SRM
UNIVERSITY
(Under section 3 of UGC Act 1956)

B.Tech. (Full Time) - Electrical and Electronics Engineering
Curriculum & Syllabus
2013 – 2014

Volume – I
(all courses except open electives)

FACULTY OF ENGINEERING AND TECHNOLOGY
SRM UNIVERSITY
SRM NAGAR, KATTANKULATHUR – 603 203

STUDENT OUTCOMES

The curriculum and syllabus for B.Tech programs (2013) conform to outcome based teaching learning process. In general, **ELEVEN STUDENT OUTCOMES** (a-k) have been identified and the curriculum and syllabus have been structured in such a way that each of the courses meets one or more of these outcomes. Student outcomes describe what students are expected to know and be able to do by the time of graduation. These relate to the skills, knowledge, and behaviors that students acquire as they progress through the program. Further each course in the program spells out clear instructional objectives which are mapped to the student outcomes.

The student outcomes are:

(a) an ability to apply knowledge of mathematics, science, and engineering
(b) an ability to design and conduct experiments, as well as to analyze and interpret data
(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
(d) an ability to function on multidisciplinary teams
(e) an ability to identify, formulate, and solve engineering problems
(f) an understanding of professional and ethical responsibility
(g) an ability to communicate effectively
(h) the broad education necessary to understand the impact of engineering solutions in global, economic, environmental, and societal context
(i) a recognition of the need for, and an ability to engage in life-long learning
(j) a knowledge of contemporary issues
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

B.Tech. Electrical and Electronics Engineering
Curriculum – 2013
(Applicable for students admitted from the academic year 2013-14 onwards)

SEMESTER I						
COURSE CODE	**CATEGORY**	**COURSE NAME**	**L**	**T**	**P**	**C**
LE1001	G	ENGLISH	1	2	0	2
PD1001	G	SOFT SKILLS I	1	0	1	1
MA1001	B	CALCULUS AND SOLID GEOMETRY	3	2	0	4
PY1001	B	PHYSICS	3	0	0	3
CY1001	B	CHEMISTRY	3	0	0	3
EE1001	E	BASIC ELECTRICAL ENGINEERING	2	0	0	2
PY1002	B	PHYSICS LABORATORY	0	0	2	1
CY1002	B	CHEMISTRY LABORATORY	0	0	2	1
EE1002	E	ELECTRICAL ENGINEERING PRACTICE	0	0	2	1
NC1001/ NS1001/ SP1001/ YG1001	G	NCC/NSS/ NSO/Yoga	0	0	1	1
TOTAL			13	4	08	19
Courses from Table I						
Student shall register for minimum 20 credits in I semester and minimum 20 credits in II semester. However student shall have registered for all the courses enlisted under Semester I and II as well as the courses in Table I by the time the registration process is complete in II semester.Keeping this in mind student shall register for the courses in I and II semesters.						

Legend:
L - Number of lecture hours per week
T - Number of tutorial hours per week
P - Number of practical hours per week
C - Number of credits for the course

Category of courses:
G - General
B - Basic Sciences
E - Engineering Sciences and Technical Arts
P - Professional Subjects

SEMESTER II						
COURSE CODE	**CATEGORY**	**COURSE NAME**	L	T	P	C
LE1002	G	VALUE EDUCATION	1	0	0	1
PD1002	G	SOFT SKILLS II	1	0	1	1
MA1002	B	ADVANCED CALCULUS AND COMPLEX ANALYSIS	3	2	0	4
PY1003	B	MATERIAL SCIENCE	2	0	2	3
EE1003	P	ANALYSIS OF ELECTRIC CIRCUITS	3	1	0	4
CY1003	B	PRINCIPLES OF ENVIRONMENTAL SCIENCE	2	0	0	2
CE1001	E	BASIC CIVIL ENGINEERING	2	0	0	2
EC1001	E	BASIC ELECTRONICS ENGINEERING	2	0	0	2
EC1002	E	ELECTRONICS ENGINEERING PRACTICE	0	0	2	1
TOTAL			16	3	5	20
Courses from Table I						
Student shall register for minimum 20 credits in I semester and minimum 20 credits in II semester. However student shall have registered for all the courses enlisted under Semester I and II as well the courses in Table I by the time the registration process is complete in II semester. *Keeping this in mind student shall register for the courses in I and II semesters.*						

Table I

COURSES WHICH CAN BE REGISTERED FOR EITHER IN I OR II SEMESTER

SEMESTER I / II						
CourseCode	**Category**	**Course Name**	**L**	**T**	**P**	**C**
CS1001	G	PROGRAMMING USING MATLAB	0	1	2	2
BT1001	B	BIOLOGY FOR ENGINEERS	2	0	0	2
ME1001	E	BASIC MECHANICAL ENGINEERING	2	0	0	2
ME1005	E	ENGINEERING GRAPHICS	0	1	4	3
TOTAL			4	2	6	9

SEMESTER III						
CourseCode	**Category**	**Course Name**	**L**	**T**	**P**	**C**
LE1003/ LE1004/ LE1005/ LE1006/ LE1007	G	GERMAN LANGUAGE PHASE I FRENCH LANGUAGE PHASE I/ JAPANESE LANGUAGE PHASE I KOREAN LANGUAGE PHASE I CHINESE LANGUAGE PHASE I	2	0	0	2
PD1003	G	APTITUDE I	1	0	1	1
MA1003	B	TRANSFORMS AND BOUNDARY VALUE PROBLEMS	4	0	0	4
EE1004	P	ELECTRICAL MACHINES – I	3	0	0	3
EE1005	P	ELECTROMAGNETIC THEORY	3	0	0	3
EE1006	P	DIGITAL SYSTEMS	3	0	0	3
EE1007	P	ELECTRON DEVICES AND CIRCUITS	3	0	0	3
EE1008	P	ELECTRICAL AND ELECTRONIC MEASUREMENTS AND INSTRUMENTATION	3	0	0	3
EE1009	P	ELECTRICAL MACHINES LABORATORY – I	0	0	3	2
EE1010	P	ELECTRIC CIRCUITS LABORATORY-I	0	0	3	1
EE1011	P	ANALOG AND DIGITAL CIRCUITS LABORATORY-1	0	0	3	2
TOTAL			**22**	**0**	**10**	**27**
Total Contact Hours			**32**			

SEMESTER IV						
Course Code	**Category**	**Course Name**	**L**	**T**	**P**	**C**
LE1008/ LE1009/ LE1010/ LE1011/ LE1012	G	GERMAN LANGUAGE PHASE II / FRENCH LANGUAGE PHASE II/ JAPANESE LANGUAGE PHASE II / KOREAN LANGUAGE PHASE II / CHINESE LANGUAGE PHASE II	2	0	0	2
PD1004	G	APTITUDE II	1	0	1	1
MA1004	B	NUMERICAL METHODS	4	0	0	4
EE1012	P	ELECTRICAL MACHINES – II	3	0	0	3
EE1013	P	CONTROL SYSTEMS	3	0	0	3
EE1014	P	LINEAR INTEGRATED CIRCUITS	3	0	0	3
EE1015	P	TRANSMISSION AND DISTRIBUTION SYSTEMS	3	0	0	3
EE1016	P	ELECTRICAL MACHINES LABORATORY– II	0	0	3	2
EE1017	P	MEASUREMENTS AND CONTROL SYSTEMS LABORATORY	0	0	2	1
	P	***Dep. Elective I***	3	0	0	3
TOTAL			**22**	**0**	**6**	**25**
Total Contact Hours			**28**			

SEMESTER V						
CourseCode	**Category**	**Course name**	**L**	**T**	**P**	**C**
PD1005	G	APTITUDE III	1	0	1	1
MA1015	B	DISCRETE MATHEMATICS	4	0	0	4
EE1018	P	POWER ELECTRONICS	3	0	0	3
EE1019	P	POWER SYSTEM PROTECTION	3	0	0	3
EE1020	P	DESIGN OF ELECTRICAL APPARATUS	3	0	0	3
EE1021	P	INTEGRATED CIRCUITS LABORATORY	0	0	3	2
EE1022	P	POWER ELECTRONICS LABORATORY	0	0	3	2
EE1047	P	INDUSTRIAL TRAINING I	0	0	1	1
	P	***Dep. Elective -II***	3	0	0	3
		Open Elective I	3	0	0	3
TOTAL			**20**	**0**	**8**	**25**
Total Contact Hours			**27**			

SEMESTER VI						
Course Code	**Category**	**Course Name**	**L**	**T**	**P**	**C**
PD1006	G	APTITUDE IV	1	0	1	1
MA1036	B	PROBABILITY AND STATISTICS	3	0	0	3
EE1023	P	DIGITAL SIGNAL PROCESSING	3	0	0	3
EE1024	P	MICROPROCESSORS AND MICROCONTROLLERS	3	0	0	3
EE1025	P	POWER SYSTEM ANALYSIS	3	0	0	3
EE1026	P	MICROPROCESSORS AND MICROCONTROLLERS LABORATORY	0	0	3	2
EE1027	P	COMPREHENSION	0	2	0	1
EE1049	P	MINORPROJECT	0	0	2	1
		Open Elective II	3	0	0	3
		Open Elective III	3	0	0	3
TOTAL			**19**	**2**	**6**	**23**
Total Contact Hours			**27**			

SEMESTER VII						
Course code	**Category**	**Course Name**	**L**	**T**	**P**	**C**
EE1028	P	SOLID STATE DRIVES AND CONTROL	3	0	0	3
EE1029	P	POWER SYSTEM OPERATION&CONTROL	3	0	0	3
EE1030	P	EMBEDDED SYSTEMS APPLIED TO ELECTRICAL ENGINEERING	3	0	0	3
EE1031	P	SIMULATION LABORATORY	0	0	3	2
EE1032	P	ELECTRIC DRIVES LABORATORY	0	0	3	2
EE1048	P	INDUSTRIAL TRAINING II (Training to be undergone after VI semester)	0	0	1	1
	P	***Dep. Elective III***	3	0	0	3
	P	***Dep. Elective IV***	3	0	0	3
TOTAL			**15**	**0**	**7**	**20**
Total Contact Hours			**22**			

SEMESTER VIII						
Course Code	**Category**	**Course Name**	**L**	**T**	**P**	**C**
EE1050	P	MAJOR PROJECT / PRACTICE SCHOOL	0	0	24	12
Total			0	0	24	12
Total Contact Hours			**24**			

DEPARTMENTAL ELECTIVES

Course Code	Category	Course Name	L	T	P	C
EE1101	P	POWER QUALITY MANAGEMENT	3	0	0	3
EE1102	P	MICROCONTROLLER BASED SYSTEM DESIGN	3	0	0	3
EE1103	P	POWER SYSTEM DYNAMICS	3	0	0	3
EE1104	P	ARTIFICIAL NEURAL NETWORKS	3	0	0	3
EE1105	P	ADVANCED CONTROL THEORY	3	0	0	3
EE1106	P	POWER GENERATION SYSTEMS	3	0	0	3
EE1107	P	MODERN POWER SYSTEM ANALYSIS	3	0	0	3
EE1108	P	FLEXIBLE AC TRANSMISSION SYSTEMS	3	0	0	3
EE1109	P	NON-CONVENTIONAL ENERGY RESOURCES	3	0	0	3
EE1110	P	HIGH VOLTAGE ENGINEERING	3	0	0	3
EE1111	P	SPECIAL ELECTRICAL MACHINES	3	0	0	3
EE1112	P	ELECTRICAL POWER UTILIZATION AND ILLUMINATION	3	0	0	3
EE1113	P	POWER SYSTEM DE-REGULATION	3	0	0	3
EE1114	P	MODERN OPTIMIZATION TECHNIQUES	3	0	0	3
EE1115	P	ARTIFICIAL INTELLIGENT SYSTEMS	3	0	0	3
EE1116	P	HVDC AND EHVAC SYSTEMS	3	0	0	3

Summary of credits										
Category	**I**	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	**Total**	**%**
G (Excluding open and departmental electives)	8		3	3	1	1			16	8.9
B (Excluding open and departmental electives)	23		4	4	4	3			38	21.1
E (Excluding open and departmental electives)	13								13	7.25
P (Excluding open and departmental electives)	4		20	15	14	13	14	12	92	51.1
Open Elective	--				3	6			9	5
Dep. Elective	--			3	3	-	6		12	6.67
Total	48		27	25	25	23	20	12	180	100

SEMESTER-I

LE1001	**ENGLISH**	**L**	**T**	**P**	**C**
	Total Contact Hours-45	**1**	**2**	**0**	**2**
	Prerequisite				
	Nil				

PURPOSE	
To help students achieve proficiency in English and develop their professional communication skills to meet the demand in the field of global communication to enable them to acquire placement anywhere with ease and confidence.	
INSTRUCTIONAL OBJECTIVES	
1.	To enable students improve their lexical, grammatical and communicative competence.
2.	To enhance their communicative skills in real life situations.
3	To assist students understand the role of thinking in all forms of communication.
4.	To equip students with oral and appropriate written communication skills.
5.	To assist students with employability and job search skills.

UNIT I- INVENTIONS **(9 hours)**

1. Grammar and Vocabulary – Tense and Concord:
2. Listening and Speaking – Common errors in Pronunciation (Individual sounds); Process description (Describing the working of a machine, and the manufacturing process)
3. Writing – Interpretation of data (Flow chart, Bar chart)
4. Reading -- (Reading Comprehension -- Answering questions)

UNIT II - ECOLOGY **(9 hours)**

1. Grammar and Vocabulary – Error Analysis – Synonyms and Antonyms, Parallelisms
2. Listening and Speaking - Conducting Meetings
3. Writing – Notice, Agenda, Minutes , letters to the editor via email : Email etiquette
4. D Reading Comprehension – Summarizing and Note-making

UNIT III- SPACE **(9 hours)**

1. Grammar and Vocabulary – tense and concord; word formation
2. Listening and Speaking – Distinction between native and Indian English (Speeches by TED and Kalam) – accent, use of vocabulary and rendering;
3. Writing – Definitions and Essay writing
4. Reading Comprehension – Predicting the content

UNIT IV- CAREERS **(9 hours)**

1. Grammar and Vocabulary –Homonyms and Homophones
2. Listening and Speaking – – Group Discussion
3. Writing Applying for job, cover letter and resume
4. Reading, etymology (roots ; idioms and phrases), Appreciation of creative writing.

UNIT V- RESEARCH **(9 hours)**

1. Grammar and Vocabulary – Using technical terms, Analogies
2. Listening and Speaking -- Presentation techniques (Speech by the learner)
3. Writing – Project Proposal
4. Reading Comprehension -- Referencing Skills for Academic Report Writing (Research Methodology – Various methods of collecting data) Writing a report based on MLA Handbook

TEXTBOOK

1. Department of English and Foreign Languages. "*English for Engineers*", SRM University Publications, 2013.

REFERENCES

1. Dhanavel.S.P, "*English and Communication Skills for Students of Science and Engineering*"**,** Orient Blackswan Ltd., 2009.
2. Meenakshi Raman and Sangeetha Sharma**.** "*Technical Communication-Principles and Practice*", Oxford University Press, 2009.
3. Day.R.A. Scientific English:"*A Guide for Scientists and Other Professionals*", 2nd ed. Hyderabad: Universities Press, 2000.

LE1001 ENGLISH												
Course Designed by		**Department of English and Foreign Languages**										
1.	Student outcomes	a	b	c	d	e	f	g	h	i	j	k
					x		x	x		x		
2.	Mapping of instructional objectives with student outcome				1-5		1-5	1-5		1-5		
3.	Category	General (G)		Basic Sciences(B)			Engineering Sciences and Technical Arts(E)			Professional Subjects(P)		
		X										
4.	Approval	23rd Meeting of Academic Council, May 2013										

PD1001	**SOFT SKILLS-I**	**L**	**T**	**P**	**C**
	Total Contact Hours - 30	**1**	**0**	**1**	**1**
	Prerequisite				
	Nil				

PURPOSE

To enhance holistic development of students and improve their employability skills.

INSTRUCTIONAL OBJECTIVES

1.	To develop inter personal skills and be an effective goal oriented team player.
2.	To develop professionals with idealistic, practical and moral values.
3.	To develop communication and problem solving skills.
4.	To re-engineer attitude and understand its influence on behavior.

UNIT I - SELF ANALYSIS **(4 hours)**

SWOT Analysis, Who am I, Attributes, Importance of Self Confidence, Self Esteem

UNIT II - ATTITUDE **(4 hours)**

Factors influencing Attitude, Challenges and lessons from Attitude.

Change Management

Exploring Challenges, Risking Comfort Zone, Managing Change

UNIT III - MOTIVATION **(6 hours)**

Factors of motivation, Self talk, Intrinsic & Extrinsic Motivators.

UNIT IV - GOAL SETTING **(6 hours)**

Wish List, SMART Goals, Blue print for success, Short Term, Long Term, Life Time Goals.

Time Management

Value of time, Diagnosing Time Management, Weekly Planner To do list, Prioritizing work.

UNIT V - CREATIVITY **(10 hours)**

Out of box thinking, Lateral Thinking

Presentation

ASSESSMENT

1. A practical and activity oriented course which has continuous assessment for 75 marks based on class room interaction, activities etc.
2. Presentation – 25 marks

TEXT BOOK

1. INSIGHT, 2012, Career Development Centre, SRM Publications.

REFERENCES

1. Covey Sean, *Seven Habits of Highly Effective Teens*, New York, Fireside Publishers, 1998.
2. Carnegie Dale, *How to win Friends and Influence People*, New York: Simon & Schuster, 1998.
3. Thomas A Harris, *I am ok, You are ok* , New York-Harper and Row, 1972
4. Daniel Coleman, *Emotional Intelligence*, Bantam Book, 2006

<table>
<tr><th colspan="13">PD1001 - SOFT SKILLS-I</th></tr>
<tr><td colspan="2">Course designed by</td><td colspan="11">Career Development Centre</td></tr>
<tr><td rowspan="2">1.</td><td rowspan="2">Student Outcome</td><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td><td>g</td><td>h</td><td>i</td><td>j</td><td>k</td></tr>
<tr><td></td><td></td><td></td><td>X</td><td></td><td>X</td><td>X</td><td></td><td>X</td><td></td><td></td></tr>
<tr><td>2.</td><td>Mapping of instructional objectives with student outcome</td><td></td><td></td><td></td><td>1</td><td></td><td>2</td><td>3</td><td></td><td>4</td><td></td><td></td></tr>
<tr><td rowspan="2">3.</td><td rowspan="2">Category</td><td colspan="3">General (G)</td><td colspan="3">Basic Sciences (B)</td><td colspan="3">Engineering Sciences and Technical Arts (E)</td><td colspan="2">Professional Subjects (P)</td></tr>
<tr><td colspan="3">X</td><td colspan="3"></td><td colspan="3"></td><td colspan="2"></td></tr>
<tr><td>4.</td><td>Approval</td><td colspan="11">23rd meeting of Academic Council, May 2013</td></tr>
</table>

MA1001	CALCULUS AND SOLID GEOMETRY	L	T	P	C
	Total Contact Hours-75	3	2	0	4
	(Common to all Branches of Engineering except Bio group)				

PURPOSE

To impart analytical ability in solving mathematical problems as applied to the respective branches of Engineering.

INSTRUCTIONAL OBJECTIVES

1.	To apply advanced matrix knowledge to Engineering problems.
2.	To equip themselves familiar with the functions of several variables.
3.	To familiarize with the applications of differential equations.
4.	To improve their ability in solving geometrical applications of differential calculus problems
5.	To expose to the concept of three dimensional analytical geometry.

UNIT I- MATRICES (15 Hours)

Characteristic equation – Eigen values and Eigen vectors of a real matrix – Properties of Eigen values – Cayley – Hamilton theorem orthogonal reduction of a symmetric matrix to diagonal form – Orthogonal matrices – Reduction of quadratic form to canonical form by orthogonal transformations.

UNIT II- FUNCTIONS OF SEVERAL VARIABLES (15hours)

Function of two variables – Partial derivatives – Total differential – Taylor's expansion – Maxima and Minima – Constrained Maxima and Minima by Lagrangian Multiplier method – Jacobians – Euler's theorem for homogeneous function.

UNIT III- ORDINARY DIFFERENTIAL EQUATIONS (15hours)

Linear equations of second order with constant and variable coefficients – Homogeneous equation of Euler type – Equations reducible to homogeneous form – Variation of parameter – Simultaneous first order with constant co-efficient.

UNIT IV- GEOMETRICAL APPLICATIONS OF DIFFERENTIAL CALCULUS (15 hours)

Curvature – Cartesian and polar coordinates – Circle of curvature – Involutes and Evolutes – Envelopes – Properties of envelopes.

UNIT V- THREE DIMENSIONAL ANALYTICAL GEOMETRY (15 hours)

Equation of a sphere – Plane section of a sphere – Tangent Plane – Orthogonal Sphere - Equation of a cone – Right circular cone – Equation of a cylinder – Right circular cylinder.

TEXT BOOKS

1. Kreyszig.E, "*Advanced Engineering Mathematics*", John Wiley & Sons. Singapore, 10th edition, 2012.
2. Ganesan.K, Sundarammal Kesavan, Ganapathy Subramanian.K.S.& SrinivasanV., "*Engineering Mathematics*",Gamma Publications, Revised Edition, 2013.

REFERENCES

1. Grewal.B.S, Higher Engineering Mathematics, Khanna Publications, 42nd Edition,2012.
2. Veerajan.T, "*Engineering Mathematics I*", Tata McGraw Hill Publishing Co, New Delhi, 5th edition, 2006.
3. Kandasamy Petal. "*Engineering Mathematics*", Vol.I (4th revised edition), S.Chand &Co, New Delhi, 2000.
4. Narayanan.S, Manicavachagom Pillay.T.K, Ramanaiah.G, "*Advanced Mathematics for Engineering students*", Volume I (2nd edition), S.Viswanathan Printers and Publishers, 1992.
5. Venkataraman.M.K, "*Engineering Mathematics*" – First Year (2nd edition), National Publishing Co., Chennai, 2000.

MA1001 CALCULUS AND SOLID GEOMETRY												
Course designed by		**Department of Mathematics**										
1.	Student Outcome	a	b	c	d	e	f	G	h	i	j	k
		x				x						
2.	Mapping of instructional objectives with student outcome	1-5				1-5						
3.	Category	General (G)	Basic Sciences (B)	Engineering Sciences and Technical Arts (E)	Professional Subjects (P)
		--	x	--	--
4.	Approval	23rd meeting of Academic Council, May 2013			

PY1001	PHYSICS	L	T	P	C
	Total Contact Hours-45	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

The purpose of this course is to provide an understanding of physical concepts and underlying various engineering and technological applications. In addition, the course is expected to develop scientific temperament and analytical skill in students, to enable them logically tackle complex engineering problems in their chosen area of application.

INSTRUCTIONAL OBJECTIVES

1.	To understand the general scientific concepts required for technology
2.	To apply the Physics concepts in solving engineering problems
3.	To educate scientifically the new developments in engineering and technology
4.	To emphasize the significance of Green technology through Physics principles

UNIT I–MECHANICAL PROPERTIES OF SOLIDS AND ACOUSTICS (9 hours)

Mechanical properties of solids: Stress-strain relationship – Hooke's law – Torsional Pendulum – Young's modulus by cantilever – Uniform and non-uniform bending –– Stress-strain diagram for various engineering materials – Ductile and brittle materials – Mechanical properties of Engineering materials (Tensile strength, Hardness, Fatigue, Impact strength, Creep) – Fracture – Types of fracture (Elementary ideas).

Acoustics: Intensity – Loudness – Absorption coefficient and its determination – Reverberation – Reverberation time – Factors affecting acoustics of buildings and their remedies – Sources and impacts of noise – Sound level meter – Strategies on controlling noise pollution – Ultrasonic waves and properties – Methods of Ultrasonic production (Magnetostriction and Piezoelectric) – Applications of Ultrasonics in Engineering and medicine.

UNIT II–ELECTROMAGNETIC WAVES, CIRCUITS AND APPLICATIONS (9 hours)

Del operator – grad, div, curl and their physical significances - displacement current –Maxwell's equations (derivation) – Wave equation for electromagnetic waves – Propagation in free space – Poynting theorem – Characteristic of Transverse electric and magnetic waves – Skin depth – Rectangular and circular waveguides – High powered vacuum-based cavity magnetrons – Applications including radars, microwave oven and lighting systems.

UNIT III– LASERS AND FIBER OPTICS (9 hours)

Lasers: Characteristics of Lasers – Einstein's coefficients and their relations – Lasing action – Working principle and components of CO_2 Laser, Nd-YAG Laser, Semiconductor diode Laser, Excimer Laser and Free electron Laser – Applications in Remote sensing, holography and optical switching – Mechanism of Laser cooling and trapping.

Fiber Optics: Principle of Optical fiber – Acceptance angle and acceptance cone – Numerical aperture – V-number – Types of optical fibers (Material, Refractive index and mode) – Photonic crystal fibers – Fiber optic communication – Fiber optic sensors.

UNIT IV– QUANTUM MECHANICS AND CRYSTAL PHYSICS (9 hours)

Quantum mechanics: Inadequacies of Classical Mechanics – Duality nature of electromagnetic radiation – De Broglie hypothesis for matter waves – Heisenberg's uncertainty principle –Schrödinger's wave equation – Particle confinement in 1D box (Infinite Square well potential). **Crystal Physics:** Crystal directions – Planes and Miller indices – Symmetry elements – Quasi crystals – Diamond and HCP crystal structure – Packing factor – Reciprocal lattice – Diffraction of X-rays by crystal planes – Laue method and powder method – Imperfections in crystals.

UNIT V– GREEN ENERGY PHYSICS (9 hours)

Introduction to Green energy – **Solar energy:** Energy conversion by photovoltaic principle – Solar cells – **Wind energy:** Basic components and principle of wind energy conversion systems – **Ocean energy:** Wave energy – Wave energy conversion devices – Tidal energy – single and double basin tidal power plants – Ocean Thermal Electric Conversion (OTEC) – **Geothermal energy:** Geothermal sources (hydrothermal, geo-pressurized hot dry rocks, magma) – **Biomass:** Biomass and bio-fuels – bio-energies from wastages – **Fuel cells**: H_2O_2 – **Futuristic Energy:** Hydrogen – Methane Hydrates – Carbon capture and storage (CCS).

* One problem sheet consisting of 10 to 15 problems is to be prepared for each unit and discussed in the class.
* Few problems based on design considerations related to appropriate branches of engineering can be incorporated in each problem sheet.

TEXT BOOKS

1. Thiruvadigal.J.D, Ponnusamy.S, Sudha.D, and Krishnamohan M., *"Physics for Technologists"*, Vibrant Publication, Chennai, 2013
2. Dattu R.Joshi, "Engineering Physics",Tata McGraw- Hill,New Delih,2010.

REFERENCES

1. Wole Soboyejo, "*Mechanical Properties of Engineered Materials*", Marcel Dekker Inc., 2003.
2. Frank Fahy, "*Foundations of Engineering Acoustics*", Elsevier Academic Press, 2005.
3. Alberto Sona, "*Lasers and their applications*", Gordon and Breach Science Publishers Ltd., 1976.
4. David J. Griffiths, "*Introduction to electrodynamics*", 3rd ed., Prentice Hall, 1999.
5. Leonard. I. Schiff, "*Quantum Mechanics"*, Third Edition, Tata McGraw Hill, 2010.
6. Charles Kittel, "*Introduction to Solid State Physics*", Wiley India Pvt. Ltd, 7th ed., 2007.
7. Godfrey Boyle, "*Renewable Energy: Power sustainable future*", 2nd edition, Oxford University Press, UK, 2004.

<table>
<tr><td colspan="13">PY1001 PHYSICS</td></tr>
<tr><td colspan="2">Course designed by</td><td colspan="11">Department of Physics and Nanotechnology</td></tr>
<tr><td rowspan="2">1.</td><td rowspan="2">Student Outcome</td><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td><td>g</td><td>h</td><td>i</td><td>j</td><td>k</td></tr>
<tr><td>x</td><td></td><td>x</td><td></td><td>x</td><td></td><td></td><td></td><td></td><td></td><td>x</td></tr>
<tr><td>2.</td><td>Mapping of instructional objectives with student outcome</td><td>1</td><td></td><td>4</td><td></td><td>2</td><td></td><td></td><td></td><td></td><td></td><td>3</td></tr>
<tr><td rowspan="2">3.</td><td rowspan="2">Category</td><td>General (G)</td><td colspan="3">Basic Sciences (B)</td><td colspan="4">Engineering Sciences and Technical Arts (E)</td><td colspan="3">Professional Subjects (P)</td></tr>
<tr><td>--</td><td colspan="3">x</td><td colspan="4">--</td><td colspan="3">--</td></tr>
<tr><td>4.</td><td>Approval</td><td colspan="11">23rd meeting of Academic Council, May 2013</td></tr>
</table>

	CHEMISTRY	L	T	P	C
CY1001	Total Contact Hours - 45	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

To enable the students to acquire knowledge in the principles of chemistry for engineering applications

INSTRUCTIONAL OBJECTIVES

1.	The quality of water and its treatment methods for domestic and industrial applications.
2.	The classification of polymers, different types of polymerizations, preparation, properties and applications of important polymers and FRPs.
3.	The phase rule and its application to one and two component systems.
4.	The principle, types and mechanism of corrosion and protective coatings.
5.	The classification and selection of lubricants and their applications.
6.	The basic principles, instrumentation and applications of analytical techniques

UNIT I-WATER TREATMENT (9 hours)

Water quality parameters: Physical, Chemical & Biological significance - Hardness of water - estimation of hardness (EDTA method) - Dissolved oxygen – determination (Winkler's method), Alkalinity - determination - disadvantages of using hard water in boilers: Scale, sludge formation - disadvantages - prevention - treatment: Internal conditioning - phosphate, carbon and carbonate conditioning methods - External: Zeolite, ion exchange methods - desalination - reverse osmosis and electrodialysis - domestic water treatment.

UNIT II - POLYMERS AND REINFORCED PLASTICS (9 hours)

Classification of polymers - types of polymerization reactions - mechanism of addition polymerization: free radical, ionic and Ziegler - Natta - effect of structure on the properties of polymers - strength, plastic deformation, elasticity and crystallinity -Preparation and properties of important resins: Polyethylene, PVC, PMMA, Polyester, Teflon, Bakelite and Epoxy resins - compounding of plastics - moulding methods - injection, extrusion, compression and calendaring - reinforced plastics - FRP – Carbon and Glass- applications.

UNIT III - PHASE EQUILIBRIA, LUBRICANTS AND ADHESIVES (9 hours)

Phase rule: Statement - explanation of the terms involved - one component system (water system only). Condensed phase rule - thermal analysis - two component systems: simple eutectic, Pb-Ag; compound formation, Zn-Mg.

Lubricants: Classification –solid, semi solid, liquid, emulsion- properties – selection of lubricants for different purposes, Adhesives: classification-natural, synthetic, inorganic- Adhesive action - applications.

UNIT IV- CORROSION AND ITS CONTROL (9 hours)

Corrosion: Basic concepts - mechanism of chemical, electrochemical corrosion - Pilling Bedworth rule – Types of Electrochemical corrosion - galvanic corrosion - differential aeration corrosion - pitting corrosion - stress corrosion – Measurement of corrosion (wt. loss method only) - factors influencing corrosion. Corrosion control: Cathodic protection - sacrificial anodic method - corrosion inhibitors. Protective coatings: surface preparation for metallic coatings - electro plating (copper plating) and electroless plating (Nickel plating) - chemical conversion coatings - anodizing, phosphating & chromate coating.

UNIT V- INSTRUMENTAL METHODS OF ANALYSIS (9 hours)

Basic principles, instrumentation and applications of potentiometry, UV - visible spectroscopy, infrared spectroscopy, atomic absorption spectroscopy and flame photometry .

TEXT BOOKS

1. Kamaraj,Pand Arthanareeswari. M, "*Applied Chemistry", 9th Edition*, Sudhandhira Publications, 2012.
2. Dara.S.S, A Text book of Engineering Chemistry, 10th Edition, S.Chand & Company Ltd., New Delhi, 2003

REFERENCES

1. Jain.P.C and Monika Jain, "*Engineering Chemistry*", Danpat Rai publishing company (P) Ltd, New Delhi, 2010.
2. Helen P Kavitha, "*Engineering Chemistry – I", Scitech* Publications, 2nd edition, 2008.

CY1001 CHEMISTRY												
Course designed by		**Department of Chemistry**										
1.	Student outcome	a	b	c	d	e	f	g	h	i	j	k
		x	x	x		x						x
2.	Mapping of instructional objective with student outcome	1-6	1,5	3		2						4

3.	Category	General (G)	Basic Sciences (B)	Engineering Sciences and Technical Arts (E)	Professional Subjects (P)
		--	x	--	--
4.	Approval	23rd meeting of Academic Council, May 2013			

EE1001	BASIC ELECTRICAL ENGINEERING	L	T	P	C
	Total Contact Hours - 30	2	0	0	2
	Prerequisite				
	Nil				

PURPOSE

This course provides comprehensive idea about circuit analysis, working principles of machines and common measuring instruments.

INSTRUCTIONAL OBJECTIVES

1.	Understand the basic concepts of magnetic circuits, AC & DC circuits.
2.	Explain the working principle, construction, applications of DC & AC machines and measuring instruments.
3.	Gain knowledge about the fundamentals of wiring and earthing

UNIT I – FUNDAMENTALS OF DC CIRCUITS (6 hours)

Introduction to DC and AC circuits, Active and passive two terminal elements, Ohms law, Voltage-Current relations for resistor, inductor, capacitor , Kirchhoff's laws, Mesh analysis, Nodal analysis, Ideal sources –equivalent resistor, current division, voltage division

UNIT II – MAGNETIC CIRCUITS (6 hours)

Introduction to magnetic circuits-Simple magnetic circuits-Faraday's laws, induced emfs and inductances

UNIT III – AC CIRCUITS (6 hours)

Sinusoids, Generation of AC, Average and RMS values, Form and peak factors, concept of phasor representation, J operator. Analysis of R-L, R-C, R-L-C circuits. Introduction to three phase systems - types of connections, relationship between line and phase values.

UNIT IV–ELECTRICAL MACHINES & MEASURING INSTRUMENTS (6 hours)

Working principle, construction and applications of DC machines and AC machines (1 - phase transformers, single phase induction motors: split phase, capacitor start and capacitor start & run motors). Basic principles and classification of instruments -Moving coil and moving iron instruments.

UNIT V–ELECTRICAL SAFETY, WIRING &INTRODUCTION TO POWER SYSTEM (6 hours)

Safety measures in electrical system- types of wiring- wiring accessories-staircase, fluorescent lamps & corridor wiring- Basic principles of earthing-Types of earthing- Simple layout of generation, transmission & distribution of power.

TEXT BOOK

1. Dash.S.S,Subramani.C,Vijayakumar.K,"BasicElectrical Engineering", First edition,Vijay Nicole Imprints Pvt.Ltd,2013

REFERENCES

1. Smarajt Ghosh, "*Fundamentals of Electrical & Electronics Engineering*", Second edition, PHI Learning, 2007.
2. Metha.V.K, Rohit Metha, "*Basic Electrical Engineering*", Fifth edition, Chand.S& Co, 2012.
3. Kothari.D.P and Nagrath.I.J, "*Basic Electrical Engineering*", Second edition, Tata McGraw - Hill, 2009.
4. Bhattacharya.S.K, "*Basic Electrical and Electronics Engineering"*, First edition, Pearson Education, 2011.

EE1001 - BASIC ELECTRICAL ENGINEERING												
Course designed by		**Department of Electrical and Electronics Engineering**										
1.	Student outcome	a	b	c	d	e	f	g	h	i	j	k
		x				x						
2.	Mapping of instructional objective with student outcome	1-3				1						
3.	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts (E)				Professional Subjects (P)		
		--		--		x				--		
4.	Approval	23rd meeting of Academic Council, May 2013										

PY1002	PHYSICS LABORATORY	L	T	P	C
	Total Contact Hours - 30	0	0	2	1
	Prerequisite				
	Nil				

PURPOSE

The purpose of this course is to develop scientific temper in experimental techniques and to reinforce the physics concepts among the engineering students

INSTRUCTIONAL OBJECTIVES

1.	To gain knowledge in the scientific methods and learn the process of measuring different Physical variables
2.	Develop the skills in arranging and handling different measuring instruments
3.	Get familiarized with experimental errors in various physical measurements and to plan / suggest on how the contributions could be made of the same order, so as to minimize the errors.

LIST OF EXPERIMENTS

1. Determination of Young's modulus of a given material – Uniform / Non-uniform bending methods.
2. Determination of Rigidity modulus of a given material – Torsion pendulum
3. Determination of dispersive power of a prism – Spectrometer
4. Determination of laser parameters – divergence and wavelength for a given laser source –laser grating/ Particle size determination using laser
5. Study of attenuation and propagation characteristics of optical fiber cable
6. Calibration of voltmeter / ammeter using potentiometer
7. Construction and study of IC regulation properties of a given power supply
8. Study of V-I and V-R characteristics of a solar cell
9. Mini Project – Concept based Demonstration

REFERENCES

1. .Souires.G.L "*Practical Physics:*", 4th Edition, Cambridge University, UK, 2001.
2. .Shukla.R.K and Anchal Srivastava, "*Practical Physics*", 1st Edition, New Age International (P) Ltd, New Delhi, 2006.
3. Chattopadhyay.D, Rakshit.P.C, and Saha.B, "*An Advanced Course in Practical Physics*", 2nd ed., Books & Allied Ltd., Calcutta, 1990.

PY1002 - PHYSICS LABORATORY												
Course designed by		**Department of Physics and Nanotechnology**										
1.	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
		x	x			x						
2.	Mapping of instructional objectives with student outcome	1	3			2						
3.	Category	General(G)		Basic Sciences (B)		Engineering Sciences and Technical Arts (E)					Professional Subjects (P)	
		--		x		--					--	
4.	Approval	23rd meeting of Academic Council, May 2013										

CY1002	CHEMISTRY LABORATORY	L	T	P	C
	Total Contact Hours - 30	0	0	2	1
	Prerequisite				
	Nil				

PURPOSE

To apply the concepts of chemistry and develop analytical skills for applications in engineering.

INSTRUCTIONAL OBJECTIVES

1. To enable the students to understand the basic concepts involved in the analyses.

LIST OF EXPERIMENTS

1. Preparation of standard solutions
2. Estimation of total, permanent and temporary hardness by EDTA method
3. Conductometric titration - determination of strength of an acid
4. Estimation of iron by potentiometry.
5. Determination of molecular weight of polymer by viscosity average method
6. Determination of dissolved oxygen in a water sample by Winkler's method
7. Determination of Na / K in water sample by Flame photometry (Demonstration)
8. Estimation of Copper in ore
9. Estimation of nickel in steel
10. Determination of total alkalinity and acidity of a water sample
11. Determination of rate of corrosion by weight loss method.

REFERENCES

1. Kamaraj & Arthanareeswari, Sudhandhira Publications "*Practical Chemistry*" (work book) , 2011.
2. Helen P. Kavitha "*Chemistry Laboratory Manual*" , Scitech Publications, 2008.

CY1002 - CHEMISTRY LABORATORY												
Course designed by		**Department of Chemistry**										
1.	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
		x	x									x
2.	Mapping of instructional objectives with student outcome	1	1									1
3.	Category	General(G)		Basic Sciences (B)		Engineering Sciences and Technical Arts (E)				Professional Subjects (P)		
		--		x		--				--		
4.	Approval	23rd meeting of Academic Council, May 2013										

EE1002	ELECTICAL ENGINEERING PRACTICE	L	T	P	C
	Total Contact Hours - 30	0	0	2	1
	Prerequisite				
	Nil				

PURPOSE

To provide exposure to the students with hands on experience on various Electrical Engineering practices.

INSTRUCTIONAL OBJECTIVES

At the end of the course students will be able

1.	To learn the residential wiring and various types of wiring.
2.	To measure the various electrical quantities.
3.	To gain knowledge about the fundamentals of various electrical gadgets and their working and trouble shooting of them.
4.	To design a prototype of a transformer.
5.	To know the necessity and types of earthing and measurement of earth resistance.

LIST OF EXPERIMENTS

1. Residential wiring (using Energy meter, fuses, switches, indicator, lamps, etc)
2. Types of wiring (fluorescent lamp wiring, staircase wiring, godown wiring, etc)
3. Measurement of electrical quantities (like voltage, current, power, power factor in RLC circuits)
4. Measurement of energy (using single phase and three phase energy meter)
5. Study of Earthing and Measurement of Earth resistance.
6. Study of trouble shooting of electrical equipments (fan, iron box, mixer-grinder, etc)
7. Study of various electrical gadgets (Induction motor, transformer, CFL, LED, PV cell, etc)
8. Assembly of choke or small transformer.

REFERENCES

1. Subhransu Sekhar Dash & K.Vijayakumar, "*Electrical Engineering Practice Lab Manual".* Vijay Nicole Imprints Private Ltd., First Edition, 2013.
2. Jeyachandran.K, Natarajan.Sand Balasubramanian.S, " *A Primer on engineering practices laboratory*", Anuradha Publications, 2007.
3. Jeyapoovan.T, Saravanapandian.M and Pranitha.S, "*Engineering practices lab manual*",Vikas Publishing House Pvt., Ltd., 2006.

EE1002- ELECTICAL ENGINEERING PRACTICE												
Course designed by		**Department of Electrical and Electronics Engineering**										
1.	Student outcomes	a	b	c	d	e	f	g	h	i	j	k
		x	x	x								
2.	Mapping of instructional objectives with student outcome	1-5	2,5	4								
3.	Category	General (G)		Basic Sciences (B)			Engineering Sciences and Technical Arts(E)				Professional Subjects(P)	
		--		--			x				--	
4.	Approval	23rd meeting of Academic Council, May 2013										

NC1001/ NS1001/ SP1001/ YG1001	NATIONAL CADET CORPS (NCC)/ NATIONAL SERVICE SCHEME (NSS)/ NATIONAL SPORTS ORGANIZATION (NSO) / YOGA	L	T	P	C
	Total Contact Hours – 15 (minimum, but may vary depending on the course)	0	0	1	1
	Prerequisite				
	Nil				

PURPOSE	
To imbibe in the minds of students the concepts and benefits of NCC/NSS/NSO/YOGA and make them practice the same	
INSTRUCTIONAL OBJECTIVES	
1.	To enable the students to gain knowledge about NCC/NSS/NSO/YOGA and put the same into practice

NATIONAL CADET CORPS (NCC)

Any student enrolling as a member of National Cadet Core (NCC) will have to attend sixteen parades out of twenty parades each of four periods over a span of academic year. Attending eight parades in first semester will qualify a student to earn the credits specified in the curriculum. Grading shall be done based on punctuality, regularity in attending the parades and the extent of active involvement.

NATIONAL SERVICE SCHEME (NSS)

A student enrolling as member of NSS will have to complete 60 hours of training / social service to be eligible to earn the credits specified in the curriculum.

Grading shall be done by the faculty member handling the course based on punctuality, regularity in attending the classes and the extent of active involvement.

NATIONAL SPORTS ORGANIZATION (NSO)

Each student must select one of the following games/sports events and practice for one hour per week. An attendance of 75% is compulsory to earn the credits specified in the curriculum. Grading shall be done by the faculty member handling the course based on punctuality, regularity in attending the classes and the extent of active involvement.

List of games/sports:

Basket Ball, Football, Volley Ball, Ball Badminton, Cricket, Throw-ball, Track events. Field events or any other game with the approval of faculty member.

YOGA

Benefits of Agnai Meditation -Meditation - Agnai, Asanas, Kiriyas, Bandas, Muthras. Benefits of santhi Meditation - Meditation Santhi Physical Exercises (I&II). Lecture & Practice - Kayakalpa Yoga Asanas, Kiriyas, Bandas, Muthras. Analysis of Thought - Meditation Santhi Physical Exercises III & IV. Benefits of Thuriyam - Meditation Thuriyam Kayakalpa Asanas, Kiriyas, Bandas, Muthras. Attitude - Meditation Thuriyam Kayakalpa Asanas, Kiriyas, Bandas, Muthras. Importance of Arutkappy & Blessings - Meditation Thuriyam Kayakalpa Asanas, Kiriyas, Bandas, Muthras. Benefits of Blessings - Meditation Santhi Kayakalpa Asanas, Kiriyas, Bandas, Muthras

Assessment

An attendance of 75% is compulsory to earn the credits specified in the curriculum. Grading shall be done by the faculty member handling the course based on punctuality, regularity in attending the classes and the extent of active involvement.

TEXT BOOKS

1. Yogiraj Vethathiri Maharishi, "*Yoga for Modern Age*", Vethathiri Publishers, 1989
2. Vethathiri Maharishi.T, "*Simplified Physical Exercises*", Vethathiri Publishers, 1987.

NC1001/ NS1001/ SP1001/ YG1001		**NATIONAL CADET CORPS (NCC)/ NATIONAL SERVICE SCHEME (NSS)/ NATIONAL SPORTS ORGANIZATION (NSO)/YOGA**										
Course designed by		**NCC/NSS/NSO/YOGA PRACTITIONERS**										
1.	Student outcomes	a	b	c	d	e	f	g	h	i	j	k
2.	Mapping of instructional objectives with student outcome				X					X		
3.	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts(E)				Professional Subjects(P)		
		--		--		x				--		
4.	Approval	23rd meeting of Academic Council, May 2013										

SEMESTER II

LE1002	**VALUE EDUCATION**	**L**	**T**	**P**	**C**
	Total Contact Hours- 15	**1**	**0**	**0**	**1**
	Prerequisite				
	Nil				

PURPOSE

To provide guiding principles and tools for the development of the whole person recognizing that the individual is comprised of Physical, Intellectual, Emotional and Spiritual dimensions.

INSTRUCTIONAL OBJECTIVES

1.	To help individuals think about and reflect on different values.
2.	To deepen understanding, motivation and responsibility with regard to making personal and social choices and the practical implications of expressing them in relation to themselves, others, the community and the world at large
3.	To inspire individuals to choose their own personal, social, moral and spiritual values and be aware of practical methods for developing and deepening

UNIT I- INTRODUCTION **(3 hours)**

Definition, Relevance, Types of values, changing concepts of values

UNIT II- INDIVIDUAL AND GROUP BEHAVIOUR **(3 hours)**

Personal values – Self – Strengths (self-confidence, self-assessment, self-reliance, self-discipline, determination, self-restraint, contentment, humility, sympathy and compassion, gratitude, forgiveness) Weaknesses (Influences -- Peer pressure, familial and societal expectations, media)

UNIT III- SOCIETIES IN PROGRESS **(3 hours)**

Definition of society; Units of society; Communities – ancient and modern – Agents of change – Sense of survival, security, desire for comfort and ease sense of belonging, social consciousness and responsibility

UNIT IV- ENGINEERING ETHICS **(3 hours)**

Definition- Societies for engineers – Code of Ethics – Ethical Issues involved in cross border research -- Ethical and Unethical practices – case studies – situational decision making

UNIT V- SPIRITUAL VALUES **(3 hours)**

What is religion? -- Role of religion – Misinterpretation of religion – moral policing – Consequences -- Religion as spiritual quest – Aesthetics and religion

TEXT BOOK

1. Department of English and Foreign Languages SRM University, "*Rhythm of Life",* SRM Publications, 2013.

REFERENCE

1. Values **(**Collection of Essays). Published by: Sri Ramakrishna Math, Chennai-4. 1996.

LE1002 - VALUE EDUCATION												
Course designed by		**Department of English and Foreign Languages**										
1.	Student outcomes	a	b	c	d	e	f	g	h	i	J	k
							x			x		
2.	Mapping of instructional objectives with student outcome						1-3			1-3		
3.	Category	General (G)		Basic Sciences (B)			Engineering Sciences and Technical Arts(E)			Professional Subjects(P)		
		x		--			--			--		
4.	Approval	23rd meeting of Academic Council, May 2013										

PD1002	**SOFT SKILLS-II**	**L**	**T**	**P**	**C**
	Total Contact Hours - 30	**1**	**0**	**1**	**1**
	Prerequisite				
	Nil				

PURPOSE	
To enhance holistic development of students and improve their employability skills.	
INSTRUCTIONAL OBJECTIVES	
1.	To develop inter personal skills and be an effective goal oriented team player.
2.	To develop professionals with idealistic, practical and moral values.
3.	To develop communication and problem solving skills.
4.	To re-engineer attitude and understand its influence on behavior.

UNIT I - INTERPERSONAL SKILLS (6 hours)

Understanding the relationship between Leadership Networking & Team work, Realizing Ones Skills in Leadership, Networking & Team Work, and Assessing Interpersonal Skills Situation description of Interpersonal Skill.

Team Work

Necessity of Team Work Personally, Socially and Educationally

UNIT II - LEADERSHIP (4 hours)

Skills for a good Leader, Assessment of Leadership Skills

Change Management

Exploring Challenges, Risking Comfort Zone, Managing Change

UNIT III - STRESS MANAGEMENT (6 hours)

Causes of Stress and its impact, how to manage & distress, Understanding the circle of control, Stress Busters.

Emotional Intelligence

What is Emotional Intelligence, emotional quotient why Emotional Intelligence matters, Emotion Scales. Managing Emotions.

UNIT IV - CONFLICT RESOLUTION (4 hours)

Conflicts in Human Relations – Reasons Case Studies, Approaches to conflict resolution.

UNIT V - DECISION MAKING **(10 hours)**

Importance and necessity of Decision Making, process of Decision Making, Practical way of Decision Making, Weighing Positives & Negatives.

Presentation

ASSESSMENT

1. A practical and activity oriented course which has a continuous assessment for 75 marks based on class room interaction, activities etc.,
2. Presentation - 25 marks

TEXT BOOK

1. INSIGHT, 2009. Career Development Centre, SRM Publications.

REFERENCES

1. Covey Sean, *Seven Habit of Highly Effective Teens*, New York, Fireside Publishers, 1998.
2. Carnegie Dale, *How to win Friends and Influence People*, New York: Simon & Schuster, 1998.
3. Thomas A Harris, *I am ok, You are ok* , New York-Harper and Row, 1972.
4. Daniel Coleman, *Emotional Intelligence*, Bantam Book, 2006

PD1002 - SOFT SKILLS-II												
Course designed by		**Career Development Centre**										
1.	Student Outcome	a	b	c	d	e	f	g	h	i	j	K
					X		X	X		X		
2.	Mapping of instructional objectives with student outcome				1		2	3		4		
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences and Technical Arts (E)				Professional Subjects(P)		
		X										
4.	Approval	23rd meeting of Academic Council, May 2013										

	ADVANCED CALCULUS AND COMPLEX ANALYSIS	L	T	P	C
MA1002	Total Contact Hours -75	3	2	0	4
	(Common to all Branches of Engineering except Bio group)				

PURPOSE

To impart analytical ability in solving mathematical problems as applied to the respective branches of Engineering.

INSTRUCTIONAL OBJECTIVES

1.	To have knowledge in multiple calculus
2.	To improve their ability in Vector calculus
3.	To equip themselves familiar with Laplace transform
4.	To expose to the concept of Analytical function
5.	To familiarize with Complex integration

UNIT I- MULTIPLE INTEGRALS (**15 hours)**

Double integration in Cartesian and polar coordinates – Change of order of integration – Area as a double integral – Triple integration in Cartesian coordinates – Conversion from Cartesian to polar – Volume as a Triple Integral.

UNIT II- VECTOR CALCULUS **(15 hours)**

Gradient, divergence, curl – Solenoidal and irrotational fields – Vector identities (without proof) – Directional derivatives – Line, surface and volume integrals – Green's, Gauss divergence and Stoke's theorems (without proof) – Verification and applications to cubes and parallelopipeds only.

UNIT III- LAPLACE TRANSFORMS **(15 hours)**

Transforms of simple functions – Basic operational properties – Transforms of derivatives and integrals – Initial and final value theorems – Inverse transforms – Convolution theorem – periodic functions – Applications of Laplace transforms for solving linear ordinary differential equations up to second order with constant coefficients only.

UNIT IV- ANALYTIC FUNCTIONS **(15 hours)**

Definition of Analytic Function – Cauchy Riemann equations – Properties of analytic functions - Determination of harmonic conjugate – Milne-Thomson's method – Conformal mappings: 1/z, az, az+b and bilinear transformation.

UNIT V- COMPLEX INTEGRATION **(15 hours)**

Line integral – Cauchy's integral theorem (without proof) – Cauchy's integral formulae and its applications – Taylor's and Laurent's expansions (statements only) – Singularities – Poles and Residues – Cauchy's residue theorem – Contour integration – Unit circle and semi circular contour.

TEXT BOOKS

1. Kreyszig.E, "*Advanced Engineering Mathematics*", 10th edition, John Wiley & Sons. Singapore, 2012.
2. Ganesan.K, Sundarammal Kesavan, Ganapathy.K.S, Subramanian & Srinivasan.V, "*Engineering Mathematics*", Gamma publications, Revised Edition, 2013.

REFERENCES

1. Grewal.B.S, "*Higher Engg Maths*", Khanna Publications, 42nd Edition, 2012.
2. Veerajan.T, "*Engineering Mathematics I*", Tata McGraw Hill Publishing Co., New Delhi, 5th edition, 2006.
3. Kandasamy Petal. "*Engineering Mathematics*", Vol.I (4th revised edition), Chand.S.&Co., New Delhi, 2000.
4. Narayanan.S, Manicavachagom Pillay.T.K, Ramanaiah.G, "*Advanced Mathematics*" for Engineering students, Volume I (2nd edition), Viswanathan.S. Printers and Publishers, 1992.
5. Venkataraman.M.K, "*Engineering Mathematics*" – First Year (2nd edition), National Publishing Co., Chennai, 2000.

MA1002 - ADVANCED CALCULUS AND COMPLEX ANALYSIS												
Course designed by		**Department of Mathematics**										
1.	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
		x				x						
2.	Mapping of instructional objectives with student outcome	1-5				1-5						
3.	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts (E)				Professional Subjects (P)		
		--		x		--				--		
4.	Approval	23rd meeting of academic council, May 2013										

PY1003	MATERIALS SCIENCE	L	T	P	C
	Total Contact Hours - 60	2	0	2	3
	Prerequisite				
	Nil				

PURPOSE

The course introduces several advanced concepts and topics in the rapidly evolving field of material science. Students are expected to develop comprehension of the subject and to gain scientific understanding regarding the choice and manipulation of materials for desired engineering applications.

INSTRUCTIONAL OBJECTIVES

1.	To acquire basic understanding of advanced materials, their functions and properties for technological applications
2.	To emphasize the significance of materials selection in the design process
3.	To understand the principal classes of bio-materials and their functionalities in modern medical science
4.	To get familiarize with the new concepts of Nano Science and Technology
5.	To educate the students in the basics of instrumentation, measurement, data acquisition, interpretation and analysis

UNIT I– ELECTRONIC AND PHOTONIC MATERIALS (6 hours)

Electronic Materials: Fermi energy and Fermi–Dirac distribution function – Variation of Fermi level with temperature in intrinsic and extrinsic semiconductors – Hall effect – Dilute Magnetic Semiconductors (DMS) and their applications

Superconducting Materials: Normal and High temperature superconductivity – Applications.

Photonic Materials: LED – LCD – Photo conducting materials – Photo detectors – Photonic crystals and applications – Elementary ideas of Non-linear optical materials and their applications.

UNIT II– MAGNETIC AND DIELECTRIC MATERIALS (6 hours)

Magnetic Materials: Classification of magnetic materials based on spin – Hard and soft magnetic materials – Ferrites, garnets and magnetoplumbites – Magnetic bubbles and their applications – Magnetic thin films – Spintronics and devices (Giant magneto resistance, Tunnel magneto resistance and Colossal magneto resistance).

Dielectric Materials: Polarization mechanisms in dielectrics – Frequency and temperature dependence of polarization mechanism – Dielectric loss – Dielectric waveguide and dielectric resonator antenna – Piezoelectric, pyroelectric and ferroelectric materials and their applications.

UNIT III– MODERN ENGINEERING AND BIOMATERIALS (6 hours)

Modern Engineering Materials: Smart materials – Shape memory alloys – Chromic materials (Thermo, Photo and Electro) – Rheological fluids – Metallic glasses – Advanced ceramics – Composites.

Bio-materials: Classification of bio-materials (based on tissue response) – Comparison of properties of some common biomaterials – Metallic implant materials (stainless steel, cobalt-based and titanium-based alloys) – Polymeric implant materials (Polyamides, polypropylene, Acrylic resins and Hydrogels) – Tissue replacement implants – Soft and hard tissue replacements – Skin implants – Tissue engineering – Biomaterials for organ replacement (Bone substitutes) – Biosensor.

UNIT IV– INTRODUCTION TO NANOSCIENCE AND NANOTECHNOLOGY (6 hours)

Basic concepts of Nanoscience and Nanotechnology – Quantum wire – Quantum well – Quantum dot – fullerenes – Graphene – Carbon nanotubes – Material processing by chemical vapor deposition and physical vapor deposition – Principle of SEM, TEM, AFM, Scanning near-field optical microscopy (SNOM) – Scanning ion-conducting microscopy (SCIM) – Potential uses of nanomaterials in electronics, robotics, computers, sensors, sports equipment, mobile electronic devices, vehicles and transportation – Medical applications of nanomaterials.

UNIT V– MATERIALS CHARACTERIZATION (6 hours)

X-ray diffraction, Neutron diffraction and Electron diffraction– X-ray fluorescence spectroscopy – Fourier transform Infrared spectroscopy (FTIR) – Ultraviolet and visible spectroscopy (UV-Vis) – Thermogravimetric Analysis (TGA) – Differential Thermal Analysis (DTA) – Differential Scanning Calorimetry (DSC).

PRACTICAL EXPERIMENTS (30 hours)

1. Determination of resistivity and band gap for a semiconductor material – Four probe method / Post-office box
2. Determination of Hall coefficient for a semiconducting material
3. To study V-I characteristics of a light dependent resistor (LDR)
4. Determination of energy loss in a magnetic material – B-H curve
5. Determination of paramagnetic susceptibility – Quincke's method

6. Determination of dielectric constant for a given material
7. Calculation of lattice cell parameters – X-ray diffraction
8. Measurement of glucose concentration – Electrochemical sensor
9. Visit to Advanced Material Characterization Laboratory (Optional)

TEXT BOOKS

1. Thiruvadigal, J. D., Ponnusamy,S..Sudha.D. and Krishnamohan M., "*Materials Sciences"*, Vibrant Publication, Chennai, 2013
2. Rajendran.V, "*Materials Science*",Tata McGraw- Hill,New Delhi,2011

REFERENCES

1. Rolf E. Hummel, "*Electronic Properties of Materials"*, 4th ed., Springer, New York, 2011.
2. Dennis W. Prather, "*Photonic Crystals: Theory, Applications, and Fabrication"*, John Wiley & Sons, Hoboken, 2009.
3. James R. Janesick, "*Scientific Charge-Coupled Devices",* Published by SPIE - The International Society for Optical Engineering, Bellingham, Washington, 2001.
4. David M. Pozar, "*Microwave Engineering*", 3rd ed., John Wiley & Sons, 2005.
5. Silver.F,and Dillion.C, "*Biocompatibility: Interactions of Biological and Implantable Materials*", VCH Publishers, New York, 1989.
6. Severial Dumitriu, "*Polymeric Biomaterials*" Marcel Dekker Inc, CRC Press, Canada 2001.
7. Cao.G, "*Nanostructures and Nanomaterials: Synthesis, Properties and Applications*", Imperial College Press, 2004.
8. Pradeep.T, "*A Text Book of Nanoscience and Nanotechnology*", Tata McGraw Hill, New Delhi, 2012.
9. Sam Zhang, "*Materials Characterization Techniques*", CRC Press, 2008.

PY1003 MATERIALS SCIENCE												
Course designed by		**Department of Physics and Nanotechnology**										
1.	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
		x	x		x	x						x
2.	Mapping of instructional objectives with student outcome	1	5		4	2						3
3.	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts (E)				Professional Subjects(P)		
		--		x		--				--		
4.	Approval	23rd meeting of Academic Council, May 2013										

	ANALYSIS OF ELECTRIC CIRCUITS	L	T	P	C
EE1003	Total Contact Hours - 60	3	1	0	4
	Prerequisite				
	EE1001-Basic Electrical Engineering				

PURPOSE

To enrich the students to acquire knowledge about the basics of circuit analysis, network theorems, concepts of AC circuits, transient analysis and Synthesis of electrical networks.

INSTRUCTIONAL OBJECTIVES

1.	Understand about the network elements, types of networks, analysis of complex circuits using Mesh current & Nodal voltage method.
2.	Gain knowledge about the solution methods of AC and DC circuits.
3.	Get an insight into solution of RLC circuits, analysis of coupled circuits.
4.	Understand the concept of two port network
5.	Gain knowledge about transients

UNIT I– ANALYSIS OF DC CIRCUITS (12 hours)

Introduction to DC circuits, Mesh analysis, Presence of dependent sources, circuits with current sources, Node analysis, presence of dependent sources, circuits with voltage sources, network reduction, source transformation, star-delta transformation. Graph of a network, Trees, chords and branches, Tie-set and cut-set of a graph.

UNIT II– ANALYSIS OF AC CIRCUITS (12 hours)

Introduction to AC circuit, steady state analysis of RL, RC and RLC circuits, Impedance, phasor diagrams, power and power factor, Series resonance, Parallel resonance, Mesh impedance matrix and node admittance matrix, solving AC circuits using mesh and node analysis, Analysis of coupled circuits, Analysis of simple balanced and unbalanced three phase circuits.

UNIT III – NETWORK THEOREMS (12 hours)

Super position theorem, Compensation theorem, Thevenin's theorem, Norton's theorem, Maximum power transfer theorem, Tellegen's theorem, Millman's theorem, Reciprocity theorem; Application of network theorems in solving DC and AC circuits; Dual networks.

UNIT IV– TRANSIENT ANALYSIS (12 hours)

Test Signals, Exponentially increasing and decreasing functions, time constant, Certain common aspects of RL and RC circuits, transients in RC, RL and RLC circuit, Laplace transforms, Transform impedance, Circuit transients using Laplace transform, Poles and zeros, Hurwitz polynomial.

UNIT V– NETWORK SYNTHESIS (12 hours)

Impedance and admittance parameters, Hybrid parameters and transmission parameters, conversion between parameters, synthesis of RL and RC networks by Foster and Cauer methods

TEXT BOOKS

1. Sudhakar.A and Shyam Mohan.S.P, "C*ircuits and Networks Analysis and Synthesis"*, Fourth edition, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2010.
2. Jegatheesan. R, " *Analysis of Electric Circuits*", Aassaan Learning Series, (India), 2002 .

REFERENCES

1. William H Hayt, J E Kemmerly and Steven M Durbin, " *Engineering Circuit Analysis*", Seventh Edition, Mc Graw Hill, 2007.
2. Charles K. Alexander and Matthew N. Q. Sadiku, "*Fundamentals of Electric Circuits*", Third Edition, Mc Graw-Hill International Edition, 2007.
3. Richard C. Dorf and James A. Svoboda, "*Introduction to Electric Circuits*", 7th Edition, John Wiley & Sons, Inc. 2006.
4. Edminister.J.A, "*Theory and Problems of Electric Circuits"*, Schaum's Outline Series, McGraw Hill Book Company, 5th Edition, 1995.

EE1003 - ANALYSIS OF ELECTRIC CIRCUITS												
Course designed by		**Department of Electrical and Electronics Engineering**										
1.	Student outcomes	a	b	c	d	e	f	g	h	i	j	k
		x				x						
2.	Mapping of instructional objectives with student outcome	1-5				1-5						
3.	Category	General(G)	Basic Sciences (B)			Engineering Sciences and Technical Arts (E)					Professional Subjects (P)	
		--	--			--					x	
4.	Approval	23rd meeting of Academic Council, May 2013										

CY1003	**PRINCIPLES OF ENVIRONMENTAL SCIENCE**	**L**	**T**	**P**	**C**
	Total Contact Hours - 30	2	0	0	2
	Prerequisite				
	Nil				

PURPOSE

The course provides a comprehensive knowledge in environmental science, environmental issues and the management.

INSTRUCTIONAL OBJECTIVES

1.	To enable the students
2.	To gain knowledge on the importance of environmental education and ecosystem.
3.	To acquire knowledge about environmental pollution- sources, effects and control measures of environmental pollution.
4.	To understand the treatment of wastewater and solid waste management.
5.	To acquire knowledge with respect to biodiversity, its threats and its conservation and appreciate the concept of interdependence.
6.	To be aware of the national and international concern for environment for protecting the environment

UNIT I- ENVIRONMENTAL EDUCATION AND ECOSYSTEMS (6 hours)

Environmental education: Definition and objective. Structure and function of an ecosystem – ecological succession –primary and secondary succession - ecological pyramids – pyramid of number, pyramid of energy and pyramid of biomass.

UNIT II- ENVIRONMENTAL POLLUTION (6 hours)

Environmental segments – structure and composition of atmosphere - Pollution – Air, water, soil , thermal and radiation – Effects – acid rain, ozone layer depletion and green house effect – control measures – determination of BOD, COD, TDS and trace metals.

UNIT III- WASTE MANAGEMENT (6 hours)

Waste water treatment (general) – primary, secondary and tertiary stages.

Solid waste management: sources and effects of municipal waste, bio medical waste - process of waste management.

UNIT IV- BIODIVERSITY AND ITS CONSERVATION (6 hours)

Introduction: definition - genetic, species and ecosystem diversity – bio diversity hot spots - values of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values - threats to biodiversity: habitat loss, poaching of wildlife – endangered and endemic species of India, Conservation of biodiversity: in-situ and ex-situ conservations.

UNIT V- ENVIRONMENTAL PROTECTION (6 hours)

National concern for environment: Important environmental protection acts in India – water, air (prevention and control of pollution) act, wild life conservation and forest act – functions of central and state pollution control boards - international effort – key initiatives of Rio declaration, Vienna convention, Kyoto protocol and Johannesburg summit.

TEXT BOOKS

1. Kamaraj.P and Arthanareeswari.M, "*Environmental Science – Challenges and Changes"*, 4th Edition, Sudhandhira Publications, 2010.
2. Sharma.B.K. and Kaur, "*Environmental Chemistry",* Goel Publishing House, Meerut, 1994.

REFERENCES

1. De.A.K, "*Environmental Chemistry"*, New Age International, New Delhi, 1996.
2. Helen P Kavitha, "*Principles of Environmental Science*", Sci tech Publications, 2nd Edition, 2008.

<table>
<tr><th colspan="14">CY1003 – PRINCIPLES OF ENVIRONMENTAL SCIENCE</th></tr>
<tr><td colspan="2">Course designed by</td><td colspan="12">Department of Chemistry</td></tr>
<tr><td rowspan="2">1.</td><td rowspan="2">Student outcome</td><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td><td>g</td><td>h</td><td>i</td><td>j</td><td>k</td></tr>
<tr><td></td><td></td><td>x</td><td></td><td>x</td><td>x</td><td></td><td>x</td><td>x</td><td>x</td><td></td></tr>
<tr><td>2.</td><td>Mapping of instructional objective with student outcome</td><td></td><td></td><td>5</td><td></td><td>2</td><td>4</td><td></td><td>1,3</td><td>3</td><td>2, 5</td><td></td></tr>
<tr><td rowspan="2">3.</td><td rowspan="2">Category</td><td colspan="2">General (G)</td><td colspan="3">Basic Sciences (B)</td><td colspan="4">Engineering Sciences and Technical Arts (E)</td><td colspan="3">Professional Subjects (P)</td></tr>
<tr><td colspan="2"></td><td colspan="3">x</td><td colspan="4">--</td><td colspan="3">--</td></tr>
<tr><td rowspan="2">4.</td><td rowspan="2">Broad area (For 'P' category)</td><td colspan="2">Electrical Machines</td><td colspan="3">Circuits & Systems</td><td colspan="2">Electronics</td><td colspan="2">Power Systems</td><td colspan="2">Intelligent Systems</td></tr>
<tr><td colspan="2">--</td><td colspan="3">--</td><td colspan="2">--</td><td colspan="2">--</td><td colspan="2">--</td></tr>
<tr><td>5.</td><td>Approval</td><td colspan="12">23rd meeting of Academic Council, May 2013</td></tr>
</table>

CE1001	BASIC CIVIL ENGINEERING	L	T	P	C
	Total Contact Hours - 30	2	0	0	2
	Prerequisite				
	Nil				

PURPOSE

To get exposed to the glimpses of Civil Engineering topics that is essential for an Engineer.

INSTRUCTIONAL OBJECTIVES

1.	To know about different materials and their properties
2.	To know about engineering aspects related to buildings
3.	To know about importance of surveying and the transportation systems
4.	To get exposed to the rudiments of engineering related to dams, water supply, and sewage disposal

UNIT I- BUILDING MATERILAS (6hours)

Introduction – Civil Engineering – Materials: Bricks – composition – classifications – properties –uses. Stone – classification of rocks – quarrying – dressing – properties –uses. Timber - properties –uses –ply wood. Cement – grades –types – properties –uses. Steel – types – mild steel – medium steel – hard steel – properties – uses – market forms. Concrete – grade designation – properties – uses.

UNIT II- MATERIAL PROPERTIES (6hours)

Stress – strain – types – Hook's law – three moduli of elasticity – poisons ratio – relationship – factor of safety. Centroid - center of gravity – problems in symmetrical sections only (I, T and channel sections). Moment of inertia, parallel, perpendicular axis theorems and radius of gyration (definitions only).

UNIT III -BUILDING COMPONENTS (6hours)

Building – selection of site – classification – components. Foundations –functions – classifications – bearing capacity. Flooring – requirements – selection – types – cement concrete marble – terrazzo floorings. Roof – types and requirements.

UNIT IV-SURVEYING AND TRANSPORTATION (6hours)

Surveying – objectives – classification – principles of survey. Transportation – classification – cross section and components of road – classification of roads. Railway – cross section and components of permanent way –functions. Water way – docks and harbor – classifications – components. Bridge – components of bridge.

UNIT V- WATER SUPPLY AND SEWAGE DISPOSAL (6hours)

Dams – purpose – selection of site – types –gravity dam (cross section only). Water supply – objective – quantity of water – sources – standards of drinking water – distribution system. Sewage – classification – technical terms – septic tank – components and functions.

TEXT BOOKS

1. Raju K.V.B, Ravichandran P.T, "*Basics of Civil Engineering"*, Ayyappa Publications, Chennai, 2012.
2. Rangwala,S.C.," *Engineering Materials"*, Charotar Publishing House, Anand, 2012.

REFERENCES

1. Ramesh Babu, "*Civil Engineering"* , VRB Publishers, Chennai, 2000.
2. National Building Code of India, Part V, "*Building Materials"*, 2005.
3. Surendra Singh, "*Building Materials"*, Vikas Publishing Company, New Delhi, 1996.

CE1001 - BASIC CIVIL ENGINEERING												
Course designed by		**Department of Civil Engineering**										
1.	Student outcome	a	b	c	D	e	f	g	h	i	j	k
		x				**x**						**x**
2.	Mapping of instructional objectives with student outcome	1 - 4				1-4						2-4
3.	Category	General (G)	Basic Sciences (B)			Engineering Sciences and Technical Arts (E)					Professional Subjects (P)	
						x						
4.	Approval	23rd meeting of academic council , May 2013										

	BASIC ELECTRONICS ENGINEERING	L	T	P	C
EC1001	Total Contact Hours – 30	2	0	0	2
	Prerequisite				
	Nil				

PURPOSE

This course provides comprehensive idea about working principle, operation and characteristics of electronic devices, transducers, Digital Electronics and Communication Systems.

INSTRUCTIONAL OBJECTIVES

At the end of the course students will be able to gain knowledge about the

1.	Fundamentals of electronic components, devices, transducers
2.	Principles of digital electronics
3.	Principles of various communication systems

UNIT I- ELECTRONIC COMPONENTS (4 hours)

Passive components – resistors, capacitors & inductors (properties, common types, I-V relationship and uses).

UNIT II- SEMICONDUCTOR DEVICES (7 hours)

Semiconductor Devices - Overview of Semiconductors - basic principle, operation and characteristics of PN diode, zener diode, BJT, JFET, optoelectronic devices (LDR, photodiode, phototransistor, solar cell, optocouplers)

UNIT III- TRANSDUCERS (5 hours)

Transducers - Instrumentation – general aspects, classification of transducers, basic requirements of transducers, passive transducers - strain gauge, thermistor, Hall-Effect transducer, LVDT, and active transducers – piezoelectric and thermocouple.

UNIT IV- DIGITAL ELECTRONICS (7 hours)

Number systems – binary codes - logic gates - Boolean algebra, laws & theorems - simplification of Boolean expression - implementation of Boolean expressions using logic gates - standard forms of Boolean expression.

UNIT V- COMMUNICATION SYSTEMS **(7 hours)**

Block diagram of a basic communication system – frequency spectrum - need for modulation - methods of modulation - principles of AM, FM, pulse analog and pulse digital modulation – AM / FM transmitters & receivers (block diagram description only)

TEXT BOOKS

1. Thyagarajan.T, SendurChelvi.K.P, Rangaswamy.T.R, *"Engineering Basics: Electrical, Electronics and Computer Engineering"*, New Age International, Third Edition, 2007.
2. Somanathan Nair.B, Deepa.S.R, "*Basic Electronics",* I.K. International Pvt. Ltd., 2009.

REFERENCES

1. Thomas L. Floyd, *"Electronic Devices",* Pearson Education, 9th Edition, 2011.
2. Rajput.R.K, *"Basic Electrical and Electronics Engineering"*, Laxmi Publications, First Edition, 2007.

EC1001 BASIC ELECTRONICS ENGINEERING												
Course designed by		**Department of Electronics and Communication Engineering**										
1.	Student outcome	a	b	c	d	e	f	g	h	i	j	k
		x										
2.	Mapping of instructional objectives with student outcome	1-3										
3.	Category	General (G)		Basic Sciences (B)		Engineering Sciences & Technical Arts (E)				Professional Subjects (P)		
		--		--		x				--		
4.	Broad area (For 'P' category)	Electrical Machines		Circuits & Systems		Electronics		Power Systems		Intelligent Systems		
		--		--		--		--		--		
5.	Approval	23rd meeting of Academic Council, May 2013										

EC1002	ELECTRONICS ENGINEERING PRACTICES	L	T	P	C
	Total Contact Hours - 30	0	0	2	1
	Prerequisite				
	Nil				

PURPOSE

To equip the students with the knowledge of PCB design and fabrication processes.

INSTRUCTIONAL OBJECTIVES

1.	To familiarize the electronic components and basic electronic instruments.
2.	To make familiar with PCB design and various processes involved.
3.	To provide in-depth core knowledge in the and fabrication of Printed Circuit Boards.
4.	To provide the knowledge in assembling and testing of the PCB based electronic circuits.

Expt.1: INTRODUCTION TO BASICS OF ELECTRONIC COMPONENTS AND INSTRUMENTS (4 hours)

Study of electronic components- active & passive, Electronic Instruments: CRO, Function generator, Power Supply, Multi-meter, IC tester. Solder practice.

Expt. 2: SCHEMATIC CAPTURE (6 hours)

Introduction to ORCAD schematic capture tool, Simulation of simple electronic circuit, Schematic to layout transfer, Layout Printing

Expt. 3: PCB DESIGN PROCESS (6 hours)

Conception Level Introduction: Specifying Parts, Packages and Pin Names, Libraries and Checking foot prints of the components, Partlist, Netlist, Making Netlist Files, Placing Parts, Routing Traces, Modifying Traces, Mounting Holes, Adding Text, PCB Layout, DRC, Pattern Transfer

Expt. 4: PCB FABRICATION PROCESS (6 hours)

Etching, cleaning, drying and drilling

Expt. 5: ASSEMBLING AND TESTING **(8 hours)**

Identifying the components and its location on the PCB, soldering of active and passive components, Testing the assembled circuit for correct functionality

REFERENCES

1. Department Laboratory Manual
2. Orcad User manualPrinted Circuit Boards: Design, Fabrication, and Assembly (McGraw-Hill Electronic Engineering-2006) by Raghbir Singh Khandpur.

EC1002 ELECTRONICS ENGINEERING PRACTICE												
Course designed by		**Department of Electronics and Communication Engineering**										
1.	Student outcome	a	b	c	d	e	f	g	h	i	j	k
		x	x	x								x
2.	Mapping of instructional objectives with student outcome	1	2,3	2,3								1-4
3.	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts (E)					Professional Subjects (P)	
		--		--		x					--	
4.	Approval	23rd meeting of Academic Council, May 2013										

Table II

CS1001	**PROGRAMMING USING MATLAB**	**L**	**T**	**P**	**C**
	Total Contact Hours - 45	**0**	**1**	**2**	**2**
	Prerequisite				
	Nil				

PURPOSE	
This Lab Course will enable the students to understand the fundamentals and programming knowledge in MATLAB.	
INSTRUCTIONAL OBJECTIVES	
1.	To learn the MATLAB environment and its programming fundamentals
2.	Ability to write Programs using commands and functions
3.	Able to handle polynomials, and use 2D Graphic commands

LIST OF EXPERIMENTS

1. Practicing MATLAB environment with simple exercises to familiarize Command Window, History, Workspace, Current Directory, Figure window, Edit window, Shortcuts, Help files.
2. Data types, Constants and Variables, Character constants, operators, Assignment statements.
3. Control Structures: For loops, While, If control structures, Switch, Break, Continue statements.
4. Input-Output functions, Reading and Storing Data.
5. Vectors and Matrices, commands to operate on vectors and matrices, matrix Manipulations.
6. Arithmetic operations on Matrices, Relational operations on Matrices, Logical operations on Matrices.
7. Polynomial Evaluation, Roots of Polynomial, Arithmetic operations on Polynomials.
8. Graphics: 2D plots, Printing labels, Grid & Axes box, Text in plot, Bar and Pie chart.

TEXT BOOK

1. Bansal.R.K, Goel.A.K, Sharma.M.K, "*MATLAB and its Applications in Engineering*", Pearson Education, 2012.

REFERENCES

1. Amos Gilat, *"MATLAB-An Introduction with Applications"*, Wiley India, 2009.
2. Stephen.J.Chapman, *"Programming in MATLAB for Engineers"*, Cengage Learning, 2011.

<table>
<tr><th colspan="13">CS1001 PROGRAMMING USING MATLAB</th></tr>
<tr><td colspan="2">Course designed by</td><td colspan="11">Department of Computer Science and Engineering</td></tr>
<tr><td rowspan="2">1.</td><td rowspan="2">Student outcome</td><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td><td>g</td><td>h</td><td>i</td><td>j</td><td>k</td></tr>
<tr><td>x</td><td>x</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>x</td></tr>
<tr><td>2.</td><td>Mapping of instructional objective with student outcome</td><td>2,3</td><td>1-3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>1</td></tr>
<tr><td rowspan="2">3.</td><td rowspan="2">Category</td><td colspan="2">General (G)</td><td colspan="3">Basic Sciences (B)</td><td colspan="4">Engineering Sciences and Technical Arts (E)</td><td colspan="2">Professional Subjects(P)</td></tr>
<tr><td colspan="2">x</td><td colspan="3">--</td><td colspan="4">--</td><td colspan="2">--</td></tr>
<tr><td>4.</td><td>Approval</td><td colspan="11">23rd meeting of Academic Council, May 2013</td></tr>
</table>

BT1001	BIOLOGY FOR ENGINEERS	L	T	P	C
	Total Contact Hours - 30	2	0	0	2
	Prerequisite				
	Nil				

PURPOSE

The purpose of this course is to provide a basic understanding of biological mechanisms of living organisms from the perspective of engineers. In addition, the course is expected to encourage engineering students to think about solving biological problems with engineering tools.

INSTRUCTIONAL OBJECTIVES

1.	To familiarize the students with the basic organization of organisms and subsequent building to a living being
2.	To impart an understanding about the machinery of the cell functions that is ultimately responsible for various daily activities.
3.	To provide knowledge about biological problems that require engineering expertise to solve them

UNIT I- BASIC CELL BIOLOGY (6 hours)

Introduction: Methods of Science-Living Organisms: Cells and Cell theory Cell Structure and Function, Genetic information, protein synthesis, and protein structure, Cell metabolism-Homoeostasis- Cell growth, reproduction, and differentiation.

UNIT II- BIOCHEMISTRY AND MOLECULAR ASPECTS OF LIFE (5 hours)

Biological Diversity --Chemistry of life: chemical bonds--Biochemistry and Human biology--Protein synthesis—Stem cells and Tissue engineering.

UNIT III- ENZYMES AND INDUSTRIAL APPLICATIONS (5 hours)

Enzymes: Biological catalysts, Proteases, Carbonic anhydrase, Restriction enzymes, and Nucleoside monophosphate kinases—Photosynthesis

UNIT IV- MECHANOCHEMISTRY (7 hours)

Molecular Machines/Motors—Cytoskeleton—Bioremediation—Biosensors

UNIT V- NERVOUS SYSTEM, IMMUNE SYSTEM, AND CELL SIGNALING (7 hours)

Nervous system--Immune system- General principles of cell signaling

TEXT BOOK

1. ThyagaRajan.S, Selvamurugan.N, Rajesh.M.P, Nazeer.R.A, Richard W. Thilagaraj, Barathi.S, and Jaganathan.M.K, "*Biology for Engineers*," Tata McGraw-Hill, New Delhi, 2012.

REFERENCES

1. Jeremy M. Berg, John L. Tymoczko and Lubert Stryer, "*Biochemistry*," W.H. Freeman and Co. Ltd., 6th Ed., 2006.
2. Robert Weaver, "*Molecular Biology*," MCGraw-Hill, 5th Edition, 2012.
3. Jon Cooper, "*Biosensors A Practical Approach*" Bellwether Books, 2004.
4. Martin Alexander, "*Biodegradation and Bioremediation,"* Academic Press, 1994.
5. Kenneth Murphy, "*Janeway's Immunobiology*," Garland Science; 8th edition, 2011.
6. Eric R. Kandel, James H. Schwartz, Thomas M. Jessell, "Principles of Neural Science, McGraw-Hill, 5th Edition, 2012.

BT1001 BIOLOGY FOR ENGINEERS												
Course designed by		**Department of Biotechnology**										
1	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
		x			x						x	
2	Mapping of instructional objectives with student outcome	1			2						3	
3	Category	General (G)	Basic Sciences(B)			Engineering Sciences and Technical Arts (E)				Professional Subjects(P)		
			x									
4	Approval	23rd meeting of Academic Council, May 2013										

ME1001	**BASIC MECHANICAL ENGINEERING**	**L**	**T**	**P**	**C**
	Total Contact Hours - 30	**2**	**0**	**0**	**2**
	Prerequisite				
	Nil				

PURPOSE	
To familiarize the students with the basics of Mechanical Engineering.	
INSTRUCTIONAL OBJECTIVES	
1.	To familiarize with the basic machine elements
2.	To familiarize with the Sources of Energy and Power Generation
3.	To familiarize with the various manufacturing processes

UNIT I– MACHINE ELEMENTS– I (5 hours)

Springs: Helical and leaf springs – Springs in series and parallel. **Cams:** Types of cams and followers – Cam profile.

UNIT II- MACHINE ELEMENTS– II (5 hours)

Power Transmission: Gears (terminology, spur, helical and bevel gears, gear trains). Belt drives (types). Chain drives. Simple Problems.

UNIT III- ENERGY (10 hours)

Sources: Renewable and non-renewable (various types, characteristics, advantages/disadvantages). **Power Generation:** External and internal combustion engines – Hydro, thermal and nuclear power plants (layouts, element/component description, advantages, disadvantages, applications). Simple Problems.

UNIT IV - MANUFACTURING PROCESSES - I (5 hours)

Sheet Metal Work: Introduction – Equipments – Tools and accessories – Various processes (applications, advantages / disadvantages). **Welding:** Types – Equipments – Tools and accessories – Techniques employed -applications, advantages / disadvantages – Gas cutting – Brazing and soldering.

UNIT V - MANUFACTURING PROCESSES– II (5 hours)

Lathe Practice: Types - Description of main components – Cutting tools – Work holding devices – Basic operations. Simple Problems. **Drilling Practice:** Introduction – Types – Description – Tools. Simple Problems.

TEXT BOOKS

1. Kumar, T., Leenus Jesu Martin and Murali, G., *"Basic Mechanical Engineering"*, Suma Publications, Chennai, 2007.
2. Prabhu, T. J., Jai Ganesh, V. and Jebaraj, S., *"Basic Mechanical Engineering"*, Scitech Publications, Chennai, 2000.

REFERENCE BOOKS

1. Hajra Choudhary.S.K. and HajraChoudhary.A.K, "*Elements of Workshop Technology", Vols. I & II*, Indian Book Distributing Company Calcutta, 2007.
2. Nag.P.K, "*Power Plant Engineering"*, Tata McGraw-Hill, New Delhi, 2008.
3. Rattan.S.S, "*Theory of Machines"*, Tata McGraw-Hill, New Delhi, 2010.

ME1001 BASIC MECHANICAL ENGINEERING												
Course designed by		**Department of Mechanical Engineering**										
1.	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
		x				x						
2.	Mapping of instructional objectives with student outcome	1- 3				1- 3						
3.	Category	General (G)		Basic sciences(B)		Engineering sciences and technical art (E)				Professional subjects (P)		
		--		--		x				--		
4.	Broad area (For 'P' category)	Electrical Machines		Circuits & Systems		Electronics		Power Systems		Intelligent Systems		
		--		--		--		--		--		
5.	Approval	23rd meeting of the Academic Council , May 2013										

	ENGINEERING GRAPHICS	L	T	P	C
ME1005	Total Contact Hours - 75	0	1	4	3
	Prerequisite				
	Nil				

First Angle Projection is to be followed - Practice with Computer Aided Drafting tools

PURPOSE	
1.	To draw and interpret various projections of 1D, 2D and 3D objects.
2.	To prepare and interpret the drawings of buildings.
INSTRUCTIONAL OBJECTIVES	
1.	To familiarize with the construction of geometrical figures
2.	To familiarize with the projection of 1D, 2D and 3D elements
3.	To familiarize with the sectioning of solids and development of surfaces
4.	To familiarize with the Preparation and interpretation of building drawing

UNIT I- FUNDAMENTALS OF ENGINEERING GRAPHICS (2 hours)

Lettering – Two dimensional geometrical constructions – Conics – Representation of three-dimensional objects – Principles of projections – Standard codes – Projection of points.

UNIT II- PROJECTION OF LINES AND SOLIDS (4 hours)

Projection of straight lines – Projection of planes - Projection of solids – Auxiliary projections.

UNIT III- SECTIONS AND DEVELOPMENTS (3 hours)

Sections of solids and development of surfaces.

UNIT IV- PICTORIAL PROJECTIONS (4 hours)

Conversion of Projections: Orthographic projection – Isometric projection of regular solids and combination of solids.

UNIT V- BUILDING DRAWING (2 hours)

Plan, Elevation and section of single storied residential (or) office building with flat RCC roof and brick masonry walls having not more than 3 rooms (planning / designing is not expected in this course) with electrical wiring diagram.

PRACTICAL (60 hours)

REFERENCES

1. Venugopal.K and Prabhu Raja.V, "*Engineering Graphics"*, Eighth Edition (Revised), New Age International Publishers, Chennai, 2007.
2. Natarajan.K.V, "*A Text Book of Engineering Graphics"*, 21st Edition, Dhanalakshmi Publishers, Chennai, 2012.
3. Jeyapoovan.T, "*Engineering Drawing and Graphics using AutoCAD"*, Vikas Publishing House Pvt. Ltd., New Delhi, 2010.
4. Bethune.J.D, "Engineering Graphics with AutoCAD 2013", PHI Learning Private Limited, Delhi, 2013.
5. Bhatt.N.D, "*Elementary Engineering Drawing (First Angle Projection)"*, Charotar Publishing Co., Anand, 1999.
6. Narayanan.K.L and Kannaiah.P, "*Engineering Graphics"*, Scitech Publications, Chennai, 1999.
7. Shah.M.B and Rana.B.C, "*Engineering Drawing"*, Pearson Education (Singapore) Pvt. Ltd., New Delhi, 2005.

<table>
<tr><th colspan="13">ME1005 ENGINEERING GRAPHICS</th></tr>
<tr><th colspan="2">Course designed by</th><th colspan="11">Department of Mechanical Engineering</th></tr>
<tr><td rowspan="2">1.</td><td rowspan="2">Student Outcome</td><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td><td>g</td><td>h</td><td>i</td><td>j</td><td>k</td></tr>
<tr><td></td><td>x</td><td>x</td><td></td><td></td><td></td><td>x</td><td></td><td></td><td></td><td></td></tr>
<tr><td>2.</td><td>Mapping of instructional objectives with student outcome</td><td></td><td>1-4</td><td>1-4</td><td></td><td></td><td></td><td>1-4</td><td></td><td></td><td></td><td></td></tr>
<tr><td rowspan="2">3.</td><td rowspan="2">Category</td><td colspan="2">General(G)</td><td colspan="2">Basic sciences(B)</td><td colspan="4">Engineering sciences and technical art (E)</td><td colspan="3">Professional subjects (P)</td></tr>
<tr><td colspan="2">--</td><td colspan="2">--</td><td colspan="4">x</td><td colspan="3">--</td></tr>
<tr><td>4.</td><td>Approval</td><td colspan="11">23rd meeting of the Academic Council , May 2013</td></tr>
</table>

SEMESTER III

LE1003	**GERMAN LANGUAGE PHASE I**	**L**	**T**	**P**	**C**
	Total Contact Hours – 30	**2**	**0**	**0**	**2**
	Prerequisite				
	Nil				

PURPOSE

Germany offers infinite opportunities for students of engineering for higher studies, research and employment in Germany. B.Tech Students are offered German Language during their second year. Knowledge of the language will be helpful for the students to adjust themselves when they go for higher studies.

INSTRUCTIONAL OBJECTIVES

1.	To introduce the language, phonetics and the special characters in German language
2.	To introduce German culture & traditions to the students.
3.	By the end of Phase – I, the students will be able to introduce themselves and initiate a conversation..
4.	We endeavor to develop the ability among the students to read and understand small texts written in German
5.	To enable the students to elementary conversational skills.

UNIT I (**6 hours)**

Wichtige Sprachhandlungen: Phonetics – Sich begrüßen - Sich und andere vorstellen formell / informell - Zahlen von 1 bis 1 Milliarde - verstehen & sprechen
Grammatik: regelmäßige Verben im Präsens - "sein" und haben im Präsens - Personalpronomen im Nominativ

UNIT II **(6 hours)**

Wichtige Sprachhandlungen Telefon Nummern verstehen und sprechen
Uhrzeiten verstehen und sagen Verneinung "nicht und kein" (formell und informell)
Grammatik : Wortstellung – Aussagesatz – W-Frage und Satzfrage (Ja/Nein Frage) Nomen buchstabieren und notieren bestimmter und unbestimmter Artikel und Negativartikel im Nom. & Akkusativ

UNIT III **(6 hours)**

Wichtige Sprachhandlungen Tageszeiten verstehen und über Termine sprechen -Verabredungen verstehen - Aufgaben im Haushalt verstehen **Grammatik** Personalpronomen im Akkusativ und Dativ - W-Fragen "wie, wer, wohin,wo, was usw.- Genitiv bei Personennamen - Modalverben im Präsens "können, müssen, möchten"

UNIT IV **(6 hours)**

Wichtige Sprachhandlungen Sich austauschen, was man kann, muss – Bezeichnungen Lebensmittel – Mengenangaben verstehen – Preise verstehen und Einkaufzettel schreiben

Grammatik Wortstellung in Sätzen mit Modalverben – Konnektor "und" – "noch"-kein-------mehr – "wie viel, wie viele, wie alt, wie lange" –Possessivartikel im Nominativ.

UNIT V **(6 hours)**

Wichtige Sprachhandlungen Freizeitanzeigen verstehen – Hobbys und Sportarten Anzeigen für Freizeitpartner schreiben bzw. darauf antworten – Vorlieben und Abneigungen ausdrucken

Grammatik Verben mit Vokalwechsel im Präsens – Modalverben im Präsens " dürfen, wollen und mögen - "haben und sein" im Präteritum – regelmäßige Verben im Perfekt – Konnektoren "denn, oder, aber

TEXT BOOK

1. Studio d A1. Deutsch als Fremdsprache with CD.(Kursbuch und Sprach training).

REFERENCES

1. German for Dummies
2. Schulz Griesbach

<table>
<tr><th colspan="13">LE1003 GERMAN LANGUAGE PHASE I</th></tr>
<tr><td colspan="2">Course designed by</td><td colspan="11">Department of English and Foreign Languages</td></tr>
<tr><td rowspan="2">1.</td><td rowspan="2">Student outcome</td><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td><td>g</td><td>h</td><td>i</td><td>j</td><td>k</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td>x</td><td></td><td></td><td></td><td></td></tr>
<tr><td>2.</td><td>Mapping of instructional objectives with student outcome</td><td></td><td></td><td></td><td></td><td></td><td></td><td>1-5</td><td></td><td></td><td></td><td></td></tr>
<tr><td rowspan="2">3.</td><td rowspan="2">Category</td><td>General (G)</td><td colspan="3">Basic Sciences (B)</td><td colspan="3">Engineering Sciences andTechnical Arts (E)</td><td colspan="3">Professional Subjects (P)</td></tr>
<tr><td>x</td><td colspan="3">--</td><td colspan="3">--</td><td colspan="3">--</td></tr>
<tr><td>4.</td><td>Approval</td><td colspan="11">23rd meeting of Academic Council, May 2013</td></tr>
</table>

LE1004	FRENCH LANGUAGE PHASE I	L	T	P	C
	Total Contact Hours - 30	2	0	0	2
	Prerequisite				
	Nil				

PURPOSE

To enable the student learners acquire a basic knowledge of the French language and concepts of general French for everyday interactions and technical French at the beginner's level and also to get to know the culture of France.

INSTRUCTIONAL OBJECTIVES

1.	To enable students improve their grammatical competence.
2.	To enhance their listening skills.
3	To assist students in reading and speaking the language.
4.	To enhance their lexical and technical competence.
5.	To help the students introduce themselves and focus on their communication skills.

UNIT I **(6 hours)**

1. Grammar and Vocabulary: Usage of the French verb "se presenter", a verb of self- introduction and how to greet a person- "saluer"
2. Listening and Speaking – The authentic sounds of the letters of the French alphabet and the accents that play a vital role in the pronunciation of the words.
3. Writing – correct spellings of French scientific and technical vocabulary.
4. Reading -- Reading of the text and comprehension – answering questions.

UNIT II **(6 hours)**

1. Grammar and Vocabulary – Definite articles , "prepositions de lieu" subject pron ouns
2. Listening and Speaking – pronunciation of words like Isabelle, presentez and la liaison – vous etes, vous appelez and role play of introducing each other – group activity
3. Writing – particulars in filling an enrollment / registration form
4. Reading Comprehension – reading a text of a famous scientist and answering questions.

UNIT III **(6 hours)**

1. Grammar and Vocabulary – verb of possession "avoir' and 1st group verbs "er", possessive adjectives and pronouns of insistence- moi, lui..and numbers from 0 to 20
2. Listening and Speaking –nasal sounds of the words like feminine, ceinture , parfum and how to ask simple questions on one's name, age, nationality, address mail id and telephone number.
3. Writing –conjugations of first group verbs and paragraph writing on self – introduction and introducing a third person.
4. Reading Comprehension – reading a text that speaks of one's profile and answering questions

UNIT IV **(6 hours)**

1. Grammar and Vocabulary –negative sentences, numbers from 20 to 69, verb "aimer"and seasons of the year and leisure activities.
2. Listening and Speaking – To express one's likes and dislikes and to talk of one's pastime activities (sports activities), je fais du ping-pong and nasal sounds of words – janvier, champagne
3. Writing- conjugations of the irregular verbs – faire and savoir and their usage. Paragraph writing on one's leisure activity- (passé temps favori)
4. Reading- a text on seasons and leisure activities – answering questions.

UNIT V **(6 hours)**

1. Grammar and Vocabulary – les verbes de direction- to ask one's way and to give directions, verbes- pouvoir and vouloir and 2nd group verbs , a droite, la premiere a gauche and vocabulary relating to accommodation.
2. Listening and Speaking – to read and understand the metro map and hence to give one directions – dialogue between two people.
3. Writing –paragraph writing describing the accommodation using the different prepositions like en face de, derriere- to locate .
4. Reading Comprehension -- a text / a dialogue between two on location and directions- ou est la poste/ la pharmacie, la bibliotheque?.....

TEXT BOOK

1. Tech French

REFERENCES

1. French for Dummies.
2. French made easy-Goyal publishers
3. Panorama

<table>
<tr><th colspan="13">LE1004 FRENCH LANGUAGE PHASE I</th></tr>
<tr><td colspan="2">Course designed by</td><td colspan="11">Department of English and Foreign Languages</td></tr>
<tr><td rowspan="2">1.</td><td rowspan="2">Student outcome</td><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td><td>g</td><td>h</td><td>i</td><td>j</td><td>k</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td>x</td><td></td><td></td><td></td><td></td></tr>
<tr><td>2.</td><td>Mapping of instructional objectives with student outcome</td><td></td><td></td><td></td><td></td><td></td><td></td><td>1-5</td><td></td><td></td><td></td><td></td></tr>
<tr><td rowspan="2">3.</td><td rowspan="2">Category</td><td colspan="2">General (G)</td><td colspan="3">Basic Sciences (B)</td><td colspan="4">Engineering Sciences andTechnical Arts (E)</td><td colspan="2">Professional Subjects (P)</td></tr>
<tr><td colspan="2">x</td><td colspan="3">--</td><td colspan="4">--</td><td colspan="2">--</td></tr>
<tr><td>4.</td><td>Approval</td><td colspan="11">23rd meeting of Academic Council, May 2013</td></tr>
</table>

LE 1005	JAPANESE LANGUAGE PHASE I	L	T	P	C
	Total Contact Hours- 30	2	0	0	2
	Prerequisite				
	Nil				

PURPOSE

To enable students achieve a basic exposure on Japan, Japanese language and culture. To acquire basic conversational skill in the language.

INSTRUCTIONAL OBJECTIVES

1.	To help students learn the Japanese scripts viz. hiragana and a few basic kanji.
2.	To make the students acquire basic conversational skill.
3.	To enable students to know about Japan and Japanese culture.
4.	To create an advantageous situation for the students to have better opportunity for employability by companies who have association with Japan.

UNIT I **(8 hours)**

1. Introduction to Japanese language. Hiragana Chart 1 - vowels and consonants and related vocabulary.
2. Self introduction
3. Grammar – usage of particles wa, no, mo and ka and exercises
4. Numbers (1-100)
5. Kanji – introduction and basic kanjis – naka, ue, shita, kawa and yama
6. Greetings, seasons, days of the week and months of the year
7. Conversation – audio
8. Japan – Land and culture

UNIT II **(8 hours)**

1. Hiragana Chart 1 (contd.) and related vocabulary
2. Grammar – usage of kore, sore, are, kono, sono, ano, arimasu and imasu. Particles – ni (location) and ga. Donata and dare.
3. Numbers (up to 99,999)
4. Kanji – numbers (1-10, 100, 1000, 10,000 and yen)
5. Family relationships and colours.
6. Conversation – audio
7. Festivals of Japan

UNIT III (**5 hours)**

Hiragana Charts 2&3, double consonants, vowel elongation and related vocabulary

Lesson 3

Grammar - particles ni (time), kara, made and ne. Koko, soko, asoko and doko.

Time expressions (today, tomorrow, yesterday, day before, day after)

Kanji – person, man, woman, child, tree and book

Directions – north, south, east and west

UNIT IV **(5 hours)**

Grammar - directions,-kochira, sochira, achira and dochira. Associated vocabulary (mae, ushiro, ue, shita, tonari, soba, etc.)

Conversation – audio

Japanese art and culture like ikebana, origami, etc.

UNIT V **(4hours)**

Kanji – hidari, migi, kuchi

Japanese sports and martial arts

TEXT BOOK

First lessons in Japanese, ALC Japan

REFERENCES

1. Japanese for dummies. Wiley publishing co. Inc., USA.
2. Kana workbook, Japan foundation

LE1005 JAPANESE LANGUAGE PHASE I												
Course designed by		**Department of English and Foreign Languages**										
1.	Student outcome	a	b	c	d	e	f	g	h	i	j	k
								x				
2.	Mapping of instructional objectives with student outcome							1 - 4				
3.	Category	General (G)		Basic Sciences (B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		x		--		--				--		
4.	Approval	23rd meeting of Academic Council, May 2013										

LE1006	KOREAN LANGUAGE PHASE I	L	T	P	C
	Total Contact Hours-30	2	0	0	2
	Prerequisite				
	Nil				

PURPOSE

To enable students achieve a basic exposure on Korea, Korean language and culture. To acquire basic conversational skill in the language.

INSTRUCTIONAL OBJECTIVES

1.	To help students learn the scripts.
2.	To make the students acquire basic conversational skill.
3	To enable students to know about Korean culture.
4.	To create an advantageous situation for the students to have better opportunity for employability by companies who have association with Korea.

UNIT I **(6 hours)**

Lesson 1 < Introduction to Korean Language >, Lesson2 < Consonants and Vowels >, <Basic Conversation, Vocabularies and Listening >

UNIT II (**10 hours)**

Lesson 3<Usage of "To be" >, Lesson 4 < Informal form of "to be">, Lesson 5 <Informal interrogative form of "to be">, Lesson 6 <To be, to have, to stay>, < Basic Conversation, Vocabularies and Listening >

UNIT III (**10 hours)**

Lesson 7 < Interrogative practice and Negation >, < Basic Conversation, Vocabularies and Listening >

UNIT IV **(4 hours)**

Lesson 8 < Korean Culture and Business Etiquette >, < Basic Conversation, Vocabularies and Listening

TEXT BOOK

Korean Through English 1(Basic Korean Grammar and Conversation).

REFERENCES

1. Bharati Korean (Intermediate Korean Grammar).
2. Hand-outs.
3. Various visual mediums such Movie CD, Audio CD.
4. Collection of vocabularies for engineering field.

LE1006KOREAN LANGUAGE PHASE I												
Course designed by		**Department of English and Foreign Languages**										
1.	Student outcome	a	b	c	d	e	f	g	h	i	j	k
								x				
2.	Mapping of instructional objectives with student outcome							1 - 4				
3.	Category	General (G)	Basic Sciences (B)			Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		x	--			--				--		
4.	Approval	23rd meeting of Academic Council, May 2013										

	CHINESE LANGUAGE PHASE I	L	T	P	C
LE1007	Total contact hours- 30	2	0	0	2
	Prerequisite				
	NIL				

PURPOSE

To enable students achieve a basic exposure on China, Chinese language and culture. To acquire basic conversational skill in the language.

INSTRUCTIONAL OBJECTIVES

1.	To help students learn the Chinese scripts.
2.	To make the students acquire basic conversational skill.
3	To enable students to know about China and Chinese culture.
4.	To create an advantageous situation for the students to have better opportunity for employability by companies who have association with china.

UNIT I

Introduction of Chinese Language

UNIT II

Phonetics and Notes on pronunciation

a) 21 Initials:

b p m f d t n l g k h j q x z c s zh ch sh r

b) 37 Finals:

a	o	e	i	u	ü
ai	ou	ei	ia	ua	üe
an	ong	en	ian	uai	üan
ang		eng	iang	uan	ün
ao		er	iao	uang	
	ie	uei(ui)			
	in	uen(un)			
	ing	ueng			
		iong		uo	
		iou(iu)			

c) The combination of Initials and Finals - Pinyin

UNIT III

Introduction of Syllables and tones

a) syllable=initial+final+tone

b) There are four tones in Chinese: the high-and-level tone, the rising tone, the falling-and-rising tone, and the falling tone. And the markers of the different tones.

UNIT IV

A. Tones practice

B. the Strokes of Characters

1. Introduction of Chinese Characters
2. The eight basic strokes of characters

UNIT V

1. Learn to read and write the Characters:

八(eight) 不(not) 马(horse) 米(rice) 木(wood).

2. **Classes are organized according to several Mini-dialogues.**

TEXT BOOK

A New Chinese Course 1- Beijing Language and Culture University Press.

REFERENCES

1. New Practical Chinese Reader Textbook (1) – Beijing Language and Culture University Press.
2. 40 Lessons For Basic Chinese Course I – Shanghai Translation Press.
3. My Chinese Classroom - East China Normal University Press.

LE1007CHINESE LANGUAGE PHASE I												
Course designed by		**Department of English and Foreign Languages**										
1.	Student outcome	a	b	c	d	e	f	g	h	i	j	k
								x				
2.	Mapping of instructional objectives with student outcome							1-4				
3.	Category	General (G)	Basic Sciences (B)			Engineering Sciences andTechnical Arts (E)					Professional Subjects (P)	
		x	--			--					--	
4.	Approval	23rd meeting of Academic Council, May 2013										

PD1003	APTITUDE-I	L	T	P	C
	Total Contact Hours - 30	1	0	1	1
	Prerequisite				
	Nil				

PURPOSE	
To enhance holistic development of students and improve their employability skills.	
INSTRUCTIONAL OBJECTIVES	
1.	To improve aptitude, problem solving skills and reasoning ability of the student.
2.	To collectively solve problems in teams & group.

UNIT I – NUMBERS **(6 hours)**

Types and Properties of Numbers, LCM, GCD, Fractions and decimals, Surds

UNIT II - ARITHMETIC – I **(6 hours)**

Percentages, Profit & Loss, Simple Interest & Compound Interest, , Clocks & calendars

UNIT III - ALGEBRA - I **(6 hours)**

Logarithms, Problems on ages

UNIT IV - MODERN MATHEMATICS - I **(6 hours)**

Permutations, Combinations, Probability

UNIT V - REASONING **(6 hours)**

Logical Reasoning, Analytical Reasoning

ASSESSMENT

1. Objective type – Paper based / Online – Time based test

REFERENCES

1. Agarwal.R.S – *"Quantitative Aptitude for Competitive Examinations",* S.Chand Limited 2011.
2. Abhijit Guha*, "Quantitative Aptitude for Competitive Examinations",*Tata McGraw Hill, 3rd Edition*,* 2011.
3. Edgar Thrope,*"Test Of Reasoning for Competitive Examinations",* Tata McGraw Hill, 4th Edition, 2012.
4. *Other material related to quantitative aptitude*

<table>
<tr><td colspan="13">PD1003 – APTITUDE-I</td></tr>
<tr><td colspan="2">Course designed by</td><td colspan="11">Career Development centre</td></tr>
<tr><td rowspan="2">1.</td><td rowspan="2">Student Outcome</td><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td><td>g</td><td>h</td><td>i</td><td>j</td><td>k</td></tr>
<tr><td>X</td><td></td><td></td><td>X</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>2.</td><td>Mapping of instructional objectives with student outcome</td><td>1</td><td></td><td></td><td>2</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td rowspan="2">3.</td><td rowspan="2">Category</td><td colspan="2">General (G)</td><td colspan="3">Basic Sciences(B)</td><td colspan="4">Engineering Sciences and Technical Arts (E)</td><td colspan="2">Professional Subjects(P)</td></tr>
<tr><td colspan="2">X</td><td colspan="3"></td><td colspan="4"></td><td colspan="2"></td></tr>
<tr><td>4.</td><td>Approval</td><td colspan="11">23rd meeting of Academic Council, May 2013</td></tr>
</table>

	TRANSFORMS AND BOUNDARY VALUE PROBLEMS	L	T	P	C
MA1003	Total Contact Hours - 60	4	0	0	4
	(Common to CSE, SWE, ECE, EEE, ICE, EIE, TCE & MECT)				

PURPOSE

To impart analytical ability in solving mathematical problems as applied to the respective branches of Engineering.

INSTRUCTIONAL OBJECTIVES

1.	To know to formulate and solve partial differential equations
2.	To have thorough knowledge in Fourier series
3.	To be familiar with applications of partial differential equations
4.	To gain good knowledge in the application of Fourier transform
5.	To learn about Z- transforms and its applications

UNIT I PARTIAL DIFFERENTIAL EQUATIONS (12 hours)

Formation – Solution of standard types of first order equations – Lagrange's equation – Linear homogeneous partial differential equations of second and higher order with constant coefficients - Classification of second order linear partial differential equations including the reduction to the above types – Separable Variable Method.

UNIT II FOURIER SERIES (12 hours)

Dirichlet's conditions – General Fourier series – Half range Sine and Cosine series – Parseval's identity – Harmonic Analysis.

UNIT III ONE DIMENSIONAL WAVE & HEAT EQUATION (12 hours)

Boundary and initial value problems - Transverse vibrations of elastic string with fixed ends – Fourier series solutions – One dimensional heat equation - Steady and transient states – problems – Excluding thermally insulated ends.

UNIT IV FOURIER TRANSFORMS (12 hours)

Statement of Fourier integral theorem(proof omitted) – Fourier transform pairs – Fourier Sine and Cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval's identity – Integral equations.

UNIT V - Z-TRANFORMS AND DIFFERENCE EQUATIONS (12 hours)

Z-transform – Elementary properties – Inverse Z-transfrom – Convolution theorem – Formation of Difference equations – Solution of difference equations using Z-transform.

TEXT BOOKS

1. Kreyszig.E, "*Advanced Engineering Mathematics"*, 10th edition, John Wiley & Sons. Singapore, 2012.
2. Grewal B.S, *"Higher Engg Maths",* Khanna Publications, 42nd Edition,2012.

REFERENCES:

1. Kandasamy Petal. *"Engineering Mathematics",* Vol. II & Vol. III (4th revised edition), Chand.S& Co., New Delhi, 2000.
2. Narayanan.S, Manicavachagom Pillay.T.K, Ramanaiah.G, *"Advanced Mathematics for Engineering students"*, Volume II & III (2nd edition), Viswanathan.S, Printers and Publishers, 1992.
3. Venkataraman.M.K, *"Engineering Mathematics"* – Vol.III – A & B (13th edition), National Publishing Co., Chennai, 1998.
4. Sankara Rao, "*Introduction to Partial Differential Equations"*, 2nd Edition, PHI Learning Pvt. Ltd., 2006.
5. Sivaramakrishna Das.P and Vijayakumari.C,*"A text book of Engineering Mathematics-III"*,Viji's Academy,2010

MA1003 TRANSFORMS AND BOUNDARY VALUE PROBLEMS												
Course Designed by		**Department of Mathematics**										
1.	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
		x				x						
2.	Mapping of instructional objectives with student outcome	1-5				1-5						
3.	Category	General (G)	Basic Sciences(B)			Engineering Sciences and Technical Arts (E)				Professional Subjects(P)		
		--	x			--				--		
4.	Approval	23rd meeting of academic council, May 2013										

EE 1004	ELECTRICAL MACHINES – I	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite				
	EE1001-Basic Electrical Engineering				

PURPOSE

To give the students a fair knowledge on the working of various DC machines & Transformers.

INSTRUCTIONAL OBJECTIVES

1.	To analyze the performance of different types of DC machines & Transformers.
2.	To appreciate the applications of DC machines & Transformers.

UNIT I – ELECTRO MAGNETIC INDUCTION & BASIC CONCEPTS IN ROTATING MACHINES (8 hours)

Introduction to magnetic circuits – Magnetically induced EMF and force – AC operation of magnetic circuits –. Energy in magnetic systems – Field energy & mechanical force – Single and Multiple excited systems. MMF of distributed windings – Magnetic fields in rotating machines – Generated voltages – Torque.

UNIT II – DC GENERATORS (10 hours)

Constructional features of DC machine – Principle of operation of DC generator – EMF equation – Types of excitation – No load and load characteristics of DC generators – commutation – armature reaction – Parallel operation of DC generators.

UNIT III – DC MOTORS (8 hours)

Principle of operation of DC motors-Back EMF – Torque equation –Types of DC motors-Speed – Torque characteristics of DC motors – Starting of DC motors: 2 point starter, 3 point starter, 4 point starter – Speed control: Field control, Armature control, voltage control, Thyristor control – Losses and efficiency – Applications

UNIT IV– TRANSFORMERS (10 hours)

Principle of operation – Constructional features of single phase and three phase transformers – EMF equation – Transformer on No load and Load –Phasor diagram --equivalent circuit – Regulation - three phase transformer connections-parallel operation of single phase and three phase transformer- Auto transformers

UNIT V– TESTING OF DC MACHINES & TRANSFORMERS (9 hours)

Losses and efficiency –Condition for maximum efficiency – Testing of DC machines: Brake test , Swinburne's test, Retardation test, Hopkinson's test- Testing of transformer: polarity test, load test, open circuit and short circuit test, Sumpner's test – All day efficiency.

TEXT BOOKS

1. Kothari.D.P and Nagrath.I.J., "*Electrical Machines"*, Tata McGraw Hill Publishing Co.Ltd, New Delhi, 5th edition 2002.
2. .Bimbhra.P.S, Electrical Machinery,Khanna Publishers, IL Kosow, "*Electrical Machines & Transformers",* Prentice Hall of India. 2nd edition 2003.

REFERENCES

1. Dr. Murugesh Kumar.K. "*DC Machines & Transformers"*, Vikas Publishing House Pvt Ltd.,2nd edition 2003.
2. Fitgerald, A.E., Charles Kingsely Jr. Stephen D.Umans, "*Electric Machinery"* McGraw Hill Books Company,6th edition 2002.
3. Hill Stephen, Chapman.J, "*Electric Machinery Fundamentals"*, McGraw Hill Book Co., New Delhi, 4th edition 2005.
4. Albert E Clayton and Hancock.N.N, "*The performance and design of direct current Machines"*, Oxford and IBH publishing company Pvt. Ltd., New Delhi 1990.

EE 1004 ELECTRICAL MACHINES – I												
Course designed by		**Department of Electrical and Electronics Engineering**										
1.	Student outcomes	a	b	c	d	e	f	g	h	i	j	k
		x				x			x			
2.	Mapping of instructional objectives with student outcome	1,2				1,2			1,2			
3.	Category	General (G)	Basic Sciences(B)			Engineering Sciences andTechnical Arts(E)				Professional Subjects(P)		
		--	--			--				x		
4.	Broad area (for 'P'category)	Electrical Machines	Circuits and Systems			Electronics			Power Systems	Intelligent Systems		
		x	--			--			--	--		
5.	Approval	23rd meeting of Academic Council, May 2013										

EE1005	ELECTROMAGNETIC THEORY	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

The purpose of this course is to enable the students to have a fair knowledge about the theory and problems in Electromagnetic Fields.

INSTRUCTIONAL OBJECTIVES

1.	To understand the concepts of Electrostatics and their applications.
2.	To understand the concepts of Magnetostatics and their applications.
3.	To understand the concept of Electromagnetic Fields, waves and wave propagation.

UNIT I – ELECTROSTATICS (9 hours)

Introduction to various Co-ordinate Systems - Coulomb's law – Electric field intensity – electric fields due to point, line, surface and volume charge distributions – Electric flux density – Gauss's law and its applications – Electric potential – potential gradient – Divergence and divergence theorem.

UNIT II – ELECTROSTATICS APPLICATIONS (9 hours)

Current and current density – Continuity of Current - Conductors and Dielectrics - Boundary conditions – capacitance – Capacitance of system of conductors – Energy stored in capacitor – Energy density - Poisson's and Laplace's equations (simple problems).

UNIT III – MAGNETOSTATICS (9 hours)

Magnetic field intensity – Biot – Savart Law – Ampere's Law – Magnetic field due to straight conductors, circular loop, infinite sheet of current – Curl – Stoke's theorem – Magnetic flux – Magnetic flux density – The Scalar and Vector magnetic potentials – Force on a moving charge and current elements – Force and Torque on closed circuit.

UNIT IV– MAGNETOSTATICS APPLICATIONS (9 hours)

Introduction to magnetic materials – Magnetization and Permeability – Magnetic boundary conditions – Magnetic circuit – Potential energy and forces on Magnetic materials – Inductance and mutual inductance – Inductance of solenoids, toroids, and transmission lines.

UNITV–ELECTROMAGNETIC FIELDS AND WAVE PROPAGATION (9 hours)

Faraday's Law – Time varying magnetic field - Conduction current and Displacement current – Maxwell's equation in point and integral forms – Electromagnetics Wave Equations - Wave propagation in free space, Dielectrics, conductors – Power and the Pointing Vector.

TEXT BOOKS

1. William Hayt, "*Engineering Electromagnetics*", McGraw Hill, New york, 7th edition, 2011.
2. Gangadhar.K.A, "Field theory", *Khanna Publishers*, New Delhi,15th edition, 2004.

REFERENCES

1. Matthew. N.O. Sadiku, "*Elements of Electromagnetics*", Fourth Edition, Oxford University Press, First Indian Edition, 2010.
2. David K Cheng, "*Field and Wave Electromagnetics*",Pearson Education, 2nd edition, 2004.
3. John D. Kraus, *"Electromagnetics*" McGraw Hill, 5th Edition, 1999.
4. Narayana Rao.N, "*Elements of Engg. Electro Magnetics*", Prentice Hall of India, 6rd Edition, 2008.

EE1005 ELECTROMAGNETIC THEORY												
Course designed by		**Department of Electrical and Electronics Engineering**										
1.	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
		x				x						
2.	Mapping of instructional objectives with student outcome	1-3				1-3						
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences and Technical Arts (E)					Professional Subjects(P)	
		--		--		--					x	
4.	Broad Area	Electrical Machines		Circuits &Systems		Electronics		Power Systems			Intelligent Systems	
		--		x		--		--			--	
5.	Approval	23rd meeting of Academic Council, May 2013										

EE1006	DIGITAL SYSTEMS	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

To develop a strong foundation in the field of Digital Electronics. The subject gives the students an in depth knowledge about Digital logic families, Combinational circuits and enable them to analyze and design any sequential circuits. Also this subject gives knowledge about various memory devices, VHDL & Verilog

INSTRUCTIONAL OBJECTIVES

1.	Understand the concepts of digital logic circuits.
2.	Design combinational and sequential logic circuits.
3.	Understand the concepts of Memory devices, VHDL & Verilog

UNIT I – BOOLEAN ALGEBRA AND COMBINATIONAL CIRCUITS (9 hours)

Boolean algebra: De-Morgan's theorem, switching functions and simplification using K maps & Quine McCluskey method, Design of adder, subtractor, comparators, code converters, encoders, decoders, multiplexers and demultiplexers.

UNIT II – SYNCHRONOUS SEQUENTIAL CIRCUITS (9 hours)

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

UNIT III – ASYNCHRONOUS SEQUENCTIAL CIRCUIT (9 hours)

Analysis of asynchronous sequential machines, state reduction, state assignment, asynchronous design problem.

UNIT IV– PROGRAMMABLE LOGIC DEVICES, MEMORY AND LOGIC FAMILIES (9 hours)

Memories: ROM, PROM, EPROM, PLA, PAL, PLD, CPLD, FPGA: **Digital logic families**: TTL, ECL, MOS families

UNIT V– VHDL AND RECENT TRENDS (9 hours)

RTL Design – combinational logic – Types – Operators – Packages – Sequential circuit – Sub programs – Test benches. (Examples: adders, counters, flipflops, FSM, Multiplexers / Demltiplexers). Introduction to Verilog

TEXT BOOKS

1. Morris. M. Mano and Michael.D.Ciletti, "*Digital Design"*, Fourth edition, Pearson Education, 2008.
2. Floyd and Jain, "*Digital Fundamentals"*, Eighth edition, Pearson Education, 2003.

REFERENCES

1. John M.Yarbrough, "*Digital Logic Application & Design"*, First edition, West Publishing Company, College & School Division, 1997.
2. Raj Kamal, "*Digital systems-Principles and Design"*, Second edition, Pearson educaion, 2007.
3. Charles H.Roth, '*Fundamentals Logic Design*', Fourth edition, Jaico Publishing, 2002.
4. John F.Wakerly, "*Digital Design Principles and Practice*", Third edition, Pearson Education,2002.
5. Bhasker.J, "*A VHDL Primer*" Third edition, PHI Learning, 2009.

<table>
<tr><td colspan="13">EE1006 - DIGITAL SYSTEMS</td></tr>
<tr><td colspan="2">Course designed by</td><td colspan="11">Department of Electrical and Electronics Engineering</td></tr>
<tr><td rowspan="2">1.</td><td rowspan="2">Student Outcome</td><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td><td>g</td><td>h</td><td>i</td><td>j</td><td>k</td></tr>
<tr><td>x</td><td></td><td>x</td><td></td><td>x</td><td></td><td></td><td>x</td><td></td><td>x</td><td>x</td></tr>
<tr><td>2.</td><td>Mapping of instructional objectives with student outcome</td><td>1-3</td><td></td><td>2</td><td></td><td>2</td><td></td><td></td><td>2,3</td><td></td><td>2,3</td><td>3</td></tr>
<tr><td rowspan="2">3.</td><td rowspan="2">Category</td><td colspan="2">General (G)</td><td colspan="3">Basic Sciences (B)</td><td colspan="4">Engineering Sciences and Technical Arts (E)</td><td colspan="2">Professional Subjects (P)</td></tr>
<tr><td colspan="2">--</td><td colspan="3">--</td><td colspan="4">--</td><td colspan="2">x</td></tr>
<tr><td rowspan="2">4.</td><td rowspan="2">Broad Area</td><td colspan="2">Electrical Machines</td><td colspan="3">Circuits & Systems</td><td colspan="2">Electronics</td><td colspan="2">Power Systems</td><td colspan="2">Intelligent Systems</td></tr>
<tr><td colspan="2">--</td><td colspan="3">x</td><td colspan="2">x</td><td colspan="2">--</td><td colspan="2">--</td></tr>
<tr><td>5.</td><td>Approval</td><td colspan="11">23rd meeting of Academic Council, May 2013</td></tr>
</table>

	ELECTRON DEVICES AND CIRCUITS	L	T	P	C
EE1007	Total Contact Hours – 45	**3**	**0**	**0**	**3**
	Prerequisite				
	EC1001-Basic Electronics Engineering				

PURPOSE

To enable the students to have a fair knowledge about semiconductor devices like diodes, transistors, thyristors and their applications like amplifiers, basic concepts of feedback, oscillators, power supply.

INSTRUCTIONAL OBJECTIVES

1.	Understand the theory of semiconductor diodes and their application.
2.	Know the basics of BJT and FET operation, configuration and their application.
3.	Gain a thorough understanding of operation and characteristics of TRIAC & DIAC, GTO, HEMT.
4.	Understand the concept of frequency response of amplifiers and different types of feedback.
5.	Gain knowledge about the operation of oscillators and power supplies.

UNIT I - APPLICATIONS OF SEMICONDUCTOR DEVICES (09 hours)

Introduction to diode and its characteristics, Characteristics of DIAC, TRIAC, GTO, HEMT-MOS as a charge transferring Device – CCD, VVR operation of a FET. LED, LCD characteristics, Photo diode, Tunnel diode, Schotkky diode, - Photo voltaic cell - Rectifiers: HWR, FWR, DBR, filters, Regulators (series and shunt), SMPS.

UNIT II - SMALL SIGNAL ANALYSIS (09 hours)

Introduction to transistor and its characteristics- Transistor as a switch - Operating point of a BJT - Bias stability - Thermal runaway - Use of a heat sink- Biasing circuits for transistors - Hybrid model – Evaluation of H- parameters —- Cascade – Darlington connection - JFET – Biasing a JFET and MOSFET-small signal model – CS and CD amplifiers.

UNIT III - LARGE SIGNAL AMPLIFIERS (09 hours)

Classification of amplifiers, Distortion in amplifiers - Determining efficiency of Class A amplifiers, Class B amplifier, push-pull amplifier - Class C-Single, double-stagger tuned amplifiers, Class D amplifier – Class S amplifier - MOSFET power amplifier Differential amplifiers: DC and AC analysis-CMRR.

UNIT IV - FEED BACK AMPLIFIERS (09 hours)

Feedback amplifiers – Barkhausen criterion- Stability –Distortion - Voltage / current, series / shunt feedback amplifiers - Operation and analysis of RC phase shift, Wienbridge, Hartely, colpitts and crystal oscillators.

UNIT V - PULSE CIRCUITS (09 hours)

RC wave shaping circuits- Clampers and Clippers-Differentiator-Integrator-Voltage Multiplier - Multivibrators – Astable, Monostable, Bistable - Analysis of performance parameters of multivibrators - Schmitt trigger , UJT relaxation oscillators.

TEXT BOOKS

1. Jacob. Millman, Christos C.Halkias, "*Electronic Devices and Circuits"*, Tata McGraw Hill Publishing Limited, New Delhi, 2007.
2. Sedha.R.S, "*A Text Book of Applied Electronics"*, Sultan Chand Publishers, 2008.

REFERENCES

1. David A.Bell, "*Electronic Devices and Circuits"*, Prentice Hall of India Private Limited, New Delhi, 2007.
2. Gupta.J.B, "*Electron Devices and Circuits"*- S.K.Kataria & Sons, 2012.
3. Mathur.S.P, Kulshreshtha.D.C and Chanda.P.R, "*Electronic Devices – Applications and Integrated circuits"* – Umesh Publications, 2005.
4. Malvino, "*Electronic Principles"*, Tata McGraw Hill, 6th edition,2000.
5. Boylestad & Nashelsky, "*Electronic Devices & Circuit Theory"*, Eighth edition, Prentice Hall Of India (P) Ltd., 2003.
6. www.circuitstoday.com
7. www.electronic_circuits.com

EE1007-ELECTRON DEVICES AND CIRCUITS												
Course designed by		**Department of Electrical and Electronics Engineering**										
1.	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
		x		x		x						
2.	Mapping of instructional objectives with student outcome	1-5		2,4,5		2,4,5						
3.	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts (E)					Professional Subjects (P)	
		--		--		--					x	
4.	Broad Area	Electrical Machines		Circuits & Systems		Electronics		Power Systems			Intelligent Systems	
		--		--		x		--			--	
5.	Approval	23rd meeting of Academic Council, May 2013										

	ELECTRICAL AND ELECTRONICS MEASUREMENTS AND INSTRUMENTATION	L	T	P	C
EE1008	Total Contact Hours - 45	**3**	**0**	**0**	**3**
	Prerequisite				
	Nil				

PURPOSE

To enable the students gain knowledge about different types of measuring techniques for measurement of circuit components and electrical quantities using electrical and electronic instruments.

INSTRUCTIONAL OBJECTIVES

1.	To learn the use of DC and AC bridges for measuring R, L and C.
2.	To learn the use of different types of analog meters for measuring electrical quantities such as current, voltage, power energy power factor and frequency.
3.	To learn the principle of working and applications of CRO and other electronic measuring devices.

UNIT I– MEASUREMENT OF R, L, C (9 hours)

Functional elements of instrument – units and standards of measurements - static and dynamic characteristics – Errors in measurement. Measurement of R, L, C – Wheatstone, Kelvin's double, Maxwell, Anderson and Schering bridges. Measurement of high resistance – Megger – loss of charge method.

UNIT II– MEASURING INSTRUMENTS (9 hours)

Principle of operation and construction of PMMC, MI, Dynamometer, Induction, Thermal and Rectifier type instruments – Measurement of voltage and current – use of ammeter shunts and voltmeter multiplier – Use of CT and PT for extending instrument ranges.

UNIT III– MEASUREMENT OF POWER AND ENERGY (9 hours)

Dynamometer type wattmeter – induction type energy meter- 1 phase & 3 phase – errors and compensation – energy meter calibration by direct and phantom loading – Maximum demand indicator – Measurement of reactive power – Trivector meter.

UNIT IV– MEASUREMENT OF FREQUENCY, POWER FACTOR AND PHASE SEQUENCE (9 hours)

Frequency meters – Power factor meter - 1 phase & 3 phase – Synchroscope – Phase sequence indicator.

Storage and display devices: Magnetic tape recorders – Strip chart recorder- X-Y recorder.

Digital plotters and printers – Cathode ray Oscilloscope – block diagram – CRT – Dual Trace oscilloscope-LED, LCD, dot matrix display.

UNIT V– TRANSDUCERS AND ELECTRONIC INSTRUMENTS (9 hours)

Electronic instruments– Digital voltmeter – Multimeter – Signal generator – Function generator-frequency counters.

Classification of transducers – resistive, capacitive and inductive – piezoelectric transducer – strain gauges – LVDT – thermoelectric – piezoelectric. Transducers for measurement of displacement – temperature – pressure – velocity.

TEXT BOOKS

1. Sawhney.A.K, "*A course in Electrical and electronic Measurement and Instrumentation"*, Dhanpat Rai & Sons, New Delhi, 2008.
2. Albert D Halfride & William D Cooper, "*Modern Electronic instrumentation and measurement techniques"*, Prentice Hall of India Pvt Ltd., 2007.

REFERENCES

1. Stout MB, "*Basic Electrical Measurements"*, Prentice Hall of India Pvt Ltd., 2007.
2. Rajendra Prasad, "*Electrical Measurements & Measuring instruments"*, C Publishers, 4th Edition , 2004.

<table>
<tr><th colspan="13">EE 1008 ELECTRICAL AND ELECTRONICS MEASUREMENTS AND INSTRUMENTATION</th></tr>
<tr><td colspan="2">Course designed by</td><td colspan="11">Department of Electrical and Electronics Engineering</td></tr>
<tr><td rowspan="2">1.</td><td rowspan="2">Student Outcome</td><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td><td>g</td><td>h</td><td>i</td><td>j</td><td>k</td></tr>
<tr><td>x</td><td></td><td></td><td></td><td>x</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>2.</td><td>Mapping of instructional objectives with student outcome</td><td>1-3</td><td></td><td></td><td></td><td>2</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td rowspan="2">3.</td><td rowspan="2">Category</td><td colspan="2">General (G)</td><td colspan="3">Basic Sciences (B)</td><td colspan="4">Engineering Sciences and Technical Arts (E)</td><td colspan="2">Professional Subjects (P)</td></tr>
<tr><td colspan="2">--</td><td colspan="3">--</td><td colspan="4">--</td><td colspan="2">x</td></tr>
<tr><td rowspan="2">4.</td><td rowspan="2">Broad Area</td><td colspan="2">Electrical Machines</td><td colspan="3">Circuits & Systems</td><td colspan="2">Electronics</td><td colspan="2">Power Systems</td><td colspan="2">Intelligent Systems</td></tr>
<tr><td colspan="2">--</td><td colspan="3">x</td><td colspan="2">--</td><td colspan="2">--</td><td colspan="2">--</td></tr>
<tr><td>5.</td><td>Approval</td><td colspan="11">23rd meeting of Academic Council, May 2013</td></tr>
</table>

EE1009	**ELECTRICAL MACHINES LABORATORY – I**	**L**	**T**	**P**	**C**
	Total Contact Hours - 45	**0**	**0**	**3**	**2**
	Prerequisite				
	Nil				

PURPOSE

To give students a fair knowledge of testing different types of DC machines and transformers.

INSTRUCTIONAL OBJECTIVES

1.	To rig up circuits for testing a given machine.
2.	To obtain the performance characteristics of machines.

LIST OF EXPERIMENTS

1. Load test on DC motors
2. Speed Control of DC Motor: Field control, Armature control, Thyristorised control
3. Load test on DC generators.
4. Load test on single phase transformer.
5. Open circuit & Short circuit test on single phase transformer
6. Open circuit characteristics of DC generator (Self and Separately Excited)
7. Swinburne's test and separation of losses in DC Machine.
8. Hopkinson's test
9. Sumpner's test on 1-phase transformers
10. 3-phase transformer connections
11. 3-phase to 2 –phase conversion

REFERENCES

1. Department Laboratory Manual.
2. Laboratory manual in Electro Machines by curriculum Development cell IIT, Delhi, Wiley Eastern Ltd,1990.

EE1009 ELECTRICAL MACHINES LABORATORY – I												
Course designed by		**Department of Electrical and Electronics Engineering**										
1.	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
		x	x			x						
2.	Mapping of instructional objectives with student outcome	1,2	1,2			1,2						
3.	Category	General (G)	Basic Sciences (B)	Engineering Sciences and Technical Arts (E)						Professional Subjects (P)		
		--	--	--						x		
4.	Broad Area	Electrical Machines	Circuits & Systems	Electronics	Power Systems	Intelligent Systems						
		x	--	--	--	--						
5.	Approval	23rd meeting of Academic Council, May 2013										

EE1010	ELECTRIC CIRCUITS LABORATORY	L	T	P	C
	Total Contact hours - 45	0	0	3	1
	Prerequisite				
	EE1003- ANALYSIS OF ELECTRIC CIRCUITS				

PURPOSE

This laboratory course will give a thorough knowledge about the basics of circuit analysis.

INSTRUCTIONAL OBJECTIVES

1.	Implement and verify circuit theorems
2.	Gain knowledge about resonance and circuit transients.

LIST OF EXPERIMENTS

1. Verification of Kirchhoff's laws
2. Verification of Superposition theorem
3. Verification of Thevenin's Theorem
4. Verification of Norton's Theorem
5. Verification of Maximum Power Transfer theorem
6. Transient analysis of Series RL, RC circuits
7. Verification of KVL and KCL using Digital simulation
8. Verification of Superposition theorem & Thevenin's Theorem using Digital simulation
9. Verification of Reciprocity Theorem& Maximum Power Transfer theorem using Digital simulation
10. RLC Series Resonance by Digital simulation
11. Circuit Transients by Digital simulation

REFERENCES

1. Department Lab Manual
2. Sudhakar.A and Shyam Mohan.S.P, "C*ircuits and NetworksAnalysisand Synthesis"*, Fourth edition, Tata McGraw Hill PublishingCompany Ltd., New Delhi, 2010.

<table>
<tr><th colspan="13">EE1010 -ELECTRIC CIRCUITS LABORATORY</th></tr>
<tr><td colspan="2">Course designed by</td><td colspan="11">Department of Electrical and Electronics Engineering</td></tr>
<tr><td rowspan="2">1.</td><td rowspan="2">Student Outcome</td><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td><td>g</td><td>h</td><td>i</td><td>j</td><td>k</td></tr>
<tr><td>x</td><td>x</td><td></td><td></td><td>x</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>2.</td><td>Mapping of instructional objectives with student outcome</td><td>1,2</td><td>1, 2</td><td></td><td></td><td>1,2</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td rowspan="2">3.</td><td rowspan="2">Category</td><td colspan="2">General (G)</td><td colspan="3">Basic Sciences (B)</td><td colspan="4">Engineering Sciences and Technical Arts (E)</td><td colspan="2">Professional Subjects (P)</td></tr>
<tr><td colspan="2">--</td><td colspan="3">--</td><td colspan="4">--</td><td colspan="2">x</td></tr>
<tr><td rowspan="2">4.</td><td rowspan="2">Broad Area</td><td colspan="2">Electrical Machines</td><td colspan="3">Circuits & Systems</td><td colspan="2">Electronics</td><td colspan="2">Power Systems</td><td colspan="2">Intelligent Systems</td></tr>
<tr><td colspan="2">--</td><td colspan="3">x</td><td colspan="2">--</td><td colspan="2">--</td><td colspan="2">--</td></tr>
<tr><td>5.</td><td>Approval</td><td colspan="11">23rd meeting of Academic Council, May 2013</td></tr>
</table>

EE1011	**ANALOG AND DIGITAL CIRCUITS LABORATORY**	**L**	**T**	**P**	**C**
	Total Contact hours - 45	**0**	**0**	**3**	**2**
	Prerequisite				
	Nil				

PURPOSE

This laboratory course will give the students a fair knowledge on the performance characteristics of various electron devices and digital logic circuits.

INSTRUCTIONAL OBJECTIVES

1.	Design circuits using discrete components.
2.	Analyze the performance characteristics of electronic devices and their applications.
3.	Design and analyze the frequency response of amplifiers.
4.	Design combinational logic circuits using digital IC's.

LIST OF EXPERIMENTS

1. Characteristics of PN Junction diode , Zener diode & Series Voltage Regulator
2. Input and Output characteristic of CB, CE configuration
3. Characteristics of SCR & UJT
4. Halfwave Rectifier, Full Wave rectifier, Clipper & Clampers.
5. Design of Wien-bridge Oscillator & RC phase shift oscillator.
6. Hartley Oscillator & Colpitt's oscillator
7. Astable, Monostable, Bistable Multivibrator
8. Frequency response of voltage series feedback amplifier
9. Adder , Subtractor & Flipflops
10. Design of MUX & DEMUX
11. Design of Counters
12. Design of Digital logic circuits using VHDL

REFERENCES

1. Laboratory Manual

EE1011 - ANALOG AND DIGITAL CIRCUITS LABORATORY												
Course designed by		**Department of Electrical and Electronics Engineering**										
1.	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
		x	x	x		x						
2.	Mapping of instructional objectives with student outcome	1-4	1-4	1-4		2-4						

3.	Category	General (G)	Basic Sciences (B)	Engineering Sciences and Technical Arts (E)	Professional Subjects (P)
		--	--	--	x

4.	Broad Area	Electrical Machines	Circuits & Systems	Electronics	Power Systems	Intelligent Systems
		--	x	x	--	--
5.	Approval	23rd meeting of Academic Council, May 2013				

SEMESTER IV

LE1008	**GERMAN LANGUAGE PHASE II**	**L**	**T**	**P**	**C**
	Total Contact Hours- 30	**2**	**0**	**0**	**2**
	Prerequisite				
	LE1003-German Language Phase I				

PURPOSE

Familiarity in German language will be helpful for the students in preparing their resumes in German. Proficiency in the language will be an added asset for the students to have an edge in the present day highly competitive and global job market.

INSTRUCTIONAL OBJECTIVES

1.	To enable the students to speak and understand about most of the activities in the day to day life.
2.	The students will be able to narrate their experiences in Past Tense.
3.	The students will be able to understand and communicate even with German Nationals.
4.	By the end of Phase – II the students will have a reasonable level of conversational skills.

UNIT I **(6 hours)**

Wichtige Sprachhandlungen: Zimmersuche, Möbel

Grammatik: Verben mit trennbaren Vorsilben im Präsens und Perfekt. Verben mit trennbaren Vorsilben und Modalverben imPräsens. Verben mit untrennbaren Vorsilben im Perfekt. Unregelmäßige und gemischte Verben im Perfekt.

UNIT II **(6 hours)**

Wichtige Sprachhandlungen: Kleidung ,Farben , Materialien.

Grammatik : formelle Imperativsätze mit "Sie" informelle Imperativsätze Vorschläge mit "wir" – "sollen/wollen wir"—Soll ich? Modalpartikeln "doch" "mal" "doch mal.

UNIT III **(6 hours)**

Wichtige Sprachhandlungen : Sehenswürdigkeite (Prater, Brandenburger Tör,Kolossium, Eifeltürm)

Grammatik : Ortsangaben mit Akk. und Dativ "alle","man" Indefinitepronomen "etwas", "nichts",

UNIT IV **(6 hours)**

Wichtige Sprachhandlungen : Wegbeschreibung/ Einladung interkulturelle Erfahrung.

Grammatik : Verwendung von Präsens für zukünftigen Zeitpunkt.

UNIT V **(6 hours)**

Wichtige Sprachhandlungen: Essen und Trinken im Restaurant, Partyvorbereitung und Feier

Grammatik: Nomen aus Adjektiven nach "etwas"und "nichts" Nomen aus dem Infinitiv von Verben, zusammegesetzte Nomen und ihre Artikel. Adjektive im Nom. und Akk. nach unbestimmten Artikel, Negativartikel und Possessivartikel.

TEXT BOOK

1. Studio d A1. Deutsch als Fremdsprache with CD.(Kursbuch und Sprachtraining).

REFERENCES

1. German for Dummies
2. Schulz Griesbach

LE1008 GERMAN LANGUAGE PHASE II												
Course designed by		**Department of English and Foreign Languages**										
1.	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
								x				
2.	Mapping of instructional objectives with student outcome							1-4				
3.	Category	General (G)	Basic Sciences (B)			Engineering Sciences and Technical Arts (E)					Professional Subjects(P)	
		x	--			--					--	
4.	Approval	23rd meeting of Academic Council, May 2013										

LE1009	FRENCH LANGUAGE PHASE II	L	T	P	C
	Total Contact Hours- 30	2	0	0	2
	Prerequisite				
	LE1004- French Language Phase I				

PURPOSE

To enable the students communicate effectively with any French speaker and have a competitive edge in the international market.

INSTRUCTIONAL OBJECTIVES

1.	To enable students access information on the internet
2.	To receive and send e mails
3	To assist students in gaining a certain level of proficiency to enable them to give the level 1 exam conducted by Alliance Française de Madras.
4.	To enhance their lexical and technical competence.

UNIT I **(6 hours)**

1. Grammar and Vocabulary: The second group verbs: Finir, rougir, grossir, grandir . "Les preposition de temps": à, en, le, de 7h à 8h, jusqu' à, vers.
2. Listening and Speaking – the semi- vowels: Voilà, pollutant. Writing –the days of the week. Months, technical subjects, time, "les spécialités scientifiques et l' année universitaire, paragraph writing about time table.
3. Reading -- Reading of the text and comprehension – answering questions

UNIT II **(6 hours)**

Grammar and Vocabulary – The adjectives, the nationality, feminine & masculine noun forms "les métiers scientifiques".
Listening and Speaking – Vowels: soirée, année, près de, très.
Writing – Countries name, nationality, "les métiers scientifiques", numbers from: 69 to infitive and some measures of unit.
Reading Comprehension – reading a text.

UNIT III **(6 hours)**

Grammar and Vocabulary – near future, The demonstrative adjectives, Express the aim by using the verb, Listening and Speaking –"La liaison interdite – en haut". Writing – some scientific terms, French expressions to accept an invitation. Sentence framing. Reading Comprehension – reading a text.

UNIT IV **(6 hours)**

Grammar and Vocabulary –the verbs: manger, boire , the partitive articles Listening and Speaking – "le 'e' caduc Writing- the food, the ingredients, fruits, vegetables, expression of quantity, paragraph writing about food habits. Reading – reading a text.

UNIT V **(6 hours)**

Grammar and Vocabulary – " les prepositions de lieu": au à la, à l', chez, the reflexives verbs, verbs to nouns. Listening and Speaking – "le 'e' sans accents ne se prononce pas. C'est un "e" caduc. Ex: quatre, octobre. " les sons (s) et (z)- salut , besoin. Writing –paragraph writing about one's everyday life, French culture. Reading Comprehension -- reading a text or a song.....

TEXT BOOK

Tech French

REFERENCES

1. French for Dummies
2. French made easy: Goyal publishers
3. Panorama

LE1009 FRENCH LANGUAGE PHASE II												
Course designed by		**Department of English and Foreign Languages**										
1.	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
								x				
2.	Mapping of instructional objectives with student outcome							1-4				
3.	Category	General (G)	Basic Sciences (B)			Engineering Sciences and Technical Arts (E)				Professional Subjects(P)		
		x	--			--				--		
4.	Approval	23rd meeting of Academic Council, May 2013										

LE 1010	JAPANESE LANGUAGE PHASE II	L	T	P	C
	Total Contact Hours- 30	2	0	0	2
	Prerequisite				
	LE1005- Japanese Language Phase I				

PURPOSE

To enable students to learn a little advanced grammar in order to improve their conversational ability in Japanese.

INSTRUCTIONAL OBJECTIVES

1.	To help students learn Katakana script (used to write foreign words)
2.	To improve their conversational skill.
3	To enable students to know about Japan and Japanese culture.
4.	To improve their employability by companies who are associated with Japan.

UNIT I **(8 hours)**

Introduction to Verbs; Ikimasu, okimasu, nemasu, tabemasu etc.
Grammar – usage of particles de, o, to, ga(but) and exercises
Common daily expressions and profession.
Katakana script and related vocabulary.
Religious beliefs, Japanese housing and living style.
Conversation – audio

UNIT II **(8 hours)**

Grammar :Verbs –Past tense, negative - ~mashita, ~masen deshita..
i-ending and na-ending adjectives - introduction
Food and transport (vocabulary)
Japanese food, transport and Japanese tea ceremony.
Kanji Seven elements of nature (Days of the week)
Conversation – audio

UNIT III **(6 hours)**

Grammar - ~masen ka, mashou
Adjectives (present/past – affirmative and negative)
Conversation – audio

UNIT IV **(4 hours)**

Grammar – ~te form
Kanji – 4 directions
Parts of the body
Japanese political system and economy
Conversation – audio

UNIT V **(4 hours)**

Stationery, fruits and vegetables
Counters – general, people, floor and pairs

TEXT BOOK

First lessons in Japanese, ALC Japan

REFERENCES

1. Japanese for dummies. Wiley publishing co. Inc., USA.
2. Kana workbook, Japan foundation

LE1010 JAPANESE LANGUAGE PHASE II												
Course designed by		**Department of English and Foreign Languages**										
1.	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
								x				
2.	Mapping of instructional objectives with student outcome							1- 4				
3.	Category	General (G)	Basic Sciences (B)			Engineering Sciences and Technical Arts (E)				Professional Subjects(P)		
		x	--			--				--		
4.	Approval	23rd meeting of Academic Council, May 2013										

LE1011	KOREAN LANGUAGE PHASE II	L	T	P	C
	Total Contact Hours-30	2	0	0	2
	Prerequisite				
	LE1006-Korean Language Phase I				

PURPOSE

To enable students achieve a basic exposure on Korea, Korean language and culture. To acquire basic conversational skill in the language.

INSTRUCTIONAL OBJECTIVES

1.	To help students learn the scripts.
2.	To make the students acquire basic conversational skill.
3	To enable students to know about Korean culture.
4.	To create an advantageous situation for the students to have better opportunity for employability by companies who have association with Korea.

UNIT I (**9 hours)**

Lesson 1 <Review of Vowels and Consonants>, Lesson2 < Various Usages of "To be">, Lesson3 < Informal form of "to be"><Basic Conversation, Vocabularies and Listening>

UNIT II (**9 hours)**

Lesson 4< Informal interrogative form of "to be">, Lesson 5 < To be, to have, to stay>, Lesson 5 < Advanced Interrogative practice>, Lesson 6 < Types of Negation>, <Basic Conversation, Vocabularies and Listening>

UNIT III (**9 hours)**

Lesson 7 < Honorific forms of noun and verb2>, Lesson8 < Formal Declarative2>, Lesson 9 < Korean Business Etiquette>, <Basic Conversation, Vocabularies and Listening>

UNIT IV (**3 hours)**

Lesson 10 <Field Korean as an Engineer1>, <Field Korean as an Engineer2><Basic Conversation, Vocabularies and Listening>

TEXT BOOK

Korean through English 2(Basic Korean Grammar and Conversation)

REFERENCES

1. Bharati Korean (Intermediate Korean Grammar)
2. Hand-outs
3. Various visual media such Movie CD, Audio CD, and music
5. Collection of vocabularies for engineering field.

LE1011KOREAN LANGUAGE PHASE II												
Course designed by		**Department of English and Foreign Languages**										
1.	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
								x				
2.	Mapping of instructional objectives with student outcome							1-4				
3.	Category	General (G)	Basic Sciences (B)			Engineering Sciences and Technical Arts (E)					Professional Subjects(P)	
		x	--			--					--	
4.	Approval	23rd meeting of Academic Council, May 2013										

LE1012	CHINESE LANGUAGE PHASE II	L	T	P	C
	Total Contact Hours-30	2	0	0	2
	Prerequisite				
	LE1007-Chinese Language Phase I				

PURPOSE

To enable students achieve a basic exposure on China, Chinese language and culture. To acquire basic conversational skill in the language.

INSTRUCTIONAL OBJECTIVES

1.	To help students learn the Chinese scripts.
2.	To make the students acquire basic conversational skill.
3	To enable students to know about China and Chinese culture.
4.	To create an advantageous situation for the students to have better opportunity for employability by companies who have association with china.

UNIT I

A) Greetings
Questions and answers about names
Introducing oneself
Receiving a guest
Making corrections

New words:你（you）好（good, well）工作（work, job）人员（personnel, staff member）请问（May I ask…）贵（expensive , valuable）姓（one's family name is ）

B) Questions and answers about the number of people in a family
Expressing affirmation/negation
Questions and answers about the identity of a person same or not.

New words: 家（family, home）有（have）几（several）
爸爸 (father）妈妈 (mother) 哥哥 (elderly brother）

UNIT II

A. About places
B. About numbers
C. if one knows a certain person
D. Expressing apology
E. Expressing affirmation/negation
F. Expressing thanks.

New Words:

客人（guest,visitor）这儿（here）中文（Chinese）对（right, correct）学生（student）多（many, a lot）

Grammar: Sentences with a verbal predicate

UNIT III

Introducing people to each other

A. Exchanging amenities
B. Making/Negating conjectures
C. Questions and answers about nationality

Grammar: Sentences with an adjectival predicate

UNIT IV

A) About places to go
Indicating where to go and what to do
Referring to hearsay.
Saying good-bye
B) Making a request
Questions and answers about postcodes and telephone numbers
Reading dates postcodes and telephone numbers
Counting Renmibi

Grammar: Sentences with a subject-verb construction as its predicate
Sentences with a nominal predicate

UNIT V

A. Asking and answering if someone is free at a particular time
B. Making proposals
C. Questions about answers about time
D. Making an appointment
E. Telling the time
F. Making estimations

TEXT BOOK

A New Chinese Course 1- Beijing Language and Culture University Press

REFERENCES

1. New Practical Chinese Reader Textbook (1) – Beijing Language and Culture University Press.
2. 40 Lessons For Basic Chinese Course I – Shanghai Translation Press.
3. My Chinese Classroom - East China Normal University Press.

LE1012CHINESE LANGUAGE PHASE II												
Course designed by		**Department of English and Foreign Languages**										
1.	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
								x				
2.	Mapping of instructional objectives with student outcome							1-4				
3.	Category	General (G)	Basic Sciences (B)			Engineering Sciences and Technical Arts (E)					Professional Subjects(P)	
		x	--			--					--	
4.	Approval	23rd meeting of Academic Council, May 2013										

PD1004	APTITUDE-II	L	T	P	C
	Total Contact Hours - 30	1	0	1	1
	Prerequisite				
	Nil				

PURPOSE

To enhance holistic development of students and improve their employability skills.

INSTRUCTIONAL OBJECTIVES

1. To improve verbal aptitude, vocabulary enhancement and reasoning ability of the student.

UNIT I **(6 hours)**

Critical Reasoning – Essay Writing

UNIT II **(6 hours)**

Synonyms – Antonyms - Odd Word - Idioms & Phrases

UNIT III **(6 hours)**

Word Analogy - Sentence Completion

UNIT IV **(6 hours)**

Spotting Errors - Error Correction - Sentence Correction

UNIT V **(6 hours)**

Sentence Anagram - Paragraph Anagram - Reading Comprehension

ASSESSMENT

1. Objective type – Paper based /Online – Time based test

TEXT BOOK:

1. Personality Development -Verbal Work Book, Career Development Centre, SRM Publications

REFERENCES

1. Green Sharon Weiner M.A and Wolf Ira K.*Barron's New GRE*, *19th Edition*. Barron's Educational Series, Inc, 2011.
2. Lewis Norman, *Word Power Made Easy*, Published by W.R.Goyal Pub, 2011.
3. Thorpe Edgar and Thorpe Showich, *Objective English.* Pearson Education 2012.
4. Murphy Raymond, *Intermediate English Grammar*, (Second Edition), Cambridge University Press, 2012.

PD1004 - APTITUDE-II												
Course designed by		**Career Development Centre**										
1.	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
								X				
2.	Mapping of instructional objectives with student outcome							1				
3.	Category	General (G)	Basic Sciences (B)			Engineering Sciences and Technical Arts (E)				Professional Subjects (P)		
		X										
4.	Approval	23rd meeting of Academic Council, May 2013										

MA1004	NUMERICAL METHODS	L	T	P	C
	Total Contact Hours - 60	4	0	0	4
	(Common to Auto, Aero, Mech, Mechatronics, EEE, Civil , Chemical, ICE & EIE)				

PURPOSE

To impart analytical ability in solving mathematical problems as applied to the respective branches of Engineering.

INSTRUCTIONAL OBJECTIVES

1.	To familiarise with numerical solution of equations
2.	To get exposed to finite differences and interpolation
3.	To be thorough with the numerical Differentiation and integration
4.	To find numerical solutions of ordinary differential equations
5.	To find numerical solutions of partial differential equations

UNIT I - CURVE FITTING AND NUMERICAL SOLUTION OF EQUATIONS (12 hours)

Method of Least Squares – Fitting a straight line – Fitting a parabola – Fitting an exponential curve – Fitting a curve of the form $y = ax^b$ – Calculation of the sum of the squares of the residuals.- Newton-Raphson method – Gauss Elimination method – Gauss Jacobi method – Gauss Seidel method.

UNIT II - FINITE DIFFERENCES AND INTERPOLATION (12 hours)

First and Higher order differences – Forward differences and backward differences and Central Differences – Differences of a polynomial – Properties of operators – Factorial polynomials – Shifting operator E – Relations between the operators. Interpolation – Newton-Gregory Forward and Backward Interpolation formulae - Divided differences – Newton's Divided difference formula – Lagrange's Interpolation formula – Inverse interpolation

UNIT III - NUMERICAL DIFFERENTIATION AND INTEGRATION (12 hours)

Newton's forward and backward differences formulae to compute first and higher order derivatives – The Trapezoidal rule – Simpson's one third rule and three eighth rule.

UNIT IV - NUMERICAL SOLUTIONS OF ORDINARY DIFFERENTIAL EQUATIONS (12 hours)

Solution by Taylor's series – Euler's method – Improved and modified Euler method – Runge-Kutta methods of fourth order (No proof) – Milne's Method - Adam's Bashforth method.

UNIT V - NUMERICAL SOLUTIONS OF PARTIAL DIFFERENTIAL EQUATIONS

(12 hours)

Classification of Partial differential equations of the second order - Difference quotients – Laplace's equation and its solution by Liebmann's process – Solution of Poisson's equation – Solutions of Parabolic and Hyperbolic equations.

TEXT BOOKS

1. Grewal.B.S, "*Numerical Methods in engineering and science"*, Khanna Publishers, 42nd edition, 2012.
2. Sastry.S.S, "*Introductory Methods of Numerical Analysis",* 4th edition, 2005.

REFERENCES

1. Dr.Venkataraman.M.K*, "Numerical Methods in Science and Engineering"*, National Publishing Co., 2005.
2. Balagurusamy.E, "*Computer Oriented Statistical and Numerical Methods"* – Tata McGraw Hill., 2000.
3. Jain.M.K, Iyengar.S.R.K and Jain.R.L, "*Numerical Methods for Scientific and Engineering Computation"*, Wiley Eastern Ltd., 4th edition, 2003.
4. Jain.M.K, "*Numerical Solution of Differential Equations"*, 2nd edition (Reprint), 2002.
5. Kandasamy Petal.P, "*Numerical Methods"*, S.Chand & Co., New Delhi, 2003.

MA1004 NUMERICAL METHODS												
Course designed by		**Department of Mathematics**										
1.	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
		x				x						
2.	Mapping of instructional objectives with student outcome	1-5				1-5						
3.	Category	General (G)	Basic Sciences (B)			Engineering Sciences and Technical Arts (E)					Professional Subjects (P)	
		--	x			--					--	
4.	Approval	23rd meeting of Academic Council, May 2013										

	ELECTRICAL MACHINES- II	L	T	P	C
EE1012	Total Contact Hours - 45	3	0	0	3
	Prerequisite				
	EE1004-Electrical Machines -I				

PURPOSE

To enable the students to have a fair knowledge about different types of A.C. machines

INSTRUCTIONAL OBJECTIVES

1.	Ability to understand the principle of operation, construction and characteristics of three phase induction motor and its application.
2.	Ability to understand the construction and characteristics of single phase induction motor and its applications.
3.	Describe the methods to analyze the construction and performance of synchronous machines and its applications
4.	Understand the concepts of equivalent circuit.

UNIT I - THREE PHASE INDUCTION MACHINES (9 hours)

Construction and principle of operation of three phase induction motor – Torque & Power equations – Torque - slip characteristics – No load and blocked rotor tests- equivalent circuit- performance calculation from circle diagram- Double cage rotor – Induction generator

UNIT II - STARTING AND SPEED CONTROL OF INDUCTION MACHINES (9 hours)

Starting methods of three phase induction motor – Speed control techniques - Voltage control – Pole changing – Frequency control –cascade connection - Rotor resistance control – Slip energy recovery scheme -- Thyristorised speed control techniques – Cogging & Crawling - Electric Braking.

UNIT III - SINGLE PHASE MOTORS (9 hours)

Single phase induction motors – Double revolving field theory – Equivalent circuit – No load and Blocked rotor test - Performance analysis – Methods of Self starting – Special motors: shaded pole motor, reluctance motor, repulsion motor-AC series Motor, Linear Induction motor.

UNIT IV - SYNCHRONOUS GENERATORS (9 hours)

Construction features of alternators –working of synchronous machine as generator and motor- e.m.f equation - armature reaction – Synchronous

reactance – Predetermination of voltage regulation using e.m.f, m.m.f, Potier reactance and ASA methods – parallel operation – Synchronizing power—Active and reactive power sharing—Alternator on infinite bus bars - Salient pole synchronous machine – two reaction theory – slip test – operating characteristics—capability curves.

UNIT V- SYNCHRONOUS MOTOR (9 hours)

Methods of starting – torque and power developed equations –Effect of change in excitation and load on synchronous motor-- V curves and inverted V curves – Hunting and suppression methods – Synchronous condenser.

TEXT BOOKS

1. Nagarath.I.J. and Kothari.D.P., "*Electric Machines*", T.M.H. Publishing Co Ltd., New Delhi, 3th edition 2006.
2. Bimbhra.P.S,Electrical Machinery,Khanna Publishers, IL Kosow, "*Electrical Machines & Transformers",* Prentice Hall of India. 2nd edition 2003.

REFERENCES

1. .Gupta., "*Theory and Performance of Electrical Machines",*.Kataria and Sons,14th edition 2009.
2. Fitzgerald Kingsley and Umans, "*Electric Machinery*" 6th Edition, McGraw Hill Books co., New Delhi, 2002.
3. Stephen J. Chapman, "*Electric Machinery Fundamentals*", McGraw Hill Book Co., New Delhi 4th edition 2004.
4. Murugesh Kumar, "*Induction and Synchronous Machines*", Vikas Publication Pvt. Ltd., 2003.

EE 1012- ELECTRICAL MACHINES- II												
Course designed by		Department of Electrical and Electronics Engineering										
1.	Student Outcome	a	b	c	d	e	f	g	h	l	j	k
		x				x			x			
2.	Mapping of instructional objectives with student outcome	1-4				1-4			1-4			
3.	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts (E)						Professional Subjects (P)
		--		--		--						x
4.	Broad Area	Electrical Machines		Circuits & Systems		Electronics		Power Systems				Intelligent Systems
		x		--		--		--				--
5.	Approval	23rd meeting of Academic Council, May 2013										

	CONTROL SYSTEMS	L	T	P	C
EE1013	Total Contact Hours - 45	3	0	0	3
	Prerequisite				
	NIL				

PURPOSE	
To provide an introduction to the analysis of linear control systems. This will permit an engineer to exploit time domain and frequency domain tools	
INSTRUCTIONAL OBJECTIVES	
1.	To Understand the basic components of control systems.
2.	To Gain knowledge in various time domain and frequency domain tools for analysis and design of linear control systems and compensators.
3.	To Understand the methods to analyze the stability of systems from transfer function forms
4.	To Understand the concept of state variable analysis

UNIT I -TRANSFER FUNCTIONS (10 hours)

Introduction and classification of control systems – linear, non-linear, time varying, time invariant, continuous, discrete, SISO and MIMO systems – definitions. Mathematical modeling of mechanical (translation and rotational) and electrical systems ,mechanical –electrical analogies, Transfer function block diagram reduction technique and signal flow graphs using Mason's gain formula. Servomotors, Tacho generators, gear train.

UNIT II-TRANSIENT AND STEADY STATE ANALYSIS (9 hours)

Transient and steady state response – definitions – Mathematical expression for standard test signals, Type and order of systems – step response of first order and second order under damped systems, critically damped and over damped systems, Time domain specifications of second order under damped systems, Steady state error analysis, Responses of first order systems with P, PI, PID controllers, Design and Simulation of time domain analysis.

UNIT III-FREQUENCY DOMAIN ANALYSIS (9 hours)

Frequency response analysis ,frequency domain specifications of second order systems, minimum phase, nonminimum phase and all pass transfer functions, polar plots, bode plots and Nichols chart. Design of lead, lag compensating networks using bode plot technique, Design and Simulation of frequency domain analysis.

UNIT IV- STABILITY ANALYSIS (9 hours)

Stability analysis, characteristic equation, location of roots in s plane for stability, Routh's stability criterion, relative stability analysis, root locus technique, construction of root loci, stability analysis using bode plot, Nyquist stability criterion.

UNIT V- STATE VARIABLE ANALYSIS (8 hours)

Concept of state, State Variable, State Model, State models for linear and continuous time systems, Solution of state and output equation, controllability and observability.

TEXT BOOKS

1. Katsuhiko Ogata, "*Modern Control Engineering*" 5th edition, Prentice Hall of India Private Ltd., New Delhi, 2010.
2. Nagrath I J and Gopal.M., "*Control Systems Engineering*", 5th edition, New Age International (P)Ltd.,Publishers 2008.

REFERENCES

1. M. Gopal, "*Control Systems: Principles and Design*", 3rd Edition, McGraw,Hill, 2008
2. Benjamin C Kuo, "*Automatic Control system*", Prentice Hall of India PrivateLtd., New Delhi, 2009.
3. R.C. Dorf and R.H. Bishop, "*Modern Control Systems*", 12th Edition, Prentice,Hall, 2010.
4. http://www.mathworks.com/access/helpdesk/help/toolbox/control/
5. http://brie.library.cmu.edu/ctms

<table>
<tr><th colspan="14">EE1013-CONTROL SYSTEMS</th></tr>
<tr><td colspan="2">Course designed by</td><td colspan="12">Department of Electrical and Electronics Engineering</td></tr>
<tr><td rowspan="2">1.</td><td rowspan="2">Student Outcome</td><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td><td>g</td><td>h</td><td>i</td><td>j</td><td>k</td></tr>
<tr><td>x</td><td></td><td>x</td><td></td><td>x</td><td></td><td></td><td>x</td><td></td><td></td><td></td></tr>
<tr><td>2.</td><td>Mapping of instructional objectives with student outcome</td><td>1-4</td><td></td><td>1,4</td><td></td><td>1,2</td><td></td><td></td><td>3,4</td><td></td><td></td><td></td></tr>
<tr><td rowspan="2">3.</td><td rowspan="2">Category</td><td colspan="2">General (G)</td><td colspan="3">Basic Sciences (B)</td><td colspan="4">Engineering Sciences and Technical Arts (E)</td><td colspan="2">Professional Subjects (P)</td></tr>
<tr><td colspan="2">--</td><td colspan="3">--</td><td colspan="4">--</td><td colspan="2">x</td></tr>
<tr><td rowspan="2">4.</td><td rowspan="2">Broad Area</td><td colspan="2">Electrical Machines</td><td colspan="3">Circuits & Systems</td><td colspan="2">Electronics</td><td colspan="2">Power Systems</td><td colspan="2">Intelligent Systems</td></tr>
<tr><td colspan="2">x</td><td colspan="3">x</td><td colspan="2">--</td><td colspan="2">--</td><td colspan="2">--</td></tr>
<tr><td>5.</td><td>Approval</td><td colspan="12">23rd meeting of Academic Council, May 2013</td></tr>
</table>

	LINEAR INTEGRATED CIRCUITS	L	T	P	C
EE1014	Total Contact Hours - 45	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

The purpose of this course is to enable the students to understand the fundamentals of analog integrated circuits. In addition, the course equips them with the knowledge of basic circuit designing for various engineering and other technical fields of application

INSTRUCTIONAL OBJECTIVES

1.	To appreciate and understand scientific concepts underlying engineering and technological applications
2.	To educate scientifically the new developments in engineering and technology
3.	To emphasize the significance of low power, small size, reliable, high performance IC chips.
4.	To provide a modest experience to handle and experiment with IC's used for various applications

UNIT I – OP-AMP FUNDAMENTALS & CHARACTERISTICS (8 hours)

Configurations: Basic information- Op-amp configurations – Open loop & Feedback Modes- Inverting and Non Inverting Modes

Characteristics: Ideal op-amp characteristics-Non ideal characteristics- DC characteristics – Input bias current-Input offset voltage- Input offset current-Thermal drift- AC characteristics- Frequency response- Frequency compensation-Slew rate.

UNIT II – OP-AMP IC741 APPLICATIONS (10 hours)

General applications: Summing amplifier - Difference amplifier - Voltage follower - Differentiator - Integrator –Sample and hold circuit-Log and Antilog amplifier-Multiplier- Instrumentation amplifier

Precision Op-amps: Definition- Applications- Precision rectifiers-Clipper-Clamper.

Waveform generators: Comparator-Applications-Schmitt Trigger-Square, triangular, sine wave generators.

UNIT III – ACTIVE FILTERS & PLL (9 hours)

RC Active filters: - Low pass High pass, Band pass, Band reject and Notch filter.

PLL: Phase locked loop – Functional diagram description-Applications – Frequency multiplier, Frequency divider, AM detector and FM demodulator.

UNIT IV– REGULATORS AND DATA CONVERTERS (9 hours)

Voltage regulators: IC Voltage regulators - Fixed voltage regulators, Adjustable voltage regulators –723 general purpose voltage regulator

ADC & DAC: - Digital to analog converters- Basic concepts & Types-weighted, R-2R ladder DAC. Analog to Digital converter- Basic concepts & Types-Flash, Successive approximation and Dual slope

UNIT V– SPECIAL IC APPLICATIONS (9 hours)

IC 555: Timer functional diagram-Monostable mode-Astable mode- Schmitt trigger –Applications

Advanced IC applications: ICL 8038 function generator IC –Opto - Coupler – Opto - Electronic ICs.

TEXT BOOKS

1. Roy Choudry and Shail Jain, "*Linear Integrated Circuits*", Wiley Eastern Ltd., 4th edition, 2010.
2. Gayakwad .R A,*"Op-amps & Linear Integrated Circuits"*, Prentice Hall of India, New Delhi, 2009.

REFERENCES

1. Millman, J. and Halkias, C.C., *"Integrated Electronics-Analog and Digital Systems"*,McGraw Hill, 2009.
2. Bakshi. U A A. V Bakshi, A. P Godse, *"Linear IC's and applications",* Technical Publications, Pune , 2010.
3. Maheswari,. L K M. M.S. Anand , *" Analog Electronics",* PHI , 2008.
4. Sergio Franco,' "*Design with operational amplifiers and Analog Integrated circuits"*,Tata McGraw Hill 3rd Edition 2007.
5. Robert F.Coughlin, Fredrick F.Driscoll, "*Op-amp and Linear ICs",* Pearson Education, 4th edition, 2002 / PHI.

<table>
<tr><th colspan="13">EE1014- LINEAR INTEGRATED CIRCUITS</th></tr>
<tr><td colspan="2">Course designed by</td><td colspan="11">Department of Electrical and Electronics Engineering</td></tr>
<tr><td rowspan="2">1.</td><td rowspan="2">Student Outcome</td><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td><td>g</td><td>h</td><td>i</td><td>j</td><td>k</td></tr>
<tr><td>x</td><td></td><td>x</td><td></td><td>x</td><td></td><td></td><td></td><td></td><td>x</td><td></td></tr>
<tr><td>2.</td><td>Mapping of instructional objectives with student outcome</td><td>1,2</td><td></td><td>3,4</td><td></td><td>1, 2</td><td></td><td></td><td></td><td></td><td>1-4</td><td></td></tr>
<tr><td rowspan="2">3.</td><td rowspan="2">Category</td><td colspan="2">General (G)</td><td colspan="3">Basic Sciences (B)</td><td colspan="4">Engineering Sciences and Technical Arts (E)</td><td colspan="2">Professional Subjects (P)</td></tr>
<tr><td colspan="2"></td><td colspan="3"></td><td colspan="4"></td><td colspan="2">x</td></tr>
<tr><td rowspan="2">4.</td><td rowspan="2">Broad Area</td><td colspan="2">Electrical Machines</td><td colspan="3">Circuits & Systems</td><td colspan="2">Electronics</td><td colspan="2">Power Systems</td><td colspan="2">Intelligent Systems</td></tr>
<tr><td colspan="2">--</td><td colspan="3">x</td><td colspan="2">x</td><td colspan="2">--</td><td colspan="2">--</td></tr>
<tr><td>5.</td><td>Approval</td><td colspan="11">23rd meeting of Academic Council, May 2013</td></tr>
</table>

	TRANSMISSION AND DISTRIBUTION SYSTEMS	L	T	P	C
EE1015	Total Contact Hours - 45	3	0	0	3
	Prerequisite				
	EE1005-Electro Magnetic Theory				

PURPOSE

To enrich the students with the fair knowledge of distribution systems, transmission line parameters, cables and insulators and also the recent trends in power Transmission and Distribution Systems.

INSTRUCTIONAL OBJECTIVES

1.	To understand the various types of transmission and distribution systems
2.	To analyze the performance of transmission lines.
3.	To understand the types and constructional features of cables and insulation.
4.	To know about the transmission and distribution Substation design.
5.	To know about IE rules for transmission and distribution systems

UNIT I – INTRODUCTION (8 hours)

Structure of electric power systems – one line diagram – Two wire DC, AC single phase and three phase systems- Recent Trends in transmission systems, comparison of EHVAC and HVDC systems. Economic distance for HVDC – terminal equipment for HVDC systems-Introduction to FACTS technology

UNIT II - TRANSMISSION LINE PARAMETERS (9 hours)

Resistance, inductance and capacitance of single phase transmission lines – stranded and bundled conductors – symmetrical and unsymmetrical spacing – transposition of conductors– Double circuit line Application of self and mutual GMD – Skin and Proximity effect –Inductive interference with neighbouring circuits – Corona loss.

UNIT III – PERFORMANCE OF TRANSMISSION LINES (10 hours)

Equivalent circuits for short, medium and long lines – attenuation constant, phase constant, surge impedance – transmission efficiency and voltage regulation – Real and reactive power flows in lines –power angle diagram – power circle diagrams for receiving and sending end, limiting factors for transmission line loadability, voltage control of lines by: shunt & series compensation – Ferranti effect.

UNIT IV– CABLES AND INSULATORS (9 hours)

Underground cables:

Constructional features of LT and HT cables – Insulation resistance –Dielectric and grading – Capacitance and inter – sheath grading – Thermal characteristics.

Insulators:

Types of insulators for overhead lines – Voltage distribution in insulator string and grading string, efficiency – Methods of improving string efficiency.

UNIT V -MECHANICAL DESIGN OF TRANSMISSION LINE AND DISTRIBUTION SYSTEMS (9 hours)

Stress and Sag calculations – effect of wind and ice – supports at different levels - Types of distribution system – Radial and Ring main system. Current and voltage calculation in distributors with concentrated and distributed loads-Kelvin's law for the design of feeders and its limitations - Substation design-Types of Substation- Bus-bar Arrangement- Substation Bus Schemes-Substation Location-Substation Equipments - IE rules - Various voltage levels of transmission and distribution systems - Indian grid scenario

TEXT BOOKS

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

REFERENCES

1. Luces M. Fualkenberry, Walter Coffer, "*Electrical Power Distribution and Transmission*", Pearson Education, 1996.
2. Despande.M.V, "*Electrical Power Systems Design"* , Tata McGraw Hill PublishingCompany, New Delhi, 1990.
3. Stevenson.W.L., "*Elements of Power System Analysis*", McGraw Hill, New Delhi, 1999
4. Nagarath.I.J. & Kothari.D.P., "*Modern Power System Analysis",* Tata McGraw Hill Publishing Company, New Delhi 1990.
5. Central Electricity Authority (CEA), "*Guidelines for Transmission System Planning"*, New Delhi.
6. Singh.S.N, "*Electric Power Generation, Transmission and Distribution"*, Prentice Hall of India Pvt. Ltd, New Delhi, 2002.

<table>
<tr><th colspan="13">EE1015TRANSMISSION AND DISTRIBUTION SYSTEMS</th></tr>
<tr><td colspan="2">Course designed by</td><td colspan="11">Department of Electrical and Electronics Engineering</td></tr>
<tr><td rowspan="2">1.</td><td rowspan="2">Student Outcome</td><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td><td>g</td><td>h</td><td>i</td><td>j</td><td>k</td></tr>
<tr><td>x</td><td></td><td></td><td></td><td>x</td><td></td><td></td><td>x</td><td></td><td></td><td></td></tr>
<tr><td>2.</td><td>Mapping of instructional objectives with student outcome</td><td colspan="2">1,2</td><td colspan="2"></td><td colspan="2">4,5</td><td colspan="2"></td><td colspan="2">1-5</td><td colspan="2"></td></tr>
<tr><td rowspan="2">3.</td><td rowspan="2">Category</td><td colspan="3">General (G)</td><td colspan="3">Basic Sciences (B)</td><td colspan="4">Engineering Sciences and Technical Arts (E)</td><td colspan="2">Professional Subjects (P)</td></tr>
<tr><td colspan="3">--</td><td colspan="3">--</td><td colspan="4">--</td><td colspan="2">x</td></tr>
<tr><td rowspan="2">4.</td><td rowspan="2">Broad Area</td><td colspan="3">Electrical Machines</td><td colspan="3">Circuits & Systems</td><td colspan="2">Electronics</td><td colspan="2">Power Systems</td><td colspan="2">Intelligent Systems</td></tr>
<tr><td colspan="3">--</td><td colspan="3">x</td><td colspan="2">--</td><td colspan="2">x</td><td colspan="2">--</td></tr>
<tr><td>5.</td><td>Approval</td><td colspan="11">23rd meeting of Academic Council, May 2013</td></tr>
</table>

EE1016	ELECTRICAL MACHINES LABORATORY - II	L	T	P	C
	Total Contact Hours - 30	0	0	3	2
	Prerequisite				
	Nil				

PURPOSE

To give students a fair knowledge of testing different types of AC machines

INSTRUCTIONAL OBJECTIVES

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

1. Understand the characteristics and performance of AC machines.
2. Gain knowledge about speed control techniques of induction machines.

LIST OF EXPERIMENTS

1. Voltage regulation of alternators
2. Determination of X_d and X_q
3. Determination of positive, Negative and Zero sequence reactance of synchronous machines
4. Synchronization and parallel operation of alternators
5. Determination of V curves
6. Power angle characteristic of synchronous machine.
7. Circle diagram of induction motor
8. Load test on 3-phase induction motor
9. Load test on 1-phase induction motor
10. Speed control of squirrel cage induction motor by variable frequency
11. Rotor Rheostat speed control of slip ring induction motor
12. Study of speed control of induction motor by injecting emf in the rotor circuit.

REFERENCES

1. Laboratory Manual.

EE1016ELECTRICAL MACHINES LABORATORY - II												
Course designed by		Department of Electrical and Electronics Engineering										
1.	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
		x	x			x						
2.	Mapping of instructional objectives with student outcome	1,2	1,2			1,2						
3.	Category	General (G)	Basic Sciences (B)			Engineering Sciences and Technical Arts (E)					Professional Subjects (P)	
		--	--			--					x	
4.	Broad Area	Electrical Machines	Circuits & Systems			Electronics		Power Systems			Intelligent Systems	
		x	--			--		--			--	
5.	Approval	23rd meeting of Academic Council, May 2013										

	MEASUREMENT AND CONTROL SYSTEM LABORATORY	L	T	P	C
EE1017	Total Contact Hours	0	0	2	1
	Prerequisite				
	Nil				

PURPOSE

To acquire skills on using different measuring devices and mathematical modeling of machines and use of control system components

INSTRUCTIONAL OBJECTIVES

1.	To Understand the operation of DC and AC bridges
2.	To Calibrate the different types of meters and special type of instruments
3.	Simulation of various machines, controllers and stability analysis using MATLAB software.

LIST OF EXPERIMENTS

1. Measurement of resistance
2. Measurement of inductance & capacitance
3. Calibration of single phase energy meter
4. Calibration of three phase energy motor
5. Measurement of power factor
6. Study of displacement and pressure transducers.
7. Transfer function of armature controlled and field controlled DC Motor.
8. Transfer function of DC and AC servomotor.
9. Design and implementation of Lag and lead compensator.
10. Design and implementation of P, PI, PD, PID controllers.
11. Digital simulation of the above controllers using MATLAB software.
12. Stability analysis of a second order system using MATLAB software.

REFERENCES

1 Laboratory Manual

EE1017 MEASUREMENTS AND CONTROL SYSTEM LABORATORY												
Course designed by		**Department of Electrical and Electronics Engineering**										
1.	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
		x	x			x						x
2.	Mapping of instructional objectives with student outcome	1	3			2						3
3.	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts (E)					Professional Subjects (P)	
		--		--		--					x	
4.	Broad Area	Electrical Machines		Circuits & Systems		Electronics		Power Systems			Intelligent Systems	
		x		x		--		--			--	
5.	Approval	23rd meeting of Academic Council, May 2013										

SEMESTER V

PD1005	**APTITUDE-III**	**L**	**T**	**P**	**C**
	Total Contact Hours - 30	**1**	**0**	**1**	**1**
	Prerequisite				
	Nil				

PURPOSE	
To enhance holistic development of students and improve their employability skills.	
INSTRUCTIONAL OBJECTIVES	
1.	Understand the importance of effective communication in the workplace.
2.	Enhance presentation skills – Technical or general in nature.
3.	Improve employability scope through Mock GD, Interview

UNIT I **(6 hours)**
Video Profile

UNIT II **(6 hours)**
Tech Talk / Area of Interest / Extempore / Company Profile

UNIT III **(6 hours)**
Curriculum Vitae

UNIT IV **(6 hours)**
Mock Interview

UNIT V **(6 hours)**
Group Discussion / Case Study

ASSESSMENT

1. Objective type – Paper based / Online – Time based test
2. 50% marks based on test, 50 % based on Continuous Communication assessment

REFERENCES

1. Bovee Courtland and Throill John, *Business Communication Essentials: A skills-Based Approach to Vital Business English*. Pearson Education Inc., 2011.
2. Dhanavel.S.P, *English & Communication Skills for Students of Science and Engineering*. Orient Black Swan, 2009.
3. Rizvi M. Ashraf *Effective Technical Communication*, Tata McGraw-Hill Publishing Company Limited, 2006.

<table>
<tr><th colspan="13">PD1005 – APTITUDE-III</th></tr>
<tr><td colspan="2">Course designed by</td><td colspan="11">Career Development Centre</td></tr>
<tr><td rowspan="2">1.</td><td rowspan="2">Student Outcome</td><td>a</td><td>b</td><td>c</td><td>D</td><td>e</td><td>f</td><td>g</td><td>h</td><td>i</td><td>j</td><td>k</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td>X</td><td></td><td>X</td><td>X</td><td></td></tr>
<tr><td>2.</td><td>Mapping of instructional objectives with student outcome</td><td></td><td></td><td></td><td></td><td></td><td></td><td>1,2,3</td><td></td><td>1,2</td><td></td><td>2,3</td></tr>
<tr><td rowspan="2">3.</td><td rowspan="2">Category</td><td colspan="2">General (G)</td><td colspan="3">Basic Sciences (B)</td><td colspan="4">Engineering Sciences and Technical Arts (E)</td><td colspan="2">Professional Subjects (P)</td></tr>
<tr><td colspan="2">x</td><td colspan="3"></td><td colspan="4"></td><td colspan="2"></td></tr>
<tr><td>4.</td><td>Approval</td><td colspan="11">23rd meeting of Academic Council, May 2013</td></tr>
</table>

	DISCRETE MATHEMATICS	L	T	P	C
MA1015	Total Contact Hours - 60	**4**	**0**	**0**	**4**
	(Common to CSE, SWE, ECE,TCE & EEE)				

PURPOSE

To impart analytical ability to describe, analyze and solving mathematical problems as applied to the respective branches of Engineering in a logical and systematic fashion.

INSTRUCTIONAL OBJECTIVES

1.	To understand Logic and mathematical reasoning and to count /enumerate objects in a systematic way. To understand Mathematical induction and recursion.
2.	To understand Set theory, relations and functions and to Read, understand and construct mathematical arguments.
3.	To understand Recurrence Relation, Generating functions and Algebraic Systems and their applications in coding theory - Group codes.
4.	To understand to apply graph theory to solve real-world problems like traveling salesman problem and networks and the maximum flow problem
5.	To understand Boolean algebra and its application to switching theory. To understand grammars, finite state machines and Turing Machines

UNIT I - MATHEMATICAL LOGIC (**12 Hours)**

Propositions and Logical operators - Truth tables and propositions generated by a set - Equivalence and Implication - Tautologies - Laws of logic - Proofs in Propositional calculus - Direct proofs - Conditional conclusions - Indirect proofs - Mathematical Induction - The existential and universal quantifiers - Predicate calculus including theory of inference.

UNIT II - SET THEORY (**12 Hours)**

Laws of Set theory - Partition of a set - The duality principle - Relations – Properties - Equivalence relation and partial order relation-poset-Graphs of relations - Hasse diagram - Matrices of relations - Closure operations on relations - Warshall's algorithm - Functions – Combinatorics - Pigeonhole Principle – Generalized Pigeon hole principle.

UNIT III- RECURRENCE RELATION & ALGEBRAIC SYSTEMS (**12 Hours)**

Recurrence relations - Solving a recurrence relation – Homogeneous and Non-homogeneous Recurrence relations - Formation of Recurrence relations obtained from solutions - Generating functions - Solution of a recurrence relation using generating functions - Groups – Properties - Cyclic groups and subgroups – Properties – Cosets – Lagrange's Theorem - Normal subgroups – Group Homomorphism.

UNIT IV- GRAPH THEORY (**12 Hours)**

Basic concepts - Basic Definitions – Some Special Graphs – Matrix Representation of Graphs -–- Paths and circuits - Eulerian and Hamiltonian Graphs – connected graphs - Trees - Spanning Trees - Rooted trees - Binary Trees - Kruskal's algorithm - Traversals of Binary trees.

UNIT V- BOOLEAN ALGEBRA & FORMAL LANGUAGES (**12 Hours)**

Boolean algebra - Application of Boolean Algebra to switching theory. Languages - Recognition and generation - Phase structure grammars and languages – Finite state Machine - Recognition in regular languages.

TEXT BOOKS

1. Alan Doerr and Kenneth Levasseur, "*Applied Discrete Structures for Computer Science*", Galgotia Publications (P) Ltd, 1992.
2. Tremblay J. P. and Manohar R., "*Discrete Mathematical Structures with applications to Computer Science*", Tata Mc Graw Hill Publishing Co., 35th edition, 2008.

REFERENCES

1. Sundaresan.V, Ganapathy Subramanian.K.S. and Ganesan.K, "*Discrete Mathematics*", New Revised Edition, A. R. Publications, 2001.
2. Kolman and Busby, "*Discrete Mathematical Structures for Computer Science*", Prentice Hall, 3rd edition, 1997.
3. Kenneth H.Rosen, "*Discrete Mathematics and its Application*", Fifth edition, Tata McGraw-Hill Publishing company PVT .Ltd., New Delhi, 2003.
4. Lipschutz Seymour, Marc Lars Lipson, "*Discrete Mathematics*", Mc Graw Hill Inc., 1992.
5. Liu.C.L, "*Elements of Discrete Mathematics*", 2nd Edition, McGraw Hill Publications, 1985.

MA1015 DISCRETE MATHEMATICS												
Course designed by		**Department of Mathematics**										
1.	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
		x				x						
2.	Mapping of instructional objectives with student outcome	1-5				1-5						
3.	Category	General (G)	Basic Sciences (B)			Engineering Sciences and Technical Arts (E)					Professional Subjects (P)	
		--	x			--					--	
4.	Approval	23rd meeting of Academic Council, May 2013										

	POWER ELECTRONICS	L	T	P	C
EE1018	Total Contact Hours - 45	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

To enable the students to gain a fair knowledge on characteristics and applications of power electronic devices and circuits.

INSTRUCTIONAL OBJECTIVES

1.	To learn the characteristics of different types of power electronic devices
2.	To understand the operation of controlled rectifiers
3.	To understand the operation of choppers
4.	To understand the operation of inverters
5.	To learn the operation of control circuits and applications of power electronic circuits

UNIT I - POWER ELECTRONIC DEVICES (09 hours)

Construction, Principle of operation - Static and dynamic characteristics of Power diodes, SCR, TRIAC, GTO, power BJT, power MOSFET and IGBT – Safe operating Area – protection circuits – series and parallel connections.

UNIT II - AC TO DC CONVERTERS (09 hours)

Single phase and three phase controlled rectifiers(half and full converters) with R, RL and RLE load –Estimation of RMS load voltage, RMS load current and input power factor - effect of source inductance and firing circuits – Single phase and three phase dual converters.

UNIT III - DC TO DC CONVERTERS (09 hours)

Principle of step up and step down operation – single quadrant DC chopper with R, RL and RLE load –Time ratio control – Estimation of average load voltage and load current for continuous current operation – two quadrant and four quadrant DC choppers. Voltage, current and load-commutated choppers.

UNIT IV - DC TO AC CONVERTERS & AC TO AC CONVERTERS (09 hours)

Inverters– Types – voltage source and current source inverters – single phase bridge inverters – three phase bridge inverters – PWM inverters - Series inverter control of AC output voltage – Harmonic reduction- AC Voltage regulator- Step up and step down cycloconverter -three phase to single phase and three phase to three phase cycloconverter

UNIT V - CONTROL CIRCUITS & APPLICATIONS (09 hours)

Functional requirements of the switching control circuits – generation of control signals for single phase AC to DC converters – Cosine wave crossing control, ramp comparator approach, Generation of timing pulses for DC choppers – Applications: UPS – HVDC systems – Tap changing of transformers

TEXT BOOKS

1. Rashid, M.H., "*Power Electronics - Circuits Devices and Applications*", Prentice Hall of India, 1995.
2. Sen .P C, "*Power Electronics*", Tata Mc Graw Hill Education, Twelfth Edition

REFERENCES

1. Bhimbra.P. S. *Power Electronics*", Khanna publishers, Fifth edition.
2. Singh.M.D and Kanchandani-"*Power Electronics*"-Tata McGraw-Hill & Hill Publication Company Ltd New Delhi-2002.
3. Joseph Vithayathil, "*Power Electronics*", Mc Graw Hill series in Electrical and Computer Engineering , USA., 1995.
4. Dubey.G.K, Doradia.S.R, Joshi, A. and Sinha.R.M, "*Thyristorised Power Controllers"*, Wiley Eastern Limited, 1986.
5. Lander.W, "*Power Electronics*", McGraw Hill and Company, Third Edition, 1993.
6. Loganathan Umanand, "*Power Electronics*", Wiley India Pvt. Limited, 2009.

EE1018 - POWER ELECTRONICS												
Course designed by		**Department of Electrical and Electronics Engineering**										
1.	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
		x				x			x		x	
2.	Mapping of instructional objectives with student outcome	1-5				2-4			2-5		3,4	
3.	Category	General (G)		Basic Sciences (B)			Engineering Sciences and Technical Arts (E)				Professional Subjects (P)	
		--		--			--				x	
4.	Broad Area	Electrical Machines		Circuits & Systems		Electronics			Power Systems		Intelligent Systems	
		--		x		x			--		--	
5.	Approval	23rd meeting of Academic Council, May 2013										

	POWER SYSTEM PROTECTION	L	T	P	C
EE1019	Total Contact Hours - 45	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

To introduce the students with basic concepts of Relays, Protection schemes, Switch gear and Modern trends in protection for protecting the power system equipments.

INSTRUCTIONAL OBJECTIVES

1.	To appreciate and understand scientific concepts underlying engineering and technological applications
2.	To apply the electrical concepts in solving engineering problems
3.	To educate the basic concepts and new developments in power system protection
4.	To emphasize the significance of protection for electrical equipments

UNIT I - INTRODUCTION TO PROTECTION SCHEME (9 hours)

Need for Protective systems - Nature and causes of Faults -Types of faults - Effect of faults - fault statistics - Evolution of protective relays - Zones of protection - Primary and Back -up Protection - Essential qualities of Protection - Classification of Protective schemes -Automatic reclosing - current transformer for Protection - potential transformer - summation transformer -phase - sequence current - segregating network - basic relay terminology

UNIT II - RELAYS (9 hours)

General considerations - sensing of faults - construction of electro-magnetic attraction and induction types relays - Buchholz and negative sequence relay - concept of reset, pick up, inverse time and definite time characteristics, over current, over voltage, directional, differential and distance relays on R-X diagram - Static Relays: Introduction, advantage and limitation of static relays, static over current, directional, distance and differential relays.

UNIT III - PROTECTION (9 hours)

Types & detection of faults and their effects, alternator protection scheme (stator, rotor, reverse power protection etc.) - Power transformer protection (external and internal faults protection), generator-transformer unit protection scheme, bus bar protection - Transmission line protection (current/time grading, distance), Pilot relaying schemes, power line carrier protection.

UNIT IV- SWITCHGEAR (9 hours)

Theory of current interruption- energy balance and recovery rate theory, arc quenching, recovery and restriking voltages - Types of circuit breakers. bulk oil and minimum oil, air break and air blast, sulphur hexafluoride (SF6) and vacuum circuit breakers - Rating selection and testing of circuit breakers/operating mechanisms - LT switchgear, HRC fuses, types construction and applications.

UNIT V- MODERN TRENDS IN PROTECTION (9 hours)

Electronic relays - static relays functional circuits: comparators, level detectors, logic and training circuits, microprocessor and computer based protection schemes - software development for protection, security and reliability.

TEXT BOOKS

1. Badriram & Vishwakarma, "*Power System Protection*",Tata McGraw-Hill Education, 2011.
2. Paithankar Y. G.,S. R. Bhide., "*Fundamentals of power system protection*"PHI Learning Pvt. Ltd., 2004.

REFERENCES

1. The Elementary Council, "*Power System Protection*", Vol.1,2 &3, Peter PeregrinusLtd.Tata McGraw-Hill Education, 2010.
2. Ravindra Nath.B, and Chandar.M, "*Power systems protection and switchgear*",New age international (P) Ltd. 2005.
3. Rao Sunil.S, "*Switchgear and protection".* Khanna Publishers,1999.
4. Paithankar.Y.G," *Transmission Network Protection: Theory and Practice*", MarcelDeicker, Inc.1998.
5. Van.A.R & Warrington.C, "*Protective Relays: Their Theory and Practice*", Vol 1 & Vol 2, Chapman and Hall. Springer 1977.
6. GEC Measurements, "*Protective Relays: Application Guide*", GEC Measurements.
7. *"J & P Switchgear handbook*" Newnes-Butterworths, 1972.

EE1019 POWER SYSTEM PROTECTION												
Course designed by		**Department of Electrical and Electronics Engineering**										
1.	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
		x				x			x		x	
2.	Mapping of instructional objectives with student outcome	1-4				2			4		4	
3.	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts (E)					Professional Subjects (P)	
		--		--		--					x	
4.	Broad Area	Electrical Machines		Circuits & Systems		Electronics		Power Systems			Intelligent Systems	
		--		--		--		x			--	
5.	Approval	23rd meeting of Academic Council, May 2013										

	DESIGN OF ELECTRICAL APPARATUS	L	T	P	C
EE1020	Total Contact Hours - 45	3	0	0	3
	Prerequisite				
	EE1004-Electrical Machines-I EE1012- Electrical Machines-II				

PURPOSE

To enable the students gain fair knowledge on design of magnetic circuits and electrical machines.

INSTRUCTIONAL OBJECTIVES

1.	Understand basics of design considerations for rotating and static electrical machines
2.	Understand the design procedure for various parts of DC and AC rotating machines
3.	Gain the knowledge in design of Transformer

UNIT I – BASIC CONSIDERATION IN DESIGN (9 hours)

Major considerations in Electrical Machine Design - Electrical Engineering Materials - Design limitations and specifications - Heat dissipation-Internal temperature - Temperature gradient in cores and slots - Thermal resistivity of winding

UNIT II – DESIGN OF DC MACHINES (9 hours)

Magnetic circuit calculations - Gap contraction factor-Net length of Iron - Real and Apparent flux densities - Output equation of DC machine-Choice of specific loadings - Selection of number of poles - Design of Armature - Design of Commutator and brushes

UNIT III – DESIGN OF TRANSFORMER (9 hours)

Output Equations – Main Dimensions - KVA output for single and three phase transformers – Window space factor – Core area factor-Overall dimensions – Design of core and windings-Design of tank with cooling tubes

UNIT IV – DESIGN OF THREE PHASE INDUCTION MOTORS (9 hours)

Output equation for induction motor – Main dimensions - Choice of specific loadings- Length of air gap- Rules for selecting rotor slots of squirrel cage machines - Stator Design - Design of rotor bars & slots – Design of end rings - Design of wound rotor

UNIT V – DESIGN OF SYNCHRONOUS MACHINES (9 hours)

Pole construction – run away speed – output equation, choice of specific loading - short circuit ratio - shape of pole face - Design of armature – Armature parameters-Estimation of air gap length– Design of field system- Design of turbo alternators

TEXTBOOKS

1. Sawhney.A.K, "*A Course in Electrical Machine Design*", Dhanpat Rai & Sons, New Delhi, 2005.
2. Say.M.G, "*The Performance and Design of Alternating current Machines",* Isaac Pitman & sons Ltd., 1995.

REFERENCES

1. Sen.S.K, "*Principles of Electrical Machine Designs with Computer Programmes*", Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi, 2009.
2. Shanmugasundaram.A, Gangadharan.G, Palani.R, *"Electrical Machine Design Data Book",* New Age Intenational Pvt. Ltd., Reprint 2007.
3. Rai.H.M, "*Electrical Machine Design",* Sathiya Prakashan Publications, Third edition, 2004.
4. Clayton.A.E, "*Performance & Design of Direct current Machines*", English Language Book society & Sri Isaac Pitman & sons Ltd., London 1995.

<table>
<tr><th colspan="13">EE1020 DESIGN OF ELECTRICAL APPARATUS</th></tr>
<tr><td colspan="2">Course designed by</td><td colspan="11">Department of Electrical and Electronics Engineering</td></tr>
<tr><td rowspan="2">1.</td><td rowspan="2">Student Outcome</td><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td><td>g</td><td>h</td><td>i</td><td>j</td><td>k</td></tr>
<tr><td>x</td><td></td><td>x</td><td></td><td>x</td><td></td><td></td><td>x</td><td></td><td>x</td><td></td></tr>
<tr><td>2.</td><td>Mapping of instructional objectives with student outcome</td><td>1-3</td><td></td><td>1-3</td><td></td><td>1-3</td><td></td><td></td><td>1-3</td><td></td><td>1-3</td><td></td></tr>
<tr><td rowspan="2">3.</td><td rowspan="2">Category</td><td colspan="2">General (G)</td><td colspan="3">Basic Sciences (B)</td><td colspan="4">Engineering Sciences and Technical Arts (E)</td><td colspan="2">Professional Subjects (P)</td></tr>
<tr><td colspan="2">--</td><td colspan="3">--</td><td colspan="4">--</td><td colspan="2">x</td></tr>
<tr><td rowspan="2">4.</td><td rowspan="2">Broad Area</td><td colspan="2">Electrical Machines</td><td colspan="3">Circuits & Systems</td><td colspan="2">Electronics</td><td colspan="2">Power Systems</td><td colspan="2">Intelligent Systems</td></tr>
<tr><td colspan="2">x</td><td colspan="3">--</td><td colspan="2">--</td><td colspan="2">--</td><td colspan="2">--</td></tr>
<tr><td>5.</td><td>Approval</td><td colspan="11">23rd meeting of Academic Council, May 2013</td></tr>
</table>

EE1021	INTEGRATED CIRCUITS LABORATORY	L	T	P	C
	Total Contact Hours - 45	0	0	3	2
	Prerequisite				
	EE1014-Linear Integrated Circuits				

PURPOSE

To acquire the skills of designing and testing analog integrated circuits

INSTRUCTIONAL OBJECTIVES

1. To enable the students to analyze and design various applications of Op-amps.
2. To enable the students to design and construct waveform generation circuits.

LIST OF EXPERIMENTS

1. Characteristics of IC741 Op- amp.
2. Applications of IC741 Op-amp
3. Waveform generation using IC741 Op-amp.
4. IC555 timer applications
5. Design of RC active filters
6. Study of DAC & ADC
7. IC723 voltage regulator characteristics
8. Simulation of IC circuits using PSPICE/SIMULINK

REFERENCES

1. Laboratory Manual

EE1021 INTEGRATED CIRCUITS LABORATORY												
Course designed by		**Department of Electrical and Electronics Engineering**										
1.	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
		x	x	x		x						x
2.	Mapping of instructional objectives with student outcome	1,2	1,2	1,2		1,2						1,2
3.	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts (E)						Professional Subjects (P)
		--		--		--						x
4.	Broad Area	Electrical Machines		Circuits & Systems		Electronics		Power Systems				Intelligent Systems
		--		x		x		--				--
5.	Approval	23rd meeting of Academic Council, May 2013										

EE1022	POWER ELECTRONICS LABORATORY	L	T	P	C
	Total Contact Hours - 45	0	0	3	2
	Prerequisite				
	Nil				

PURPOSE

To make the students gain comprehensive knowledge on power electronics devices and their applications.

INSTRUCTIONAL OBJECTIVES

1.	To design and construct converter and inverter circuits using power electronic devices.
2.	To design and construct commutation circuits.
3.	To perform the speed control of machines using various power electronic circuits.

LIST OF EXPERIMENTS

1. R, RC & UJT Triggering circuits
2. Single phase Semi & Full converter
3. Single phase AC voltage controller using Triac and SCRs
4. Single phase series inverter (Basic)
5. Single phase Parallel inverter
6. Single phase Mc Murray inverter
7. Voltage and Current commutated choppers
8. Speed control of DC shunt motor (using Rectifier & Chopper)
9. Speed control of TPIM using PWM inverter
10. Single phase Cyclo-converter
11. Fly back converter(SMPS)
12. Sepic converter & Cuk converter
13. Single phase multi-level inverter

REFERENCES

1. Laboratory Manual

EE1022 - POWER ELECTRONICS LABORATORY												
Course designed by		**Department of Electrical and Electronics Engineering**										
1.	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
		x	x	x		x					x	
2.	Mapping of instructional objectives with student outcome	1-3	1,2	1-3		1-3					3	

3.	Category	General (G)	Basic Sciences (B)	Engineering Sciences and Technical Arts (E)	Professional Subjects (P)
		--	--	--	x

4.	Broad Area	Electrical Machines	Circuits & Systems	Electronics	Power Systems	Intelligent Systems
		x	x	x	--	--
5.	Approval	23rd meeting of Academic Council, May 2013				

EE1047	INDUSTRIAL TRAINING I (Training to be undergone after VI semester)	L	T	P	C
	Prerequisite	0	0	1	1
	Nil				

PURPOSE

To provide hands-on experience at industry or a company where Electrical and Electronics engineering projects are carried out.

INSTRUCTIONAL OBJECTIVES

1.	Students have to undergo three – week practical training in Electrical and Electronics Engineering related project at industry or a company so that they become aware of the practical application of theoretical concepts studied in the class rooms.

Students have to undergo three-week practical training in Electrical and Electronics Engineering related project atindustry or a company of their choice but with the approval of the department. At the end of the training student will submit a report as per the prescribed format to the department.

Assessment process

This course is mandatory and a student has to pass the course to become eligible for the award of degree. The student shall make a presentation before a committee constituted by the department which will assess the student based on the report submitted and the presentation made. Marks will be awarded out of 100 and appropriate grades assigned as per the regulations.

EE1047 INDUSTRIAL TRAINING I												
Course designed by		Department of Electrical and Electronics Engineering										
1.	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
					x	x	x	x	x	x	x	
2.	Mapping of instructional objectives with student outcome				1	1	1	1	1	1	1	
3.	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts (E)					Professional Subjects (P)	
		--		--		--					x	
4.	Broad Area	Electrical Machines		Circuits & Systems		Electronics		Power Systems			Intelligent Systems	
		x		x		x		x			x	
5.	Approval	23rd meeting of Academic Council, May 2013										

SEMESTER VI

PD1006	**APTITUDE-IV**	**L**	**T**	**P**	**C**
	Total Contact Hours - 30	**1**	**0**	**1**	**1**
	Prerequisite				
	Nil				

PURPOSE	
To enhance holistic development of students and improve their employability skills.	
INSTRUCTIONAL OBJECTIVES	
1.	To improve aptitude, problem solving skills and reasoning ability of the student.
2.	To collectively solve problems in teams & group.

UNIT I - ARITHMETIC - II **(6 hours)**
Ratios & Proportions, Averages, Mixtures & Solutions

UNIT II - ARITHMETIC – III **(6 hours)**
Time, Speed & Distance, Time & Work

UNIT III - ALGEBRA – II **(6 hours)**
Quadratic Equations, Linear equations & inequalities

UNITIV– GEOMETRY **(6 hours)**
2D Geometry, Trigonometry, Mensuration

UNIT V – MODERN MATHEMATICS – II **(6 hours)**
Sets & Functions, Sequences & Series, Data Interpretation, Data Sufficiency

ASSESSMENT
1. Objective type – Paper based / Online – Time based test

REFERENCES

1. Agarwal.R.S – *Quantitative Aptitude for Competitive Examinations,* S Chand Limited 2011.
2. Abhijit Guha*, Quantitative Aptitude for Competitive Examinations,*Tata Mcgraw Hill, 3rd Edition.
3. Edgar Thrope*, Test Of Reasoning For Competitive Examinations,* Tata Mcgraw Hill, 4th Edition.
4. *Other material related to quantitative aptitude*

PD1006 - APTITUDE-IV												
Course designed by		**Career Development Centre**										
1.	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
		X			X							
2.	Mapping of instructional objectives with student outcome	1			2							
3.	Category	General (G)	Basic Sciences (B)			Engineering Sciences and Technical Arts (E)					Professional Subjects (P)	
		x										
4.	Approval	23rd meeting of Academic Council, May 2013										

	PROBABILITY AND STATISTICS	L	T	P	C
MA 1036	Total Contact Hours - 45	3	0	0	3
	Prerequisite				
	NIL				

PURPOSE

To develop an understanding of the methods of probability and statistics which are used to model engineering problems.

INSTRUCTIONAL OBJECTIVES

1.	To apply the basic rules and theorems of probability theory such as Baye's Theorem, to determine probabilities that help to solve engineering problems and to determine the expectation and variance of a random variable from its distribution
2.	To appropriately choose, define and/or derive probability distributions such as the Binomial, Poisson and Normal etc to model and solve engineering problems.
3.	To learn how to formulate and test hypotheses about means, variances and proportions and to draw conclusions based on the results of statistical tests.
4.	To understand how regression analysis can be used to develop an equation that estimates how two variables are related and how the analysis of variance procedure can be used to determine if means of more than two populations are equal.
5.	To understand the fundamentals of quality control and the methods used to control systems and processes

UNIT I - PROBABILITY AND RANDOM VARIABLES (9 hours)

Sample space, Random experiments and random variables, Concept of probability, Conditional probability, Addition and multiplication laws, Baye's theorem - One dimensional Random Variables- Expectation, Variance, Covariance, and Moments.

UNIT II - THEORETICAL DISTRIBUTIONS (9 hours)

Discrete: Binomial, Poisson, Geometric, Negative Binomial; Continuous: Exponential and Normal Distributions, their properties and applications to industrial problems.

UNIT III - TESTING OF HYPOTHESIS (9 hours)

Introduction – Large sample tests based on normal distribution - Test for single mean, difference between means, proportion, difference between proportions - Small sample tests based on t, F distributions- Test for single mean, difference between means, standard deviation, difference between standard deviation - Chisquare test for goodness of fit - Independence of attributes.

UNIT IV - CORRELATION, REGRESSION AND ANALYSIS OF VARIANCE (9 hours)

Pearson's Correlation coefficient- Spearman's Rank correlation coefficient. Regression-Concepts – Regression lines – Multiple correlation and regression. Analysis of Variance- One-way classification and two way classification.

UNIT V - STATISTICAL QUALITY CONTROL (9 hours)

Classification of Partial differential equations of the second order - Difference quotients – Laplace's equation and its solution by Liebmann's process – Solution of Poisson's equation – Solutions of Parabolic and Hyperbolic equations.

TEXT BOOKS

1. Gupta.S.C and Kapoor.V.K, Fundamentals of Mathematical Statistics, 11th extensively revised edition, Sultan Chand & Sons, 2007. 2. Veerarajan .T, "Probability, Statistics and Random Processes", Tata McGraw hill
2. Veerarajan .T, "Probability, Statistics and Random Processes", Tata McGraw Hill,3rd edition, 2008

REFERENCES

1. Dr.Ross.S, "A first Course in Probability", Fifth Edition, Pearson Education, Delhi 2002.
2. Johnson.R.A, "Miller & Freund's Probability and Statistics for Engineers", Sixth Edition, Pearson Education, Delhi, 2000.
3. Walpole.R.E, Myers.R.H, Myers,R.S.L and Ye.K, "Probability and Statistics for Engineers and Scientists", Seventh Edition, Pearsons Education, Delhi, 2002.
4. Lipschutz.S and Schiller.J, "Schaum's outlines - Introduction to Probability and Statistics", McGraw-Hill, New Delhi, 1998.

MA 1036 - PROBABILITY AND STATISTICS												
Course Designed by		**Department of Mathematics**										
1.	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
		x				x						
2.	Mapping of instructional objectives with student outcome	1-5				1-5						
3.	Category	General (G)	Basic Sciences (B)			Engineering Sciences and Technical Arts (E)					Professional Subjects (P)	
		--	x			--					--	
4.	Approval	23rd Meeting of Academic Council, May 2013										

EE1023	DIGITAL SIGNAL PROCESSING	L	T	P	C
	Total Contact Hours – 45	3	0	0	3
	Prerequisite				
	NIL				

PURPOSE

To introduce the concept of analyzing discrete time signals & systems in the time and frequency domain.

INSTRUCTIONAL OBJECTIVES

1.	To classify signals and systems and its mathematical representation.
2.	To analyze the discrete time systems.
3.	To study various transformation techniques and computation.
4.	To study about filters and design for digital implementation.
5.	To study about a programmable digital signal processor and quantization effects.

UNIT I- INTRODUCTION (9 hours)

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 and analog to digital conversion.

UNIT II - DISCRETE TIME SYSTEM ANALYSIS (9 hours)

Z-transform and its properties, inverse z-transforms; difference equation – Solution by z-transform, application to discrete systems - Stability analysis, frequency response – Convolution –, Analysis of L TI Systems in z-domain. Introduction to two dimensional z-transform.

UNIT III - DISCRETE FOURIER TRANSFORM & COMPUTATION (9 hours)

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 hours)

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 hours)

Architecture – Features – Addressing Formats – Functional modes – Instruction Set– Quantization error-Finite word length effects in designing digital filters.

TEXT BOOKS

1. Proakis.J.G. and Manolakis.D.G, "*Digital Signal Processing Principles, Algorithms and Applications*", Pearson Education, New Delhi, 2009 / PHI
2. Alan V. Oppenheim, Ronald W. Schafer and John R. Buck, "*Discrete – Time Signal Processing*", Pearson Education, New Delhi, 2007.

REFERENCES

1. Mitra.S.K, "*Digital Signal Processing – A Computer Based Approach*", Tata McGraw Hill, New Delhi, 2001.
2. Venkataramani.B, Bhaskar.M, "*Digital Signal Processors, Architecture, Programming and Applications*", Tata McGraw Hill, New Delhi, 2003.
3. Salivahanan.S, Vallavaraj.A, Gnanapriya.C, "*Digital Signal Processing*", Tata McGraw Hill, New Delhi, 2005.
4. Steven W. Smith, "*The Scientist and Engineer's Guide to Digital Signal Processing*", Second Edition, California Technical Publishing San Diego, California.(www.dspguide.com)
5. Johny R. Johnson, "*Introduction to Digital Signal Processing"*, PHI, 2006.

<table>
<tr><th colspan="13">EE1023 DIGITAL SIGNAL PROCESSING</th></tr>
<tr><td colspan="2">Course designed by</td><td colspan="11">Department of Electrical and Electronics Engineering</td></tr>
<tr><td rowspan="2">1.</td><td rowspan="2">Student Outcome</td><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td><td>g</td><td>h</td><td>i</td><td>j</td><td>k</td></tr>
<tr><td>x</td><td></td><td>x</td><td></td><td>x</td><td></td><td></td><td>x</td><td></td><td>x</td><td></td></tr>
<tr><td>2.</td><td>Mapping of instructional objectives with student outcome</td><td>1,2</td><td></td><td>1-3</td><td></td><td>2,3</td><td></td><td></td><td>4</td><td></td><td>5</td><td></td></tr>
<tr><td rowspan="2">3.</td><td rowspan="2">Category</td><td colspan="2">General (G)</td><td colspan="3">Basic Sciences (B)</td><td colspan="4">Engineering Sciences and Technical Arts (E)</td><td colspan="2">Professional Subjects (P)</td></tr>
<tr><td colspan="2"></td><td colspan="3"></td><td colspan="4"></td><td colspan="2">x</td></tr>
<tr><td rowspan="2">4.</td><td rowspan="2">Broad Area</td><td colspan="2">Electrical Machines</td><td colspan="3">Circuits & Systems</td><td colspan="2">Electronics</td><td colspan="2">Power Systems</td><td colspan="2">Intelligent Systems</td></tr>
<tr><td colspan="2">--</td><td colspan="3">x</td><td colspan="2">x</td><td colspan="2">--</td><td colspan="2">--</td></tr>
<tr><td>5.</td><td>Approval</td><td colspan="11">23rd meeting of Academic Council, May 2013</td></tr>
</table>

EE1024	MICROPROCESSORS AND ICROCONTROLLERS	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

To gain knowledge in microprocessor architecture, programming and its various applications.

INSTRUCTIONAL OBJECTIVES

1.	To Gain knowledge the architecture of INTEL 8085, instruction sets, programming and interrupt structures.
2.	To Design microprocessor based systems along with I/O interfacing.
3.	To Understand the impact of microcontrollers in engineering applications.

UNIT I - INTRODUCTION (9 hours)

Evolution of Microprocessors, Microcontrollers and Computers, – Microprocessor based system design – need-steps, Advantages and limitations – organization of a microcomputer, Bus system – Decoders – Tri state logic – Interrupts – Memory devices: classifications and its interfacing – Data Transfer – Concepts, Methods – Parallel I/O interfacing – Serial I/O interfacing concepts – Use of SID and SOD lines – DMA method of transfer.

UNIT II - MICROPROCESSORS (9 hours)

Intel 8085, Z-80, 8086, 80186, Pentium Architecture – Functions of various blocks and signals – addressing modes – Program execution – Instruction set – Assemblers – Instruction Timing and status signals – Stack and subroutine, Pipelining concepts – Simple programs.

UNIT III - MICROCONTROLLERS (9 hours)

Role of microcontrollers – 8 bit microcontrollers – architecture of Intel 8031/8051/8751 –hardware description memory organization – addressing modes – overview of instruction set – simple programs.

UNIT IV - INTERFACING DEVICES (9 hours)

8255 programmable peripheral interface – 8257/8237 programmable DMA controller, 8279 keyboard/display interfacing – 8253/8254 – Programmable interval timer, Need of Interrupts – 8259 programmable interrupt controller.

UNIT V - APPLICATIONS **(9 hours)**

Stepper motor control – Speed control of DC motor – Waveform Generator – Frequency counter – Temperature measurement – Robotics.

TEXT BOOKS

1 Gaonkar.R.S, "*Microprocessor Architecture, Programming and Applications*", Wiley Eastern Limited, New Delhi, Fifth Edition, 1997.

1. Kenneth Ayala, "*Intel 8051 – Microcontrollers*", Prentice hall, Second Edition, 2005.

REFERENCES

1. Mazidi and Mazidi, "*8051 Microcontrollers*", Pearson Education India, 2006.
2. Mathur.A.P, "*Introduction to Microprocessors*", Tata McGraw Hill, India, Third Edition, 1995.
3. Peatman, "*Microcomputer Hardware*", McGraw Hill Book Company.,1995.
4. Douglas V. Hall, "*Microprocessor and Interfacing*", Tata McGraw Hill, 2006.
5. Ghosh and Sridhar.S.S, "*0000 to 8085*", Prentice Hall of India Pvt Ltd.,1995.
6. Leventhal.L.A, "*Introduction to Microprocessor, Software, Hardware, Programming*", Prentice Hall, India, 1987.

<table>
<tr><th colspan="13">EE1024 MICROPROCESSORS AND MICROCONTROLLERS</th></tr>
<tr><td colspan="2">Course designed by</td><td colspan="11">Department of Electrical and Electronics Engineering</td></tr>
<tr><td rowspan="2">1.</td><td rowspan="2">Student Outcome</td><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td><td>g</td><td>h</td><td>i</td><td>j</td><td>k</td></tr>
<tr><td>x</td><td></td><td>x</td><td></td><td>x</td><td></td><td></td><td>x</td><td></td><td>x</td><td>x</td></tr>
<tr><td>2.</td><td>Mapping of instructional objectives with student outcome</td><td>1</td><td></td><td>2</td><td></td><td>1,2</td><td></td><td></td><td>2,3</td><td></td><td>3</td><td>3</td></tr>
<tr><td rowspan="2">3.</td><td rowspan="2">Category</td><td colspan="2">General (G)</td><td colspan="2">Basic Sciences (B)</td><td colspan="4">Engineering Sciences and Technical Arts (E)</td><td colspan="2">Professional Subjects (P)</td></tr>
<tr><td colspan="2">--</td><td colspan="2">--</td><td colspan="4">--</td><td colspan="2">x</td></tr>
<tr><td rowspan="2">4.</td><td rowspan="2">Broad Area</td><td colspan="2">Electrical Machines</td><td colspan="2">Circuits & Systems</td><td colspan="2">Electronics</td><td colspan="2">Power Systems</td><td colspan="2">Intelligent Systems</td></tr>
<tr><td colspan="2">--</td><td colspan="2">x</td><td colspan="2">x</td><td colspan="2">--</td><td colspan="2">--</td></tr>
<tr><td>5.</td><td>Approval</td><td colspan="11">23rd meeting of Academic Council, May 2013</td></tr>
</table>

EE1025	POWER SYSTEM ANALYSIS	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

To enable the students to gain comprehensive knowledge on power system analysis problems.

INSTRUCTIONAL OBJECTIVES

1.	To develop mathematical model of a given power system.
2.	To perform power flow analysis using numerical techniques.
3.	To analyze the behavior of the power system under faulted condition.
4.	To study the stability status of power system under transient condition.
5.	To gain practical aspects on power system analysis problems.

UNIT I – POWER SYSTEM OVERVIEW (6 hours)

Power scenario in India, Power system components, Representation. Single line diagram, per unit quantities, p.u. impedance diagram, Network graph, Bus incidence matrix, Primitive parameters, Bus admittance matrix using singular method, Formation of bus admittance matrix of large power network, Representation of off nominal transformer

UNIT II – POWER FLOW ANALYSIS (10 hours)

Bus classification, Formulation of Power Flow problems, Power flow solution using Gauss Seidel method, Handling of Voltage controlled buses, Power Flow Solution by Newton Raphson method, Fast Decoupled Power Flow Solution.

UNIT III – SYMMETRICAL FAULT ANALYSIS (9 hours)

Symmetrical short circuit on Synchronous Machine, Bus Impedance matrix building algorithm, Symmetrical fault analysis through bus impedance matrix, Selection of circuit breaker, Fault level, Current limiting reactors.

UNIT IV– UNSYMMETRICAL FAULT ANALYSIS (10 hours)

Symmetrical components, Sequence impedance, Sequence networks, Analysis of unsymmetrical fault at generator terminals, Use of bus impedance matrix for analyzing unsymmetrical fault occurring at any point in a power system.

UNIT V– POWER SYSTEM STABILITY (10 hours)

Introduction to stability studies, Swing equation, Swing curve, Equal area criterion, Critical clearing angle and time, Modified Euler's method, Fourth order Runge Kutta method, Multi-machine transient stability.

TEXT BOOKS

1. John.J.Grainger, William D. Stevenson, "*Power System Analysis",* Tata Mc Graw Hill Publishing company, New Delhi, 2003.
2. Nagarath I.J. and Kothari D.P. "*Modern Power System Analysis*", Fourth Edition, Tata Mc Graw Hill Publishing company, New Delhi, 2011.

REFERENCES

1. Hadi Sadat, "*Power System Analysis"*, Tata Mc Graw Hill Publishing company, New Delhi, 2002.
2. Pai M.A. "*Computer Techniques in Power System Analysis*", Tata Mc Graw Hill Publishing Company, New Delhi, 2003.
3. Abhijit Chakrabarti and Sunita Halder, "*Power System Analysis Operation and Control",* PHI Learning Private Limited, New Delhi, 2011.
4. Arthur R and Vijay Vittal, "*Power Systems Analysis",* Dorling Kinderley (India) Private Limited, New Delhi, 2012.

<table>
<tr><td colspan="14">EE1025POWER SYSTEM ANALYSIS</td></tr>
<tr><td colspan="2">Course designed by</td><td colspan="12">Department of Electrical and Electronics Engineering</td></tr>
<tr><td rowspan="2">1.</td><td rowspan="2">Student Outcome</td><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td><td>g</td><td>h</td><td>i</td><td>j</td><td>k</td></tr>
<tr><td>x</td><td></td><td></td><td></td><td>x</td><td></td><td></td><td>x</td><td></td><td>x</td><td></td></tr>
<tr><td>2.</td><td>Mapping of instructional objectives with student outcome</td><td>1-4</td><td></td><td></td><td></td><td>1-4</td><td></td><td></td><td>2-4</td><td></td><td>2-5</td><td></td></tr>
<tr><td rowspan="2">3.</td><td rowspan="2">Category</td><td colspan="2">General (G)</td><td colspan="3">Basic Sciences (B)</td><td colspan="4">Engineering Sciences and Technical Arts (E)</td><td colspan="2">Professional Subjects (P)</td></tr>
<tr><td colspan="2">--</td><td colspan="3">--</td><td colspan="4">--</td><td colspan="2">x</td></tr>
<tr><td rowspan="2">4.</td><td rowspan="2">Broad Area</td><td colspan="2">Electrical Machines</td><td colspan="3">Circuits & Systems</td><td colspan="2">Electronics</td><td colspan="2">Power Systems</td><td colspan="2">Intelligent Systems</td></tr>
<tr><td colspan="2">--</td><td colspan="3">--</td><td colspan="2">--</td><td colspan="2">x</td><td colspan="2">--</td></tr>
<tr><td>5.</td><td>Approval</td><td colspan="12">23rd meeting of Academic Council, May 2013</td></tr>
</table>

	MICROPROCESSORS AND MICROCONTROLLERS LABORATORY	L	T	P	C
EE1026	Total Contact Hours - 45	0	0	3	2
	Prerequisite				
	Nil				

PURPOSE

To gain knowledge in programming microprocessor and to learn about various interfacing concepts.

INSTRUCTIONAL OBJECTIVES

1.	To program microprocessor for various operations
2.	To design microprocessor based interfacing systems.
3.	To understand the impact of microcontrollers in engineering applications.

LIST OF PROGRAMS

1. Arithmetic operations of 8/16 bit numbers
2. Sorting of numbers
3. Factorial of the given number
4. Code conversion
5. Study of monitor routines
6. Interfacing 8255 for Traffic light control.
7. Waveform Generator using 8253.
8. Study of interrupts and experiment using interrupts for real time control applications (using RIM and SIM.
9. Interfacing matrix keyboard and 7 segment display using 8279.
10. Interfacing Stepper motor, DC motor
11. Interfacing ADC, DAC

REFERENCE

1. Laboratory Manual.

EE1026 MICROPROCESSORS AND MICROCONTROLLERS LABORATORY												
Course designed by		**Department of Electrical and Electronics Engineering**										
1.	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
		x	x	x		x						x
2.	Mapping of instructional objectives with student outcome	1	1,2	2		1,2						3
3.	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts (E)					Professional Subjects (P)	
		--		--		--					x	
4.	Broad Area	Electrical Machines		Circuits & Systems		Electronics		Power Systems			Intelligent Systems	
		--		x		x		--			--	
5.	Approval	23rd meeting of Academic Council, May 2013										

	COMPREHENSION	L	T	P	C
EE1027	Total Contact Hours - 30	**0**	**2**	**0**	**1**
	Prerequisite				
	Nil				

PURPOSE

To test the student on the understanding of all the concepts in engineering that they have learnt so far in the Electrical and Electronics Engineering programme.

INSTRUCTIONAL OBJECTIVES

1.	To guide the students in such a way that the students attain the confidence and competence to solve real life engineering problems. The Comprehension shall consist of substantial exercises and objective type questions.

The students will be tested in Electrical and Electronics Engineering areas:

- Electric circuits
- Electrical Machines and drives.
- Analog and Digital Electronics circuits
- Power systems Engineering
- Power Electronics and drives.
- Embedded systems

Class room exercises, group discussion, case studies and topics on how the stuff works are assigned to students on an individual basis and evaluation done by a panel of teachers. The internal marks for the students is awarded based on the average of all the components conducted for the entire semester. The students are required to take-up an end semester examination and obtain a minimum mark for gaining the required credit.

EE1027 COMPREHENSION												
Course designed by		**Department of Electrical and Electronics Engineering**										
1.	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
		x	x	x	x	x	x	x	x	x	x	x
2.	Mapping of instructional objectives with student outcome	1										
3.	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts (E)				Professional Subjects (P)		
		--		--		--				x		
4.	Broad Area	Electrical Machines		Circuits & Systems		Electronics		Power Systems		Intelligent Systems		
		x		x		x		x		x		
5.	Approval	23rd meeting of Academic Council, May 2013										

	MINOR PROJECT	L	T	P	C
EE1049	Total Contact Hours - 30	0	0	2	1
	Prerequisite				
	Nil				

PURPOSE

To carry out a design project in one of the specializations of Electrical and Electronics Engineering with substantial multidisciplinary component

INSTRUCTIONAL OBJECTIVES

1.	To guide the students in such a way so that they carry out a work on a topic as a forerunner to the full-fledged project work to be taken subsequently in VIII semester. The project work shall consist of substantial multidisciplinary component.

The students will carry out a project in one of the following Electrical and Electronics Engineering areas but with substantial multidisciplinary component:

- Electric circuits
- Electrical Machines and drives.
- Analog and Digital Electronic circuits
- Power systems Engineering
- Power Electronics and drives.
- Embedded systems

Student groups will be formed (4/6 in a group) and a faculty member will be allocated to guide them. There will be three reviews . First review will not carry any marks but the project topic will be finalized in it. Of remaining 2 reviews one will be carried out in the mid-semester and the last one by the end of semester.
Assessment:

Marks	Awarded by	Criteria
30	Guide	For regularity, systematic progress, extent of work and quality of w
20	Review committee during II review	Presentation, contents and viva
20	Review committee during III review	Quality of project report
10	Review committee during III review	Multidisciplinary component
20	Review committee during III review	Presentation, contents and viva

<table>
<tr><th colspan="12">EE1049 MINOR PROJECT</th></tr>
<tr><td colspan="2">Course designed by</td><td colspan="10">Department of Electrical and Electronics Engineering</td></tr>
<tr><td rowspan="2">1.</td><td rowspan="2">Student Outcome</td><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td><td>g</td><td>h</td><td>i</td><td>j</td><td>k</td></tr>
<tr><td>x</td><td>x</td><td>x</td><td>x</td><td>x</td><td>x</td><td>x</td><td>x</td><td>x</td><td>x</td><td>x</td></tr>
<tr><td>2.</td><td>Mapping of instructional objectives with student outcome</td><td colspan="10">1</td></tr>
<tr><td rowspan="2">3.</td><td rowspan="2">Category</td><td colspan="2">General (G)</td><td colspan="3">Basic Sciences (B)</td><td colspan="4">Engineering Sciences and Technical Arts (E)</td><td>Professional Subjects (P)</td></tr>
<tr><td colspan="2">--</td><td colspan="3">--</td><td colspan="4">--</td><td>x</td></tr>
<tr><td rowspan="2">4.</td><td rowspan="2">Broad Area</td><td colspan="2">Electrical Machines</td><td colspan="3">Circuits & Systems</td><td colspan="2">Electronics</td><td colspan="2">Power Systems</td><td>Intelligent Systems</td></tr>
<tr><td colspan="2">X</td><td colspan="3">x</td><td colspan="2">x</td><td colspan="2">x</td><td>x</td></tr>
<tr><td>5.</td><td>Approval</td><td colspan="10">23rd meeting of Academic Council, May 2013</td></tr>
</table>

SEMESTER VII

	SOLID STATE DRIVES AND CONTROL	L	T	P	C
EE1028	Total Contact Hours – 45	3	0	0	3
	Prerequisite				
	EE1004-Electrical Machines-I EE1012-Electrical Machines-II EE1018-Power Electronics				

PURPOSE

To enable the students to get a comprehensive knowledge on various power controllers for
Solid state drives and computer control of drives.

INSTRUCTIONAL OBJECTIVES

1.	Understand the stable steady state operation and transient dynamics of motor-load system
2.	Learn characteristics and control of solid state DC motors drives, induction motor drives & Synchronous motor drives
3.	Learn digital control of AC and DC drives

UNIT I- REVIEW OF ELECTRIC DRIVES (9 hours)

Fundamentals of Electric Drives-Advantage of Electric Drives-selection of Motor power rating-Thermal model of motor for heating and cooling - Classes of duty cycle-Determination of motor rating -control of Electric drives- modes of operation - speed control and drive classifications -closed loop control of drives.

UNIT II- SOLID STATE CONTROL OF DC DRIVES (9 hours)

DC Motor Drives:-DC motor and their performance-Braking - Transient analysis - Ward Leonard drives - Transformer and uncontrolled rectifier control - controlled rectifier fed DC drives - Chopper controlled DC drives - Time ratio control and current limit control - Single, two and four quadrant operations - Effect of ripples on the DC motor performance.

UNIT III- SOLID STATE CONTROL OF INDUCTION MOTOR (9 hours)

Induction Motor Drives-Stator control-Stator voltage and frequency control – VSI,CSI and cyclo converter fed induction motor drives –open loop and closed VVVF control - Rotor resistance control and slip power recovery schematic control of rotor resistance using DC chopper-Vector Control basic concepts.

UNIT IV-SOLID STATE CONTROL OF SYNCHRONOUS MOTOR&PMSM(9 hours)

Synchronous Motor Drives: - Speed control of three phase synchronous motors-Voltage and current source fed synchronous motor-Cyclo converter fed synchronous motors-Effects of harmonics on the performance of AC motors - PMSM

UNIT-V: DIGITAL TECHNIQUE IN SPEED CONTROL (9 hours)

Digital Control and Drive Applications-Digital technique in speed control of electric drive system-Advantages and limitations - microcontroller based control of drives- selection of drives and control schemes for electrical vehicle Application, paper mills, lifts and cranes.

TEXT BOOKS

1. Dubey.G.K. "*Fundamentals of Electrical drives*", Narora publications, 1995.
2. Bose. B.K. "*Power Electronics and Variable frequency drives*", 1st edition, IEEE Press Standard Publications 2002.

REFERENCES

1. Mazidi and Mazidi, "*Intel 8051 Microcontrollers*", Pearson education, India, 2006.
2. R. Krishnan, "*Electric motor drives Modeling, Analysis and Control*", 1st edition, Pearson Publications, 2009.
3. Gaekward, "*Analog and Digital control systems*", Wiley Eastern Ltd, 1989.
4. VedamSubramanyan, "*Thyristor control of Electrical Drives*", Tata McGraw Hill, Publications, 1996.
5. Bimal K. Bose, "*Modern Power Electronics and AC Drives*", Prentice Hall of India, 2005

<table>
<tr><th colspan="13">EE1028 SOLID STATE DRIVES AND CONTROL</th></tr>
<tr><td colspan="2">Course designed by</td><td colspan="11">Department of Electrical and Electronics Engineering</td></tr>
<tr><td rowspan="2">1.</td><td rowspan="2">Student Outcome</td><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td><td>g</td><td>h</td><td>i</td><td>j</td><td>k</td></tr>
<tr><td>x</td><td></td><td>x</td><td></td><td>x</td><td></td><td></td><td>x</td><td></td><td>x</td><td></td></tr>
<tr><td>2.</td><td>Mapping of instructional objectives with student outcome</td><td>1-3</td><td></td><td>1-3</td><td></td><td>1-3</td><td></td><td></td><td>2,3</td><td></td><td>3</td><td></td></tr>
<tr><td rowspan="2">3.</td><td rowspan="2">Category</td><td colspan="3">General (G)</td><td colspan="3">Basic Sciences (B)</td><td colspan="4">Engineering Sciences and Technical Arts (E)</td><td>Professional Subjects (P)</td></tr>
<tr><td colspan="3">--</td><td colspan="3">--</td><td colspan="4">--</td><td>x</td></tr>
<tr><td rowspan="2">4.</td><td rowspan="2">Broad Area</td><td colspan="3">Electrical Machines</td><td colspan="3">Circuits & Systems</td><td colspan="2">Electronics</td><td colspan="2">Power Systems</td><td>Intelligent Systems</td></tr>
<tr><td colspan="3">x</td><td colspan="3">x</td><td colspan="2">x</td><td colspan="2">--</td><td>--</td></tr>
<tr><td>5.</td><td>Approval</td><td colspan="11">23rd meeting of Academic Council, May 2013</td></tr>
</table>

EE1029	POWER SYSTEM OPERATION AND CONTROL	L	T	P	C
	Total Contact Hours -45	3	0	0	3
	Prerequisite				
	EE1025-Power System Analysis				

PURPOSE

To enable the students gain knowledge on factors involved in the operation and control of power systems and to learn the control of power system using digital computers.

INSTRUCTIONAL OBJECTIVES

1.	To learn the basics of power system control
2.	To control the power system frequency and voltage
3.	To study the economic operation of power system.
4.	To study the control of power system using digital computers.

UNIT 1-INTRODUCTION (8 hours)

Basic concepts of operation and control of power system - necessity of voltage and frequency regulation in power systems-real power-frequency and reactive power- voltage control loops-system load variation, load curves and basic concepts of load dispatching, load forecasting, unit commitment, load shedding and islanding.

UNIT II-REAL POWER FREQUENCY CONTROL (9 hours)

Plant and system level control - basics of speed governing mechanisms and modeling-speed load characteristics-regulation of two generators in parallel-Concept of control area-LFC of single area system-static and dynamic analysis of uncontrolled and controlled cases- integration of economic dispatch controller with LFC-LFC of two area system-tie line modeling-block diagram representation of two area system-static and dynamic analysis-state variable model.

UNIT III-REACTIVE POWER VOLTAGE CONTROL (9 hours)

Basics of reactive power control- Excitation system requirement-elements of excitation system-static and dynamic analysis-stability compensation-generation and absorption of reactive power-methods of voltage control-control by tap changing transformer-shunt and series compensation, phase angle compensation.

UNIT IV-ECONOMIC OPERATION OF POWER SYSTEM (10 hours)

Statement of economic dispatch problem-incremental cost curve-input and output characteristics of thermal and hydro plants-system constraints-hydrothermal

scheduling of long and short terms-optimal operation of thermal units without and with transmission losses using penalty factor, incremental transmission loss, and transmission loss formula (no derivation)-base point and participation factors-Statement of unit commitment-constraints in unit commitment-solution methods using priority list and dynamic programming.

UNIT V-COMPUTER CONTROL OF POWER SYSTEMS (9 hours)

Concept of energy control centre and functions-need of computer control of power systems-system monitoring, data acquisition and controls-System hardware configurations-SCADA and EMS functions- network topology-state estimation-security analysis and control-various operating states (normal, alert, emergency, restorative and in-extremis)-state transition diagram.

TEXT BOOKS

1. Olle.I.Elgerd, "*Electric energy systems theory-An introduction*", Tata McGraw Hill publishing Ltd, New Delhi,2008.
2. Prabha Kundur, "*Power system stability and control*", Tata McGraw Hill publishing Ltd, New Delhi,5th reprint,2008.

REFERENCES

1. Allen J.Wood,Bruce F.Wollenberg, "*Power Generation", Operation and Control*" ,2nd Edition,John Wiley and sons,1996.
2. I.J.Nagrath and D.P.Kothari, "*Power System Engineering*", 2nd Edition, Tata McGraw Hill publishing Ltd, New Delhi,2008.
3. S.Sivanagaraju,G.Sreenivasan, "*Power System Operation and Control*", Pearson Education, 2010.

<table>
<tr><th colspan="13">EE1029- POWER SYSTEM OPERATION AND CONTROL</th></tr>
<tr><td colspan="2">Course designed by</td><td colspan="11">Department of Electrical and Electronics Engineering</td></tr>
<tr><td rowspan="2">1.</td><td rowspan="2">Student Outcome</td><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td><td>g</td><td>h</td><td>i</td><td>j</td><td>K</td></tr>
<tr><td>x</td><td></td><td></td><td></td><td>x</td><td></td><td></td><td>x</td><td></td><td>x</td><td></td></tr>
<tr><td>2.</td><td>Mapping of instructional objectives with student outcome</td><td>1,3</td><td></td><td></td><td></td><td>1-4</td><td></td><td></td><td>2-4</td><td></td><td>2-4</td><td></td></tr>
<tr><td rowspan="2">3.</td><td rowspan="2">Category</td><td colspan="2">General (G)</td><td colspan="3">Basic Sciences (B)</td><td colspan="3">Engineering Sciences and Technical Arts (E)</td><td colspan="3">Professional Subjects (P)</td></tr>
<tr><td colspan="2">--</td><td colspan="3">--</td><td colspan="3">--</td><td colspan="3">X</td></tr>
<tr><td rowspan="2">4.</td><td rowspan="2">Broad Area</td><td colspan="2">Electrical Machines</td><td colspan="3">Circuits & Systems</td><td colspan="2">Electronics</td><td colspan="2">Power Systems</td><td colspan="2">Intelligent Systems</td></tr>
<tr><td colspan="2">--</td><td colspan="3">--</td><td colspan="2">--</td><td colspan="2">x</td><td colspan="2">--</td></tr>
<tr><td>5.</td><td>Approval</td><td colspan="11">23rd meeting of Academic Council, May 2013</td></tr>
</table>

	EMBEDDED SYSTEMS APPLIED TO ELECTRICAL ENGINEERING	L	T	P	C
EE1030	Total Contact Hours-45	3	0	0	3
	Prerequisite				
	EE1024-Microprocessors and Microcontrollers				

PURPOSE

To enable the students to gain a fair knowledge on characteristics and applications of Embedded systems to Electrical Engineering

INSTRUCTIONAL OBJECTIVES

1.	To learn and understand the characteristics of Embedded systems and its architectures.
2.	To understand the types of embedded architectures and its variants.
3.	To understand and use the CPU bus and its protocols.
4.	To understand the operation of real time operating systems.
5.	To learn the operation of control systems applications of electrical engineering and design the same.

UNIT I - INTRODUCTION (9 hours)

Characteristics of Embedding Computing Applications-Concept of Real time Systems,-Challenges in Embedded System Design- Design Process-Requirements, Specifications, Architecture Design- Designing of Components and System Integration

UNIT II - EMBEDDED SYSTEM ARCHITECTURE (9 hours)

Instruction Set Architecture-CISC architecture [8051] and RISC instruction set architecture [ARM processors], DSP Processors, Harvard Architecture-PIC. Co-processors and Hardware Accelerators, Processor Performance Enhancement-Pipelining, Super-scalar Execution, CPU Power Consumption, Memory System Architecture-, Caches, Virtual Memory, Memory management unit and address Translation.

UNIT III - DESIGNING EMBEDDED COMPUTING PLATFORM (9 hours)

Designing with Processors-System Architecture, Hardware Design, Implementation-Development Environment, Debugging Techniques, Manufacturing and Testing. Design Using CPU Bus: Bus Protocols, Bus Organization, I/O Device Interfacing, Interfacing Protocols-GPIB, FIREWIRE, USB, Watchdog Timers.

UNIT IV - OPERATING SYSTEMS **(9 hours)**

Kernel Features: Real-time Kernels, Polled Loops System, Co-routines, Interrupt-driven System, Multi-rate System, Processes and Threads, Context Switching, Cooperative Multi-tasking, Pre-emptive Multi-tasking. Scheduling-Rate-Monotonic Scheduling, Earliest-Deadline First Scheduling, Task Assignment, Fault-Tolerant Scheduling. Inter-process Communication-Real-time Memory Management: Stack Management, Dynamic Allocation-Evaluating and Optimizing Operating System Performance-Response.

UNIT V - EMBEDDED CONTROL APPLICATIONS **(9 hours)**

Open-loop and Closed Loop Control Systems-Application Examples-Washing Machine, Automotive Systems, Auto-focusing digital camera, Air-conditioner, Elevator Control System, ATM System.

TEXT BOOKS

1. Raj Kamal, "*Embedded Systems*", TMH,first edition, 2004.
2. David E. Simon, "*An Embedded Software Primer*", Pearson Education, 1999.

REFERENCES

1. Wayne wolf, "*Computers as components*", Morgan Kaufmann publishers, 2nd Edition, 2008.
2. Ayala. K.J. "*The 8051 Microcontroller*", Penram International, 1991.
3. Dr. Prasad, "*Embedded Real Time System*", Wiley Dreamtech, 2004.
4. Jean J.Labrosse, "*Embedded system building blocks*", CMP books, 2nd Edition, 1999.
5. Arnold berger, "*Embedded system design*", CMP books, 1st Edition, 2001.
6. Narayan and gong, "*Specifications and design of embedded systems*", Pearson education, 2nd Edition, 1999.

<table>
<tr><th colspan="14">EE1030 EMBEDDED SYSTEMS APPLIED TO ELECTRICAL ENGINEERING</th></tr>
<tr><th colspan="2">Course designed by</th><th colspan="12">Department of Electrical and Electronics Engineering</th></tr>
<tr><td rowspan="2">1.</td><td rowspan="2">Student Outcome</td><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td><td>g</td><td>h</td><td>i</td><td>j</td><td>K</td></tr>
<tr><td>x</td><td>x</td><td>x</td><td></td><td>x</td><td></td><td></td><td></td><td></td><td>x</td><td>X</td></tr>
<tr><td>2.</td><td>Mapping of instructional objectives with student outcome</td><td>1-3</td><td></td><td>4,5</td><td></td><td>1-5</td><td></td><td></td><td></td><td></td><td>4,5</td><td>1-3</td></tr>
<tr><td rowspan="2">3.</td><td rowspan="2">Category</td><td colspan="2">General (G)</td><td colspan="3">Basic Sciences (B)</td><td colspan="4">Engineering Sciences and Technical Arts (E)</td><td colspan="2">Professional Subjects (P)</td></tr>
<tr><td colspan="2">--</td><td colspan="3">--</td><td colspan="4">--</td><td colspan="2">X</td></tr>
<tr><td rowspan="2">4.</td><td rowspan="2">Broad Area</td><td colspan="2">Electrical Machines</td><td colspan="3">Circuits & Systems</td><td colspan="2">Electronics</td><td colspan="2">Power Systems</td><td colspan="2">Intelligent Systems</td></tr>
<tr><td colspan="2">--</td><td colspan="3">x</td><td colspan="2">x</td><td colspan="2">--</td><td colspan="2">--</td></tr>
<tr><td>5.</td><td>Approval</td><td colspan="12">23rd meeting of Academic Council, May 2013</td></tr>
</table>

EE1031	SIMULATION LABORATORY	L	T	P	C
	Total Contact Hours – 45	0	0	3	2
	Prerequisite				
	EE1025-Power System Analysis				

PURPOSE

To enable the students gain a fair knowledge on the programming and simulation of Power Systems.

INSTRUCTIONAL OBJECTIVES:

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

1.	Acquire skills of using computer packages MATLAB coding and SIMULINK in power system studies.
2.	Acquire skills of using ETAP, MiPOWER and POWER WORLD SIMULATOR software for power system studies.

LIST OF EXPERIMENTS

1) Use of MATLAB for the following

- Formation of Y-Bus by inspection method and analytical method.
- Formation of Z-Bus matrix.
- Power flow analysis by GS, NR and FDLF methods.
- Performance of transmission lines
- Economic Dispatch Problem-without losses
- Economic Dispatch Problem-with losses

2) Use of MATLAB Simulink for solving the following

- Automatic load frequency control
- Automatic voltage regulation.

3) Use of ETAP /MiPower / Power World software for the following

- Power flow solution by GS and FDLF
- Symmetrical and unsymmetrical fault analysis
- Transient stability analysis

REFERENCES

1. Laboratory Manual

EE1031 SIMULATION LABORATORY												
Course designed by		**Department of Electrical and Electronics Engineering**										
1.	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
		x	x			x			x			x
2.	Mapping of instructional objectives with student outcome	1,2	1,2			1,2			2			2
3.	Category	General (G)	Basic Sciences (B)			Engineering Sciences and Technical Arts (E)					Professional Subjects (P)	
		--	--			--					X	
4.	Broad Area	Electrical Machines	Circuits & Systems			Electronics		Power Systems			Intelligent Systems	
		--	--			--		x			--	
5.	Approval	23rd meeting of Academic Council, May 2013										

	ELECTRIC DRIVES LABORATORY	L	T	P	C
EE1032	Total Contact Hours - 45	0	0	3	2
	Prerequisite				
	EE1004-Electrical Machines-I EE1012-Electrical Machines-II EE1018-Power Electronics				

PURPOSE

To enable the students gain a fair knowledge on the hard ware programming and control of Power Electronics circuit based motor control.

INSTRUCTIONAL OBJECTIVES

1.	To acquire skills using FPGA & DSP processor
2.	To learn about control of power electronic converters and motors

LIST OF EXPERIMENTS

1. FPGA Based DC Motor control using DC-DC Chopper
2. Develop and Test Algorithms for open-loop and closed loop v/f of 3 phase Induction motor
3. FPGA based PWM control of induction motor drives
4. DSP Based DC Servo motor position control system
5. DSP Based SRM motor control system.
6. DSP/FPGA Based PMSM control system.
7. Develop a systematic approach to controller design for vector control AC motor drives

REFERENCES

1. Laboratory Manual.
2. Dubey.G.K, "*Fundamentals of Electrical drives*", Narora publications, 1995.
3. Bose.B.K, "*Power Electronics and Variable frequency drives*", 1st ed, IEEE Press Standard Publications 2002.
1. Mazidi and Mazidi, "*Intel 8051 Microcontrollers*", Pearson education, India, 2006.

<table>
<tr><th colspan="13">EE1032 ELECTRIC DRIVES LAB</th></tr>
<tr><td colspan="2">Course designed by</td><td colspan="11">Department of Electrical and Electronics Engineering</td></tr>
<tr><td rowspan="2">1.</td><td rowspan="2">Student Outcome</td><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td><td>g</td><td>h</td><td>i</td><td>j</td><td>k</td></tr>
<tr><td>x</td><td>x</td><td></td><td></td><td>x</td><td></td><td></td><td>x</td><td></td><td></td><td>x</td></tr>
<tr><td>2.</td><td>Mapping of instructional objectives with student outcome</td><td>1,2,</td><td>1,2</td><td></td><td></td><td>1,2</td><td></td><td></td><td>1,2</td><td></td><td></td><td>1,2</td></tr>
<tr><td rowspan="2">3.</td><td rowspan="2">Category</td><td colspan="2">General (G)</td><td colspan="3">Basic Sciences (B)</td><td colspan="4">Engineering Sciences and Technical Arts (E)</td><td>Professional Subjects (P)</td></tr>
<tr><td colspan="2">--</td><td colspan="3">--</td><td colspan="4">--</td><td>X</td></tr>
<tr><td rowspan="2">4.</td><td rowspan="2">Broad Area</td><td colspan="2">Electrical Machines</td><td colspan="3">Circuits & Systems</td><td colspan="2">Electronics</td><td colspan="2">Power Systems</td><td>Intelligent Systems</td></tr>
<tr><td colspan="2">x</td><td colspan="3">--</td><td colspan="2">x</td><td colspan="2">--</td><td>--</td></tr>
<tr><td>5.</td><td>Approval</td><td colspan="11">23rd meeting of Academic Council, May 2013</td></tr>
</table>

EE1048	INDUSTRIAL TRAINING II (Training to be undergone after VI semester)	L	T	P	C
	Prerequisite	0	0	1	1
	Nil				

PURPOSE

To provide hands-on experience at industry or a company where Electrical and Electronics Engineering projects are carried out

INSTRUCTIONAL OBJECTIVES

1.	Students have to undergo three – week practical training in Electrical and Electronics Engineering related project at industry or a company so that they become aware of the practical application of theoretical concepts studied in the class rooms.

Students have to undergo three-week practical training in Electrical and Electronics Engineering related project at industry or a company of their choice but with the approval of the department. At the end of the training student will submit a report as per the prescribed format to the department.

Assessment process

This course is mandatory and a student has to pass the course to become eligible for the award of degree. The student shall make a presentation before a committee constituted by the department which will assess the student based on the report submitted and the presentation made. Marks will be awarded out of 100 and appropriate grades assigned as per the regulations.

EE1048 INDUSTRIAL TRAINING II												
Course designed by		Department of Electrical and Electronics Engineering										
1.	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
		x	x	x	x	x	x	x	x	x	x	x
2.	Mapping of instructional objectives with student outcome	1	1	1	1	1	1	1	1	1	1	1
3.	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts (E)					Professional Subjects (P)	
		--		--		--					X	
4.	Broad Area	Electrical Machines		Circuits & Systems		Electronics		Power Systems			Intelligent Systems	
		x		x		x		x			X	
5.	Approval	23rd meeting of Academic Council, May 2013										

SEMESTER VIII

	MAJOR PROJECT / PRACTICE SCHOOL	L	T	P	C
EE1050	Total Contact Hours-360	**0**	**0**	**24**	**12**
	Prerequisite				
	Nil				

PURPOSE

To simulate real life situations related to Electrical and Electronics Engineering and impart adequate training so that confidence to face and tackle any problem in the field is developed in the college itself.

INSTRUCTIONAL OBJECTIVES

1.	To guide the students such a way that the they carry out a comprehensive work on the chosen topic which will stand them in good stead as they face real life situations. The project work so chosen by the student shall culminate in gaining of major design experience in the related area of specialization.

MAJOR PROJECT

Each project will cover all the aspects (to the extent possible) like investigation, planning, designing, fabrication, trouble shooting and estimating of a Electrical and Electronics Engineering based work. Alternately, a few research problems also may be identified for investigation and the use of laboratory facilities to the fullest extent may be taken as a project work. The project shall be driven by realistic constraints like that related to economic, environmental, social, political, ethical, health & safety, manufacturability and sustainability. The outcomes to be attained by students by doing the project work shall be spelt out clearly. A project report is to be submitted on the topic which will be evaluated during the final review. Assessment procedure will be as spelt out in the regulations.

PRACTICE SCHOOL

Alternately, a student is encouraged to take an industrial project with Electrical and Electronics engineering organizations or firms chosen by the institute. In such cases the student will stay with the firm and carry out the project. The project will be guided by the faculty member and the concerned officer in the industry. All the requirements spelt out under ' MAJOR PROJECT' above, shall be incorporated under this work also. However reviews will be conducted in the institute which the student shall attend.

EE1050 MAJOR PROJECT/PROJECT SCHOOL												
Course designed by		**Department of Electrical and Electronics Engineering**										
	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
		x	x	x	x	x	x	x	x	x	x	x
2.	Mapping of instructional objectives with student outcome	1	1	1	1	1	1	1	1	1	1	1
3.	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts (E)					Professional Subjects (P)	
		--		--		--					X	
4.	Broad Area	Electrical Machines		Circuits & Systems		Electronics		Power Systems			Intelligent Systems	
		x		x		x		x			X	
5.	Approval	23rd meeting of Academic Council, May 2013										

DEPARTMENTAL ELECTIVES

EE1101	**POWER QUALITY**	**L**	**T**	**P**	**C**
	Total Contact hours - 45	**3**	**0**	**0**	**3**
	Prerequisite				
	Nil				

PURPOSE	
To study the various issues affecting Power Quality, their production, monitoring and suppression.	
INSTRUCTIONAL OBJECTIVES	
1.	To study the production of voltages sags, interruptions and harmonics and methods of control.
2.	To study various methods of power quality monitoring.

UNIT I - INTRODUCTION TO POWER QUALITY (9 hours)

Power Quality phenomenon-Terms and definitions-Various Power events in power quality - causes for reduction in power quality

UNIT II - VOLTAGE SAGS (9 hours)

Sources of sags – Magnitude & duration of sag-effect of sag on computer and consumer Electronics- Monitoring and mitigation of voltage sag.

UNIT III – INTERRUPTIONS (9 hours)

Origin of Long & Short interruption –influence on various equipments-Basic reliability indices -monitoring and mitigation of interruption

UNIT IV – HARMONICS (9 hours)

Harmonic distortion: Voltage and current distortion- harmonic indices- harmonic sources from commercial and industrial loads- Effects of harmonics on various equipments- harmonic distortion evaluation- Devices for controlling harmonic distortion

UNIT V - POWER QUALITY MONITORING (9 hours)

Monitoring considerations: Power line disturbance analyzer, power quality measurement equipment, harmonic spectrum analyzer, flicker meters, disturbance analyzer.

TEXT BOOKS

1. Arindam Ghosh,*"Power Quality Enhancement Using Custom Power DevicesPower Quality Enhancement Using Custom Power Devices",* Springer, 2002.
2. Roger.C.Dugan, Mark.F.McGranagham, Surya Santoso, H.Wayne Beaty, "*Electrical Power Systems Quality*" McGraw Hill, 2003.

REFERENCE

1. Math H.J.Bollen, "*Understanding Power Quality Problems-Voltage sag & Interruptions*", IEEE Press,2000.

<table>
<tr><th colspan="14">EE1101 POWER QUALITY</th></tr>
<tr><th colspan="2">Course designed by</th><th colspan="12">Department of Electrical and Electronics Engineering</th></tr>
<tr><td rowspan="2">1.</td><td rowspan="2">Student Outcome</td><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td><td>g</td><td>h</td><td>i</td><td>j</td><td>k</td></tr>
<tr><td>x</td><td></td><td></td><td></td><td>x</td><td></td><td></td><td>x</td><td></td><td>x</td><td></td></tr>
<tr><td>2.</td><td>Mapping of instructional objectives with student outcome</td><td>1,2</td><td></td><td></td><td></td><td>1,2</td><td></td><td></td><td>1,2</td><td></td><td>1,2</td><td></td></tr>
<tr><td rowspan="2">3.</td><td rowspan="2">Category</td><td colspan="3">General (G)</td><td colspan="3">Basic Sciences (B)</td><td colspan="4">Engineering Sciences and Technical Arts (E)</td><td colspan="2">Professional Subjects (P)</td></tr>
<tr><td colspan="3">--</td><td colspan="3">--</td><td colspan="4">--</td><td colspan="2">X</td></tr>
<tr><td rowspan="2">4.</td><td rowspan="2">Broad Area</td><td colspan="3">Electrical Machines</td><td colspan="3">Circuits & Systems</td><td colspan="2">Electronics</td><td colspan="2">Power Systems</td><td colspan="2">Intelligent Systems</td></tr>
<tr><td colspan="3">--</td><td colspan="3">x</td><td colspan="2">--</td><td colspan="2">--</td><td colspan="2">--</td></tr>
<tr><td>5.</td><td>Approval</td><td colspan="12">23rd meeting of Academic Council, May 2013</td></tr>
</table>

EE1102	MICROCONTROLLER BASED SYSTEM DESIGN	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite				
	EE1024-Microprocessors and Microcontrollers				

PURPOSE

This course on Micro-controller based system design aims at introducing the need of microcontrollers. Also, the detailed view of designing both the hardware and software of a completed system based on Intel 8051/31 & PIC microcontrollers is covered.

INSTRUCTIONAL OBJECTIVES

1.	To understand the need of micro-controller family.
2.	To develop the assembly level programs based on INTEL 8051and PIC microcontrollers.
3.	To design the detailed hardware circuits for given applications.
4.	To identify the need for I/O and memory expansion methods for specific applications.
5.	To introduce ARM processor

UNIT I - MICROCONTROLLERS – INTRODUCTION (9 hours)

Role of microcontrollers – 8 bit microcontrollers – architecture of In 8031/8051/8751 –hardware description – memory organization – addressing mode – Boolean processing –instruction set – simple programs.

UNIT II - PIC MICROCONTROLLERS (9 hours)

Introduction - PIC microcontroller – Architecture-memory organization – I/ O ports – Reset circuits – Instruction set – compare/capture/PWM – Application and introduction to MPLAB.

UNIT III - ARM PROCESSOR (9 hours)

ARM: The ARM architecture – ARM organization and implementation – The ARM instruction set – The thumb instruction set – Basic ARM Assembly language program.

UNIT IV - INTERFACING CONCEPTS (9 hours)

Peripheral interface – interrupt – applications – small motor control – keyboard interfacing – pulse width and frequency interfacing – analog and digital interfacing.

UNIT V - APPLICATIONS **(9 hours)**

Stepper motor control – Real time clock – DC motor speed control – Generation of Gating Signals for Converters and Inverters – Advanced communication processor – Subscriber processor – Bluetooth Baseband controller

TEXT BOOKS

1. John Peatman, "*Design with PIC Microcontrollers"*, Pearson Education Asia, 2001.
2. Kenneth ayala, "*Intel 8051 – Microcontrollers"*, Prentice hall of India, Second Edition, 2005.

REFERENCES

1. Mazidi and Mazidi, "*Intel 8051 Microcontrollers"*, Pearson education, India, 2006.
2. Douglas V Hall, "*Microprocessor and Interfacing"*, Tata McGraw Hill, 2006.
3. Steve Furber, "*ARM System-on-chip architecture"*, Pearson education, India, 2000.

<table>
<tr><th colspan="14">EE1102 MICROCONTROLLER BASED SYSTEM DESIGN</th></tr>
<tr><th colspan="2">Course designed by</th><td colspan="12">Department of Electrical and Electronics Engineering</td></tr>
<tr><td rowspan="2">1.</td><td rowspan="2">Student Outcome</td><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td><td>g</td><td>h</td><td>i</td><td>j</td><td>k</td></tr>
<tr><td>x</td><td></td><td>x</td><td></td><td>x</td><td></td><td></td><td>x</td><td></td><td>x</td><td>x</td></tr>
<tr><td>2.</td><td>Mapping of instructional objectives with student outcome</td><td>1</td><td></td><td>1-4</td><td></td><td>3,4</td><td></td><td></td><td>3,4</td><td></td><td>5</td><td>5</td></tr>
<tr><td rowspan="2">3.</td><td rowspan="2">Category</td><td colspan="3">General (G)</td><td colspan="3">Basic Sciences (B)</td><td colspan="4">Engineering Sciences and Technical Arts (E)</td><td colspan="2">Professional Subjects (P)</td></tr>
<tr><td colspan="3">--</td><td colspan="3">--</td><td colspan="4">--</td><td colspan="2">x</td></tr>
<tr><td rowspan="2">4.</td><td rowspan="2">Broad Area</td><td colspan="3">Electrical Machines</td><td colspan="3">Circuits & Systems</td><td colspan="3">Electronics</td><td colspan="2">Power Systems</td><td colspan="2">Intelligent Systems</td></tr>
<tr><td colspan="3">--</td><td colspan="3">x</td><td colspan="3">x</td><td colspan="2">--</td><td colspan="2">--</td></tr>
<tr><td>5.</td><td>Approval</td><td colspan="12">23rd meeting of Academic Council, May 2013</td></tr>
</table>

	POWER SYSTEM DYNAMICS	L	T	P	C
EE1103	Total Contact Hours - 45	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

To become familiar with the modeling of components and system for carrying out transient and dynamic stability analysis of large scale power systems.

INSTRUCTIONAL OBJECTIVES

1.	To learn the modeling of synchronous machines.
2.	To learn about the controlling of excitation system and speed governing system.
3.	To understand the transient and dynamic stability of power systems.

UNIT I – INTRODUCTION (8 hours)

Concept and importance of stability in power system operation and design- distinction between transient and dynamic stability- complexity of stability problem in large system- Need for reduced models- stability of interconnected systems.

UNIT II – MACHINE MODELING (9 hours)

Park's transformation- flux linkage equations, current space model- per unit conversion- normalizing the equations- equivalent circuit- flux linkage state space model- Simplified models (one axis and constant flux linkage)- steady state equations and phasor diagrams.

UNIT III – MACHINE CONTROLLERS (9 hours)

Exciter and voltage regulators- function of excitation systems, 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 hours)

State equation for multi machine simulation with one axis model- transient stability simulation of multi machine power system with one axis machine model including excitation system and speed governing system using R-K method of fourth order (Gill's technique)- power system stabilizer.

UNIT V– DYNAMIC STABILITY **(10 hours)**

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.

TEXT BOOKS

1. Kundur.P, *"Power System Stability and Control"*, McGraw Hill Inc., USA, 1994.
2. Anderson.P.M and Fouad.A.A, *"Power System Control and Stability"* Galgotia Publications, New Delhi, 2003.

REFERENCE

1. Pai. M.A and Sauer.W, *"Power System Dynamics and Stability"*, Pearson Education Asia, India, 2002.

EE1103 POWER SYSTEM DYNAMICS												
Course designed by		**Department of Electrical and Electronics Engineering**										
1.	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
		x		x		x			x			
2.	Mapping of instructional objectives with student outcome	1-3		1-3		1-3			2			
3.	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts (E)					Professional Subjects (P)	
		--		--		--					x	
4.	Broad Area	Electrical Machines		Circuits & Systems		Electronics		Power Systems			Intelligent Systems	
		--		--		--		x			--	
5.	Approval	23rd meeting of Academic Council, May 2013										

EE 1104	ARTIFICIAL NEURAL NETWORKS	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

To enable the students to understand the concepts of artificial neural networks and its applications in power engineering.

INSTRUCTIONAL OBJECTIVES

1.	To understand the fundamental concepts of ANN and different architectures and its learning methodologies.
2.	To gain knowledge about different network architectures and its applications in power systems and power electronics.
3.	To learn the concepts of the various training/learning algorithms and its use.

UNIT I - INTRODUCTION (9 hours)

Artificial neural networks – definition and fundamental concepts – engineering approaches to neural computing-biological neural networks – Artificial neuron-activation functions – setting of weights – typical architectures – biases and thresholds – learning and its methods – training algorithms.

UNIT II - FEED FORWARD NEURAL NETS (9 hours)

Perceptron – architectures, algorithm and applications – linear separability – ADALINE – feed forward networks – back propagation algorithm-applications – alternate activation functions-number of hidden layers – practical consideration – gradient decent algorithms- radial basis function networks[RBF].

UNIT III - STATISTICAL METHODS BASED NEURAL NETS (9 hours)

Associate memory-Auto associative-hetero associative – bidirectional associative memory-Hopfield neural networks – discrete and continuous net-applications of Hopfield networks.

UNIT IV - COMPETITIVE NETWORKS (9 hours)

Kohonen's self organizing maps [SOM]-learning vector quantization [LVQ] and its types- Adaptive resonance theory –ART1 & ART2 architecture, algorithms-applications.

UNIT V - APPLICATIONS OF ANN **(9 hours)**

Applications of ANN in:

(1) Power systems – load forecasting- unit commitment -load scheduling –Power flow studies.

(2) Control applications in AC and DC electric drives.

(3) Fault Analysis and fault classification problems.

TEXT BOOKS

1. Simon Haykin, "*Neural Networks and learning machines*" , Prentice Hall,third edition 2009.
2. Laurene fausett, "*Fundamentals of Neural Network Architecture*", algorithms and applications – pearsons education.2008 first edition and third reprint.

REFERENCES

1. Yegnanarayana.B, "*Artificial Neural Networks*", Prentice Hall of India Private Ltd., New Delhi, 1999.
2. Robert J. Schalkoff, "*Artificial Neural Networks*", McGraw-Hill International Editions, first edition,1997.
3. James a Freeman and David M.Sakapura, "*Neural Network Algorithms applications and programming techniques*" – pearsons education (2004).
4. Sivanandam.S.N,Deepa.S.N, *"Principles of soft computing*",2nd Edition, Wiley India Pvt Limited, 2011.

EE1104 ARTIFICIAL NEURAL NETWORK												
Course designed by		**Department of Electrical and Electronics Engineering**										
1.	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
		x				x					x	x
2.	Mapping of instructional objectives with student outcome	1-3				2,3					2,3	2,3
3.	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts (E)					Professional Subjects (P)	
		--		--		--					x	
4.	Broad Area	Electrical Machines		Circuits & Systems		Electronics		Power Systems			Intelligent Systems	
		--		--		--		--			x	
5.	Approval	23rd meeting of Academic Council, May 2013										

	ADVANCED CONTROL THEORY	L	T	P	C
EE1105	Total Contact Hours - 45	**3**	**0**	**0**	**3**
	Prerequisite				
	EE1013-Control Systems				

PURPOSE

To enable the students to have a fair knowledge about the use of mathematical techniques in control system

INSTRUCTIONAL OBJECTIVES

1. To understand the concepts of non linear systems and stability concepts.
2. To gain knowledge in the basics of optimal and adaptive controls

UNIT I - NONLINEAR SYSTEMS **(9 hours)**

Types of non-linear phenomena- singular points- phase plane method-construction of phase trajectories- Derivation of describing functions.

Need for model reduction-dominant pole concept-model reduction via partial realization-time moment matching and pade approximation-Hankel norm model reduction.

UNIT II - STABILITY CONCEPTS **(9 hours)**

Stability concepts - Equilibrium points - BIBO and asymptotic stability-Lyapunov Theory-Direct method of Lyapunov-Application to non-linear problems. Stability of non- linear systems by describing function method- jump resonance. Frequency domain stability criteria- Popov's criterion.

UNIT III - OPTIMAL CONTROL **(9 hours)**

Formulation of optimal control problems- solving of optimal control problems - Hamiltonian formulation- linear regulator problem- solution of Richatti equation-Pontryagin's minimum principle- time optimal control.

UNIT IV - ADAPTIVE CONTROL **(9 hours)**

Classification of adaptive control systems-MRAC systems-different configuration-classification- Mathematical description- Direct and indirect MRAC- MIT rule for continues time MRAC systems -Lypunov approach and hyper stability approach for continuous time and discrete time MRAC systems - multivariable systems - Investigation on stability and convergence.

UNIT V - SELF TUNING REGULATORS **(9 hours)**

Different approaches to self-tuning-Recursive parameter estimation-Implicit and explicit STR - LQG self-tuning - convergence analysis-minimum variance and pole assignment approaches to multivariable self-tuning regulators.

TEXT BOOKS

1. Ogata.K, *"Modern Control Engineering"* Prentice Hall of India, Fifth edition, 2010.
2. Gopal. M., "*Modern control system Theory*", Wiley Eastern Ltd., 2nd Edition Reprint 1995.

REFERENCES

1. Nagrath.I.J, and Gopal.M, "*Control Systems Engineering*" New Age International (P) Limited, 2010.
2. Graham.C, Goodwill, Graebe.S, and Salgado.M, "*Control System Design*" Prentice Hall India, New Delhi, 2000.
3. Astrom.K.J, and Wittenmark.B, "*Adaptive control*", Addison-Wesley Longman Publishing Co, Second Edition,1994.
4. Brian.D, Anderson.O, John Barratt Moore, "*Optimal Control*" Prentice Hall, 1990.
5. Stefani, Shahian, Savant & Hostetter, "*Design of feedback control systems*," Oxford University Press, 2002.
6. Stanley M. Shinners, "*Modern Control System Theory & Design*," John Wiley & Sons Inc., 1998.

EE1105 - ADVANCED CONTROL THEORY												
Course designed by		**Department of Electrical and Electronics Engineering**										
1.	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
		x		x		x					x	
2.	Mapping of instructional objectives with student outcome	1,2		1,2		1,2					1,2	
3.	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts (E)					Professional Subjects (P)	
		--		--		--					x	
4.	Broad Area	Electrical Machines		Circuits & Systems		Electronics		Power Systems			Intelligent Systems	
		x		x		--		--			--	
5.	Approval	23rd meeting of Academic Council, May 2013										

EE1106	POWER GENERATION SYSTEMS	L	T	P	C
	Total Contact Hours – 45	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

To familiarize the students with different types of power generating systems their related instruments and the economics associated with power generation.

INSTRUCTIONAL OBJECTIVES:

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

1.	To learn generation of electrical power from different types of power plants like thermal ,nuclear and hydro power stations.
2.	To understand the concepts of generation of electrical power using non conventional energy resources
3.	To learn the economics connected with power generation
4.	To understand the measurements of various parameter in power plant and their control.

UNIT I -ECONOMICS OF GENERATION (9 hours)

Load and load duration curve – Load, demand and diversity factors – Plant capacity and plant use factors – choice of type of generation – choice of size and number of unit – cost of energy generated – Tariffs.

UNIT II - THERMAL, NUCLEAR AND HYDRO POWER PLANTS (9 hours)

Location, Layout and working of steam ,diesel and gas power plants - Principles of nuclear power generation, Types of nuclear power plants and their comparison, Layout and working of nuclear power plants, Advantages and disadvantages of nuclear energy- Layout and working, Types of hydroelectric power plants, Advantages of hydro generation, Environmental issues.

UNIT III - POWER PLANT INSTRUMENTATION (9 hours)

Importance of instrumentation in power plants, UP & I diagram of boiler- Measurements of non electrical parameters, flow of feed water, air, steam, radiation detector, smoke density measurement-analyzers, flue gas oxygen analyzer, chromatography, PH meter, pollution monitoring instruments.

UNIT IV - BOILER, TURBINE-MONITORING AND CONTROL (9 hours)

Combustion control - furnace draft control-drum level control- deaerator control-boiler interlocks-speed, vibration, temperature monitoring control of turbine-lubrication and cooling system of turbine.

UNIT V - DISTRIBUTED GENERATION AND NON CONVENTIONAL PLANTS (9 hours)

Introduction to the concept of distributed generation –basics on distributed generation Technologies- Effect on system operation.

Basic concepts, Principle of working and layout of MHD, Solar, Wind, Tidal, Biomass and Geothermal Power Generation Systems

TEXT BOOKS

1. Nagpal.G.R, "*Power plant engineering*",Khanna Publishers,New Delhi,2001.
2. Uppal.S.L, "*Electrical Power*", Khanna Publishers, New Delhi, 1997.

REFERENCES

1. Soni, Gupta, Bhatnagar, "*A Course in Electrical Power*", Dhanpat Rai & Sons, Delhi.1992.
2. Sam.G,Dukelow, "*The control of boilers*",instrument Society of America,1991
3. Nagrath.I.J,andKothari.D.P, "Modern Power System Analysis", Tata Mc Graw Hill,3rd edition,2003.
4. Wadhwa, C.L., "*Generation, Distribution and Utilization of Electric Energy*", New Age International Ltd.,3rd edition,2011
5. Gupta.B.R, "*Generation of Electrical energy*" , Eurasia Publishing House(p) Ltd,New Delhi,2003
6. Deshpande.M.V, "*Elements of Electrical Power Station design*", Pitman, New Delhi.1991.
7. Anne-Marie Borbely, Jan F.Kreider, "*Distributed Generation*", CRC Press LLc,2001.
8. .Jain.R.K, "*Mechanical and industrial Measurements*",Khanna Publishers,New Delhi,1995.

EE1106 - POWER GENERATION SYSTEMS												
Course designed by		**Department of Electrical and Electronics Engineering**										
1.	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
		x		x		x			x			
2.	Mapping of instructional objectives with student outcome	1,4		1,2		3			1,2			

3.	Category	General (G)	Basic Sciences (B)	Engineering Sciences and Technical Arts (E)	Professional Subjects (P)
		--	--	--	x

4.	Broad Area	Electrical Machines	Circuits & Systems	Electronics	Power Systems	Intelligent Systems
		x	--	--	x	--
5.	Approval	23rd meeting of Academic Council, May 2013				

EE1107	**MODERN POWER SYSTEM ANALYSIS**	**L**	**T**	**P**	**C**
	Total Contact Hours - 45	**3**	**0**	**0**	**3**
	Prerequisite				
	EE1025-Power System Analysis				

PURPOSE	
To introduce the students to various numerical tools for analyzing power system operation	
INSTRUCTIONAL OBJECTIVES	
1.	To learn the algorithms for computing network matrices
2.	To understand the use of numerical methods for power flow analysis, optimal power flow analysis, short circuit analysis and stability analysis.

UNIT I - FORMATION OF NETWORK MATRICES (9 hours)

System graph, loop, cutest and incidence matrices, y-bus formation, sparsity and optimal ordering, Matrix representation of Power system equations – impedance matrices – Formation and algorithms – Computer programs for Building up of Z bus and Y Bus,

UNIT II - POWER FLOW ANALYSIS (9 hours)

Formulation of three phase power flow, DC power flow, formulation of AC-DC power flow, Formation of power flow equations – Newton Raphson and Fast Decoupled Power flow algorithms – Computer flow chart and algorithms – Voltage controlled buses – Off nominal transformer ratios – Phase shifting transformers.

UNIT III - OPTIMAL POWER FLOW ANALYSIS (9 hours)

Review of economic dispatch problems – Formation of operating cost minimization problems – Transmission loss minimization problems – Solution by non linear and successive linear programming methods.

UNIT IV - SHORT CIRCUIT ANALYSIS (9 hours)

Symmetrical and unsymmetrical short circuit – Algorithms for short circuit analysis – Z bus formation for fault analysis.

UNIT V - STABILITY ANALYSIS (9 hours)

Transient stability analysis – Swing equation for single machine infinite bus system – Solution of swing equation by modified Euler method and Runge – Kutta methods – stability of multi-machine systems – Computer flow charts and programs. Milne's predictor corrector method. Representation of power system

for transient stability studies – load representation, network performance equations. Solution techniques with flow charts.

TEXT BOOKS

1. John.J.Grainger, William D. Stevenson, "*Power System Analysis",* Tata Mc Graw Hill Publishing company, New Delhi, 2003.
2. Hadi Saadat, "*Power System Analysis*", Tata McGraw Hill Publishing Co. Ltd., New Delhi, 2002.

REFERENCES

1. Nagrath.J, and Kothari.D.P, "*Modern Power System Analysis*", Tata McGraw Hill, New Delhi, 1994.
2. Stagg.S.W, and Abiad.A.E, El. "*Computer Methods in power system analysis*", McGraw Hill, Newyork 1994.
3. Pai.M.A, "*Computer techniques in Power System Analysis*", Tata McGraw Hill, New Delhi, 1979.
4. Wood.A.J and Wollenberg.N.F,"*Power Generation Operation & Control*", John Wiley and Sons, Newyork, 1984.
5. George L. Kusic, "*Computer Aided Power System Analysis*". Prentice Hall of India (P) Ltd., New Delhi, 1989.
6. Arrilaga.J. Arnold.C.P, Harker.B. J*, "Computer Modelling of Electric Power Systems*", John Wiley & Sons.K.
7. Mahailnaos, Kothari.D.P, Ahson,S.I*, "Computer Aided Power System Analysis & Control*", Tata McGraw Hill Publishing Co. Ltd., New Delhi, 1988.
8. Singh. L.P, "*Advanced Power System Analysis and Dynamics*", New Age International Publishers,New Delhi.
9. .Heydt. T "*Computer Analysis Methods for Power Systems*", Macmillan Publishing Company, New York.

<table>
<tr><th colspan="13">EE1107 MODERN POWER SYSTEM ANALYSIS</th></tr>
<tr><td colspan="2">Course designed by</td><td colspan="11">Department of Electrical and Electronics Engineering</td></tr>
<tr><td rowspan="2">1.</td><td rowspan="2">Student Outcome</td><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td><td>g</td><td>h</td><td>i</td><td>j</td><td>k</td></tr>
<tr><td>x</td><td></td><td></td><td></td><td>x</td><td></td><td></td><td>x</td><td></td><td>x</td><td></td></tr>
<tr><td>2.</td><td>Mapping of instructional objectives with student outcome</td><td>1,2</td><td></td><td></td><td></td><td>1,2</td><td></td><td></td><td>1,2</td><td></td><td>1,2</td><td></td></tr>
<tr><td rowspan="2">3.</td><td rowspan="2">Category</td><td colspan="2">General (G)</td><td colspan="3">Basic Sciences (B)</td><td colspan="4">Engineering Sciences and Technical Arts (E)</td><td colspan="2">Professional Subjects (P)</td></tr>
<tr><td colspan="2">--</td><td colspan="3">--</td><td colspan="4">--</td><td colspan="2">x</td></tr>
<tr><td rowspan="2">4.</td><td rowspan="2">Broad Area</td><td colspan="2">Electrical Machines</td><td colspan="3">Circuits & Systems</td><td colspan="2">Electronics</td><td colspan="2">Power Systems</td><td colspan="2">Intelligent Systems</td></tr>
<tr><td colspan="2">--</td><td colspan="3">--</td><td colspan="2">--</td><td colspan="2">x</td><td colspan="2">--</td></tr>
<tr><td>5.</td><td>Approval</td><td colspan="11">23rd meeting of Academic Council, May 2013</td></tr>
</table>

	FLEXIBLE AC TRANSMISSION SYSTEMS	L	T	P	C
EE1108	Total Contact Hours - 45	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

To enable the students gain a fair knowledge on the concepts and technology of flexible AC transmission systems.

INSTRUCTIONAL OBJECTIVES

1.	To understand the need for FACTS
2.	To learn shunt and series compensation techniques
3.	To learn about controlled voltage and Phase angle regulator
4.	To learn the concept of unified power flow controller

UNIT I - INTRODUCTION (9 hours)

Electrical transmission network – Need of transmission interconnections – power flow in AC systems – power flow and dynamic stability considerations – Relative importance of controllable parameters – Basic types of FACTS controllers Brief description && definitions – Benefits from FACTS technology.

UNIT II - STATIC VAR COMPENSATOR (SVC) (9 hours)

Introduction to shunt compensation – Objectives of Shunt compensation – Voltage control by SVC – VI characteristics – advantages of slope in dynamic characteristics – Influence of SVC on system voltage, SVC applications: Steady state power transfer capacity – enhancement of transient stability – Prevention of voltage instability – Introduction to PODC.

UNIT III -THYRISTOR CONTROLLED SERIES CAPACITOR (TCSC) (9 hours)

Introduction to series compensation – Objectives of series compensation – Operation of TCSC: Different modes of operation – Modeling of TCSC: variable reactance model, Transient stability model – TCSC applications: Improvement of system stability limit –voltage collapse prevention .

UNIT IV -EMERGING FACTS CONTROLLERS (9 hours)

Basic concept of voltage source converters and current source converter
SSSC – principle of operation – Applications, STATCOM – principle of operation – VI characteristics – Applications – UPFC: - Modes of operation – Applications – Introduction to IPFC – Comparison of SVC and STATCOM.

UNIT V - STATIC VOLTAGE AND PHASE ANGLE REGULATOR (9 hours)

Objectives of voltage and phase angle regulators — Approaches to thyristor controlled voltage and phase angle regulators – Industrial applications of FACTS devices- Case studies.

TEXT BOOKS

1. Narain G.Hingorani and Laszl Gyugyi, "*Understanding FACTS – Concept & technology of flexible AC transmission systems*", Standard publishers distributors, IEEE press, 2001.
2. Padiyar.K.R," *FACTS Controllers in Power Transmission and Distribution*", New Age International (P) Limited, Publishers, New Delhi, 2008.

REFERENCES

1. Mohan. R.Mathur & Rajiv K. Varma, "*Thyristor – Based FACTS controllers for Electrical transmission systems*", Wiley Inter science publications, 2002.
2. Enrique Acha, Claudio R.Fuerte, Esquivel, Hygo Ambriz, Perez & Cesar Angeles – Camacho, "*FACTS – Modeling and Simulators in Power Networks*", John wiley & sons, 2004.
3. John. A.T. "*Flexible AC transmission systems*", Institution of Electrical and Electronics Engineers, IEEE press, 1999.

<table>
<tr><th colspan="13">EE1108 FLEXIBLE AC TRANSMISSION SYSTEMS</th></tr>
<tr><td colspan="2">Course designed by</td><td colspan="11">Department of Electrical and Electronics Engineering</td></tr>
<tr><td rowspan="2">1.</td><td rowspan="2">Student Outcome</td><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td><td>g</td><td>h</td><td>i</td><td>j</td><td>k</td></tr>
<tr><td>x</td><td></td><td></td><td></td><td>x</td><td></td><td></td><td>x</td><td></td><td>x</td><td></td></tr>
<tr><td>2.</td><td>Mapping of instructional objectives with student outcome</td><td>1-4</td><td></td><td></td><td></td><td>1-4</td><td></td><td></td><td>1-4</td><td></td><td>1-4</td><td></td></tr>
<tr><td rowspan="2">3.</td><td rowspan="2">Category</td><td colspan="3">General (G)</td><td colspan="3">Basic Sciences (B)</td><td colspan="4">Engineering Sciences and Technical Arts (E)</td><td>Professional Subjects (P)</td></tr>
<tr><td colspan="3">--</td><td colspan="3">--</td><td colspan="4">--</td><td>x</td></tr>
<tr><td rowspan="2">4.</td><td rowspan="2">Broad Area</td><td colspan="3">Electrical Machines</td><td colspan="3">Circuits & Systems</td><td colspan="2">Electronics</td><td colspan="2">Power Systems</td><td>Intelligent Systems</td></tr>
<tr><td colspan="3">--</td><td colspan="3">x</td><td colspan="2">x</td><td colspan="2">x</td><td>--</td></tr>
<tr><td>5.</td><td>Approval</td><td colspan="11">23rd meeting of Academic Council, May 2013</td></tr>
</table>

EE1109	NON-CONVENTIONAL ENERGY RESOURCES	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

To create awareness among the students about the different types of non-conventional energy resources and emphasize its importance.

INSTRUCTIONAL OBJECTIVES

1.	To understand and analyze the aspects of non conventional energy sources.
2.	To educate scientifically the new developments in non conventional and renewable energy studies.
3.	To emphasize the significance of Green Energy Technologies.

UNIT I – CONVENTIONAL AND NON-CONVENTIONAL SOURCES (9 hours)

Introduction to Energy Sources: Energy Consumption - World Energy Futures - Discussion on conventional Energy Sources - Availability and Non-conventional Energy Sources - Green coal technologies - Petroleum and natural gas - Nuclear fuels and power plants - Hydro sources and power plants - Energy strategies - Energy conservation - Energy audit - Cost of energy.

UNIT II – SOLAR RADIATION AND APPLICATIONS OF SOLAR ENERGY (9 hours)

Solar radiation: Solar spectra-latitude and longitude - Solar window - Seasonal variations - Daily variation - Hour angle - Calculation of angle of incidence - Angstroms equation and constants - Solar radiation data - Daily global radiation calculations

Applications of solar energy: Solar water heating systems(active & passive) - Solar space heating & cooling systems - Solar desalination systems - Solar thermal power systems - Solar cells - Performance of solar cell - Estimation of power obtain from solar power - Solar panels - PV systems

UNIT III – WIND ENERGY (9 hours)

Wind energy - Energy chains - Application - Historical background - Merits and limitations - Nature of wind - Planetary and local day / night winds - Wind energy quantum - Wind power density - Power calculations - Power in wind turbine – Efficiency - Kinetic energy - Torque thrust calculations - Velocity at different heights - Site selection - Favorable wind speed range - Wind energy conversion system - Energy pattern factor

UNIT IV– BIOMASS ENERGY (9 hours)

Principles of bio-conversion - Anaerobic/aerobic digestion - Types of bio-gas digesters - Gas yield - Combustion characteristics of bio-gas - Utilization for cooking – IC engine operation and economic aspects - Waste to biomass resources - Terms and definitions - Incineration, wood and wood waste, harvesting super trees and energy forests -Pyrolyis

UNIT V– OCEAN & TIDAL ENERGY (9 hours)

Ocean: Ocean energy conversion - Energy sources in ocean - Ocean tidal, Wave and Ocean Thermal Energy Conversion (OTEC), Ocean saline gradient concept - Electrical and non electrical routes – Bipolar, Mono polar - HVDC cable Transmission - Merits and demerits of ocean energy technologies.

Tidal Energy: Tides - Spring tide, Neap tide - Daily and monthly variation - Tidal range - Tidal power - Types of tidal power plants - Single basin & double basin schemes - Main requirements in tidal power plants - Energy storage - Prospects of tidal power in world

TEXT BOOKS

1. Rai.G.D, "*Non-conventional resources of energy*", Khanna publishers , Fourth edition , 2010.
2. Khan.B.H,"*Non-Conventional Energy Resources*", The McGraw Hills, Second edition, 2009.

REFERENCES

1. Rao.S. & Parulekar, *"Energy Technology"*, Khanna publishers, Fourth edition, 2005.
2. Pai.B.R, and Ram Prasad, *"Power Generation through Renewable Sources of Energy*", Tata McGraw Hill, New Delhi, 1991.
3. Bansal, Kleeman and Meliss, *"Renewable Energy Sources and Conversion Techniques*", Tata Mc Graw Hill, 1990.
4. Godfrey Boyl, *"Renewable Energy: Power sustainable future*",Oxford University Press, Third edition, 2012.
5. B.H.Khan, "*Non-Conventional Energy Resources*", The McGraw Hills, Second edition, 2009.
6. John W Twidell and Anthony D Weir, *"Renewable Energy Resources*", Taylor and Francis, 2006.
7. Freris.L.L, *"Wind Energy Conversion systems"*, Prentice Hall, UK, 1990.

EE1109 Non-Conventional Energy Resources												
Course designed by		**Department of Electrical and Electronics Engineering**										
1.	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
		x				x			x		x	
2.	Mapping of instructional objectives with student outcome	1				1-3			2		3	
3.	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts (E)					Professional Subjects (P)	
		--		--		--					x	
4.	Broad Area	Electrical Machines		Circuits & Systems		Electronics		Power Systems			Intelligent Systems	
		--		x		x		x			--	
5.	Approval	23rd meeting of Academic Council, May 2013										

EE1110	HIGH VOLTAGE ENGINEERING	L	T	P	C
	Total Contact Hours – 45	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

To get a fair knowledge about the generation, measurements of high voltages and currents, testing of high voltage apparatus

INSTRUCTIONAL OBJECTIVES

1.	To understand the concept of solid, liquid and gaseous dielectrics
2.	To understand the generation and measurement of high voltages and currents
3.	To gain knowledge in testing of high voltage equipments

UNIT I - OVER VOLTAGES IN ELECTRICAL POWER SYSTEMS (9 hours)

Causes of over voltages and their effects on power system – Lightning, switching and temporary over voltages – protection against over voltages - Insulation coordination

UNIT II - ELECTRICAL BREAKDOWN IN GASES, SOLIDS AND LIQUIDS (9 hours)

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 VOLTAGE AND CURRENTS (9 hours)

Generation of high DC voltages - multiplier circuits –Van de Graff generator – high alternating voltage generation using cascade transformers-production of high frequency AC high voltages-standard impulse wave shapes-Marx circuit-generation of switching surges - impulse current generation-tripping and control of impulse generators.

UNIT IV - MEASUREMENT OF HIGH VOLTAGES AND CURRENTS (9 hours)

HVDC measurement techniques – measurement of power frequency A.C voltages-sphere gap measurement technique-potential divider for impulse voltage measurements – measurement of high D.C, A.C and impulse currents

UNIT V - HIGH VOLTAGE TESTING **(9 hours)**

Tests on insulators-testing of bushings-testing of isolators and circuit breakers-cable testing- testing of transformers-surge diverter testing -radio interference measurement-use of I.S for testing.

TEXT BOOKS

1 .Naidu.M.S, and Kamaraju, "*High Voltage Engineering",* Tata McGraw Hill, 2009.

2. Wadhwa.C.L, "*High Voltage Engineering"*, Wiley Eastern Limited, 2007.

REFERENCES

1. Kuffel.E and Abdullah. M, "*High Voltage Engineering",* Pergamon Press, 2000.
2. Dieter Kind, "*An Introduction to High Voltage Experimental Technique"*, Wiley Eastern Limited, 1978.
3. Ravindra Arora, Wolfgang Mosh, "*High Voltage and Electrical Insulation Engineering",* Wiley-VCH Publishers, 2011.

EE1110 HIGH VOLTAGE ENGINEERING												
Course designed by		**Department of Electrical and Electronics Engineering**										
1.	Student Outcome	a	b	C	d	e	f	g	h	i	j	k
		x				x			x			
2.	Mapping of instructional objectives with student outcome	1,3				1,3						
3.	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts (E)					Professional Subjects (P)	
		--		--		--					x	
4.	Broad Area	Electrical Machines		Circuits & Systems		Electronics		Power Systems			Intelligent Systems	
		--		x		x		--			--	
5.	Approval	23rd meeting of Academic Council, May 2013										

	SPECIAL ELECTRICAL MACHINES	L	T	P	C
EE1111	Total Contact Hours - 45	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

To enable the students to have a fair knowledge in different special electrical machines

INSTRUCTIONAL OBJECTIVES

1.	To understand the working principle and construction of commutator motors, stepper motors and switched reluctance motors.
2.	To gain knowledge in principle of operation and characteristics of permanent magnet brushless dc motors and synchronous motors.

UNIT I - STEPPER MOTORS (9 hours)

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.

UNIT II -SWITCHED RELUCTANCE MOTORS (9 hours)

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

UNIT III - PERMANENT MAGNET BRUSHLESS D.C. MOTORS (9 hours)

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

UNIT IV - PERMANENT MAGNET SYNCHRONOUS MOTORS (9 hours)

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

UNIT V - COMMUTATOR MOTORS (9 hours)

Construction – Principle of operation- Characteristics – Applications – Universal, repulsion motors and linear induction motors.

TEXT BOOKS

1. .Bimbhra.P.S "*Generalized Theory of Electrical Machines*", Khanna Publishers, Fifth edition, 2013.
2. .Sen.P.C "*Principles of Electrical Machines and Power Electronics*", John willey & Sons, Second edition, 2008.

REFERENCES

1. Dubey.G.K. "*Fundamentals of Electric Drives*", Alpha Science International Limited, Second revised edition, 2008.
2. Cyril G. Veinott, "*Fractional and Sub-fractional horse power electric motors*", McGraw Hill International Limited, Fourth edition,1986.
3. Say. M.G "*Alternating current Machines*", John willey & Sons, Fifth edition 1983.
4. Rai. H.M *"Electrical Machine Design",* Satya Prakashan Publications, Third edition, 2004.

<table>
<tr><th colspan="13">EE1111 SPECIAL ELECTRICAL MACHINES</th></tr>
<tr><td colspan="2">Course designed by</td><td colspan="11">Department of Electrical and Electronics Engineering</td></tr>
<tr><td rowspan="2">1.</td><td rowspan="2">Student Outcome</td><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td><td>g</td><td>h</td><td>i</td><td>j</td><td>k</td></tr>
<tr><td>x</td><td></td><td></td><td></td><td>x</td><td></td><td></td><td>x</td><td></td><td>x</td><td></td></tr>
<tr><td>2.</td><td>Mapping of instructional objectives with student outcome</td><td>1,2</td><td></td><td></td><td></td><td>1,2</td><td></td><td></td><td>1,2</td><td></td><td>1,2</td><td></td></tr>
<tr><td rowspan="2">3.</td><td rowspan="2">Category</td><td colspan="2">General (G)</td><td colspan="3">Basic Sciences (B)</td><td colspan="3">Engineering Sciences and Technical Arts (E)</td><td colspan="3">Professional Subjects (P)</td></tr>
<tr><td colspan="2">--</td><td colspan="3">--</td><td colspan="3">--</td><td colspan="3">x</td></tr>
<tr><td rowspan="2">4.</td><td rowspan="2">Broad Area</td><td colspan="2">Electrical Machines</td><td colspan="3">Circuits & Systems</td><td colspan="2">Electronics</td><td colspan="2">Power Systems</td><td colspan="2">Intelligent Systems</td></tr>
<tr><td colspan="2">x</td><td colspan="3">--</td><td colspan="2">x</td><td colspan="2">--</td><td colspan="2">--</td></tr>
<tr><td>5.</td><td>Approval</td><td colspan="11">23rd meeting of Academic Council, May 2013</td></tr>
</table>

	ELECTRIC POWER UTILIZATION AND ILLUMINATION	L	T	P	C
EE1112	Total Contact Hours - 45	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

The purpose of this course is to enable the students to have fair knowledge about electric heating, welding, illumination, traction and their industrial applications.

INSTRUCTIONAL OBJECTIVES

1.	To understand the concept behind illumination and battery maintenance
2.	To select a particular motor for a specific application
3.	To have basic knowledge about traction system

UNIT I - ELECTRIC HEATING & WELDING (9 hours)

Advantages of Electric Heating- Modes of heat transfer- Resistance heating – Infra red heating – Arc furnaces- Induction Heating- High frequency eddy current heating- Dielectric heating – Choice of frequency Resistance welding – arc welding- Ultrasonic welding- Preparation of work-Electrodes- Power supply for arc welding- arc welding with D.C and A.C – Circuits used in Resistance welding- Comparison of different types of welding- Simple problems

UNIT II - ILLUMINATION (9 hours)

Production of light – Laws of illumination – lighting calculation – Determination of MHCP and MSCP – Polar curves of different types of sources – Rousseau's construction – photometers – interior and exterior illumination systems – lighting schemes – design on lighting schemes – factory lighting – flood lighting – electrical lamps – Gaseous discharge lamps – High pressure and low pressure neon sign – high frequency , low pressure discharge tubes.

UNIT III - INDUSTRIAL UTILIZATION (9 hours)

Introduction – Selection of Motors- Types of drives- Nature of Load- Running , Starting Characteristics- Speed Control- Types of enclosures- Bearings- Transmission of drive- Choice of drive- Noise- Size and rating- Temperature Rise-time curve- Choice of rating of motors- Insulation Materials- problems- Motors for particular Services

UNIT IV - TRACTION SYSTEMS **(9 hours)**

Different types of traction- Systems of Electric Traction- Track Electrification- comparison between DC and AC systems of Railway electrification

Train movement and Energy Consumption: Typical Speed- Time curves- Factors affecting Schedule Speed- Simplified Speed-time Curve- Mechanics of Train movement- tractive effort – Power, Energy output from the driving axles- Determination of specific energy output- Factors affecting Energy consumption, Specific Energy consumption- Dead weight, accelerating weight and adhesion weight- Problems

UNIT V - BRAKING **(9 hours)**

Advantages and disadvantages of regenerative braking- Calculation of energy returned- Mechanical Regenerative Braking- Mechanical Braking- Mechanical Consideration- Control Equipment- Auxiliary equipment

Power Supply: Current collector-overhead construction for Tramways and Trolley buses and Railways-sag and tension calculation for trolley wire- substations- their location- Feeding and Distributing Systems- Interference in Telecommunication circuits.

TEXT BOOKS

1. Open Shaw Taylor , "*Utilisation of Electrical Energy"*, Oriented Longmans Limited.1978
2. Partab H , "*Art and science of Utilisation of Electrical Energy*", Dhanpat Rai & Sons,1995

REFERENCES

1. Uppal.S. L,"*Electric Power"*, Khanna Publications., 1997.
2. Soni, Gupta &Bhatnagar, "*A Course in Electric Power"* – Dhanpat Rai & Sons, 1999.
3. Gupta.J.B, "*Utilisation of Electric Power & Electric Traction"*, S.K.Kataria & sons.1995.

EE1112 ELECTRIC POWER UTILIZATION AND ILLUMINATION												
Course designed by		Department of Electrical and Electronics Engineering										
1.	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
		x				x			x			
2.	Mapping of instructional objectives with student outcome	1,4				3			3,4			
3.	Category	General (G)		Basic Sciences (B)			Engineering Sciences and Technical Arts (E)				Professional Subjects (P)	
		--		--			--				x	

4.	Broad Area	Electrical Machines	Circuits & Systems	Electronics	Power Systems	Intelligent Systems
		x	x	--	x	--
5.	Approval	23rd meeting of Academic Council, May 2013				

EE1113	**POWER SYSTEM DEREGULATION**	**L**	**T**	**P**	**C**
	Total Contact Hours - 45	**3**	**0**	**0**	**3**
	Prerequisite				
	Nil				

PURPOSE

To study the various role of various entities in restructured power system

INSTRUCTIONAL OBJECTIVES

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

1.	To understand the basics of deregulation and its benefits
2.	To learn the role of ISO
3.	To know the transmission services and its pricing
4.	To acquire knowledge on security and congestion management

UNIT I - INTRODUCTION TO DEREGULATION (9 hours)

Introduction- Deregulation- Different entities in deregulated electricity markets- Background from competitive electricity markets- After effects of deregulation- Review of Economic Load Dispatch problem (ELD) - Recent developments in ELD.

UNIT II - OPTIMAL POWER FLOW (9 hours)

Optimal power flow (OPF) as a basic tool- OPF model- Examples- Characteristic features of OPF- Unit commitment- basic model, additional issues- Formation of power pools- Energy Brokerage system.

UNIT III - ROLE OF INDEPENDENT SYSTEM OPERATOR (9 hours)

Role of Independent system operator (ISO) - structure of UK and Nordic Electricity deregulated market- Operational planning activities of ISO- ISO pool and bilateral markets- operational planning activities of GENCO- GENCO in pool and bilateral markets- Market participation issues- UC in deregulated environment- Competitive bidding.

UNIT IV - TRANSMISSION PRICING (9 hours)

Power wheeling- Transmission open access- cost components in transmission- pricing of power transactions and embedded cost based transmission pricing-

Incremental cost based transmission pricing- transmission open access and pricing mechanisms in various countries.

UNIT V - SECURITY AND CONGESTION MANAGEMENT (9 hours)

Developments in international transmission pricing- Security management in deregulated environment, scheduling of spinning reserves, interruptible load options for security management- congestion management in deregulation, economic instruments for handling congestion.

TEXT BOOKS

1. Mohammad Shahidehpoura and Muwaffaq A Iomoush "*Restructured Electric Power System operation trading and volatility*", Macsel Dekker Inc,2001
2. Kankar Bhattacharya,"*Operation of Restructured Power Systems*", Kluwer academic publishers, 2001.

REFERENCE

1. Zaccour.G. "*Deregulation of Electric Utilities*", Kluwer academic publishers, 1998

EE1113 - POWER SYSTEM DEREGULATION												
Course designed by		Department of Electrical and Electronics Engineering										
1.	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
		x		x		x			x		x	
2.	Mapping of instructional objectives with student outcome	1-4		1-4		1-4			1-4		1-4	

3.	Category	General (G)	Basic Sciences (B)	Engineering Sciences and Technical Arts (E)		Professional Subjects (P)
		--	--	--		x
4.	Broad Area	Electrical Machines	Circuits & Systems	Electronics	Power Systems	Intelligent Systems
		--	--	--	x	--
5.	Approval	23rd meeting of Academic Council, May 2013				

EE1114	MODERN OPTIMIZATION TECHNIQUES	L	T	P	C
	Total Contact Hours -45	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

To learn the concepts and techniques of evolutionary and optimization techniques in power system applications

INSTRUCTIONAL OBJECTIVES

1.	To have knowledge on optimization techniques applied to power systems
2.	To understand the different evolutionary computation techniques and multi objective optimization and their applications in power systems

UNIT I - OPTIMIZATION FUNDAMENTALS (8 hours)

Definition- Classification of optimization problems- Unconstrained and Constrained optimization-Optimality conditions- Classical Optimization techniques.

UNIT II - OPTIMAL POWER SYSTEM OPERATION (9 hours)

Economic Dispatch problem-Unit commitment-Optimal Power Flow Problem-Solution Using Classical methods

UNIT III -EVOLUTIONARY COMPUTATION TECHNIQUES (10 hours)

Evolution in nature-Fundamentals of Evolutionary algorithms-Working Principles of Genetic Algorithm- Evolutionary Strategy and Evolutionary Programming-Genetic Operators-Selection, Crossover and Mutation-Issues in GA implementation-GA solution of economic dispatch and unit commitment.

UNIT IV - PARTICLE SWARM OPTIMIZATION (9 hours)

Fundamental principle-Velocity Updating-Advanced operators-Hybrid approaches-Implementation issues-Solution of OPF problem

UNIT V - MULTI OBJECTIVE OPTIMIZATION (9 hours)

Concept of pareto optimality-Conventional approaches for MOOP-Multi objective GA-Fitness assignment-Sharing function-Economic Emission dispatch using MOGA

TEXT BOOKS

1. Kalyanmoy Deb, *"Multi objective optimization using Evolutionary Algorithms"*, John Wiley and Sons, 2008.
2. D.P.Kothari and J.S.Dhillon, *"Power System Optimization*", 2nd Edition, PHI learning private limited, 2010.

REFERENCES

1. Carlos A.Coello Coello, Gary B.Lamont, David A.Van Veldhuizen, *"Evolutionary Algorithms for solving Multi Objective Problems",* 2nd Edition,Springer,2007.
2. Kwang Y.Lee,Mohammed A.El Sharkawi, *"Modern heuristic optimization techniques",* John Wiley and Sons,2008.

EE1114MODERN OPTIMIZATION TECHNIQUES												
Course designed by		Department of Electrical and Electronics Engineering										
1.	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
		x		x		x					x	x
2.	Mapping of instructional objectives with student outcome	1		1		1					2	2
3.	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts (E)					Professional Subjects (P)	
		--		--		--					x	
4.	Broad Area	Electrical Machines		Circuits & Systems		Electronics		Power Systems			Intelligent Systems	
		--		--		--		--			x	
5.	Approval	23rd meeting of Academic Council, May 2013										

EE1115	ARTIFICIAL INTELLIGENT SYSTEMS	L	T	P	C
	Total Contact Hours – 45	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

To enable the students acquire knowledge on Artificial Intelligence, Fuzzy Logic, Artificial Neural Network, Genetic Algorithm and Neuro Fuzzy Controllers

INSTRUCTIONAL OBJECTIVES

1.	To introduce the concepts of artificial intelligence and expert systems.
2.	To understand the concept of fuzzy logic and controllers
3.	To understand the various architectures of ANN and its learning methods
4.	To learn about basic concepts of genetic algorithm, PSO and its operators
5.	To understand the Neuro fuzzy control and its applications.

UNIT I - INTRODUCTION TO AI (9 hours)

Introduction to AI- Problem formulation, Problem Definition - Production systems, Control strategies, Search strategies , Problem characteristics, Production system characteristics - Problem solving methods: graphs, Matching, Indexing and Heuristic functions-hill climbing, best first search. Introduction to expert systems, Characteristics, Acquiring, representing knowledge reasoning,

UNIT II – ARTIFICIAL NEURAL NETWORK (9 hours)

Neural Networks - biological neurons - Artificial neurons – activation functions - Architectures: feed forward networks, recurrent networks – learning/training algorithms - supervised learning, unsupervised learning - perceptron -linear separability, back propagation algorithms -Associative models:-auto & hetero associative networks, Hopfield networks - Applications of ANN.

UNIT III - INTRODUCTION TO FUZZY LOGIC & CONTROLLER (9 hours)

Crisp set-vagueness – uncertainty and imprecision – fuzzy set-fuzzy operators – properties – crisp versus fuzzy sets-representation of fuzzy sets-fuzzy complements, union, intersection, combination of operators, crisp and fuzzy relations – compositions of fuzzy relations, Membership functions, fuzzification and its types-defuzzification methods – rule base – inference engine-structure of FLC. Applications of FLC.

UNIT IV – GENETIC ALGORITHM AND PSO (9 hours)

Genetic Algorithm Based Optimization -Principle of Genetic Algorithm -Genetic operators-selection, crossover and mutation, issues in GA implementation.

Particle swarm optimization- Fundamental principle, velocity updating, implementation issues, GA and PSO in engineering applications.

UNIT V-NEURO-FUZZY TECHNOLOGY (9 hours)

Fuzzy Neural Networks and their learning-Architecture of Neuro- Fuzzy Systems-ANFIS- Neuro Fuzzy Control- Combination of Genetic Algorithm with Neural Networks-Combination of Genetic Algorithms and Fuzzy Logic in engineering applications.

TEXT BOOKS

1. Sivanandam.S.N,Deepa.S.N, "*Principles of soft computing*",2nd Edition, Wiley India Pvt Limited, 2011.
2. Juh Shing Roger Jang,Cheun Tsai Sun,Eiji Mizutani, *"Neuro fuzzy and soft computing*" ,Prentice Hall, 1997.

REFERENCES

1. Elaine Rich, "*Artificial Intelligence*", 2nd Edition, McGraw Hill, 2005.
2. Timothy J.Ross, "*Fuzzy Logic with Engineering Applications*", International edition, McGraw Hill, 2000.
3. Donald A. Waterman, "*A guide to Expert System*", Addison Wiley, 2012. Stuart Russel, Peter Norvig "*AI – A Modern Approach"*, 2nd Edition, Pearson Education 2007.
4. Dan W.Patterson," *Introduction to AI and expert systems*",3rd Edition, Pearson education ,2002.
5. Aliev.R.A, Aliev,R.R, *"Soft Computing and its Application"*, World Scientific Publishing Co. Pvt. Ltd., 2001.
6. Mehrotra.K, Mohan.C.K, Ranka.S, *"Elements of Artificial Neural Networks"*, The MIT Press, 1997.
7. Ronald R.Yager, Lofti Zadeh, *"An Introduction to fuzzy logic applications in intelligent Systems"*, Kluwer Academic,1992.
8. Cordón.O, Herrera.F, Hoffman.F, Magdalena.L, *"Genetic Fuzzy systems"*, World Scientific Publishing Co. Pvt. Ltd., 2001.

EE1115-ARTIFICIAL INTELLIGENT SYSTEMS												
Course designed by		**Department of Electrical and Electronics Engineering**										
1.	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
		x				x			x		x	x
2.	Mapping of instructional objectives with student outcome	1-5				2-5			2-5		2-5	2-5
3.	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts (E)					Professional Subjects (P)	
		--		--		--					x	
4.	Broad Area	Electrical Machines		Circuits & Systems		Electronics		Power Systems			Intelligent Systems	
		--		--		--		--			x	
5.	Approval	23rd meeting of Academic Council, May 2013										

EE1116	HVDC AND EHVAC SYSTEMS	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

The purpose of this course is to provide an understanding of various aspects of EHV AC and HVDC System and its operation. In addition, the course is expected to emphasize the calculations and economics involved in EHVAC and HVDC systems to students, to enable them logically tackle complex engineering problems in their chosen area of application.

INSTRUCTIONAL OBJECTIVES

1.	To understand the basic concepts underlying Extra High Voltage Transmission.
2.	To learn the general background in EHVAC Transmission Systems
3.	To realize the operational concepts of EHVAC Transmission Systems
4.	To emphasize the significance of HVDC Transmission and its modern trends and applications.
5.	To educate the general principle of HVDC control and harmonic elimination in HVDC Systems

UNIT I – EHV TRANSMISSION (7 hours)

Introduction-Necessity for EHV Transmission-Problems involved in EHV Transmission-Operational Aspects of EHV power transmission-Compensation of EHV systems-Gas insulated EHV lines-Environmental and biological aspects.

UNIT II – GENERAL BACKGROUND OF EHVAC TRANSMISSION SYSTEMS (10 hours)

Standard Voltage levels for Transmission lines-Hierarchical levels of Transmission Network-Average values of line parameters-Power handling capacity and line losses-Cost of Transmission line and Equipments-Mechanical consideration in line performance-Comparison of Overhead and Underground lines-Examples of Giant power pools in the world.

UNIT III – ASPECTS OF EHVAC SYSTEM (9 hours)

Power Transferability of Ac line – Line losses-Conductor cost -Transient stability of Ac line – control of power flow through line Right – of- way(Row)-Corona-Towers(support)-Insulation Coordination and surge arrester protection-Line insulation-Clearance and Creepage distances.

UNIT IV– HVDC TRANSMISSION SYSTEMS (10 hours)

Choice of HVDC Transmission - Comparison of AC and DC Transmission – Economics of DC power Transmission, Technical Performance and Reliability – Description of HVDC Converter station- Types of HVDC Links- Merits and Limitations of HVDC System - Applications -Modern Trends in HVDC transmission –Case Studies of HVDC links in the world.

UNIT V– CONVERTERS AND HVDC SYSTEM CONTROL (10 hours)

Pulse number – Choice of Converter Configuration – Simplified analysis of Graetz circuit – Principles of HVDC link Control –DC Breaker - Harmonic Elimination – AC and DC Filter design –Protection Systems in HVDC Substation-HVDC Simulator.

TEXT BOOKS

1. Rakosh Das Begamudre, "*Extra High Voltage AC Transimission Engineering*", Third Edition , New Age International(P) Limited,Publishers.,2009.
2. .Padiyar. K.R "*HVDC Power Transmission Systems*", New Age International(P) Limited,Publishers.,2009.

REFERENCES

1. Chakrabarti.A M.L.Soni,P.V.Gupta,U.S.Bhatnagar, "*PowerSystem Engineering*", Dhanpat Rai & Co., 2010.
2. Sunil S.Rao, "*Switchgear Protection and Power Systems*",Khanna Publishers,2004.

<table>
<tr><th colspan="13">EE1116 HVDC AND EHVAC SYSTEMS</th></tr>
<tr><th colspan="2">Course designed by</th><th colspan="11">Department of Electrical and Electronics Engineering</th></tr>
<tr><td rowspan="2">1.</td><td rowspan="2">Student Outcome</td><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td><td>g</td><td>h</td><td>i</td><td>j</td><td>k</td></tr>
<tr><td>x</td><td></td><td></td><td></td><td>x</td><td></td><td></td><td>x</td><td></td><td></td><td></td></tr>
<tr><td>2.</td><td>Mapping of instructional objectives with student outcome</td><td>1</td><td></td><td></td><td></td><td>2,3</td><td></td><td></td><td>4</td><td></td><td></td><td></td></tr>
<tr><td rowspan="2">3.</td><td rowspan="2">Category</td><td colspan="2">General (G)</td><td colspan="3">Basic Sciences (B)</td><td colspan="4">Engineering Sciences and Technical Arts (E)</td><td colspan="2">Professional Subjects (P)</td></tr>
<tr><td colspan="2">--</td><td colspan="3">x</td><td colspan="4">--</td><td colspan="2">--</td></tr>
<tr><td rowspan="2">4.</td><td rowspan="2">Broad Area</td><td colspan="2">Electrical Machines</td><td colspan="3">Circuits & Systems</td><td colspan="2">Electronics</td><td colspan="2">Power Systems</td><td colspan="2">Intelligent Systems</td></tr>
<tr><td colspan="2">--</td><td colspan="3">--</td><td colspan="2">--</td><td colspan="2">--</td><td colspan="2">x</td></tr>
<tr><td>5.</td><td>Approval</td><td colspan="11">23rd meeting of Academic Council, May 2013</td></tr>
</table>

AMENDMENTS

S.No.	Details of Amendment	Effective from	Approval with date