SRM
UNIVERSITY
(Under section 3 of UGC Act 1956)

B.Tech. (Full Time) - Electronics and Instrumentation Engineering

Curriculum & Syllabus

2013 – 2014

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:

1. an ability to apply knowledge of mathematics, science, and engineering
2. an ability to design and conduct experiments, as well as to analyze and interpret data
3. 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
4. an ability to function on multidisciplinary teams
5. an ability to identify, formulate, and solve engineering problems
6. an understanding of professional and ethical responsibility
7. an ability to communicate effectively
8. the broad education necessary to understand the impact of engineering solutions in global, economic, environmental, and societal context
9. a recognition of the need for, and an ability to engage in life-long learning
10. a knowledge of contemporary issues
11. an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

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

SEMESTER I						
Course Code	**Category**	**Course Name**	**L**	**T**	**P**	**C**
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
PY1002	B	PHYSICS LABORATORY	0	0	2	1
CY1001	B	CHEMISTRY	3	0	0	3
CY1002	B	CHEMISTRY LABORATORY	0	0	2	1
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.						

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**
PD1002	G	SOFT SKILLS II	1	0	1	1
MA1002	B	ADVANCED CALCULUS AND COMPLEX ANALYSIS	3	2	0	4
PY1003	B	MATERIALS SCIENCE	2	0	2	3
CY1003	B	PRINCIPLES OF ENVIRONMENTAL SCIENCE	2	0	0	2
EI1001	P	ELECTRIC CIRCUITS AND NETWORKS	3	0	0	3
EI1002	P	CIRCUITS & DEVICES LABORATORY	0	0	3	2
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						
Course Code	**Category**	**Course Name**	**L**	**T**	**P**	**C**
LE1001	G	ENGLISH	1	2	0	2
LE1002	G	VALUE EDUCATION	1	0	0	1
CS1001	G	PROGRAMMING USING MATLAB	1	0	2	2
BT1001	B	BIOLOGY FOR ENGINEERS	2	0	0	2
CE1001	E	BASIC CIVIL ENGINEERING	2	0	0	2
ME1001	E	BASICMECHANICAL ENGINEERING	2	0	0	2
EE1001	E	BASIC ELECTRICAL ENGINEERING	2	0	0	2
EC1001	E	BASIC ELECTRONICS ENGINEERING	2	0	0	2
ME1005	E	ENGINEERING GRAPHICS	1	0	4	3
EC1002 **	E	ELECTRONICS ENGINEERING PRACTICES	0	0	2	1

EE1002 **	E	ELECTRICAL ENGINEERING PRACTICES	0	0	2	1
NC1001 NS1001 SP1001 YG1001	G	*NCC/NSS/NSO/YOGA	0	0	1	1

*NCC-National Cadet Corps
NSS-National Service Scheme
NSO-National Sports Organization (India)

*Not applicable for B.Tech. Genetic Engineering , Biotechnology and Bioinformatics programs.
**Against workshop course, students of B.Tech. ECE, ICE,EEE ,E& I and TCE shall register for EC1002 and EE 1002 only. Students of B.Tech, CSE and IT shall register for IT 1001 only. Students of all other programs shall register for ME1004 only.

SEMESTER III						
Course Code	**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
EI1003	P	DIGITAL ELECTRONICS	3	0	0	3
EI1004	P	PRINCIPLES OF COMMUNICATION ENGINEERING	3	0	0	3
EI1005	P	ELECTRONIC CIRCUITS	3	0	0	3
EI1006	P	SIGNALS AND SYSTEMS	3	0	0	3
EE1051	P	ELECTRICAL MACHINES	3	0	0	3
EI1007	P	ELECTRONIC CIRCUITS LAB	0	0	3	2

EE1052	P	ELECTRICAL MACHINES LABORATORY	0	0	3	2
TOTAL			**22**	**0**	**7**	**26**
Total Contact Hours			**29**			

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
ME1054	E	THERMODYNAMICS AND FLUID MECHANICS	3	0	0	3
EI1008	P	ELECTRICAL AND ELECTRONICS MEASUREMENTS AND INSTRUMENTATION	3	0	0	3
E1009	P	LINEAR INTEGRATED CIRCUITS AND APPLICATIONS	3	0	0	3
EI1010	P	SENSORS AND TRANSDUCERS	3	0	0	3
EI1011	P	LINEAR AND DIGITAL INTEGRATED CIRCUITS LABORATORY	0	0	3	2
EI1012	P	SENSORS AND TRANSDUCERS LABORATORY	0	0	2	1
	P	Dep. Elective I	3	0	0	3
TOTAL			**22**	**0**	**6**	**25**
Total Contact Hours			**28**			

SEMESTER V						
Course Code	**Category**	**Course Name**	**L**	**T**	**P**	**C**
PD1005	G	APTITUDE III	1	0	1	1
MA1005	B	PROBABILITY AND STATISTICS	4	0	0	4
EI1013	P	INDUSTRIAL INSTRUMENTATION	3	0	0	3
EI1014	P	CONTROL SYSTEMS ENGINEERING	3	0	0	3
EI1015	P	MICROPROCESSOR AND MICROCONTROLLER	3	0	0	3
EI1016	P	CONTROL SYSTEMS ENGINEERING LAB	0	0	2	1
EI1017	P	MICROPROCESSOR AND MICROCONTROLLER PROGRAMMING LAB	0	0	3	2
EI1047	P	INDUSTRIAL TRAINING I (Training to be undergone after IV semester)	0	0	1	1
	P	Dep. Elective -II	3	0	0	3
	P	*Open Elective I*	*3*	*0*	*0*	*3*
TOTAL			**20**	**0**	**7**	**24**
Total Contact Hours			**27**			

SEMESTER VI						
Course Code	**Category**	**Course Name**	**L**	**T**	**P**	**C**
PD1006	G	APTITUDE IV	1	0	1	1
EI1018	P	DIGITAL SIGNAL PROCESSING AND APPLICATIONS	3	0	0	3
EI1019	P	PROCESS CONTROL ENGINEERING	3	0	0	3
EI1020	P	POWER ELECTRONICS AND DRIVES	3	0	0	3
EI1021	P	PROCESS CONTROL ENGINEERING LABORATORY	0	0	3	2
EI1022	P	ELECTRONIC DESIGN PROJECT LABORATORY	0	0	3	2
EI1048	P	MINOR PROJECT	0	0	2	1
	P	Dep. Elective III	3	0	0	3

	P	*Open Elective II*	*3*	*0*	*0*	*3*
	P	*Open Elective III*	*3*	*0*	*0*	*3*
TOTAL			**19**	**0**	**9**	**24**
Total Contact Hours			**28**			

SEMESTER VII						
Course Code	**Category**	**Course Name**	**L**	**T**	**P**	**C**
EI1023	P	LOGIC AND DISTRIBUTED CONTROL SYSTEM	3	0	0	3
EI1024	P	DIGITAL IMAGE PROCESSING	3	0	0	3
EI1025	P	ROBOTICS AND AUTOMATION	3	0	0	3
EI1026	P	DIGITAL IMAGE PROCESSING LAB	0	0	2	1
EI1027	P	INDUSTRIAL AUTOMATION LABORATORY	0	0	3	2
EI1028	P	VIRTUAL INSTRUMENTATION LAB	0	0	2	1
EI1049	P	INDUSTRIAL TRAINING II (Training to be undergone after VI semester)	0	0	1	1
	P	*Dep. Elective IV*	3	0	0	3
	P	*Dep. Elective V*	3	0	0	3
TOTAL			**15**	**0**	**8**	**20**
Total Contact Hours			**23**			

SEMESTER VIII						
Course Code	**Category**	**Course Name**	**L**	**T**	**P**	**C**
EI1050	P	MAJOR PROJECT / PRACTICE SCHOOL	0	0	24	12
Total			**0**	**0**	**24**	**12**
Total Contact Hours			**24**			

DEPARTMENT ELECTIVES						
Course Code	**Category**	**Course Name**	**L**	**T**	**P**	**C**
EI1101	P	NETWORK ANALYSIS AND SYNTHESIS	3	0	0	3
EI1102	P	ELECTROMAGNETIC THEORY	3	0	0	3
EI1103	P	ANALYTICAL INSTRUMENTATION	3	0	0	3
EI1104	P	DIGITAL SYSTEM DESIGN	3	0	0	3
EI1105	P	BIOMEDICAL INSTRUMENTATION	3	0	0	3
EI1106	P	MODERN CONTROL SYSTEM	3	0	0	3
EI1107	P	INSTRUMENTATION BUSES AND DATA NETWORKS	3	0	0	3
EI1108	P	COMPUTER CONTROL OF PROCESSES	3	0	0	3
EI1109	P	AUTOTRONIX	3	0	0	3
EI1110	P	SOFT COMPUTING	3	0	0	3
EI1111	P	INSTRUMENTATION AND CONTROL IN PROCESS INDUSTRIES	3	0	0	3
EI1112	P	ADAPTIVE CONTROL SYSTEMS	3	0	0	3
EI1113	P	ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEMS	3	0	0	3
EI1114	P	POWER PLANT INSTRUMENTATION	3	0	0	3
EI1115	P	VIRTUAL INSTRUMENTATION	3	0	0	3
EI1116	P	VLSI DESIGN	3	0	0	3

Summary of Credits										
Category	**I**	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	**Total**	**%**
G (Excluding open and departmental electives)	4	4	3	3	1	1			16	8.89
B (Excluding open and departmental electives)	12	11	4	4	4				35	19.44
E (Excluding open and departmental electives)	9	4		3					16	8.89
P (Excluding open and departmental electives)		5	19	12	13	14	14	12	89	49.44
Open Elective					3	6			9	5.00
Dep. Elective				3	3	3	6		15	8.33
Total	**25**	**24**	**26**	**25**	**24**	**24**	**20**	**12**	**180**	**100**

SEMESTER – I

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, Career Development Centre, SRM Publications. 2012.

REFERENCES

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

PD1001 - SOFT SKILLS-I												
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										

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)				
	Nil				
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.K.S. Ganapathy Subramanian & V.Srinivasan, "*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. P, etal. "*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.

<table>
<tr><th colspan="13">MA1001 CALCULUS AND SOLID GEOMETRY</th></tr>
<tr><td colspan="2">Course Designed by</td><td colspan="11">Department of Mathematics</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>1-5</td><td></td><td></td><td></td><td>1-5</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="2">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="2">x</td><td colspan="4">--</td><td colspan="3">--</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="3">Intelligent Systems</td></tr>
<tr><td colspan="2">--</td><td colspan="2">--</td><td colspan="2">--</td><td colspan="2">--</td><td colspan="3">--</td></tr>
<tr><td>5.</td><td>Approval</td><td colspan="11">23rd Meeting of Academic Council, May 2013</td></tr>
</table>

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 Joshi. R, "*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.

PY1001 PHYSICS													
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	
2.	Mapping of instructional objectives with student outcome	1		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											

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 electrical characteristics of a solar cell
9. Mini Project – Concept based Demonstration

TEXT BOOKS

1. Thiruvadigal . J. D, Ponnusamy,S..Sudha.D and Krishnamohan M, "*Physics for Technologists"*, Vibrant Publication, Chennai, 2013
2. Shukla. R.K and Anchal Srivastava, "*Practical Physics*", 1st Edition, New Age International (P) Ltd, New Delhi, 2006.

REFERENCES

1. Souires. G.L, "*Practical Physics:*", 4th Edition, Cambridge University, UK, 2001.
2. 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										

CY1001	CHEMISTRY	L	T	P	C
	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. P & Arthanareeswari. M, "*Applied Chemistry", 9th Edition*, Sudhandhira Publications, 2012.
2. Dara. S.S. 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 Art (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

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.

CY100 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 objective 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										

SEMESTER – II

	SOFT SKILLS-II	L	T	P	C
PD1002	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, Career Development Centre, SRM Publications2009.

REFERENCE

1. Covey Sean, "*Seven Habit of Highly Effective Teen"*, New York, Fireside Publishers, 1998.
2. Carnegie Dale, "*How to win Friends and Influence Peopl"* 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 Science sand Technical Arts (E)				Professional Subjects (P)		
		x		--		--				--		
4.	Approval	23rd Meeting of Academic Council, May 2013										

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

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 (15hours)

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 Subramanian. K.S & 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. P, etal. "*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.

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 Prather.w, "*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		**Course Designed by**										
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										

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

To enable the students

1.	To gain knowledge on the importance of environmental education and ecosystem.
2.	To acquire knowledge about environmental pollution- sources, effects and control measures of environmental pollution.
3.	To understand the treatment of wastewater and solid waste management.
4.	To acquire knowledge with respect to biodiversity, its threats and its conservation and appreciate the concept of interdependence.
5.	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 & 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.

CY1003 – PRINCIPLES OF ENVIRONMENTAL SCIENCE												
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	x	
2.	Mapping of instructional objective with student outcome			5		2	4		1,3	3	2, 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										

EI1001	**ELECTRIC CIRCUITS AND NETWORKS**	**L**	**T**	**P**	**C**
	Total Contact Hours-45	**3**	**0**	**0**	**3**
	Prerequisite				
	Nil				

PURPOSE

To enable the students to acquire knowledge about the basics of circuit analysis, network theorems, AC circuits and transient analysis.

INSTRUCTIONAL OBJECTIVES

1.	To learn the analysis of complex circuits using mesh current and nodal voltage methods.
2.	To analyze complex circuits using network theorems.
3.	To get an insight into solution of RLC circuits.
4.	To understand the concept of complex frequency & free and forced responses of RL, RC & RLC circuits.
5.	To understand the different parameters of two port networks.

UNIT I – NETWORK ANALYSIS (9 hours)

Voltage, Current, Power and Energy – Circuit Elements(R,L,C) – Independent and Dependent Sources – Kirchhoff's Laws – Series and Parallel Combinations of Elements– Voltage Division and Current Division– Node Analysis – Mesh Analysis– Three Phase Networks– Star/Delta Connection.

UNIT II – NETWORK THEOREMS (9 hours)

Linearity– Superposition Theorem – Source Transformations–Thevenin's Theorem– Norton's Theorem– Maximum Power Transfer Theorem– Compensation Theorem– Reciprocity Theorem–Millman's Theorem–Telegen's Theorem.

UNIT III – DC CIRCUITS STEADY-STATE ANALYSIS (9 hours)

Singularity Functions– RC and RL Source-Free Circuits– Constant and Non-Constant Forcing Functions – Initial and Final Values – RLC Circuits– Time-Domain Analysis.

UNIT IV – SINUSOIDAL STEADY-STATE ANALYSIS (9 hours)

Sinusoids– Complex Numbers– Complex, Exponential Representations of Sinusoids– Impedance and Admittance– Analysis and Network Theorems for Sinusoidal Steady-State– Frequency Response– Resonance– Power Analysis– Instantaneous and Average Power– Power Factor and Power Factor Correction– Complex Power.

UNIT V – TWO PORT NETWORKS **(9 hours)**

Introduction– T-to- Π Transformation– Two- Port Three Terminal Networks– Equations of Two-Port Networks– Z andY Parameters– Hybrid and Transmission Parameters– Relationships Between Two-Port Parameters– Inter-connection of Two-Port Networks– Lattice Networks.

TEXT BOOKS

1. William Hayt, Jack.E.Kemmerley and Steven. M. Durbin, "*Engineering circuit Analysis"*, Tata McGraw-Hill, Sixth Edition, Reprint, 2008.
2. M.E.VanValkenburg, "*Network Analysis*", Prentice-Hall, Third Edition, 1974.
3. Vasudev. K, Aatre, "*Network Theory and Filter Design"*, John Wiley& Sons, Second Edition, 1987.

REFERENCES

1. Joseph. A, Edminister, "*Theory and Problems of Electric Circuits"*, Schaum's Outline Series, McGraw-Hill Book Company, Fourth Edition, 2003.
2. Richard. C, Dorf & James. A, Svoboda, "*Introduction to Electric Circuits*", John Wiley& Sons, Eighth Edition, 2010.
3. Sudhakar. A and ShyammohanS.Palli, "*Circuits and Networks Analysis and Synthesis"*, Tata McGraw- Hill Publishing Company Limited, Third Edition, 2008.

EI1001 ELECTRIC CIRCUITS AND NETWORKS												
Course Designed by		**Department of Electronics and Instrumentation 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	1,2,3	3,4	3,4	4,5	3,4,5					3	5
3	Category	General (G)		Basic Sciences (B)			Engineering Sciences and Technical Arts (E)				Professional Subjects (P)	
		--		--			--				X	
4	Broad Area	Electronics Engineering		Instrumentation Engineering			Control Engineering				Electrical Engineering	
		--		--			--				X	
5	Approval	23rd meeting of Academic Council, May 2013										

EI1002	CIRCUITS AND DEVICES LABORATORY	L	T	P	C
	Total Contact Hours – 45	0	0	3	2
	Prerequisite				
	Nil				

PURPOSE

To gain practical knowledge about basic electrical circuits, theorems in circuit analysis and fundamental characteristics of electronic devices.

INSTRUCTIONAL OBJECTIVES

1.	Design circuits for verifying theorems in circuit analysis.
2.	Understand transient analysis of AC circuits.
3.	Get an insight into solution of RLC circuits, analysis of coupled circuits.
4.	Determine the characteristics of electronic devices.

LIST OF EXPERIMENTS

1. Verification of KVL and KCL.
2. Verification of Thevenin and Norton Theorems.
3. Verification of superposition Theorem.
4. Verification of Maximum power transfer and reciprocity theorems.
5. Verification of Compensation theorems.
6. Frequency response of series and parallel resonance circuits.
7. Transients in RLC circuits.
8. Characteristics of PN and Zener diode.
9. Characteristics of CE/CB/CC configuration.
10. Characteristics of JFET and MOSFET.
11. Characteristics of Diac and Triac.
12. Characteristics of Photodiode and Phototransistor.

REFERENCES

1. Obert. L, Boylestad and Louis Nashesky, *"Electronic Devices and Circuit Theory",* 10th Edition, Pearson Prentice Hall, 2009.
2. *"Circuits and devices"* laboratory manual.

EI1002 CIRCUITS AND DEVICES LABORATORY												
Course Designed by		**Department of Electronics and Instrumentation Engineering**										
1.	Student outcome	a	b	c	d	e	f	g	h	i	j	k
		x	x	x	x	x					x	
2.	Mapping of instructional objectives with student outcome	1,2, 3	3,4	3,4	4	3,4					3	
3.	Category	General (G)		Basic Sciences (B)			Engineering Sciences and Technical Arts (E)				Professional Subjects (P)	
		--		--			--				X	
4.	Broad Area	Electronics Engineering		Instrumentation Engineering			Control Engineering				Electrical Engineering	
		X		--			--				--	
5.	Approval	23rd Meeting of Academic Council, May 2013										

TABLE I

	ENGLISH	**L**	**T**	**P**	**C**
LE1001	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. 2Meenakshi 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 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				
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 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.	Approval	23rd Meeting of Academic Council, May 2013										

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

CS1001 PROGRAMMING USING MATLAB												
Course Designed by		Department of Computer Science and Engineering										
1.	Student outcome	a	b	c	d	e	f	g	h	i	j	k
		x	x									x
2.	Mapping of instructional objective with student outcome	2,3	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										

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. S ,Rajesh. M.P Nazeer. R, Richard Thilagaraj. S, Barathi, 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. Kandel. Eric. R, 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										

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 MATERIALS (6 hours)

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 (6 hours)

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 (6 hours)

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 (6 hours)

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 (6 hours)

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.

REFERENCES

1. Raju. K.V.B, Ravichandran. P.T, "*Basics of Civil Engineering"*, Ayyappa Publications, Chennai, 2012.
2. Ramesh Babu, "*Civil Engineering"* , VRB Publishers, Chennai, 2000.
3. Rangwala,S.C., "*Engineering Materials"*, Charotar Publishing House, Anand, 2012.
4. National Building Code of India, Part, "*Building Materials"*, 2005.
5. 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										

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 **(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

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.	Approval	23rd meeting of the 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

Dash.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, S.Chand & Co, 2012.
3. Kothari D. P and Nagrath IJ, "*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 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.	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										

EC1001	BASIC ELECTRONICS ENGINEERING	L	T	P	C
	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.T.P, Rangaswamy.T.R, *"Engineering Basics: Electrical, Electronics and Computer Engineering"*, New Age International, Third Edition, 2007.
2. Somanathan Nair.B, Deepa.SR, "*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	1,2,3										
3.	Category	General (G)		Basic Sciences (B)		Engineering Sciences & Technical Arts (E)				Professional Subjects (P)		
		--		--		x				--		
4.	Approval	23rd Meeting of Academic Council, May 2013										

ME1005	**ENGINEERING GRAPHICS**	**L**	**T**	**P**	**C**
	Total Contact Hours - 75	**1**	**0**	**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)

TEXT BOOKS

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.

REFERENCES

1. Bethune.J.D, "Engineering Graphics with AutoCAD 2013", PHI Learning Private Limited, Delhi, 2013.
2. Bhatt. N.D, "*Elementary Engineering Drawing (First Angle Projection)"*, Charotar Publishing Co., Anand, 1999.
3. Narayanan. K.L, and Kannaiah. P, "*Engineering Graphics"*, Scitech Publications, Chennai, 1999.
4. Shah. M.B and Rana. B.C, "*Engineering Drawing"*, Pearson Education (Singapore) Pvt. Ltd., New Delhi, 2005.

ME1005 ENGINEERING GRAPHICS												
Course Designed by		**Department of Mechanical 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				1-4				
3.	Category	General (G)		Basic sciences (B)		Engineering sciences and technical art (E)				Professional subjects (P)		
		--		--		x				--		
4.	Approval	23rd meeting of the 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

TEXT BOOKS

1. Orcad User manual.
2. Raghbir Singh Khandpur, "Printed Circuit Boards: Design, Fabrication, and Assembly", Tata McGraw-Hill Education, 2005.

REFERENCE

1. Department Laboratory Manual.

<table>
<tr><th colspan="13">EC1002 ELECTRONICS ENGINEERING PRACTICE</th></tr>
<tr><td colspan="2">Course Designed by</td><td colspan="11">Department of Electronics and Communication 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>
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<tr><td>2.</td><td>Mapping of instructional objectives with student outcome</td><td>1</td><td>2,3</td><td>2,3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>1-4</td></tr>
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<tr><td>4.</td><td>Broad Area</td><td colspan="2">Electrical Machines</td><td colspan="2">Circuits & Systems</td><td colspan="3">Electronics</td><td>Power Systems</td><td colspan="2">Intelligent Systems</td></tr>
<tr><td>5.</td><td>Approval</td><td colspan="11">23rd Meeting of Academic Council, May 2013</td></tr>
</table>

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. S & Balasubramanian. S, " *A Primer on engineering practices laboratory*", Anuradha Publications, 2007
3. Jeyapoovan. T Saravanapandian.M, & 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.	Broad Area	Electrical Machines		Circuits and Systems		Electronics			Power System		Intelligent Systems	
		--		x		--			--		--	
5.	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 Outcome	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 – 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

LE1003 GERMAN 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							1-5				
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										

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

LE1004 FRENCH 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							1-5				
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										

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

1. 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 and Technical 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

2. 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.

LE1006 KOREAN 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 and Technical Arts (E)				Professional Subjects (P)		
		x		--		--				--		
4.	Approval	23rd Meeting of Academic Council, May 2013										

LE1007	CHINESE 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 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

1. 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.

LE1007 CHINESE 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 and Technical Arts (E)				Professional Subjects (P)		
		x		--		--				--		
4.	Broad Area	Electrical Machines		Circuits & Systems		Electronics		Power Systems		Intelligent Systems		
5.	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

UNITII - 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

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

REFERENCE

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><th colspan="13">PD1003 – APTITUDE-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>
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<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="2">Basic Sciences (B)</td><td colspan="4">Engineering Sciences and Technical Arts (E)</td><td colspan="3">Professional Subjects (P)</td></tr>
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<tr><td>4.</td><td>Approval</td><td colspan="11">23rd Meeting of Academic Council, May 2013</td></tr>
</table>

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

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. P, etal. *"Engineering Mathematics",* Vol. II & Vol. III (4th revised edition), S.Chand & 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											

	DIGITAL ELECTRONICS	L	T	P	C
EI1003	Total Contact Hours – 45	**3**	**0**	**0**	**3**
	Prerequisite				
	Nil				

PURPOSE

To introduce the fundamentals of digital circuits, combinational and sequential circuits.

INSTRUCTIONAL OBJECTIVES

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

UNIT 1 – NUMBER SYSTEM & BOOLEAN ALGEBRA (9 hours)

Review of number system – types and conversion – codes – Boolean algebra – De– Morgan's theorem – switching functions and simplification using K Maps – Quine McCluskey method.

UNIT II – COMBINATIONAL CIRCUITS (9 hours)

Design of logic gates – design adder – subtractor – comparators – code converters – encoders – decoders – multiplexers and demultiplexers – function realization using gates & multiplexers.

UNIT III – SYNCHRONOUS SEQUENTIAL CIRCUITS (9 hours)

Flip flops – SR, D, JK, T and Master slave flip flop – analysis of synchronous sequential circuits – design of synchronous sequential circuits – completely and incompletely specified sequential circuits – state diagram – state reduction – state assignment – counters – synchronous– asynchronous – up – down counter– modulo counter – ring counter– Johnson counters – shift registers.

U**NIT IV – ASYNCHRONOUS SEQUENTIAL CIRCUIT (9 hours)**

Analysis of asynchronous sequential machines – state assignment – asynchronous design problem.

UNIT V – MEMORY DEVICES AND LOGIC FAMILIES (9 hours)

Introduction to memory organization and operation– introduction to different types of memories such as RAM – PROM – EPROM – EEPROM – RAM – PLA – PAL– PLD.– digital logic families – TTL – ECL – CMOS

TEXT BOOKS

1. Morris Mano M, "*Digital Logic and Computer Design*", Prentice Hall of India, 2002.
2. Floyd, "*Digital Fundamentals*", 8th edition, Pearson Education, 2003.

REFERENCES

1. Charles. H, Roth, "*Fundamentals Logic Design*", Jaico Publishing, IV edition, 2002.
2. John Yarbrough. M, *"Digital Logic, Application & Design*", Thomson, 2002.
3. John Wakerly. F, "*Digital Design Principles and Practice*", 3rd edition, Pearson Education, 2002.

EI1003 DIGITAL ELECTRONICS												
Course Designed by		**Department of Electronics and Instrumentation 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	2,3	2,3,4	4	2,3	4					2,3
3.	Category	General (G)		Basic Sciences (B)			Engineering Sciences and Technical Arts (E)			Professional Subjects (P)		
		--		--			--			X		
4.	Broad Area	Electronics Engineering		Instrumentation Engineering			Control Engineering			Electrical Engineering		
		x		--			--			--		
5.	Approval	23rd meeting of Academic Council– May 2013										

EI1004	**PRINCIPLES OF COMMUNICATION ENGINEERING**	**L**	**T**	**P**	**C**
	Total Contact Hours - 45	**3**	**0**	**0**	**3**
	Prerequisite				
	Nil				

PURPOSE

To know about the basics of communication engineering such as analog modulation (AM, FM, Transmission, Reception), and pulse modulation methods.

INSTRUCTIONAL OBJECTIVES	
1.	To know the AM and FM modulation and demodulation.
2.	To know the different methods of radio receiver for AM & FM
3.	To understand the different types of Pulse modulation-PAM, PWM, PPM.
4.	To obtain the knowledge of fundamentals of TV.

UNIT I – AMPLITUDE MODULATION (9 hours)

Introduction – Amplitude modulation – Generation of AM waves – Double side band full carrier – Double sideband suppressed carrier – Single side band modulation – Vestigial side band modulation – Demodulations of AM waves – Comparisons of various AM systems – AM transmitters – Low level transmitters and high level transmitters.

UNIT II – ANGLE MODULATION (9 hours)

Angle modulation – Narrowband FM and wide band FM – Multitone FM. Direct method – Frequency modulator – FM Transmitter – FM demodulator – Slope detector – PLL – Introduction to Phase modulation.

UNIT III – RADIO RECEIVERS (9 hours)

TRF and super heterodyne receivers – RF, mixer and IF stages, choice of IF, image frequency, alignment and tracking of radio receivers, AGC, Tone and volume controls – Receiver characteristics and their measurements – FM receivers – Fading and diversity reception.

UNIT IV – DISCRETE MODULATION (9 hours)

Introduction to pulse modulation – Sampling theorem – PAM – Natural sampling, flat top sampling – PAM modulator and demodulator – Generation of PTM signals – Modulation and demodulation of PWM and PPM – Comparisons of pulse modulation technique.

UNIT V – TELEVISION (9 hours)

Elements of Television system – Basic blocks of television transmitter and receiver, camera , picture tube, Scanning, flicker, interlaced scanning, Horizontal and vertical resolution, composite video signal – Vertical and horizontal synchronization – Television camera – Working principle of CCD colour television camera – Block schematic explanation, transmission of sound signal.

TEXT BOOKS

1. Singh. R.P and Sapre. S.D, "*Analog and Digital Communication Systems*", McGraw-Hill Publishing Company Ltd., 2003.
2. Kennedy. G, "*Electronic Communication Systems*", McGraw-Hill, 4th Edition, 2003.

REFERENCES

1. Gulati. R.P, "*Modern Television Practice Principles*", Technology and Servicing",New Age International Pvt. Ltd., 2002.
2. Haykins. S, "*Communication Systems*", 4th Edition, John Wiley Inc., 2000.
3. Simon Haykin, "*Introduction to "Analog and Digital Communication systems*", John Wiley and Sons, 3rd Edition, 2001.

EI1004 PRINCIPLES OF COMMUNICATION ENGINEERING												
Course Designed by		**Department of Electronics & Instrumentation**										
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		2,3	2,4	2,3,4			1			
3.	Category	General (G)		Basic Sciences (B)			Engineering Sciences and Technical Arts (E)			Professional Subjects (P)		
		--		--			--			X		
4.	Broad Area	Electronics Engineering		Instrumentation Engineering			Control Engineering			Electrical Engineering		
		x		--			--			--		
5.	Approval	23rd Meeting of Academic Council, May 2013										

EI1005	ELECTRONIC CIRCUITS	L	T	P	C
	Total Contact Hours – 45	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

The aim of this course is to familiarise the student with the analysis and design of basic transistor amplifier circuits, tuned amplifiers, wave shaping, multi vibrator circuits and power supplies.

INSTRUCTIONAL OBJECTIVES

1.	To learn the biasing methods of transistors.
2.	To understand the various advantages and method of analysis of feedback.
3.	To analyse many simple feedback amplifier circuits and to design LC Oscillators.
4.	To analysis large signal power amplifiers and design wave shaping circuits and multi vibrators.
5.	To analyse and design the rectifiers and power supplies.

UNIT I – TRANSISTOR BIASING CIRCUITS (9 hours)

BJT - Biasing - DC Load line, AC load line - Operating point - Fixed bias - Emitter stabilized network - Voltage Divider bias- Design of Bias circuit with emitter resistor- Bias stabilization -FET Biasing-Fixed Bias, Self Bias - Voltage Divider Bias.

UNIT II – DESIGN AND ANALYSIS OF SMALL SIGNAL AMPLIFIERS (9 hours)

BJT Transistors Modelling - Hybrid Equivalent circuit- BJT - small signal analysis CE, CB, CC amplifiers - FET Small signal analysis - CS, CG and Source follower- Multistage amplifiers- Cascade Connection- Darlington Connection –Emitter coupled differential Amplifier Analysis- Single tuned Amplifiers –Double tuned amplifiers-Stagger tuned amplifiers& their frequency response

UNIT III – FEEDBACK AMPLIFIERS AND OSCILLATORS (9 hours)

Feedback Amplifiers: Classification of feedback amplifiers-Effect of feedback on amplifier characteristics-Voltage series-shunt, current series-shunt feedback configurations

Oscillators: Conditions for oscillation –LC & RC type oscillators- Colpitts, Hartley Oscillator and Crystal, RC phase Shift Oscillator - Wein Bridge Oscillator and Quartz Oscillator.

UNIT IV – LARGE SIGNAL AMPLIFIERS &WAVE SHAPING CIRCUITS (9 hours)

Large signal Amplifiers: Classification of power amplifiers (Class A, B, AB, C&D), Efficiency of class A, RC coupled and transformer-Coupled power amplifiers-Class B complementary-symmetry, push-pull power amplifiers- Calculation of power output, efficiency and power dissipation-Crossover distortion. **Wave shaping Circuits:** RC Wave Shaping Circuits - Diode Clampers and Clippers - Multivibrator - Monostable - Astable and bistable multivibrator - Schmitt Triggers.

UNIT V – RECTIFIERS AND POWER SUPPLIES (9 hours)

Half wave & Full wave bridge Rectifier with R load- Analysis for DC voltage and ripple voltage with C, CL, L-C and C-L-C filters- Regulated dc power supplies- Line regulation, output resistance and temperature coefficient-Series Voltage Regulation - Shunt Voltage Regulation – Switched Mode Power Supply

TEXT BOOKS

1. Robert L.Boylestad and Louis Nashesky, "*Electronic Devices and Circuit Theory*", 10th Edition, Pearson Prentice Hall, 2009.
2. David A. Bell, "*Electronic Devices and Circuits*", 3rd Edition, Prentice Hall Publications, 1986.

REFERENCES

1. Milman. J and Halkias. C, "*Integrated Electronics*", 1stEdition, Tata McGraw Hill Ltd, 2001.
2. Donald Schilling, "*Electronic Circuits*", 3rd edition, Tata McGraw Hill, 1989.
3. Thomas L.Floyd, *"Electronic Devices*", 9th Edition, Pearson Education, 2011.

EI1005 ELECTRONIC CIRCUITS												
Course Designed by		**Department of Electronics and Instrumentation 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	3,4		1,5	2,3,4						4,5
3.	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts (E)				Professional Subjects (P)		
		-		-		-				x		
4.	Broad Area	Electronics Engineering		Instrumentation Engineering		Control Engineering				Electrical Engineering		
		x		--		--				--		
5.	Approval	23rd Meeting of Academic Council, May 2013										

EI1006	**SIGNALS AND SYSTEMS**	**L**	**T**	**P**	**C**
	Total Contact Hours – 45	**3**	**0**	**0**	**3**
	Prerequisite				
	Nil				

PURPOSE

To familiarize the fundamentals of signals and systems which are basic to Digital Signal Processing.

INSTRUCTIONAL OBJECTIVES

1.	To study the basics of Signals and Systems.
2.	To learn the various transform techniques applicable to signals and systems.
3.	To analyze and understand characterization of the CT signal and system.
4.	To analyze and understand characterization of the DT Signal and system.
5.	To understand the basics of Z –transform and inverse Z-transform.

UNIT I – BASICS OF SIGNALS AND SYSTEMS (9 hours)

Continuous time signals (CT signals)- Discrete time signals (DT signals) – Step- Ramp- Pulse- Impulse- Exponential- classification of CT and DT signals –periodic and aperiodic signals- random signals- Energy & Power signals - CT systems and DT systems- Transformation of signals-Classification of systems.

UNIT II – ANALYSIS OF CONTINUOUS TIME SIGNALS (9 hours)

Fourier series analysis- spectrum of Continuous Time (CT) signals- Fourier and Laplace Transforms in Signal Analysis.

UNIT III – LINEAR TIME INVARIANT –CONTINUOUS TIME SYSTEMS (9 hours)

Differential Equation-Block diagram representation-impulse response- convolution integrals-Fourier and Laplace transforms in Analysis- State variable equations and matrix of systems.

UNIT IV – ANALYSIS OF DISCRETE TIME SIGNALS (9 hours)

Baseband Sampling of CT signals- Aliasing- DTFT and properties- Z-transform &Properties- Inverse Z-transform

UNIT V – LINEAR TIME INVARIANT –DISCRETE TIME SYSTEMS (9 hours)

Difference Equations-Block diagram representation-Impulse response-Convolution sum- DTFT and Z Transform analysis of Recursive & Non-Recursive systems- State variable equations and matrix representation of systems.

TEXT BOOKS

1. Allan. V.Oppenheim-S.Wilsky and S.H.Nawab,"*Signals and Systems*", 2nd edition-Pearson, 2007.
2. Simon Haykins and Barry Van Veen, "*Signals and Systems*", 2nd edition-John Wiley & sons, 2003.

REFERENCE

1. John. G, .Proakis and Dimitris. G Manolakis, "*Digital signal processing-Principles-Alogrithms and Applications*", 3rd edition-PHI, 2000.
2. Lindner- "*Signals and Systems*", 2nd edition-McGraw Hill International, 2003.

EI1006 SIGNALS AND SYSTEMS												
Course Designed by		**Department of Electronics and Instrumentation 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	1,2,5	1,2		1,2,5	1,2	1			1,2,5		1,5
3.	Category	General (G)		Basic Sciences (B)			Engineering Sciences and Technical Arts (E)				Professional Subjects (P)	
											x	
4.	Broad Area	Electronics Engineering		Instrumentation Engineering			Control Engineering				Electrical Engineering	
		x		--			--				--	
5.	Approval	23rd Meeting of Academic Council, May 2013										

EE 1051	ELECTRICAL MACHINES	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite				
	EE1001-Basic Electrical Engineering				

PURPOSE

To give students, a fair knowledge on the working of various electrical machines

INSTRUCTIONAL OBJECTIVES

1. To understand the construction, working, characteristics and applications of DC generators & DC motors.
2. To understand the construction, working, characteristics and testing of single phase transformers.
3. To understand the principle of operation, construction and characteristics of 3 phase induction motor.
4. To understand the construction and characteristics of single phase induction motor and some special motors
5. To analyze the constructions and performance of synchronous machines.

UNIT I - DC MACHINES (9 hours)

Constructional details of DC machine - working principle of DC generator - Types of Generators - EMF equation - No load and load characteristics. Principle of operation of DC motors - Back emf - Torque equation - characteristics of shunt, series and compound motors.

UNIT II -TRANSFORMER (9 hours)

Principle of operation - Constructional features of single phase transformers - EMF equation - Transformer on No load and on load - Effects to resistance and leakage reactance of the windings - Equivalent circuit - Voltage regulation. Testing of transformer: load test, open circuit and short circuit test, Sumpner's test.

UNIT III - THREE PHASE INDUCTION MOTOR (9 hours)

Construction - Production of rotating magnetic field- Principle of operation - Torque equations - Torque slip characteristics- Power stages- No load & blocked rotor tests – Equivalent circuit - Methods of speed control and starters.

UNIT IV- FRACTIONAL HORSE POWER MOTORS (9 hours)

Single phase induction motors – Double revolving field theory – Equivalent circuit – Starting methods of Single phase motors – Special motors: shaded pole motor, reluctance motor, repulsion motor, Universal motor.

UNIT V - SYNCHRONOUS MACHINES (9 hours)

Constructional features of synchronous machines - types - emf equation - brief idea of armature reaction - . voltage regulation (EMF method only) - Phasor diagram.

Working principle of synchronous motors - Types of excitation - Constant load variable excitation - Constant excitation variable load - Phasor diagram - Starting methods.

TEXT BOOK

1. Deshpande M.V, *"Electrical Machines",* PHI Learning Private Limited, New Delhi, 2011.

REFERENCES

1. Nagarath.I.J, and Kothari.D.P, "*Electrical Machines"*, Tata McGraw Hill Publishing Company, New Delhi, 4th edition, 2010.
2. Del Toro, "*Electrical Engineering Fundamentals",* Pearson Education, New Delhi, 2007.
3. John Bird, "*Electrical Circuit theory and technology",*Elsevier, Indian edition, 2007.
4. Bimbhra. P.S,*"Electrical Machinery"*,Khanna Publishers,7th edition..
5. Thereja .B.L "*A Text book of Electrical Technology*", Volume- II, S.Chand & Co Ltd, 2008.
6. Dr. Sen S.K, "*Electrical Machinery"*, Khanna Publishers,4th edition, 2008.

EE1051 – ELECTRICAL MACHINES												
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	1,2,3,4,5	1,2,3,4,5			1,2,3,4,5						
3.	Category	General (G)		Basic Sciences (B)			Engineering Sciences and Technical Arts(E)			Professional Subjects (P)		
		--		--			--			x		
4.	Broad Area	Electronics Engineering		Instrumentation Engineering			Control Engineering			Electrical Engineering		
		--		--			--			x		
5.	Approval	23rd Meeting of Academic Council, May 2013										

EI1007	ELECTRONIC CIRCUITS LABORATORY	L	T	P	C
	Total Contact Hours-45	0	0	3	2
	Prerequisite				
	Nil				

PURPOSE

To gain knowledge in designing basic electronic circuits and to study their operation practically.

INSTRUCTIONAL OBJECTIVES

1.	To know the design procedure of various electronic circuit configurations
2.	To have an idea about the frequency response of amplifiers
3.	To have a clear understanding of operation of oscillators and power supplies
4.	To study about the different types of feedback circuits

LIST OF EXPERIMENTS

1. Series and Shunt feedback amplifiers
2. Design of Wein bridge oscillator
3. Design of transistor RC phase shift oscillator
4. Design of LC–Hartley and Colpitt oscillator
5. Class C tuned amplifier
6. Integrators and Differentiators
7. Clippers and Clampers
8. Design of Half Wave Rectifier circuit
9. Design of Full Wave Rectifier circuit
10. Design of Monostable Multivibrator
11. Design of Astable Multivibrator
12. Design of Bistable Multivibrator

REFERENCES

1. Electronic Circuits Laboratory Manual.

EI1007 ELECTRONICS CIRCUITS LABORATORY												
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		x			x			x
2.	Mapping of instructional objectives with student outcome	2,3,4	1,4	1		2,3			1			1,2,3
3.	Category	General (G)		Basic Sciences (B)			Engineering Sciences and Technical Arts(E)				Professional Subjects (P)	
		--		--			--				X	
4.	Broad Area	Electronics Engineering		Instrumentation Engineering			Control Engineering				Electrical Engineering	
		X		--			--				--	
5.	Approval	23rd Meeting of Academic Council, May 2013										

	ELECTRICAL MACHINES LAB	L	T	P	C
EE1052	Total Contact hours - 45	**0**	**0**	**3**	**2**
	Prerequisite				
	NIL				

PURPOSE

To gain practical knowledge in various electrical machines

INSTRUCTIONAL OBJECTIVES

1.	To obtain Performance characteristics of given generators and motors
2.	To obtain Performance characteristics of single phase transformer

LIST OF EXPERIMENTS

1. OCC and Load characteristics of DC Shunt Generator
2. Load test on DC shunt motor
3. Load test on DC series motors.
4. Speed control of DC Shunt motor
5. Load test on single phase transformer
6. OC & SC test on single phase transformer
7. Sumpner's test.
8. Load test on three phase induction motor
9. Equivalent circuit by no load & blocked rotor tests
10. Load test on single phase induction motor
11. Voltage regulation by EMF method
12. Construction of V and inverted V curves

REFERENCE

1. Electrical machines Laboratory Manual.

EE1052 - ELECTRICAL MACHINES LAB												
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 and Technical Arts(E)			Professional Subjects (P)		
		--		--			--			x		
4.	Broad Area	Electronics Engineering		Instrumentation Engineering			Control Engineering			Electrical Engineering		
		--		--			--			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 A1. Deutsch als Fremdsprache with CD.(Kursbuch und Sprachtraining).

REFERENCES

1. German for Dummies
2. Schulz Griesbach

LE01008 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.

U.NIT 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

1. 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)**

ction 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)**

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

1. 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

1. 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
4. Collection of vocabularies for engineering field.

LE1011 KOREAN 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ˆyou˘好ˆgood 'well˘

工作ˆwork 'job˘人员ˆpersonnel 'staff member˘ 请问ˆMay I ask…˘ 贵ˆexpensive 'valuable˘ 姓ˆone'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ˆfamily 'homeˇ 有ˆhaveˇ 几ˆseveralˇ
爸爸 (fatherˇ 妈妈 (mother) 哥哥 (elderly brotherˇ

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ˆguest,visitorˇ这儿ˆhereˇ中文ˆChineseˇ 对ˆright, correctˇ
学生ˆstudentˇ 多ˆmany, a lotˇ
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

1. 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

LE1012 CHINESE 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										

	APTITUDE-II	L	T	P	C
PD1004	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.

UNITI **(6 hours)**

Critical Reasoning – Essay Writing

UNIT II **(6 hours)**

Synonyms – Antonyms - Odd Word - Idioms & Phrases

UNIT III **(6 hours)**

Word Analogy - Sentence Completion

UNITIV **(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

REFERENCE

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

<table>
<tr><th colspan="13">PD1004 - APTITUDE-II</th></tr>
<tr><th colspan="2">Course Designed by</th><th colspan="11">Career Development Centre</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>
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<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</td><td></td><td></td><td></td><td></td></tr>
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<tr><td>4.</td><td>Approval</td><td colspan="11">23rd Meeting of Academic Council, May 2013</td></tr>
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	NUMERICAL METHODS	L	T	P	C
MA1004	Total Contact Hours - 60	4	0	0	4
	(Common to Auto, Aero, Mech, Mechatronics, EEE, Civil , Chemical, ICE & EIE)				
	Nil				

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. SRK 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 etal. 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										

ME1054	THERMODYNAMICS AND FLUID MECHANICS	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite				
	NIL				

PURPOSE

This course provides the basic knowledge about Thermodynamics and Fluid Mechanics.

INSTRUCTIONAL OBJECTIVES

1.	Understand the thermodynamic laws and their applications.
2.	Understand the principles of Air Standard Cycles and Rankine Cycles.
3.	Understand the principles of Refrigeration & Air Conditioning Systems and Air Compressors.
4.	Understand the principles of Fluid Mechanics and the Measurement Techniques of Fluid properties

UNIT I - BASICS OF THERMODYNAMICS (9 hours)

Systems, Zeroth Law, First Law - Concept of Internal Energy and Enthalpy- Applications to closed and open systems - Second Law - Concept of Entropy - Clausius Inequality.

UNIT II - CYCLES AND SYSTEMS (9 hours)

Otto, Diesel and Brayton cycles. IC engines - 4 stroke and 2 stroke engines - Brake power - Efficiencies - Heat Balance test - Simple problems only. Properties of steam - Use of steam tables and mollier diagram -Rankine cycle - Simple problems.

UNIT III - REFRIGERATION AND AIR CONDITIONING SYSTEMS (9 hours)

Vapour compression Refrigeration systems - COP - Simple problems – Basics and Types of Air Conditioning systems. Reciprocating compressors - Volumetric efficiency - Power required -Simple problems - Rotary compressors. Heat transfer - Modes of heat transfer - Simple problems on conduction-Composite wall, Cylinder & Sphere - Convection -Flow over flat plate-and Radiation.

UNIT IV- BASICS OF FLUID MECHANICS (9 hours)

Introduction - Properties of fluid - Density, viscosity, pressure and velocity - Types of fluid flow - Continuity equation - Energy / Head of fluid - Euler's equation - Bernoulli's equation, flow through pipes - Hagen Poiseulli's law - major and minor losses.

UNIT V - FLUID MEASUREMENTS **(9 hours)**

Flow Measurements - Orifice meter, Venturimeter. Rota meter and Elbow meter. Pressure Measurement -Total and static pressure measurements using pitot tube, manometer, mechanical gauges. Velocity Measurements - Anemometers - Cup and Vane types, Hot wire anemometers, Laser anemometers.

TEXT BOOKS

1. Sarkar B.K, "*Thermal Engineering"*, Tata McGraw Hill Co. Ltd., India, 2005.
2. Rajput.R.K. "*Fluid Mechanics and Hydraulic Machines"*, S.Chand & Co., India 2008.
3. Nag.P.K., "*Engineering Thermo Dynamics"*, Tata McGraw Hill Co. Ltd., India, 2005.

REFERENCES

1. Rajput. R.K, *"Thermal Engineering"*, Laxmi Publications (P) Ltd., New Delhi, Edition. 2010
2. Kumar D.S, "*Fluid Mechanics and Fluid Power Engineering"*, Kataria. S.K & Sons Publishers, India, 6th Edition, 2003

ME1054 – THERMODYNAMICS AND FLUID MECHANICS												
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	1-4				1,2,3						
3.	Category	General (G)			Basic Sciences (B)		Engineering Sciences and Technical Arts (E)				Professional Subjects (P)	
		--			--		--				x	
4.	Broad Area	Manu factoring			Design		Thermal				General	
		--			--		x				--	
5.	Approval	23rd Meeting of Academic Council, May 2013										

	ELECTRICAL AND ELECTRONICS MEASUREMENTS AND INSTRUMENTATION	L	T	P	C
EI1008	Total Contact Hours - 45	**3**	**0**	**0**	**3**
	Prerequisite				
	Basic Knowledge in Electrical and Electronics				

PURPOSE

To enable the students to learn in detail about the various instruments available for monitoring/measuring electrical parameters encountered in domestic / industrial applications.

INSTRUCTIONAL OBJECTIVES

1.	To understand and learn the different principles and instruments adopted for measurement of current, voltage, power, energy etc.
2.	To study different methods available for measurement of passive elements like resistance, inductance & capacitance.
3.	To solve problems in the various electrical parameter measurements.
4.	To study the storage of digital signal and analyzers for analyzing digital signal to provide with meaning full information.

UNIT I – MEASUREMENT OF CURRENT AND VOLTAGE (9 hours)

Introduction to electrical measurements – Classification of analog instruments – Galvanometers – vibration, tangent and d'Arsonval type. Principle of operation, construction, sources of errors and compensations in PMMC – Moving iron – Dynamometer and induction type instruments. Extension of ranges and calibration of ammeters & voltmeters.

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

Power measurement – Voltmeter ammeter method, Electrodynamic wattmeter – Theory, errors and compensation methods – Low power factor wattmeter – Power measurement in poly-phase systems-Energy measurement – Single phase and poly phase induction type energy meter – theory and adjustments –DC energy meter – Testing of energy meters – Calibration of wattmeter and energy meter.

UNIT III – MEASUREMENT OF RESISTANCE AND IMPEDANCE (9 hours)

Low Resistance: Kelvin's double bridge and Ductor Ohmmeter method - **Medium Resistance:** Voltmeter Ammeter method – Substitution method – Wheatstone bridge method v High Resistance: Megger– Direct deflection method – Megohm bridge method – Earth resistance measurement. Introduction to A.C. bridges Sources and Detectors in A.C. bridges. Measurement of Self Inductance: Maxwell's bridge – Hay's bridge, and Anderson's bridge. Measurement of Mutual Inductance: Heaviside M.I. bridge – Measurement of Capacitance: Schering's bridge – De-Sauty's bridge Measurement of frequency using Wien's bridge.

UNIT IV – OSCILLOSCOPES & SIGNAL GENERATORS (9 hours)

CRO – General purpose and advanced type – Sampling and storage scopes – Signal and function generators – Noise generators – Pulse and square wave generator –Sweep generator – Wobbluscope– Pattern generator.

UNIT V – RECORDING DEVICES AND WAVE ANALYSERS (9 hours)

Signal recorders – X-Y recorder – Magnetic tape recorders – Digital recording and data loggers – Basic wave analyzer – Frequency selective and heterodyne spectrum analyzer – Fundamental type harmonic distortion analyzers – Distortion factor meter – Q meter – Distortion analyzers using resonance bridge, Wien bridge, bridge – T Method – Impedance measurement.

TEXT BOOKS

1. Sawhney A.K, "*A Course in Electrical and Electronics Measurements and "Instrumentation*", 18th Edition, DhanpatRai & Company Private Limited, 2007.
2. Golding. E. W, and Widdis F.C, "*Electrical Measurements and Measuring" Instruments"*, 5th Edition, A.H.Wheeler&Company, 2003.

REFERENCES

1. Kalsi.H.S,"*Electronic Instrumentation*", 2nd Edition, Tata McGraw Hill company, 2004.
2. Copper. W.D and Hlefrick.. A.D, "*Modern Electronic Instrumentation and Measurement Techique*",5rd Edition, Prentice Hall of India, 2002.

EI1008 ELECTRICAL AND ELECTRONICS MEASUREMENTSAND INSTRUMENTATION												
Course Designed by		**Department of Electronics and Instrumentation 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	4		3						
3.	Category	General (G)		Basic Sciences (B)			Engineering Sciences and Technical Arts (E)			Professional Subjects (P)		
		--		--			--			x		
4.	Broad Area	Electronics Engineering		Instrumentation Engineering			Control Engineering			Electrical Engineering		
		x		x			--			--		
5.	Approval	23rd Meeting of Academic Council, May 2013										

	LINEAR INTEGRATED CIRCUITS AND APPLICATIONS	L	T	P	C
EI1009	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 integrated circuits and designing electronic circuits using it.

INSTRUCTIONAL OBJECTIVES

1.	Design various circuits using Op – Amps.
2.	Design waveform Generating circuits and Multivibrators
3.	Design simple filter circuits for specific engineering applications.
4.	Gain knowledge in digital and analog voltage regulator
5.	Design combinational logic circuits using digital IC's

UNIT I – OP-AMP FUNDAMENTALS, CHARACTERISTICS AND APPLICATIONS (9 hours)

Basic information – Op-amp configurations – Ideal op-amp circuit analysis – DC and AC characteristics of ideal Op-amp – Inverting and Non-inverting amplifiers – Summing amplifier – Difference amplifier – Voltage Follower – Differentiator – Integrator – V to I converter – I to V converter – Instrumentation Amplifier – Clamper – Clipper – Sample and hold circuit

UNIT II – COMPARATORS AND WAVEFORM GENERATORS (9 hours)

Introduction – Basic comparator operation – applications – Schmitt trigger – square wave – triangular wave – sine wave generators –Wein Bridge – RC Phase shift oscillator – Mono stable multivibrator.

UNIT III – ACTIVE FILTERS &PLL (9 hours)

Design and Analysis of RC active filters – Low pass – High pass – Band pass – Band reject – notch filter – Phase Locked Loop(PLL) – Description – applications – Frequency multiplier – Frequency divider.

UNIT IV – DATA CONVERTERS (9 hours)

Digital to analog converters – basic concepts –analog switches – types – Weighted resistor – R-2R ladder DAC –Analog to Digital converter – basic concepts – Types – Flash – Counter – Successive approximation – Dual slope – ADC and DAC specifications.

UNIT V - VOLTAGE REGULATORS AND TIMERS (9 hours)

Voltage regulators – Fixed voltage regulators – Adjustable voltage regulators – switching regulator – 723 general purpose voltage regulator – IC555 Timer – Timer functional diagram –Monostable and Astable operation – Schmitt trigger – applications.

TEXT BOOKS

1. Roy Choudhury. D and Shail .B, Jain, "*Linear Integrated Circuits",* 2nd edition, Reprint. 2006, New Age International.
2. Gayakwad. R.A, "*Op-amps & Linear Integrated Circuits"*, Prentice Hall of India, New Delhi ,VI edition,2003.

REFERENCES

1. Sergio Franco, "*Design with operational amplifiers and Analog Integrated circuits"*,TataMcGraw Hill 3rd Edition 2002
2. Millman. J and Halkias. C.C, "*Integrated Electronics-Analog and Digital Systems"*, McGraw Hill, 9th Reprint, 1995.

EI1009 - LINEAR INTEGRATED CIRCUITS AND APPLICATIONS												
Course Designed by		**Department of Electronics and Instrumentation Engineering**										
1.	Student outcome	a	b	c	d	e	f	g	h	i	j	k
		x	x	x		x			x			x
2.	Mapping of instructional objectives with student outcome	3,4,5	1,4, 5	1		2,3			1			1,3
3.	Category	General (G)		Basic Sciences (B)			Engineering Sciences and Technical Arts (E)			Professional Subjects (P)		
		--		--			---			x		
4.	Broad Area	Electronics Engineering		Instrumentation Engineering			Control Engineering			Electrical Engineering		
		x		--			--			--		
5.	Approval	23rd Meeting of Academic Council, May 2013										

EI1010	**SENSORS AND TRANSDUCERS**	**L**	**T**	**P**	**C**
	Total Contact Hours - 45	**3**	**0**	**0**	**3**
	Prerequisite				
	Nil				

PURPOSE

To enable the students to select and design suitable instruments to meet the requirements of industrial applications and various transducers used for the measurement of various physical quantities

INSTRUCTIONAL OBJECTIVES

1.	It deals with various types of Sensors & Transducers and their working principle
2.	It deals with Resistive, Capacitive and Inductive transducers
3.	It deals with some of the miscellaneous transducers
4.	It deals with characteristics of transducers

UNIT I – MEASUREMENTS AND INSTRUMENTATION OF TRANSDUCERS(9 hours)

Measurements – Basic method of measurement – Generalized scheme for measurement systems – Units and standards – Errors – Classification of errors, error analysis – Statistical methods – Sensor – Transducer – Classification of transducers – Basic requirement of transducers.

UNIT II – CHARACTERISTICS OF TRANSDUCERS (9 hours)

Static characteristics – Dynamic characteristics – Mathematical model of transducer – Zero, first order and second order transducers – Response to impulse, step, ramp and sinusoidal inputs

UNIT III – RESISTIVE TRANSDUCERS (9 hours)

Potentiometer –Loading effect – Strain gauge – Theory, types, temperature compensation – Applications – Torque measurement – Proving Ring – Load Cell – Resistance thermometer – Thermistors materials – Constructions, Characteristics – Hot wire anemometer

UNIT IV – INDUCTIVE AND CAPACITIVE TRANSDUCER (9 hours)

Self inductive transducer – Mutual inductive transducers – Linear Variable Differential Transformer – LVDT Accelerometer – RVDT – Synchros – Microsyn – Capacitive transducer – Variable Area Type – Variable Air Gap type – Variable Permittivity type – Capacitor microphone.

UNIT V – MISCELLEANEOUS TRANSDUCERS (9 hours)

Piezoelectric transducer – Hall Effect transducers – Smart sensors – Fiber optic sensors – Film sensors – MEMS – Nano sensors, Digital transducers

TEXT BOOKS

1. Sawhney. A.K**,** "*A Course in Electrical and Electronics Measurements and Instrumentation*", 18th Edition, Dhanpat Rai & Company Private Limited, 2007.
2. Renganathan. S,*"Transducer Engineering"*, Allied Publishers, Chennai, 2003.

REFERENCES

1. Doebelin. E.A, "*Measurement Systems – Applications and Design*", Tata McGraw Hill, New York, 2000.
2. Patranabis. D, "*Sensors and Transducers*", Prentice Hall of India, 1999.
3. John. P, Bentley, "*Principles of Measurement Systems*", III Edition, Pearson Education, 2000.
4. Murthy.D.V.S, "*Transducers and Instrumentation*", Prentice Hall of India, 2001.

EI1010 SENSORS AND TRANSDUCERS												
Course Designed by		**Department of Electronics and Instrumentation Engineering**										
1	Student outcome	a	b	c	d	e	f	g	h	i	j	k
		x	x		x	x			x			x
2.	Mapping of instructional objectives with student outcome	1	2,3		1,4	2,3,4			4			2,4
3.	Category	General (G)		Basic Sciences (B)			Engineering Sciences and Technical Arts (E)			Professional Subjects (P)		
		--		--			--			x		
4.	Broad Area	Electronics Engineering		Instrumentation Engineering			Control Engineering			Electrical Engineering		
		--		x			--			--		
5.	Approval	23rd Meeting of Academic Council, May 2013										

EI1011	**LINEAR AND DIGITAL INTEGRATED CIRCUITS LABORATORY**	**L**	**T**	**P**	**C**
	Total Contact hours - 45	**0**	**0**	**3**	**2**
	Prerequisite				
	Digital systems, Linear integrated circuits				

PURPOSE

To study various Digital & Linear Integrated Circuits used in Simple System Configuration.

INSTRUCTIONAL OBJECTIVES

1.	To enable the students to understand the various types of combinational circuits.
2.	To understand the various types of sequential circuits
3.	To study the Operational amplifier characteristics and applications
4.	To design and verify waveform generator circuits and filter circuits

LIST OF EXPERIMENTS

1. Design and testing of Instrumentation Amplifier
2. Verification of Characteristics of μA741
3. Verification of Mathematical Applications of OP-AMP
4. Design and testing of first order Low Pass and High Pass Active filters
5. Design and testing of Phase shift Oscillators and Wein bidge oscillators
6. Design and testing of Monostable and Astable Multivibrator using NE555 Timer IC555
7. Study of Basic Digital IC' s (Verification of Truth table for logic gates and flip flops)
8. Implementation of Boolean Functions, Adder and Subtractor circuits
9. Implementation and testing of code converters
10. Implementation and testing of multiplexers &demultiplexer
11. Implementation of 4- Bit shift registers using flip flops
12. Implementation and testing of counters using flip flops

REFERENCE

1. Linear and Digital Integrated Circuits Laboratory Manual.

EI1011 LINEAR AND DIGITAL INTEGRATED CIRCUITS LABORATORY												
Course Designed by		Department of Electronics and Instrumentation Engineering										
1.	Student outcome	a	b	c	d	e	f	g	h	i	j	k
		x	x	x		x			x			x
2.	Mapping of instructional objectives with student outcome	3,4,5	1,4,5	1		2,3			1			1,3
3.	Category	General (G)		Basic Sciences (B)			Engineering Sciences and Technical Arts (E)			Professional Subjects (P)		
		--		--			--			x		
4.	Broad Area	Electronics Engineering		Instrumentation Engineering			Control Engineering			Electrical Engineering		
		x		--			--			--		
5.	Approval	23rd Meeting of Academic Council, May 2013										

EI1012	SENSORS AND TRANSDUCERS LABORATORY	L	T	P	C
	Total Contact hours – 30	**0**	**0**	**2**	**1**
	Prerequisite				
	Sensor and transducer theory				

PURPOSE

To enable the students practically to know about transducers and about the types of transducers and various transducers used for the measurement of various physical quantities

INSTRUCTIONAL OBJECTIVES

1.	To identify suitable instruments to meet the requirements of industrial applications
2.	To learn about Resistive, Capacitive and Inductive transducers
3.	It know practically about the transducer used for the measurement temperature
4.	It deals with characteristics of transducers

LIST OF EXPERIMENTS

1. Characteristics of Strain gauge
2. Characteristics of load cell
3. Characteristics of thermistor
4. Characteristics of RTD
5. Characteristics of Thermocouple
6. Characteristics of LDR
7. Loading effect of Potentiometer
8. Characteristics of Synchros

9. Characteristics of LVDT
10. Characteristics of Piezo-electric transducer
11. Characteristics of Hall-effect transducer
12. Study of smart transducers

REFERENCES

1. Murthy. D.V.S, "*Transducers and Instrumentation*", Prentice Hall of India, 2001.
2. Sensors and transducers lab manual.

<table>
<tr><th colspan="13">EI1012 SENSORS AND TRANSDUCERS LABORATORY</th></tr>
<tr><td colspan="2">Course Designed by</td><td colspan="11">Department of Electronics and Instrumentation 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>x</td></tr>
<tr><td>2.</td><td>Mapping of instructional objectives with student outcome</td><td>1</td><td>2,3</td><td></td><td></td><td>2,3,4</td><td></td><td></td><td></td><td></td><td></td><td>2,4</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">Electronics Engineering</td><td colspan="3">Instrumentation Engineering</td><td colspan="4">Control Engineering</td><td>Electrical Engineering</td></tr>
<tr><td colspan="2">x</td><td colspan="3">--</td><td colspan="4">--</td><td>--</td></tr>
<tr><td>5.</td><td>Approval</td><td colspan="11">23rd Meeting of Academic Council, May 2013</td></tr>
</table>

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
UNITIV **(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

REFERENCE

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.

PD1005 – APTITUDE-III												
Course Designed by		**Career Development Centre**										
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		1,2		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										

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MA 1005	PROBABILITY AND STATISTICS	L	T	P	C
	Total contact hours = 60 hours	4	0	0	4
	(Common to Auto, Aero, Mech, Mectr, Civil , Chemical, ICE & EIE)				

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 (12 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 (12 hours)

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

UNIT III - TESTING OF HYPOTHESIS (12 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 VARIANC(12 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 (12 hours)

Introduction – Process control – control charts for variables - X and R, X and S charts control charts for attributes: p chart, np chart, c chart and their applications in process control.

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,3rd edition, 2008.

REFERENCES

1. 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 1005 - 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										

EI1013	INDUSTRIAL INSTRUMENTATION	L	T	P	C
	Total Contact Hours - 45	**3**	**0**	**0**	**3**
	Prerequisite				
	Sensors and Transducers				

PURPOSE

To provide details on basic process parameters that is applied in most processing industries for both measurement and control applications.

INSTRUCTIONAL OBJECTIVES

1.	To provide sound knowledge about various techniques used for the measurement of industrial parameters
2.	To have an adequate knowledge about temperature and pressure transducers
3.	To know about various flow and level measurement techniques adopted in industrial environment
4.	Exposure to various force, torque, density and velocity measuring instruments

UNIT I – MEASUREMENT OF PRESSURE (9 hours)

Units of pressure–Manometers–different types– Elastic type pressure gauges– Bourdon tube, bellows, diaphragms–Electrical methods– Measurement of vacuum- McLeod gauge, thermal conductivity gauges, Ionization gauge- cold cathode and hot cathode types, flapper-nozzle assembly.

UNIT II – MEASUREMENT OF TEMPERATURE (9 hours)

Temperature scales– bimetallic thermometer– filled- in Thermometer– Electrical method of measurement–RTD–3wire and 4 wire RTD, Thermistor, Thermocouples, laws of thermocouple, cold junction compensation, special techniques for measuring high temperature using thermocouples–thermal well– Radiation methods of temperature measurement–Pyrometers –radiation pyrometer and optical pyrometers.

UNIT III – MEASUREMENT OF FLOW AND LEVEL (9 hours)

Flow: Variable head type flow meters–variable area flow meter–turbine flow meter–electromagnetic flow meter–ultrasonic flow meter–coriolis and thermal mass flow meter–open channel flow measurement–solid flow measurement.

Level: Measurement of level using float and displacer–level switch–Hydrostatic type–bubbler method–Electrical methods- resistance, inductive, capacitance type–gamma radiation method –ultrasonic level gauging.

UNIT IV – MEASUREMENT OF DENSITY, VISCOSITY, HUMIDITY (9 hours)

Density: Measurement of density using pressure head type, float type and bridge type densitometer

Viscosity: Viscosity terms–say bolt viscometer–rotameter type viscometer.

Humidity: Humidity terms – dry & wet bulb psychrometers, hot wire electrode type hygrometer, Dew point hygrometer

UNIT V – MEASUREMENT OF SPEED, FORCE AND TORQUE (9 hours)

Speed: Measurement of speed–moving iron and moving coil type–AC and DC tachogenerators, photo electric pickup–stroboscope

Force: Measurement of force – Load cell, pneumatic and hydraulic load cell.

Torque: Measurement of torque–Inductive principle and Digital methods.

TEXT BOOKS

1. Patranabis. D *"Principles of Industrial Instrumentation",* Tata McGraw Hill, 3rdEdition, New Delhi, Reprint 2010.
2. Sawhney. A.K ":*A course in Electrical and Electronic Measurement and Instrumentation*" - Dhanpat Raj and Sons, New Delhi, 1999.

REFERENCE

1. Singh S. K., *"Industrial Instrumentation & Control"* 3rdEdition, Tata McGraw Hill, Reprint 2009.
2. Krishnaswamy K.& Vijayachitra S., "*Industrial Instrumentation*" New age International, Reprint 2008.
3. Jain R.K., *"Mechanical and Industrial Measurements",*Khanna Publishers, Delhi 1999.
4. Liptak B.G., *"Instrument Engineers Handbook (Measurement)",* Chilton Book Co., 1994.

EI1013 INDUSTRIAL INSTRUMENTATION												
Course Designed by		**Department of Electronics and Instrumentation Engineering**										
1.	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
		x	x	x	x	x	x		x	x		x
2.	Mapping of instructional objectives with student outcome	1	2,3,4	1,2,3	2,3,4	2,3,4	1		2,3,4	1		2,3,4
3.	Category	General (G)		Basic Sciences (B)			Engineering Sciences and Technical Arts(E)				Professional Subjects (P)	
											x	
4.	Broad Area	Electronics Engineering		Instrumentation Engineering			Control Engineering				Electrical Engineering	
				x			x					
5.	Approval	23rd Meeting of Academic Council, May 2013										

EI1014	**CONTROL SYSTEMS ENGINEERING**	**L**	**T**	**P**	**C**
	Total Contact Hours - 45	**3**	**0**	**0**	**3**
	Prerequisite				
	Nil				

PURPOSE

To provide sound knowledge in the basic concepts of linear control theory and design of control system.

INSTRUCTIONAL OBJECTIVES

1.	To develop the mathematical model for mechanical and electrical systems.
2.	To provide adequate knowledge in the time response of systems and steady state error analysis.
3.	To analyze the stability of systems in different methods from transfer function forms.
4.	To study the function of compensators and design.

UNIT I -TRANSFER FUNCTIONS (9 hours)

Basic components of control systems-classification of control systems- feedback and its effects–mathematical modelling of a system-Transfer function of mechanical (translational and rotational), Electrical, electro-mechanical systems (AC,DC motors)-Block Diagram reduction technique and Signal flow graphs.

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

Test signals for time response of control systems-type and order of systems-Time response of first order and second order systems (under damping, critical, over damping) - Time domain specifications - Steady state error analysis.

UNIT III - STABILITY: TIME DOMAIN ANALYSIS (9 hours)

BIBO Stability – Determining the stability by Routh-Hurwitz criterion-Properties and construction of the root loci-effect of adding a pole and zeros to a system

UNIT IV – STABILITY: FREQUENCY DOMAIN ANALYSIS (9 hours)

Relative stability: gain margin and phase margin-stability analysis with Bode plots - polar plots-constant M and N circles- Nyquist stability criterion-Nichols chart

UNIT V – COMPENSATORS DESIGN (9 hours)

Design specifications- compensator configuration (series and feedback)-design cascade and feedback compensators (lag,lead,lag-lead) by using bode plot

TEXT BOOKS

1. Nagrath I J and Gopal .M., *"Control Systems Engineering"*, Anshan Pub, 2008.
2. Benjamin C Kuo, *" Automatic Control System"*, 9th edition, John wiley&sons, 2010.

REFERENCE

1. Katsuhiko Ogata, *"Modern Control Engineering"*-fifth edition, Prentice Hall of India Private Ltd, New Delhi, 2009.
2. Richard .C. Dorf and Robert.H.Bishop, *"Modern Control System Engineering"*, Pearson Education (US), United States, 2010.
3. Roland S.Burns, *"Advanced Control Engineering",* A division of Reed educational and professional publishing Ltd, 2001.

EI1014- CONTROL SYSTEMS ENGINEERING												
Course Designed by		**Department of Electronics and Instrumentation Engineering**										
1.	Student outcome	a	b	c	d	e	f	g	h	i	j	k
		x	x	x	x	x	x			X		x
2.	Mapping of instructional objectives with student outcome	1,2,3,4	1,2,3,4	4	1,4	3,4,	1,4			3,4		1,2,3,4
3.	Category	General (G)		Basic Sciences (B)			Engineering Sciences and Technical Arts (E)			Professional Subjects (P)		
		--		--			--			x		
4.	Broad Area	Electronics Engineering		Instrumentation Engineering			Control Engineering			Electrical Engineering		
		--		--			x			--		
5.	Approval	23rd Meeting of Academic Council, May 2013										

EI1015	**MICROPROCESSOR AND MICROCONTROLLER**	**L**	**T**	**P**	**C**
	Total Contact Hours - 45	**3**	**0**	**0**	**3**
	Prerequisite				
	Digital systems, LIC				

PURPOSE

The purpose of this course is to enable the students to acquire knowledge about the basics of processors, co-processors, and their applications.

INSTRUCTIONAL OBJECTIVES

1.	Understand concepts of Microprocessors and programming them.
2.	Understand concepts of Microcontrollers and programming them.
3.	Understand various interfacing circuits necessary for various applications.
4.	Understand various interfacing concepts.
5.	Understand basic concepts of programming using 8085, 8086 microprocessor &8051 Microcontrollers.

UNIT I - INTEL 8085 **(9 hours)**

Introduction to minicomputers-microprocessors- microcontrollers-Digital signal processors- Evolution of Microprocessors- History of microprocessors. Evolution of microprocessors- 8085-microprocessor architecture -addressing modes- Instruction set - Memory interfacing -Basic timing diagram- interrupts - Software Interrupts - Data transfer schemes simple programs.

UNIT II - INTEL 8086 **(9 hours)**

8086-Architecture-Register organization-Signal description-Interrupts-Minimum mode-Maximum mode operations- Assembler directives.

Instruction set-Data transfer instructions-Arithmetic instructions-Bit manipulation instructions-String instructions-Program execution transfer instructions-Process control instructions-Addressing modes-Timing diagrams- Service Routine-Assembly language programming.

UNIT III - INTERFACING DEVICES **(9 hours)**

IO and Memory Interfacing concepts-Programmable Peripheral Interface 8255 - Programmable Communication Interface 8251 USART - Programmable Interrupt Controller 8259A - Programmable Interval Timer 8253 - Keyboard/Display Controller 8279 - DMA Controller 8237 - Floppy Disk Controller 8272- CRT Controller 8275.

UNIT IV - 8051 MICROCONTROLLER **(9hours)**

8051 architecture-8051 micro controller hardware- input/output pins-ports-external memory- counters and timers- serial data i/o-interrupts-Addressing modes.External data moves-code memory read PUSH and POP op codes-data exchanges- Byte-level logical operations-bit-level logical operations-rotate and swap operations- Flags-incrementing and decrementing- addition-subtraction-multiplication -division-decimal arithmetic- Jump -call program range- jumps- calls – subroutines- interrupts - returns.

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

Microprocessor based process control system - microcomputer based scale - interfacing alphanumeric displays keyboard interface-speed control of stepper motor - high power devices interfacing - A/D and D/A interfacing- CRT terminal interface- Printer interface-level control-Temperature control ,Traffic control system.

TEXT BOOKS

1. Ramesh. S, Gaonkar, "*Microprocessor architecture, programming and its application with 8085"* , Penram Int. Pub. (India) IV edition-2000.
2. Roy. A.K, Bhurchandi K.M, "*Intel Microprocessors Architecture, Programming and Interfacing"*, McGraw Hill International Edition – 2001.
3. Rafiquzzaman. M, "*Microprocessors - Theory and Applications Intel and Motorola*",PHI Pvt. Ltd., New Delhi 2001.

REFERENCES

1. Douglas V.Hall,"*Microprocessors and Interfacing programming and hardware"*, Tata McGraw Hill Edition 2003.
2. John E.Uffenbeck,"*The 80x86 Family, Design, Programming and Interfacing"*,3rd Edition 2002.
3. Muhammad Ali Mazidi and JanicaGilliMazidi, "*The 8051 microcontroller and embedded systems"*, Pearson Education, 5th Indian reprint, 2003.
4. Kenneth J. Ayala, "*The 8051 Microcontroller: Architecture, programming and applications",* (Penram International) 2000.
5. MykePredko, *Programming and customizing the 8051 Microcontroller*, Tata McGraw Hill, New Delhi - Second Edition, 2001

EI1010 SENSORS AND TRANSDUCERS												
Course Designed by		**Department of Electronics and Instrumentation 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 - 3	3,4	3,4	4,5	3,4,5					3	5
3.	Category	General (G)		Basic Sciences (B)			Engineering Sciences and Technical Arts (E)			Professional Subjects (P)		
		--		--			--			x		
4.	Broad Area	Electronics Engineering		Instrumentation Engineering			Control Engineering			Electrical Engineering		
		--		--			x			--		
5.	Approval	23rd Meeting of Academic Council, May 2013										

EI1016	**CONTROL SYSTEMS ENGINEERING LABORATORY**	**L**	**T**	**P**	**C**
	Total Contact Hours - 30	**0**	**0**	**2**	**1**
	Prerequisite				
	Nil				

PURPOSE

To apply the concepts of control system and design and verify using software tools

INSTRUCTIONAL OBJECTIVES

1. To enable the students to simulate the various steps involved in design of control system

LIST OF EXPERIMENTS

1. Determination of transfer functions of separately excited dc generator.
2. Determination of transfer function of armature controlled dc motor.
3. Determination of transfer function of field controlled dc motor.
4. Step and ramp response of first order systems.
5. Identification of damping in second order systems.
6. Step and ramp response of second order systems.
7. Time domain specification of type-0 and type-1 system.
8. Stability analysis of linear systems using various graphical methods.
9. Frequency response of lead, lag compensators.
10. Design lead, lag, lead-lag compensator by using bode plots.

REFERENCE

1. LAB manual

EI1016- CONTROL SYSTEMS ENGINEERING												
Course Designed by		**Department of Electronics and Instrumentation Engineering**										
1.	Student outcome	a	b	c	d	e	f	g	h	i	j	k
		X	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	Electronics Engineering		Instrumentation Engineering			Control Engineering			Electrical Engineering		
		--		--			x			--		
5.	Approval	23rd Meeting of Academic Council, May 2013										

EI1017	**MICROPROCESSOR & MICROCONTROLLER PROGRAMMING LAB**	**L**	**T**	**P**	**C**
	Total Contact hours - 30	**0**	**0**	**3**	**2**
	Prerequisite				
	Nil				
PURPOSE					
To enable the students to do basic programming in microprocessors and interfacing.					

INSTRUCTIONAL OBJECTIVES	
1.	To understand code conversion.
2.	To carry out basic arithmetic and logical calculations.
3.	To understand the programming concepts of microprocessor.
4.	To understand the programming concepts of microcontroller.
5.	To understand the concepts of interfacing.

LIST OF EXPERIMENTS - (8085, 8086, 8051)

1. Addition and subtraction of 8 bit numbers
2. Addition and subtraction of 16 bit numbers
3. Multi byte subtraction
4. Multiplication of two 8 bit numbers
5. Division of two 8 bit numbers
6. Sorting numbers in ascending order and descending order
7. Block data transfer - forward and reverse order
8. Sum of series of N numbers
9. Code conversion Decimal to Hexadecimal and Hexadecimal to Decimal
10. Stepper motor control
11. Interfacing of Analog to digital converter (ADC)
12. Interfacing of Digital to Analog converter (DAC)
13. Interfacing of traffic light control systems
14. Keyboard/Display Interface
15. Rolling display
16. Flashing display
17. Interfacing of temperature control system
18. Interfacing of level control system

REFERENCES

1. Ramesh. S, Gaonkar, "*Microprocessor architecture, programming and its application with 8085"*, Penram Int. Pub. (India) IV edition-2000.
2. Roy. A.K, Bhurchandi. K.M "*Intel Microprocessors Architecture, Programming and Interfacing"*, McGraw Hill International Edition – 2001.
3. Rafiquzzaman. M, "*Microprocessors - Theory and Applications Intel and Motorola*", PHI Pvt. Ltd., New Delhi, 2001.
4. Douglas. V, Hall, "*Microprocessors and Interfacing programming and hardware"*, Tata McGraw Hill Edition, 2003.
5. John E.Uffenbeck, "*The 80x86 Family, Design, Programming and Interfacing"*, 3rd Edition, 2002.
6. Muhammad Ali Mazidi and Janica Gilli Mazidi, "*The 8051 microcontroller and embedded systems"*, Pearson Education, 5th Indian reprint, 2003.
7. Kenneth .J, Ayala, "*The 8051 Microcontroller: Architecture, programming and applications",* (Penram International), 2000.
8. Myke Predko, "*Programming and customizing the 8051 Microcontroller"*, Tata McGraw Hill, New Delhi - Second Edition, 2001.

<table>
<tr><th colspan="13">EI1017 MICROPROCESSOR AND MICROCONTROLLER PROGRAMMING LAB</th></tr>
<tr><td colspan="2">Course Designed by</td><td colspan="11">Department of Electronics and Instrumentation 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 objectives with student outcome</td><td>1,2,3</td><td>3,4</td><td>3,4</td><td>4,5</td><td>3,4,5</td><td></td><td></td><td></td><td></td><td>3</td><td>5</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">Electronics Engineering</td><td colspan="3">Instrumentation Engineering</td><td colspan="3">Control Engineering</td><td colspan="3">Electrical Engineering</td></tr>
<tr><td colspan="2"></td><td colspan="3"></td><td colspan="3">x</td><td colspan="3"></td></tr>
<tr><td>5.</td><td>Approval</td><td colspan="11">23rd Meeting of Academic Council, May 2013</td></tr>
</table>

	INDUSTRIAL TRAINING I (Training to be undergone after IV semester)	L	T	P	C
EI1047	2 week practical training in industry	**0**	**0**	**1**	**1**
	Prerequisite				
	Nil				

PURPOSE

To provide hands-on experience at site / planning or design office where Electronics & Instrumentals engineering projects are carried out

INSTRUCTIONAL OBJECTIVES

1. Students have to undergo two – week practical training in Instrumentation Engineering related project site or design / planning office so that they become aware of the practical application of theoretical concepts studied in the class rooms.

Students have to undergo two-week practical training in Instrumentation Engineering related project site or design / planning office 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 the 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.

EI1047 INDUSTRIAL TRAINING I												
Course Designed by		**Department of Electronics and Instrumentation Engineering**										
1.	Student outcome	a	b	c	d	e	f	g	h	i	j	k
					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	Electronics Engineering		Instrumentation Engineering			Control Engineering			Electrical Engineering		
		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

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

REFERENCE

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										

	DIGITAL SIGNAL PROCESSING AND APPLICATIONS	L	T	P	C
EI1018	Total Contact Hours - 45	**3**	**0**	**0**	**3**
	Prerequisite				
	Nil				

PURPOSE

The purpose of this course is to introduce students to the basics of Signals and Systems, Digital Signal Processing and to DSP processor. The main objective of this subject is to help students to design the digital filters and Implementation of digital filters using various structures.

INSTRUCTIONAL OBJECTIVES

1.	To Understand the basics of Signals and Systems
2.	To learn the various transform techniques applicable to signals and systems
3.	To design and implement digital IIR and FIR filters
4.	To learn the DSP Processor and its applications

UNIT I – DISCRETE TIME SIGNALS AND SYSTEM **(9 hours)**

Review of discrete-time signals & systems – DFT and its properties – Circular convolution – Radix 2 FFT – Decimation in time FFT algorithm – Decimation in frequency FFT algorithm – Computing inverse DFT using FFT

UNIT II – DESIGN OF DIGITAL FIR FILTERS **(9hours)**

Basic elements of Digital Signal Processing – LTI system as Frequency selective filters – Design of digital FIR filters – Frequency sampling method – Fourier series method – window techniques.

UNIT III – DESIGN OF DIGITAL IIR FILTERS (9 hours)

Review of analog filters – Butterworth – Chebyshev approximations – Frequency transformations – Design of digital IIR filters using – Bilinear transformation method – Impulse Invariant transformation method.

UNIT IV – FILTER IMPLEMENTATION (9 hours)

Implementation of discrete time systems – Structures for the realization of discrete time systems – Structures for IIR and FIR filters – simulation of IIR and FIR filters – Representation of numbers – Quantization of filter coefficients – Round – off effects in digital filters.

UNIT V – DSP PROCESSOR (9 hours)

Introduction- Architecture of TMS320C54X– CPU – Arithmetic logic unit – Multiplier/adder unit – On chip peripherals – Data addressing modes –Applications – image processing– radar system.

TEXT BOOKS

1. John. G, Proakis and Manolakis, " *Digital Signal Processing Principles, Algorithm and Applications",* Pearson, Fourth Edition, 2007.
2. Mithra. S.K, *"Digital Signal Processing: A Computer Based Approach",* 3rdEdition, 2005.

REFERENCES

1. Sen-Maw Kuo, Woon-SengGan, "*Digital signal processors: architectures, implementations and applications",* Pearson Prentice Hall, 2005.
2. Li Tan, Jean Jiang, "*Digital Signal Processing, Fundamentals and Applications",* Academic Press, 2013.

EI1018- DIGITAL SIGNAL PROCESSING AND APPLICATIONS												
Course Designed by		**Department of Electronics and Instrumentation 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	1,2	1,3	3,4	2,3	4	1,4			1,2,3		4
3.	Category	General (G)		Basic Sciences (B)			Engineering Sciences and Technical Arts (E)			Professional Subjects (P)		
										x		
4.	Broad Area	Electronics Engineering		Instrumentation Engineering			Control Engineering			Electrical Engineering		
				x								
5.	Approval	23rd Meeting of Academic Council, May 2013										

EI1019	PROCESS CONTROL ENGINEERING	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

To enable the students to learn the basic concepts of process control and to develop sufficient knowledge of the various control actions and design of controllers used to control any process.

INSTRUCTIONAL OBJECTIVES

1.	Learn the basic control actions and characteristics of different types of controllers
2.	Select ,design and tune a controller to suit a particular process
3.	Study and design about the characteristics of final control elements
4	Learn about the control schemes applied to various processes

UNIT I - MATHAMATICAL MODELLING OF PROCESSES (9 hours)

Process control introduction – Need for process control –Hardware elements of a process control system – Need of Mathematical modelling –Mathematical model of level, pressure ,thermal processes and interacting and non-interacting systems – Servo and Regulator Operation – Batch & Continuous Process – Concept of self regulation– Dead time–Degrees of freedom –Linearization.

UNIT II - VARIOUS CONTROLLERS AND ITS CHARACTERISTICS (9 hours)

Characteristics of ON- OFF, Single speed floating and PID controllers - Response of P,PI and PID controllers to various type of error signals – Analysis of Servo and Regulatory response of P and PI and PID controllers for first order and second order process – Reset Wind-up and prevention – Derivative and Proportional kick – Bumpless transfer – Selection of a controller for a particular process

UNIT III - CONTROLLER DESIGN (9 hours)

Need for controller tuning –Evaluation criteria - Quarter Decay Ratio, IAE, ISE and ITAE– Optimum controller tuning using Evaluation criteria–Tuning of PID controllers using Process reaction curve method, Damped oscillation method and Z-N tuning method.

UNIT IV - FINAL CONTROL ELEMENTS (9 hours)

I/P, P/I converters – Final control elements - Pneumatic and electric actuators - Types of control valves - Valve positioner and its importance - Inherent and Installed characteristics of control valve - Control valve sizing - Cavitation and flashing.

UNIT V - ADVANCED CONTROL METHODS **(9 hours)**

Cascade control – Feed forward control –Ratio Control - Inferential control –- Split-range control – override control –- selective control – Auto tuning – Smith predictor control scheme – Internal Model Controller –Introduction to multivariable control using examples from distillation column and boiler systems

TEXT BOOKS

1. Stephanopoulos. G, "*Chemical Process Control - An Introduction to Theory and Practice*", Prentice Hall of India, 2005.
2. Johnson .C.D, "*Process Control Instrument Technology*", Prentice Hall Inc., 2004.

REFERENCES

1. Bequette. B.W, "*Process Control Modeling, Design and Simulation*", Prentice Hall ofIndia, 2004.
2. Seborg. D.E, Edgar. T.F and Mellichamp. D.A, "*Process Dynamics and Control*", Wiley John and Sons, 2nd Edition, 2003.
3. Coughanowr, D.R, "*Process Systems Analysis and Control*", McGraw –Hill International Edition, 2004.
4. Harriott .P, "*Process Control*", Tata McGraw Hill, 2005.
5. Liptak B.G, " *Process Control*" ,Chilton Book Co., 1994.

EI1019 PROCESS CONTROL ENGINEERING												
Course Designed by		**Department of Electronics and Instrumentation 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		2,3,4	1,4	2,4			2,3			
3.	Category	General (G)		Basic Sciences (B)			Engineering Sciences and Technical Arts (E)			Professional Subjects (P)		
										x		
4.	Broad Area	Electronics Engineering		Instrumentation Engineering			Control Engineering			Electrical Engineering		
		x										
5.	Approval	23rd Meeting of Academic Council, May 2013										

EI1020	POWER ELECTRONICS AND DRIVES	L	T	P	C
	Total Contact Hours-45	3	0	0	3
	Prerequisite				
	Electric Circuits & Networks				

PURPOSE

The purpose of this course is to develop basic understanding of power semi conductor devices, its construction, V-I and switching characteristics and implementation in various power converter applications. Qualitative analysis of DC and AC drives is done to understand the applications of the course.

INSTRUCTIONAL OBJECTIVES

1.	To learn the operation of power semi conductor devices.
2.	To design protection circuits for power semiconductor devices used in power converters.
3.	To understand the basics of industrial drives.
4.	To learn the implementation of power semi conductor devices in industrial drives applications.
5.	To know the design and selection of drives in industrial applications.

UNIT I – POWER SEMICONDUCTOR DEVICES (9hours)

Need for Power conversion – Power Electronic Converters – Classification and Scope – Power Semiconductor Switches – Diodes, SCR – Triggering and Commutation Techniques – Series and Parallel Operation – TRIAC, GTO and Transistors (BJT, MOSFET and IGBT) – Ratings – Static and Dynamic characteristics – Drive – Protection – Switching Aid Circuits and Cooling.

UNIT II – ELECTRIC DRIVES (9hours)

Electric Drives – Concepts – Selection of Motor – Motor rating – Four Quadrant Drives and Load Characteristics – Control and Stability of Electric Drives – Feedback Control of Drives.

UNIT III – RECTIFIERS, CHOPPERS AND DC DRIVES (9hours)

Rectifiers: Single Phase and Three Phase Operation–Power Factor–Effect of Source Inductance–Single and Multi-Quadrant Operation with DC Motor Load – Steady State Analysis.

DC-DC Converters: Buck, Boost, Buck-Boost, Cuk Converters–Circuit Configuration andAnalysis – Choppers – Single and Multi-Quadrant Operation with DC Motor Load – Steady State Analysis.

UNIT IV – INVERTERS, AC VOLTAGE REGULATORS AND AC DRIVES (9hours)

Inverters – Single Phase and Three Phase Bridge Inverters – PWM Inverters – Induction Motor Drives – Variable Frequency Operation – Three Phase Induction Motor – Stator Voltage Control – v/f Control Methods – Rotor Control Methods – VSI and CSI fed Synchronous Motor Drives – Single Phase and Three Phase AC Voltage Regulator – Cyclo-Converter.

UNIT V – NON-DRIVE APPLICATIONS OF POWER ELECTRONIC CONVERTERS (9hours)

Switched Mode Power Supply (SMPS) – Uninterrupted Power Supply (UPS) – Active Power Line Conditioner – Electronic Ballast – Induction Heater.

TEXT BOOKS

1. Ned Mohan, Tore M. Undeland and William P. Robbins, "*Power Electronics Converters, Applications and Design*", John Wiley and Sons,Third Edition, 2002.
2. G. K. Dubey, S. R. Doradla, A. Joshi and R. M. K. Sinha, "*Thyristorised Power Controllers*", New Age International Publishers, First Edition, Reprint 2005.
3. VedamSubrahmanyam, "*Electric Drives, Concepts and applications*", Tata McGraw-Hill, Second Edition, 2009.

REFERENCES

1. Bimbhra P. S, "*Power Electronics*", Khanna Publishers, Fourth Edition, 2006.
2. VedamSubrahmanyam, "*Thyristor Control of Electric Drives*", Tata McGraw Hill, First Edition, Reprint 2008.
3. Singh. M .D, Khanchandani. K.B, "*Power Electronics*", Tata McGraw-Hill, Second Edition, 2008.
4. Williams. B.W, "*Power Electronics: Devices, Drivers, Applications and Passive Components*", Macmillan,Second Edition, Reprint 2007.
5. Muhammad. H, Rashid, "*Power Electronics Handbook*", Butterworth-Heinemann, Third edition, 2011.

EI1020 POWER ELECTRONICS AND DRIVES												
Course Designed by		**Department of Electronics and Instrumentation 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	2,3,5		2,3,5	3,4	2,5			3,5			2,5
3.	Category	General (G)		Basic Sciences (B)			Engineering Sciences and Technical Arts (E)			Professional Subjects (P)		
		--		--			--			x		
4.	Broad Area	Electronics Engineering		Instrumentation Engineering			Control Engineering			Electrical Engineering		
		x		-			-			x		
5.	Approval	23rd Meeting of Academic Council, May 2013										

EI1021	PROCESS CONTROL ENGINEERING LABORATORY	L	T	P	C
	Total Contact Hours - 45	**0**	**0**	**3**	**2**
	Prerequisite				
	Process Control Engineering				

PURPOSE

To enable the students to understand the fundamentals of process control, types of processes, characteristics of different types of controllers for controlling a process and process automation.

INSTRUCTIONAL OBJECTIVES

1.	Control of processes using PID and ON-OFF controllers
2.	Control of a process using personal computer
3.	Automation of process
4	Design and Tuning of controllers

LIST OF EXPERIMENTS

1. Study the characteristic of I/P and P/I converters
2. Study the characteristic Step and Impulse response of Interacting and Non-interacting systems
3. Study the characteristic of control valve with and without positioner
4. Study the characteristic of various type of control valves
5. Design of ON/OFF ,PI and PID Controller for the Temperature Process
6. Design of ON/OFF ,P,PI and PID Controller for the level Process and study the characteristics of level transmitter
7. Design of P ,PI and PID Controller for the flow process and study the characteristic of flow transmitter
8. Design of ON/OFF, PI and PID controller for the pressure process
9. Design and Tuning of PID controller for first order process with and without delay
10. Design and tuning of cascade control loop using Z-N tuning method
11. Study the design and tuning of feed forward control loop
12. Study the design of Inferential control loop.

REFERENCES

1. Process Control Lab manual

<table>
<tr><th colspan="13">EI1021 PROCESS CONTROL ENGINEERING LAB</th></tr>
<tr><td colspan="2">Course Designed by</td><td colspan="11">Department of Electronics and Instrumentation 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>
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<tr><td>2.</td><td>Mapping of instructional objectives with student outcome</td><td>1,3</td><td></td><td>2,3,4</td><td>1,4</td><td>2,4</td><td></td><td></td><td>2,3</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="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">Electronics Engineering</td><td colspan="3">Instrumentation Engineering</td><td colspan="3">Control Engineering</td><td colspan="3">Electrical Engineering</td></tr>
<tr><td colspan="2">x</td><td colspan="3">--</td><td colspan="3">--</td><td colspan="3">--</td></tr>
<tr><td>5.</td><td>Approval</td><td colspan="11">23rd Meeting of Academic Council, May 2013</td></tr>
</table>

EI1022	ELECTRONIC DESIGN PROJECT LABORATORY	L	T	P	C
	Total Contact Hours-45	0	0	3	2
	Prerequisite				
	Nil				

PURPOSE

The purpose of this course is to imbed circuit design and implementation of amplifiers, filters, signal conditioning circuits for sensors like RTD, Thermocouple, and Strain Gauge etc.

INSTRUCTIONAL OBJECTIVES

1.	To design and implement circuits with an emphasis on hardware and hands on experience.
2.	To create an ability to design a circuit to meet desired specifications.
3.	To identify, formulate and solve engineering problems.
4.	To assemble and test circuit elements.
5.	To perform a circuit simulation of the design.

LIST OF EXPERIMENTS

1. Design of Regulated Power Supply.
2. Design of Instrumentation Amplifier.
3. Design of Two-Stage BJT Amplifier.
4. Design of Active Low Pass, High Pass, Band Pass and Band Reject Filters.
5. Design of DC Motor Driver Circuit.
6. Design of V/I, I/V And V/F Converters.
7. Design of Cold –Junction Compensation Circuit for Thermocouple.
8. Design of Signal Conditioning Circuit for RTD.
9. Design of Signal Conditioning Circuit for Strain Gauge.
10. Design of Analog PID Controllers.
11. Design of Orifice Plate and Rota Meter –Study.
12. Piping and Instrumentation Diagram-Case Study.

REFERENCES

1. Ramakant. A, Gayakwad, "*Lab Manual to Accompany Op-Amps and Linear Integrated Circuits"*, Prentice Hall, Fourth Edition, 2000.
2. Paul Horowitz and Winfield Hill, "*The Art of Electronics*", Cambridge University Press, Third Edition, 2011.
3. Curtis. D, Johnson, "Process *Control Instrumentation Technology*", Prentice Hall, Eighth Edition, 2009.
4. Bela. G, Liptak, "*Instrument Engineers Handbook"*, CRC Press, Fourth Edition, 2006.

EI1022 Electronic Design Project Lab												
Course Designed by		Department of Electronics and Instrumentation 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	3,4			3,4,5						
3.	Category	General (G)		Basic Sciences (B)			Engineering Sciences and Technical Arts (E)			Professional Subjects (P)		
		--		--			--			x		
4.	Broad Area	Electronics Engineering		Instrumentation Engineering			Control Engineering			Electrical Engineering		
		x		--			--			X		
5.	Approval	23rd Meeting of Academic Council, May 2013										

EI1048	MINOR PROJECT	L	T	P	C
	Total Contact Hours - 30	0	0	2	1
	Prerequisite				
	Nill				

PURPOSE

To carry out a design project in one of the specializations of the program 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 specializations of program under study with substantial multidisciplinary component

Student groups will be formed and a faculty member will be allocated to guide them. Assessment will be based on internal reviews. Based on the reviews marks will be allotted out of 100.

EI1048 MINOR PROJECT												
Course designed by		**Department of Electronics and Instrumentation 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.	Approval	23rd meeting of Academic Council, May 2013										

SEMESTER-VII

EI1023	**LOGIC AND DISTRIBUTED CONTROL SYSTEM**	**L**	**T**	**P**	**C**
	Total Contact Hours – 45	**3**	**0**	**0**	**3**
	Prerequisite				
	Nil				

PURPOSE

This course introduces the student to practical methods of automatic control of machines, processes and systems. Also the student will learn the PLC programming fundamentals and some knowledge in DCS and SCADA which are used in process automation industries.

INSTRUCTIONAL OBJECTIVES

1.	To Understand the need for automation in process industries and to learn about PLC.
2.	To Learn the programming languages of PLC.
3.	To get an exposure to SCADA
4.	To Learn about industrial DCS and its applications.
5.	To have an exposure about communication networks.

UNIT I – PROGRAMMABLE LOGIC CONTROLLER BASICS (9 hours)

Overview of PLC systems – parts of PLC –Input/Output modules – power supplies and isolators – Fundamental PLC wiring diagram – relays – switches – transducers – sensors –seal-in circuits.

UNIT II – PROGRAMMING OF PLC (9 hours)

Fundamentals of logic – Program scan – Relay logic – PLC programming languages – timers – counters – math instructions – data manipulation instructions – requirement of communication networks for PLC – connecting PLC to computer.

UNIT III – SCADA (9 hours)

Definition – elements of SCADA system – history of SCADA – remote terminal unit (RTU) – discrete control – analog control – master terminal unit – (MTU) – operator interface.

UNIT IV – DISTRIBUTED CONTROL SYSTEM (9 hours)

Evolution – Different architectures – local control unit – Operator Interface – Displays – Engineering Interface – DCS Applications in power plants – Iron plant – steel plant– Cement plant.

UNIT V - HART AND FIELD BUS (9 hours)

Introduction – evolution of signal standards – HART communication protocol – communication modes – HART networks – Control system interface – HART commands – HART field controller implementation – HART and OSI model – Field bus – Introduction – General field bus architecture – basic requirements of field bus standard – field bus topology – interoperability –interchangeability.

TEXT BOOKS

1. Frank Petruzella. D, *"Programmable Logic Controllers"*, Tata McGraw Hill Third Edition, 2010.
2. Bolton. W, *"Programmable Logic Controllers"* Fifth Edition,2009.
3. Michael Lucas, *"Distributed Control Systems"*, Van Nostrand Reinhold Co., 1986.

REFERENCES

1. Stuart Boyer A, *"Supervisory contril and data Acquisition"*, Second edition, ISA.
2. Romily Bowden, *"HART application guide and the OSI communication foundation"*, 1999.
3. McMillan. G.K, *"Process/ Industrial instrument and handbook"*, McGraw-Hill, New York, 1999.

EI1023- LOGIC AND DISTRIBUTED CONTROL SYSTEM												
Course Designed by		**Department of Electronics and Instrumentation Engineering**										
1.	Student outcome	a	b	c	d	e	f	g	h	i	j	k
		x	x	x	x	x	x			x		x
2.	Mapping of instructional objectives with student outcome	1	1,3	3,4	2,4	3,4	1,4			2,4, 5		4,5
3.	Category	General (G)		Basic Sciences (B)			Engineering Sciences and Technical Arts (E)			Professional Subjects (P)		
										x		
4.	Broad Area	Electronics Engineering		Instrumentation Engineering			Control Engineering			Electrical Engineering		
		x					x					
5.	Approval	23rd Meeting of Academic Council, May 2013										

EI1024	**DIGITAL IMAGE PROCESSING**	**L**	**T**	**P**	**C**
	Total Contact Hours - 45	**3**	**0**	**0**	**3**
	Prerequisite				
	Nil				

PURPOSE

The purpose of this course is to introduce the basic concept and methodologies for digital
image processing

INSTRUCTIONAL OBJECTIVES

1. To study the image fundamentals, mathematical transforms necessary for image processing.
2. About the various techniques of image enhancement, reconstruction, compression and segmentation.
3. To know sampling and reconstruction procedures
4. To design image processing systems

UNIT I – FUNDAMENTALS OF DIP (9 hours)

Origin of digital Image Processing –Components of Image processing system – Elements of visual perception – Image sampling and quantization– Basic relationship between pixels –properties of human eye- nImage representation.

UNIT II – IMAGE TRANSFOMATIONS (9 hours)

Basic geometric transformations–Introduction to Fourier Transform and DFT – Properties of 2D Fourier Transform – FFT – Separable Image Transforms -Walsh – Hadamard – Discrete Cosine Transform-Haar, KL transforms.

UNIT III – I MAGE ENHANCEMENT (9 hours)

Spatial Domain methods: Basic grey level transformation – Histogram equalization – Enhancement using Arithmetic/logical operations, Spatial filtering: Smoothing, sharpening filters – Laplacian filters – Frequency domain filters : Smoothing – Sharpening filters – Homomorphic filtering.

UNIT IV – I MAGE RESTORATION (9 hours)

Model of Image Degradation/Restoration process – Noise models – Restoration in the presence of Noise, only Spatial filtering–Periodic Noise reduction by Frequency Domain Filtering –Inverse filtering –Least mean square filtering – Constrained least mean square filtering– Wiener filtering.

UNIT V – IMAGE COMPRESSION AND SEGMENTATION (9 hours)

Lossless compression: Variable length coding – LZW coding – Bit plane coding-predictive coding-DPCM.**Lossy Compression**: Transform coding – Wavelet coding – Basics of Image compression standards: JPEG, MPEGEdge detection – Thresholding – Region Based segmentation, boundary descriptors: Simple descriptors –Fourier descriptors – Regional descriptors.

TEXT BOOKS

1. Rafael. C, Gonzalez, Richard E Woods, "*Digital Image Processing*"- 2nd Edition, Pearson Education, 2003.
2. Jain A.K, "*Fundamentals of Digital Image Processing*", Pearson education.

REFERENCES

1. Chanda Dutta Magundar "*Digital Image Processing and Applications"*, Prentice Hall of India, 2000.
2. William K Pratt, "*Digital Image Processing*", John Willey (2001).

EI1024 DIGITAL IMAGE PROCESSING												
Course Designed by		**Department of Electronics and Instrumentation 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	2,3	4	2,3					2.3	4	2,3
3.	Category	General (G)		Basic Sciences (B)			Engineering Sciences and Technical Arts (E)			Professional Subjects (P)		
										x		
4.	Broad Area	Electronics Engineering		Instrumentation Engineering			Control Engineering			Electrical Engineering		
		x										
5.	Approval	23rd Meeting of Academic Council, May 2013										

EI1025	ROBOTICS AND AUTOMATION	L	T	P	C
	Total Contact Hours – 45	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

To enable students to understand about the working concepts of robot and its role in automation

INSTRUCTIONAL OBJECTIVES

1.	To know about power sources and sensors
2.	To know about manipulators, actuators and grippers
3.	To know about kinematic and Path Planning

UNIT I – BASIC CONCEPTS (9 hours)

Definition and origin of robotics - different types of Industrial robotics - various generations of robots - degrees of freedom - Asimov's laws of robotics - dynamic stabilization of robots-Standard Robot configuration and construction.

UNIT - II POWER SOURCES AND SENSORS (9 hours)

Hydraulic, pneumatic and electric drives - electronic and pneumatic manipulator control circuits. Determination of HP of motor and gearing ratio - variable speed arrangements - path determination - micro machines in robotics - machine vision - ranging - laser - acoustic - magnetic, fiber optic and tactile sensors.

UNIT – III ROBOT DYNAMICS AND END EFFECTORS (9 hours)

Manipulator dynamics – Robot equations of motion, Jacobian, Legrangian and Eulers - Legrangian formulation – End Effectors, Tools and Grippers-Gripper design and Gripper force

UNIT – IV ROBOT KINEMATICS AND PATH PLANNING (9hours)

Matrix representation of translational and Rotational motion – Homogenious Transformation- DH representation of standard configuration Robots- Inverse Kinematics. Joint space vs Cartesian space-Basics of Trajectory planning in Joint and Cartesion space.

UNIT – V CASE STUDIES (9 hours)

Multiple robots - machine interface - robots in manufacturing and non-manufacturing application - robot cell design - selection of a robot.

TEXT BOOKS

1. Mikell. P, Weiss .G.M, Nage.l R.N and Odraj .N.G, "*Industrial Robotics"*, McGraw Hill Singapore, 1996.
2. Ghosh, "*Control in Robotics and Automation: Sensor Based Integration"*, Allied Publishers, Chennai, 1998.

REFERENCES

1. Deb.S.R, "*Robotics technology and flexible Automation"*, John Wiley, USA 1992.
2. Asfahl. C.R, "*Robots and manufacturing Automation"*, John Wiley, USA 1992.
3. Klafter. R.D, Chimielewski. T.A, Negin. M, "*Robotic Engineering - An integrated approach"*, Prentice Hall of India, New Delhi, 1994.

EI1025 - ROBOTICS AND AUTOMATION												
Course Designed by		**Department of Electronics and Instrumentation 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	3		2,3	1	3				2,3		
3.	Category	General (G)		Basic Sciences (B)			Engineering Sciences and Technical Arts (E)			Professional Subjects (P)		
										x		
4.	Broad Area	Electronics Engineering		Instrumentation Engineering			Control Engineering			Electrical Engineering		
5.	Approval	23rd Meeting of Academic Council, May 2013										

EI1026	**DIGITAL IMAGE PROCESSING LABORATORY**	**L**	**T**	**P**	**C**
	Total Contact hours - 30	**0**	**0**	**2**	**1**
	Prerequisite				
	Nil				

PURPOSE

The purpose of this lab course is to know and understand the design and methodologies for digital image processing.

INSTRUCTIONAL OBJECTIVES

1. To design image processing systems
2. About the various techniques of image enhancement, reconstruction, compression and segmentation.

LIST OF EXPERIMENTS

1. Display of Gray scale Images.
2. Histogram Equalization.
3. Design of Non-linear Filtering.
4. Determination of Edge detection using Operators.
5. 2-D DFT and DCT.
6. Filtering in frequency domain.
7. Display of colour images.
8. Conversion between colour spaces.
9. DWT of images.
10. Segmentation using watershed transform

REFERENCE

1. Rafael gonzalez, richard woods, "*digital image processing*"- 2nd edition, pearson education, 2003.

EI1026 DIGITAL IMAGE PROCESSING LABORATORY													
Course Designed by		**Department of Electronics and Instrumentation 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	3		2,3	1	3				2,3			
3.	Category	General (G)		Basic Sciences (B)			Engineering Sciences and Technical Arts (E)			Professional Subjects (P)			
										x			
		Electronics Engineering		Instrumentation Engineering			Control Engineering			Electrical Engineering			
4.	Broad Area	x		x									
5.	Approval	23rd Meeting of Academic Council, May 2013											

EI1027	INDUSTRIAL AUTOMATION LABORATORY	L	T	P	C
	Total Contact Hours – 45	0	0	3	2
	Prerequisite				
	Nil				

PURPOSE

This course introduces the student to practical methods of automatic control of machines, processes and systems. Also the student will learn the PLC programming for various real time process applications and some knowledge in SCADA which are used in process automation industries.

INSTRUCTIONAL OBJECTIVES

1. To enable the students to learn about the various technologies used in process automation

LIST OF EXPERIMENTS

1. Study of PLC
2. Code conversion
3. Traffic light control system
4. Water level control system
5. Material handling system
6. Bottle filling system
7. Sequential operation of motor
8. Star to delta starter
9. Smart room design
10. Temperature control system
11. DC motor speed control
12. Implementation of PLC programming through SCADA

REFERENCE

1. Frank. D, Petruzella, "*Programmable Logic Controllers",* Tata McGraw Hill Third Edition-2010.

EI1027- INDUSTRIAL AUTOMATION LABORATORY												
Course Designed by		**Department of Electronics and Instrumentation 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	3		2,3	1	3				2,3		
3.	Category	General (G)		Basic Sciences (B)			Engineering Sciences and Technical Arts (E)			Professional Subjects (P)		
										x		
		Electronics Engineering		Instrumentation Engineering			Control Engineering			Electrical Engineering		
4.	Broad Area						x					
5.	Approval	23rd Meeting of Academic Council, May 2013										

EI1028	**VIRTUAL INSTRUMENTATION LABORATORY**	**L**	**T**	**P**	**C**
	Total Contact Hours – 45	**0**	**0**	**2**	**1**
	Prerequisite				
	Nil				

PURPOSE

To get practical knowledge in programming techniques, data acquisition and interfacing techniques of virtual instrumentation and to use VI for different applications.

INSTRUCTIONAL OBJECTIVES

1.	To familiarize with the VI software and learn programming in VI.
2.	To experiment various functions available in LabVIEW.
3.	To practice various Instrument Interfacing and data acquisition methods.
4.	To check various analysis tools and develop programs for Process control applications.

LIST OF EXPERIMENTS

1. Verification of Arithmetic Operations.
2. Verification of Half Adder and Full adder.
3. Program to find Addition of First n natural numbers using for and while loop.
4. Implementation of Array functions.
5. Program for implementing Seven segment display.
6. Program to perform Traffic light control.
7. Calculation of BMI using cluster.
8. Program to control Temperature by using RTD and DAQ .
9. Program to control Temperature by using Thermocouple and DAQ
10. Program to control Temperature by using Thermister and DAQ
11. Program for controlling the Flow of water using DAQ.
12. Program for controlling the Level of water using DAQ.
13. Program for Pressure control using DAQ.
14. Program for controlling the speed of a DC motor using PID tool box.

REFERENCES

1. Dr. Sumathi. S, Prof. Surekha. P, "*LabVIEW Based Advanced Instrumentation Systems*", 2nd edition, 2007.
2. Virtual instrumentation lab Manual.

EI1028 VIRTUAL INSTRUMENTAION LAB												
Course Designed by		**Department of Electronics and Instrumentation 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, 2, 3	2,4	2,4	4			3	4			1,4
3.	Category	General (G)		Basic Sciences (B)			Engineering Sciences and Technical Arts (E)			Professional Subjects (P)		
										x		
		Electronics Engineering		Instrumentation Engineering			Control Engineering			Electrical Engineering		
4.	Broad Area			x								
5.	Approval	23rd Meeting of Academic Council, May 2013										

EI1049	INDUSTRIAL TRAINING II (Training to be undergone after VI semester)	L	T	P	C
	2 week practical training in industry	0	0	1	1
	Prerequisite				
	Nil				

PURPOSE

To provide hands-on experience at site / planning or design office where Instrumental engineering projects are carried out

INSTRUCTIONAL OBJECTIVES

1.	Students have to undergo three – week practical training in Instrumentation Engineering related project site or design / planning office so that they become aware of the practical application of theoretical concepts studied in the class rooms.

Students have to undergo two-week practical training in Instrumentation Engineering related project site or design / planning office 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 the 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.

EI1049 INDUSTRIAL TRAINING II												
Course Designed by		Department of Electronics and Instrumentation Engineering										
1.	Student outcome	a	b	c	d	e	f	g	h	i	j	k
					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		
		Electronics Engineering		Instrumentation Engineering			Control Engineering			Electrical Engineering		
4.	Broad Area	x		x			x			x		
5.	Approval	23rd Meeting of Academic Council, May 2013										

SEMESTER VIII
DEPARTMENT ELECTIVE

EI1101	**NETWORK ANALYSIS AND SYNTHESIS**	**L**	**T**	**P**	**C**
	Total Contact Hours – 45	**3**	**0**	**0**	**3**
	Prerequisite				
	Circuit Theory				

PURPOSE

The purpose of this course is to enrich the students to acquire knowledge about the basics of network analysis, network synthesis, deign of filters.

INSTRUCTIONAL OBJECTIVES

1.	Understand about the network elements, network functions
2.	Understand the fundamentals of filters and attenuators
3.	Gain knowledge about the design of filters
4.	Gain knowledge about synthesis of RL,RC & RLC networks

UNIT I – NETWORK FUNTIONS (9 hours)

Poles and Zeros – Network functions for the one port and two port – Poles and zeros of network functions– Restrictions on pole and zero locations for driving point functions and transfer functions– Time domain behaviour from the pole zero plot.

UNIT II – ATTENUATOR &EQUALISERS (9 hours)

Attenuators: Symmetrical and Asymmetrical attenuators– T-type attenuator, P-type attenuator, Lattice attenuator, Bridged T attenuator, L type attenuator.

Equalisers: Two terminal Equalizer – Four Terminal Equalizer – Full series, Full shunt, Bridged-T , Lattice Equalizers

UNIT III – FILTERS (9 hours)

Filter fundamentals – Pass and stop bands – Characteristic impedance– Constant K low pass filter, Constant K high pass filter – m - derived T section, m- derived π Section –Variation of characteristic impedance over the pass band– Termination with m-derived half section – Band pass filters– Filter circuit design – Filter performance.

UNIT IV – FILTER DESIGN (9 hours)

Filter design problem – Approximation problem in network theory– The maximally flat low pass filter approximation– other low-pass filter approximations– Transient

response of low pass filters– Magnitude and phase normalization– Frequency transformation.

UNIT V – NETWORK SYNTHESIS (9 hours)

Positive real function: definition and properties– properties of LC,RC and RL driving point functions– synthesis of LC,RC and RL driving point immitance functions using Foster and Cauer first and second forms.

TEXT BOOKS

1. Vanvalkenburg. M.E, *"Network Analysis"*, 3rd Edition PHI, 2003.
2. Ghosh&. S.P, Chakraborthy. A.K "*Network Analysis and Synthesis*", McGrawHill, 2010.

REFERENCES

1. Sudhakar. A and Shyam Mohan. SP, "*Circuits and Networks: Analysis and Synthesis*", 3rd Edition, TMH, 2006.
2. John D Ryder, "*Networks, Lines and Fields*", 2nd Edition, PHI, 2003.
3. Franklin. F, Kuo**,** *"Network Analysis and Synthesis*", 2nd Edition, Wiley India Ltd., 2005.

EI1101 NETWORK ANALYSIS ANS SYNTHESIS												
Course Designed by		**Department of Electronics and Instrumentation 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	3	3,4	2,3							1,3,4
3.	Category	General (G)		Basic Sciences (B)			Engineering Sciences and Technical Arts (E)			Professional Subjects (P)		
										x		
		Electronics Engineering		Instrumentation Engineering			Control Engineering			Electrical Engineering		
4.	Broad Area	x								x		
5.	Approval	23rd Meeting of Academic Council, May 2013										

EI1102	**ELECTROMAGNETIC THEORY**	**L**	**T**	**P**	**C**
	Total Contact Hours – 45	**3**	**0**	**0**	**3**
	Prerequisite				
	Basic knowledge in Electrical Engineering				

PURPOSE

To provide a knowledge in understanding the fundamentals of electromagnetic fields and their applications in Engineering field.

INSTRUCTIONAL OBJECTIVES

1.	To impart knowledge on concepts of electrostatics, electrical potential, energy density and their applications.
2.	Concepts of magnetostatics, magnetic flux density, scalar and vector potential and its applications.
3.	Faraday's laws, induced emf and their applications.
4.	Concepts of electromagnetic waves and Pointing vector

UNIT 1 – ELECTO MAGNETIC FIELDS (9 hours)

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

UNITII – ELECTROSTATICS (9 hours)

Electric field intensity – Field due to point and continuous charges – Electric fulx density – Gauss's law and application – Electric potential – Electric field and equi potential plots – Electric field in free space, conductors, dielectric – Dielectric polarization – Dielectric strength – Electric field in multiple dielectrics – Boundary conditions, Poisson's and Laplace's equations – Capacitance- Energy density.

UNITIII – MAGNETOSTATICS (9 hours)

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

UNIT IV – ELECTRO DYNAMIC FIELDS (9 hours)

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

UNITV – ELECTRO MAGNETIC WAVES (9 hours)

Generation – Electro Magnetic Wave equations – Wave parameters; velocity, intrinsic impedance, propagation constant – Waves in free space, lossy and lossless dielectrics, conductors – skin depth, Poynting vector –Plane wave reflection and refraction

TEXT BOOKS

1. MathewSADIKU. N.O, "*Elements of Electromagnetics",* Oxford University press Inc. First India edition, 2007.
2. Ashutosh Pramanik, *"Electromagnetism – Theory and Applications",* Prentice-Hall of India Private Limited, New Delhi, 2006.

REFERENCES

1. Joseph.A.Edminister, *"Theory and Problems of Electromagnetics",* Second edition, Schaum Series, Tata Mc Graw Hill, 2002.
2. William .H ,Hayt,*"Engineering Electromagnetics" ,* Tata Mc Graw Hill edition, 2001.
3. Kraus and Fleish,*"Electromagnetics with Applications",* McGraw Hill International Editions, Fifth Edition, 2007.

EI1102 ELECTROMAGNETIC THEORY												
Course Designed by		**Department of Electronics and Instrumentation 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,-4	1	1,2						2-,4
3.	Category	General (G)		Basic Sciences (B)			Engineering Sciences and Technical Arts (E)			Professional Subjects (P)		
							x			x		
		Electronics Engineering		Instrumentation Engineering			Control Engineering			Electrical Engineering		
4.	Broad Area									x		
5.	Approval	23rd Meeting of Academic Council, May 2013										

	ANALYTICAL INSTRUMENTATION	L	T	P	C
EI1103	Total Contact Hours – 45	**3**	**0**	**0**	**3**
	Prerequisite				
	Basic Chemistry				

PURPOSE

The course is designed to equip the students with an adequate knowledge of a number of analytical tools which are useful for clinical analysis in hospitals, drugs and pharmaceutical laboratories and above all for environmental pollution monitoring and control.

INSTRUCTIONAL OBJECTIVES

1.	To introduce the student to principles and theory of instrumental analysis.
2.	To develop an understanding of the operation, maintenance, and calibration of chemical analysis instruments**.**
3.	To study important methods of analysis of industrial gases and radio chemical methods of analysis
4.	To acquire and develop skill for preventive maintenance and repairs of sophisticated instruments.

UNIT I – INSTRUMENTAL ANALYSIS (9 hours)

Introduction to Chemical instrumental analysis –classification: Spectral, electro analytical and separative methods, Instrumental methods of analysis, basic components and their classification. Sampling systems – ion selective electrodes – conductivity meters – pH meters

UNIT II – DISSOLVED COMPONENT AND GAS ANALYS (9 hours)

Dissolved oxygen analyser– sodium analyser– silica analyser– moisture measurement – Oxygen analyser– CO monitor –Nox analyser– H_2S analyser– dust and smoke measurement– thermal conductivity type – thermal analyser– industrial analysers.

UNIT III – CHROMATOGRAPHY (9 hours)

Gas chromatography – liquid chromatography – principles, types and applications – high pressure liquid chromatography – detectors.

UNIT IV – SPECTROPHOTOMETER AND FLAME PHOTOMETER (9 hours)

Spectral methods of analysis – Beer's law UV – visible spectrophotometers – single beam and double beam instruments – source and detectors – IR spectrophotometers – sources and detectors – FTIR spectrometers – atomic absorption spectrophotometer – flame emission spectrophotometers –Flame Photometry – applications.

UNIT V – NUCLEAR MAGNETIC RESONANCE AND RADIATION TECHNIQUES (9hours)

NMR – basic principle – NMR spectrometers – applications – introduction to mass spectrophotometers – nuclear radiation detectors – GM counter, proportional counter , solid state detectors, scintillation counter– introduction to x ray spectroscopy.

TEXT BOOKS

1. Khandpur. R.S, "*Handbook of Analytical Instruments*", Tata McGraw Hill publishing Co. Ltd., 2003.
2. Bella. G, Liptak,*"Process Measurement and analysis".*, CRC press LLC., 2003.

REFERENCES

1. Francis Rousseau and Annick Rouesssac *"Chemical analysis Modern Instrumentation Methods and Techniques*", John wiley& sons Ltd., 2007.
2. James W.Robinson , *"Undergraduate Instrumental Analysis*", Marcel Dekker., 2005.
3. Dwayne Heard, *"Analytical Techniques for atmospheric measurement*", Blackwell Publishing, 2006.

EI1103 ANALYTICAL INSTRUMENTATION												
Course Designed by		**Department of Electronics and Instrumentation Engineering**										
1.	Student outcome	a	b	c	d	e	f	g	h	i	j	k
		x	x			x				x	x	x
2.	Mapping of instructional objectives with student outcome	1	2,3			2				2,3	1	2,3
3.	Category	General (G)		Basic Sciences (B)			Engineering Sciences and Technical Arts (E)			Professional Subjects (P)		
										x		
		Electronics Engineering		Instrumentation Engineering			Control Engineering			Electrical Engineering		
4.	Broad Area			x								
5.	Approval	23rd Meeting of Academic Council, May 2013										

EI1104	DIGITAL SYSTEM DESIGN	L	T	P	C
	Total Contact Hours – 45	3	0	0	3
	Prerequisite				
	Digital Systems				

PURPOSE

The purpose of this course is to identify appropriate design specifications and to design solutions of the system component, using digital ICs.

INSTRUCTIONAL OBJECTIVES

1.	To analyze operation and performance of fundamental combinational and sequential circuits
2.	To introduce the most common digital logic families.
3.	To familiarize with basic structures and features of programmable logic devices (PLDs) and PLA
4.	To provide introduction to digital memories such as ROM, RAM, SRAM, etc.

UNIT I – COMBINATIONAL CIRCUIT DESIGN (9 hours)

Introduction – Analysis and design procedures for Multiplexers, Demultiplexers, encoders, decoders, code converters, comparators

UNIT II – SEQUENTIAL CIRCUIT DESIGN (9hours)

Analysis of clocked synchronous sequential circuits and modelling– State diagram, state table, state table assignment and reduction–Design of synchronous sequential circuits–design of iterative circuits–ASM chart and realization using ASM – implementation of dice game – alternative realizations using micro programming – linked state machines.

UNIT III – DESIGNING WITH PROGRAMMABLE LOGIC DEVICES & NETWORKS FOR ARITHMETIC OPERATION (9 hours)

Read only memory – Principles and design considerations of specific PROMS, EPROMS, SRAMS, and SDRAMS, PLA's ,PAL's – other sequential programmable logic devices – design of key board scanner – serial adder with accumulator – parallel adder with accumulator –traffic light controller –Binary multiplier – Multiplication of signed binary numbers – Binary dividers.

UNIT IV – DESIGN WITH CPLD'S AND PGA (9hours)

XILINX 3000 series FPGA's – designing with FPGA's – XILINX 4000 series – one hot state assignment – Altera CPLA's – Alter FLEX 10K series CPLD's.

UNIT V – DIGITAL SYSTEM DESIGN CASE STUDIES (9hours)

Multiphase clock generators – digital FIR design using TTL/CMOS IC's – PRBS generator, digital PLL's – DRAM controller design – LED/LCD display controller and other examples.

TEXT BOOKS

1. Charles. H, RothJr, *"Digital System Design using VHDL"*, Thomson learning., 2004.
2. Floyd,*"Digital "Fundamentals with PLD Programming"*,Pearson Prentice Hall., 2006.

REFERENCES

1. Charles. H, RothJr, "*Fundamentals of Logic Design*", Cengage Learning., 2010.
2. Donald D.Givone, "*Digital Principles and Design*", Tata McGraw–Hill., 2007.
3. Morris Mano. M, "*Digital Design*", 3rd edition, Pearson Education, 3rd edition, 2007.

EI1104 DIGITAL SYSTEM DESIGN												
Course Designed by		**Department of Electronics and Instrumentation 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	3-5			3-5				4-5		3-5
3.	Category	General (G)		Basic Sciences (B)			Engineering Sciences and Technical Arts (E)			Professional Subjects (P)		
										x		
		Electronics Engineering		Instrumentation Engineering			Control Engineering			Electrical Engineering		
4.	Broad Area	x										
5.	Approval	23rd Meeting of Academic Council, May 2013										

EI1105	**BIOMEDICAL INSTRUMENTATION**	**L**	**T**	**P**	**C**
	Total Contact Hours – 45	**3**	**0**	**0**	**3**
	Prerequisite				
	Nil				

PURPOSE

The purpose of this course is to educate students on the various physiological systems of the human body and to provide an exposure to the instruments used in various departments and laboratories of a hospital.

INSTRUCTIONAL OBJECTIVES

1.	To understand the physical foundations of biological systems and the various electrodes used in medical field.
2.	To have a detailed understanding about the various electro physiological measurements in the human body.
3.	To gain knowledge on the measurement of non-electrical parameter in the human body.
4.	To understand the basic concepts of various medical imaging techniques and their applications.
5.	Understand medical assisting and therapy equipments.

UNIT I – PHYSIOLOGY (9 hours)

Man instrument system – Problems encountered in measuring a living system – Transducers for biomedical applications – Cell and its structure – Resting and action potential – Propagation of action potentials – The heart and cardiovascular system - Electrophysiology of cardiovascular system – Physiology of the respiratory system – Nervous system - Central nervous system and Peripheral nervous system – Electrode theory – Biopotential electrodes.

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UNIT II – ELECTRO PHYSIOLOGICAL MEASUREMENT (9 hours)

ECG – Vector cardiography – EEG – EMG – ERG – EOG – Lead system and recording methods – Typical waveforms.

UNIT III – NON- ELECTRICAL PARAMETER MEASUREMENTS (9 hours)

Measurement of blood pressure, blood flow and cardiac output – Plethysmography – Measurement of heart sounds – Gas analysers – Blood gas analysers - Oximeters.

UNIT IV – MEDICAL IMAGING AND TELEMETRY (9 hours)

X-ray machine – Echocardiography – Computer tomography – MRI – Diagnostic ultrasound – PET – SPECT – Electrical impedance tomography – Thermography – Biotelemetry.

UNIT V – ASSISTING AND THERAPEUTIC DEVICE (9 hours)

Pacemakers – Defibrillators – Ventilator – Anesthesia machine – Nerve and muscle stimulator – Heart lung machine – Kidney machine – Audiometers – Diathermy – Endoscopes – Lasers in biomedicine.

TEXT BOOKS

1. Leslie Cromwell, Fred. J, Weibell and Erich A. Pleiffer, "*Biomedical Instrumentation and Measurements*", 2nd edition, Prentice Hall of India, 2004.
2. Kandpur. R.S, "*Handbook of Biomedical Instrumentation*", 2nd edition, Tata McGraw Hill, 2011.

REFERENCES

1. John .G, Webster, Editor, "*Medical Instrumentation, Application and Design*", John Wiley and Sons Inc, 2009.

EI1105 BIOMEDICAL INSTRUMENTATION												
Course Designed by		**Department of Electronics and Instrumentation 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							4,5			3- 5
3.	Category	General (G)		Basic Sciences (B)			Engineering Sciences and Technical Arts (E)			Professional Subjects (P)		
										x		
		Electronics Engineering		Instrumentation Engineering			Control Engineering			Electrical Engineering		
4.	Broad Area			x								
5.	Approval	23rd Meeting of Academic Council, May 2013										

EI01106	MODERN CONTROL SYSTEMS	L	T	P	C
	Total Contact Hours – 45	3	0	0	3
	Prerequisite				
	CONTROL SYSTEMS ENGINEERING				

PURPOSE

To gain knowledge in compensator and controller design, state variable analysis, non-linear systems and optimal control.

INSTRUCTIONAL OBJECTIVES

1.	To design cascade compensators in time domain and design PID controllers in time domain and frequency domain
2.	To understand and develop state space model for different systems
3.	To analyse the controllability and observability of a system and to design controllers and observers.
4.	To give a basic knowledge in non-linearity and methods to find the stability of non-linear systems
5.	To understand the need of optimality and solving problems

UNIT – I LINEAR CONTROL DESIGN (9 hours)

Design specifications- compensator configuration (series and feedback)-design cascade and feedback compensators (lag, lead, lag-lead) by using time domain. Introduction of PID controllers and design PD, PI, PID controllers using time and frequency domain methods

UNIT – II STATE SPACE ANALYSIS (9 hours)

Concepts of State, State variable and State space model- State space representation of linear continuous time systems using physical variables, phase variables and canonical variables-diagonalization-State space representation of discrete time systems-Solution of state equations-computation of state transition matrix.

UNIT III - CONTROLLABILITY AND OBSERVABILITY (9 hours)

BIBO Stability – Determining the stability by Routh-Hurwitz criterion-
Properties and construction of the root loci-effect of adding a pole and zeros to a system

UNIT IV – NON-LINEAR CONTROL **(9 hours)**

Non-linear systems-properties-common physical non-linearity's-dead zone, relay, saturation nonlinearities phase plane method-singular points-phase trajectories-stability analysis by describing function method-Liapunov's stability criterion.

UNIT – V OPTIMAL CONTROL **(9 hours)**

Problem formulation – necessary conditions of optimality – state regulator problem – Matrix Riccati equation – infinite time regulator problem – output regulator and tracking problems

TEXT BOOKS

1. Gopal. M, "*Modern Control System theory"*, New age international(P) ltd, 2012.
2. Nagrath.I.J, and Gopal .M, "*Control Systems Engineering"*, Anshan Pub, 2008.

REFERENCES

1. Katsuhiko Ogata, "*Modern Control Engineering"*-fifth edition, Prentice Hall of India Private Ltd, New Delhi, 2009.
2. Kirk D.E, "*Optimal control theory-an introduction*", Prentice Hall, N.J. 1970.
3. Richard .C, Dorf and Robert.H.Bishop, "*Modern Control System Engineering"*, Pearson Education (US), United States, 2010.

<table>
<tr><th colspan="13">EI1106- MODERN CONTROL SYSTEMS</th></tr>
<tr><td colspan="2">Course Designed by</td><td colspan="11">Department of Electronics and Instrumentation 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>
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<tr><td>2.</td><td>Mapping of instructional objectives with student outcome</td><td>1-4</td><td>3,4</td><td>3,4</td><td>1,2, 4</td><td>1-4</td><td>4</td><td>5</td><td></td><td>1,4, 5</td><td></td><td>1,4, 5</td></tr>
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<tr><td colspan="2">Electronics Engineering</td><td colspan="3">Instrumentation Engineering</td><td colspan="3">Control Engineering</td><td colspan="3">Electrical Engineering</td></tr>
<tr><td>4.</td><td>Broad Area</td><td colspan="2"></td><td colspan="3"></td><td colspan="3">x</td><td colspan="3"></td></tr>
<tr><td>5.</td><td>Approval</td><td colspan="11">23rd Meeting of Academic Council, May 2013</td></tr>
</table>

	INSTRUMENTATION BUSES AND DATA NETWORKS	L	T	P	C
EI1107	Total Contact Hours – 45	**3**	**0**	**0**	**3**
	Prerequisite				
	Nil				

PURPOSE

To introduce the concepts, terminologies and technologies associated with instrumentation buses and data networks.

INSTRUCTIONAL OBJECTIVES

1.	To understand the basic concept of communication buses
2.	To provide an idea about various data networks.
3.	To study the functions of OSI layers.
4.	To make the students to get familiarized with different protocols and network components
5.	To make the students to get familiarized with different buses such as Field bus HART, MOD bus, PROFI bus FIP BUS, MAP &TOP Protocol

UNIT I – BASIC CONCEPT OF BUSES (9 hours)

Basic concepts of Busses - Interrupts - Interfacing PC systems – Interfacing Standards – comparison of different busses – PCI Bus – PCI operation - Bus arbitration – PCI pins – configuring address space – I/O addressing.

UNIT II – NETWORK FUNDAMENTAL (9 hours)

Networks – Introduction-LAN Network- Man Network-Wide Area Network - Topologies- Architecture of OSI model-Routers,-Bridges and repeaters - Transmission media-Guided media- Unguided media- Data transmission-Parallel transmission-serial transmission.

UNIT III – BUS ACCESS METHOD&INTERFACING (9 hours)

CSMA/CD- Ethernet-Introduction-10Mbps Ethernet and 100Mbps Ethernet-Token passing method - Gateway – Data link services- SDN-SDA- SRD-RS 232C-RS 422C and RS- 485-Line Drivers – 4 to 20 ma current loop device –GPIB.

UNIT IV – FIELDBUS **(9 hours)**

Field bus:- Introduction- General Field bus architecture-Basic requirements of Field bus standard Field bus topology- Interoperability and Inter changeability – Introduction to OLE for process control (OPC)Network.

UNIT V – NETWORK INDUSTRIAL PROTOCOL& APPLICATION **(9 hours)**

Introduction- Evolution of signal standard – HART communication protocol – Communication modes – HART Networks – HART commands – HART applications –MOD bus protocol– PROFI bus protocol – FIP bus protocol – Block diagram FIP Bus Architecture MAP and Top Protocol.

TEXT BOOKS

1. Berge, J, "*Field Buses for Process Control: Engineering"*, Operation, and Instrument engineer's Handbook Process control and Optimization Bela G. Liptak - 2010Maintenance", ISA Press, 2004.
2. Andrew. S, Tanenbaum "*Computer Networks*", Prentice Hall PTR, 2003.

REFERENCES

1. MindShare, Tom Shanley, "*PCI – X System architecture"* Addison-Wesley, 2001.
2. W. Stalling, "*Data and Computer communication*" 8th edition, 2007
3. Douglas .E.Comer "*Computer Networks and Internets*" Addison Wesley , 2000.
4. Brijiendra Singh "*Data communication and Computer Network",* 2nd Edition. Prentice Hall of India 2006.

EI1107-INSTRUMENTATION BUSES AND DATA NETWORKS												
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					x	x		x
2.	Mapping of instructional objectives with student outcome	1,2,3, 4,5	1,2,5	1,2,3					1,2,5	2,4,5		4,5
3.	Category	General (G)		Basic Sciences (B)			Engineering Sciences and Technical Arts(E)			Professional Subjects (P)		
										X		
4.	Broad Area	Electronics Engineering		Instrumentation Engineering			Control Engineering			Electrical Engineering		
										X		
5.	Approval	23rd Meeting of Academic Council, May 2013										

EI1108	COMPUTER CONTROL OF PROCESSES	L	T	P	C
	Total Contact Hours – 45	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

To introduce the knowledge on the principle of sampled data control system. To impart the ideas of system modelling and identification of process.

INSTRUCTIONAL OBJECTIVES

1.	To understand the basics of Z transform and modified Z transform of sampled data system.
2.	To have knowledge in modelling and identification of process.
3.	To understand the control algorithm and its implementation.
4.	To have a knowledge in multivariable control system.
5.	To understand the concept of adaptive control and its design.

UNIT I – SAMPLED DATA CONTROL SYSTEM (9 hours)

Introduction – Review of Z transform – modified Z transform – need of computer in a control system – functional block diagram of a computer control system – direct digital control(DDC) – supervisory control – data logger – SCADA .

UNIT II – SYSTEM MODELLING AND IDENTIFICATION (9 hours)

Introduction to pulse transfer function – open loop and closed loop response of SDS – pulse testing for process identification – linear least square algorithm – implementation of digital controllers – digital temperature control system – digital position control system – stepping motors and their control.

UNIT III – DESIGN OF DIGITAL CONTROL ALGORITH (9 hours)

Design and implementation of different digital control algorithm – Dead beat – Dahlin – Kalmans algorithm – pole placement controller – position and velocity form algorithm – selection of sampling time – Smith predictor algorithm – Jury's stability test – Schur Cohn stability criterion.

UNIT IV – ADAPTIVE CONTROL (9 hours)

Self tuning – gain scheduling – Model Reference Adaptive Control – self tuning regulator – auto tuning and gain scheduling adaptive control design with examples – feedforward control – cascade control.

UNIT V – MULTI VARIABLE CONTROL SYSTEM (9 hours)

Interaction Analysis – Singular value decomposition – Internal model control – Simplified model predictive control

TEXT BOOKS

1. Deshpande. Pm,and Ash, "*Elements of Computer Control System*" ISA Press, USA, 1998.
2. Lennart Ljung "*System Identification Theory for the user*" PTR Printice Hall Information and system sciences Series, NJ, 1999.

REFERENCES

1. Richard. H, Middleton and Graham. C, Goodwin "*Digital Control and Estimation A Unified Approach*" Printice Hall NJ, 1990.
2. Dale Seborg. E, Thomas. F, Edgar, Duncan. A, Mellichamp, "*Process Dynamics and Control*" Willey India, 2006.
3. Astrom .K. J, Bjorn Wittenmark, "*Adaptive Control"*, Second Edition, Prentice Hall of India.

EI1108 COMPUTER CONTROL OF PROCESSES												
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	x		x			x		x
2.	Mapping of instructional objectives with student outcome	1	1,2	3,4	2,4		1,4			1,2,3		4
3.	Category	General (G)		Basic Sciences (B)			Engineering Sciences and Technical Arts(E)			Professional Subjects (P)		
										x		
4.	Broad Area	Electronics Engineering		Instrumentation Engineering			Control Engineering			Electrical Engineering		
				x								
5.	Approval	23rd Meeting of Academic Council, May 2013										

	AUTOTRONIX	L	T	P	C
EI1109	Total Contact Hours-45	3	0	0	3
	Prerequisite				
	Transducers, Control Systems, Power Electronics & Drives				

PURPOSE

The purpose of this course is to understand the extent and nature of electronic circuitry in automotive systems including monitoring and control circuits for engines, emission control system, ignition systems, fuel systems including carbureted and fuel injected. Applications of sensors on automotive systems measurement for better insight into the course.

INSTRUCTIONAL OBJECTIVES

1.	To understand the application of electronics in automotive industry.
2.	To identify the different control systems in automotives and their control.
3.	To identify, formulate and solve real time engineering problems.
4.	To learn digitization of the conventional control systems in automotives.
5.	To understand the basics of different instrumentation systems in automotives.

UNIT I – FUNDAMENTALS OF AUTOMOTIVE ELECTRONICS (9 hours)

Electronic Engine Management System – Components – Open and Closed Loop Control Strategies – PID Control – Look Up Tables – Introduction – Modern Control Strategies Like Fuzzy Logic and Adaptive Control – Controlled Parameters – SI and CI Engines.

UNIT II – SENSORS AND ACTUATORS (9 hours)

Introduction – Basic Sensor Arrangement – Types Of Sensors – Hall Effect Sensor – Hot Wire Anemometer – Thermistor – Piezo-Electric Sensor – Piezo-Resistive Sensors – Oxygen Concentration Sensor – Lambda Sensor – Crankshaft Angular Position Sensor – Cam Position Sensor – Mass Air Flow (MAF) Rate – Manifold Absolute Pressure (MAP) – Throttle Plate Angular Position – Engine Oil Pressure Sensor – Vehicle Speed Sensor – Stepper Motors – Relays – Detonation Sensor – Emission Sensors.

UNIT III – SPARK IGNITION ENGINE MANAGEMENT (9 hours)

Feedback Carburetor System – Throttle Body Injection – Multi Point Fuel Injection System – Injection System Controls –Advantage of Electronic Ignition Systems – Three Way Catalytic Converter – Conversion Efficiency Versus Lambda – Group and Sequential Injection Techniques – Fuel System Components – Advantages of Electronic Ignition Systems –Solid State Ignition Systems – Principle Of Operation – Types – Contact Less Electronic Ignition System – Electronic Spark Timing Control.

UNIT IV – COMPRESSION IGNITION ENGINE MANAGEMENT (9 hours)

Fuel Injection System – Parameters Affecting Combustion – Noise and Emissions in CI Engines – Pilot, Main, Advanced – Post Injection and Retarded Post Injection – Electronically Controlled Unit Injection System – Layout of the Common Rail Fuel Injection System – Fuel Injector – Fuel Pump – Rail Pressure Limiter – Flow Limiter – Working Principle – EGR Valve Control in Electronically Controlled Systems.

UNIT V – DIGITAL ENGINE CONTROL SYSTEM (9 hours)

Open Loop and Closed Loop Control System – Engine Cooling and Warm Up Control – Idle Speed Control – Acceleration and Full Load Enrichment – Deceleration Fuel Cut-off – Fuel Control Maps – Open Loop Control of Fuel Injection – Closed Loop Lambda Control – Exhaust Emission Control – **On Board Diagnostics:** Diagnostics – Future Automotive Electronic Systems – Electronic Dash Board Instruments – Onboard Diagnosis System.

TEXT BOOKS

1. Arthur Primrose Young, Leonard Griffiths, "*Automobile Electrical and Electronic Equipment: Theory and Practice for Students, Designers, Automobile Electricians and Motorists*", London Butterworths, Ninth Edition, 1986.
2. William Ribbens, "*Understanding Automotive Electronics: An Engineering Perspective*", Butterworth-Heinemann, Seventh Edition, 2013.

REFERENCES

1. Allan Bonnick, "*Automotive Computer Controlled Systems*" Taylor & Francis, Fifth Edition, 2001.
2. Tom Denton, "*Automobile Electrical and Electronics Systems*", Butterworth-Heinemann, Fourth Edition, 2004.
3. Robert Bosch GmbH, "*Diesel-Engine Management*", John Wiley & Sons, Fourth Edition, 2006.
4. Robert Bosch GmbH and Horst Bauer, "*Gasoline-Engine Management*", Bentley Publishers, Second Edition, 2006.

5. Robert. N, Brady, "*Automotive Computers and Digital Instrumentation*", Prentice Hall, First Edition, 1988.
6. Hillier V.A.W, "*Fundamentals of Automotive Electronics*", Nelson Thornes Limited, Sixth Edition, 2012.

EI1109 Autotronix												
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	x						x
2.	Mapping of instructional objectives with student outcome	1,2,3		3,4	2,5	2,3						2,4,5
3.	Category	General (G)		Basic Sciences (B)			Engineering Sciences and Technical Arts(E)			Professional Subjects (P)		
										X		
4.	Broad Area	Electronics Engineering		Instrumentation Engineering			Control Engineering			Electrical Engineering		
		x		x								
5.	Approval	23rd Meeting of Academic Council, May 2013										

EI1110	**SOFT COMPUTING**	**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 on the fundamentals of neural network and fuzzy systems. To learn the different intelligent techniques for control and to gain knowledge in genetic algorithm.

INSTRUCTIONAL OBJECTIVES

1.	To study the various architectures of biological and artificial neural network.
2.	To apply the concepts in solving engineering problems and implementing controllers.
3.	To get familiarized with search techniques in artificial intelligence.
4.	To study about various hybrid control strategies.
5.	To appreciate and understand the modern techniques in intelligent controllers.

UNIT I – INTRODUCTION TO ARTIFICIAL NEURAL NETWORK (ANN) & FUZZY LOGIC (9 hours)

Neuron, nerve structure and synapse –Artificial Neuron and its model, activation functions,

neural network architecture –Single Layer Perceptron– Multi Layer Perceptron – Back propagation algorithm (BPA), Fuzzy set theory – Fuzzy sets – Operation on Fuzzy sets – Scalar cardinality, fuzzy cardinality, union and intersection, complement, equilibrium points, aggregation, projection, composition, decomposition, cylindrical extension, fuzzy relation – Fuzzy membership functions.

UNIT II – NEURAL NETWORKS FOR MODELLING AND CONTROL (9 hours)

Modelling of non linear systems using ANN– Generation of training data – optimal architecture – Model validation– Control of non linear system using ANN– Direct and Indirect neuro control schemes –Adaptive neuro controller – Case study – Familiarization of Neural Network Control Tool Box.

UNIT III – FUZZY LOGIC FOR MODELLING AND CONTROL (9 hours)

Modelling of non linear systems using fuzzy models(Mamdani and Sugeno) – Takagi-Sugeno-Kang (TSK) model– Fuzzy Logic controller – Fuzzification – Knowledge base – Decision making logic – Defuzzification –Case study –Inverted pendulum–Familiarization of Fuzzy Logic Tool Box.

UNIT IV – GENETIC ALGORITHM (8 hours)

Basic concept of Genetic algorithm – flow chart of GA – Genetic representations – encoding – Initialization and selection, Genetic operators – Mutation, Generational Cycle, applications – Concepts on search techniques – Tabu search, Ant-colony search and Particle Swarm Optimization (PSO).

UNIT V – HYBRID CONTROL SCHEMES (9 hours)

Neuro fuzzy systems –Adaptive neuro fuzzy inference system(ANFIS) – Optimization of membership function and rule base using Genetic Algorithm and PSO – Case study–Introduction to Support Vector Regression – Familiarization of ANFIS Tool Box.

TEXT BOOKS

1. Laurene. V, Fausett, "*Fundamentals of Neural Networks, Architecture, Algorithms, and Applications*", Pearson Education, 2008.
2. Timothy. J, Ross, "*Fuzzy Logic with Engineering Applications*", Wiley, Third Edition, 2010.

REFERENCES

1. Zimmermann. H.J, "*Fuzzy set theory-and its Applications*"- Springer international edition, 2011.
2. David Goldberg. V "*Genetic Algorithms in Search, Optimization, and Machine Learning*", Pearson Education, 2009.
3. Miller W.T, Sutton . R.S and Webrose . P.J, "*Neural Networks for Control*", MIT Press, 1996.
4. Cortes. C, and Vapnik. V, "*Support-Vector Networks, Machine Learning*", 2002.

EI1110 SOFT COMPUTING												
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		X			X	X		X
2.	Mapping of instructional objectives with student outcome	1,2,4	2,4	2,5		2			5	3		2,3,4
3.	Category	General (G)		Basic Sciences (B)			Engineering Sciences and Technical Arts(E)			Professional Subjects (P)		
										x		
4.	Broad Area	Electronics Engineering		Instrumentation Engineering			Control Engineering			Electrical Engineering		
							x					
5.	Approval	23rd Meeting of Academic Council, May 2013										

EI1111	**INSTRUMENTATION AND CONTROL IN PROCESS INDUSTRIES**	**L**	**T**	**P**	**C**
	Total Contact Hours – 45	**3**	**0**	**0**	**3**
	Prerequisite				
	Nil				

PURPOSE

To learn the complete operation of petrochemical industries and the control of iron and steel industries.

INSTRUCTIONAL OBJECTIVES

1.	It deals with various equipments involved in the petrochemical industries.
2.	It deals with distillation column, reactor , heat exchangers and evaporators.
3.	It deals with performance of the pumps.
4.	It deals with appropriate sensors and transducers for various measurements in iron and steel industries.
5.	It deals with the role of instrumentation and control in industries.

UNIT I – INTRODUCTION TO PETROLEUM (9 hours)

Petroleum exploration – production and refining – constituents of crude oil – P & I diagram of petroleum refinery – atmospheric distillation of crude oil – vacuum distillation process – thermal conversion process – control of distillation column – temperature control.

UNIT II – CHEMICAL REACTORS AND HEAT EXCHANGERS (9 hours)

Temperature control– pressure control – control of dryers – batch dryers – atmospheric and vacuum – continuous dryers – liquid to liquid heat exchangers – steam heaters – condensers – reboilers and vaporizers – evaporators– types of evaporators.

UNIT III – EFFLUENT AND WATER TREATMENT CONTROL (9hours)

Centrifugal pump – On– Off control – pressure control – flow control – throttling control , rotary pumps – On– Off control – pressure control, reciprocating pump – On– Off control and throttling control – chemical oxidation – chemical reduction – naturalization – precipitation – biological control.

UNIT IV – FLOW DIAGRAM AND DESCRIPTION OF IRON AND STEEL (9 hours)

Raw materials preparation– iron making– blast furnaces – stoves– raw steel making – basic oxygen furnace – electric furnace – measurement of level – pressure – density – temperature – flow weight – thickness and shape – graphic displays and alarms. Blast furnace stove combustion control system – gas and water controls in BOF furnace – Sand casting old control.

UNIT V – COMPUTER APPLICATIONS IN INDUSTRY (9 hours)

Review of data logging – SCADA– DDC and DCS – steel rolling mill control – annealing process control – utilities management with computer system.

TEXT BOOKS

1. Dr. Ram Prasad, "*Petroleum Refining Technology*", Khanna Publisher, 1st Edition, 2000.
2. Liptak B.G, "*Instrument Engineers Handbook"*, Volume III, 2006.

REFERENCES

1. Liptak. B. G, "*Process Control*" , Third edition , Chilton Book Company, Pennsylvania, 1995.
2. Considine. D. M, "*Process/Industrial Instruments and control Handbook*" , McGraw Hill, 4th edition ,1993.

3. Serope Kalpakjian, "*Manufacturing Engineering and Technology*", Addison Wesley Publishing Company, Massachusetts, 3rd edition, 1995.
4. Robert. H, Perry, Green. D.W, and J.O. Maloney, Perry's – "*Chemical Engineers Handbook*", McGraw Hill Inc, New York, 7th edition, 1998.

EI1111 INSTRUMENTATION AND CONTROL IN PROCESS INDUSTRIES												
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		x			x		x
2.	Mapping of instructional objectives with student outcome			1-3	2,4		1,4	4	5	1,2,3		4
3.	Category	General (G)		Basic Sciences (B)			Engineering Sciences and Technical Arts(E)			Professional Subjects (P)		
										x		
4.	Broad Area	Electronics Engineering		Instrumentation Engineering			Control Engineering			Electrical Engineering		
				x								
5.	Approval	23rd Meeting of Academic Council, May 2013										

EI1112	**ADAPTIVE CONTROL SYSTEMS**	**L**	**T**	**P**	**C**
	Total Contact Hours – 45	**3**	**0**	**0**	**3**
	Prerequisite -Control Systems				

PURPOSE

To provide a knowledge of existing algorithms for adaptive control, with a basic understanding of their stability properties and of how to implement them.

INSTRUCTIONAL OBJECTIVES

1.	To give an Introduction and an overview of the theoretical approach in adaptive control.
2.	To have an adequate knowledge in adaptive control design, analysis, and application of a Wide variety of algorithms.
3.	To give the knowledge on Implementation of Adaptive controllers.
4.	To introduce the student in research in adaptive control that can be used to manage Dynamical systems with unknown parameters.

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

Introduction to Adaptive Control- Feedback in control systems- system modelling-continuous time-Discrete time- feedback control-adaptive control system prototypes-simple adaptive control systems-Direct Adaptive Control-Indirect Adaptive Control-Back stepping non linear Design-Adaptive versus Fixed Control-Dynamic systems models - Non linear system-linear System

UNIT II - ADAPTIVE PARAMETER ESTIMATION (9 hours)

Parameterized system model – linear parametric models – normalized gradient algorithm – normalized least squares algorithm (LS) Estimation - Recursive Least Squares (RLS) Estimation- Extended Least Squares (ELS) Estimation and- Least Mean Square (LMS) Estimation– parameter convergence – persistency of excitation – convergence of the gradient algorithm – convergence of the least squares algorithm

UNIT III - SELF TUNING REGULATORS (9 hours)

Pole placement Design-Indirect Self –Tuning Regulators-Continuous –Time Self – Tuners- Direct Self –Tuning Regulators- Disturbances with Known Characteristics-minimum Variance-Moving-Average Controllers- Stochastic Self-Tuning Regulators-Unification of Direct Self –Tuning Regulators-Linear Quadratic STR-Adaptive Predictive Control.

UNIT IV - CONTINUOUS TIME MODEL REFERENCE ADAPTIVE CONTRO(9 hours)

Control system structure – model reference control – adaptive control – tracking error equation – Lyapunov design for relative degree 1 – alternative design for relative degree 1 – Lyapunov design for arbitrary relative degrees – gradient design for arbitrary relative degrees - Relations between MRAS and STR

UNIT V - GAIN SCHEDULING (9 hours)

Gain Scheduling principle- Gain Scheduling Controller Design -Non linear Transformations-Application of Gain Scheduling- Auto-tuning techniques-Methods based on Relay feedback Practical Issues and implementation-Controller and Estimator Implementation- Case Studies- chemical Reactor Control-Temperature Control in a Distillation Column

TEXT BOOKS

1. Gang Tao, *"Adaptive Control Design and Analysis"*,. Hoboken, N.J. : Wiley-Inter science, 2003.
2. Astrom & Bjorn Wittenmark, *"Adaptive Control"*, Addison Wesley. 2nd Edition 1994.

REFERENCES

1. Sastry. S & Bodson M, *"Adaptive Control: Stability"*, Convergence, and Robustness, Prentice Hall. 2011.
2. Ljung. L, *"System Identification: Theory for the User"*, Prentice Hall.1999.

EI1112 ADAPTIVE CONTROL SYSTEMS												
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	x	x	x		x	x		x
2.	Mapping of instructional objectives with student outcome	2		2,3,4		2,3,4				1,2,3,4	1,2,3,4	1,2,3
3.	Category	General (G)		Basic Sciences (B)			Engineering Sciences and Technical Arts(E)			Professional Subjects (P)		
										x		
4.	Broad Area	Electronics Engineering		Instrumentation Engineering			Control Engineering			Electrical Engineering		
							x					
5.	Approval	23rd Meeting of Academic Council, May 2013										

EI1113	ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEMS	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

To represent the concepts of intelligent agents, search techniques, knowledge, reasoning and planning and applications in expert systems.

INSTRUCTIONAL OBJECTIVES

1.	To study the ideas of intelligent agents and search methods.
2.	To study about knowledge representation.
3.	To study about planning and learning methodologies.
4.	To construct plans and methods for designing controllers.
5.	To study the concepts of expert systems.

UNIT I –INTRODUCTION TO ARTIFICIAL INTELLIGENC` (8 hours)

Overview of AI – History and developments in AI – general concepts – production systems and examples – Intelligent agents – Perception – Introduction to natural language processing.

UNIT II – SEARCHSTRATEGIES AND ALGORITHMS. (9 hours)

Structures and strategies for state space search – Data and Goal driven search – search techniques– BFS, DFS, DFS with iterative deepening, best first search and Heuristic search – A* algorithm – AO* algorithm – constraint satisfaction.

UNIT III – KNOWLEDGE REPRESENTATION AND REASONING. (10 hours)

Representing knowledge – propositional calculus – predicate calculus – AI representational schemes – semantic networks, conceptual dependency, scripts and frames – theorem proving by resolution refutation –Basic probability notation – Axioms of probability – Baye's rule – Probabilistic reasoning.

UNIT IV – PLANNING AND LEARNING (10 hours)

Planning: Planning problem – Partial order planning – Planning and acting in non-deterministic domains – Learning: Learning decision trees – Knowledge in learning – Neural networks – basic architectures and types – Reinforcement learning – Passive and active.

UNIT V – EXPERT SYSTEMS (8 hours)

Definition – Features of an expert system – Organization – Characteristics – Prospector – Knowledge Representation in expert systems – Expert system tools – MYCIN – EMYCIN.

TEXT BOOKS

1. George. F, Luger, *"Artificial Intelligence – Structures and Strategies for Complex Problem Solving"*, Fourth Edition, Pearson Education, 2002.
2. Elain Rich and Kevin Knight, *"Artificial Intelligence"*, Second Edition Tata McGraw Hill, 2004.

REFERENCES

1. Stuart Russel and Peter Norvig, *"Artificial Intelligence - A Modern Approach"*, Second Edition, Pearson Education, 2003.
2. Donald. A, Waterman, *"A Guide to Expert Systems"*, Pearson Education.2009.
3. Oliver Pourret, PatrikNaim and Bruce Marcot, *"Bayesian Networks-A Practical guide to applications"*, 2008.

EI1113 ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEMS												
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	x			x	x		x
2.	Mapping of instructional objectives with student outcome	2,3,4		4	4,5	3,4			3	4,5		3,4,5
3.	Category	General (G)		Basic Sciences (B)			Engineering Sciences and Technical Arts(E)			Professional Subjects (P)		
										x		
4.	Broad Area	Electronics Engineering		Instrumentation Engineering			Control Engineering			Electrical Engineering		
				x								
5.	Approval	23rd Meeting of Academic Council, May 2013										

EI1114	POWER PLANT INSTRUMENTATION	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

To enable the students to learn in detail about the various instruments available for monitoring/controlling power plant electrical and non-electrical parameters.

INSTRUCTIONAL OBJECTIVES

1.	To Familiarises about different power generation process.
2.	To understand and learn the different principles and instruments adopted for measurement of current, voltage, power, energy etc.
3.	To analysis important parameter for monitoring and controlling in power plant
4.	To get detailed knowledge on Nuclear power plant.

UNITI - METHODS OF POWER GENERATION (9 hours)

Power generation - types - importance of instrumentations in power generation - basic building block for all types of power generation plants - details of boiler processes - P&I diagram of boiler - cogeneration.

UNIT II - PARAMETERS OF POWER PLANT AND ITS MEASUREMENT (9 hours)

Electrical and non electrical parameter measurement -correction factor for steam temp and temp-steam pressure - drum level measurement -radiations detector - smoke density measurement -dust monitor - speed vibration, shell temperature monitoring & control - steam pressure control lubricant temp control of turbines.

UNIT III - ANALYZERS IN POWER PLANTS (9 hours)

Flue gas oxygen analyzer - analysis of impurities in feed water and steam - dissolved oxygen analyzer - chromatography - PH Meter - Fuel analyzer -pollution monitoring instruments.

UNIT IV - CONTROL LOOPS IN BOILER (9 hours)

Combustion Control-air/fuel ratio control - furnace draft control - drum level control - main steam and reheat steam temp control - super heater control - attemperator - deaerator control - distributed control system in power plants - interlocks in boiler operation.

UNIT V - NUCLEAR POWER PLANT (9hours)

Nuclear power plant instrumentation - P&I diagram of different types of nuclear power plant - radiations detection instruments - process sensors for nuclear power plants - Spectrum Analyzer - nuclear reactor control systems and allied instrumentation.

TEXT BOOKS

1. Sam Dukelow. G *"The control of Boilers"*, instrument society of America, 1991.
2. Modern power station practice, Vol.6, "*Instrumentation Controls and Testing"*, Pergamon Press, Oxford, 1971. A 153.

REFERENCES

1. Elonka. S.M, and Kohan. A.L, *"Standard Boilers Operations"*, McGraw Hill, New Delhi, 1994.
2. Jain. R.K, *"Mechanical and industrial Measurements"*, Khanna Publishers, New Delhi, 1995.

EI1114 POWER PLANT INSTRUMENTATION												
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	x			x	x			x
2.	Mapping of instructional objectives with student outcome	1,2,3	2,4	2,4	4			3	4			1,4
3.	Category	General (G)		Basic Sciences (B)			Engineering Sciences and Technical Arts(E)			Professional Subjects (P)		
										x		
4.	Broad Area	Electronics Engineering		Instrumentation Engineering			Control Engineering			Electrical Engineering		
				x			x			x		
5.	Approval	23rd Meeting of Academic Council, May 2013										

EI1115	VIRTUAL INSTRUMENTATION	L	T	P	C
	Total Contact Hours – 45	**3**	**0**	**0**	**3**
	Prerequisite				
	Nil				

PURPOSE

Enable students to understand basics, programming techniques, data acquisition and interfacing techniques of virtual instrumentation and to use VI for different applications.

INSTRUCTIONAL OBJECTIVES

1.	To understand what is Virtual instrumentation and to realize the architecture of VI.
2.	To familiarize with the VI software and learn programming in VI.
3.	To study various Instrument Interfacing and data acquisition methods.
4.	To understand various analysis tools and develop programs for Process control applications.

UNIT I –REVIEW OF VIRTUAL INSTRUMENTATION (9 hours)

Historical perspective – Need of VI – Advantages of VI – Define VI – Block diagram & Architecture of VI – Data flow techniques – Graphical programming in data flow – Comparison with conventional programming.

UNIT II – PROGRAMMING TECHNIQUES (9hours)

VIS and sub-VIS – Loops and charts – Arrays – Clusters – Graphs – Case & sequence structures – Formula nodes – Local and global variable – String & file input.

UNIT III – DATA ACQUISITION BASICS (9 hours)

DIO – Counters and timers – PC Hardware structure – Timing – Interrupts – DMA – Software and Hardware Installation – GPIB/IEEE 488 concepts – Embedded system buses – PCI – EISA – CPCI.

UNIT IV – COMMON INSTRUMENT INTERFACES (9 hours)

Current loop – RS 232C/RS 485 – Interface basics: USB – PCMCIA – VXI – SCXI – PXI – networking basics for office and industrial application VISA and IVI – Image acquisition and processing – Motion Control – DMM – Waveform generator.

UNIT V – USE OF ANALYSIS TOOLS AND APPLICATION OF VI (9 hours)

Fourier transforms – Power spectrum – Correlation methods – Windowing and flittering – Pressure control system – Flow control system – Level control system– Temperature data acquisition system – Motion control employing stepper motor – PID controller tool box.

TEXT BOOKS

1. Dr. Sumathi. S and Prof. Surekha. P, "*LabVIEW Based Advanced Instrumentation Systems*", 2nd edition, 2007.
2. Gary Johnson, "*LabVIEW Graphical Programming*", McGraw Hill, 2006.

REFERENCES

1. Lisa .K, Wells and Jeffrey Travis, "*LABVIEW for Everyone*", Prentice Hall, 2009.
2. Skolkoff, "*Basic concepts of LABVIEW 4*", PHI, 1998.
3. Gupta. S, Gupta. J.P, "*PC Interfacing for Data Acquisition and Process Control*", ISA, 1994.
4. Amy. L.T, "*Automation System for Control and Data Acquisition*", ISA, 1992.

EI1115 VIRTUAL INSTRUMENTAION												
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	x			x	x			x
2.	Mapping of instructional objectives with student outcome	1,2,3	2,4	2,4	4			3	4			1,4
3.	Category	General (G)		Basic Sciences (B)			Engineering Sciences and Technical Arts(E)			Professional Subjects (P)		
										x		
4.	Broad Area	Electronics Engineering		Instrumentation Engineering			Control Engineering			Electrical Engineering		
				x								
5.	Approval	23rd Meeting of Academic Council, May 2013										

EI1116	VLSI DESIGN	L	T	P	C
	Total Contact Hours - 45	**3**	**0**	**0**	**3**
	Prerequisite				
	Nil				

PURPOSE

The purpose of this course is to develop a basic idea about the VLSI technology for the engineering graduates by learning the concepts of Integrated Circuit design and testing.

INSTRUCTIONAL OBJECTIVES

1.	To learn the MOS Process Technology
2.	To rightly apply the concepts in real time applications and to explain the recent developments in the present area
3.	To learn the concepts of modeling a digital system using Hardware Description Language.
4.	To give basic knowledge of ASIC internals
5.	To impart knowledge on ASIC types and tools used in the design.

UNIT I - INTRODUCTION TO MOS TECHNOLOGY (9 hours)

An overview of Silicon Semiconductor technology– NMOS fabrication–CMOS fabrication: n-well, p-well - Twin tub, interconnects–Basic MOS transistors: symbols, Enhancement mode, Depletion mode transistor operation–Basic Electrical Properties of MOS and BICMOS Circuits– Bipolar transistors– Latch up and prevention.

UNIT II - MOS CIRCUIT DESIGN PROCESS (9 hours)

Channel length modulation– CMOS inverter DC characteristics– power dissipation– transmission gate NMOS and CMOS inverter –Pass transistor– Determination of pull up to pull down ratio – Design of logic gates – Stick diagrams–Design rules and layout – Delay unit– Inverter delays – Propagation delays– Scaling models.

UNIT III - CMOS SUBSYSTEM DESIGN (9 hours)

Introduction – Design of Adders: Carry Look Ahead, Carry Select, Carry Save Parity generators–Design of multipliers: Array, Braun array, Baugh - Wooley Array, Wallace tree multiplier–Sequential Machines – Latches and Flipflops–Sequential system and Clocking discipline – Sequential System Design.

UNIT IV - ASIC (9 hours)

Introduction, Types of ASIC– Design Flow of VLSI– Types of Simulation– Programmable ASIC– Floor Planning– Placement– Partitioning– Routing.

UNIT V - VHDL (9 hours)

Program Structure– Types and Constants– functions and Procedures– Libraries and Packages– Structural Design Elements– Dataflow design Elements– Behavioral design Elements–Time Dimension and Simulation, Synthesis.

TEXT BOOKS

1. Douglas Pucknell, "*Basic VLSI Design Systems and Circuits*", Prentice Hall PTR, 2005.
2. Michael John Sabestian Smith, "*Application Specific Integrated circuits*", 2008.

REFERENCES

1. Wayne Wolf, "*Modern VLSI Design (System on Silicon)",* Prentice Hall PTR, 2008.
2. Neil Weste& Kamran Eshrangian, "*Principles of CMOS VLSI Design*", Addison Wesley, 2nd edition, 1998.
3. Jacob Baker, Harry, David E.Boyce, "*CMOS Circuit Design, Layout and Simulation*", Prentice Hall India, 1998.
4. Bhasker. J, " *A VHDL Primer*", Pearson Education, Third edition, 1999.
5. John Wakerly, "*Digital Design Principles & Practices*", 3rd Edition,Pearson Education, 2002.

EI1116 VLSI DESIGN												
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	x			x	x		x
2.	Mapping of instructional objectives with student outcome	1,3		2,5	1,4	2,5			2,3	1,3		2,5
3.	Category	General (G)		Basic Sciences (B)			Engineering Sciences and Technical Arts(E)			Professional Subjects (P)		
										x		
4.	Broad Area	Electronics Engineering		Instrumentation Engineering			Control Engineering			Electrical Engineering		
		x										
5.	Approval	23rd Meeting of Academic Council, May 2013										

CE1050	MAJOR PROJECT / PRACTICE SCHOOL	L	T	P	C
	Total Contact Hours – 360	**0**	**0**	**24**	**12**
	Prerequisite				
	Nil				

PURPOSE

To simulate real life situations related to the program 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) of real life application of concepts studied under the program. . Alternately, a few research problems also may be identified for investigation. 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 reputed 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.

CE1050 MAJOR PROJECT												
Course designed by		**Department of Civil 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	Approval	23rd meeting of Academic Council, May 2013										