMENT TOPIC: **3**

Evocation / Application of Mathematics, Arithmetical Ability – Time and Work – Time and Distance (for internal evaluation only)

Total: L + T: 45 + 15 = 60 Periods

LEARNING OUTCOMES:

After successful completion of this course the students will be able to:

- Design electric circuits using mathematical differential equations of first, second and higher orders
- Apply the concept of vector calculus in the field of transportation
- Apply Laplace Transform to solve differential equation arises in circuit theory
- Acquire knowledge and analytical skills necessary for entry level placement

TEXT BOOKS:

1. Bali N.P. and Manish Goyal, "Text book of Engineering Mathematics", Third Edition, Laxmi Publications (P) Ltd, 2008.
2. Grewal B.S., "Higher Engineering Mathematics", 42 nd Edition, Khanna Publications, 2012

REFERENCE BOOKS:

1. Ramana B.V.,"Higher Engineering Mathematics", 11 th Reprint, Tata Mc-Graw Hill Publishing Company, New Delhi, 2010.
2. Glyn James, "Advanced Engineering Mathematics", Third Edition, Pearson Education, 2007.
3. Erwin Kreyszig, "Advanced Engineering Mathematics", Tenth Edition, Wiley India, 2011.
4. Jain R.K. and Iyengar S.R.K., "Advanced Engineering Mathematics", Third Edition, Narosa Publishing House Pvt. Ltd, 2007
5. Agarwal R.S., "Quantitative Aptitude", S.Chand Publications

01UPH204	APPLIED PHYSICS (COMMON TO CSE, ICE, ECE, EEE, IT & EIE BRANCHES)	L	T	P	C
		3	0	0	3

COURSE OBJECTIVE:

- To get a clear knowledge of principles and applications of conducting materials
- To understand the principles and working knowledge semiconductor
- To know the basic principles of magnetic materials and superconductivity
- To know the basic principles optical materials and dielectrics
- To develop the fundamental research interest in nano materials

UNIT I CONDUCTING MATERIALS **9**

Conductors – classical free electron theory of metals – Electrical and thermal conductivity – Wiedemann – Franz law – Lorentz number – Draw backs of classical theory – Quantum theory – Fermi distribution function – Effect of temperature on Fermi Function – Density of energy states – carrier concentration in metals

UNIT II SEMICONDUCTING MATERIALS **9**

Intrinsic semiconductor – carrier concentration derivation in n-type and p-type semiconductor – Fermi level – Variation of Fermi level with temperature – extrinsic semiconductors – carrier concentration derivation in n-type and p-type semiconductor – variation of Fermi level with temperature and impurity concentration – Hall effect –Determination of Hall coefficient – Applications

UNIT III MAGNETIC MATERIALS AND SUPERCONDUCTIVITY **9**

Origin of magnetic moment – Bohr magnetron – Dia and para magnetism – Ferro magnetism – Domain theory – Hysteresis – soft and hard magnetic materials – antiferromagnetic materials – Ferrites – applications – magnetic recording and readout – storage of magnetic data – tapes, floppy and magnetic disc drives.Superconductivity: Properties - Types of super conductors – BCS theory of superconductivity (Qualitative) - High Tc superconductors – Applications

UNIT IV OPTICAL MATERIALS AND DIELECTRIC MATERIALS **9**

Optical properties of metals, insulator and Semiconductor-Phosphorescence and fluorescence-Excitons, traps and colourcentres and their importance-different phosphors used in CRO screen-Liquid crystal as display material-Thermography and its applications.Dielectric Materials: Electrical susceptibility-Dielectric constant-Electronic,ionic,orientational and space charge polarization-Frequency and temperature dependence of polarization-Internal field-Claussius Mosotti relation(Derivation)

UNIT V NEW ENGINEERING MATERIALS **9**

Metallic glasses, preparation, properties and applications- Shape memory alloys (SMA): Characteristics, properties, application, advantages. Nanomaterials: synthesis –plasma arcing – chemical vapour deposition –electro deposition-solgels – ball milling - properties of nanoparticles and applications- Introduction to Carbon nanotubes

Total: 45 Periods

LEARNING OUTCOMES:

After successful completion of this course the students will be able to:

- Understand the classification of solid, formation of semiconductor diode and its application
- Recognize the working functions of magnetic storage devices and gain the knowledge of Superconductors
- To gain knowledge about Nano materials and dielectrics

TEXT BOOKS:

1. Dr.Mani P.A., “Text Book of Engineering Physics”, Ninth Edition, Dhanam Publications, Chennai,2011
2. Rajendran V., “Engineering Physics”, Tata Mc-Graw Hill Publishing Company limited, New Delhi, 2011
3. Gaur R.K. and Gupta.S.L., “Engineering Physics”, Dhanapat Rai Publications, New Delhi, 2011
4. Arumugam M., “Material Science”, Anuradha Technical Book Publisher, Kumbakonam,1997

REFERENCE BOOKS:

1. Serway and Jewett, “Physics for Scientists and Engineers with Modern Physics”, Sixth Edition, Thomson Brooks/Cole, Indian reprint, 2007
2. Rajendran V. and Marikani A., “Engineering Physics”, Third Edition, Tata Mc-Graw Hill Publications Ltd, New Delhi, 2004
3. Palanisamy P.K., “Engineering Physics”, Scitech publications, Chennai, 2007
4. Jayakumar S., “Engineering Physics”, R.K. Publishers, Tirunelveli, 2003
5. Pillai S.O., “Solid State Physics”, New Age Inc., 1998

01UCY204	ENVIRONMENTAL SCIENCE (COMMON TO ALL BRANCHES)	L	T	P	C
		3	0	0	3

COURSE OBJECTIVE:

- To understand the effect of technology on the environment and ecological balance and make the student sensitive to the environment problems in every professional endeavour that he/she participates

UNIT I ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY 10

Definition, scope and importance of environment – Need for public awareness – Concept of an ecosystem – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the (a) Forest ecosystem (b) Grassland ecosystem (c) Desert ecosystem (d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) – Introduction to biodiversity – Definition: genetic, species and ecosystem diversity – Biogeographical 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.

- Field study of common plants, insects, birds
- Field study of simple ecosystems – pond, river, hill slopes, etc.

UNIT II 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.

Field study of local polluted site – Urban / Rural / Industrial / Agricultural

UNIT III NATURAL RESOURCES 9

Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people – Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, food adulteration, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies – Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources. case studies – Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification – Role of an individual in conservation of

natural resources – Equitable use of resources for sustainable lifestyles. – Field study of local area to document environmental assets – river / forest / grassland / hill / mountain.

UNIT IV SOCIAL ISSUES 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 production act – Air (Prevention and Control of Pollution) act – Water (Prevention and control of Pollution) act – Wildlife protection act – Forest conservation act – enforcement machinery involved in environmental legislation – Public awareness.

UNIT V HUMAN POPULATION AND THE ENVIRONMENT 8

Population growth, variation among nations – Population explosion – Family welfare programme – Environment and human health – Human rights – Value education – HIV / AIDS – Women and child welfare – Role of information technology in environment and human health – Case studies.

Total: 45 Periods

LEARNING OUTCOMES:

After successful completion of this course the students will be able to:

- Realise the importance of environment
- Know about the precious resources in the environment
- Learn to conserve the resources
- Perform their role in maintaining a clean environment for future generation
- Maintain ecological balance and preserve bio-diversity

TEXT BOOKS:

1. Gilbert M.Masters, “Introduction to Environmental Engineering and Science”, Third Edition, Pearson Education, Upper saddle River, New Jersey, 2004.
2. Benny Joseph, “Environmental Science and Engineering”, Tata Mc-Graw Hill, New Delhi, 2006.

REFERENCE BOOKS:

1. Miller T.G. Jr., “Environmental Science”, Wadsworth Publishing Company, Belmont, California, 1996.
2. Anubha Kaushik, Kaushik C.P., “Environmental Science and Engineering”, Third Edition, New Age International, New Delhi, 2009.
3. De A.K., “Environmental Chemistry”, Wiley Eastern Ltd., New Delhi, 2001.
4. Trivedi R.K., Goel P.K., “Introduction to Air Pollution”, Techno-Science Publications, Jaipur, 1995.

01UME205	BASIC CIVIL AND MECHANICAL ENGINEERING (COMMON TO ALL BRANCHES)	L	T	P	C
		4	0	0	4

COURSE OBJECTIVE:

- To understand the fundamentals of thermal systems
- To understand the basics of building construction and infrastructures

A – CIVIL ENGINEERING

UNIT I SURVEYING AND CIVIL ENGINEERING MATERIALS 15 Surveying: Objects – types – classification – principles – measurements of distances – angles – leveling – determination of areas – illustrative examples.

Civil Engineering Materials:

Bricks – stones – sand – cement – concrete – steel sections.

UNIT II BUILDING COMPONENTS AND STRUCTURES 15 Foundations: Types, Bearing capacity – Requirement of good foundations.

Superstructure: Brick masonry – stone masonry – beams – columns – lintels – roofing – flooring – plastering – Mechanics – Internal and external forces – stress – strain – elasticity – Types of Bridges and Dams – Basics of Interior Design and Landscaping.

B – MECHANICAL ENGINEERING

UNIT III POWER PLANT ENGINEERING 10

Introduction, Classification of Power Plants – Working principle of steam, Gas, Diesel, Hydro-electric and Nuclear Power plants – Merits and Demerits – Pumps and turbines – working principle of Reciprocating pumps (single acting and double acting) – Centrifugal Pump.

UNIT IV IC ENGINES 10

Internal combustion engines as automobile power plant – Working principle of Petrol and Diesel Engines – Four stroke and two stroke cycles – Comparison of four stroke and two stroke engines – Boiler as a power plant.

UNIT V REFRIGERATION AND AIR CONDITIONING SYSTEM 10

Terminology of Refrigeration and Air Conditioning. Principle of vapour compression and absorption system – Layout of typical domestic refrigerator – Window and Split type room Air conditioner.

Total: 60 Periods

LEARNING OUTCOMES:

After successful completion of this course the students will be able to:

- Understand the fundamentals of thermal systems
- Basic knowledge on construction of infrastructures

TEXT BOOKS:

1. Seeni kannan P., Pitchayya Pillai G. and Arun Balasubramanian K., “Basic Civil and Mechanical Engineering”, Little Moon Publication, 2012.
2. Shanmugam G. and Palanichamy M.S., “Basic Civil and Mechanical Engineering”, Tata Mc-Graw Hill Publishing Co., New Delhi,1996.

REFERENCE BOOKS:

1. Ramamrutham S., “Basic Civil Engineering”, Dhanpat Rai, Publishing Co. (P) Ltd, 1999.
2. Seetharaman S., “Basic Civil Engineering”, Anuradha Agencies, 2005.
3. Venugopal K. and Prabhu Raja V., “Basic Mechanical Engineering”, Anuradha Publishers, Kumbakonam, 2000.
4. Shantha Kumar S.R.J., “Basic Mechanical Engineering”, Hi-Tech Publications, Mayiladuthurai, 2000.

01UEE207	ELECTRIC CIRCUITS	L	T	P	C
		3	1	0	4

COURSE OBJECTIVE:

- To introduce the basic concepts of single phase, three phase and DC Electrical circuits
- To study the transient and steady state response of the circuits subjected to step and sinusoidal excitations
- To introduce the methods of circuit analysis using Network theorems

UNIT I BASIC CIRCUITS ANALYSIS **9+3**

Electrical quantities - current, voltage, power , active and passive elements, Energy, Circuits and circuit elements - Voltage and current source ,Ohm's Law – Kirchoff's laws – DC and AC Circuits – Resistors in series and parallel circuits – Mesh current and node voltage method of analysis for D.C and A.C. circuits.

UNIT II NETWORK REDUCTION AND NETWORK THEOREMS FOR DC AND AC CIRCUITS **9+3**

Network reduction: voltage and current division, source transformation – star delta conversion. Thevenins and Nortons Theorem – Superposition Theorem – Maximum power transfer theorem – Reciprocity Theorem - Principle of duality and dual networks.

UNIT III RESONANCE AND COUPLED CIRCUITS **9+3**

Series and parallel resonance – their frequency response – Quality factor and Bandwidth - Self and mutual inductance – Coefficient of coupling – Tuned circuits – Single tuned circuits

UNIT IV TRANSIENT RESPONSE FOR DC CIRCUITS **9+3**

Transient response of RL, RC and RLC Circuits using Laplace transform for DC input and A.C. with sinusoidal input

UNIT V ANALYSING THREE PHASE CIRCUITS **9+3**

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

Total: 45+15 Periods

LEARNING OUTCOMES:

After successful completion of this course the students will be able to:

- Acquire knowledge on basic laws and network theorems on DC and AC circuits and network reduction
- Analyze the circuits during transient condition
- Derive and apply techniques of circuit analysis in most complicated circuits

TEXT BOOKS:

1. William H. Hayt Jr., Jack E. Kemmerly and Steven M. Durbin, “Engineering Circuits Analysis”, Sixth Edition, Tata McGraw Hill publishers, New Delhi, 2010.
2. Arumugam M. and Premkumar N., “Electric Circuits Theory”, Fifth Edition, Khanna Publishers, New Delhi, 2006.

REFERENCE BOOKS:

1. Sudhakar A. and Shyam Mohan S.P., “Circuits and Network Analysis and Synthesis”, Third Edition, Tata McGraw Hill, 2007.
2. Paranjothi SR., “Electric Circuits Analysis,” Fourth Edition, New Age International Ltd., New Delhi, 2011.
3. Joseph A. Edminister and Mahmood Nahri, “Electric circuits”, Second Edition, Schaum’s series, Tata McGraw Hill, New Delhi 2001.
4. Chakrabati A., “Circuits Theory (Analysis and synthesis)”, Third Edition, Dhanpatrai publication, New Delhi, 2008.

01UEE208	ELECTRIC CIRCUITS LABORATORY	L	T	P	C
		0	0	3	2

LIST OF EXPERIMENTS

1. Verification of Ohm's Law and Kirchoff's Laws.
2. Verification of Thevenin's and Norton's Theorem.
3. Verification of superposition Theorem.
4. Verification of maximum power transfer theorem.
5. Verification of reciprocity theorem.
6. Verification of mesh and nodal analysis.
7. Transient response of RL and RC circuits for DC input.
8. Frequency response of series and parallel resonance circuits.
9. Frequency response of single tuned coupled circuits.
10. Measurement of time constant for RL, RC and RLC circuits.
11. Determination of self, mutual inductances and co-efficient of coupling.
12. Measurements of three phase power using two wattmeter method.

Total: 45 Periods

01UCS209	**COMPUTER PRACTICE LABORATORY – II** (COMMON TO ALL BRANCHES)	**L**	**T**	**P**	**C**
		0	**0**	**3**	**2**

LIST OF EXPERIMENTS

1. UNIX COMMANDS **15**

Study of Unix OS - Basic Shell Commands - Unix Editor .

2.SHELL PROGRAMMING **15**

Simple Shell program - Conditional Statements - Testing and Loops

3. C PROGRAMMING ON UNIX **15**

Dynamic Storage Allocation-Pointers-Functions-File Handling

Total: 45 Periods

01UGS210	PHYSICS & ENVIRONMENTAL SCIENCE LABORATORY (COMMON TO ALL BRANCHES)	L	T	P	C
		0	0	2	1

PHYSICS LABORATORY

List of Experiments

1. Determination of Band Gap of a semiconductor
2. Determination of viscosity of liquid – Poiseuille's method.
3. Spectrometer –To find the dispersive power of a prism
4. Determination of velocity of sound and compressibility of liquid –Ultrasonic interferometer.
5. To verify Newton's law of cooling of different liquid and to draw the cooling curve.
6. Determination of thermal conductivity of a bad conductor – Lee's Disc method.

- **A minimum of five experiments shall be offered**

ENVIRONMENTAL SCIENCE LABORATORY

List of Experiments

1. Determination of pH of water sample
2. Determination of electrical conductivity of water sample
3. Estimation of hardness of Water by EDTA method
4. Estimation of alkalinity of water sample
5. Estimation of Chloride in Water sample (Argentometric method)
6. Determination of DO in water (Winkler's method)
7. Determination of acidity of water sample

- **A minimum of five experiments shall be offered**

Total: 30 Periods

01UMA321 TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS

L	T	P	C
3	1	0	4

(Common to ALL Branches)

OBJECTIVES :

- To make the student knowledgeable in formulating certain practical problems in terms of partial differential equations, solve them and physically interpret the results.
- To familiarize the students to formulate and identify certain boundary value problems encountered in engineering practices, decide on applicability of the Fourier series method of solution, solve them numerically and interpret the results.
- To acquaint the student with the basics of Z - transform in its applicability to discretely varying functions, gained the skill to formulate certain problems in terms of difference equations and solve them using the Z - transform technique bringing out the elegance of the procedure involved

UNIT I FOURIER SERIES 9 + 3

Dirichlet's conditions – General Fourier series – Odd and even functions – Half range sine series – Half range cosine series – Complex form of Fourier Series – Parseval's identity – Harmonic analysis - Application of Fourier series.

UNIT II FOURIER TRANSFORM 9 + 3

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

UNIT III Z-TRANSFORM AND DIFFERENCE EQUATIONS 9 + 3

Z-transform – Elementary properties – Inverse Z-transform – Convolution theorem – Initial and Final value Theorems - Formation of difference equations – Solution of difference equations.

UNIT IV APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS 9 + 3

Introduction of Partial differential equations - Solutions of one dimensional wave equation – One dimensional equation of heat conduction – Steady state solution of two-dimensional equation of heat equation (Insulated edges excluded) – Fourier series solutions in Cartesian coordinates.

UNIT V NUMERICAL SOLUTIONS OF PARTIAL DIFFERENTIAL EQUATIONS 9 + 3

Finite difference solution of one dimensional heat equation by explicit and implicit methods – One dimensional wave equation and two dimensional Laplace and Poisson equations.

TOTAL : 45 (L) + 15 (T) = 60 PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Write any periodic function as a combination of series of sine and cosine which are harmonically related which are used in engineering to express periodic functions into a combination of simple waves.
- Acquire knowledge on Fourier transform and its properties which is used to transform signals between time and frequency domain, which has many applications in engineering.
- Apply finite difference concept to solve one dimensional wave, two dimensional Laplace and Poisson equations which play a key role in field theory (like Electric, magnetic & fluid velocity field etc.)
- Apply Fourier series to solve partial differential equations representing one dimensional and two dimensional heat and wave equations

TEXT BOOKS:

1. Grewal B.S, “Higher Engineering Mathematics”, Khanna Publishers, New Delhi, 42nd Edition, (2012).
2. Kandasamy.P, Thilagavathy.K, and Gunavathy.K, Engineering Mathematics III, S.Chand & Company Ltd., New Delhi, 3rd Edition, (1996).

REFERENCE BOOKS:

1. Bali N.P., Manish goyal and Watains, “Advanced Engineering Mathematics”, Firewall Media (An imprint of Laxmi Publication Private limited) New Delhi, 7th Edition, (2009).

2. Ramana.B.V, “Higher Engineering Mathematics” Tata McGraw Hill, New Delhi, 11th Reprint (2010).
3. Glyn James, “Advanced Modern Engineering Mathematics”, Pearson Education, New Delhi, 3rd Edition, (2007).
4. Erwin Kreyszig, “Advanced Engineering Mathematics”, Wiley India, 10th Edition, (2011).
5. Gerald C.F. and Wheateley, P.O. “Applied Numerical Analysis”, Pearson Education, New Delhi, 6th Edition, (2006).

01UEE302 **DC MACHINES AND TRANSFORMERS**

L	T	P	C
3	1	0	4

OBJECTIVES:

- To introduce the fundamental principles of Electro-mechanical energy conversion and the MMF pattern of electrical machines
- To impart knowledge on the operation and performance characteristics of DC machines and Transformers

UNIT I BASIC CONCEPTS OF ELECTRICAL MACHINES 9+3

Energy in magnetic systems- field energy, co energy and mechanical force – single and multiple excited systems, Magnetic circuits – inductance – Statically and Dynamically Induced EMF, Elementary concepts of rotating machines - Armature and field windings MMF Curves Generated voltage – Torque in wound rotor machine - hysteresis and core losses.

UNIT II DC GENERATORS 9+3

Laws of magnetic circuit – Principle of operation, Constructional details, Armature Windings, EMF equation, Separate and Self (shunt, series and compound) excitations. – Characteristics of various types of DC Generators.-Armature reaction, Commutation, Inter poles, Compensating windings, Applications of various types of DC Generators.

UNIT III DC MOTORS 9+3

Principle of operation – Torque equation, Electrical and Mechanical characteristics of DC shunt, series and compound motors. Starters – Speed control – Armature and field control – Braking-Applications

UNIT IV TRANSFORMERS 9+3

Principle of operation – Constructional features, Classification of Transformers, EMF equation, Transformation ratio, Transformer on no-load and load, Phasor diagrams. Equivalent circuit - Voltage regulation, Losses, Efficiency, All day efficiency Auto transformers, three phase connections – parallel operation of transformers – tap changing-Instrument Transformers

UNIT V TESTING OF DC MACHINES AND TRANSFORMERS 9+3

Losses and efficiency -Testing of DC machines – Brake test, Swinburne's test, Retardation test and Hopkinson's test- Testing of transformers – Polarity test, load test, open circuit and short circuit tests-Sumpner's test.

TOTAL : 45 (L) + 15 (T) = 60 PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Express the concepts of electromechanical energy conversion and MMF of Electrical machines
- Explain the construction and principle of operation of DC machines and Transformers
- Illustrate the characteristics of DC motors and DC generators
- Calculate the losses and efficiency of DC machines and transformers

TEXT BOOKS:

1. Kothari D.P., Nagrath I.J, " Electric Machines ", Tata McGraw Hill, 2009.
2. Bimbhra., "Electrical Machinery" ,Khanna Publishers, 2003

REFERENCE BOOKS:

1. Fitzgerald A.E. and Charles Kingsley and Stephen D.Umans, "Electric Machinery", Tata McGraw Hill., 2003.
2. Gupta J.P. , " Theory and Performance of Electrical Machines" ,S.K.Kataria and Sons, 2010
3. Theraja B.L.,"A Text Book of Electrical Technology Vol. II ", S.Chand& Co. Ltd, 2008
4. Murugesh Kumar K.,"DC Machines and Transformers ", Vikas publishing house Pvt Ltd, 2004.
5. Mehta. V.K., " Principles of Electrical Machines ", S.Chand & Co. Ltd, 2007.

		L	T	P	C
01UEE303	**FIELD THEORY**	**3**	**0**	**0**	**3**

OBJECTIVES:

- To impart knowledge on vector fields - electrostatic and magneto static fields, concepts of electrodynamics and electromagnetic waves.

UNIT I INTRODUCTION 9

Sources and effects of electromagnetic fields – Vector fields – Different co-ordinate systems- vector calculus – Gradient, Divergence and Curl - Divergence theorem – Stoke's theorem.

UNIT II ELECTROSTATICS 9

Coulomb's Law – Electric field intensity – Field due to point and continuous charges – Gauss's law and application – Electric potential – Electric field due to infinite line charge , charged circular ring - Equipotential plots –Dielectric polarization - Dielectric strength – Boundary condition between conductor and free space- Poisson's and Laplace's equations – Capacitance- Energy density.

UNIT III MAGNETOSTATICS 9

Lorentz Law of force, magnetic field intensity – Biot-savart Law - Ampere's Law – Magnetic field due to straight conductors, circular loop – Magnetic flux density (B) – B in free space, conductor, magnetic materials – Magnetization – Boundary conditions – Scalar and vector potential – Magnetic force – Torque – Inductance – Energy density

UNIT IV ELECTRODYNAMIC FIELDS 9

Faraday's laws, induced emf – Transformer and motional EMF – Forces and Energy in quasi-stationary Electromagnetic Fields - Maxwell's equations (differential and integral forms) – Displacement current – Relation between field theory and circuit theory.

UNIT V ELECTROMAGNETIC WAVES 9

Generation – Electro Magnetic Wave equations – Wave parameters; velocity, intrinsic impedance, propagation constant – Waves in free space, lossy and lossless dielectrics, conductors-skin depth, Poynting vector – Plane wave reflection and refraction – Transmission lines – Line equations – Input impedances – Standing wave ratio and power

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Apply vector calculus to understand the behavior of static electric and magnetic fields
- Distinguish the laws applied in electrostatics and magneto statics
- Explain Maxwell's equation in both differential and integral forms
- Compute the wave parameters in different media

TEXT BOOKS:

1. Mathew N.O. Sadiku., “Elements of Electromagnetics ”, Oxford University press, First Edition, 2007.
2. William .H. Hayt, “Engineering Electromagnetics ”, Tata McGraw Hill edition Ltd, 2001.

REFERENCE BOOKS:

1. Joseph A. Edminister, “Theory and Problems of Electromagnetics”, Schaum Series, Tata McGraw Hill, second Edition, 1993.
2. Kraus and Fleish, “Electromagnetics with Applications”, McGraw Hill International Editions, Fifth Edition, 1999.
3. Ashutosh Pramanik, “Electromagnetism – Theory and Applications”, Prentice-Hall of India Private Limited, 2006
4. Clayton R. Paul., Keith W. Whites. and Syed A. Nasar, “Introduction to Electromagnetic Fields”, Tata McGraw Hill, third Edition, 2007.

01UEE304 POWER PLANT ENGINEERING

L	T	P	C
3	0	0	3

OBJECTIVES:

- To impart knowledge on Power Plants
- To discuss the role of Electrical Engineers in their operation and maintenance

UNIT I COAL BASED THERMAL POWER PLANTS 9

Rankine cycle - improvisations, Layout of modern coal power plant, Super Critical Boilers, FBC Boilers, Turbines, Condensers, Steam & Heat rate, Subsystems of thermal power plants – Fuel and ash handling, Draught system, Feed water treatment. Binary Cycles and Cogeneration systems.

UNIT II DIESEL, GAS TURBINE AND COMBINED CYCLE POWER PLANTS 9

Otto, Diesel, Dual & Brayton Cycle - Analysis & Optimisation. Components of Diesel and Gas Turbine power plants. Combined Cycle Power Plants. Integrated Gasifier based Combined Cycle systems.

UNIT III NUCLEAR POWER PLANTS 9

Basics of Nuclear Engineering, Layout and subsystems of Nuclear Power Plants, Working of Nuclear Reactors: Boiling Water Reactor (BWR), Pressurized Water Reactor (PWR), CA Nada Deuterium-Uranium reactor (CANDU), Breeder, Gas Cooled and Liquid Metal Cooled Reactors. Safety measures for Nuclear Power plants.

UNIT IV POWER FROM RENEWABLE ENERGY 9

Hydro Electric Power Plants – Classification, Typical Layout and associated components including Turbines. Principle, Construction and working of Wind, Tidal, *Solar* Photo Voltaic (SPV), Solar Thermal, Geo Thermal, Biogas and Fuel Cell power systems.

UNIT V ENERGY, ECONOMIC AND ENVIRONMENTAL ISSUES OF POWER PLANTS 9

Power tariff types, Load distribution parameters, load curve, Comparison of site selection criteria, relative merits & demerits, Capital & Operating Cost of different power plants. Pollution control technologies including Waste Disposal Options for Coal and Nuclear Power Plants.

TOTAL : 45 PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Describe different types of power plants,
- Explain the functions and flow lines of various power plants and issues related to them.
- Analyze the operation of various renewable energy sources
- Analyze energy and economic related issues in power sectors.

TEXT BOOKS:

1. Nag P.K., “Power Plant Engineering", Tata McGraw – Hill Publishing Company Ltd., Third Edition, 2008.
2. Arora Domkundwar, “ A Course in Power Plant Engineering ”, Dhanpat Rai and Co.Pvt.Ltd,

REFERENCE BOOKS:

1. El-Wakil M.M., “Power Plant Technology”, Tata McGraw – Hill Publishing Company Ltd., 2010.
2. Black & Veatch, “Power Plant Engineering”, Springer, 1996.
3. Thomas C. Elliott., Kao Chen, and Robert C. Swanekamp, “Standard Handbook of Power Plant Engineering”, Second Edition, McGraw – Hill, 1998.
4. Godfrey Boyle, “Renewable energy, Open University, Oxford University Press in association with the Open University”, 2004.

01UEE305	SEMICONDUCTOR DEVICES AND CIRCUITS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To impart knowledge on the construction, theory and characteristics of the various electronic devices
- To familiarize with the applications of PN diode and BJT

UNIT I SEMICONDUCTOR DIODE AND ITS APPLICATIONS 9

PN junction diode-VI characteristics – Rd, temperature effects – Drift and diffusion currents – switching characteristics – Rectifiers: HWR, FWR, BR - Filters- Zener diode – VI characteristics, Regulators (series and shunt), LED, LCD characteristics and applications

UNIT II BJT AND ITS APPLICATIONS 9

Bipolar Junction Transistor – Transistor construction – Input and output characteristics – CE, CB and CC configurations – relationship between α, β and γ - hybrid model – Analytical expressions – switching characteristics – RF application – Power transistors – Opto couplers.

UNIT III FET AND ITS APPLICATIONS 9

JFET – Characteristics and parameters – small signal model – LF and HF equivalent circuits – CS and CD amplifiers –cascade and cascade amplifiers – Darlington connection – MOSFET - Enhancement and Depletion – Characteristics

UNIT IV AMPLIFIERS AND OSCILLATORS 9

Differential amplifiers: CM and DM –Single tuned amplifiers-Feedback amplifiers – Power amplifier (Qualitative analysis) -stability – Voltage /current, series / shunt feedback – Oscillators – Condition for oscillation – LC-Hartley, Colpitts and Clapps, RC-Phase shift and Wein Bridge, Crystal oscillator.

UNIT V PULSE CIRCUITS 9

RC wave shaping circuits – Diode clippers and clampers – Multivibrators-astable, monostable and Bistable – Schmitt triggers – UJT based saw tooth oscillators

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Explain the characteristics of semiconductor devices in various applications
- Construct simple amplifier and oscillator circuits using semiconductor devices.
- Design simple wave shaping circuits
- Choose various multivibrator circuits based on the applications

TEXT BOOKS:

1. David Bell, “Electronic Devices and Circuits ”, PHI, 2007.
2. Millman and Halkias, “ Electronic Devices and Circuits ”, Tata McGraw– Hill, 2007.
3. Floyd. T.L., “Electronic Devices” , PearsonEducation, VI Edition, 2003.

REFERENCE BOOKS:

1. Paynter, “ Introductory electronic devices and circuits ”, PHI.,2006.
2. Mottershead A., “ Electronic Devices and Circuits an Introduction”, Prentice Hall of India,
3. Theodre. F. Boghert , “Electronic Devices and Circuits ”, Pearson Education,VI Edition, 2003.
4. Rashid, “Microelectronic circuits”, Thomson, 1999.
5. Singh B.P. and Rekha Singh, “Electron devices & Integrated Circuits ”, Pearson Education, 2006.

01UEE306 **DIGITAL LOGIC CIRCUITS**

L	T	P	C
3	1	0	4

OBJECTIVES:

- To impart knowledge on the various number systems, Boolean functions and combinational circuits
- To explain synchronous, asynchronous sequential circuits and PLCs
- To introduce digital simulation for development of application oriented logic circuits

UNIT I NUMBER SYSTEMS AND DIGITAL LOGIC FAMILIES 9+3

Review of number systems, binary codes, error detection and correction codes (Parity and Hamming code0- Digital Logic Families, comparison of RTL, DTL, TTL, ECL and MOS families - operation, characteristics of digital logic family.

UNIT II COMBINATIONAL CIRCUITS 9+3

Combinational logic - representation of logic functions-SOP and POS forms, K-map representations – minimization using K maps - simplification and implementation of combinational logic – multiplexers and demultiplexers - code converters, adders, subtractors.

UNIT III SYNCHRONOUS SEQUENTIAL CIRCUITS 9+3

Sequential logic- SR, JK, D and T flip flops - level triggering and edge triggering - counters - asynchronous and synchronous type - Modulo counters - Shift registers - design of synchronous Sequential circuits – Moore and Melay models- Counters, state diagram; state reduction; state assignment.

UNIT IV ASYNCHRONOUS SEQUENTIAL CIRCUITS AND PROGRAMMABLE LOGIC DEVICES 9+3

Asynchronous sequential logic circuits-Transition table, flow table-race conditions, hazards &errors in digital circuits; analysis of asynchronous sequential logic circuits-introduction to Programmable Logic Devices: PROM – PLA –PAL

UNIT V VHDL 9+3

RTL Design – combinational logic – Sequential circuit – Operators – Introduction to Packages – Subprograms – Test bench. (Simulation /Tutorial Examples: adders, counters, Flip-flops, FSM, Multiplexers / Demultiplexers).

TOTAL: 45 (L) + 15 (T) = 60 PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Apply knowledge of number systems, codes and Boolean algebra to the design of digital logic circuits
- Differentiate the synchronous sequential circuit operations with the asynchronous sequential circuit operations
- Describe the memory organization and classification of memories
- Write VHDL code for simple combinational circuits

TEXT BOOKS:

1. Raj Kamal, “Digital systems-Principles and Design”, Pearson Education 2nd edition, 2007.
2. Morris Mano M., “Digital Design with an introduction to the VHDL”, Pearson Education, 2013.

REFERENCE BOOKS:

1. Mandal , “Digital Electronics Principles & Application”, McGraw Hill Edu, 2013.
2. Charles H. Roth and Jr.Lizy Lizy Kurian John, “Digital System Design using VHDL”, Cengage, 2013.
3. John M.Yarbrough, “Digital Logic, Application & Design”, Thomson, 2002.
4. Gaganpreet Kaur, “VHDL Basics to Programming”, Pearson, 2013.
5. Botros, “HDL Programming Fundamental”, VHDL& Verilog, Cengage, 2013.

01UEE307 DC MACHINES AND TRANSFORMERS LABORATORY L T P C

OBJECTIVE: 0 0 3 2

- To demonstrate the operation and performance characteristics of D.C. machines and transformers

LIST OF EXPERIMENTS:

1. Open circuit and load characteristics of separately and self excited DC shunt generators.
2. Load characteristics of DC compound generator with differential and cumulative connection.
3. Load characteristics of DC shunt and compound motor.
4. Load characteristics of DC series motor.
5. Swinburne's test and speed control of DC shunt motor.
6. Hopkinson's test on DC motor – generator set.
7. Load test on single-phase transformer and three phase transformer connections.
8. Open circuit and short circuit tests on single phase transformer.
9. Sumpner's test on transformers.
10. Separation of no-load losses in single phase transformer.
11. Study of Scott connection of Transformer.
12. Study of parallel operation of Transformer.
13. Study of Characteristics of Welding Transformer.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Analyze the characteristics of DC Motors and DC Generators
- Analyze the characteristics of Transformers
- Demonstrate the performance of dc machines and transformers
- Describe the Parallel operation of Transformers

HARDWARE REQUIREMENT :

S.No.	Description of Equipment	Quantity Required
1	**D.C motor – Generator set**	
	D.C motor – Shunt Generator	2 set
	D.C motor – Compound Generator	2 set
2	D.C. Shunt Motor	2 Nos.
3	D.C. Series Motor	1 No.
4	D.C. Compound Motor	1 No.
5	Single phase transformers	7 Nos.
6	Three phase transformers	2 Nos.
7	Resistive load single phase	3 Nos.
8	Single phase Auto transformer	5 Nos
9	Three phase auto transformer	1 No.
10	Moving Coil Ammeter of different ranges	20 Nos.
11	Moving Coil Voltmeter of different ranges	20 Nos.
12	Moving Iron Ammeter of different ranges	20 Nos.
13	Moving Iron voltmeter of different ranges	20 Nos.
14	Wire wound Rheostats of different ratings	30 Nos.
15	Tachometers	10 Nos.
16	Single element wattmeters of different ranges UPF/LPF	10 Nos.
17	Double element wattmeters of different ranges	2 Nos.
18	Digital multimeter	2 Nos.
19	Frequency meter	1 No.
20	Three point starter, four point starter	1 No.(for each experiment)

01UEE308	SEMICONDUCTOR DEVICES AND CIRCUITS LABORATORY	L	T	P	C
OBJECTIVE:		**0**	**0**	**3**	**2**

- To review the characteristics of semiconductor devices

LIST OF EXPERIMENTS:

1. Characteristics of Semiconductor diode and zener diode.
2. Characteristics of Transistor using various configurations.
3. Characteristics of FET.
4. Characteristics of UJT.
5. Characteristics of SCR, DIAC and TRIAC.
6. Photo diode, phototransistor Characteristics and study of light activated relay circuit.
7. Static characteristics of Thermistors.
8. Single phase half wave and full wave rectifiers with inductive and capacitive filters.
9. Differential amplifier using FET.
10. Study of CRO for frequency and phase measurement.
11. Realization of Passive filters.
12. Study of Resistance impact under series and parallel connection using MultiSim Simulator.
13. Study of Common Emitter amplifier using MultiSim Simulator.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Illustrate the characteristics of semiconductor diodes, BJT, FET, UJT and Photo devices
- Use oscilloscope for measuring the amplitude and frequency of electronic circuits
- Construct common emitter/base/collector amplifier and measure its voltage gain
- Design rectifiers and filter circuits

HARDWARE REQUIREMENT:

S.No.	Description of Equipment	Quantity Required
1	Regulated Power Supply	15
2	Dual Trace CRO	15
3	Function Generator	15
4	Digital Multi meter	10
5	Bread Boards	40
6	Transistor (BC107)	25 Nos.
7	JFET (BFW10)	10 Nos.
8	Diode (1N4001)	10 Nos.
9	Zener Diode (4.7VZ)	5 Nos.
10	UJT (2N2422)	5 Nos.
11	Photo Diode	5 Nos.
12	Photo Transistor	5 Nos.
13	Thermistors	5 Nos.
14	OP-amp (IC741)	10 Nos.
15	Milli Ammeter (0-100mA)	15 Nos.
16	Micro Ammeter (0-50μA)	10 Nos.
17	Low range voltmeter (0-30V)	10 Nos.
18	Resistor of various ranges	50 Nos.
19	Capacitors of various ranges	50 Nos.
20	Connecting wires (Single Strand)	10 Coils
21	Multisim	25 Users

VALUE EDUCATION AND HUMAN RIGHTS

01UGS331	L	T	P	C
(Common to ALL Branches)				
	2	**0**	**0**	**P/F**

OBJECTIVE :

- To inculcate the values of humanism, spirituality and to have an awareness of human rights
- To impart knowledge and develop a sensitivity to the diversity of Indian culture

UNIT I VALUES AND SELF DEVELOPMENT 6

Concept of value- Social values and individual attitudes, Work ethics, Indian vision of humanism, Moral and non moral valuation, Standards and principles - - Need for inculcation of values in today's society- Sense of duty, Devotion, Self reliance, Confidence, Concentration, Truthfulness, Cleanliness, Honesty, Humanity, Power of faith, National unity, Patriotism, Love for nature, Discipline.

UNIT II PERSONALITY AND BEHAVIOR DEVELOPMENT 6

Soul and scientific attitude, God and scientific attitude, Positive thinking, Integrity and discipline, Punctuality, Love and kindness, Avoiding fault finding, Free from anger, Dignity of labor, Universal brotherhood and religious tolerance, True friendship, Happiness vs. suffering love for truth, Aware of self destructive habits, Association and cooperation, Doing best, Saving nature**.**

UNIT III CHARACTER AND COMPETENCE 6

Science vs. God, Holy books vs. blind faith, Self management and good health, Science of reincarnation, Equality, Nonviolence, Humility, Role of women, All religions and same message, Mind your mind, Self control, Honesty, Studying effectively.

UNIT IV STRATEGIES FOR VALUE INCULCATION AND EVALUATION 6

Co-curricular Activities- Story – Telling- Discussion / Symposium- Drama- Role – play- Slogans and Quotations - Slides, filmstrips, films- Games- Songs -The need for value evaluation-Tool and Techniques of value evaluation- Written tests technique Multiple choice, True and False, Fill in the blanks, Matching, Short answer-Tally of events Technique- Quiz technique- Photo language session- Checklist Technique- Art Computation Technique**.**

UNIT V HUMAN RIGHTS 6

Jurisprudence of human rights nature and definition, Universal protection of human rights, Regional protection of human rights, National level protection of human rights, Human rights and vulnerable groups

TOTAL: 30 PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to:

- Acquire a holistic vision and growth to become an integrated Personality
- Imbibe the essence of spirituality by which they will manifest the noble virtues of Universal brotherhood and benevolence

TEXT BOOKS:

1. Chakraborty, S.K., “Values and Ethics for Organizations Theory and Practice”, Oxford University Press, New Delhi, 2001.
2. Kapoor, S.K., “Human rights under International Law and Indian Law”,Prentice Hall of India ,New Delhi, 2002..

REFERENCE BOOKS:

1. Frankena, , W.K., “Ethics ”, Prentice Hall of India,, New Delhi, 1990.
2. Meron Theodor, “Human Rights and International Law Legal Policy Issues”, Oxford University Press, First Edition, New Delhi, 2000.
3. R.P.Shukla, “Value Education and Human Rights, Sarup and Sons Publishing, New Delhi, 2004.
4. Yogesh Kumar Singh and Reschika Nath. “Value Education”. APH Publishing Corporation, New Delhi, 2005.

NUMERICAL METHODS

01UMA422 **L T P C**

(Common to ICE, EEE, CIVIL & EIE)

3 1 0 4

OBJECTIVES :

- To acquaint the student with the roots of nonlinear (algebraic or transcendental) equations, solutions of large system of linear equations and eigen value problem of a matrix can be obtained numerically where analytical methods fail to give solution.
- To familiarize the student with the methods discussed on interpolation which will be useful in constructing approximate polynomial to represent the data and to find the intermediate values, when huge amounts of experimental data are involved.
- To make the student acquire sound knowledge in applications of numerical methods in various fields, solving practical technical problems using scientific and mathematical tools when available in Engineering.

UNIT I SOLUTION OF ALGEBRAIC AND TRANSCENDENTAL EQUATIONS 9 + 3

Bisection method – Method of False position – Iteration method – Newton- Raphson method – Ramanujan's method – Secant method.

UNIT II SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS 9 + 3

Gauss Elimination method – Pivoting – Gauss Jordan methods – Iterative methods of Gauss Jacobi and Gauss Seidel - Matrix Inversion by Gauss Jordan method – Eigen values of a matrix by Power method – Jacobi's method for a real symmetric matrix.

UNIT III INTERPOLATION AND APPROXIMATION 9 + 3

Lagrangian Polynomials – Newton's divided difference interpolation – Newton's forward and backward difference interpolation – Interpolating with a cubic spline.

UNIT IV NUMERICAL DIFFERENTIATION AND NUMERICAL INTEGRATION 9 + 3

Derivatives from difference tables – Divided differences and finite differences – Numerical integration by Trapezoidal and Simpson's 1/3 and 3/8 rules – Romberg's method – Two point and Three point

Gaussian quadrature formulae - Double integrals using Trapezoidal and Simpson's rules.

UNIT V CURVE FITTING 9 + 3

Method of Group Averages – The least squares method – Fitting a straight line - Fitting a Parabola - Fitting a curve of the form $y = ax^b$ - Fitting an exponential curve – Method of moments.

TOTAL : 45 (L) + 15 (T) = 60 PERIODS

TEXT BOOKS:

1. Sankar Rao.K., "Numerical Methods for scientists and engineers", Prentice Hall of India, New Delhi, 3rd Edition, 2007.
2. Sastry S.S., "Introductory methods of Numerical Analysis", Prentice Hall of India, New Delhi, 4th Edition,2008.

REFERENCE BOOKS:

1. Kandasamy P, Thilagavathy K. and Gunavathy.K, "Numerical Methods", S.Chand Co. Ltd., New Delhi, 2003.
2. Gerald C.F. and Wheateley P.O., "Applied Numerical Analysis", Pearson Education, New Delhi, 6th Edition, 2006.
3. GrewaL B.S. and Grewal J.S., "Numerical methods in Engineering and Science", Khanna Publishers, New Delhi, 9th Edition, 2007.
4. Chapra S.C. and Canale R.P., "Numerical Methods for Engineers", Tata McGraw-Hill, New Delhi, 5th Edition, 2007.

01UEE402	AC MACHINES	L	T	P	C
		3	1	0	4

OBJECTIVES:

- To impart knowledge on theory and performance characteristics of Induction machines, Synchronous machines
- To familiarize the operation and performance characteristics of fractional horse power motors.

UNIT I THREE-PHASE INDUCTION MOTORS **9+3**

Construction details- Principle of operation – Types of rotors – Torque equation – Torque-Slip characteristics. Maximum torque – Effect of rotor resistance. Equivalent circuit -Phasor diagram – Performance calculation from circle diagram, Losses and Efficiency, Double cage rotor- induction generator- synchronous induction motor.

UNIT II THREE PHASE INDUCTION MOTOR STARTING & SPEED CONTROL METHODS **9+3**

Starters – DOL, Auto-Transformer, Star-Delta and Rotor resistance starters –Crawling and Cogging – Electrical Braking - Speed control by rotor resistance, Pole changing ,cascaded connection - change of supply voltage and frequency, injection of EMF in the rotor circuit, Slip power recovery Scheme.

UNIT III SYNCHRONOUS GENERATOR **9+3**

Types and construction - EMF equation –Armature reaction- Synchronous reactance and impedance- Voltage regulation by EMF, MMF, ZPF and ASA methods- Parallel operation- load characteristics, salient pole machine.- Blondel two reaction theory for salient pole machine - Slip test for the measurement of Xd and Xq - Phasor diagram using Xd, and Xq – Capability curves.

UNIT IV SYNCHRONOUS MOTOR **9+3**

Principle of operation – Torque Equation - Methods of starting –-Operation on infinite bus bar. Phasor diagrams – V-curves and Inverted V-curves – Current loci for constant power input, constant excitation and constant power developed— Hunting and methods of Suppression Synchronous condensers.

UNIT V SINGLE PHASE MOTORS **9+3**

Principle of operation of single phase induction motor-Double field revolving field theory – Cross field theory, Equivalent circuit- Performance analysis – Starting method of single phase induction motor-split phase induction motor (resistance & capacitance type), shaded pole, repulsion, A.C. series, Universal motor– Reluctance motor – Hysteresis motor - Linear inductance motor

TOTAL: 45(L)+15 (T) =60 PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Explain the operating principle of AC machines
- Analyze the performance characteristics of induction motors and alternators
- Choose appropriate starting method for a synchronous motor
- Sketch the performance characteristics of synchronous motor
- Differentiate the operating principles of single phase and three phase motors

TEXT BOOKS:

1. Gupta J.B., “Theory and Performance of Electrical Machines”, S.K.Kataria and Sons, 2008.
2. Bhimbhra P.S., “Electrical Machinery”, Khanna Publishers, Eighth Edition, 2003.

REFERENCE BOOKS:

1. Fitzgerald A.E.,Charles Kingsley and Stephen D. Umans, “Electrical Machine Design Data Book”, 2003.
2. Say M.G., “ Alternating Current Machines”, Fifth Edition.1990.
3. Theraja B.L., “A Text Book of Electrical Technology”, S.Chand & Co. Ltd, 2007.
4. Murugesh Kumar K., “Electric Machines”, Vikas publishing house Pvt Ltd, 2002.
5. Mehta V.K., “Principles of Electrical Machines ”, S.Chand & Co. Ltd, 2007.

01UEE403 **TRANSMISSION AND DISTRIBUTION**

L	T	P	C
3	0	0	3

OBJECTIVES:

- To impart knowledge on the computation of transmission line parameters and modeling of transmission lines
- To understand the operation of the different distribution schemes.

UNIT I STRUCTURE OF POWER SYSTEM 9

Structure of electric power system: generation, transmission and distribution; Types of AC and DC distributors – distributed and concentrated loads – interconnection – EHVAC and HVDC transmission -Introduction to FACTS.

UNIT II TRANSMISSION LINE PARAMETERS 9

Parameters of single and three phase transmission lines with single and double circuits - Resistance, inductance and capacitance of solid, stranded and bundled conductors, Symmetrical and unsymmetrical spacing and transposition - application of self and mutual GMD; skin and proximity effects - interference with neighboring communication circuits - Typical configurations, conductor types and electrical parameters of EHV lines, corona discharges.

UNIT III MODELLING AND PERFORMANCE OF TRANSMISSION LINES 9

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

UNIT IV INSULATORS AND CABLES 9

Insulators - Types, voltage distribution in insulator string, improvement of string efficiency, testing of insulators. Underground cables - Types of cables, Capacitance of Single-core cable, Grading of cables, Power factor and heating of cables, Capacitance of 3- core belted cable, D.C cables.

UNIT V MECHANICAL DESIGN OF LINES AND GROUNDING 9

Mechanical design of transmission line – sag and tension calculations for different weather conditions, Tower spotting, Types of towers, Substation Layout (AIS, GIS), Methods of grounding.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Explain the concepts of Electric power systems
- Compute transmission line parameters
- Model the equivalent circuit for different types of transmission lines
- Analyze the voltage distribution in insulator strings and cables

TEXT BOOKS:

1. Kothari D. and Nagarath I.J., “Power System Engineering”, Tata McGraw-Hill Publishing Company limited, New Delhi, Second Edition, 2008.
2. Wadhwa C.L., “Electrical Power Systems”, New Academic Science Ltd, 2009.
3. Singh S.N., “Electric Power Generation, Transmission and Distribution”, Prentice Hall of India Pvt. Ltd, New Delhi, Second Edition, 2011.

REFERENCE BOOKS:

1. Gupta B.R and Chand S., “Power System Analysis and Design”,New Delhi, Fifth Edition, 2008.
2. Luces M. Fualkenberry and Walter Coffer, “Electrical Power Distribution and Transmission”, Pearson Education, 2007.
3. Hadi Saadat, “Power System Analysis”, PSA Publishing; Third Edition, 2010.
4. Brian J., Hardy and Colin R.Bayliss , “Transmission and Distribution in Electrical Engineering”,Newnes; Fourth Edition, 2012.
5. Ramamurthy G., “Handbook of Electrical power Distribution” , Universities Press, 2013

01UEE404	ANALOG INTEGRATED CIRCUITS (Common to ICE & EEE)	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To impart knowledge on the characteristics of OPAMP and IC fabrication procedure
- To introduce the design of OPAMP based application circuits.

UNIT I IC FABRICATION 9

IC classification, fundamental of monolithic IC technology, epitaxial growth, masking and etching, diffusion of impurities. Realization of monolithic ICs and packaging. Fabrication of diodes, capacitance, resistance and FETs.

.

UNIT II CHARACTERISTICS OF OPAMP 9

Ideal OP-AMP characteristics, DC characteristics, AC characteristics, offset voltage and current: Voltage series feedback and shunt feedback amplifiers, differential amplifier; frequency response of OP-AMP; Basic applications of op-amp – summer, differentiator and integrator.

UNIT III APPLICATIONS OF OPAMP 9

Instrumentation amplifier, first and second order active filters, V/I & I/V converters, comparators, multivibrators, waveform generators, clippers, clampers, peak detector, S/H circuit, Log and antilog amplifiers, D/A converter (R-2R ladder and weighted resistor types), A/D converter - Dual slope, successive approximation and flash types

UNIT IV SPECIAL ICs 9

555 Timer circuit – Functional block, characteristics & applications; 566-voltage controlled oscillator circuit; 565-phase lock loop circuit functioning and applications, Analog multiplier ICs.

UNIT V APPLICATION ICs 9

IC voltage regulators - LM317, 723 regulators, switching regulator, MA 7840, LM 380 power amplifier, ICL 8038 function generator IC, isolation amplifiers, opto coupler, opto electronic ICs.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Explain the IC fabrication procedure
- Design various signal conditioning circuits using op-amp
- Describe the operation of various special application ICs
- Choose appropriate Analog IC for a given Application

TEXT BOOKS:

1. Ramakant A.Gayakward, “Op-amps and Linear Integrated Circuits”, Pearson Education, Fourth Edition, 2003.
2. Roy Choudhary D. and Sheil B. Jani, “Linear Integrated Circuits”, New Age, second Edition,2003.

REFERENCE BOOKS:

1. Jacob Millman. and Christos C. Halkias, “ Integrated Electronics - Analog and Digital circuits system”, Tata McGraw Hill,2003.
2. Robert F. Coughlin and Fredrick F. Driscoll, “Op-amp and Linear ICs”, Pearson Education Fifth Edition., 2002
3. David A. Bell, “Op-amp & Linear ICs”, Prentice Hall of India, 1997.
4. Sergio Franco, “Design with operational amplifiers and analog integrated circuits”, Tata McGraw –Hill, second Edition, 2002.

01UEE405 **ELECTRICAL MEASUREMENTS AND INSTRUMENTATION**

L	T	P	C
3	0	0	3

OBJECTIVES:

- To introduce the general instrument system, error, calibration etc.
- To familiarize the comparison methods of measurement.
- To explain storage and display devices, various transducers and data acquisition system

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 Watt meters and energy meters, Trivector meter - Maximum Demand Indicator – Magnetic measurements – Determination of B-H curve and measurements of iron loss – Instrument transformers – Instruments for measurement of frequency and phase, Power factor meter.

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 – Multiple earth and earth loops - Electrostatic and electromagnetic interference – Grounding techniques.

UNIT IV STORAGE AND DISPLAY DEVICES 9

Magnetic disk and tape – Recorders, digital plotters and printers, CRT display, Storage CRO - Multiple trace digital CRO- dot matrix display – Data Loggers.

UNIT V TRANSDUCERS AND DATA ACQUISITION SYSTEMS 9

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

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Explain static and dynamic characteristics of an instrument
- Choose an appropriate measuring instrument for a given electrical or electronic parameters
- Design a bridge circuit to measure resistance or impedance
- Discuss the operation of various monitoring and recording devices.

- Summarize the selection factors of transducers and their classification based on working principle

TEXT BOOKS:

1. Doebelin E.O, "Measurement Systems – Application and Design", Tata McGraw Hill publishing company, 2003 .
2. Sawhney A.K. , "A Course in Electrical & Electronic Measurements & Instrumentation ", Dhanpat Rai and Co, 2004

REFERENCE BOOKS:

1. Bouwens A.J., " Digital Instrumentation ", Tata McGraw Hill, 1997
2. Moorthy D.V.S., "Transducers and Instrumentation ", Prentice Hall of India Pvt Ltd, 2007
3. Kalsi H.S., " Electronic Instrumentation ", Tata McGraw Hill, II Edition, 2004
4. Martin Reissland., "Electrical Measurements", New Age International (P) Ltd, 2001.
5. Gupta J. B., "A Course in Electronic and Electrical Measurements", S. K. Kataria & Sons, 2003.

01UIT424	DATA STRUCTURES AND ALGORITHMS (Common to ICE, EEE & EIE)	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To review the basic concepts and applications of OOPs
- To explain the systematic way of solving problems using various data structures
- To demonstrate implement the different data structures

UNIT I PRINCIPLES OF OBJECT ORIENTED PROGRAMMING 9

Introduction-Tokens-Expressions-Control Structures-Functions in C++, Classes and Objects, Constructors and Destructors, Operator overloading.

UNIT II ADVANCED OBJECT ORIENTED PROGRAMMING 9

Inheritance, Extending classes, pointers, Virtual functions and polymorphism, File Handling templates, Exception handling, Manipulating strings.

UNIT III DATA STRUCTURES AND ALGORITHMS 9

Algorithm, Abstract Data Types, Lists, Stacks and queues- Application of List, Stack and Queues, Priority queues- Hashing.

UNIT IV NONLINEAR DATA STRUCTURES 9

Trees- Binary trees, Binary search tree, AVL trees, Graph Algorithms-Topological sort, shortest path algorithm - Minimum spanning tree - Introduction to NP - completeness.

UNIT V SORTING AND APPLICATIONS OF DATA STRUCTURES 9

Sorting –Bubble Sort – Selection Sort - Insertion sort, Shell sort, Heap sort, Merge sort, Quick sort, Bucket sort. Introduction to Algorithm Design Techniques – Greedy algorithm (Minimum Spanning Tree), Divide and Conquer (Merge Sort).

TOTAL : 45 PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Summarize basic oops concepts for an appropriate application
- Identify the suitable data structure for various applications
- Demonstrate search trees using data structures
- Analyze the efficiency of algorithms

TEXT BOOKS:

1. E.Balagurusamy, “Object oriented programming with C++”,Tata Mc Graw Hill, Sixth Edition, 2013.
2. Weiss. M.A, “Data Structures and Algorithm Analysis in C++”, Pearson Education, Fourth Edition, 2014.

REFERENCE BOOKS:

1. Joshva Devadas.T, A. Chandrababu. “A Programming with C++”, Narosa Publishing House, First Edition, 2009.
2. Stroustrup.B, “The C++ Programming language”, Pearson Education, Third Edition, 2004.
3. Aho.V, Hopcroft.J.E. and Ullman.J.D, “Data Structures and Algorithms”, Pearson Education, First Edition Reprint, 2003.
4. Gilberg.R.F, Forouzan.B.A, “Data Structures”, Thomson India, Pearson Education, Second Edition, 2000.

01UGS431

QUALITATIVE AND QUANTITATIVE APTITUDE	L	T	P	C
	1	0	0	1

OBJECTIVES :

- To make the student acquire sound knowledge of the characteristic of quantitative and qualitative aptitude
- To familiarize the student with various principles involved in solving mathematical problems.
- To develop an understanding of the basic concepts of reasoning skills.

UNIT I QUANTITATIVE APTITUDE 8

Numbers – HCF and LCM - Arithmetic and Geometric Progression – Averages –Percentages – Problems on ages – Profit and Loss – Simple and Compound Interest - Ratio and Proportion – Time – Speed – Distance – Work – Pipes and Cistern – Problems on Trains – Alligation or Mixture– Permutation and Combination – Clocks – Calendars.

UNIT II NON VERBAL AND LOGICAL REASONING 7

Analytical Reasoning – Critical reasoning – Circular and Linear arrangement – Direction problems – Blood relations – Analogy – Odd Man Out – Attention to detail - Logical Reasoning – Venn Diagrams – Deductive and Inductive reasoning – Statement and Conclusion, Statement and Implications – Brain Teasers – Letter series & arrangement – Alpha Numeric Series – Syllogism - Coding – Decoding.

TOTAL = 15 PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Solve the problems on commercial mathematics.
- Compute problems on Ratio, Proportions.
- Choose appropriate statistical tools for data analysis.
- Interpret the graphical and numerical data.

WEBSITES:

www.tcyonline.com , www.m4maths.com, www.indiabix.com , www.fresherworld.com, www.careerbless.com

TEXT BOOKS:

1. Dr. R.S.Agarwal, "Quantitative Aptitude", S. Chand Publications, New Delhi, 17th Edition, (2010).
2. Trishna Knowledge Systems, "Quantitative Aptitude", Pearson Education, South Asia, 2nd Edition, (2009).

REFERENCE BOOKS:

1. Abijit Guha, "Quantitative Aptitude for Competitive Examinations", Tata McGraw Hill Publication, New Delhi, 4th Edition, (2011).
2. Dr. V.A.Sathgurunath's "A Guide for Campus Recruitment", Sagarikka Publications, Thiruchirapalli, 3rd Edition, (2011).
3. NISHIT K.Sinha "Quantitative Aptitude for CAT", Pearson Publication, New Delhi, 2nd Edition, (2009).
4. Dr. N.K.Singh, "Quantitative Aptitude Test", Upkars Prakashan Publications, Agra, Revised Edition, (2013).

01UEE408	AC MACHINES LABORATORY	L	T	P	C
		0	0	3	2

OBJECTIVE:

- To demonstrate the performance characteristics of Synchronous machines, Induction machines and Alternators

LIST OF EXPERIMENTS

1. Regulation of three phase alternator by emf and mmf methods.
2. Regulation of three phase alternator by ZPF and ASA methods.
3. Regulation of three phase salient pole alternator by slip test.
4. Load test on three phase alternator.
5. V and Inverted V curves of Three Phase Synchronous Motor.
6. Load test on three-phase 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. No load and blocked rotor test on single-phase induction motor.
11. Measurements of negative sequence and zero sequence impedance of alternators.

TOTAL : 45 PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Calculate the percentage of regulation of three phase Alternator by various methods
- Estimate the performance parameters of Synchronous and Induction motors
- Sketch the characteristics curves of synchronous machines
- Demonstrate parallel operation of three phase alternators

HARDWARE REQUIREMENT

S.No.	Description of Equipment	Quantity Required
1.	DC shunt motor coupled three phase alternator	
2.	Synchronous motor	

3.	Three phase induction motors-	
	Squirrel cage	2
	Slip ring	1
4.	DC Shunt motor coupled salient pole three phase alternator	1
5.	Single phase induction motors	2
6.	Air core inductor to do ZPF	1
7.	Starter	
	Three phase induction motor starters	1
	Single phase induction motor starters	1
8.	Meters-	
	Voltmeter (MI)	15
	Ammeter (MI)	15
	Wattmeter (LPF)	15
	Wattmeter (UPF)	30
9	Double element wattmeters of different ranges	4
10	Three phase auto transformer	5
11.	Rheostats of various range	12
12.	Power factor meter	2
13.	Inductive load	

01UIT429	DATA STRUCTURES AND ALGORITHMS LABORATORY (Common to ICE, EEE & EIE)	L	T	P	C
		0	0	3	2

OBJECTIVE:

- To demonstrate the concepts of Data Structures using Object Oriented Programming

LIST OF EXPERIMENTS

1. Write a C++ program using classes with primitive data members and objects.
2. Write a C++ program to create classes with constructor, destructor and copy constructor.
3. Write a C++ program to perform operator overloading.
4. Write a C++ program to create classes with inheritance concepts.
5. Write a C++ program to implement a queue using exception handling.
6. Write a C++ program to Implement linked lists.
7. Write a C++ program to Implement stack and use it to convert infix to postfix expression.
8. Write a C++ program to implement an expression tree. Produce its pre-order, in-order, and post order traversals
9. Write a C++ program to implement insertion and deletion in AVL trees.
10. Write a C++ program to sort the given numbers using bubble sort, selection sort, and insertion sort.
11. Write a C++ program to sort the given numbers using quick sort, merge sort, heap sort.
12. Write a C++ program to search the given number using sequential and binary search.

TOTAL: 45 PERIODS

COURSE OUTCOMES :

After the successful completion of this course, the student will be able to

- Apply the basic knowledge of object oriented programming
- Design programs using linear and nonlinear data structures
- Demonstrate application programs using trees
- Resolve the issues in arranging the given data using sorting techniques

HARDWARE AND SOFTWARE REQUIRMENTS :

Computer Required: 30 No's

Minimum Requirement: Processor: Pentium IV, Ram: 1 GB, Hard Disk: 80 GB

Software Requirements:

Operating System: Linux (Ubuntu/Fedora/ Debian /Mint OS) / Windows

01UEE410	DIGITAL AND ANALOG INTEGRATED CIRCUITS LABORATORY	L	T	P	C
		0	0	3	2

OBJECTIVE:

- To inculcate the knowledge on design, testing and characterizing of circuit behaviour using digital and analog ICs

LIST OF EXPERIMENTS

1. Study of Basic Digital IC's. (Verification of truth table for AND, OR, EXOR, NOT, NOR, NAND, JK FF, RS FF, D FF)
2. Implementation of Boolean Functions, Adder/ Subtractor circuits.
3. (a) Code converters, Parity generator and parity checking, Excess-3, 2s Complement, Binary to Gray code using suitable IC's .

   (b) Encoders and Decoders: Decimal and Implementation of 4-bit shift registers in SISO, SIPO, PISO, PIPO modes using suitable IC's.
4. Counters: Design and implementation of 4-bit modulo counters as synchronous and Asynchronous types using FF IC's and specific counter IC.
5. Shift Registers:

   Design and implementation of 4-bit shift registers in SISO, SIPO, PISO, PIPO modes using suitable IC's. Study of 4:1; 8:1 multiplexer and Study of 1:4; 1:8 demultiplexer
6. Timer IC application:

   NE/SE 555 timer in Astable, Monostable operation.
7. Application of Op-Amp:

   Slew rate verifications, inverting and non-inverting amplifier, Adder, comparator, Integrator and Differentiator.
8. Study of Comparator with Hysteresis
9. Study of Analog to Digital Converter and Digital to Analog Converter: Verification of A/D conversion using dedicated IC's.
10. Study of VCO and PLL ICs:

    i. Voltage to frequency characteristics of NE/ SE 566 IC.

    ii. Frequency multiplication using NE/SE 565 PLL IC.

TOTAL : 45 PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Construct digital circuits using Boolean functions
- Illustrate the operation of counters and shift registers
- Demonstrate monostable and astable operation of 555 timer
- Design simple analog computational circuits using IC741

HARDWARE REQUIRMENTS:

S.No.	Description of Equipment	Quantity Required
1	Dual Regulated Power Supply Single Regulated Power Supply	4 each
2	CRO and Function Generator	3 each
3	Digital IC trainer Kit	15
4	Analog IC trainer kit	4
5	Components and bread boards	10 each
6	Chips IC – 7400	10
7	Chips IC – 7402	10
8	Chips IC – 7408	10
9	Chips IC – 7432	10
10	Chips IC – 7410	25
11	Chips IC – 555, IC-566, IC-565	Each 10
12	Chips IC – 741	10
13	Chips IC – 74153	10
14	Chips IC – 7474	10
15	Chips IC – 7490	10
16	Chips IC – 7447	10

01UEE501 **POWER ELECTRONICS**

L	T	P	C
3	0	0	3

OBJECTIVES

- To review the different types of power semiconductor devices and their switching characteristics
- To impart knowledge on converters and inverters

UNIT I POWER SEMI-CONDUCTOR DEVICES 9

Study of switching devices, - Frame, Driver and snubber circuit of SCR, TRIAC, BJT, IGBT, MOSFET,- Turn-on and turn-off characteristics, switching losses, Turn-on methods - Commutation circuits for SCR.

UNIT II PHASE-CONTROLLED CONVERTERS 9

2-pulse, 3-pulse and 6-pulse converters – Effect of source inductance – performance parameters – Reactive power control of converters – Dual converters - Battery charger.

UNIT III DC TO DC CONVERTER 9

Step-down and step-up chopper -- Multiphase chopper operation - Forced commutated chopper– Voltage commutated, Current commutated, Load commutated – Buck, boost, buck-boost converter, concept of Resonant switching – Application of Choppers

UNIT IV INVERTERS 9

Single phase and three phase (both 120 mode and 180 mode) inverters - PWM techniques: Sinusoidal PWM modified sinusoidal PWM - multiple PWM – Introduction to space vector modulations - Voltage and harmonic control - Series resonant inverter - Current source inverter, Introduction to Multilevel Inverter, Applications of Inverters.

UNIT V AC TO AC CONVERTERS 9

Single and three phase AC voltage controllers – Multistage sequence control - single and three phase cyclo converters –Introduction to Integral cycle control, Power factor control and Matrix converters, AC motor speed control applications.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Illustrate the characteristics of various power electronic switching devices
- Calculate the performance parameters of phase controlled converters
- Analyze the following converters using semiconductor switching devices AC-DC, AC-AC, DC-DC, DC-AC
- Design ac –ac converters for motor speed control applications

TEXT BOOKS:

1. Rashid M.H, “Power Electronics: Circuits, Devices and Applications ”, Pearson Education, PHI Third edition, 2004.
2. Bimbra P.S., “Power Electronics ”, Khanna Publishers, Third edition, 2003

REFERENCE BOOKS:

1. Ashfaq Ahmed, “ Power Electronics for Technology ”,Pearson Education, 2003 .
2. Philip T. Krein, “ Elements of Power Electronics ”, Oxford University Press, 2004
3. Ned Mohan,Tore M. Undeland and William P. Robbins, “Power Electronics: Converters, Applications and Design ”, John Wiley and sons, Third edition, 2003
4. Alok Jain, “Power Electronics and its applications”, Pernam International Publishing (IND) Pvt ltd, Second edition, 2003

01UEE502 **CONTROL SYSTEMS** **L T P C**

3 1 0 4

OBJECTIVES:

- To familiarize with time and frequency response of the system
- To impart knowledge on stability analysis of the system
- To introduce state variable representation of physical systems and study the effect of state feedback

UNIT I SYSTEMS AND THEIR REPRESENTATION 9+3

Basic elements in control systems – Open and closed loop systems – Electrical analogy of mechanical and thermal systems – Transfer function – Synchros – AC and DC servomotors – Block diagram reduction techniques – Signal flow graphs.

UNIT II TIME RESPONSE 9+3

Time response – Time domain specifications – Types of test input–I and II order system response –Error coefficients – Generalized error series – Steady state error – Root locus construction- Effects of P, PI, PID modes of feedback control –Time response analysis.

UNIT III FREQUENCY RESPONSE 9+3

Frequency response – Bode plot – Polar plot – Determination of closed loop response from open loop response - Correlation between frequency domain and time domain specifications- Effect of Lag, lead and lag-lead compensation on frequency response- Analysis.

UNIT IV STABILITY AND COMPENSATOR DESIGN 9+3

Characteristics equation – Routh Hurwitz criterion – Nyquist stability criterion- Performance criteria –Lag, lead and lag-lead networks – Lag/Lead compensator design using bode plots.

UNIT V STATE VARIABLE ANALYSIS 9+3

Concept of state variables – State models for linear and time invariant Systems – Solution of state and output equation in controllable canonical form – Concepts of controllability and observability –Effect of state feedback.

TOTAL: 45 (L) + 15 (T) = 60 PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Derive transfer function of the given system using block diagram reduction and Mason's gain formula
- Compute time response parameters and steady state errors of Linear Time Invariant Systems
- Sketch the frequency response of a given system using Bode and Polar plots
- Analyze the stability of the control system using analytical and graphical methods.
- Describe state variable representation of physical systems

TEXT BOOKS:

1. Gopal M., “Control Systems, Principles and Design”, 4th Edition, Tata McGraw Hill, New Delhi, 2012
2. S.K.Bhattacharya, Control System Engineering, 3rd Edition, Pearson, 2013.

REFERENCE BOOKS:

1. Richard C. Dorf and Robert H. Bishop, “ Modern Control Systems”, Pearson Prentice Hall, 2012.
2. Ogata K., “ Modern Control Engineering”, 5th edition, PHI, 2012.
3. Sivanandam S.N. and Deepa S.N., “Control System Engineering using Mat Lab”, 2nd Edition, Vikas Publishing, 2012.
4. Palani S. and Anoop. K.Jairath, “Automatic Control Systems including Mat Lab”, Vijay Nicole/ Mcgraw Hill Education, 2013.

01UEE503	POWER SYSTEM ANALYSIS	L	T	P	C
		3	1	0	4

OBJECTIVES:

- To familiarize with solving of power flow problems using efficient numerical methods suitable for computer simulation.
- To discuss about the power systems under abnormal conditions for both balanced and unbalanced load
- To impart knowledge on stability analysis of power system

UNIT I INTRODUCTION 9+3

Modern power system (or) electric energy system - Analysis for system planning and operational studies – basic components of a power system. Generator models - transformer model – transmission system model - load representation. Single line diagram – per phase and per unit representation – change of base. Simple building algorithms for the formation of Y-Bus matrix and Z-Bus matrix.

UNIT II POWER FLOW ANALYSIS 9+3

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. Iterative solution using Gauss-Seidel method - Q-limit check for voltage controlled buses - Iterative solution using Newton-Raphson (-N-R) method (polar form) - Jacobian matrix elements – algorithm and flow chart - Development of Fast Decoupled Power Flow (FDPF) model and iterative solution – algorithm and flowchart.

UNIT III FAULT ANALYSIS – BALANCED FAULTS 9+3

Importance short circuit (or) for fault analysis - basic assumptions in fault analysis of power systems. Symmetrical (or) balanced three phase faults – problem formulation – fault analysis using Z-bus matrix – algorithm and flow chart. Computations of short circuit capacity, post fault voltage and currents.

UNIT IV FAULT ANALYSIS – UNBALANCED FAULTS 9+3

Introduction to symmetrical components – sequence impedances – sequence networks – representation of single line to ground, line to line and double line to ground fault conditions. Unbalanced fault analysis - problem formulation – analysis using Z-bus impedance matrix – (algorithm and flow chart.).

UNIT V STABILITY ANALYSIS 9+3

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 by using step by step method modified Euler method and Runge-Kutta second order method. Algorithm and flow chart.

TOTAL : 45 (L) + 15 (T) = 60 PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Model the power system under steady state operating condition and abnormal (or) fault conditions
- Apply numerical methods to solve the power flow problem
- Analyze the transient behavior and stability of power system when it is subjected to a fault
- Design a power system based on the requirements and realistic constraints

TEXT BOOKS:

1. Nagrath I.J. Kothari D.P, "Modern Power System Analysis", Tata McGraw-Hill, Forth Edition, 2011 .
2. John J.Grainger and W.D.Stevenson Jr., "Power System Analysis", Tata McGraw-Hill, Sixth reprint, 2010.

REFERENCE BOOKS:

1. Hadi Saadat, "Power System Analysis", Tata McGraw Hill Education Pvt. Ltd., New Delhi, 21st reprint, 2010.
2. Kundur P. , "Power System Stability and Control", Tata McGraw-Hill Education Pvt. Ltd., New Delhi, 10th reprint, 2010.
3. Olle. I. Elgerd, " Electric Energy Systems Theory – An Introduction ", Tata McGraw Hill Publishing Company Limited, New Delhi, Second Edition, 2012.
4. P.Venkatesh, B.V.Manikandan, S.Charles Raja, A.Srinivasan, "Electrical Power Systems Analysis, Security and Deregulation", PHI Learning Private Limited, New Delhi, 2012.

01UEE504	MICROPROCESSORS AND MICROCONTROLLER PROGRAMMING	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To familiarize the architecture, addressing modes and instruction sets of µP8085 & µC 8051
- To inculcate knowledge on programming using 8085 & 8051and interfacing

UNIT I 8085 PROCESSOR 9

Hardware Architecture, pin outs – Functional Building Blocks of Processor – Memory organization – I/O ports and data transfer concepts– Timing Diagram – Interrupts.

UNIT II PROGRAMMING OF 8085 PROCESSOR 9

Instruction format and addressing modes – Assembly language format – Data transfer, data manipulation & control instructions – Programming: Loop structure with counting & Indexing – Look up table - Subroutine instructions - stack.

UNIT III 8051 MICRO CONTROLLER 9

Hardware Architecture, pin outs – Functional Building Blocks of Processor – Memory organization – I/O ports and data transfer concepts– Timing Diagram – Interrupts-Comparison to Programming concepts with 8085.

UNIT IV PERIPHERAL INTERFACING 9

Study on need, Architecture, configuration and interfacing with ICs: 8255, 8259, 8254, 8237, 8251, 8279 ,- A/D and D/A converters &Interfacing with 8085 & 8051.

UNIT V MICRO CONTROLLER PROGRAMMING AND APPLICATIONS 9

Data Transfer, Manipulation, Control Algorithms & I/O instructions – Simple programming exercises key board and display interface – Closed loop control of servo motor- stepper motor control – Washing Machine Control.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Describe the architecture and interrupts of 8085 /8051, microprocessors/microcontroller
- Develop coding for simple task using 8085/8051 instruction sets

- Choose an appropriate interfacing device to interface different peripherals with microprocessor and microcontroller
- Apply the programming techniques in developing the assembly language program for microcontroller based simple applications

TEXT BOOKS:

1. Krishna Kant, “Microprocessor and Microcontrollers”, Eastern Company Edition, Prentice Hall Of India, New Delhi , 2007.
2. Muhammad Ali Mazidi , Janice Gilli Mazidi and R.D.Kinel, “The 8051 Micro Controller and Embedded Systems”, PHI Pearson Education, 5th Indian reprint, 2003.

REFERENCE BOOKS:

1. Gaonkar R.S., “Microprocessor Architecture Programming and Application”, with 8085, Wiley Eastern Ltd., New Delhi, 2013.
2. Soumitra Kumar Mandal, “Microprocessor & Microcontroller Architecture, Programming & Interfacing using 8085, 8086, 8051”, McGraw Hill Edu,2013.
3. Senthil Kumar N., Saravanan M., Jeevananthan S., “Microprocessors and Microcontrollers”, Oxford,2013.
4. Godse A.P., Godse G.P,“Microprocessors &Microcontrollers ”, Technical Publication, 2010.

01UEE505	PROTECTION AND SWITCH GEAR	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To introduce the characteristics and functions of relays and protection schemes
- To impart knowledge on apparatus protection and functioning of circuit breakers
- To introduce static and numerical relays

UNIT I PROTECTION SCHEMES 9

Principles and need for protective schemes – nature and causes of faults – types of faults – fault current calculation using symmetrical components – Methods of Neutral grounding – Zones of protection and essential qualities of protection – Protection schemes

UNIT II ELECTROMAGNETIC RELAYS 9

Operating principles of relays - the Universal relay – Torque equation – R-X diagram – Electromagnetic Relays – Over current, Directional, Distance, Differential, Negative sequence and Under frequency relays.

UNIT III APPARATUS PROTECTION 9

Current transformers and Potential transformers and their applications in protection schemes - Protection of transformer, generator, motor, bus bars and transmission line.

UNIT IV STATIC RELAYS AND NUMERICAL PROTECTION 9

Static relays – Phase, Amplitude Comparators – Synthesis of various relays using Static comparators– Block diagram of Numerical relays – Over current protection, transformer differential protection and distant protection of transmission lines.

UNIT V CIRCUIT BREAKERS 9

Physics of arcing phenomenon and arc interruption - DC and AC circuit breaking – re-striking voltage and recovery voltage - rate of rise of recovery voltage - resistance switching - current chopping -interruption of capacitive current - Types of circuit breakers – air blast, air break, oil, SF6 and vacuum circuit breakers – comparison of different circuit breakers – Rating and selection of Circuit breakers.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Ability to understand and analyze power system operation, stability, control and protection.
- Explain the causes of faults, lightning and switching surges of the apparatus and system.
- Illustrate the characteristics and functions of relays and protection schemes.
- Describe the apparatus protection
- Analyze the functions of circuit breakers

TEXT BOOKS:

1. Sunil S.Rao, “Switch gear and Protection”, Khanna Publishers, New Delhi, 2008.
2. Rabindranath B. and Chander N., “Power System Protection and Switchgear”, New Age International (P) Ltd., First Edition 2011.
3. Soni M.L., Gupta P.V., Bhatnagar U.S. and Chakrabarti A., “A Text Book on Power System Engineering”, Dhanpat Rai& Co.,1998.

REFERENCE BOOKS:

1. BadriRam B.H. Vishwakarma, “Power System Protection and Switchgear”, New Age International Pvt Ltd Publishers, Second Edition, 2011.
2. Paithankar Y.G. and Bhide S.R., “Fundamentals of power system protection”, Second Edition, Prentice Hall of India Pvt. Ltd., New Delhi, 2010.
3. Wadhwa C.L., “Electrical Power Systems”, 6th Edition, New Age International (P) Ltd., 2010
4. Ravindra P.Singh, “Switchgear and Power System Protection”, PHI Learning Private Ltd., NewDelhi, 2009.
5. BhaveshBhalja, Maheshwari R.P. and Nilesh G. Chotani, “Protection and Switchgear”, Oxford University Press, 2011.

01UEC523	COMMUNICATION ENGINEERING (Common to ICE , EEE & EIE)	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To introduce the fundamentals of analog and digital communication
- To provide the knowledge of various coding techniques for data transmission
- To impart the knowledge of satellite and optical fiber communication

UNIT I ANALOG COMMUNICATION **9**

AM – Frequency spectrum – vector representation – power relations – generation of AM – DSB,DSB/SC, SSB, VSB AM Transmitter & Receiver; FM and PM – frequency spectrum – power relations : NBFM & WBFM, Generation of FM and DM, Armstrong method & Reactance modulations :FM & PM frequency.

UNIT II DIGITAL COMMUNICATION **9**

Pulse modulations – concepts of sampling and sampling theorems, PAM, PWM, PPM, PTM, quantization and coding : DCM, DM, slope overload error. ADM, DPCM, OOK systems – ASK, FSK,PSK, BSK, QPSK, QAM, MSK, GMSK, applications of Data communication

UNIT III OURCE CODES, LINE CODES & ERROR CONTROL **9**

Primary communication – entropy, properties, BSC, BEC, source coding: Shannon- Fano, Huffman coding: noiseless coding theorem, BW – SNR trade off ,codes: NRZ, RZ, AMI, HDBP, ABQ, MBnB codes: Efficiency of transmissions, error control codes and applications: convolutions & block codes.

UNIT IV MULTIPLE ACCESS TECHNIQUES **9**

SS&MA techniques: FDMA, TDMA, CDMA, SDMA application in wire and wireless Communication: Advantages (merits)

UNIT V SATELLITE, OPTICAL FIBER – POWERLINE, SCADA **9**

Orbits: types of satellites: frequency used link establishment, MA techniques used in satellite Communication, earth station; aperture actuators used in satellite – Intelsat and Inset: fibers – types: sources, detectors used, digital filters, optical link: power line carrier communications: SCADA

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Compare different kind of analog and digital modulation techniques in terms of generation demodulation , power and bandwidth requirement
- Analyze the error performance of various coding techniques used for data transmission
- Explain the techniques used in satellite and optical fiber communication

TEXT BOOKS:

1. Taub & Schiling, "Principles of communication systems" , Tata McGraw hill, 2007.
2. Das J., "Principles of digital communication" , New Age International, 1986

REFERENCE BOOKS:

1. Kennedy and Davis, "Electronic communication systems", Tata McGraw hill , 4th Edition, 1993.
2. Sklar, "Digital communication fundamentals and applications" , Pearson Education, 2001.
3. Bary le, "Memuschmidt, digital Communication" , Kluwer Publication, , 2004.
4. Amitabha Bhattacharya, "Digital Communication", TMH 2006

01UEE507	POWER ELECTRONICS LABORATORY	L	T	P	C
		0	0	3	2

OBJECTIVE:

- To demonstrate the performance and characteristics of power semiconductor devices, converters and inverters

LIST OF EXPERIMENTS

1. Characteristics of SCR
2. Characteristics of DIAC and TRIAC
3. Characteristics of MOSFET and IGBT
4. Transient characteristics of SCR and MOSFET
5. AC to DC fully controlled converter
6. AC to DC half-controlled converter
7. Step down and step up MOSFET based choppers
8. IGBT based single-phase PWM inverter
9. IGBT based three-phase PWM inverter
10. Resonant dc-to-dc converter
11. THD analysis in Multilevel Inverter
12. Simulation of Power electronic circuits using MATLAB
13. Study of battery charger, UPS and SMPS.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Sketch the characteristics curves of different switching devices.
- Analyze the operation of AC/DC fully and half controlled converters
- Demonstrate the operation of switching devices in chopper circuits
- Obtain the output of inverters for different duty cycle
- Simulate simple power electronic circuits using suitable simulation tool

HARDWARE REQUIREMENT:

S.No.	Description of Equipment	Quantity Required
1.	Device characteristics (for SCR, MOSFET, TRIAC and IGBT) kit with built in power supply & meters	2 each
2.	SCR firing circuit module	2 Nos.
3.	Single phase SCR based ½ controlled converter & fully controlled converter along with built-in / separate / firing circuit / module and meter	2 each
4.	MOSFET based step up and step down choppers	1 each
5.	IGBT based single phase PWM inverter module	2 Nos.
6.	IGBT based three phase PWM inverter module	2 Nos.
7.	IGBT based high switching frequency chopper module with built-in controller	2 Nos.
8.	Resonant DC-DC converter module with built in power supply and controller	2 Nos.
9.	SCR & TRIAC based 1 phase A.C.phase controller along with lamp or rheostat load	4
10.	SCR based V/I commuted chopper module with relevant firing module(separate or built-in)	4
11.	Dual regulated DC power supply with common ground	4
12.	Cathode Ray Oscilloscope	5
13.	Isolation Transformer	5
14.	Single phase Auto transformer	3
15.	Components (Inductance, Capacitance)	3 sets for each
16.	Multi meter	5
17.	LCR meter	3
18.	Rheostats of various ranges	2 sets of 10 value
19.	Work tables	12
20.	DC and AC metes of required ranges	20

01UEE508	CONTROL AND INSTRUMENTATION LABORATORY	L	T	P	C
		0	0	3	2

OBJECTIVES:

- To impart knowledge on analysis and design of control system along with basics of instrumentation

LIST OF EXPERIMENTS:

CONTROLSYSTEMS:

1. Determination of transfer function parameters of Armature controlled and Field controlled of DC (Servo) motor.
2. Determination of transfer function parameters of an AC servomotor.
3. Analog simulation of type-0 and type-1 systems
4. Digital simulation of first order and second order systems
5. DC and AC position control systems.
6. Stepper motor control system
7. Determination of transfer function parameters of DC generators.
8. Design of P, PI and PID controllers.

INSTRUMENTATION:

1. AC bridges.
2. DC bridges.
3. Instrumentation amplifiers.
4. A/D and D/A converters.
5. Measurement of iron loss.
6. Measurement of complex power with Trivector meter and verification

TOTAL : 45 PERIODS

COURSE OUTCOMES:

CONTROLSYSTEMS:

After the successful completion of this course, the student will be able to

- Determine the transfer function parameters of DC (servo) motor, AC (servo) motor and DC generator
- Simulate the response of type-0, type-1, first order and second order system for various test inputs.
- Demonstrate the working of different control system components

INSTRUMENTATION:

After the successful completion of this course, the student will be able to

- Measure resistance and impedance by constructing suitable bridge circuit.
- Predict the amount of core loss and permeability in any ring specimen
- Construct and test instrumentation amplifier, A/D and D/A converters

HARDWARE REQUIREMENT:

CONTROLSYSTEMS:

Sl.No	Description of Equipment	Quantity required
1.	DC Servo motor Field separately excited-loading facility variable voltage source	1
2.	AC servo Motor Minimum of 100w necessary sources for main winding & control winding	1
3.	Rigged up models of type-o & type-1 system using analog components	1
4.	System with MATLAB / MATHCAD (or) equivalent software (or) SCILAB	minimum 3 user license
5.	AC position control kit	1
6.	DC position control kit	1
7.	Stepping Motor	1
	Microprocessor kit	1
8.	DC Generator	1
	Tachometer	1
	Various meters	1 Each
	Stop watch	1
9.	PID controller trainer kit	1

INSTRUMENTATION:

Sl.No	Description of Equipment	Quantity required
1	**AC bridge**	
	a) Maxwell's Inductance – Capacitance Bridge	
	1. Maxwell's inductance Capacitance Bridge kit	1 No.
	2. Multimeter	1 No.
	3. Unknown Inductance	1 No.
	b) SCHERING BRIDGE	
	1. Schering Bridge kit	1 No.
	2. Multimeter	1 No.
	3. Unknown capacitance	1 No.

2.	**DC bridges**. **a) Wheat Stone Bridge** 1. Wheat stone Bridge kit 2. Unknown resistance 3. Multimeter **b) KELVIN'S DOUBLE BRIDGE** 1. Kelvin Double bridge kit 2. Unknown resistance 3. Multimeter	 1 No. 1 No. 1 No. 1 No. 1 No. 1 No.
3	**Instrumentation amplifiers** 1. Operational Amplifier 2. Resistors 3. RPS 4. Voltmeter 5. Multimeter	 1 No. 1 No. 1 No. 1 No. 1 No.
4	**A/D and D/A converters** **a) A/D converters** 1. IC 741 2. DC trainer kit 3. RPS 4. Resistor 5. CRO **b) D/A converters** 1. IC 741 2. DC Trainer kit 3. RPS 4. Resistor 5. CRO	 1 No. 1 No. 1 No. 1 No. 1 No. 1 No. 1 No. 1 No. 1 No. 1 No.
5	**Measurement of iron loss (Maxwell Bridge)** 1. Maxwell bridge set up 2. Ring specimen 3. Ammeter 4. Galvanometer	 1 No. 1 No. 1 No. 1 No.

01UEE509	MICROPROCESSORS AND MICROCONTROLLER PROGRAMMING LABORATORY	L	T	P	C
		0	0	3	2

OBJECTIVE:

- To familiarize with programming of microprocessors and microcontrollers and the interfacing requirements

LIST OF EXPERIMENTS:

1. Simple arithmetic operations: addition / subtraction / multiplication / division.
2. Programming with control instructions:
   - Ascending / Descending order, Maximum / Minimum of numbers
   - Programs using Rotate instructions
   - Hex / ASCII / BCD code conversions.
3. Interface Experiments: with 8085
   A/D Interfacing. & D/A Interfacing.
4. Traffic light controller.
5. I/O Port / Serial communication
6. Programming Practices with Simulators/Emulators/open source
7. Read a key ,interface display
8. Demonstration of basic instructions with 8051 Micro controller execution, including:
   - Conditional jumps, looping
   - Calling subroutines.
9.. Programming I/O Port 8051
   - Study on interface with A/D & D/A
   - Study on interface with DC & AC motor.
10. Mini project development with processors.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Write and execute simple assembly language programs for arithmetic operations using 8085 & 8051
- Interface A/D, D/A converters and simple controllers
- Configure parallel port with 8051 programming
- Program microcontroller using simulation tools and C compiler.

HARDWARE REQUIREMENT

Sl. No.	Description of Equipment	Quantity required
1	8085 Microprocessor Trainer with Power supply	15
2	8051 Micro controller Trainer Kit with power supply	15
3	8255 Interface board	5
4	8251 Interface board	5
5	8259 Interface board	5
6	8279 Keyboard/Display Interface Board	
7	8254 timer counter	5
8	ADC and DAC card	5
9	AC & DC Motor with controller	1 each
10	Traffic Light Control System	5

01UG 531	SOFT SKILLS AND COMMUNICATION LABORATORY (Common to CSE, ECE, EEE & IT)	L	T	P	C
		0	0	2	1

OBJECTIVES :

- To develop a requisite knowledge in soft skills and communication skills.
- To enhance the students' acumen in sharpening the skills to meet the global challenges and industrial needs.

UNIT I COMMUNICATION SKILL **10**

Listening to the Conversation - Introducing Oneself Before Audience - Group Discussion - Formal Letter writing - E Mail Etiquettes - Power Point Presentation

UNIT II PREPARATION FOR INTERVIEWS **10**

Preparation of Resume - Difference between Bio-data and CV- Visiting Company Web site - Gathering Information about Company - Mode of Selection - Different types of Selection Methods – Pre-Placement Talk - Attitude Before Interview.

UNIT III INTERVIEW SKILL **10**

Body Language - Types of Interview - Attending Telephonic Interview – Do's and Don'ts during and after the Interview - Expectation of the Interviewer - Mock Interview.

TOTAL: 30 PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to:

- Present ideas and viewpoints in a very flexible manner in order to differentiate and eliminate ambiguity
- Write well-structured and easily readable reports, e-mails and articles on complex topics in an appropriate style
- Comprehend any spoken language delivered face to face and through different media like telephone and public announcement.

REFERENCE BOOKS:

1. Anderson, P.V, Technical Communication, Thomson Wadsworth, Sixth Edition, New Delhi, 2007.
2. Dr. K.Alex, Soft Skills, know yourself and know the world, Second Revised Edtion2011, S Chand Publication New Delhi-110055

SOFTWARE AND HARDWARE REQUIREMENT:

SOFTWARE:

Globarena and CDs Generated by the Department of English

HARDWARE:

1. 60 Systems
2. LCD Projector
3. Speakers

01UEE601 **ELECTRIC DRIVES AND CONTROL**

L	T	P	C
3	0	0	3

OBJECTIVES:

- To discuss the steady state operation and transient dynamics of a motor load system.
- To explain the operation of the converter / chopper fed dc drive and ac drive
- To impart knowledge on design of current and speed controllers for a closed loop solid state dc motor drive

UNIT I DRIVE CHARACTERISTICS 9

Equations governing motor load dynamics - steady state stability - Multi quadrant dynamics - Acceleration, deceleration, starting and stopping - load torque characteristics of various drives. Digital techniques in speed control - Advantages and limitations - Selection of drives and control schemes for various applications.

UNIT II CONVERTER / CHOPPER FED DC MOTOR DRIVE 9

Steady state analysis of the single and three phase fully controlled converter fed separately excited D.C motor drive - Continuous and discontinuous conduction Time ratio and current limit control – 4 quadrant operation of converter, Microcontroller based control of DC motor drives.

UNIT III INDUCTION MOTOR DRIVES 9

Stator voltage control – energy efficient drive - v/f control, constant air-gap flux – field weakening mode - voltage/current fed inverters - Block diagram of vector control - closed loop control - Microcontroller based control of Induction motor drives.

UNIT IV SYNCHRONOUS MOTOR DRIVES 9

V/f control and self control of synchronous motor: Margin angle control and power factor control – permanent magnet synchronous motor.

UNIT V DESIGN OF CONTROLLERS FOR DRIVES 9

Transfer function for DC motor, load and converter – Closed loop control with current and speed feedback - Armature voltage control and field weakening mode control, Design of controllers: Current controller and speed controller - Converter selection and characteristics - Use of simulation software package.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Explain steady state operation and transient dynamics of a motor load system.
- Analyze the operation of the converter / chopper fed dc drive.

- Illustrate the operation and performance of AC motor drives.
- Analyze the current and speed controllers for a closed loop solid state DC motor drive

TEXT BOOKS:

1. Gopal K.Dubey, “Power Semi conductor controlled drives ”, New Jersey, 1989.
2. Bimal K. Bose, “ Modern Power Electronics and AC Drives ”, PHI / Pearson Education, Eighth Edition, 2002.

REFERENCE BOOKS:

1. De N.K. and Sen S.K, “Electrical Drives”, PHI, 9th Edition, 2009.
2. Vedam Subramanyam, “ Electric Drives: Concepts and Applications” ,Tata McGraw Hill Ltd Pvt. Ltd., 2004
3. Krishnan R, “ Electric Motor & Drives Modeling, Analysis and Control ”, Prentice Hall of India, 2001
4. Eclayton A. and NNHancock,, “The performance and Design of Direct current Machines ”, CBS & Distributors Pvt.Ltd, 2004.

ELECTRICAL MACHINE DESIGN

01UEE602	L	T	P	C
	3	1	0	4

OBJECTIVES:

- To impart knowledge on the design of DC &AC machines
- To introduce the basic design concepts and cooling arrangement of transformer

UNIT I INTRODUCTION 9+3

Major considerations in Electrical Machine Design - Electrical Engineering Materials – Space factor – Choice of Specific Electrical and Magnetic loadings – Thermal considerations - Heat flow – Temperature rise - Rating of machines – Standard specifications.

UNIT II DC MACHINES 9+3

Output Equations – Main Dimensions -Magnetic circuit calculations – Carter's Coefficient - Net length of Iron –Real & Apparent flux densities – Unbalanced Magnetic Pull- Selection of number of poles – Design of Armature – Design of Field winding - Design of commutator and brushes – performance prediction using design values.

UNIT III TRANSFORMERS 9+3

Output Equations – Main Dimensions - KVA output for single and three phase transformers – Window space factor - Overall dimensions – Operating characteristics – Regulation – No load current – Temperature rise in Transformers – Design of Tank - Methods of cooling of Transformers.

UNIT IV INDUCTION MOTORS 9+3

Output equation of Induction motor – Main dimensions –Length of air gap- Rules for selecting rotor slots of squirrel cage machines – Design of rotor bars & slots – Design of end rings – Design of wound rotor -– Magnetic leakage calculations – Leakage reactance of polyphase machines- Magnetizing current - Short circuit current – Circle diagram - Operating characteristics.

UNIT V SYNCHRONOUS MACHINES 9+3

Output equations – choice of loadings – Design of salient pole machines – Short circuit ratio – shape of pole face – Armature design – Armature parameters – Estimation of air gap length – Design of rotor –Design of damper winding – Determination of full load field mmf – Design of field winding – Design of turbo alternators – Rotor design.

TOTAL : 45 (L) + 15 (T) = 60 PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Discuss the factors influencing the designing of electrical machines
- Derive output equations of AC and DC Machines
- Calculate Magnetic circuit parameters of electrical machines
- Design the dimensions of AC and DC machines based on given parameters

- Design the cooling tube arrangement of transformers

TEXT BOOKS:

1. Sawhney A.K, "A Course in Electrical Machine Design ", Dhanpat Rai& Sons, 1984.
2. Sen S.K., " Principles of Electrical Machine Designs with Computer Programmers ", Oxford and IBH Publishing Co. Pvt. Ltd, Eighth Edition, 1987.

REFERENCE BOOKS:

1. Shanmugasundaram A., Gangadharan and Palani R, "Electrical Machine Design Data Book ", New Age International Pvt. Ltd., 2007.
2. Upadhyay K.G., " Design of Electrical Machines", New Age International Pvt. Ltd., 2008
3. Agarwal R.K., "Principles of Electrical Machine Design ", S.K.Kayaria& Sons , 2007
4. Eclayton A. and NNHancock, , "The performance and Design of Direct current Machines ", CBS & Distributors Pvt.Ltd, 2004.

01UEE603	HIGH VOLTAGE ENGINEERING	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To impart knowledge on over voltages, protection schemes, breakdown mechanism and measurement of over voltages in power system
- To familiarize about the various testing methods of power apparatus

UNIT I OVER VOLTAGES IN ELECTRICAL POWER SYSTEMS 9

Causes of over voltages and its effects on power system – Lightning, switching surges and temporary over voltages – protection against over voltages – Bewley's lattice diagram.

UNIT II ELECTRICAL BREAKDOWN IN GASES, SOLIDS AND LIQUIDS 9

Gaseous breakdown in uniform and non-uniform fields – Corona discharges – Vacuum breakdown – Conduction and breakdown in pure and commercial liquids – Breakdown mechanisms in solid and composite dielectrics.

UNIT III GENERATION OF HIGH VOLTAGES AND HIGH CURRENTS 9

Generation of High DC, AC, impulse voltages and currents. Tripping and control of impulse generators.

UNIT IV MEASUREMENT OF HIGH VOLTAGES AND HIGH CURRENTS 9

High Resistance with series ammeter – Dividers, Resistance, Capacitance and Mixed dividers - Peak Voltmeter, Generating Voltmeters - Capacitance Voltage Transformers, Electrostatic Voltmeters – Sphere Gaps - High current shunts- Digital techniques in high voltage measurement

UNIT V HIGH VOLTAGE TESTING & INSULATION COORDINATION 9

High voltage testing of electrical power apparatus – Power frequency, impulse voltage and DC testing – International and Indian standards – Insulation Coordination

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Classify the types of over voltages in power system and their protection schemes
- Analyze the breakdown phenomenon in gases, liquids and solid insulators
- Explain the causes of high voltages and high currents in electric power system
- Discuss the measuring techniques of high voltages and high currents in electric power system
- Describe overvoltage phenomena and insulation coordination in power systems

TEXT BOOKS:

1. Naidu M.S., Kamaraju V," High Voltage Engineering ", Tata McGraw Hill,4th Edition, 2009.
2. Uppal, S.L," Electric Power ", Khanna Publishers, 13th Edition, 2003.

REFERENCE BOOKS:

1. Kuffel ., Zaengel W.S," High Voltage Engineering Fundamentals ", Pergamon Press, 2nd edition, 2000 .
2. Wadhwa C.L, " High Voltage Engineering ", New Age International Pvt. Ltd., Third Edition, 2010
3. Chakrabati A., Soni M.L, Gupta P.V, " Text book on Power System Engineering ", DhanpatRai& Co Ltd,, 2011
4. Thapar B., Gupta B.R Khera L.K, " Power System Transients and High voltage Principles ", MohindraCaptial Publishers,, Revised Edition , 2009

01UEC624	APPLIED DIGITAL SIGNAL PROCESSING (Common to ICE , EEE & EIE)	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To introduce the basic concept of signals and systems
- To explain the different transform techniques to analyze the discrete time systems
- To provide a thorough understanding of the design techniques for digital filters and digital signal processors

UNIT I INTRODUCTION **9**

Classification of systems: Continuous, discrete, linear, causal, stable, dynamic, recursive, time variance; classification of signals: continuous and discrete, energy and power; mathematical representation of signals; spectral density; sampling techniques, quantization, quantization error, Nyquist rate, aliasing effect. Digital signal representation

UNIT II DISCRETE TIME SYSTEM ANALYSIS **9**

Z-transform and its properties, inverse z-transforms; difference equation – Solution by z-transform, application to discrete systems - Stability analysis, frequency response – Convolution – Fourier transform of discrete sequence – Discrete Fourier series.

UNIT III DISCRETE FOURIER TRANSFORM & COMPUTATION **9**

DFT properties, magnitude and phase representation - Computation of DFT using FFT algorithm –DIT & DIF - FFT using radix 2 – Butterfly structure.

UNIT IV DESIGN OF DIGITAL FILTERS **9**

FIR & IIR filter realization – Parallel & cascade forms. FIR design: Windowing Techniques – Need and choice of windows – Linear phase characteristics. IIR design: Analog filter design – Butterworth and Chebyshev approximations; digital design using impulse invariant and bilinear transformation -Warping, prewarping - Frequency transformation.

UNIT V DIGITAL SIGNAL PROCESSORS **9**

Introduction – Architecture – Features – Addressing Formats – Functional modes - Introduction to Commercial Processors

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Describe the concept of signals and system
- Analyze the discrete time systems using transform techniques
- Choose the best filter structure for implementation
- Apply the digital signal processors for real time applications

TEXT BOOKS:

1. J.G. Proakis and D.G. Manolakis, “Digital Signal Processing Principles, Algorithms and Applications” , Pearson Education, New Delhi, 2003.
2. S.K. Mitra, “Digital Signal Processing – A Computer Based Approach” , Tata McGraw Hill, New Delhi 2001

REFERENCE BOOKS:

1. E.C. Ifeachor and B.W. Jervis, “Digital signal processing – A practical approach” Fourth Edition, 2007.
2. Johny R. Johnson, Introduction to Digital Signal Processing” , PHI , 2006.
3. Venkataramani, “Digital Signal Processor”, Tata McGraw Hill, 2011.
4. Andreas Antoniou, “Digital Signal Processing ”, Tata McGraw Hill, 2001.

ELECTIVE I

ELECTIVE II

01UEE607	ELECTRIC DRIVES AND CONTROL LABORATORY	L	T	P	C
		0	0	3	2

OBJECTIVE:

- To explain the performance of converter, inverter and chopper fed DC and AC drives

LIST OF EXPERIMENTS

1. Single Phase Fully Controlled Converter fed DC motor Drive
2. Chopper Fed DC motor Drive
3. IGBT based single phase PWM Inverter Fed AC motor Drive
4. Three Phase Fully Controlled Converter fed DC motor Drive
5. Single phase and three-phase AC Voltage Controller fed AC motor drive.
6. Micro controller based speed control of Converter/Chopper fed DC motor.
7. Micro controller based speed control of VSI fed three-phase induction motor.
8. Micro controller based speed control of Stepper motor.
9. DSP based speed control of BLDC motor.
10. Modeling and simulation of Induction Generator using MATLAB

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Demonstrate the operation and performance of Single Phase Fully Controlled Converter and Chopper fed DC motor Drive
- Analyze the performance of AC machines
- Obtain the speed control characteristics of DC motor, AC motor and special machines by using microcontroller and DSP processor.
- Simulate the induction generator using MATLAB

HARDWARE REQUIREMENT:

S. No.	Description of Equipment	Quantity Required
1.	Microcontroller(8bit/16 bit)	4 Nos.
2.	DSP (Texas/Analog – 2000 platform or equivalent)	4 Nos.
3.	1-φ Inverter with Control circuit	3 Nos.
4.	1-φ Rectifier (Controlled) with Control Circuit	1 No.
5.	3-φ Controlled rectifier with Control Circuit	1 No.
6.	Chopper (DC) (with Control Circuit)	1 No.
7.	1 φ & 3 Φ AC voltage controller circuit	3 Nos.
8.	Power Converter for BLDC (with Control Circuit)	1 No.
9.	DC Motor & Load setup	1 No.
10.	IM Motor & Load setup	1 No.
11.	DC Motor & Load setup	1 No
12.	BLDC motor with loading arrangement	1 No.
13.	Software Like MATLAB	1 No.
14.	Computers	1 Nos.

01UEC628 APPLIED DIGITAL SIGNAL PROCESSING LABORATORY	L	T	P	C
	0	0	3	2

OBJECTIVES:

- To implement the signal processing techniques using the instructions of DSP processor
- To develop the knowledge of simulation software as a tool for signal processing.
- To implement the IIR and FIR filter using simulation software

LIST OF EXPERIMENTS

USING DSP PROCESSOR

- Study of various addressing modes of DSP using simple programming examples
- Sampling of input signal and display
- Implementation of FIR filter
- Calculation of FFT

USING SIMULATION SOFTWARE

- Generation of Signals
- Linear and circular convolution of two sequences
- Sampling and effect of aliasing
- Design of FIR filters
- Design of IIR filters
- Calculation of FFT of a signal

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Program digital signal processing algorithms using simulation software
- Use simulation software tool to analyze discrete systems and design digital filters.
- Implement Signal processing algorithms in digital signal processor.

HARDWARE AND SOFTWARE REQUIREMENT FOR A BATCH OF 30 STUDENTS

1. PCs with Fixed / Floating point DSP Processors (Kit / Add-on Cards)-15 Units(2 students per system)
2. Simulation software with Simulink and Signal Processing Tool Box-10 Users license
3. Function Generators (1MHz)- 15
4. CRO (20MHz) -15

01UEE608	TECHNICAL SEMINAR / MINI PROJECT	L	T	P	C
		0	0	2	1

OBJECTIVES:

- To inculcate the importance of communication skills
- To familiarize with the concepts in emerging engineering field

DESCRIPTION:

This course is introduced to enrich the communication skills of the student and to create awareness on recent development in Electrical and Electronics Engineering through Technical presentation. In this course, a student has to present at least two Technical papers or recent advances in Engineering / Technology that will be evaluated by a Committee constituted by the Head of the Department.

Students shall work in groups of 4 each and work on a small research problem. Students have to carry out the project under the guidance of faculty member using the knowledge of subjects that he/she has learned up to 5th semester .The student should submit the report at the end of the semester. The product should be demonstrated at the time of examination.

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Explain the concept in an effective manner
- Apply innovative ideas on emerging engineering field

01UME701	**PROJECT MANAGEMENT AND FINANCE** **(Common to MECH, ICE, ECE, EEE & EIE)**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

OBJECTIVES:

- To impart knowledge to find solutions and approaches for various projects.
- To familiarize the utilization of project within time, resource and financial constraints.

UNIT I PROJECT MANAGEMENT CONCEPTS 9

Concept and characteristics of a project, importance of project management, types of project, project organizational structure, project life cycle, Statement of Work, Work Breakdown Structure.

UNIT II PROJECT PLANNING 9

Project Planning and Scheduling techniques - developing the project network USING CPM/PERT, constructing network diagram, AON basics, Forward Pass and backward pass, Limitations of CPM/PERT, Precedence Diagramming Method, constructing diagram and computations using precedence diagramming method, PERT/CPM simulation, reducing project duration.

UNIT III RESOURCE SCHEDULING & CRITICAL CHAIN SCHEDULING 9

Resource Scheduling - Resource allocation method, splitting and multitasking, Multi project resources scheduling - Critical Chain Scheduling -Concept of critical chain scheduling - critical chain scheduling method, application of Critical chain scheduling and limitations.

UNIT IV PROJECT QUALITY MANAGEMENT 9

Concept of project quality, responsibility for quality in projects, quality management at different stages of project, tools and techniques, Quality Management Systems, TQM in projects - Project performance Measurement and Control - Monitor and assess project performance, schedule, and cost. Earned value Management, performance measurement. methods to monitor, evaluate, and control planned cost and schedule performance - Project Closure/ Termination - Meaning of closure/ termination, project audit process, termination steps, final closure.

UNIT V FINANCIAL ACCOUNTING 9

Balance sheet and related concepts - Profit & Loss Statement and related concepts - Financial Ratio Analysis - Cash flow analysis - Funds flow analysis – Comparative financial statements - Analysis & Interpretation of financial statements. Investments - Risks and return evaluation of investment decision - Average rate of return - Payback Period - Net Present Value - Internal rate of return.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Describe the various characteristics and need of project management.
- Compare the tools for critical scheduling and planning process.
- Explain the project quality management.
- Discuss Cash and Funds flow analysis.
-

TEXT BOOKS:

1. Clifford F Gray, Erik W Larson, “Project Management-The Managerial Process”, Tata Mcgraw-Hill Publishing Co Ltd.
2. Prasanna Chandra, “Fundamentals of Financial Management”, Tata Mc Graw-Hill Publishing Ltd, 2005.

REFERENCE BOOKS:

1. Jack Meredith, Samuel J and Mantel Jr, “Project Management- A Managerial Approach ”, John Wiley and Sons.
2. John M Nicholas, “Project Management For Business And Technology”, Prentice Hall Of India Pvt Ltd.
3. Paresh Shah, “Basic Financial Accounting for Management”, Oxford University Press, 2007.
4. Rick A Morris, “The Everything Project Management Book”, 2008.

01UEE702	POWER SYSTEM OPERATION AND CONTROL	L	T	P	C
		3	1	0	4

OBJECTIVES:

- To summarize the power system operation and control
- To impart knowledge on real power-frequency control and reactive power-voltage control
- To introduce the concepts of computer control of power systems

UNIT I INTRODUCTION 9+3

System load variation - load characteristics - load curves and load-duration curve (daily, weekly and annual) - load factor - diversity factor. Importance of load forecasting and simple techniques of forecasting. An overview of power system operation and control and the role of computers in the implementation. (Qualitative treatment with block diagram).

UNIT II REAL POWER - FREQUENCY CONTROL 9+3

Basics of speed governing mechanism and modeling - speed-load characteristics – load sharing between two synchronous machines in parallel. Control area concept LFC control of a single-area system. Static and dynamic analysis of uncontrolled and controlled cases. Integration of economic dispatch control with LFC. Two-area system – modeling - static analysis of uncontrolled case - tie line with frequency bias control of two-area system - state variable model.

UNIT III REACTIVE POWER VOLTAGE CONTROL 9+3

Basics of reactive power control. Excitation systems – modeling. Static and dynamic analysis - stability compensation - generation and absorption of reactive power, Introduction to voltage collapse. Relation between voltage, power and reactive power at a node - method of voltage control - tap-changing transformer - SVC (TCR + TSC) and STATCOM – secondary voltage control.

UNIT IV UNIT COMMITMENT AND ECONOMIC DISPATCH 9+3

Formulation of economic dispatch problem – cost of generation – incremental cost curve - co-ordination equations without loss and with loss, solution by direct method and λ-iteration method. (No derivation of loss coefficients). Statement of Unit Commitment problem - Priority-list methods - forward dynamic programming approach.

UNIT V COMPUTER CONTROL OF POWER SYSTEMS 9+3

Need of computer control of power systems - Concept of energy control centre (or) load dispatch centre and the functions - system monitoring - data acquisition and control. System hardware configuration – SCADA and EMS functions. Network topology - state estimation -WLSE - Contingency Analysis - State transition diagram showing various state transitions and control strategies.

TOTAL : 45 (L) + 15 (T) = 60 PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Explain load characteristics and load factors in designing of power system
- Differentiate the static and dynamic performance of uncontrolled and controlled (frequency control & voltage control)power systems
- Analyze economic constraints and cost factors of power system operation and control
- Discuss the needs of computer control of power systems

TEXT BOOKS:

1. Allen. J. Wood. And Bruce F. Wollenberg, " Power Generation, Operation and Control ", John Wiley & Sons,2003.
2. Chakrabarti, Halder, " Power System Analysis: Operation and Control ", Prentice Hall of India, 2004.

REFERENCE BOOKS:

1. Kothari D.P. Nagrath I.J, "Modern Power System Analysis ", Tata McGraw Hill Publishing Company Limited, Third Edition, 2003.
2. Grigsby L.L., "The Electric Power Engineering, Hand Book ", CRC Press & IEEE Press, 2001.
3. Hadi Saadat, " Power System Analysis",11th Edition, 2007.
4. Kundur P., " Power System Stability and Control ", MC Craw Hill Publisher, 2006.

SPECIAL ELECTRICAL MACHINES

01UEE703	L	T	P	C
	3	0	0	3

OBJECTIVE

To impart knowledge on

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

UNIT I SYNCHRONOUS RELUCTANCE MOTORS 9

Constructional features –Types –Axial and radial air gap motors–Operating principle –Reluctance – Phasor diagram-Characteristics–Vernier motor.

UNIT II STEPPING MOTORS 9

Constructional features –Principle of operation –Variable reluctance motor –Hybrid motor –Single and multi stack configurations –Theory of torque predictions –Linear and non-linear analysis– Characteristics–Drive circuits – Microcontroller based Stepper Motor control- Closed loop control.

UNIT III SWITCHED RELUCTANCE MOTORS 9

Constructional features –Principle of operation–Torque prediction –Power controllers–Non-linear analysis –Microprocessor based control-Characteristics–Computer control.

UNIT IV PERMANENT MAGNET BRUSHLESS D.C. MOTORS 9

Principle of operation –Types–Magnetic circuit analysis–EMF and torque equations–Power controllers–Motor characteristics and control – Adjustable speed drive applications.

UNIT V PERMANENT MAGNET SYNCHRONOUS MOTORS 9

Principle of operation –EMF and torque equations –Reactance –Phasor diagram–Power controllers-Converter-Volt-ampere requirements –Torque speed characteristics-Microprocessor based control – Applications in wind energy systems.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Explain the construction and principle of operation of various special electrical machines
- Analyze the linear and non linear characteristics of special electrical machines.
- Develop a power control circuit for special electrical machines.
- Choose a special electrical machine for a given application

TEXT BOOKS:

1. Miller T.J.E., " Brushless Permanent Magnet and Reluctance Motor Drives", Clarendon Press, Oxford, 1989
2. Aearnley P.P., "Stepping Motors–A Guide to Motor Theory and Practice", Peter Perengrinus, 1982.

REFERENCE BOOKS:

1. Kenjo T., "Stepping Motors and Their Microprocessor Controls ", Clarendon Press London, 1984.
2. Kenjo T. and Nagamori S., "Permanent Magnet and Brushless DC Motors ", Clarendon Press, 1988.
3. Chang – Liang X.A., "Permanent Magnet Brushless DC Motors Drives and Controls ", Wiley, 2012.
4. Venkataratnam . K , "Special Electrical Machines ", CRC Press, 2008

01UEE704	ELECTRIC POWER UTILIZATION AND ENERGY CONSERVATION	L	T	P	C
		3	1	0	4

OBJECTIVES:

- To explain the operation of various types of lamps
- To familiarize the different methods of electric heating and electric welding.
- To introduce knowledge on Solar radiation, Solar Energy Collectors and Wind Energy

UNIT I ELECTRIC DRIVES AND TRACTION 9+3

Fundamentals of electric drive - choice of an electric motor - application of motors for particular services - traction motors - characteristic features of traction motor - systems of railway electrification -electric braking - train movement and energy consumption - traction motor control - track equipment and collection gear.

UNIT II ILLUMINATION 9+3

Introduction - definition and meaning of terms used in illumination engineering - classification of light sources - incandescent lamps, sodium vapour lamps, mercury vapour lamps, fluorescent lamps –design of illumination systems - indoor lighting schemes - factory lighting halls - outdoor lighting schemes - flood lighting - street lighting - energy saving lamps, LED.

UNIT III HEATING AND WELDING 9+3

Introduction - advantages of electric heating – modes of heat transfer - methods of electric heating -resistance heating - arc furnaces - induction heating - dielectric heating - electric welding – types -resistance welding - arc welding - power supply for arc welding - radiation welding.

UNIT IV SOLAR RADIATION AND SOLAR ENERGY COLLECTORS 9+3

Introduction - solar constant - solar radiation at the Earth's surface - solar radiation geometry – estimation of average solar radiation - physical principles of the conversion of solar radiation into heat – flat-plate collectors - transmissivity of cover system - energy balance equation and collector efficiency - concentrating collector - advantages and disadvantages of concentrating collectors - performance analysis of a cylindrical - parabolic concentrating collector – Feed- in Inverters.

UNIT V WIND ENERGY 9+3

Introduction - basic principles of wind energy conversion - site selection considerations – basic components of a WECS (Wind Energy Conversion System) - Classification of WECS - types of wind .Turbines - analysis of aerodynamic forces acting on the blade - performances of wind.

TOTAL : 45 (L) + 15 (T) = 60 PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Explain Electric traction systems and their performance.
- Design the illumination schemes for residential, commercial and street lighting
- Explain the types and operations of different electric heating and welding processes
- Utilize the engineering aspects of electrical energy generation, utilization and conservation.

TEXT BOOKS:

1. Suryanarayana N.V., “Utilization of Electric Power”, Wiley Eastern Limited, New Age International Limited,1993.
2. Gupta J.B, “Utilization Electric power and Electric Traction”, S.K.Kataria and Sons, 2000.
3. Rai G.D., “Non-Conventional Energy Sources”, Khanna Publications Ltd., New Delhi, 1997.

REFERENCE BOOKS:

1. Rajput R.K., “Utilisation of Electric Power”, Laxmi publications Private Limited.,2007.
2. Partab H., “Art and Science of Utilisation of Electrical Energy”, Dhanpat Rai and Co., New Delhi, 2004.
3. Wadhwa C.L., “Generation, Distribution and Utilisation of Electrical Energy”, New Age International Pvt.Ltd., 2003.
4. Sivanagaraju S., Balasubba Reddy M. and D. Srilatha, “ Generation and Utilization of Electrical Energy”, Pearson Education, 2010.
5.Donals L. Steeby, “ Alternative Energy Sources and Systems”, Cengage Learning, 2012

ELECTIVE III

ELECTIVE IV

01UEE707	POWER SYSTEM SIMULATION LABORATORY	L	T	P	C
		0	0	3	2

OBJECTIVES:

- To familiarize with the digital simulation of power system problems

LIST OF EXPERIMENTS:

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

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Calculate the Transmission Line parameters
- Formulate Bus Admittance and Impedance Matrices
- Estimate the Load Flow Analysis parameters
- Analyze power system operation, stability, control and protection.

SOFTWARE REQUIREMENT:

Sl. No.	Description of Equipment	Quantity required
1	Personal computers (Pentium-IV, 80GB, 512 MBRAM)	25
2	Printer laser	1
3	Dotmatrix	1
4	Server (Pentium IV, 80GB, 1GBRAM) (High Speed Processor)	1
5	Software: E.M.T.P/ETAP/CYME/MIPOWER /any power system simulation software	5 licenses
6	Compliers: C, C++, VB, VC++	25 users

ELECTIVE V

ELECTIVE VI

01UEE803	PROJECT WORK	L	T	P	C
		0	0	12	6

OBJECTIVE:

- To deepen comprehension of principles by applying them to a new problem which may be the design and manufacture of a device, a research investigation, a computer based project or management project.

PROJECT DESCRIPTION :

Six periods per week shall be allotted in the time table and this time shall be utilized by the students to receive the 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 on the progress made in the project. The progress of the project is evaluated based on a minimum of three reviews.

COURSE OUTCOMES

- Develop a system using comprehension of concepts by implementing their designs
- Evaluate the designed system with respect to different performance criteria
- Analyze the variety of issues in design concept through environmental issues and quality.
- Explain the systematic way of organizing various resources for completing the project in time.

01UEE901	ADVANCED CONTROL THEORY	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To introduce the fundamental knowledge on state space variable
- To explain the function analysis of non linear systems
- To sdiscuss the stability of the system.
-

UNIT I STATE VARIABLE ANALYSIS 9

Introduction to state Model- effect of state Feedback- Necessary and Sufficient Condition for Arbitrary Pole-placement- pole placement Design- design of state Observers- separation principle-servo design: -State Feedback with integral control.

UNIT II PHASE PLANE ANALYSIS 9

Features of linear and non-linear systems - Common physical non-linearities – Methods of linearising non-linear systems - Concept of phase portraits – Singular points – Limit cycles – Construction of phase portraits – Phase plane analysis of linear and non-linear systems – Isocline method.

UNIT III DESCRIBING FUNCTION ANALYSIS 9

Basic concepts, derivation of describing functions for common non-linearities – Describing function analysis of non-linear systems – Conditions for stability – Stability of oscillations.

UNIT IV STABILITY ANALYSIS 9

Introduction – Liapunov's stability concept – Liapunov's direct method – Lure's transformation – Aizerman's and Kalman's conjecture – Popov's criterion – Circle criterion.

UNIT V OPTIMAL CONTROL 9

Introduction -Decoupling - Time varying optimal control – LQR steady state optimal control – Solution of Ricatti's equation – Application examples. - Optimal estimation – Multivariable control design.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Derive state space model for linear continuous system
- Analyze the causes of non linearity and methods of linearization
- Determine describing functions for common non linearities
- Analyze the stability of non linear system
- Explain the basics of optimal control theory

TEXT BOOKS:

1. NagrathI.J.,Gopal , "Control Systems Engineering ", New Age International Publishers,2008.
2. AshishTewari, " Modern control Design with Matlab and Simulink' ", John Wiley , 2002

REFERENCE BOOKS:

1. George J. Thaler, "Automatic Control Systems", Jaico Publishers, 1993 .
2. Gopal M., " Modern control system theory" , New Age International Publishers, 2002.
3. Steve Heath, " Embedded Systems Design ", 2nd Edition, Elsevier Publications, 2006
4. Gene F. Franklin, David Powell J. and Abbasemami-Naeini, "Feedback Control of Dynamic Systems " , 4th Edition, Pearson Education, 2002
5. Nagoorkani A., "Advanced control Theory ", RBA publishers, 1999.

01UEE902	BIOMEDICAL ENGINEERING	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To Introduce Fundamentals of Biomedical Engineering
- To impart knowledge on electrical and non-electrical in a biomedical system with few examples
- To have with the life assisting and therapeutic devices

UNIT I FUNDAMENTALS OF BIOMEDICAL ENGINEERING 9

Cell and its structure – Resting and Action Potential – Nervous system and its fundamentals – Basic components of a biomedical system- Cardiovascular systems- Respiratory systems -Kidney and blood flow - Biomechanics of bone - Biomechanics of soft tissues - Basic mechanics of spinal column and limbs -Physiological signals and transducers - Transducers – selection criteria – Piezo electric, ultrasonic transducers - Temperature measurements - Fibre optic temperature sensors.

UNIT II NON ELECTRICAL PARAMETERS MEASUREMENT AND DIAGNOSTIC PROCEDURES 9

Measurement of blood pressure - Cardiac output - Heart rate - Heart sound - Pulmonary function measurements – spirometer – Photo Plethysmography, Body Plethysmography – Blood Gas analyzers, pH of blood –measurement of blood pCO2, pO2, finger-tip oxymeter - ESR, GSR measurements.

UNIT III ELECTRICAL PARAMETERS ACQUISITION AND ANALYSIS 9

Electrodes – Limb electrodes –floating electrodes – pregelled disposable electrodes - Micro, needle and surface electrodes – Amplifiers, Preamplifiers, differential amplifiers, chopper amplifiers – Isolation amplifier - ECG – EEG – EMG – ERG – Lead systems and recording methods – Typical waveforms - Electrical safety in medical environment, shock hazards – leakage current- Instruments for checking safety parameters of biomedical equipments.

UNIT IV IMAGING MODALITIES AND ANALYSIS 9

Radio graphic and fluoroscopic techniques – Computer tomography – MRI – Ultrasonography – Endoscopy – Thermography –Different types of biotelemetry systems - Retinal Imaging – Imaging application in Biometric systems - Analysis of digital images.

UNIT V LIFE ASSISTING, THERAPEUTIC AND ROBOTIC DEVICES 9

Pacemakers – Defibrillators – Ventilators – Nerve and muscle stimulators – Diathermy – Heart – Lung machine – Audio meters – Dialysers – Lithotripsy - ICCU patient monitoring system - Nano Robots - Robotic surgery – Advanced 3D surgical techniques- Orthopedic prostheses fixation.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Explain the physiology of various sub system of our body and their biopotential generation
- Discuss various biopotentials and their recording instruments
- Choose an appropriate instrumentation to monitor given non-electrical physiological parameters
- Summarize the operation at various medical imaging, assisting and therapeutic equipments

TEXT BOOKS:

1. Leslie Cromwell, "Biomedical Instrumentation and Measurement", Prentice hall of India, New Delhi, 2007.
2. Joseph J. carr and John M. Brown, "Introduction to Biomedical Equipment Technology", John Wiley and sons, New York, 4th Edition, 2012.
3. Khandpur R.S., "Handbook of Biomedical Instrumentation", Tata McGraw-Hill, New Delhi, 2ndEdition, 2003.

REFERENCE BOOKS:

1. John G. Webster, "Medical Instrumentation Application and Design", John Wiley and sons, New York, 1998.
2. Duane Knudson, "Fundamentals of Biomechanics", Springer, 2nd Edition, 2007.
3. Suh, Sang, Gurupur, Varadraj P., Tanik and Murat M., "Health Care Systems, Technology and Techniques", Springer, 1st Edition, 2011.
4. Joseph Ed.and Bronzino D., "The Biomedical Engineering Hand Book", Third Edition, Boca Raton, CRC Press LLC, 2006.
5. Arumugam M., "Bio-Medical Instrumentation", Anuradha Agencies, 2003.

01UEE903	NON-CONVENTIONAL ENERGY RESOURCES	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To explain concept of various forms of renewable energy
- To introduce the division aspects and utilization of renewable energy sources for both domestics and industrial applications
- To discuss the environmental and cost economics using renewable energy sources

UNIT I INTRODUCTION 9

World energy use – Reserves of energy resources – Environmental aspects of energy utilization – Renewable energy scenario in India – Potentials – Achievements – Applications.

UNIT II SOLAR ENERGY 9

Solar thermal – Flat plate and concentrating collectors – Solar heating and cooling techniques – Solar desalination – Solar cooker – Solar thermal power plant – Solar photo voltaic conversion – Solar cells – PV applications.

UNIT III WIND ENERGY 9

Wind data and energy estimation – Types of wind energy systems – Performance – Details of wind turbine generator – Safety and Environmental Aspects.

UNIT IV BIOMASS ENERGY 9

Biomass direct combustion – Biomass gasifier – Biogas plant – Ethanol production –Bio diesel – Cogeneration –Biomass applications.

UNIT V OTHER RENEWABLE ENERGY SOURCES 9

Tidal energy – Wave energy – Open and closed OTEC Cycles – Small hydro – Geothermal energy – Fuel cell systems.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Explain the Environmental aspects of energy utilization and Renewable energy scenario in India
- Illustrate the various applications of solar energy by using heating and cooling techniques
- Discuss the concepts of types and performance of wind energy systems
- Analyze the processes of biomass and other renewable energy sources

TEXT BOOKS:

1.Rai G.D., “Non Conventional Energy Sources”, Khanna Publishers,1999.
2.Khan B.H., “ Non Conventional Energy Resources”, Tata McGraw Hill Publishing Company Ltd., 2006.

REFERENCE BOOKS:

1. Godfrey Boyle, “ Renewable Energy, Power for a Sustainable Future ”, Oxford UniversiPress, 1996.
2. Twidell J.W. and Weir, “Renewable Energy Sources ”, EFN Spon Ltd, 1996
3. Tiwari, “ Solar Energy – Fundamentals Design, Modelling and applications”,Narosa Publishing House, 2002.
4. Freris L.L., “ Wind Energy Conversion systems ”, Prentice Hall, 1990.
5. Sukhatme S.P., “ Solar Energy ”, Tata McGraw Hill Publishing Company Ltd., 1997.

01UEE904	PROGRAMMABLE LOGIC CONTROLLER AND SCADA	L	T	P	C
		3	0	0	3

OBJECTIVES:

To impart knowledge on

- PLC architecture and its components
- Ladder logic diagrams for given applications using basic and advanced Instructions
- SCADA architecture operation and applications

UNIT I PROGRAMMABLE LOGIC CONTROLLER (PLC) BASICS 9

Definition – Overview of PLC systems – Input and 0utput modules – Power supplies – Isolators – General PLC programming procedures – Programming on-off outputs – Auxiliary commands and functions – Creating ladder diagrams from process control descriptions – Register basics – Timer functions – Counter functions.

UNIT II PLC INTERMEDIATE AND ADVANCED FUNCTIONS 9

Arithmetic functions – Number comparison functions – Skip and MCR functions – Data move systems – PLC advanced intermediate functions – Utilizing digital bits – Sequencer functions – Matrix functions – Alternate programming languages – Analog PLC operation – Networking of PLC – PID control of continuous processes – PLC installation – Troubleshooting and maintenance – Controlling a Robot.

UNIT III INTRODUCTION TO SCADA AND ITS SYSTEM COMPONENTS 9

SCADA: Data acquisition system, evaluation of SCADA, communication technologies, monitoring and supervisory functions. Schemes, Remote Terminal Unit, Intelligent Electronic Devices, Communication Network, SCADA server.

UNIT IV SCADA ARCHITECTURE, OPERATION AND CONTROL OF INTERCONNECTED POWER SYSTEM 9

Various SCADA Architectures, advantages and disadvantages of each system, single unified standard architecture IEC 61850 SCADA / HMI Systems. Automatic substation control, SCADA configuration, Energy management system, system operating states, system security,state estimation.

UNIT V PLC AND SCADA APPLICATIONS 9

PLC based speed control applications, SCADA Applications in transmission and distribution sector operation, monitoring analysis and improvement.. Case studies, implementation, simulation exercises.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Explain PLC architecture and its components
- Compare advantages and disadvantages of PLC with conventional controller
- Develop ladder logic diagrams for given applications using basic and advanced Instructions

- Illustrate the SCADA architecture and operation
- Apply SCADA for simple power system applications

TEXT BOOKS:

1. John. W. Webb and Ronald A. Reis, " Programmable Logic Controllers – Principles and Applications ",Fifth Edition,2002.
2. Frank D. Petruzella, "Programmable Logic Controllers ",Fourth Edition,2011

REFERENCE BOOKS:

1. Krishna Kant, "Computer based Industrial Control", Prentice Hall of India, 5th Edition, 2009.
2. Curtis D.Johnson, "Process control InstrumentarionTechnology",Pearson Education, 2006.
3. Stuart A Boyer, " SCADA supervisory control and data acquisition",4th Edition, 2009.
4. Gordan Clark and Deem Reynders, "Practical Modem SCADA Protocols", 2004

01UEE905	VLSI DESIGN AND ARCHITECTURE	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To explain the principle of operation of MOS transistor
- To familiarize with the concepts of combinational and sequential logic circuits
- To introduce the concepts on implementation strategies

UNIT I MOS TRANSISTOR PRINCIPLE 9

NMOS and PMOS transistors, Process parameters for MOS and CMOS, Electrical properties of CMOS circuits and device modeling, Scaling principles and fundamental limits, CMOS inverter scaling, propagation delays, Stick diagram, Layout diagrams

UNIT II COMBINATIONAL LOGIC CIRCUITS 9

Examples of Combinational Logic Design, Elmore's constant, Pass transistor Logic, Transmission gates, static and dynamic CMOS design, Power dissipation – Low power design principles

UNIT III SEQUENTIAL LOGIC CIRCUITS 9

Static and Dynamic Latches and Registers, Timing issues, pipelines, clock strategies, Memory architecture and memory control circuits, Low power memory circuits, Synchronous and Asynchronous design

UNIT IV DESIGNING ARITHMETIC BUILDING BLOCKS 9

Data path circuits, Architectures for ripple carry adders, carry look ahead adders, High speed adders, accumulators, Multipliers, dividers, Barrel shifters, speed and area tradeoff

UNIT V IMPLEMENTATION STRATEGIES 9

Full custom and Semi custom design, Standard cell design and cell libraries, FPGA building block architectures, FPGA interconnect routing procedures.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Explain the basic CMOS circuits and the CMOS process technology.
- Discuss the techniques of chip design using programmable devices.
- Model the digital system using Hardware Description Language.

TEXT BOOKS:

1. Jan Rabaey, AnanthaChandrakasan, Nikolic B., "Digital Integrated Circuits: A Design Perspective", Second Edition, Prentice Hall of India, 2003.
2. Smith M.J., "Application Specific Integrated Circuits", Addisson Wesley, 1997

REFERENCE BOOKS:

1. Weste N. and Eshraghian K., "Principles of CMOS VLSI Design", Second Edition, Addision Wesley 1993
2. Jacob Baker R., Harry W.LI. and David E.Boyee, "CMOS Circuit Design, Layout and Simulation", Prentice Hall of India, 2005
3. Pucknell A., Kamran Eshraghian, "BASIC VLSI Design", Third Edition, Prentice Hall of India, 2007.
4. Debprasad Das, VLSI Design, Oxford University Press, 2010.

01UEE906 ADAPTIVE CONTROL L T P C
3 0 0 3

OBJECTIVES:

- To introduce Non parametric methods
- To impart knowledge on parameter estimation methods, Recursive identification methods and Adaptive control schemes
- To familiarize with the stability, Robustness and Applications of adaptive control method

UNIT I NON PARAMETRIC METHODS 9

Non parametric methods: Transient analysis–frequency analysis–Correlation analysis–Spectral analysis.

UNIT II PARAMETER ESTIMATION METHODS 9

Least square estimation – best linear unbiased estimation under linear constraints – updating the parameter estimates for linear regression models–prediction error methods: description of prediction methods – optimal prediction – relation between prediction error methods and other identification methods – theoretical analysis - Instrumental variable methods: Description of instrumental variable methods – Input signal design for identification.

UNIT III RECURSIVE IDENTIFICATION METHODS 9

The recursive least square method – the recursive instrumental variable methods- the recursive prediction error methods – Maximum likelihood. Identification of systems operating in closed loop: Identifiability considerations – direct identification – indirect identification.

UNIT IV ADAPTIVE CONTROL SCHEMES 9

Introduction – Types of adaptive control–Gain scheduling controller–Model reference adaptive control schemes–Self tuning controller–MRAC and STC: Approaches–The Gradient approach – Lyapunov functions – Passivity theory – pole placement method – Minimum variance control – Predictive control.

UNIT V ISSUES IN ADAPTIVE CONTROL AND APPLICATIONS 9

Stability – Convergence – Robustness –Applications of adaptive control.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Compare various Non- Parametric and Parametric analysis methods of signals
- Identify the system transfer function using recursive method
- Explain the basics of adaptive control system
- Compare MRAC and STC

TEXT BOOKS:

1. Soder Storm T and Peter Stoica, “System Identification”, Prentice Hall International,1989.
2. Astrom K.J. and Wittenmark B., “Adaptive Control”, Pearson Education, 2nd Edition, 2001.

REFERENCE BOOKS:

1. Ljung L., “System Identification: Theory for the user", Prentice Hall, Engle wood Cliffs,1987.
2. Bela G. Liptak., “Process Control and Optimization, Instrument Engineers Handbook”., volume 2, CRC press and ISA, 2005.
3. William S.Levine, “Control Systems Advanced Methods, the Control Handbook”, CRC Press, 2011.
4. Sastry S. and Bodson, M.,“ Adaptive Control– Stability, Convergence and Robustness”, Prentice Hall inc., New Jersey, 1989.

OPERATION AND MAINTENANCE OF ELECTRICAL EQUIPMENTS

01UEE907	L	T	P	C
(Qualitative treatment only)				
	3	**0**	**0**	**3**

OBJECTIVES:

To impart knowledge on

- Operation and Maintenance of electrical equipments in Generation, Transmission and Distribution.
- Methods of Trouble shooting techniques

UNIT I MAINTENANCE AND INDUSTRIAL SAFETY 9

Importance of plant maintenance, Types - Preventive, Break down and Production maintenance, Maintenance records, Role of maintenance engineer, cause of accidents and prevention. Protective devices for personnel and resources-Government Acts on Safety measures in Industry-Role of Safety Engineer – General safety precautions

UNIT II GENERATOR, SUBSTATION AND SWITCH GEAR 9

Operation procedure, Routine & Breakdown Maintenance, Causes of failure and Precautions measure. .

UNIT III TRANSFORMER 9

Operation, Preliminary inspection-Inspection on arrival and before installation & Impulse voltage testing, Lightning arrester maintenance & trouble shooting, Oil purification & Testing, Gas analysis by colour of gas by using gas analyser.

UNIT IV TRANSMISSION AND DISTRIBUTION 9

Rules for low, medium and high voltages, Factor of safety, Special precautions, Minimum clearance, Conductors, System protection, Lightning arrester, Methods of laying Underground cable and fault location illumination **-** Special lighting applications, Installations, Trouble shooting, Modern developments.

UNIT V DC & AC MOTORS & STARTERS 9

Operation procedure, Routine & Breakdown Maintenance, Maintenance of contactors-Common starter troubles and remedies, Causes of failure and Precautions and Troubleshooting - Trouble shooting in pump motors.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Discuss the need of industrial safety and various methods of safety maintenance

- Analyze the over current protective devices and their application in a coordinated protection scheme
- Illustrate strategies for effective transformer maintenance and repair
- Identify the various Troubleshooting methods of DC & AC Motors and Starters

TEXT BOOKS:

1. Rao V.S., “Operation & Maintenance of Electrical Equipment – Volume I & II ”, Media Promotors & Publishers Pvt. Ltd.,1997 Edition, Mumbai
2. Kakkar K.C, “ Electrical Equipments Operation and Maintenances ”, RB Publication, New Delhi

REFERENCE BOOKS:

1. Viswanathan T.S. and Ramachandran P., “Control & Maintenance of Electrical Machines ”, Priya Publishers, 1998 Edition, Trichy
2. Rao S., “Testing Commissioning and Maintenance of Electrical Equipment ”, Fifth Edition, Khanna Publishers, 1997
3. Tarlok Singh, “ Installation Commissioning & Maintenance Of Electrical Equipments ”, 2nd Edition,
4. Sawhney A.K., “A Course in Electrical & Electronic Measurements & Instrumentation”, Dhanpat Rai and Co, 2004

01UEE908	POWER SYSTEM TRANSIENTS	L	T	P	C
		3	0	0	3

OBJECTIVES

- To introduce the concepts on generation of switching transients and the control strategies over them.
- To impart knowledge on mechanism of lighting strokes and the production of lighting surges.
- To familiarize with the propagation, reflection and refraction of travelling waves.

UNIT I INTRODUCTION AND SURVEY 9

Review and importance of the study of transients - causes for transients. RL circuit transient with sine wave excitation - double frequency transients - basic transforms of the RLC circuit transients. Different types of power system transients - effect of transients on power systems – role of the study of transients in system planning.

UNIT II SWITCHING TRANSIENTS 9

Over voltages due to switching transients - resistance switching and the equivalent circuit for interrupting the resistor current - load switching and equivalent circuit - waveforms for transient Voltage across the load and the switch - normal and abnormal switching transients. Current suppression - current chopping - effective equivalent circuit. Capacitance switching - effect of source regulation - capacitance switching with a restrike, with multiple restrikes. Illustration for multiple restriking transients - ferro resonance.

UNIT III LIGHTNING TRANSIENTS 9

Review of the theories in the formation of clouds and charge formation - rate of charging of thunder clouds – mechanism of lightning discharges and characteristics of lightning strokes – model for lightning stroke - factors contributing to good line design - protection using ground wires – tower footing resistance - Interaction between lightning and power system.

UNIT IV TRAVELING WAVES ON TRANSMISSION LINE COMPUTATION OF TRANSIENTS 9

Computation of transients - transient response of systems with series and shunt lumped parameters and distributed lines. Traveling wave concept - step response - Bewely's lattice diagram – standing waves and natural frequencies - reflection and refraction of travelling waves.

UNIT V TRANSIENTS IN INTEGRATED POWER SYSTEM 9

The short line and kilometric fault - distribution of voltages in a power system - Line dropping and load rejection - voltage transients on closing and reclosing lines - over voltage induced by faults - switching surges on integrated system Qualitative application of EMTP for transient computation.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Discuss the important of power system transients and their causes
- Explain switching and lightning transient
- Analyze the survey of power system transient.
- Determine the transient response of power systems with series and shunt lumped parameters and distributed lines
- Compute transient parameters of integrated power systems

TEXT BOOKS:

1. Allan Greenwood, " Electrical Transients in Power Systems ", Wiley Interscience,2nd Edition, New York,1991.
2. Begamudre R.D, "Extra High Voltage AC Transmission Engineering ", Wiley Eastern Limited, 1986.

REFERENCE BOOKS:

1. Naidu M.S. and Kamaraju V, "High Voltage Engineering ", Tata McGraw Hill, 2nd Edition, 2000.
2. PriHindra Chowdhuri, " Electromagnetic transient in Power System ", Research Studies Press Ltd , 1996
3. Indulkar C.S.,Kothari D.P. and Ramalingam K, "Power System Transient a Statistical approach ", PHI Ltd , 2010
4. Harold A. Peterson, "Transient in Power Systems ", Wiley, 1951.

01UEE909	SOLID STATE RELAYS	L	T	P	C
		3	0	0	3

OBJECTIVE :

- To introduce the various static relays and comparators that is used for protection
- To explain the principle of various protective relays and their operation against faults in the Power System scenario
- To introduce the knowledge on microprocessor based relays

UNIT I INTRODUCTION TO STATIC RELAYS 9

Advantages of Static Relays - Generalized characteristics and operational equations of relays - steady state and transient performance of signal driving elements - Signal mixing techniques and measuring techniques - CT's and PT's in relaying schemes - Saturation effects.

UNIT II STATIC RELAY CIRCUITS I 9

Static relay circuits (using Analog and Digital IC's) for over current, inverse - time characteristics, differential relay and directional relay.

UNIT III STATIC RELAY CIRCUITS II 9

Static relay circuits for generator loss of field, under frequency, distance relays, impedance, reactance, mho, reverse power relays.

UNIT IV CARRIER CURRENT PROTECTION AND TESTING 9

Static relay circuits for carrier current protection - Steady state and transient behaviour of static relays - Testing and maintenance - Tripping circuits using Thyristors**.**

UNIT V MICROPROCESSOR BASED RELAYS 9

Hardware and software for the measurement of voltage, current, frequency, phase angle - Microprocessor implementation of over current relays - Inverse time characteristics - Impedance relay - Directional Relay - Mho Relay.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Explain principle of various protective relays and their operation against faults in the Power System Scenario
- Choose relays based on the Scheme of protection such as distance, differential and directional using Analog and Digital configuration
- Employ various Protection schemes for power system components using Microprocessor based relay

TEXT BOOKS:

1. Rao T.S.M., " Power System Protection- Static Relays ", Tata McGraw Hill. Ltd.,2010..
2. Rao, "Digital Numerical Relays ", McGraw Hill, First Edition, 2005 .

REFERENCE BOOKS:

1. Van C. Warrington C., "Protective Relays - Their Theory and Practice ", Chapman and Hall,
2. Ravindranath B. and Chander M, "Power System Protection and Switchgear",Wiley Eastern, 2007 .
3. Badri Ram and Vishwakarma D.N, "Power System Protection and Switchgear ", Tata McGraw-Hill Education, April 1 ,2001
4. Anthaony F. Selva, " Protective Relay Principles ", CRC Press ,Taylor & Francis Group, 2009.

01UEE910	FUZZY LOGIC AND NEURAL NETWORK	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To introduce the concept of fuzzy logic and artificial neural networks
- To discuss the application of fuzzy logic and artificial neural networks

UNIT I INTRODUCTION **9**

Classical Sets and Fuzzy Sets - Classical and Fuzzy Relations, Membership function, Fuzzy number Fuzzy operation and composition.

UNIT II FUZZY LOGIC CONCEPTS **9**

Fuzzy Variables, Linguistic variables, Fuzzy Rule-Based System, fuzzification concepts of defuzzification, fuzzy logic controller.

UNIT III ARTIFICIAL NEURAL NETWORKS **9**

Fundamentals of Artificial Neural networks- Biological prototype – Artificial neuron, Activation functions, Single layer and multiplayer networks. Training Artificial neural networks, Preceptrons, Exclusive Or Problem – Linear seperability, Preceptron learning, perceptron training algorithms. Back propagation, Training algorithm, network configurations, Network paralysis, Local minima, temporal instability.

UNIT IV ARTIFICIAL NEURAL NETWORK TYPES **9**

Hopfield nets, Recurrent networks, Stability, Associative memory, Thermodynamic systems, Statistical Hopfiled networks, Applications. Bi-directional associative memories, Retrieving on stored association, Encoding the associations.

UNIT V APPLICATIONS OF FUZZY LOGIC ANDARTIFICIAL NEURAL NETWORKS **9**

Fuzzy Logic Applications in Power Systems Automatic Generation Control Using Fuzzy Logic Controllers Fuzzy logic control of Washing Machine. Neural network applications in power system and inverted pendulum applications

TOTAL: 45PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Explain the basic concept of fuzzy logic and fuzzy logic controllers
- Describe the various architectures of ANN and its learning methods
- Calculate the error using back propagation technique in neural network
- Apply the fuzzy and neuro network control in electrical technology

TEXT BOOKS:

1. TimathyJ. Ross,“Fuzzy logic with Engineering Applications ”, A John Wiley &sons Ltd,2010.
2. Kosko B., “Neural Networks and Fuzzy Systems”, Prentice-Hall of India Pvt. Ltd, 1994.

REFERENCE BOOKS:

1. Laurence Fausett, "Fundamentals of Neural Networks", Prentice Hall Publishers Ltd,1993
2. Zmmermann H.J., "Fuzzy Set Theory and its Applications", Allied Publishers Ltd, 1991
3. Klir G.J., Folger T, " Fuzzy Sets, Uncertainty and Information ", Prentice Hall Ltd., 1988
4. Zuroda J.M., "Introduction to Artificial Neural Systems ", Jaico Publishing,1994
5. Haykin S., "Artificial Neural Network: A Comprehensive Foundation ", Asia Pearson publication.
6. Sivanandam, "An Introduction to Fuzzy Logic and Neural Networks using Matlab 6.0", 1st edition , Tata Mc Graw Hill Publishers Ltd,2006

		L	T	P	C
01UEE911	**COMPUTER AIDED DESIGN OF ELECTRICAL APPARATUS**	**3**	**0**	**0**	**3**

OBJECTIVES:

- To impart knowledge on Design procedure of Various Electrical machines, vector fields - electrostatic and magneto static fields and concepts of electrodynamics
- To familiarize the knowledge about CAD Packages

UNIT I INTRODUCTION 9

Conventional design procedures – Limitations – Need for field analysis based design – Review of Basic principles of energy conversion – Development of Torque/Force

UNIT II MATHEMATICAL FORMULATION OF FIELD PROBLEMS 9

Electromagnetic Field Equations – Magnetic Vector/Scalar potential – Electrical vector /Scalar potential – Stored energy in Electric and Magnetic fields – Capacitance - Inductance- Laplace and Poisson's Equations – Energy functional.

UNIT III PHILOSOPHY OF FEM 9

Mathematical models – Differential/Integral equations – Finite Difference method – Finite element method – Energy minimization – Variational method- 2D field problems – Discretisation – Shape functions – Stiffness matrix – Solution techniques

UNIT IV CAD PACKAGES 9

Elements of a CAD System –Pre-processing – Modelling – Meshing – Material properties- Boundary Conditions – Setting up solution – Post processing.

UNIT V DESIGN APPLICATIONS 9

Voltage Stress in Insulators – Capacitance calculation - Design of Solenoid Actuator – Inductance and force calculation – Torque calculation in Switched Reluctance Motor.

TOTAL: 45PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Compare conventional design procedure with computer aided design
- Express electrical field problems in mathematical equations
- Demonstrate software for simulation and analysis of circuits and systems
- Calculate electrical parameters using CAD tools

TEXT BOOKS:

1. Salon S.J.,“Finite Element Analysis of Electrical Machines”, Kluwer Academic Publishers,1995.
2. Nicola Bianchi., “ Electrical Machine Analysis using Finite Elements”, CRC Taylor& Francis, 2005.
3. Vishnu Murthy K.M., “Computer Aided Design of Electrical Machines ”, BS Publications, 2008

REFERENCE BOOKS:

1. Joao Pedro, Bastos A and Nelson Sadowski, “Electromagnetic Modeling by Finite Element Methods”, Marcell Dekker Inc, 2003 .
2. Silvester P.P, Ferrari, “Finite Elements for Electrical Engineers” ,Cambridge University Press, 1983.
3. Lowther D.A. and Silvester P.P, “ Computer Aided Design in Magnetics ”, Springer Verlag, 1986
4. Hoole S.R.H, “Computer Aided Analysis and Design of Electromagnetic Devices”, Elsevier,New York, 1989.

01UEE912	HVDC TRANSMISSION	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To familiarize the concept, planning of DC power transmission and comparison with AC power transmission.
- To explain HVDC converters and HVDC system control
- To discuss about harmonics and design of filters

UNIT I INTRODUCTION **9**

DC Power transmission technology – Comparison of AC and DC transmission – Application of DC transmission – Description of DC transmission system – Planning for HVDC transmission – Modern trends in HVDC technology – DC breakers – Operating problems – HVDC transmission based on VSC – Types and applications of MTDC systems.

UNIT II ANALYSIS OF HVDC CONVERTERS **9**

Line commutated converter - Analysis of Graetz circuit with and without overlap - Pulse number – Choice of converter configuration – Converter bridge characteristics – Analysis of a 12 pulse converters – Analysis of VSC topologies and firing schemes.

UNIT III CONVERTER AND HVDC SYSTEM CONTROL **9**

Principles of DC link control – Converter control characteristics – System control hierarchy – Firing angle control – Current and extinction angle control – Starting and stopping of DC link – Power control – Higher level controllers – Control of VSC based HVDC link.

UNIT IV REACTIVE POWER AND HARMONICS CONTROL **9**

Reactive power requirements in steady state – Sources of reactive power – SVC and STATCOM – Generation of harmonics – Design of AC and DC filters – Active filters.

UNIT V POWER FLOW ANALYSIS IN AC/DC SYSTEMS **9**

Per unit system for DC quantities – DC system model – Inclusion of constraints – Power flow analysis – case study.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Describe the components of HVDC systems
- Analyze the behavior of converters under different conditions
- Design AC and DC filters
- Explain HVDC cables and simulation tools

TEXT BOOKS:

1. Padiyar, K. R., “HVDC power transmission system”, New Age International (P) Ltd., New Delhi,Second Edition, 2010.
2. Edward Wilson Kimbark, “Direct Current Transmission”, Vol. I, Wiley interscience, New York, London, Sydney, 1971.
3. Rakosh Das Begamudre, “Extra High Voltage AC Transmission Engineering”, New Age International (P) Ltd., New Delhi, 1990.

REFERENCE BOOKS:

1. Kundur P., “Power System Stability and Control”, McGraw-Hill, 1993.
2. Colin Adamson and Hingorani N. G., “High Voltage Direct Current Power Transmission”, GarrawayLimited, London, 1960.
3. Arrillaga, J., “High Voltage Direct Current Transmission”, Peter Pregrinus, London, 1983.
4. Kamakshaiah S., and Kamaraju V., “HVDC Transmission”, Tata McGraw Hill Education private Limited, 2011.

01UEE913	EMBEDDED SYSTEMS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To introduce the Building Blocks of Embedded System and network concepts
- To impart knowledge in Various processor scheduling algorithms
- To inculcate the Basics of Real time operating system and example tutorials to discuss on one real time operating system tool

UNIT I INTRODUCTION TO EMBEDDED SYSTEMS 9

Introduction to Embedded Systems – The build process for embedded systems- Structural units in Embedded processor , selection of processor & memory devices- DMA – Memory management methods- Timer and Counting devices, Watchdog Timer, Real Time Clock, In circuit emulator, Target Hardware Debugging.

UNIT II EMBEDDED NETWORKING 9

Embedded Networking: Introduction, I/O Device Ports & Buses– Serial Bus communication protocols - RS232 standard – RS422 – RS485 - CAN Bus -Serial Peripheral Interface (SPI) – Inter Integrated Circuits (I2C) –need for device drivers.

UNIT III EMBEDDED FIRMWARE DEVELOPMENT ENVIRONMENT 9

Embedded Product Development Life Cycle- objectives, different phases of EDLC, Modelling of EDLC; issues in Hardware-software Co-design, Data Flow Graph, state machine model, Sequential Program Model, concurrent Model, object oriented Model.

UNIT IV RTOS BASED EMBEDDED SYSTEM DESIGN 9

Introduction to basic concepts of RTOS- Task, process & threads, interrupt routines in RTOS, Multiprocessing and Multitasking, Preemptive and non-preemptive scheduling, Task communication shared memory, message passing-, Inter process Communication – synchronization between processes-semaphores, Mailbox, pipes, priority inversion, priority inheritance, comparison of Real time Operating systems: Vx Works, ЧC/OS-II, RT Linux.

UNIT V EMBEDDED SYSTEM APPLICATION DEVELOPMENT 9

Case Study of Washing Machine- Automotive Application- Smart card System Application,.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Describe the hardware and software units of Embedded system
- Explain the communication among I/O , peripheral components and buses and their interaction in embedded system
- Illustrate the architecture, memory organizations and peripherals of PIC Microcontroller
- Interface peripheral devices(LCD display keyboard) and simple electrical appliances with embedded controller

TEXT BOOKS:

1. Rajkamal, “Embedded System-Architecture, Programming, Design”, Mc Graw Hill, 2013.
2. Peckol, “Embedded system Design”, John Wiley & Sons,2010
3. Lyla B. Das, “ Embedded Systems-An Integrated Approach”, Pearson, 2013

REFERENCE BOOKS:

1. Shibu. K.V, “Introduction to Embedded Systems”, Tata Mcgraw Hill,2009.
2. Elicia White, “ Making Embedded Systems”, O’ Reilly Series,SPD,2011.
3. Tammy Noergaard, “Embedded Systems Architecture”, Elsevier, 2006.
4. Han-Way Huang, “Embedded system Design Using C8051”, Cengage Learning,2009.
5. Rajib Mall, “Real-Time systems Theory and Practice” Pearson Education, 2007

01UEE914	POWER QUALITY	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To impart knowledge on the various power quality phenomenon, their origin and monitoring and mitigation methods.
- To discuss the effects of various power quality phenomenon in various equipments

UNIT I INTRODUCTION TO POWER QUALITY 9

Terms and definitions: Overloading - under voltage - over voltage. Concepts of transients – short duration variations such as interruption - long duration variation such as sustained interruption. Sags and swells - voltage sag - voltage swell - voltage imbalance - voltage fluctuation - power frequency variations. International standards of power quality. Computer Business Equipment Manufacturers Associations (CBEMA) curve – Information Technology Information (ITI) Curve.

UNIT II VOLTAGE SAGS AND INTERRUPTIONS 9

Sources of sags and interruptions - estimating voltage sag performance. Thevenin's equivalent source - analysis and calculation of various faulted condition. Voltage sag due to induction motor starting. Estimation of the sag severity - mitigation of voltage sags, active series compensators. Static transfer switches and fast transfer switches.

UNIT III OVERVOLTAGES 9

Sources of over voltages - Capacitor switching – lightning - ferro resonance. Mitigation of voltages wells - surge arresters - low pass filters - power conditioners. Lightning protection – shielding – line arresters - protection of transformers and cables. An introduction to computer analysis tools for transients, PSCAD and EMTP.

UNIT IV HARMONICS 9

Harmonic sources from commercial and industrial loads, locating harmonic sources. Power system response characteristics - Harmonics Vs transients. Effect of harmonics - harmonic distortion - voltage and current distortion - harmonic indices - inter harmonics – resonance. Harmonic distortion evaluation - devices for controlling harmonic distortion - passive and active filters. IEEE and IEC standards.

UNIT V POWER QUALITY MONITORING 9

Monitoring considerations - monitoring and diagnostic techniques for various power quality problems-modeling of power quality (harmonics and voltage sag) problems by mathematical simulation tools - power line disturbance analyzer –quality measurement equipment - harmonic / spectrum analyzer - flicker meters – disturbance analyzer. Applications of expert systems for power quality monitoring.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Distinguish various categories of power quality problems

- Describe the root of the power quality problems in industry and their impact on performance and economics
- Apply appropriate solution techniques for power quality mitigation based on the type of problem
- Analyze the effect of harmonics on the power distribution system
- Choose appropriate device to monitor power quality parameters

TEXT BOOKS:

1. Roger. C. Dugan, Mark. F. McGranagham, Surya Santoso and H.WayneBeaty, “Electrical Power Systems Quality”, McGraw Hill,2003
2. Arrillaga J., N.R. Watson and S. Chen, “Power System Quality Assessment”,New York: Wiley,1999.

REFERENCE BOOKS:

1. Heydt G.T., “Electric Power Quality”, 2nd Edition, Stars in a Circle Publications, 1994.
2. Bollen M.H.J., “Understanding Power Quality Problems: Voltage Sags and Interruptions”, New York: IEEE Press, 1999.
3. Sankaran C., “Power Quality”, CRCPress, Taylor Francis Group,2002
4. PSCAD User Manual

01UEE915	FLEXIBLE AC TRANSMISSION SYSTEM	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To introduce the reactive power control techniques
- To impart knowledge on static VAR compensators, Thyristor controlled series capacitors, STATCOM devices, FACTS controllers and their applications

UNIT I INTRODUCTION **9**

Reactive power control in electrical power transmission lines -Uncompensated transmission line - series compensation – Basic concepts of Static Var Compensator (SVC) – Thyristor Controlled Series capacitor (TCSC) – Unified power flow controller (UPFC).

UNIT II STATIC VAR COMPENSATOR (SVC) AND APPLICATIONS **9**

Voltage control by SVC – Advantages of slope in dynamic characteristics – Influence of SVC on system voltage – Design of SVC voltage regulator –Modeling of SVC for power flow and fast transient stability – Applications: Enhancement of transient stability – Steady state power transfer – Enhancement of power system damping.

UNIT III THYRISTOR CONTROLLED SERIES CAPACITOR (TCSC) AND APPLICATIONS **9**

Operation of the TCSC – Different modes of operation – Modeling of TCSC – Variable reactance model – Modeling for Power Flow and stability studies. Applications: Improvement of the system stability limit – Enhancement of system damping.

UNIT IV VOLTAGE SOURCE CONVERTER BASED FACTS CONTROLLERS **9**

Static Synchronous Compensator (STATCOM) – Principle of operation – V-I Characteristics. Applications: Steady state power transfer-enhancement of transient stability - prevention of voltage instability. SSSC-operation of SSSC and the control of power flow –modeling of SSSC in load flow and transient stability studies.

UNIT V CO-ORDINATION OF FACTS CONTROLLERS **9**

Controller interactions – SVC – SVC interaction – Co-ordination of multiple controllers using linear control techniques – Control coordination using genetic algorithms.

TOTAL : 45 PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Describe the operating characteristic of various FACTS controllers and their role on enhancing maximum power transfer capacity
- Analyze the impact of FACTS components on power system stability and damping
- Compute basic mathematical models for FACTS devices
- Analyze the interactions and coordination amongst various FACTS Controllers

TEXT BOOKS:

1. Mohan Mathur R. and Rajiv K.Varma, “Thyristor – Based Facts Controllers for Electrical Transmission Systems”, IEEE press and John Wiley & Sons, Inc, 2002.
2. Narain G. Hingorani, “Understanding FACTS -Concepts and Technology of Flexible AC Transmission Systems”, Standard Publishers Distributors, Delhi- 110 006,

REFERENCE BOOKS:

1. John A.T., “Flexible A.C. Transmission Systems”, Institution of Electrical and Electronic Engineers (IEEE), 1999.
2. Sood . V.K., “HVDC and FACTS controllers – Applications of Static Converters in Power System”, April 2004 , Kluwer Academic Publishers, 2004.
3. Xiao – Ping Zang, Christian Rehtanz and Bikash Pal, “Flexible AC Transmission System: Modelling and Control” Springer, 2012.
4. Padiyar K.R.,” FACTS Controllers in Power Transmission and Distribution”, New Age International(P) Limited, Publishers, New Delhi, 2008.

01UEE916	EVOLUTIONARY COMPUTATION	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To introduce the evolutionary computation techniques methodologies, selection methods and algorithms
- To impart knowledge on developing evolutionary algorithms for real-world applications

UNIT I INTRODUCTION TO EVOLUTIONARY COMPUTATION 9

Biological and Artificial evolution – Evolutionary computation' and AI different historical branches of EC, e.g., GAs, EP, ES, GP, etc. – A simple evolutionary algorithm. Representation techniques, The importance of representation – Coding methods – Binary, gray, binary Vs gray, integer, real valued coding, structured coding – Representation of combinatorial problems – Adaptive representations.

UNIT II SELECTION SCHEMES 9

Fitness proportional selection and fitness scaling – Ranking, including linear, power, exponential and other ranking methods – Tournament selection – Selection pressure and its impact on evolutionary search.

UNIT III SEARCH OPERATORS 9

Recombination/Crossover for strings (e.g., binary strings) – One-point. multi-point, and uniform crossover operators – Mutation for strings - bit-flipping – Recombination / crossover and mutation rates – Recombination for real-valued representations – Discrete and intermediate recombination – Mutation for real-valued representations – Gaussian and Cauchy mutations. Self-adaptive mutations – Mixing different search operators -– An anomaly of self-adaptive mutations.

UNIT IV THEORETICAL ANALYSIS OF EVOLUTIOARY ALGORITHMS 9

Schema theorems – Co-evolution – Cooperative co-evolution, Competitive co-evolution – Niching and speciation – Fitness sharing – Crowding and mating restriction – Convergence of EAS

UNIT V APPLICATIONS AND ADDITIONAL FEATURES OF EAS 9

Evolutionary algorithms for traveling salesman problem, scheduling problem. inventory problem – Hybrid evolutionary and local search algorithms – Constraint handling – Penalty methods, repair methods – EAS for multi-objective problems – Weighted objectives, pareto optimality

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Explain evolutionary algorithms with time variables and various coding methods
- Discuss the various selection schemes of evolutionary computation
- Calculate the boundary conditions required for the solution of the equations
- Analyze theorems related to EAS and its additional features

TEXT BOOKS:

1. Baeck T., Fogel.O. B. and Michalewicz .Z., "Handbook on Evolutionary Computation", IOP Press, New Delhi, 1997
2. Carlos A. CoelloCoello, David A. Van Veldhuizen and Gary B. Lamont, “Evolutionary Algorithms for Solving Multi-Objective Problems” ,Springer,2000

REFERENCE BOOKS:

1. Michalewicz Z., "Genetic Algorithms + Data Structures = Evolution Programs", Third Edition, Springer-Verlag, Berlin, 1996
2. Banzhaf W., Nordin P., Keller R. E. and Frank D. Francone, "Genetic Programming: An Introduction", Morgan Kaufmann, 1999
3. Yao X., "Evolutionary Computation: Theory and Applications", World Scientific Pub Co., Singapore, 1999
4. Goldberg D E, "Genetic Algorithms in Search, Optimisation and Machine Learning", Addison-Wesley, 1989.

01UEE917	INTRODUCTION TO MICRO ELECTRO MECHANICAL SYSTEMS	L	T	P	C
		3	0	0	3

OBJECTIVIES:

- To impart knowledge on the fundamental science and engineering relevant to fabrication of miniature size systems
- To explain the relationship between nano/microstructure, characterization, properties and processing and design of materials
- To discuss the possess knowledge of sensors and actuators

UNIT I INTRODUCTION **9**

Intrinsic Characteristics of MEMS – Energy Domains and Transducers- Sensors and Actuators – Introduction to Micro fabrication - Silicon based MEMS processes – New Materials – Review of Electrical and Mechanical concepts in MEMS – Semiconductor devices – Stress and strain analysis – Flexural beam bending- Torsional deflection.

UNIT II SENSORS AND ACTUATORS-I **9**

Electrostatic sensors – Parallel plate capacitors – Applications – Interdigitated Finger capacitor – Comb drive devices – Micro Grippers – Micro Motors - Thermal Sensing and Actuation – Thermal expansion – Thermal couples – Thermal resistors – Thermal Bimorph - Applications – Magnetic Actuators – Micro magnetic components – Case studies of MEMS in magnetic actuators- Actuation using Shape Memory Alloys

UNIT III SENSORS AND ACTUATORS-II **9**

Piezoresistive sensors – Piezoresistive sensor materials - Stress analysis of mechanical elements – Applications to Inertia, Pressure, Tactile and Flow sensors – Piezoelectric sensors and actuators – piezoelectric effects – piezoelectric materials – Applications to Inertia , coustic, Tactile and Flow sensors

UNIT IV MICROMACHINING **9**

Silicon Anisotropic Etching – Anisotropic Wet Etching – Dry Etching of Silicon – Plasma Etching – Deep Reaction Ion Etching (DRIE) – Isotropic Wet Etching – Gas Phase Etchants – Case studies - Basic surface micromachining processes – Structural and Sacrificial Materials – Acceleration of sacrificial Etch – Striations and Antistriction methods – LIGA Process - Assembly of 3D MEMS – Foundry process.

UNIT V POLYMER AND OPTICAL MEMS **9**

Polymers in MEMS– Polimide - SU-8 - Liquid Crystal Polymer (LCP) – PDMS – PMMA – Parylene – Fluorocarbon - Application to Acceleration, Pressure, Flow and Tactile sensors- Optical MEMS – Lenses and Mirrors – Actuators for Active Optical MEMS.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Select appropriate materials for design and construction of micro electro mechanical system
- Describe the operation of various types of sensors and actuator
- Compare the various types of etching methods
- Distinguish the operating principles of polymer and optical MEMS

TEXT BOOKS:

1.Chang Liu, “Foundations of MEMS”, Pearson Education Inc., 2006.

2. Stephen Beeby and Graham Ensell, “ MEMS Mechanical sensors”, Artech House,INC,2004..

REFERENCE BOOKS:

1. NadimMaluf, “ An introduction to Micro electro mechanical system design”, Artech House, 2000.
2. Mohamed Gad-el-Hak, “ The MEMS Handbook”, CRC press Baco Raton, 2000
3. Tai Ran Hsu, “MEMS & Micro systems Design and Manufacture”, Tata McGraw Hill, New Delhi, 2002.
4. Julian w. Gardner, Vijay k. varadan and Osama O. Awadelkarim, “ Micro sensors MEMS and smart devices”, John Wiley & son Ltd,2002
5. James J.Allen, “Micro electro mechanical system design”, CRC Press, 2005

01UEE918	POWER SYSTEM DYNAMICS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To explain the modeling of synchronous machine, the excitation system and speed governing controllers
- To impart knowledge on the small signal stability analysis of a single-machine infinite bus system with excitation system and power system stabilizer
- To discuss the transient stability simulation of multi-machine power system

UNIT I INTRODUCTION **9**

Basics of system dynamics – numerical techniques – introduction to software packages to study the responses. Concept and importance of power system stability in the operation and design - distinction between transient and dynamic stability - complexity of stability problem in large system – necessity for reduced models - stability of interconnected systems.

UNIT II SYNCHRONOUS MACHINE MODELLING **9**

Synchronous machine - flux linkage equations - Park's transformation - per unit conversion - normalizing the equations - equivalent circuit - current space model - flux linkage state space model. Sub-transient and transient inductances - time constants. Simplified models (one axis and constant flux linkage) - steady state equations and phasor diagrams.

UNIT III MACHINE CONTROLLERS **9**

Exciter and voltage regulators - function and types of excitation systems - typical excitation system configuration - block diagram and state space representation of IEEE type 1 excitation system - saturation function - stabilizing circuit. Function of speed governing systems - block diagram and state space representation of IEEE mechanical hydraulic governor and electrical hydraulic governors for hydro turbines and steam turbines.

UNIT IV TRANSIENT STABILITY **9**

State equation for multimachine system with one axis model and simulation – modelling of multimachine power system with one axis machine model including excitation system and speed governing system and simulation using R-K method of fourth order (Gill's technique) for transient stability analysis - power system stabilizer. For all simulations, the algorithm and flow chart have to be discussed.

UNIT V DYNAMIC STABILITY **9**

System response to small disturbances - linear model of the unregulated synchronous machine and its modes of oscillation - regulated synchronous machine - distribution of power impact – linearization of the load equation for the one machine problem – simplified linear model - effect of excitation on dynamic stability - approximate system representation - supplementary stabilizing signals – dynamic performance measure - small signal performance measures.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Analyze the importance of power system stability in transient and dynamic behavior
- Compute transient parameters from synchronous machine mathematical model
- Discuss the controlling of excitation and speed governing system
- Compute the transient and dynamic stability of a given system using appropriate method

TEXT BOOKS:

1. P.M.Anderson and A.A.Fouad,"Power System Control and Stability", Galgotia Publications, New Delhi, 2003.
2. Kundur P., "Power System Stability and Control", Mc Graw Hill Inc., USA, 1994.

REFERENCE BOOKS:

1. Pai M.A. and Sauer W., "Power System Dynamics and Stability", Pearson Education Asia, India, 2002.
2. James A.Momoh and Mohamed. E. EI-Hawary,"Electric Systems, Dynamics and stability with Artificial Intelligence applications", Marcel Dekker, USA First Edition 2000
3. Padiyar K.R, "Power System Dynamics Stability & Control", BS Publications,Hyderabad,2002
4. Jan Machowski,JanuszW.Bialek and James R. Bumby, "Power System Dynamics : Stability & Control" ,Wiley,1997

01UEE919	SOFTWARE CIRCUIT FOR SIMULATION	L	T	P	C
		3	0	0	3

COURSE OBJECTI VES:

To impart knowledge on

- Advanced techniques in simulation
- PSPICE
- MATLAB
- SIMULINK

UNIT I INTRODUCTION **9**

Importance of simulation – General purpose circuit analysis – programs – Method of analysis of power electronic systems – Review of modeling of power electronic components and systems.

UNIT II ADVANCED TECHNIQUES IN SIMULATION **9**

Analysis of power electronic systems in a sequential manner coupled and decoupled systems – Various algorithms for computing steady state solution in power electronic systems – Future trends in computer simulation.

UNIT III PSPICE **9**

Introduction – Pspice overview – DC circuit Analysis –AC circuit analysis – Transient and the timedomain – Fourier Series and Harmonic components – An introduction to Pspice devices BJT, FET,MOSFET and is model – Amplifiers and Oscillators – Non linear Devices.

UNIT IV MATLAB **9**

Introduction - function description – Data types – Tool boxes – Graphical Display: Import and Export of data – Programs for solution of state equations.

UNIT V SIMULINK **9**

Introduction – Graphical user Interface – Selection of objects – Blocks – lines Simulation - Application programs.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Model the circuit operation to replicate the behavior of actual electronic circuits
- Analyze and simulate the electronic circuit using PSPICE
- Design electrical and electronics systems mathematically and perform simulation using MATLAB
- Interpret drawings and workout other technical details

TEXT BOOKS:

1. Rajagopalan V., “Computer aided analysis of power electronic systems”,Marcell Dekker 1987.
2. Barret J.P. ,Bornard and Meyer B., “Power System Simulatio” Ch apman & Hall

Publication,First Edition, 1997

REFERENCES BOOKS:

1. John Keown, “MicrosimPspice and circuit analysis”, Prentice hall Inc, 1998.
2. “OrcadPspice User manual “, Orcad Corporation, 2006.
3. “ Matlab / Simulink manual “, Maths Work 2007.
4. EmilsonPereira Leite , “MATLAB –Modeling,Programming& Simulation” ,First Edition,2010.

01UEE920	VISUAL LANGUAGES AND APPLICATIONS	L	T	P	C
		3	0	0	3

OBJECTI VES:

- To explain the concepts of windows programming models, MFC applications, programming using VC++, Document/View Architecture and basic ActiveX controls in visual basic.
- To impart knowledge the database and the database management system, visual data manager, data bound controls and ADO controls in VB.

UNIT I FUNDAMENTALS OF WINDOWS AND MFC 9

Messages - Windows programming - SDK style - Hungarian notation and windows data types – SDK programming in perspective. The benefits of C++ and MFC - MFC design philosophy – Document / View architecture - MFC class hierarchy - AFX functions. Application object - Frame window object - Message map. Drawing the lines – Curves – Ellipse – Polygons and other shapes. GDI pens – Brushes - GDI fonts - Deleting GDI objects and deselecting GDI objects. Getting input from the mouse: Client & Non-client - Area mouse messages - Mouse wheel - Cursor. Getting input from the keyboard: Input focus - Keystroke messages - Virtual key codes - Character & dead key messages.

UNIT II RESOURCES AND CONTROLS

Creating a menu – Loading and displaying a menu – Responding to menu commands – Command ranges - Updating the items in menu, update ranges – Keyboard accelerators. Creating menus programmatically - Modifying menus programmatically - The system menu - Owner draw menus – Cascading menus - Context menus. The C button class – C list box class – C static class - The font view application – C edit class – C combo box class – C scrollbar class. Model dialog boxes – Modeless dialog boxes.

UNIT III DOCUMENT / VIEW ARCHITECTURE

The in existence function revisited – Document object – View object – Frame window object – Dynamic object creation. SDI document template - Command routing. Synchronizing multiple views of a document – Mid squares application – Supporting multiple document types – Alternatives to MDI. Splitter Windows: Dynamic splitter window – Static splitter windows. Creating & initializing a toolbar - Controlling the toolbar's visibility – Creating & initializing a status bar - Creating custom status bar panes – Status bar support in appwizard. Opening, closing and creating the files - Reading & Writing – C file derivatives – Serialization basics - Writing serializable classes.

UNIT IV FUNDAMENTALS OF VISUAL BASIC

Menu bar – Tool bar – Project explorer – Toolbox – Properties window – Form designer – Form layout – Intermediate window. Designing the user interface: Aligning the controls – Running the application – Visual development and event driven programming.

Variables: Declaration – Types – Converting variable types – User defined data types - Lifetime of a variable. Constants - Arrays – Types of arrays. Procedures: Subroutines – Functions – Calling procedures. Text box controls – List box & Combo box controls – Scroll bar and slider controls – File controls.

UNIT V DATABASE PROGRAMMING WITH VB

Record sets – Data control – Data control properties, methods. Visual data manager: Specifying indices with the visual data manager – Entering data with the visual data manager. Data bound list

control – Data bound combo box – Data bound grid control. Mapping databases: Database object – Table def object, Query def object. Programming the active database objects – ADO object model – Establishing a connection - Executing SQL statements – Cursor types and locking mechanism – Manipulating the record set object – Simple record editing and updating.
.

TOTAL: 45 PERIODS

COURSE OUTCOMES:
After the successful completion of this course, the student will be able to

- Describe the concepts of Menu basics, menu magic and classic controls of the windows Programming using VC++.
- Analyze the concept of Document/View Architecture with single & multiple document interface, toolbars, status bars and File I/O Serialization.
- Explain about the integrated development programming event driven programming, variables, constants, procedures and basic ActiveX controls in visual basic.
- Illustrate the database and the database management system, visual data manager, data bound controls and ADO controls in VB.

TEXT BOOKS:
1. Jeff Prosise, “Programming Windows with MFC”, Second Edition, WP Publishers and Distributors (P) Ltd, Reprinted, 2002.
2. Evangelos Petroutsos, “Mastering Visual Basic 6.0”, BPB Publications, 2002.

REFERENCE BOOKS:
1. Herbert Schildt, “MFC Programming From the Ground Up”, Second Edition, Tata McGraw Hill,Reprinted, 2002.
2. John Paul Muller, “Visual C++ 6 From the Ground Up Second Edition”, Tata McGraw Hill, Reprinted, 2002.
3. Curtis Smith & Micheal Amundsen, “Teach Yourself Database Programming with Visual Basic 6 in 21 days”, Techmedia Pub, 1999.
4. Kang Zhang, “Visual Languages and Applications”, Springer Publications, 2007.

01UEE921 POWER ELECTRONICS FOR RENEWABLE ENERGY SYSTEMS

L	T	P	C
3	0	0	3

OBJECTIVES:

- To impart knowledge on the stand alone and grid connected renewable energy systems and design of power converters for Renewable energy applications.
- To discuss the various operating modes of wind electrical generators and solar energy systems.
- To explain the different power converters namely AC to DC, DC to DC and AC to AC converters for renewable energy systems and maximum power point tracking algorithms

UNIT I INTRODUCTION 9

Environmental aspects of electric energy conversion: impacts of renewable energy generation on environment (cost-GHG Emission) - Qualitative study of different renewable energy resources: Solar, wind, ocean, Biomass, Fuel cell, Hydrogen energy systems and hybrid renewable energy systems.

UNIT II ELECTRICAL MACHINES FOR RENEWABLE ENERGY CONVERSION 9

Reference theory fundamentals-principle of operation and analysis: IG, PMSG, SCIG and DFIG.

UNIT III POWER CONVERTERS 9

Solar: Block diagram of solar photo voltaic system -Principle of operation: line commutated converters (inversion-mode) - Boost and buck-boost converters- selection of inverter, battery sizing, array sizing Wind: Three phase AC voltage controllers- AC-DC-AC converters: uncontrolled rectifiers, PWM Inverters, Grid Interactive Inverters-matrix converters.

UNIT IV ANALYSIS OF WIND AND PV SYSTEMS 9

Stand alone operation of fixed and variable speed wind energy conversion systems and solar system-Grid connection Issues -Grid integrated PMSG, SCIG Based WECS, grid Integrated solar system

UNIT V HYBRID RENEWABLE ENERGY SYSTEMS 9

Need for Hybrid Systems- Range and type of Hybrid systems- Case studies of Wind-PV Maximum Power Point Tracking (MPPT).

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Explain the Environmental aspects of electric energy conversion
- Discuss the electrical machines for renewable energy conversion
- Choose the converters for renewable energy conversion
- Analyze grid connected issues in power system
- .Explain the maximum power point tracking algorithms

TEXT BOOKS:

1. Bhadra S. N. , Kastha D., and Banerjee S., “Wind Electrical Systems”, Oxford University Press, 2005.

2. Khan B.H., “Non-conventional Energy sources”, Tata McGraw-hill Publishing Company, New Delhi,2009.

REFERENCES BOOKS:

1. Rashid .M. H., “power electronics Hand book”, Academic press, 2001.
2. Ion Boldea, “Variable speed generators”, Taylor & Francis group, 2006.
3. Rai. G.D., “Non conventional energy sources”, Khanna publishes, 1993.
4. Gray, L. Johnson, “Wind energy system”, prentice hall linc, 1995.
5. Andrzej M. Trzynnadlowski, “Introduction to Modern Power Electronics’, Second edition, wiley India Pvt. Ltd, 2012.

01UCS952	PC HARDWARE AND TROUBLESHOOTING	L	T	P	C
		3	0	0	3

OBJECTIVES :

- To discuss the architectural concepts of PC.
- To explain various components of PC.
- To familiarize the different storage media.
- To demonstrate the installation procedures in PC.
- To review different Troubleshooting tools.

UNIT I **9**

Personal Computer: Introduction – History of the PC – Data flow inside the PC – Design guides – DOS memory organization - Microprocessor types and specifications – Over clocking – Cache memory. **Processor features**: Power Management – Super scalar execution – Dual independent bus architecture – Hyper threading – Dual core technology – Processor code names.

UNIT II **9**

Mother board components: Chip sets **-** North/South Bridge. **Bus standards:** ISA – PCI – MCA.

Power Supply: SMPS – Power specifications - Connectors – Switches – RTC/NVRAM batteries – Troubleshooting Power supply problems. **BIOS:** Shadowing – Upgrading – CMOS setup – Plug and Play – Error messages.

UNIT III **9**

Memory: Basics- RAM types and performance – Memory modules: SIMM, DIMM, DDR – Troubleshooting memory problems – logical memory layout. **Secondary Storage:** Floppy disk drive - Hard disk drive – parallel ATA – SATA **–** SCSI bus standard **-** CD, DVD – Troubleshooting secondary storage problems.

UNIT IV **9**

Input and Output Devices: Keyboard – Data transfer - Connector types - Mouse: mechanical and

optical – Joystick – RS 232C – USB: system, data transfer, and controller – Parallel port: SPP, EPP, ECP – Network Interface Card – MODEMS. **Display:** Video basics – Controllers – SVGA – AGP. **Printers:** dot matrix – laser jet - ink jet – Pen plotters – BIOS services for I/O devices – Troubleshooting I/O related problems.

UNIT V **9**

Installing Operating Systems: Hard disk partitioning and formatting – Windows – UNIX – Linux

– Networking - Spyware and Virus scanners – DOS interrupt services - Device Drivers.

Troubleshooting tools: Multimeter – Oscilloscope – Logic Analyzer – In-Circuit Emulator – PC Diagnostics – Testing – Maintenance.

TOTAL : 45 PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Explain the architectural concepts of PC.
- Illustrate the various peripheral devices.
- Describe the functions of various components of a PC.
- Analyze various troubleshooting tools.

TEXT BOOKS:

1. Scott Mueller, “Upgrading and Repairing PCs”, Pearson Education, Seventeenth edition, 2007. (UNITs I – V)
2. Hans Peter Messmer, “The Indispensable PC Hardware Book”, Addison-Wesley, Fourth edition, 2001. (UNITs II – IV)

REFERENCE BOOKS:

1. Peter Abel, Niyaz Nizamuddin, “IMB PC Assembly Language and Programming”, Pearson Education, 2007.
2. Scott Mueller, “Repairing PC's”, PHI, 1992.
3. Craig Zacker &John Rourke,”The Computer Reference: PC Hardware”, TataMcgraw-Hill, NewDelhi, 2001.
4. Mike Meyers, “Introduction to PC Hardware and Troubleshooting”, Tata McGraw-Hill, NewDelhi, 2003.

01UIT952	COMPUTER COMMUNICATION NETWORKS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To impart the individual components of the big picture of computer networks.
- To introduce the functions of different layers.
- To summarize IEEE standard, protocols and network components employed in computer networking.

UNIT I THE PHYSICAL LAYER 9

The uses of computer networks – Network hardware – Network software – Reference models – Example of networks – Network standardization. The Theoretical basis for data communication – Guided transmission media – wireless transmission – PSTN –Mobile telephone – Communication Satellite.

UNIT II THE DATA LINK LAYER 9

Data link layer design issues – Error detection and correction – Elementary data link protocols sliding window protocols – Example of data link protocols – ETHERNET – 802.11, 802.16, Bluetooth – Data link layer switching.

UNIT III THE NETWORK LAYER 9

Network layer design issues – Routing algorithms – Congestion control algorithms – Internetworking- Network layer in Internet.

UNIT IV THE TRANSPORT LAYER 9

Transport layer design issues – Transport Protocols – Simple transport protocol –Internet transport protocols UDP, TCP.

UNIT V THE APPLICATION LAYER 9

Domain name system – Electronic mail – World wide web – Multimedia – Cryptography, Digital signature – Communication security.

TOTAL:45 PERIODS

COURSE OUTCOMES:

After the successful completion of the course students will be able to

- Identify the components required to build different types of networks
- Choose the required functionality at each layer for given application
- Identify solution for each functionality at each layer
- Trace the flow of information from one node to another node in the network

TEXT BOOKS:

1. Achyut S Godbole, “Computer Networks”, Tata McGraw – Hill, First Edition, 2004.
2. Forouzan, Behrouz, “Introduction to Data Communications and Networking”, Tata McGraw- Hill, Delhi, 2007.

REFERENCE BOOKS:

1. William Stallings, “Data and Computer Communication”, Pearson Education, Sixth Edition,2007.
2. Andrew S.Tanenbaum, “Computer Networks”, Fourth Edition, 2003.

3. Godbole, Achyut, “Data Communications and Networks”, Tata McGraw – Hill, Delhi, 2002.
4. Kurose, James and Ross, Keith, “Computer Networking”, Pearson Education Asia, Delhi, 2001.

01UPH851 **FUNDAMENTALS OF NANOSCIENCE** **L T P C**

3 0 0 3

OBJECTIVES :

- To introduce the basic concepts of preparation of nano materials.
- To know the synthesis methods and characterization of nano materials.

UNIT I BASIC PROPERTIES OF NANO PARTICLES **9**

Size effect and properties of nano particles – particle size – particle shape – melting point, surface tension, wettability – specific surface area and pore size – reason for change in optical properties, electrical properties and mechanical properties- advantages.

UNIT II NANOTUBES **9**

Single walled and multi walled Nanotubes (SWNT & MWNT) – synthesis and purification – synthesis of carbon nano tubes by pyrolysis techniques – arc-discharge method – nanotube properties – Nanowires – methods of preparation of nanowires – VLS mechanism.

UNIT III SYNTHESIS OF NANO STRUCTURE MATERIALS **9**

Gas phase condensation – Vaccum deposition – physical vapor deposition (PVD) – chemical vapor deposition (CVD) – laser ablation – sol-gel-Ball milling – Electro deposition.

UNIT IV CHARACTERIZATION **9**

Principle and working of atomic force Microscopy (AFM) and scanning tunneling microscopy (STM) - near-field scanning optical microscopy – Principle of Transmission Electron microscopy (TEM).

UNIT V NANOTECHNOLOGY APPLICATIONS **9**

Applications of nanoparticles, quantum dots, Single electron transistors, coloumb blockade effects in ultra-small metallic tunnel junctions- nano particles based solar cells – CNT based transistors – principle of Dip Pen Lithography.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Explain the classification of solid, formation of semiconductor diode
- Discuss the functions of magnetic storage devices and superconductors.
- Describe the synthesis of Nano materials.
- Apply Nano materials in electrical and electronics field

TEXT BOOKS:

1. K.K.Chattopadhyay, A.N.Banerjee , "Introduction to NanoScience and NanoTechnology", PHI learning private limited, New Delhi,2009.

2. Murty, B.S., Shankar, P., Raj, B., Rath, B.B., Murday, "Textbook of Nanoscience and Nanotechnology", Springer Berlin Heidelberg, Germany (2006).

REFERENCE BOOKS:

1. A C. N. R. Rao, A. Mu¨ller, A. K. Cheetham, "The Chemistry of Nanomaterials: Synthesis, Properties and Applications", Volume 1, Wiley-VCH, Verlag GmbH, Germany (2004).
2. Aut C. Bre´chignac P. Houdy M. Lahmani, "Nanomaterials and Nanochemistry", Springer Berlin Heidelberg, Germany (2006).
3. Guozhong Cao, "Nanostructures & Nanomaterials Synthesis, Properties G; Z: Applications", World Scientific Publishing Private, Ltd., Singapore (2004).
4. Zhong Lin Wang, "Characterization of Nanophase Materials", Wiley-VCH, Verlag GmbH, Germany (2004).