SRM
UNIVERSITY
(Under section 3 of UGC Act 1956)

B. TECH.
INFORMATION & TELECOMMUNICATION ENGINEERING
CURRICULUM & SYLLABUS
2013 – 2014

Volume – I
(all courses except open electives)

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

STUDENT OUTCOMES

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

The student outcomes are:

(a) An ability to apply knowledge of mathematics, science, and engineering

(b) An ability to design and conduct experiments, as well as to analyze and interpret data

(c) An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability

(d) An ability to function on multidisciplinary teams

(e) An ability to identify, formulate, and solve engineering problems

(f) An understanding of professional and ethical responsibility

(g) An ability to communicate effectively

(h) The broad education necessary to understand the impact of engineering solutions in global, economic, environmental, and societal context

(i) A recognition of the need for, and an ability to engage in life-long learning

(j) A knowledge of contemporary issues

(k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

B.Tech. Information & Telecommunication Engineering
Curriculum – 2013
(Applicable for students admitted from the Academic year 2013-14 onwards)

SEMESTER I						
Course Code	**Category**	**Course name**	**L**	**T**	**P**	**C**
LE1001	G	ENGLISH	1	2	0	2
PD1001	G	SOFT SKILLS I	1	0	1	1
MA1001	B	CALCULUS AND SOLID GEOMETRY	3	2	0	4
PY1001	B	PHYSICS	3	0	0	3
PY1002	B	PHYSICS LABORATORY	0	0	2	1
CY1001	B	CHEMISTRY	3	0	0	3
CY1002	B	CHEMISTRY LABORATORY	0	0	2	1
CE1001	E	BASIC CIVIL ENGINEERING	2	0	0	2
EC1001	E	BASIC ELECTRONICS ENGINEERING	2	0	0	2
EC1002	E	ELECTRONICS ENGINEERING PRACTICES	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**
LE1002	G	VALUE EDUCATION	1	0	0	1
PD1002	G	SOFT SKILLS II	1	0	1	1
MA1002	B	ADVANCED CALCULUS AND COMPLEX ANALYSIS	3	2	0	4
PY1003	B	MATERIALS SCIENCE	2	0	2	3
CY1003	B	PRINCIPLES OF ENVIRONMENTAL SCIENCE	2	0	0	2
EC1003	P	ELECTRIC CIRCUITS	3	0	0	3
EC1004	P	ELECTRIC CIRCUITS LAB	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.						

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**
CS1001	G	PROGRAMMING USING MATLAB	0	1	2	2
BT1001	B	BIOLOGY FOR ENGINEERS	2	0	0	2
ME1001	E	BASIC MECHANICAL ENGINEERING	2	0	0	2
EE1001	E	BASIC ELECTRICAL ENGINEERING	2	0	0	2
ME1005	E	ENGINEERING GRAPHICS	0	1	4	3
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)

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
EC1006	P	ELECTRON DEVICES	3	0	0	3
EC1008	P	SIGNALS & SYSTEMS	3	1	0	4
TE1001	P	DIGITAL ELECTRONIC PRINCIPLES	3	0	0	3
TE1002	P	JAVA PROGRAMMING	3	0	0	3
TE1003	P	ELECTROMAGNETIC THEORY & WAVEGUIDE COMPONENTS	3	0	0	3
TE1004	P	JAVA PROGRAMMING LABORATORY	0	0	2	1
TE1005	P	ELECTRON DEVICES & DIGITAL CIRCUITS LABORATORY	0	0	3	2
TOTAL			21	2	7	26
Total contact hours			**30**			

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
MA1024	B	PROBABILITY AND RANDOM PROCESS	4	0	0	4
TE1006	P	TRANSMISSION LINE THEORY AND NETWORK ANALYSIS	2	1	0	3
TE1007	P	ANALOG COMMUNICATION	3	0	0	3
TE1008	P	ANALOG INTEGRATED CIRCUITS	3	0	0	3
TE1009	P	SOLID STATE ELECTRONIC CIRCUITS	2	1	0	3
TE1010	P	ELECTRONIC CIRCUITS & ANALOG IC LABORATORY	0	0	3	2

TE1011	P	ANALOG COMMUNICATION AND NETWORKS LABORATORY	0	0	3	2
	P	DEPARTMENT ELECTIVE I	3	0	0	3
TOTAL			**20**	**2**	**7**	**26**
Total contact hours			**29**			

SEMESTER V						
Course Code	**Category**	**Course name**	**L**	**T**	**P**	**C**
PD1005	G	APTITUDE III	1	0	1	1
MA1015	B	DISCRETE MATHEMATICS	4	0	0	4
TE1012	P	DIGITAL COMMUNICATION PRINCIPLES	3	0	0	3
TE1013	P	ANTENNA THEORY & RF PROPAGATION	3	0	0	3
EC1017	P	DIGITAL SIGNAL PROCESSING	3	1	0	4
TE1014	P	ANTENNA & PROPAGATION LABORATORY	0	0	3	2
TE1015	P	COMMUNICATION AND SIGNAL PROCESSING LABORATORY	0	0	3	2
TE1047	P	INDUSTRIAL TRAINING –I (to be undergone after IV semester)	0	0	1	1
	P	OPEN ELECTIVE I	3	0	0	3
	P	DEPARTMENT ELECTIVE II	3	0	0	3
TOTAL			**20**	**1**	**8**	**26**
Total Contact hours			**29**			

SEMESTER VI						
Course Code	**Category**	**Course name**	**L**	**T**	**P**	**C**
PD1006	G	APTITUDE IV	1	0	1	1
TE1016	P	RF MICROCONTROLLER DESIGN AND INTERFACING	3	0	0	3
TE1017	P	TELECOMMUNICATION SWITCHING METHODS	3	0	0	3
TE1018	P	MICROWAVE RADIO & OPTICAL FIBER COMMUNICATIONS	3	0	0	3
TE1019	P	RF MICROCONTROLLER AND INTERFACING LABORATORY	0	0	3	2
TE1020	P	MICROWAVE RADIO & OPTICAL FIBER COMMUNICATIONS LABORATORY	0	0	3	2
TE1049	P	MINOR PROJECT	0	0	2	1

	P	DEPARTMENT 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**
TE1021	P	RF CIRCUITS FOR TELE COMMUNICATIONS	3	0	0	3
TE1022	P	DATA COMMUNICATION NETWORKS	3	0	0	3
TE1023	P	WIRELESS & CELLULAR TELE-COMMUNICATIONS	3	0	0	3
TE1024	P	WIRELESS COMMUNICATION LABORATORY	0	0	3	2
TE1048	P	INDUSTRIAL TRAINING –II (to be undergone after VI semester)	0	0	1	1
	P	DEPARTMENT ELECTIVE – IV	3	0	0	3
	P	DEPARTMENT ELECTIVE – V	3	0	0	3
TOTAL			**15**	**0**	**4**	**18**
Total contact hours			**19**			

SEMESTER VIII						
Course Code	**Category**	**Course name**	**L**	**T**	**P**	**C**
TE1050	P	MAJOR PROJECT / PRACTICE SCHOOL	0	0	24	12
Total			0	0	24	12
Total contact hours			**24**			

DEPARTMENTAL ELECTIVES						
Course Code	**Category**	**Course name**	**L**	**T**	**P**	**C**
TE1101	P	INFORMATION THEORY AND CODING	3	0	0	3
TE1102	P	NETWORK ANALYSIS AND SYNTHESIS	3	0	0	3
TE1103	P	DIGITAL DESIGN AND MODELING USING HDL	3	0	0	3
TE1104	P	SPREAD SPECTRUM AND MULTICARRIER TECHNIQUES	3	0	0	3
TE1105	P	SATELLITE COMMUNICATIONS	3	0	0	3

TE1106	P	RADAR SYSTEMS AND RADIO AIDS TO NAVIGATION	3	0	0	3
TE1107	P	MULTIMEDIA SIGNAL PROCESSING	3	0	0	3
TE1108	P	COMMUNICATION SYSTEMS AND SIMULATION	3	0	0	3
TE1109	P	BROADBAND COMMUNICATIONS	3	0	0	3
TE1110	P	MOBILE & PERVASIVE COMPUTING	3	0	0	3
TE1111	P	NANOTECHNOLOGY FOR TELECOMMUNICATIONS	3	0	0	3
TE1112	P	ULTRA WIDE BAND TECHNOLOGIES	3	0	0	3
TE1113	P	EMI/EMC ISSUES IN TELECOMMUNICATIONS	3	0	0	3
TE1114	P	WIRELESS NETWORK SECURITY	3	0	0	3
TE1115	P	DIGITAL VIDEO BROADCASTING	3	0	0	3

Summary of Credits

Category	I	II	III	IV	V	VI	VII	VIII	Total	%
G (Excluding open and departmental electives)	8		3	3	1	1	-	-	16	8.89
B (Excluding open and departmental electives)	23		4	4	4	-	-	-	35	19.44
E (Excluding open and departmental electives)	13		-	-	-	-	-	-	13	7.22
P (Excluding open and departmental electives)	4		19	16	15	14	12	12	92	51.1
Open Elective	-		-	-	3	6	-	-	9	5.0
Dep. Elective	-		-	3	3	3	6	-	15	8.33
Total	**48**		**26**	**26**	**26**	**24**	**18**	**12**	**180**	**100**

SEMESTER – I

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

PURPOSE

To help students achieve proficiency in English and develop their professional communication skills to meet the demand in the field of global communication to enable them to acquire placement anywhere with ease and confidence.

INSTRUCTIONAL OBJECTIVES

1.	To enable students improve their lexical, grammatical and communicative competence.
2.	To enhance their communicative skills in real life situations.
3.	To assist students understand the role of thinking in all forms of communication.
4.	To equip students with oral and appropriate written communication skills.
5.	To assist students with employability and job search skills.

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

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

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

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

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

1. Grammar and Vocabulary – tense and concord; word formation

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

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

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

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

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

TEXTBOOK

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

REFERENCES

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

LE1001 ENGLISH												
Course designed by		**Department of English and Foreign Languages**										
1.	Student 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		1-5	1-5		1-5		
3.	Category	General (G)		Basic Sciences (B)			Engineering Sciences and Technical Arts(E)			Professional Subjects (P)		
		x		--			--			--		
4.	Approval	23rd meeting of Academic Council, May 2013										

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

PURPOSE

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

INSTRUCTIONAL OBJECTIVES

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

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

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

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

Factors influencing Attitude, Challenges and lessons from Attitude.

Change Management

Exploring Challenges, Risking Comfort Zone, Managing Change

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

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

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

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

Time Management

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

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

Out of box thinking, Lateral Thinking

Presentation

ASSESSMENT

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

TEXT BOOK

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

REFERENCE

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

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)				

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. K.Ganesan, 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.

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

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

PURPOSE

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

INSTRUCTIONAL OBJECTIVES

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

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

Mechanical properties of solids: Stress-strain relationship – Hooke's law – Torsional Pendulum – Young's modulus by cantilever – Uniform and non-uniform bending — Stress-strain diagram for various engineering materials – Ductile and brittle materials – Mechanical properties of Engineering materials (Tensile

strength, Hardness, Fatigue, Impact strength, Creep) – Fracture – Types of fracture (Elementary ideas).

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

UNIT II–ELECTROMAGNETIC WAVES, CIRCUITS AND APPLICATIONS

(9 hours)

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

UNIT III– LASERS AND FIBER OPTICS (9 hours)

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

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

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

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

UNIT V– GREEN ENERGY PHYSICS (9 hours)

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

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

TEXT BOOKS

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

REFERENCES

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

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. R.K.Shukla and Anchal Srivastava, "*Practical Physics*", 1st Edition, New Age International (P) Ltd, New Delhi, 2006.

REFERENCES

1. G.L.Souires, "*Practical Physics:"*, 4th Edition, Cambridge University, UK, 2001.
2. D. Chattopadhyay, P. C. Rakshit and B. Saha, "*An Advanced Course in Practical Physics*", 2nd ed., Books & Allied Ltd., Calcutta, 1990.

<table>
<tr><th colspan="14">PY1002 PHYSICS LABORATORY</th></tr>
<tr><td colspan="2">Course designed by</td><td colspan="12">Department of Physics and Nanotechnology</td></tr>
<tr><td rowspan="2">1.</td><td rowspan="2">Student Outcome</td><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td><td>g</td><td>h</td><td>i</td><td>j</td><td>k</td></tr>
<tr><td>x</td><td>x</td><td></td><td></td><td>x</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>2.</td><td>Mapping of instructional objectives with student outcome</td><td>1</td><td>3</td><td></td><td></td><td>2</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td rowspan="2">3.</td><td rowspan="2">Category</td><td colspan="3">General (G)</td><td colspan="3">Basic Sciences (B)</td><td colspan="3">Engineering Sciences and Technical Arts (E)</td><td colspan="2">Professional Subjects (P)</td></tr>
<tr><td colspan="3">--</td><td colspan="3">x</td><td colspan="3">--</td><td colspan="2">--</td></tr>
<tr><td>4.</td><td>Approval</td><td colspan="12">23rd meeting of Academic Council, May 2013</td></tr>
</table>

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. S.S.Dara, A Text book of Engineering Chemistry, 10th Edition, S.Chand & Company Ltd., New Delhi, 2003

REFERENCES

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

CY1001 CHEMISTRY												
Course designed by		**Department of Chemistry**										
1.	Student outcome	a	b	c	d	e	f	g	h	i	j	k
		x	x	x		x						x
2.	Mapping of instructional objective with student outcome	1-6	1,5	3		2						4
3.	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts (E)				Professional Subjects (P)		
		--		x		--				--		
4.	Approval	23rd meeting of Academic Council, May 2013										

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

PURPOSE

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

INSTRUCTIONAL OBJECTIVES

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

LIST OF EXPERIMENTS

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

REFERENCES

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

CY1002 CHEMISTRY LABORATORY											
Course designed by		**Department of Chemistry**									
1.	Student outcome	a	b	c	d	e	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									

CE1001	BASIC CIVIL ENGINEERING	L	T	P	C
	Prerequisite	**2**	**0**	**0**	**2**
	Nil				

PURPOSE

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

INSTRUCTIONAL OBJECTIVES

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

UNIT I - BUILDING MATERILAS **(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.

TEXT BOOKS

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

REFERENCES

1. Ramesh Babu, "*Civil Engineering"* , VRB Publishers, Chennai, 2000.
2. National Building Code of India, Part V, "*Building Material"s*, 2005
3. Surendra Singh, "*Building Material"s*, 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 & Technical Arts(E)				Professional Subject (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. T. Thyagarajan, K.P. SendurChelvi, T.R. Rangaswamy, *"Engineering Basics: Electrical, Electronics and Computer Engineering"*, New Age International, Third Edition, 2007.
2. B. Somanathan Nair, S.R. Deepa, "*Basic Electronics",* I.K. International Pvt. Ltd., 2009.

REFERENCES

1. Thomas L. Floyd, *"Electronic Devices",* Pearson Education, 9th Edition, 2011.
2. R.K. Rajput, *"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.	Broad Area	Electrical Machines		Circuits & Systems		Electronics			Power Systems		Intelligent Systems	
		--		--		--			--		--	
5.	Approval	23rd meeting of Academic Council, May 2013										

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

PURPOSE

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

INSTRUCTIONAL OBJECTIVES

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

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

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

Expt. 2: SCHEMATIC CAPTURE (6 hours)

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

Expt. 3: PCB DESIGN PROCESS (6 hours)

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

Expt. 4: PCB FABRICATION PROCESS (6 hours)

Etching, cleaning, drying and drilling

Expt. 5: ASSEMBLING AND TESTING (8 hours)

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

TEXT BOOKS

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

REFERENCES

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>
<tr><td>x</td><td>x</td><td>x</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</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>
<tr><td rowspan="2">3.</td><td rowspan="2">Category</td><td colspan="2">General (G)</td><td colspan="3">Basic Sciences (B)</td><td colspan="4">Engineering Sciences and Technical Arts (E)</td><td colspan="2">Professional Subjects (P)</td></tr>
<tr><td colspan="2">--</td><td colspan="3">--</td><td colspan="4">x</td><td colspan="2">--</td></tr>
<tr><td>4.</td><td>Approval</td><td colspan="11">23rd meeting of Academic Council, May 2013</td></tr>
</table>

SEMESTER – II

	VALUE EDUCATION	L	T	P	C
LE1002	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											

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

PURPOSE

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

INSTRUCTIONAL OBJECTIVES

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

UNIT I - INTERPERSONAL SKILLS **(6 hours)**

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

Team Work

Necessity of Team Work Personally, Socially and Educationally

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

Skills for a good Leader, Assessment of Leadership Skills

Change Management

Exploring Challenges, Risking Comfort Zone, Managing Change

UNIT III - STRESS MANAGEMENT **(6 hours)**

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

Emotional Intelligence

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

UNIT IV - CONFLICT RESOLUTION **(4 hours)**

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

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

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

Presentation

ASSESSMENT

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

TEXT BOOK

INSIGHT, 2009. Career Development Centre, SRM Publications.

REFERENCES

1. Covey Sean, *Seven Habit of Highly Effective Teens*, New York, Fireside Publishers, 1998.
2. Carnegie Dale, *How to win Friends and Influence People*, New York: Simon & Schuster, 1998.

3. Thomas A Harris, *I am ok, You are ok* , New York-Harper and Row, 1972
4. Daniel Coleman, *Emotional Intelligence*, Bantam Book, 2006

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

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)				

PURPOSE

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

INSTRUCTIONAL OBJECTIVES

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

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

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

UNIT II - VECTOR CALCULUS (15 hours)

Gradient, divergence, curl – Solenoidal and irrotational fields – Vector identities (without proof) – Directional derivatives – Line, surface and volume integrals –

Green's, Gauss divergence and Stoke's theorems (without proof) – Verification and applications to cubes and parallelopipeds only.

UNIT III - LAPLACE TRANSFORMS (15 hours)

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

UNIT IV - ANALYTIC FUNCTIONS (15 hours)

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

UNIT V - COMPLEX INTEGRATION (15 hours)

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

TEXT BOOKS

1. Kreyszig.E, "*Advanced Engineering Mathematics*", 10th edition, John Wiley & Sons. Singapore, 2012.
2. K.Ganesan, Sundarammal Kesavan, K.S.Ganapathy Subramanian & V.Srinivasan, "*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 W. Prather, "*Photonic Crystals: Theory, Applications, and Fabrication"*, John Wiley & Sons, Hoboken, 2009.
3. James R. Janesick, "*Scientific Charge-Coupled Devices",* Published by SPIE - The International Society for Optical Engineering, Bellingham, Washington, 2001.
4. David M. Pozar, "*Microwave Engineering*", 3rd ed., John Wiley & Sons, 2005.
5. F. Silver and C. Dillion, "*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. G. Cao, "*Nanostructures and Nanomaterials: Synthesis, Properties and Applications*", Imperial College Press, 2004.
8. T.Pradeep, "*A Text Book of Nanoscience and Nanotechnology*", Tata McGraw Hill, New Delhi, 2012.
9. Sam Zhang, "*Materials Characterization Techniques*", CRC Press, 2008.

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

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										

EC1003	ELECTRIC CIRCUITS	L	T	P	C
	Total Contact Hours - 45	**3**	**0**	**0**	**3**
	Prerequisite				
	Nil				

PURPOSE

To expose basic circuit concepts, circuit modeling and methods of circuit analysis in time domain and frequency domain for solving simple and multi dimensional circuits including coupled circuits and three phase circuits.

INSTRUCTIONAL OBJECTIVES

1.	To understand the concept of circuit elements lumped circuits, waveforms, circuit laws and network reduction
2.	To solve the electrical network using mesh and nodal analysis by applying network theorems
3.	To understand the concept of active, reactive and apparent powers, power factor and resonance in series and parallel circuits
4.	To know the basic concepts of coupled circuits, three phase loads and power measurement
5.	To analyze the transient response of series and parallel A.C. circuits and to solve problems in time domain using Laplace Transform

UNIT I - BASIC CIRCUIT CONCEPTS & LAWS (6 hours)

Classification of Circuit Elements – Node, Loop, Path & Branch – Incidence Matrix – Network topology Analysis of Incidence Matrix- Tie Set & Cut Set – Kirchoff's Laws – Series and Parallel – Voltage and Current division rule. Introduction to AC Analysis – Complex Impedance – Analysis: Mesh – Supermesh – Nodal – Supernodal.

UNIT II - NETWORK THEOREMS: (Both DC & AC Circuit Analysis) (6 hours)

Source Transformation Theorem - Super Position Principle - Thevenin's & Norton's Theorem - Reciprocity Theorem - Compensation Theorem - Millman's Theorem - Maximum Power Transfer theorem - Star - Delta Theorem.

UNIT III - RESONANCE& COUPLED CIRCUITS (6 hours)

Resonance: Introduction – series resonance – parallel resonance – Definition: Q Factor- Half power frequency resonant frequency – Bandwidth. Coupled Circuits: Mutual inductance – Co-efficient of Coupling – Dot Convention – Energy Consideration – Analysis of Coupled Circuits.

UNIT IV - TRANSIENT ANALYSIS (6 hours)

Basics - Source free and Forced Response of RL, RC and RLC Series Circuits – Forced Response of RL, RC & RLC Series circuits with Sinusoidal Excitation - Time Constant & Natural frequency of Oscillation - Laplace Transform Application to the Solution of RL, RC & RLC Transient Circuits.

UNIT V - TUNED CIRCUITS & PSPICE (6 hours)

Tuned Circuits – Single Tuned Circuits – Double Tuned Circuits – Analysis
Pspice (Elementary treatment only) – DC Analysis and Control Statements - AC Analysis and Control Statements – Transient analysis.

TEXT BOOKS

1. Sudhakar.A & Shyammohan S Palli, "*Circuits & Network Analysis & Synthesis*", 4th Edition, Tata McGraw Hill, 2010.
2. Soni.M.L & Gupta.J.C, "*Course in Electrical Circuits Analysis*", Dhanpat Rai & Sons, New Delhi, 1999.
3. Muhammed H Rashid, "*SPICE for Circuits and Electronics using PSPICE*", PHI, 2nd Edition, 2011.

REFERENCES

1. William H.Hyte, Jr, J.E.Kemmerly & Steven M.Durban, "*Engineering Circuit Analysis*", 7th Edition, McGraw Hill, 2010.
2. Joseph Edminster, "*Electric Circuits", Schaum's Outline Series"*, McGrawHill, 5th Edition, 2011.

EC1003 ELECTRIC CIRCUITS												
Course designed by		**Department of Electronics and Communication Engineering**										
1.	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
		X	**X**	**X**		X						**X**
2.	Mapping of instructional objectives with student outcome	1,3,4	2,5	2,5		2,5						1,2,5
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences and Technical Arts(E)				Professional Subjects(P)		
										X		
4.	Broad Area	Communication		Signal Processing		Electronics			VLSI	Embedded		
		--		--					--			
5.	Approval	23rd meeting of Academic Council, May 2013										

	ELECTRIC CIRCUITS LAB	L	T	P	C
EC1004	Total Contact Hours -30	**0**	**0**	**2**	**1**
	Prerequisite				
	Nil				
	Common for ECE & ITCE				

PURPOSE

To inculcate strong practical skills on the fundamental theorems and transient circuit analysis.

INSTRUCTIONAL OBJECTIVES

1	To impart hands on experience in verification of circuit laws and theorems
2	To measure circuit parameter
3	To study circuit characteristics and simulation of time response

LIST OF EXPERIMENTS

1. Verification of Kirchoff's voltage and Current Laws
2. Verification of Superposition Theorem
3. Verification of Thevenin's Theorem & Norton's Theorem
4. Verification of Maximum Power Transfer Theorem
5. Verification of Tellegen's and Reciprocity Theorem
6. Time domain response of RL Transient Circuit.
7. Time domain response of RC Transient Circuit.
8. Series RLC Resonance Circuits (Frequency response& Resonant frequency)
9. Parallel RLC Resonance Circuits (Frequency response & Resonant frequency).
10. Simulation experiments using PSPICE or MultiSim.

REFERENCES

1. LAB MANUAL, Department of ECE, SRM University.
2. David A Bell, "Laboratory Manual for "*Electric Circuits*", 6th Edition, PHI.
3. Muhammed H Rashid, "*SPICE for "Circuits and Electronics using" PSPICE"*, 2nd Edition, PHI, 1995.
4. Maheswari L. K., and Anand M M S, *"Laboratory Manual for Introductory Electronic Experiments"*, New Age, 2010.

<table>
<tr><td colspan="14">EC1004 ELECTRIC CIRCUITS LAB</td></tr>
<tr><td colspan="2">Course designed by</td><td colspan="12">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></td><td></td><td>1,2,3</td><td>1,2,3</td><td></td><td>1,2,3</td><td></td><td></td><td></td><td>3</td><td></td></tr>
<tr><td rowspan="2">3.</td><td rowspan="2">Category</td><td colspan="2">General (G)</td><td colspan="3">Basic Sciences (B)</td><td colspan="3">Engineering Sciences & Technical Arts (E)</td><td colspan="3">Professional Subjects (P)</td></tr>
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<tr><td rowspan="2">4.</td><td rowspan="2">Broad area</td><td colspan="3">Communication</td><td colspan="2">Signal Processing</td><td colspan="3">Electronics</td><td>VLSI</td><td>Embedded</td></tr>
<tr><td colspan="3"></td><td colspan="2"></td><td colspan="3">x</td><td></td><td></td></tr>
<tr><td>5.</td><td>Approval</td><td colspan="12">23rd meeting of Academic Council, May 2013</td></tr>
</table>

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

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

PURPOSE

This Lab Course will enable the students to understand the fundamentals and programming knowledge in MATLAB.

INSTRUCTIONAL OBJECTIVES

1.	To learn the MATLAB environment and its programming fundamentals
2.	Ability to write Programs using commands and functions
3.	Able to handle polynomials, and use 2D Graphic commands

LIST OF EXPERIMENTS

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

TEXT BOOK

1. R.K.Bansal, A.K.Goel, M.K.Sharma, "*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 & 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. S. ThyagaRajan, N. Selvamurugan, M. P. Rajesh, R. A. Nazeer, Richard W. Thilagaraj, S. Barathi, and M. K. Jaganathan, "*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**, 2**004.
4. Martin Alexander, "*Biodegradation and Bioremediation,"* Academic Press, 1994.
5. Kenneth Murphy, "*Janeway's Immunobiology*," Garland Science; 8th edition, 2011.
6. Eric R. Kandel, James H. Schwartz, Thomas M. Jessell, "Principles of Neural Science, McGraw-Hill, 5th Edition, 2012.

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

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

PURPOSE

To familiarize the students with the basics of Mechanical Engineering.

INSTRUCTIONAL OBJECTIVES

1.	To familiarize with the basic machine elements
2.	To familiarize with the Sources of Energy and Power Generation
3.	To familiarize with the various manufacturing processes

UNIT I – MACHINE ELEMENTS– I (5 hours)

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

UNIT II - MACHINE ELEMENTS– II (5 hours)

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

UNIT III - ENERGY (10 hours)

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

UNIT IV - MANUFACTURING PROCESSES - I (5 hours)

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

UNIT V - MANUFACTURING PROCESSES– II (5 hours)

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

TEXT BOOKS

1. Kumar, T., Leenus Jesu Martin and Murali, G., *"Basic Mechanical Engineering"*, Suma Publications, Chennai, 2007.

2. Prabhu, T. J., Jai Ganesh, V. and Jebaraj, S., *"Basic Mechanical Engineering"*, Scitech Publications, Chennai, 2000.

REFERENCES

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 & 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

1. S.S.Dash,C.Subramani,K.Vijayakumar,"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. V.K.Metha, 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. S. K. Bhattacharya, "*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										

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

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

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

UNIT I - FUNDAMENTALS OF ENGINEERING GRAPHICS (2 hours)

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

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

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

UNIT III - SECTIONS AND DEVELOPMENTS (3 hours)

Sections of solids and development of surfaces.

UNIT IV - PICTORIAL PROJECTIONS **(4 hours)**

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

UNIT V - BUILDING DRAWING **(2 hours)**

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

PRACTICAL (60 hours)

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 & technical art (E)				Professional subjects (P)	
		--		--			x				--	
4.	Approval	23rd meeting of the Academic Council , May 2013										

EE1002	ELECTRICAL ENGINEERING PRACTICES	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.

Total Periods (30 hours)

REFERENCES

1. Subhransu Sekhar Dash & Vijayakumar K., "*Reference Electrical Engineering Practice Lab Manual".* Vijay Nocole 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 PRACTICES												
Course designed by		**Department of Electrical and Electronics Engineering**										
1.	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
		X	X	X								
2.	Mapping of instructional objectives with student outcome	1-5	2,5	4								
3.	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts(E)			Professional Subjects (P)			
						X						
4.	Approval	23rd meeting of Academic Council, May 2013										

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

PURPOSE

To imbibe in the minds of students the concepts and benefits of NCC/NSS/NSO/YOGA and make them practice the same

INSTRUCTIONAL OBJECTIVES

1.	To enable the students to gain knowledge about NCC/NSS/NSO/YOGA and put the same into practice

NATIONAL CADET CORPS (NCC)

Any student enrolling as a member of National Cadet Core (NCC) will have to attend sixteen parades out of twenty parades each of four periods over a span of academic year.

Attending eight parades in first semester will qualify a student to earn the credits specified in the curriculum. Grading shall be done based on punctuality, regularity in attending the parades and the extent of active involvement.

NATIONAL SERVICE SCHEME (NSS)

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

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

NATIONAL SPORTS ORGANIZATION (NSO)

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

List of games/sports:

Basket Ball, Football, Volley Ball, Ball Badminton, Cricket, Throw-ball, Track events

Field events or any other game with the approval of faculty member.

YOGA

Benefits of Agnai Meditation -Meditation - Agnai, Asanas, Kiriyas, Bandas, Muthras

Benefits of santhi Meditation - Meditation Santhi Physical Exercises (I & II)

Lecture & Practice - Kayakalpa Yoga Asanas, Kiriyas, Bandas, Muthras

Analysis of Thought - Meditation Santhi Physical Exercises III & IV

Benefits of Thuriyam - Meditation Thuriyam Kayakalpa Asanas, Kiriyas, Bandas, Muthras

Attitude - Meditation Thuriyam Kayakalpa Asanas, Kiriyas, Bandas, Muthras

Importance of Arutkappy & Blessings - Meditation Thuriyam Kayakalpa Asanas, Kiriyas, Bandas, Muthras

Benefits of Blessings - Meditation Santhi Kayakalpa Asanas, Kiriyas, Bandas, Muthras

Assessment

An attendance of 75% is compulsory to earn the credits specified in the curriculum. Grading shall be done by the faculty member handling the course

based on punctuality, regularity in attending the classes and the extent of active involvement.

TEXT BOOKS

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

<table>
<tr><td colspan="2">NC1001/ NS1001/ SP1001/ YG1001</td><td colspan="11">NATIONAL CADET CORPS (NCC)/
NATIONAL SERVICE SCHEME (NSS)/
NATIONAL SPORTS ORGANIZATION (NSO)/YOGA</td></tr>
<tr><td colspan="2">Course designed by</td><td colspan="11">NCC/NSS/NSO/YOGA PRACTITIONERS</td></tr>
<tr><td>1.</td><td>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>2.</td><td>Mapping of instructional objectives with student outcome</td><td></td><td></td><td></td><td>X</td><td></td><td></td><td></td><td></td><td>X</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>
</table>

SEMESTER III

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

PURPOSE

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

INSTRUCTIONAL OBJECTIVES

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

UNIT I **(6 hours)**

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

UNIT II **(6 hours)**

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

UNIT III **(6 hours)**

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

UNIT IV **(6 hours)**

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

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

UNIT V **(6 hours)**

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

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

TEXT BOOK

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

REFERENCES

German for Dummies
Schulz Griesbach

<table>
<tr><th colspan="13">LE1003 GERMAN LANGUAGE PHASE I</th></tr>
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<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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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)**

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

1. 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.
2. Writing –conjugations of first group verbs and paragraph writing on self – introduction and introducing a third person.
3. 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).Conj
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

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

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

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

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.	Approval	23rd meeting of Academic Council, May 2013										

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

PURPOSE

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

INSTRUCTIONAL OBJECTIVES

1.	To improve aptitude, problem solving skills and reasoning ability of the student.
2.	To collectively solve problems in teams & group.

UNIT I – NUMBERS **(6 hours)**

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

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

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

UNIT III - ALGEBRA – I **(6 hours)**

Logarithms, Problems on ages

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

Permutations, Combinations, Probability

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

Logical Reasoning, Analytical Reasoning

ASSESSMENT

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

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*

PD1003 – APTITUDE-I												
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										

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

PURPOSE

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

INSTRUCTIONAL OBJECTIVES

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

UNIT I - PARTIAL DIFFERENTIAL EQUATIONS (12 Hours)

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

UNIT II - FOURIER SERIES (12 Hours)

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

UNIT III - ONE DIMENSIONAL WAVE & HEAT EQUATION (12 Hours)

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

UNIT IV - FOURIER TRANSFORMS (12 Hours)

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

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

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

TEXT BOOKS

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

REFERENCES

1. Kandasamy 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), S.Viswanathan 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.

<table>
<tr><th colspan="14">MA1003 TRANSFORMS AND BOUNDARY VALUE PROBLEMS</th></tr>
<tr><td colspan="2">Course designed by</td><td colspan="12">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>
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<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="12">23rd meeting of academic council, May 2013</td></tr>
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EC1006	ELECTRON DEVICES	L	T	P	C
	Total Contact Hours – 45	3	0	0	3
	Prerequisite				
	EC1001				

PURPOSE

The purpose of this course is to provide a basis for understanding the characteristics, operation and limitations of semiconductor and optoelectronic devices. This course brings together the semiconductor device physics, optoelectronic device principles and complete description of power supply circuit.

INSTRUCTIONAL OBJECTIVES

1.	To understand the physical construction, working and operational characteristics of Semiconductor devices.
2.	To understand the operation of power supply circuits built using filters, rectifiers and voltage regulators.
3.	To discuss the manufacturing process of monolithic ICs & the fabrication of components on monolithic IC.

UNIT I - SEMICONDUCTOR DIODES AND SPECIAL PURPOSE DIODES **(12 hours)**

Overview on physics and properties of semiconductors: Intrinsic semiconductor – extrinsic semiconductor – Fermi level in an intrinsic semiconductor – conductivity of a metal, intrinsic semiconductor and extrinsic semiconductor – drift – diffusion – recombination – carrier life time.

Semiconductor diodes : Formation of PN junction – working principle – VI characteristics – PN diode currents – diode current equation – diode resistance – transition and diffusion capacitance – diode models – voltage breakdown in diodes.

Special purpose diodes : Zener diode – point-contact diode – backward diode – varactor diode – step-recovery diode – schottky diode, PNPN diode – RF diode.

UNIT II - BIPOLAR TRANSISTORS **(6 hours)**

Bipolar Transistors : Construction – working – transistor currents – transistor configurations and input-output characteristics – Early effect (base-width modulation) – Ebers Moll model – transistor as an amplifier – Transistor as a switch.

UNIT III - FIELD-EFFECT TRANSISTORS **(6 hours)**

Field-Effect Transistors : construction, working and VI characteristics of JFET – comparison of BJT and JFET – MOSFET – enhancement MOSFET, depletion

MOSFET, their working principle and VI characteristics, comparison of MOSFET with JFET, comparison of D MOSFET with E MOSFET, CMOS, MESFET, CCD.

UNIT IV - DC POWER SUPPLIES (12 hours)

Rectifiers and Filters : Block schematic of a typical DC power supply, single phase HWR, FWR, full-wave bridge rectifier, power supply filters (ripple factor and efficiency analysis), bleeder resistor, voltage dividers.

Voltage regulators:voltage regulation, zener diode shunt regulator, transistor series regulator, transistor shunt regulator, switching regulators, design of complete DC power supply circuit.

UNIT V - INTEGRATED CIRCUIT FABRICATION (9 hours)

Integrated circuit – advantages and drawback of ICs – scale of integration – classification of ICs – definition of linear IC and digital IC with examples – manufacturing process of monolithic ICs – fabrication of components (diode, capacitor, bipolar transistor, resistor and field – effect transistor) on monolithic IC – comparison of MOS ICs and bipolar ICs.

TEXT BOOKS

1. Robert L. Boylestad and Louis Nashelsky, *"Electronic Devices and Circuit Theory"*, Pearson Education, 9th Edition, 2009.
2. Somanathan Nair B., *"Electronic Devices and Applications*", PHI, 2006.

REFERENCES

1. Jacob Millman, Christos C Halkias, Satyabrata Jit, *"Electron Devices and Circuits"*, Tata McGraw Hill, 2010.
1. David A Bell, *"Fundamentals of Electronic Devices and Circuits*", Oxford Press, 2009.
2. Theraja B L, Sedha R S, *"Principles of Electronic Devices and Circuits",* S.Chand, 2004.

EC1006 ELECTRON DEVICES												
Course designed by		**Department of Electronics and Communication Engineering**										
1	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
		x	x									x
2	Mapping of instructional objectives with student outcome	1,2,3	1,2,3									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										

EC1008	SIGNALS AND SYSTEMS	L	T	P	C
	Total Contact Hours - 60	3	1	0	4
	Prerequisite				

PURPOSE

The purpose of this course is to introduce students to the fundamentals of signals and systems which are basic to Digital Signal Processing. The main objective of this subject is to h elp the students to mathematically analyze different types of signals and their associated systems.

INSTRUCTIONAL OBJECTIVES

1.	Various classifications of both Continuous time and Discrete time Signals and Systems.
2.	Spectral analysis of Periodic and Aperiodic Signals using Fourier series.
3.	Analysis and characterization of the CT system through Laplace transform.
4.	Analysis and characterization of the DT system through Difference equation.
5.	Analysis and characterization of the DT system through Z transform.

UNIT I - CLASSIFICATION OF SIGNALS AND SYSTEMS (9 hours)

Classification of Signals: Continuous time signals - Discrete time signals – Periodic and Aperiodic signals – Even and odd signals – Energy and power signals –Deterministic and random signals –Complex exponential and Sinusoidal signals .Unit step, Unit ramp, Unit impulse – Representation of signals in terms of unit impulse .

Classification of Systems: Continuous time systems- Discrete time systems - Linear system – Time Invariant system – causal system – BIBO system – Systems with and without memory – LTI system.

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

Fourier series: Representation of Continuous time Periodic signals – Trigonometric and exponential-Symmetry conditions- Properties of Continuous time Fourier series – Parseval's relation for power signals –Frequency spectrum

Fourier transform: Representation of Continuous time signals- Properties of Continuous time Fourier transform – Parseval's relation for energy signals – Frequency spectrum –Analysis of LTI system using Fourier methods.

UNIT III - LTI CONTINUOUS TIME SYSTEM (9 hours)

System modeling: Solution of Differential equation with initial conditions-Zero state response and Zero input response– impulse response – Frequency response – Convolution – Analysis and characterization of LTI system using Laplace transform.

UNIT IV - ANALYSIS OF DISCRETE TIME SIGNALS AND SYSTEMS (9 hours)

Representation of sequences – Discrete Time Fourier Transform (DTFT) - Discrete Fourier Transform (DFT) and its properties – Solution of linear constant coefficient difference equations with initial conditions-Zero state response and Zero input response–- impulse response – Convolution sum -Frequency response.

UNIT V - LTI DT SYSTEM CHARACTERIZATION AND REALIZATION (9 hours)

Unilateral &Bilateral Z transforms and its properties - Inverse Z transform: Power series expansion and Partial fraction methods - Analysis and characterization of DT system using Z transform-Realization of structures for DT systems -Direct form-I- Direct form II--Parallel-Cascade forms.

Tutorial – 15 Hours

TEXT BOOKS

1. Alan V Oppenheim, Ronald W. Schafer "Discreate Time Signal Processing" Pearson education , 2nd edition, 2007
2. Simon Haykin and Barry Van Veen, *"Signals and Systems",* John Wiley & Sons Inc, 2nd Edition, 2007.

REFERENCES

1. John G. Proakis and Manolakis, *"Digital Signal Processing, Principles, Algorithms and Applications",* Pearson Education, 4th Edition, 2007.
2. B.P. Lathi, *"Linear Systems & Signals",* Oxford Press, Second Edition, 2009.
3. Rodger E Ziemer, William H. Tranter, D. Ronald Fannin, *"Signals and Systems – continuous and Discrete",* Pearson Education, 4th Edition, 2009
4. Douglas K Linder, *"Introduction to Signals and Systems",* Mc-Graw Hill, 1st Edition, 1999

EC1008 SIGNALS AND SYSTEMS												
Course designed by		**Department of Electronics and Communication Engineering**										
1	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
		X	**X**	**X**	**X**							**X**
2	Mapping of instructional objectives with student outcome	1,2,3, 4,5	1,2,3, 4,5	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	Communication		Signal Processing			Electronics		VLSI			Embedded
		--		X			--		--			
5	Approval	23rd meeting of Academic Council, May 2013										

TE1001	DIGITAL ELECTRONIC PRINCIPLES	L	T	P	C
	Total contact Hours – 45	3	0	0	3
	Prerequisite				
	NIL				

PURPOSE	
To understand the methods for the design of digital circuits and provide the fundamentalConcepts with applications in the design of electronic circuits.	
INSTRUCTIONAL OBJECTIVES	
1.	To knowthe basic postulates of Boolean algebra and different methods for simplifying the Boolean expressions.
2.	To get the knowledge about the basics of digital systems.
3.	To study experimentally the design of combinational circuits and sequential circuits and thus to gain knowledge about digital IC's.
4.	To know the concept of memories and programmable logic devices.
5.	To Address a wide variety of design-oriented applications

UNIT I - DIGITAL DESIGN PRINCIPLES (9 hours)

Number systems: Review of Number Systems and their conversion -Logic Gates -SOP and POS forms. **Boolean algebra and Logic simplification**: Basic theorems and properties of Boolean algebra- DeMorgan's theorems - Canonical and Standard forms - Minterm and Maxterm representation-Minimization of Boolean expressions using Algebric, K-map and Tabulation methods.

UNIT II - COMBINATIONAL SYSTEM DESIGN: SYNTHESIS & IMPLEMENTATION (9 hours)

Combinational system design: Adder**:** Half adder and Full adder – Subtractor: Halfsubtractor and Full subtractor - Carry look-ahead adder - Magnitude comparator-Decoders - Encoders - Multiplexers - DeMultiplexers - Code converters - Parity generators/checkers - Implementation of combinational functions using MUX, DEMUX, Decoders and Code converters.

UNIT III - SEQUENTIAL SYSTEM DESIGN: SYNTHESIS & IMPLEMENTATION (9 hours)

Flip-flops: RS Flipflop - T Flipflop - D Flipflop - JK Flipflop – Master Slave Flipflop – Characteristic equations and excitation table. **Shift Registers**: SISO, SIPO, PISO and PIPO shift registers. **Counters**: Design of counters using Excitation tables - Asynchronous counter operation - Synchronous counter operation - Up/down synchronous counter

UNIT IV - SYNCHRONOUS AND AYNCHRONOUS SEQUENTIAL CIRCUITS

(9 hours)

Synchronous Sequential Circuits: General Model – Classification – Design – Use of Algorithmic State Machine – Analysis of Synchronous Sequential Circuits- Asynchronous Sequential Circuits: Design of fundamental mode and pulse modecircuits – Incompletely specified State Machines – Problems in Asynchronous Circuits –Design of Hazard Free Switching circuits.

UNIT V- MEMORY DEVICES **(9 hours)**

Memory types and terminology – general memory operation-ROM architecture – ROM types– ROM applications-RAM architecture – Static RAM – Dynamic RAM. Fundamentals of PLD – SPLDs Introduction to CPLDs and FPGAs. Implementation of combinational logic circuits using ROM, PLA, PAL.

TEXT BOOKS

1. Floyd and Jain, "*Digital Fundamentals*", Pearson Education, 8th edition, 2007.
2. Morris Mano, "*Digital Design*", Pearson Education, 2006.
3. John F. Wakerly, "*Digital design - Principles and Practices*", Prentice Hall International, 4th edition, 2006.

REFERENCES

1. Thomas L. Floyd*, "Digital Fundamentals"*, 8th Edition, Pearson Education Inc, 2003.
2. Donald P. Leach and Albert Paul Malvino, "*Digital Principles and Applications"*, 6thEdition, TMH, 2003.
3. Charles H. Roth, "*Fundamentals of Logic Design"*, Thomson Learning, 2003.

TE1001 DIGITAL ELECTRONIC PRINCIPLES												
Course designed by		**Department of Telecommunication 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	2,3,5		3,4						4,5
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences and Technical Arts(E)				Professional Subjects(P)		
										X		
4.	Broad Area	Communication		Signal Processing		Electronics			VLSI	Embedded		
		X		X		--			--			
5.	Approval	23rd meeting of Academic Council, May 2013										

	JAVA PROGRAMMING	L	T	P	C
TE1002	Total Contact Hours - 45	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

The purpose of the course is to build programming fundamentals and promote basics of web programming. Understand fundamentals of programming such as variables, conditional and iterative execution, methods, etc. Understand fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc.

INSTRUCTIONAL OBJECTIVE

1.	To develop java programs with specified application.
2.	To design applet programs
3.	To demonstrate the Graphics and Files Programming
4.	To analyze object inheritance and its use.
5.	To develop of JAVA applets vs. JAVA applications

UNIT I - FUNDAMENTALS OF OBJECT ORIENTED PROGRAMMING (9 hours)

Fundamentals of Object-Oriented Programming – Java Evolution – Overview Of Java Language – Constants, Variables And Data Types – Operators And Expressions- Decision Making And Branching – Decision Making And Looping

UNIT II - CLASS OBJECTS AND METHODS (9 hours)

Classes, Objects and Methods –Defining a Class –Creating Objects-Constructors-Inheritance: Extending a Class-Visibility Control Arrays, Strings and Vectors –One Dimensional Arrays-Two Dimensional Arrays-Strings-Vectors

UNIT III - INTERFACES AND PACKAGES (9 hours)

Interfaces: Multiple Inheritance – Defining Interfaces-Extending Interfaces-Implementing Inter Faces-Accessing Interface Variable Packages: Putting Classes Together-Java API Packages-Using System Packages-Naming Conventions-Adding a Class to Package

UNIT IV - MULTITHREADED PROGRAMMING (9 hours)

Multithreaded Programming – Life Cycle Of A Thread -Thread Priority-Synchronization-Managing Errors And Exceptions – Types Of Errors-Expections-Syntax Of Exception Handling Code-Using Finally Statement -Applet Programming-Apple Life Cycle-Getting Input From The User.

UNIT V - GRAPHICS PROGRAMMING (9 hours)

Graphics Programming –The Graphic Class –Lines and Rectangles-Circle and Ellipses-Drawing Arcs-Drawing Polygons-Line Graph- Managing Input / Output Files in Java-Concept Of Streams-Creation Files-Random Access Files

TEXT BOOKS

1. Naughton and Schildt H. - "*The Complete Reference Java 2*" –,Tata McGraw Hill, Fifth Edition – 2010.
2. Horstmann Gary Cornell S - "*Core Java 2 Volume I - Fundamentals*" - Addison Wesley -9th Edition 2013.

REFERENCES

1. Arnold and Gosling J. - "*The Java Programming Language*" - 5th Edition 2012.
2. Krishnamoorthy & Prabhu – *"Internet & JAVA Programming"* - 2010 – New Age International Publishers.

Web Resources

www.**freejava**guide.comwww.training-notes.co.uk

TE1002 JAVA PROGRAMMING												
Course designed by		**Department of Telecommunication 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	5									
3.	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts(E)		Professional Subjects (P)				
								X				
4.	Broad Area	Circuit Analysis and Programming		System Design		Communication Engineering		Networking Embedded				
		X		--		--		--				
5.	Approval	23rd meeting of Academic Council, May 2013										

TE1003	**ELECTROMAGNETIC THEORY & WAVEGUIDE COMPONENTS**	**L**	**T**	**P**	**C**
	Total Contact Hours – 45	**3**	**0**	**0**	**3**
	Prerequisite				
	NIL				
PURPOSE					
Provides depth knowledge about electromagnetic theory and basic waveguides.					

INSTRUCTIONAL OBJECTIVES	
1.	To study and analyze the concepts of electric field and magnetic field.
2.	Derive Maxwell's equations from other theorems and poynting theorem.
3.	Gain knowledge new wave propagation in between the parallel plates.
4.	Understand the waves in different types of waveguides.

UNIT I - STATIC ELECTRIC FIELDS (12 hours)

Introduction to Rectangular, Spherical, cylindrical co-ordinate system– **Coulomb's law**: Electric field intensity – Field due to different types of charges – Electric Flux density. **Gauss law**: It's applications to symmetrical charge distributions – Concept of divergence. **Electric potential**: Potential field due to different types of charges – Potential gradient – The dipole –field due to dipole – Energy density in electrostatic field.

UNIT II - STEADY MAGNETIC FIELDS (7 hours)

Biot Savart Law: Its applications**. Ampere's circuital law**: Its applications – Curl of magnetic field intensity –Magnetic flux and magnetic flux density – The scalar and vector magnetic potentials – Steady magnetic field laws.

UNIT III - MAXWELLS EQUATIONS AND TIME VARYING FIELDS (8 hours)

Maxwell's Equations: For steady fields in point form and integral form – Faraday's law – displacement current –Maxwell's equations in point form and integral form for time-varying fields – Comparison of field and circuit theory. **Poynting Theorem:** Poynting vector

UNIT IV - GUIDED WAVES (9 hours)

Waves between parallel planes: Transverse electric waves-Transverse magnetic waves-characteristic of TE and TM waves-TEM waves. Velocity of propagation-Attenuation in parallel plane guides-Wave impedance

UNIT V - WAVEGUIDE THEORY (9 hours)

Rectangular wave guides: TE waves and TM waves in Rectangular waveguides – Dominant mode – cutoff frequency in wave guides – Impossibility of TEM waves in waveguides.

Circular waveguides: Wave impedance and characteristic impedance – Power flow in wave guides – Attenuation factor and Q of wave guides – Transmission line analogy for waveguides

TEXT BOOKS

1. William Hayt H., Jr and John Buck A., *"Engineering Electromagnetics"*, Tata McGraw-Hill Publishing Ltd, 7th Edition, 2006.
2. Edward Jordan and Balmain KG, *"Electromagnetic Waves and Radiationg Systems",* Pearson education, 2nd Edition, 2001.

REFERENCES

1. Matthew N. O. Sadiku., *"Elements of Electromagnetics",* Oxford University Press, 3rd Edition, First Indian Edition, 2006.
2. Raju G.S.N., *"Electromagnetic Field Theory and Transmission Lines"* Pearson Education, First Indian print, 2005.

TE1003 ELECTROMAGNETIC THEORY & WAVEGUIDE COMPONENTS												
Course designed by		**Department of Telecommunication Engineering**										
1	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
			X				X		X			X
2	Mapping of instructional objectives with student outcome		1,2 3,4				1,2 3,4		1,2,4	1,4	1,4	
3	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts(E)		Professional Subjects (P)				
								X				
4	Broad Area	Communication		Signal Processing		Electronics		VLSI		Embedded		
		X		--		--		--				
5	Approval	23rd meeting of Academic Council, May 2013										

		L	T	P	C
TE1004	**JAVA PROGRAMMING LABORATORY**	**0**	**0**	**2**	**1**
	Total Contact Hours – 15				
	Prerequisite				
	NIL				

PURPOSE

The purpose of the laboratory is to develop Java Programs using the given concepts. Understand fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc.

INSTRUCTIONAL OBJECTIVES

1.	To demonstrate the Graphics and Files Programming
2.	To analyze object inheritance and its use.
3.	To develop of JAVA applets vs. JAVA applications

LIST EXPERIMENTS

1. JAVA Program to perform basic arithmetic (+, - , *, /) operations using *Boolean*, *int*, *float, long* and *double* data types.
2. JAVA Program for the following :
   a) Default Constructor
   b) Parameterized Constructor
   c) Bitwise operators
   d) Special operators
3. JAVA Program to perform Matrix Addition for 3 x 3 matrix. Also check the condition for Matrix Addition.
4. JAVA Program to perform any 10 String methods.
   a) JAVA Program to perform the 4 String buffer methods.
   b) JAVA Program to illustrate the Single Inheritance.
5. JAVA Program to illustrate the following:
   a) Logical operators
   b) Conditional operators
   c) Special operators
   d) Copy Constructor
6. JAVA Program to illustrate the following:
   a) Hierarchical Inheritance
   b) Multilevel Inheritance
7. JAVA Program to illustrate the concept of Multiple Inheritance using Interfaces.
8. JAVA Program to illustrate the concept of Multithreaded Programming Using 3 Multiplication tables.
9. JAVA Program for simple Applet.

REFERENCES

1. Laboratory Manual, Department of TCE, SRM University.

2. Naughton and Schildt H. - "*The Complete Reference Java 2*" –, Tata McGraw Hill, Fifth Edition – 2010.

TE1004 JAVA PROGRAMMING LABORATORY												
Course designed by		**Department of Telecommunication 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	1,2									
3.	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts (E)		Professional Subjects (P)				
								X				
4.	Broad Area	Circuit Analysis and Programming		System Design		Communication Engineering		Networking Embedded				
		X		--		--		--				
5.	Approval	23rd meeting of Academic Council, May 2013										

	ELECTRON DEVICES AND DIGITAL CIRCUITS LABORATORY	**L**	**T**	**P**	**C**
TE1005	Total Contact Hours – 30hrs	**0**	**0**	**3**	**2**
	Prerequisite				
	Nil				

PURPOSE

This Laboratory Course will enable the students to implement and analyze the theoretical aspects of Electronic Devices & Digital Circuits.

INSTRUCTIONAL OBJECTIVES

1.	To understand the characteristic features & operations of various transistors and diodes through hands on experience.
2.	To impart hands on practice in the operation of various ICs
3.	To understand the application of the devices based on their characteristics.

LIST OF EXPERIMENTS

Electron Devices experiments:

1. To study the forward and reverse bias (volt-ampere) characteristics of a simple P-N junction diode.
2. To study the forward and reverse bias volt-ampere characteristics of a zener diode.

3. To study the voltage current characteristics of JFET
4. To study the **CB characteristics of a Transistor**
5. To study the performance of a half/full wave rectifier in terms of ripple factor and efficiency.
6. Realization of desired wave shapes using clipper and clamper circuits.

Digital circuits experiments:

1. Verification of the truth tables of Logic Gates and Flip Flops using ICs.
2. Design and Implementation of Multiplexers and De-Multiplexers using Logic gates.
3. Design and Implementation of Combinational circuits using Multiplexer, Demultiplexer, Encoder and Decoder.
4. Design and Implementation of code converters.
5. Design of Shift Registers.
6. Design of Synchronous and Asynchronous counter.

REFERENCES

1. LAB MANUAL, Department of TCE, SRM University.
2. Morris Mano, "*Digital Design*", Pearson Education, 2006.
3. Robert L. Boylestad and Louis Nashelsky, *"Electronic Devices and Circuit Theory"*, Pearson Education, 9th Edition, 2009.

TE1005 ELECTRON DEVICES AND DIGITAL CIRCUITS LABORATORY												
Course designed by		**Department of Telecommunication Engineering**										
1.	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
			X	X	X		X					X
2.	Mapping of instructional objectives with student outcome		1,2	1,2	1,2,3		1,3					1,2
3.	Category	General (G)			Basic Sciences (B)		Engineering Sciences and Technical Arts (E)			Professional Subjects (P)		
										X		
4.	Broad Area	Circuit Analysis and Programming			System Design		Communication Engineering			Networking Embedded		
		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

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

REFERENCES

German for Dummies
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.

UNIT IV **(6 hours)**

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

UNIT V **(6 hours)**

Grammar and Vocabulary – " les prepositions de lieu": au à la, à l', chez, the reflexives verbs, verbs to nouns. Listening and Speaking – "le 'e' sans accents ne se prononce pas. C'est un "e" caduc. Ex: quatre, octobre. " les sons (s) et (z)-

salut , besoin. Writing –paragraph writing about one's everyday life, French culture. Reading Comprehension -- reading a text or a song.....

TEXT BOOK

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)**

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

UNIT II **(8 hours)**

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

UNIT III **(6 hours)**

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

UNIT IV **(4 hours)**

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

UNIT V **(4 hours)**

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

TEXT BOOK

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ˆyouˇ 好ˆgood 'well' 工作ˆworkˇ 'job' 人员ˆpersonnel 'staff member' 请问ˆMay I ask…ˇ 贵ˆexpensive 'valuable' 姓ˆone's family name is ˇ

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 'home' 有ˆhave 几ˆseveral 爸爸 (father) 妈妈 (mother) 哥哥 (elderly brother)

UNIT II

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

New Words:
客人ˆguest,visitor 这儿ˆhere 中文ˆChinese 对ˆright, correct 学生ˆstudent 多ˆmany, a lot

Grammar: Sentences with a verbal predicate

UNIT III

Introducing people to each other

A. Exchanging amenities

B. Making/Negating conjectures

C. Questions and answers about nationality

Grammar: Sentences with an adjectival predicate

UNIT IV

A) About places to go

Indicating where to go and what to do

Referring to hearsay.

Saying good-bye

B) Making a request

Questions and answers about postcodes and telephone numbers

Reading dates postcodes and telephone numbers

Counting Renmibi

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

Sentences with a nominal predicate

UNIT V

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

TEXT BOOK

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										

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

PURPOSE

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

INSTRUCTIONAL OBJECTIVES

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

UNIT I **(6 hours)**

Critical Reasoning – Essay Writing

UNIT II **(6 hours)**

Synonyms – Antonyms - Odd Word - Idioms & Phrases

UNIT III **(6 hours)**

Word Analogy - Sentence Completion

UNIT IV **(6 hours)**

Spotting Errors - Error Correction - Sentence Correction

UNIT V **(6 hours)**

Sentence Anagram - Paragraph Anagram - Reading Comprehension

ASSESSMENT

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

TEXT BOOK

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

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 W.R.Goyal Pub, 2011.
3. Thorpe Edgar and Thorpe Showich, Objective English. Pearson Education 2012.
4. Murphy Raymond, Intermediate English Grammar, (Second Edition), Cambridge University Press, 2012.

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

	PROBABILITY AND RANDOM PROCESS	L	T	P	C
MA1024	Total Contact Hours – 60	**4**	**0**	**0**	**4**
	Prerequisite				
	Nil				
	Common to ECE, ITCE & NANO				

PURPOSE

To introduce the students to the idea of probability and random process, an important mathematical tool in signal processing.

INSTRUCTIONAL OBJECTIVES

1.	To acquire knowledge about Probability and Random variables.
2.	To gain knowledge on 2 - D Random variables.
3.	To expose to the concepts of Random process.
4.	To gain knowledge about the Correlation Functions.
5.	To learn about the applications of Fourier Transforms like Spectral Density and others.

UNIT I - PROBABILITY DISTRIBUTIONS (15 hours)

Random Variables - Moments - Moment generating function - Binomial, Poisson, Geometric, Exponential and Normal distributions - Functions of Random Variables.

UNIT II - TWO DIMENSIONAL RANDOM VARIABLES (12 hours)

Two dimensional Random Variables - Marginal and conditional distributions – Transformation of Random Variables - central limit theorem - simple problems.

UNIT III - RANDOM PROCESSES (12hours)

Classification of Random processes - Stationarity - WSS and SSS processes - Poisson Random process - Renewal Process - Markov Chain and transition probabilities.

UNIT IV - CORRELATION FUNCTIONS (9 hours)

Autocorrelation function and its properties - Cross Correlation function and its properties - Linear System with Random inputs - Ergodicity.

UNIT V - SPECTRAL DENSITY (12 hours)

Power spectral Density Function - Properties - System in the form of convolution - Unit Impulse Response of the System - Einstein - Weiner-Khinchine Relationship - Cross Power Density Spectrum - Properties.

TEXT BOOKS

1. Veerarajan T., "*Probability, Statistics and Random Processes"*, Tata McGraw Hill,3rd edition, 2008.
2. Trivedi K S, "*Probability and Statistics with reliability, Queueing and Computer Science Applications*",Prentice Hall of India,New Delhi,2nd revised edition, 2002.

REFERENCES

1. Sivaramakrishna Das P. and Vijayakumari.C,A Textbook of Probability and Random Processes, Viji's academy,2010
2. Papoulis, Probability, Random variables and stochastic processes, 4th edition, Tata McGraw Hill Company,2002.

MA1024 - PROBABILITY AND RANDOM PROCESS												
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		X								
4.	Approval	23rd meeting of Academic Council, May 2013										

TE1006	TRANSMISSION LINE THEORY AND NETWORK ANALYSIS	L	T	P	C
	Total conducted hours:45	**2**	**1**	**0**	**3**
	Prerequisite				
	TE1003				

PURPOSE

The purpose of this course is torelate basic electromagnetic concepts to the performance of transmission lines & Networks and to design a transmission line with minimum reflections and maximum received power.

INSTRUCTIONAL OBJECTIVES

1.	To understand various parameters on Transmission Lines
2.	To apply various networks like filters, attenuators and equalizers to make an efficient Transmission.

UNIT I - TRANSMISSION LINE THEORY (9 hours)

General theory of Transmission lines - the transmission line - general solution - The infinite line - Wavelength, velocity of propagation - Waveform distortion - the distortion-less line - Loading and different methods of loading - Line not terminated in Z_0 - Reflection coefficient - calculation of current, voltage, power delivered and efficiency of transmission - Input and transfer impedance - Open and short circuited lines - reflection factor and reflection loss.

UNIT II - HIGH FREQUENCY TRANSMISSION LINES (9 hours)

Transmission line equations at radio frequencies - Line of Zero dissipation - Voltage and current on the dissipation-less line, Standing Waves, Nodes, Standing Wave Ratio - Input impedance of the dissipation-less line - Open and short

circuited lines - Power and impedance measurement on lines - Reflection losses - Measurement of VSWR and wavelength.

UNIT III - IMPEDANCE MATCHING IN HIGH FREQUENCY LINES (9 hours)

Impedance matching: Quarter wave transformer - Impedance matching by stubs - Single stub and double stub matching - Smith chart - Solutions of problems using Smith chart - Single and double stub matching using Smith chart.

UNIT IV - PASSIVE FILTERS (9 hours)

Characteristic impedance of symmetrical networks - filter fundamentals, **Design of filters**: Constant K - Low Pass, High Pass, Band Pass, Band Elimination, m-derived sections - low pass, high pass composite filters.

UNIT V - ATTENUATORS AND EQUALIZERS (9 hours)

Attenuators: T, Π, Lattice Attenuators, Bridged - T attenuator, L-Type Attenuator, **Equalizers**: inverse network, series, full series, shunt, full shunt, constant resistance T, constant resistance, constant resistance lattice and bridged T network.

TEXT BOOKS

1. John D ryder, "*Networks, lines and fields*", 2nd Edition, Prentice Hall India, 2010.
2. Ganesan L, Sreeja S S, *"MoleTransmission Lines and Wave Guides*", 2nd Edition, Tata McGraw Hill, 2010.

REFERENCES

1. Sudhakar. A, Shyammohan S Palli, "*Circuits and Networks - Analysis and Synthesis*", 3rdEdition, Tata McGraw Hill, 2006.
2. Umesh Sinha, "*Transmission Lines and Networks*", Satya Prakashan Publishing Company, New Delhi, 2001.

TE1006 TRANSMISSION LINE THEORY AND NETWORK ANALYSIS												
Course designed by		Department of Telecommunication 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 , 2						1 , 2
3.	Category	General (G)		Basic Sciences(B)			Engineering Sciences and Technical Arts (E)				Professional Subjects (P)	
											x	
4.	Broad area	Circuit Analysis and Programming		System Design			Communication Engineering			Networking		
		x					x					
5.	Approval	23rd meeting of Academic Council, May 2013										

TE1007	ANALOG COMMUNICATION	L	T	P	C
	Total Contact Hours	3	0	0	3
	Prerequisite				
	NIL				

PURPOSE

To provide a foundation for the students to develop an appreciation and an understanding of the principles of telecommunication

INSTRUCTIONAL OBJECTIVES

1.	To enable the students to understand the basic modulations, types of modulations.
2.	To understand the noise performance of AM & FM receivers and channel models
3.	To understand the basic issues that pertain to the transmission of signals over an AWGN channel

UNIT I - AMPLITUDE MODULATION SYSTEMS (9 hours)

Need for modulation-AM modulation systems-Modulation index-Phase diagram-Power relations-Efficiency-Spectrum diagram of AM, DSB-SC, SSB & VSB systems. **Generation of AM Waves:** Square law modulator-Product Modulator-Switching Modulator. Detection of AM waves: Envelope detector-Coherent detector.

UNIT II - ANGLE MODULATION (9 hours)

Frequency Modulation-Transmission Bandwidth of FM signals-Frequency spectrum- Phase Modulation-relationship between FM & PM- Introduction Narrow

Band FM & Wide Band FM. **Generation of FM Waves:** Direct method- Indirect method of FM generation. **Detection of FM waves:** Synchronous Detector, Ratio Detector-PLL FM demodulator- Super heterodyne Receiver

UNIT III - NOISE THEORY (9 hours)

Sources of Noise- Calculation of Noise in Linear systems-Noise bandwidth-Available Power-Noise temperature-Noise in two port networks-Noise figure-Measurement of Noise figure-Signal in presence of noise-Narrow Band noise

UNIT IV - NOISE PERFORMANCE OF AM & FM RECEIVERS (9 hours)

Noises in AM receiver threshold effect-Noise in FM receivers capture effect-FM threshold effect- Improvement of noise performance using Pre emphasis &De-emphasis in FM.

UNIT V - INFORMATION THEORY (9 hours)

Concept of amount of information, Average information, Entropy, Rate of information-Discrete memory less channel-Joint Entropy & Conditional Entropy-Mutual information-Channel Capacity-Shannon's Theorem-Continuous Channel-Shannon-Hartley Theorem-Bandwidth, signal to noise ratio trade-off.

TEXT BOOKS

1. Simon Haykin, "*Communication System*", John Wiley & Sons, 5th Edition, 2009.
2. Leon Coach, "*Digital & Analog Communication systems"*, Pearson Education, 8th Edition, 2002.

REFERENCES

1. Sam Shanmugam K., "*Digital & Analog Communication System*", John Wiley & Sons, ISBN 9788126536801, 1985 Reprint 2008.
2. Bhagwandas Pannalal Lathi, Zhi Ding, "*Modern Digital & Analog Communication*", Oxford University Press, Incorporated, ISBN 9780195331455, 4th Edition 2009.

TE1007 ANALOG COMMUNICATION												
Course designed by		Department of Telecommunication 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								

3.	Category	General (G)	Basic Sciences (B)	Engineering Sciences and Technical Arts (E)			Professional Subjects (P)
		x					
4.	Broad area	Circuit Analysis and Programming		System Design	Communication Engineering		Networking
					x		
5.	Approval	23rd meeting of Academic Council, May 2013					

TE1008	**ANALOG INTEGRATED CIRCUITS**	**L**	**T**	**P**	**C**
	Total Contact Hours - 45	**3**	**0**	**0**	**3**
	Prerequisite				
	EC1006				

PURPOSE

To understand the basic concepts in the design of electronic circuits using linear integrated circuits and their applications in the processing of analog signals.

INSTRUCTIONAL OBJECTIVES

1.	To get the knowledge about the important electrical characteristics and operation of different analog IC's.
2.	To study the applications of the above IC's in the design of linear and non-linear areas.
3.	To know the basic operation and applications of analog multipliers and PLL.
4.	To know various ADC and DAC and a few special function integrated circuits.

UNIT II - FABRICATION AND CIRCUIT CONFIGURATION FOR LINEAR ICS

(9 hours)

Manufacturing process of monolithic ICs -Construction of monolithic bipolar transistor -Monolithic diodes - Integrated Resistors -Monolithic Capacitors - Inductors-General operational amplifier stages -Internal circuit diagrams of IC741-Op-amp symbol - terminals - packages-Characteristics of ideal Op amp-DC and AC performance characteristics, slew rate and its improvement.

UNIT II - APPLICATIONS OF OPERATIONAL AMPLIFIERS (9 hours)

Inverting & Non-Inverting amplifiers – voltage follower – summing and differential amplifiers – AC amplifiers-Differentiator & Integrator – precision rectifiers – clipper and clamper circuits – log and anti-log circuits – Instrumentation amplifier - comparator and its applications.

UNIT III - ANALOG MULTIPLIER AND PLL (9 hours)

Analog Multiplier using Emitter Coupled Transistor Pair - Gilbert Multiplier cell - Variabletransconductance technique- analog multiplier ICs and their applications- Operation ofthe basic PLL- Closed loop analysis-Voltage controlled oscillator-Monolithic PLL IC 566-Application of PLL.

UNIT IV - DATA CONVERSION DEVICES (9 hours)

Analog switches- High speed sample and hold circuits and sample and hold ICs-Types of converter-Performance specifications-D/A conversion circuits:R-2R & inverted R-2R Ladder- D/A converters-A/D conversion circuits :Successive approximation, dual slope and flash A/D converters.

UNIT V - OSCILLATORS AND SPECIAL FUNCTION ICs (9 hours)

Barkhausen criterion - Wien Bridge oscillator - Phase shift oscillator – Function generator - Astable and Monostable Multivibrators using 555 Timer and its applications- IC 723 general purpose regulator -Frequency to Voltage and Voltage to Frequency converters

TEXT BOOKS

1. Roy choudhury and Shail B Jain, "*Linear Integrated Circuits*", New Age International, 2007.
2. Salivahanan S. & Kanchana Bhaskaran V.S., "*Linear Integrated Circuits*", Tata McGraw Hill, 2008.

REFERENCES

1. Coughlin & Driscull, "*Operational Amplifiers & Linear Integrated Circuits*", Pearson Education, 6th edition, 2003.
2. George Clayton, Steve Winder, "*Operational Amplifiers",* Newnes, 5th edition, 2003.
3. Sergio Franco, "*Design with operational amplifiers and analog integrated circuits"*, 3rd Edition, Tata McGraw-Hill, 2007.
4. Lal Kishore K, "*Operational Amplifier and Linear Integrated Circuits"*, Pearson Education, 2006.

TE1008 ANALOG INTEGRATED CIRCUITS												
Course designed by		Department of Telecommunication Engineering										
1.	Student outcome	a	B	c	d	e	f	g	h	i	j	k
		x	X	x								x
2.	Mapping of instructional objectives with student outcome	1 , 3 , 4	2 , 3	2 , 3								1 , 4

3.	Category	General (G)	Basic Sciences (B)	Engineering Sciences and Technical Arts (E)	Professional Subjects (P)
					x
4.	Broad area	Circuit Analysis and Programming	System Design	Communication Engineering	Networking
		x	x		
5.	Approval	23rd meeting of Academic Council, May 2013			

TE1009	**SOLID STATE ELECTRONIC CIRCUITS**	**L**	**T**	**P**	**C**
	Total Contact Hours - 45	**2**	**1**	**0**	**3**
	Prerequisite				
	EC1006				

PURPOSE

To study various semiconductor devices incorporated in circuits and their applications. Emphasis is on circuit construction, measurements, and analysis. This course covers the tools and methods necessary for the creative design of useful circuits using active devices.

INSTRUCTIONAL OBJECTIVES

1.	To study the circuits using the bipolar junction transistor, but the techniques can be equally applied to circuits using JFETs, MOSFETs, MESFETs.
2.	A study of the operating characteristics of amplifiers, oscillators, and pulse-shaping devices.

UNIT I - BIASING METHODS AND SMALL SIGNAL MODELS (BJT, JFET, MOSFET) (9 hours)

DC & AC Load Lines-Operating Point-Q-Point variation-various Biasing Methods - Small signal equivalent- Calculation of voltage gain, current gain, power gain, input impedance and output impedance.

UNIT II - TRANSISTOR AMPLIFIER AND ANALYSIS (9 hours)

Small Signal analysis of BJT, JFET and MOSFET amplifiers - Cascade amplifier - Cascode amplifier -Darlington Bootstrap amplifier - Differential amplifier.

UNIT III - FEEDBACK AMPLIFIERS AND OSCILLATORS (9 hours)

Concept of feedback - Types of feedback - Analysis of voltage & current feedback amplifiers Barkhausen criterion for oscillation- mechanism for start of oscillation & stabilization of amplitude - Analysis of RC &LC oscillators.

UNIT IV - LARGE SIGNAL AND TUNED AMPLIFIERS (9 hours)

Class-A CE amplifier - Q point placement - Power calculation - Maximum dissipation Hyperbola -Transformer coupled Amplifier - Class-B push pull amplifier - Class-AB operation-- Direct coupled push pull amplifier - Amplifier using complementary symmetry- Heat sink. Single Tuned Amplifiers - Double tuned and synchronously tuned amplifiers.

UNIT V - FREQUENCY RESPONSE AND WAVE SHAPING CIIRCUITS (9 hours)

Low frequency and High frequency response of BJT and FET amplifier. Nonlinear wave shaping circuits: Astable - Bistable - Monostable Multivibrators. Schmitt Trigger - Time Base Generators.

TEXT BOOKS

1. Robert Boylsted, Louis Nashelsky, "*Electronic Devices and circuit Theory*", (11th Edition), Pearson, April 30, 2012.
2. Jacob Millman, Christos C Halkias, "*Electronic Devices and Circuits*", Tata McGraw Hill, 2007.
3. Malvino A.P, *"Electronic Principles"*, McGraw Hill International, 2005.

REFERENCES

1. Mathur S.P, m Kulshrestha D.C., Chanda P.R., *"Electronic Devices Applications and Integrated Circuits"*, Umesh Publications, 2004.
2. *Ben Streetman and Sanjay Banerjee,* "Solid state electronic devices", (6th edition) August 5, 2005.
3. Sedra / Smith, *"Micro Electronic Circuits",* Oxford University Press, 2004.

TE1009 SOLID STATE ELECTRONIC CIRCUITS												
Course designed by		**Department of Telecommunication 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**	**2**									
3.	Category	General (G)		Basic Sciences(B)			Engineering Sciences and Technical Arts (E)				Professional Subjects (P)	
											x	
4.	Broad area	Circuit Analysis and Programming			System Design			Communication Engineering			Networking	
		x										
5.	Approval	23rd meeting of Academic Council, May 2013										

	ELECTRONIC CIRCUITS & ANALOG IC LABORATORY	L	T	P	C
TE1010	Total Contact Hours - 30	**0**	**0**	**3**	**2**
	Prerequisite				
	Nil				

PURPOSE

The purpose of the lab is to train the students to analyze electronic circuits and understand their functionality. To construct analog electronic circuits using op-amp ICs and special purpose linear ICs

INSTRUCTIONAL OBJECTIVES

1.	To study experimentally the working of amplifiers, and analyze their behavior from the frequency response.
2.	To design and verify the op-amp response in linear and non-linear application areas.

LIST OF EXPERIMENTS

ELECTRONIC CIRCUITS EXPERIMENTS:

1. Design and verification of Voltage Divider Biasing using BJT or FET
2. Frequency response of a common emitter amplifier (fixed bias) using BJT.
3. Frequency response of RC coupled amplifier using BJT or FET
4. Differential amplifier in common mode and differential mode.
5. RC Phase shift oscillator.
6. Colpitts Oscillator
7. Design and efficiency calculation for Class AB Amplifier
8. Frequency response of Single Tuned Amplifier

ANALOG IC EXPERIMENTS

1. Basic op-amp circuits such as Inverting & Non-Inverting amplifiers, Voltage Follower, Summing and Differential amplifiers
2. Linear op-amp circuits such as Instrumentation amplifier, Integrator & Differentiator
3. Non-Linear op-amp circuits such as Precision Diodes, Comparators and their applications
4. Op-amp oscillators - Phase shift & Wein bridge oscillators
5. IC 555 Timer in Astable and Monostable operation

REFERENCES

1. LAB MANUAL, Department of TCE, SRM University.
2. Robert Boylsted, Louis Nashelsky, "*Electronic Devices and circuit Theory*", (11th Edition), Pearson, April 30, 2012.

3. Roy choudhury and Shail B Jain, "*Linear Integrated Circuits*", New Age International, 2007.

TE1010 ELECTRONIC CIRCUITS & ANALOG IC LABORATORY												
Course designed by		**Department of Telecommunication Engineering**										
1.	Student outcome	a	b	c	d	e	f	g	h	i	j	k
			x	X	X		X					X
2.	Mapping of instructional objectives with student outcome		1,1	1,1	1,1		2					1,2
3.	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts (E)		Professional Subjects (P)				
								x				
4.	Broad area	Circuit Analysis and Programming		System Design		Communication Engineering		Networking				
		x										
5.	Approval	23rd meeting of Academic Council, May 2013										

	ANALOG COMMUNICATION AND NETWORKS LABORATORY	L	T	P	C
TE1011	Total Contact Hours – 30	**0**	**0**	**3**	**2**
	Prerequisite				
	Nil				

PURPOSE

The purpose of the lab is to train the students to design and implement communication circuits, networks and to use software for simulation.

INSTRUCTIONAL OBJECTIVES

1.	To study experimentally the working of modulation schemes using discrete electronic components.
2.	To simulate circuits using Circuit Simulator software and analyze their response.

LIST OF EXPERIMENTS

Using discrete components

1. AM modulation and demodulation
2. FM Modulation
3. PAM modulation and Demodulation
4. VCO using PLL
5. Analog Multiplexing (Use of Kit permitted)
6. Pre-emphasis and De-emphasis

Using PSPICE Simulator

1. Amplitude modulation and detection using PSPICE
2. Design and Frequency response of constant – K passive Low pass Filter
3. Design and Frequency response of constant – K passive High pass Filter
4. Design of simulation of passive attenuator.

REFERENCES

1. LAB MANUAL,Department of TCE, SRM University.
2. Simon Haykin, "*Communication System*", John Wiley & Sons, 5th Edition, 2009.
3. Sudhakar. A, Shyammohan S Palli, "*Circuits and Networks - Analysis and Synthesis*", 3rdEdition, Tata McGraw Hill, 2006.
4. Muhammed H Rashid, "*SPICE for "Circuits and Electronics using" PSPICE"*, 2nd Edition, PHI, 1995.

TE1011 ANALOG COMMUNICATION AND NETWORKS LABORATORY												
Course designed by		**Department of Telecommunication Engineering**										
1.	Student outcome	a	b	c	d	e	f	g	h	i	j	k
			x	X	X		X					X
2.	Mapping of instructional objectives with student outcome		1, 2	1,2	1,2		1,2					1,2
3.	Category	General (G)		Basic Sciences(B)			Engineering Sciences and Technical Arts (E)					Professional Subjects (P)
							X					
4.	Broad area	Circuit Analysis and Programming			System Design		Communication Engineering					Networking
		x					X					
5.	Approval	23rd meeting of Academic Council, May 2013										

DEPARTMENT ELECTIVE I
SEMESTER V

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

PURPOSE

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

INSTRUCTIONAL OBJECTIVES

1.	Understand the importance of effective communication in the workplace.
2.	Enhance presentation skills – Technical or general in nature.
3.	Improve employability scope through Mock GD, Interview

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

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

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

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

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

ASSESSMENT

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

REFERENCES

1. Bovee Courtland and Throill John, *Business Communication Essentials: A skills-Based Approach to Vital Business English*. Pearson Education Inc., 2011

2. Dhanavel, S.P., *English & Communication Skills for Students of Science and Engineering*. Orient Black Swan, 2009
3. Rizvi M. Ashraf *Effective Technical Communication*, Tata McGraw-Hill Publishing Company Limited, 2006.

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										

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

PURPOSE

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

INSTRUCTIONAL OBJECTIVES

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

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

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

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

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

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

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

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

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

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

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

TEXT BOOKS

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

REFERENCES

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

MA 1015 - DISCRETE MATHEMATICS												
Course designed by		**Department of Mathematics**										
1.	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
		x				x						
2.	Mapping of instructional objectives with student outcome	1-5				1-5						
3.	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts (E)			Professional Subjects (P)			
		--		x		--			--			
4.	Approval	23rd meeting of academic council, May 2013										

TE1012	**DIGITAL COMMUNICATION PRINCIPLES**	**L**	**T**	**P**	**C**
	Total Contact Hours - 45	**3**	**0**	**0**	**3**
	Prerequisite				
	EC1008 &TE1007				

PURPOSE

This course presents the ideas and techniques fundamental to digital communication systems. Emphasis is placed on system design goals and the need for tradeoffs among basic system parameters such as signal-to-noise ratio (SNR), probability of error and bandwidth expenditure. It also provides students the tools needed to design and analyze the performance of digital modulations in noise.

INSTRUCTIONAL OBJECTIVES

1.	Understand basic components of digital communication systems.

2.	Design optimum receivers.
3.	Analyze the error performance of digital modulation techniques.
4.	Design digital communication systems under given power, and error performance constraints.

UNIT I - SAMPLING PROCESS (9hours)

Model of digital communication system, Sampling theorem, Reconstruction of message from its samples, Signal distortion in sampling-Aliasing, Practical aspects of sampling and signal recovery, PAM, TDM.

UNIT II - WAVEFORM CODING (9hours)

Pulse code modulation, Channel noise and error probability, Quantization noise and signal-to-noise ratio, Robust quantization - companding, Linear prediction, DPCM, Delta modulation-Quantization error and SNR calculations, Channel capacity theorem.

UNIT III - BASEBAND SHAPING FOR DATA TRANSMISSION (9hours)

Binary data formats, Intersymbol interference, Nyquist criterion for distortionless baseband binary transmission-ideal and practical solution, Correlative coding-duobinary and modified duobinary signaling with precoder, Eye pattern, Introduction to Equalization techniques.

UNIT IV - BAND PASS DATA TRANSMISSION (9 hours)

Coherent and non coherent modulation techniques-BPSK,BFSK, QPSK, M-ary PSK, DPSK- transmitter and receiver implementation, Probability of error calculations,

UNIT V - DETECTION AND ESTIMATION (9hours)

Geometric interpretation of signals, AWGN, Detection of known signals in noise-ML Detector, Correlation receiver, Matched filter receiver, Estimation: concepts and criteria, ML Estimation, Introduction to carrier and symbol synchronization.

REFERENCES

1. John G. Proakis, Masoud Salehi, "*Digital communicatins*", Mc Graw Hill, 5th Edition,2010
2. Bernard Sklar, *"Digital Communications, Fundamentals and Applications"*, 2e, Prentice Hall, 2010
3. Simon Haykins, "*Digital Communication*", John Wiley and Sons, 2010.

TE1012 DIGITAL COMMUNICATION PRINCIPLES												
Course designed by		**Department of Telecommunication 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	1,2	2,4						1,2,3		2,3
3.	Category	General (G)		Basic Sciences (B)			Engineering Sciences and Technical Arts (E)					Professional Subjects (P)
												x
4.	Broad area	Circuit Analysis and Programming				System Design	Communication Engineering					Networking
							x					
5.	Approval	23rd meeting of Academic Council, May 2013										

TE1013	ANTENNA THEORY AND RF PROPAGATION	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite				
	TE1003				

PURPOSE

To expose students to applications and various antenna types including linear and planar microstrip configuration. Introduce students to the various types and models of Radio wave propagation affecting Communication Systems. Introduction to Diversity principles. To improve the design and problem solving skills.

INSTRUCTIONAL OBJECTIVES

1.	Understand the function of antennas
2.	Understand the different types of antennas and the radiation mechanism.
3.	Evaluate the fundamental parameters of antennas and arrays operating at various frequencies from LF to Microwave applications.
4.	Ability to design various types of linear and planar antennas.
5.	Identify the atmospheric and terrestrial effects on radio wave propagation.

UNIT I - ANTENNA FUNDAMENTALS & RADIATION FIELDS OF ANTENNAS (9 hours)

Isotropic radiation, radiation intensity, directive gain, directivity, power gain, beam width bandwidth, effective area, effective length, radiation resistance, reciprocity theorem, antenna efficiency. Concept of vector potential, modification of time

varying and retarded case, fields associated with hertzian dipole, power radiated and radiation resistance of current element, Radiation from half wave dipole.

UNIT II - ANTENNA ARRAYS (9 hours)

Introduction to broadside array, end fire array, collinear array, parasitic arrays. Arrays of 2 point sources, Arrays of 'N' sources for end fire and broadside arrays, pattern Multiplication, binomial arrays, frequency scanned arrays.

UNIT III - ANTENNA TYPES & ITS APPLICATIONS (9 hours)

Traveling wave antenna, loop antenna, horn antenna, reflector antenna, log periodic antenna, Yagi- uda antenna, helical antenna, micro strip antenna, Introduction to Smart antenna- Null steering, Direction of arrival & Beam forming introduction.

UNIT IV - ANTENNA MEASUREMENTS (9 hours)

Impedance, Gain, Radiation Pattern, Beam width, Radiation resistance, antenna efficiency, Directivity, Polarization and phase measurements.

UNIT V - WAVE PROPAGATION (9 hours)

Modes of propagation, Structure of atmosphere, Mechanism of bending of waves, effect of earth's magnetic field on radio wave propagation, virtual height, MUF, OWF, Skip distance Ionosphere abnormalities Multihop propagation, super refraction space wave propagation.

TEXT BOOKS

1. Abdollah Ghasemi, Ali Abedi, Farshid Ghasemi, *"Propagation Engineering In a Radio Links Design",* Springer Science + Business media, New York, 2013.
2. Kraus J.D., Marhefka RJ. and Ahmad Khan S., *"Antennas and Wave Propagation*", TMH, New Delhi, 4 ed., (Special Indian Edition), 2010.

REFERENCES

1. Harish A.R., Sachidanada M., "*Antennas and Wave propagation",* Oxford University Press, 2007.
2. John D.Kraus, Ronald J Marhefka and Ahmad S Khan, "*Antennas for all Applications",* Tata McGraw-Hill Book Company, 3 ed, 2007.
3. Constantine A. Balanis, "*Antenna Theory Analysis and Design",* John Wiley, 2nd Edition 2007.
4. C. Jordan E and Balmain, "*Electromagnetic waves and Radiating Systems",* Pearson Education / PHI, 2006.

TE1013 ANTENNA THEORY AND RF PROPAGATION												
Course designed by		**Department of Telecommunication 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	4					5
3.	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts (E)						Professional Subjects (P)
												x
4.	Broad area	Circuit Analysis and Programming			System Design		Communication Engineering			Networking		
						X						
5.	Approval	23rd meeting of Academic Council, May 2013										

EC1017	**DIGITAL SIGNAL PROCESSING**	**L**	**T**	**P**	**C**
	Total Contact Hours – 60	**3**	**1**	**0**	**4**
	Prerequisite				
	EC1008				

PURPOSE

The purpose of this course is to introduce the concepts of Digital signal processing and DSP Processor. The mathematical analysis of FIR and IIR filter design and simulation using MATLAB are dealt with in detail

INSTRUCTIONAL OBJECTIVES

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

1.	Structures of Discrete time signals and systems
2.	Fast Fourier Transform Implementations Frequency response and design of FIR and IIR filters.
3.	Finite word length effect.
4.	DSP Processor- TMS320C5X.

UNIT I - REVIEW OF DISCRETE TIME SIGNALS AND SYSTEMS (9 hours)

Overview of signals and systems – DFT–FFT using DIT and DIF algorithms – Inverse DFT-FFT using DIT and DIF algorithms – Applications – Circular convolution – MATLAB programs for DFT and FFT.

UNIT II - DESIGN AND IMPLEMENTATION OF IIR FILTERS (9 hours)

Design of analog filters using Butterworth and Chebyshev approximations – IIR

digital filter design from analog filter using impulse invariance technique and bilinear transformations – Matlab programs IIR filters.

UNIT III - DESIGN AND IMPLEMENTATION OF FIR FILTERS (9 hours)

Linear phase response – Design techniques for FIR filters – Fourier series method and frequency sampling method –Design of Linear phase FIR filters using windows: Rectangular, Hanning and Hamming windows – Matlab programs FIR filters.

UNIT IV - FINITE WORD LENGTH EFFECTS IN DIGITAL FILTERS (9 hours)

Fixed point arithmetic – effect of quantization of the input data due to Finite word length. Product round off – need for scaling – Zero input limit cycle oscillations - Limit cycle oscillations due to overflow of adders – Table look up implementation to avoid multiplications.

UNIT V - PROCESSOR FUNDAMENTALS (9 hours)

Architecture and features: Features of DSP processors – DSP processor packaging(Embodiments) – Fixed point Vs floating point DSP processor data paths – Memory architecture of a DSP processor (Von Neumann – Harvard) – Addressing modes – pipelining – TMS320 family of DSPs (architecture of C5x).

Tutorial Total (15 hours)

TEXT BOOKS

1. John G. Proakis and Dimitris C. Manolakis, *"Digital Signal Processing Principles, Algorithms and Applications",* Pearson Education, Fourth edition 2007.
2. Venkataramani B, Bhaskar M, *"Digital Signal Processors, Architecture, Programming and Application",* Tata McGraw Hill, New Delhi, 2003.

REFERENCES

1. Sanjit Mitra, *"Digital Signal Processing – A Computer based approach",* Tata McGraw Hill, New Delhi, 2011.
2. Venkataramani B, Bhaskar M, *"Digital Signal Processors, Architecture, Programming and Application",* Tata McGraw Hill, New Delhi, 2003.
3. Hayes M.H, *"Digital Signal Processing",* Tata McGraw Hill, New Delhi, Edition, 2009.

EC1017 DIGITAL SIGNAL PROCESSING												
Course designed by		**Department of Electronics and Communication Engineering**										
1.	Student Outcome	a	b	c	D	e	f	g	h	i	j	k
		X	X	X		X			X			X
2.	Mapping of instructional objectives with student outcome	1	2,4	2		1,2			3			2
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences and Technical Arts (E)					Professional Subjects(P)	
									x			
4.	Broad Area	Communication		Signal Processing		Electronics		VLSI			Embedded	
			X									
5.	Approval	23rd meeting of Academic Council, May 2013										

TE1014	**ANTENNA AND PROPAGATIONLABORATORY**	**L**	**T**	**P**	**C**
	Total Contact Hours - 30	**0**	**0**	**3**	**2**
	Prerequisite				
	Nil				

PURPOSE

This Lab Course will enable the students to analyze and verify the characteristics of different antennas.

INSTRUCTIONAL OBJECTIVES

1.	To understand the characteristic features & operations of various antennas through hands on experience.
2.	To understand the application of different antennas based on their characteristics.

LIST OF EXPERIMENTS

1. Performance Analysis of a dipole and folded dipole antenna.
2. Performance Analysis of a loop antenna.
3. Performance Analysis of a yagi-uda antenna and two element array antennas.
4. Performance Analysis of a slot antenna and Helix antenna
5. Performance Analysis of a Hertz antenna.
6. Performance Analysis of a log periodic antenna.
7. Performance Analysis of a Parabolic antenna.
8. Determine the characteristics and Radiation pattern for all the above antennas.
9. Radio Wave Propagation Path loss Calculations using MATLAB
10. Antenna Design Concept using 4NEC2

1. yagi-uda antenna – 3 element
2. yagi-uda antenna – 5 element
3. yagi-uda antenna – 7 element

REFERENCES

1. LAB MANUAL, Department of TCE, SRM University.
2. John D.Kraus, Ronald J Marhefka and Ahmad S Khan, "*Antennas for all Applications",* Tata McGraw-Hill Book Company, 3 ed, 2007.
3. Constantine A. Balanis, "*Antenna Theory Analysis and Design",* John Wiley, 2nd Edition 2007.
4. Douglas B. Miron, "*Small Antenna Design",* Elsiever 2006.

TE1014 ANTENNA AND PROPAGATIONLABORATORY												
Course designed by		**Department of Telecommunication Engineering**										
1.	Student outcome	a	b	c	d	e	f	g	h	i	j	k
			X	X	X		X					
2.	Mapping of instructional objectives with student outcome		1,2	1,2	1,2,3		1,3					1,2
3.	Category	General (G)			Basic Sciences (B)			Engineering Sciences and Technical Arts (E)			Professional Subjects (P)	
											x	
4.	Broad area	Circuit Analysis and Programming			System Design			Communication Engineering			Networking	
								X				
5.	Approval	23rd meeting of Academic Council, May 2013										

TE1015	**COMMUNICATION & SIGNAL PROCESSING LABORATORY**	**L**	**T**	**P**	**C**
	Total Contact Hours - 30	**0**	**0**	**3**	**2**
	Prerequisite				
	NIL				

PURPOSE

To help the students to simulate and understand communication systems using Trainer kits and Simulation softwares.

INSTRUCTIONAL OBJECTIVES

1.	To carry out simulation of communication circuits using software like PSPICE and MATLAB.
2.	Analyze the error performance of digital modulation techniques.

LIST OF EXPERIMENTS

MATLAB Simulation Experiments

1. Compute DFT of a signal/Plot sampled cosine wave and compute FFT.
2. Perform linear & Circular convolution of two signals.
3. Design Butterworth digital IIR filters.(Low pass/ High pass and Band pass/ Band stop)
4. Design FIR filter using window method.
5. Modulation & Demodulation of ASK, PSK & FSK
6. BER Performance of Binary Phase Shift keying & Quadrature Phase Shift keying

Communication Trainer kit Experiments

1. ASK Demodulation using product detection
2. Noise generation using PN sequence
3. Time division multiplexing

Pspice Simulation Experiments

1. Active filters: Bandpass filter and Notch filter.
2. Digital to Analog converter (any one method)
3. Analog to Digital converter (any one method)
4. Ramp Generator

REFERENCES

1. LAB MANUAL, Department of TCE, SRM University.
2. EMONA Trainer Kit MANUAL.
3. R.K.Bansal, A.K.Goel, M.K.Sharma, "*MATLAB and its Applications in Engineering*", Pearson Education, 2012.
4. John G. Proakis and Dimitris C. Manolakis, *"Digital Signal Processing Principles, Algorithms and Applications",* Pearson Education, Fourth edition 2007.
5. Alan V. Oppenheim, S.wilsky and S.H.Nawab, *"Signals and Systems"*, Pearson Education., 2007.

TE1015 COMMUNICATION & SIGNAL PROCESSING LABORATORY												
Course designed by		**Department of Telecommunication Engineering**										
1.	Student outcome	a	b	c	d	e	f	g	h	i	j	k
		X	X									X
2.	Mapping of instructional objectives with student outcome	1	2									1 , 2
3.	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts (E)				Professional Subjects (P)		
										x		
4.	Broad area	Circuit Analysis and Programming		System Design		Communication Engineering				Networking		
		X				X						
5.	Approval	23rd meeting of Academic Council, May 2013										

TE1047	**INDUSTRIAL TRAINING I** (Training to be undergone after IV semester)	**L**	**T**	**P**	**C**
	Prerequisite	**0**	**0**	**1**	**1**
	Nil				

PURPOSE

To provide hands-on experience at site / office, planning or design where Telecommunications Engineering projects are carried out.

INSTRUCTIONAL OBJECTIVES

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

Students have to undergo one/ two-week practical training in Telecommunications Engineering related projects at site or office, design / planning 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.

<table>
<tr><th colspan="13">TE1047INDUSTRIAL TRAINING I</th></tr>
<tr><td colspan="2">Course designed by</td><td colspan="11">Department of Telecommunication 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</td><td>2</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>1,2</td></tr>
<tr><td rowspan="2">3.</td><td rowspan="2">Category</td><td colspan="3">General (G)</td><td colspan="3">Basic Sciences (B)</td><td colspan="3">Engineering Sciences and Technical Arts (E)</td><td colspan="3">Professional Subjects (P)</td></tr>
<tr><td colspan="3"></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="3">Antenna Engineering</td><td colspan="3">Modulation, Switching Techniques</td><td colspan="3">Tx /Rx Architecture Engineering</td><td colspan="3">Hardware Software for Telecom Engg.</td></tr>
<tr><td colspan="3">--</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>

SEMESTER VI

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

PURPOSE

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

INSTRUCTIONAL OBJECTIVES

1.	To improve aptitude, problem solving skills and reasoning ability of the student.
2.	To collectively solve problems in teams & group.

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

Ratios & Proportions, Averages, Mixtures & Solutions

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

Time, Speed & Distance, Time & Work

UNIT III - ALGEBRA – II **(6 hours)**

Quadratic Equations, Linear equations & inequalities

UNIT IV – 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										

	RF MICROCONTROLLER DESIGN & INTERFACING	L	T	P	C
TE1016	Total contact hours – 45	**3**	**0**	**0**	**3**
	Prerequisite				
	TE1001				

PURPOSE

This Course provides an in-depth understanding of the internal structure and operation of microprocessor and microcontroller. To be able to design and implement microcontroller -based systems in both hardware and software.

INSTRUCTIONAL OBJECTIVES

1.	To understand the functioning of microprocessors and microcontrollers.
2.	To analyze and apply logics to design a system.
3.	To be able to design and interface RF circuits with microcontroller

UNIT I - 16 – BIT PROCESSORS (INTEL 8086) (9 hours)

Intel 8086: Architecture – addressing modes and Instruction format – interfacing memory to 8086 – Interrupts – Basic timing diagram – modes of operation.

UNIT II - 8051 ARCHITECTURE (9 hours)

Introduction 8051 microcontroller Hardware – input/output pins and Circuits – External memory – counter and timers serial data input / output –Interrupts.

UNIT III - PROGRAMMING 8051 (KEIL) (9 hours)

Arithmetic and logical operations - Different Addressing modes –Port Programming –timer Programming - serial communication – Interrupt Programming – Interfacing with Real World – LCD Display, Stepper Motor.

UNIT IV - RF TRANSMITTER(RFPICI2F675) (9 hours)

Device Overview: Block Diagram – Memory Organization – Timer0 Module – Timer1 Module with Gate Control – Comparator Module – A/D Module – Data EPROM Memory – UHF ASK/ FSK Transmitter - Instruction Sets.

UNIT V - RF RECEIVER (RFRXD0420) (9 hours)

Device Overview: Block Diagram, PINOUT I/O Description – Circuit Description – Application Circuits: PLL Loop Filter Example Circuits, ASK, FSK, FM.

TEXT BOOKS

1. Muhammad Ali Mazidi, Janice GillispieMazidi, Rolin D. McKinlay, "*The 8051 Microcontroller And Embedded Systems Using Assembly and C",* 2nd edition, Pearson Education India, 2007.

REFERENCES

1. Triebel, *"The 8088 And 8086 Microprocessors: Programming, Interfacing, Software, Hardware and Applications"*, Pearson Education India, 4th Edition, 2007.
2. Kenneth J. Ayala, *"The 8051 microcontroller architecture, Programming and Application",* 3rd edition, Cengage Learning, 2004.

<table>
<tr><th colspan="13">TE1016 RF MICROCONTROLLER DESIGN & INTERFACING</th></tr>
<tr><td colspan="2">Course designed by</td><td colspan="11">Department of Telecommunication 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></td><td>2 , 3</td><td>1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>1</td></tr>
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<tr><td>5.</td><td>Approval</td><td colspan="11">23rd meeting of Academic Council, May 2013</td></tr>
</table>

TE1017	TELECOMMUNICATION SWITCHING METHODS	L	T	P	C
	Total contact hours - 45	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

This course is intended to provide a comprehensive coverage of the functions of a telecom switching office ,the course is to give a broad, in-depth and up-to-date coverage of telecommunication switching systems ,Digital Switching, multiplexing, network synchronization ,control and management, and traffic in the context of telecommunication network. Also the course introduce the concept of integrated services digital network (ISDN) a result of total digitalization on telecommunication networks.

INSTRUCTIONAL OBJECTIVES

1.	Describe the basic fundamentals of a telecom system.
2.	Describe the common switching operations found in the telecommunications industry.
3.	Analyse switching stages and expert in the domain of switching systems.
4.	Ability to analyse the performance of a digital telephone switch
5	To have a deep understand of Tele-traffic engineering and Apply telecommunication traffic engineering to evaluate network performance

UNIT I - MULTIPLEXING (9 hours)

Transmission Systems, Multiplexing and modulation: FDM and TDM, Digital Transmission and Multiplexing: Pulse Transmission, Line Coding, Binary N-Zero Substitution, Digital Biphase, Differential Encoding, Time Division Multiplex Loops and Rings.

UNIT II - DIGITAL SWITCHING (9 hours)

Switching Functions, Space Division Switching, Time Division Switching, two-dimensional switching: STS Switching, TST Switching, No.4 ESS Toll Switch, Digital Cross-Connect Systems, Digital Switching in an Analog Environment.

UNIT III - CONTROL AND NETWORK SYNCHRONIZATION MANAGEMENT (9 hours)

Timing - Timing Recovery: Phase-Locked Loop, Clock Instability, Jitter Measurements, Systematic Jitter. Timing Inaccuracies: Slips, Asynchronous Multiplexing, Network Synchronization, Network Control, Network Management.

UNIT IV - DIGITAL SUBSCRIBER ACCESS (9 hours)

ISDN: ISDN Basic Rate Access Architecture, ISDN U Interface, ISDN D Channel Protocol. High-Data-Rate Digital Subscriber Loops: Asymmetric Digital Subscriber Line, VDSL. Digital Loop Carrier Systems: Universal Digital Loop Carrier Systems, Integrated Digital Loop Carrier Systems.

UNIT V - TRAFFIC ANALYSIS (9 hours)

Traffic Characterization: Arrival Distributions, Holding Time Distributions, Loss Systems, Network Blocking Probabilities: End-to-End Blocking Probabilities, Overflow Traffic, Delay Systems: Exponential service Times, Constant Service Times, Finite Queues.

TEXT BOOKS

1. Bellamy John, "*Digital Telephony*", John Wily & Sons, Inc. 4rd end. 2010.
2. Freeman R.L., *"Telecommunication System Engineering",* 4th Edition, John Wiley & Sons Inc., 2004.

REFERENCES

1. Roger L. Freeman, *"Fundamental of Telecommunications"*, 2nd Ed, Wiley-IEEE Press, 2005.
2. Robert C. Newmann, "*Broadband communication"*, prentice Hall, 2002.
3. Flood J.I., "*Telecommunications Switching Traffic and Networks*", Pearson Education Pvt. Ltd., 2002.
4. Viswanathan. T, "*Telecommunication Switching System and Networks*", Prentice Hall of India Ltd., 2007.

<table>
<tr><th colspan="14">TE1017 TELECOMMUNICATION SWITCHING TECHNIQUES</th></tr>
<tr><td colspan="2">Course designed by</td><td colspan="12">Department of Telecommunication Engineering</td></tr>
<tr><td rowspan="2">1</td><td rowspan="2">Student outcome</td><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td><td>g</td><td>h</td><td>i</td><td>j</td><td>k</td></tr>
<tr><td>X</td><td>X</td><td></td><td></td><td>X</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>2</td><td>Mapping of instructional objectives with student outcome</td><td>1,2,3</td><td>3 , 4</td><td></td><td></td><td>5</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
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<tr><td>5</td><td>Approval</td><td colspan="12">23rd meeting of Academic Council, May 2013</td></tr>
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TE101	**MICROWAVE RADIO AND OPTICAL FIBER COMMUNICATIONS**	**L**	**T**	**P**	**C**
	Total Contact hours - 45	**3**	**0**	**0**	**3**
	Prerequisite				
	NIL				

PURPOSE

This course is intended to bring to the students the information necessary to understand both the RF, Microwave and Optical Communications. Students are introduced to the basics of different microwave components, microwave generators, amplifiers and micro strip lines. Further, the Students are enabled to understand the fundamental concepts of optical transmitters and receivers along with transmission losses

INSTRUCTIONAL OBJECTIVES

1.	Derive the S- Parameters for various microwave components
2.	Understand the working of Microwave semiconductor devices & their applications Gain knowledge about various Optical Fiber types, Optical Transmitters.

UNIT I – RF, MICROWAVE COMPONENTS (9 hours)

Radio Frequencies, Microwave Devices, Waveguide Tees - E-plane Tee, H-plane Tee, Magic Tee and their applications , Circulators and Isolators, Directional Couplers, Introduction to S parameters ,Properties of S parameters, S matrix of representation of multi-port network, S Matrix derivation for all components.

UNIT II - MICROWAVE VACCUM TUBE DEVICES & MICROWAVE SOLID STATE DEVICES (9 hours)

Introduction, Two cavity Klystron, Multi cavity Klystron Amplifiers, Two cavity Klystron oscillator, Reflex Klystrons, Traveling Wave Tubes (TWTs)-Magnetron Oscillator. Solid state devices: Transferred Electron Devices and Avalanche Transit Time Devices

UNIT III - INTRODUCTION TO MMIC & MICROWAVE COMMUNICATION SYSTEMS (9 hours)

Introduction to Micro strip Lines, & Monolithic Microwave Integrated circuits, Materials, Monolithic Microwave Integrated Circuit Growth, MMIC Fabrication Techniques, Microwave communication system - Friss Transmission Formula - Microwave Transmitters and Receivers - Noise Characterization of Microwave receiver.

UNIT IV - INTRODUCTION TO OPTICAL FIBERS (9 hours)

Element of an Optical Fiber Transmission link- Optical fiber types-Structure of Step index, Graded index and single mode fiber-Ray Optics- Attenuation - Absorption losses, Scattering losses, Bending Losses, Core and Cladding losses. Signal Distortion in Optical Wave guides- Material Dispersion, Wave guide Dispersion.

UNIT V - OPTICAL TRANSMITER AND RECIEVER (9 hours)

LED sources and LASER diode sources- Quantum efficiency- PIN and APD diodes-Receiver Configuration Fiber amplifiers- Erbium-doped Fiber Amplifiers (EDFA).Fibre -to- Fibre joints, Fibre splicing and connectors. Point-to-Point links System considerations -Link Power budget -Rise - time budget -Noise Effects on System Performance.

TEXT BOOKS

1. Samuel Y.LIAO, *"Microwave Devices and Circuits"*, - Prentice Hall of India - 3rd ed 2008.
2. Annapurna Das and Sisir K. Das, *"Microwave Engineering"*, - Tata McGraw-Hill, 2006.
3. Gerd Keiser, "*Optical Fiber Communication",* McGraw -Hill International, Singapore, 4th ed., 2008.

REFERENCES

1. Kulkarni M, "*Microwave and Radar Engineering",* Umesh Publication, 4th ed, 2010.
2. David M. Pozar "*Microwave Engg.*", - John Wiley & Sons – 3rd Edition, 2009.
3. Senior J, "*Optical Communication, Principles and Practice*",* Prentice Hall of India, 2009.

TE1018 MICROWAVE RADIO AND OPTICAL FIBER COMMUNICATIONS												
Course designed by		**Department of Telecommunication 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			2						
3.	Category	General (G)		Basic Sciences (B)			Engineering Sciences & Technical Arts (E)				Professional Subjects (P)	
											x	
4.	Broad Area	Circuit Analysis and Programming			System Design			Communication Engineering			Networking	
							X					
5.	Approval	23rd meeting of Academic Council, May 2013										

	RF MICROCONTROLLER & INTERFACING LABORATORY	L	T	P	C
TE1019	Total Contact Hours - 30	**0**	**0**	**3**	**2**
	Prerequisite				
	Nil				

PURPOSE

This Lab Course will enable the students to analyze and program Microcontrollers and help them to interface with different Microcontrollers.

INSTRUCTIONAL OBJECTIVES

1.	To understand the basic tool to perform any kind of logical operations and to simulate and manipulate them for different applications.
2.	To Design a Multitasking Microcontroller and to embed different applications into one systems.

LIST OF EXPERIMENTS

1. Arithmetic operation
2. Logical operation
3. Square wave – without timer
4. Square wave – with timer
5. Ascending and descending numbers
6. BCD – ASCII & ASCII – BCD
7. Complement the numbers (1's & 2's)
8. Staircase (number of steps to be mentioned)complement the numbers
9. Digital clock
10. Serial communication (Display the given ASCII characters)

REFERENCES

1. Laboratory Manual, Department of TCE, SRM University.
2. Muhammad Ali Mazidi, Janice GillispieMazidi, Rolin D. McKinlay, "*The 8051 Microcontroller And Embedded Systems Using Assembly and C",* 2nd edition, Pearson Education India, 2007.

TE1019 - RF MICROCONTROLLER & INTERFACING LABORATORY												
Course designed by		**Department of Telecommunication 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									2

3.	Category	General (G)	Basic Sciences (B)	Engineering Sciences and Technical Arts (E)		Professional Subjects (P)	
						X	
4.	Broad Area	Circuit Analysis and Programming		System Design	Communication Engineering		Networking
		X			X		
5.	Approval	23rd meeting of Academic Council, May 2013					

TE1020	**MICROWAVERADIO AND OPTICAL FIBER COMMUNICATIONS LABORATORY**	**L**	**T**	**P**	**C**
	Total Contact Hours - 30	**0**	**0**	**3**	**2**
	Prerequisite				
	Nil				

PURPOSE

This course is to bring to the students the practical knowledge about Microwave & optical communication and to understand how communication is being established at microwave frequencies and using fiber in optical communication.

INSTRUCTIONAL OBJECTIVES

1.	To have a detailed practical study on microwave equipment's.
2.	To study the optical devices and use in the appropriate application.

LIST OF EXPERIMENTS

Microwave experiments

1. Impedance Measurement by Slotted Line method
2. Determination of guide wavelength, frequency measurement
3. Gain and Radiation Pattern of Horns Antenna
4. Study of power distribution in Directional Coupler, E & H Plane Tee
5. Characteristics of Reflex Klystron
6. Design of Micro strip Antenna

Optical Communication experiments

1. Numerical aperture determination for fibers and Attenuation Measurement in Fibers
2. Characteristics of Laser Diode
3. Losses due to Connectors & Splices
4. Fiber optic communication links
5. LED & Photo Diode Characteristics

REFERENCES

1. Laboratory Manual, Department of TCE, SRM University.
2. David M. Pozar "*Microwave Engg.*", - John Wiley & Sons – 3rd Edition, 2009.
3. Gerd Keiser, "*Optical Fiber Communication*", McGraw -Hill International, Singapore, 4th ed., 2008.

TE1020 MICROWAVE RADIO AND OPTICAL FIBER COMMUNICATIONS LABORATORY												
Course designed by		Department of Telecommunication 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						1 , 2			
3.	Category	General (G)	Basic Sciences (B)			Engineering Sciences and Technical Arts (E)						Professional Subjects (P)
						X						X
4.	Broad Area	Circuit Analysis and Programming			System Design		Communication Engineering			Networking		
						X						
5.	Approval	23rd meeting of Academic Council, May 2013										

TE1049	MINOR PROJECT	L	T	P	C
	Total Contact Hours - 30	0	0	2	1
	Prerequisite				
	Nil				

To carry out a design/simulation project in one of the specializations of Telecommunication Engineering with substantial multidisciplinary component

INSTRUCTIONAL OBJECTIVES

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

The students will carry out a project in one of the following Telecommunication Engineering areas but with substantial multidisciplinary component involving, Mechatronics Engg. Electrical Engg., Biotechnology, Embedded, VLSI, Computer Science, Electronics & Instrumentation, etc.

1. Antenna Engineering
2. Modulation, Switching Techniques
3. Tx /Rx Architectures.
4. Wireless Communication Standards

5. Hardware / Software for Telecommunications
6. New Generation Wireless Communications

Student groups will be formed (3/4 in a group) and a faculty member will be allocated to guide them. There will be three reviews. Zero review (previous semester) will not carry any marks but the project topic will be finalized in it. The remaining 3 reviews, one will be carried out during the starting of the semester, another during mid-semester and the last one by the endof the semester.

Assessment:

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

TE1049 MINOR PROJECT												
Course designed by		Department of Telecommunication Engineering										
1.	Student outcome	a	b	c	d	e	f	g	h	i	j	k
		X	X	X	X	X	X	X	X	X	X	X
2.	Mapping of instructional objectives with student outcome	1										
3.	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts (E)					Professional Subjects (P)	
									X			
4.	Broad Area	Antenna Engineering		Modulation, Switching		Tx /Rx Architectures			Hardware/Software for Telecom Engg			
		X		X		X			X			
5.	Approval	23rd meeting of Academic Council, May 2013										

SEMESTER VII

TE1021	**RF CIRCUITS FOR TELECOMMUNICATIONS**	**L**	**T**	**P**	**C**
	Total Contact Hours 45	**3**	**0**	**0**	**3**
	Prerequisite				
	TE1009				

PURPOSE

The course presents RF system design techniques with a focus on integrated electronics and radio frequency circuit design. The course aims to develop the skills required to design and simulate RF circuits for communication systems.

INSTRUCTIONAL OBJECTIVES

1.	Demonstrate a systematic understanding of the challenges relating to RF circuit design and be able to critically evaluate RF implementation techniques
2.	Demonstrate an understanding of Radio frequency devices (Passive and Active)
3.	Apply mathematical .skills to design and simulate RF system building blocks and analyze their performance.
4.	Evaluate and analyze the effect of high frequencies on RF circuits

UNIT I - BASIC CONCEPTS IN RF DESIGN (9 hours)

Units in RF Design, Effects of Non linearity: Harmonic distortion, Gain compression, Intermodulation distortion, Cascaded Nonlinear stages, Device noise, Representation of noise in RF circuits, Sensitivity and dynamic range

UNIT II - RF FILTERS AND RF MATCHING CIRCUITS (9 hours)

RF behavior of passive components, chip components and circuit board considerations. Passive impedance transformation, Basic matching networks, Loss in matching networks, Review of transmission lines, Smith chart, Impedance matching using discrete components-micro strip line matching networks, Basic filter configurations-special filter realization (Butterworth, Chebychev) -filter implementation: Richards transformation and Kuroda Identities.

UNIT III - RF DIODES & TRANSISTORS (9 hours)

RF diodes (IMPATT, PIN, Schottky)- RF field effect transistor-high electron mobility Transistors - diode models-Large signal BJT and FET models-scattering parameter device characterization.

UNIT IV - RF AMPLIFIERS **(9 hours)**

Biasing networks (BJT and FET)- Amplifier classes of operation -characteristics of amplifiers-amplifier power relations-Amplifier stability- broadband, high power, and multistage amplifiers.

UNIT V - RF OSCILLATOR & MIXER **(9 hours)**

Basic oscillator model- Feedback Oscillators- Dielectric Resonance Oscillator – Crystal oscillator -Basic characteristics of mixer- Single ended Mixer operation

TEXT BOOKS

1. Reinhold Ludwig, Gene Bogdanov, "*RF circuit design: Theory and Applications, 2/E* ", Prentice Hall, 2009.
2. Behzad Razavi, *"RF Microelectronics"*, Prentice Hall, 2012.

REFERENCES

1. David.M.Pozar, *"Microwave Engineering",* 4th Edition, John Wiley and Sins, 2012.
2. William F Egan, *"Practical RF system design",* John Wiley and sons, 2003.

TE1021 - RF CIRCUITS FOR TELECOMMUNICATIONS												
Course designed by		**Department of Telecommunication Engineering**										
1.	Student outcome	a	b	c	d	e	f	g	h	i	j	k
		X	X	X								x
2.	Mapping of instructional objectives with student outcome	1 , 2	3 , 4	3								4
3.	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts (E)					Professional Subjects (P)	
						X					X	
4.	Broad Area	Circuit Analysis and Programming		System Design		Communication Engineering					Networking	
		x		x								
5.	Approval	23rd meeting of Academic Council, May 2013										

TE1022	DATA COMMUNICATION NETWORKS	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite				
	NIL				

PURPOSE

To study the basic concepts of Data Communication Networks and their performance. The course is designed around the TCP/IP model.

INSTRUCTIONAL OBJECTIVES

1.	Understand and explain a Data Communications System and its components.
2.	Describe the different transmission media used in a data communications system
3.	Identify the different types of network topologies and protocols.
4.	Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer.

UNIT I – INTRODUCTION (9 hours)

Data communications, networking & the Internet, Data Transmission-transmission techniques, Topologies & Transmission Media, switched networks-circuit &packet switching. Digitization. OSI model, TCP/IP protocol architecture.

UNIT II - DATA LINK LAYER PROTOCOLS (9hours)

Data link layer fundamentals-error detection, error correction. Flow control-Stop&wait, Sliding Window Protocols. Error Control - Go-Back-N ARQ, Selective Reject ARQ .High level Data Link Control (HDLC).

UNIT III - NETWORK LAYER & TRANSPORT LAYER PROTOCOLS (9 hours)

Routing protocols-Distance vector routing, Link state routing, Path vector Routing. Internet protocols-ICMP,IPv4& IPv6.Connection Oriented & Connectionless services-UDP, TCP.

UNIT IV - LAN & MAN PROTOCOLS (9 hours)

LAN protocols - Ethernet, CSMA/CD, Token bus, Token ring, FDDI. MAN Protocols- IEEE 802.6(DQDB), SMDS, Frame Relay &ATM.

UNIT V - USER LAYER PROTOCOLS (9 hours)

Internet Applications, Electronic Mail (SMTP, MIME), &Management, FTP, CMIP, SNMP, HTTP.

TEXT BOOKS

1. Behrouz Frouzan, "*Data Communication Networking*" Tata McGraw Hill 4th ed. ISBN:0-07-296775-7, 2007.
2. William M. Hancock, "*Computer Communication &Networking Technologies*", Thomson Asia Pasific LTD, Singapore, 2002.
3. Peterson &Davie, "*Computer Networks: A Systems Approach",* Mechanical Industry Press4thedition, ISBN:9787111214014, 2007.

REFERENCES

1. William Stallings, "*Data and Computer communications*", 8th edition Prentice Hall, 2006.
2. Mischa Schwartz, "*Telecommunication Networks*"-Werley Publishing Company, Reprint & Digitized in 2007.

TE1022 DATA COMMUNICATION NETWORKS												
Course designed by		**Department of Telecommunication 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.	Category	General (G)		Basic Sciences (B)			Engineering Sciences and Technical Arts (E)				Professional Subjects (P)	
							X				X	
4.	Broad Area	Circuit Analysis and Programming			System Design		Communication Engineering			Networking		
							x					
5.	Approval	23rd meeting of Academic Council, May 2013										

	WIRELESS & CELLULAR TELECOMMUNICATIONS	**L**	**T**	**P**	**C**
TE1023	Total Contact Hours - 45	**3**	**0**	**0**	**3**
	Prerequisite				
	TE1007 & TE1012				

PURPOSE

To provide a comprehensive coverage of different wireless services and adequate knowledge in cellular communication, adequate mastery in solving technical problems. This comprehensive course addresses all major segments of wireless & cellular telecommunications.

INSTRUCTIONAL OBJECTIVE	
1	To understand and acquire knowledge in wireless communication.
2.	To emphasis on knowledge-building to solve problems in wireless communication systems.
3	To provide a complete understanding on concepts, to identify the pros and cons of designing a system as well the emerging Technologies,

UNIT I - INTRODUCTION TO WIRELESS / CELLULAR COMMUNICATIONS AND STANDARDS (7 hours)

History and Evolution of mobile radio systems. Types of mobile wireless services/systems - Paging, Cordless, WLL, Cellular Systems, WLL, Satellite systems. Standards overview: AMPS, GSM, CDMA (IS-95), DECT, 3G – UMTS Network Architecture.

UNIT II - CELLULAR CONCEPT AND SYSTEM DESIGN FUNDAMENTALS (9 hours)

Cellular Concept and Frequency Reuse, Multiple Access Schemes, Channel Assignment, Handoff, Interference and System Capacity- Improving Coverage Capacity in Cellular Systems. Trunking and Erlang Capacity - Calculations.

UNIT III - MOBILE RADIO PROPAGATION (9 hours)

Large Scale Path Loss : Introduction to Radio Propagation, Basic Propagation Mechanism, Propagation models (Free Space Propagation Model, Outdoor Models, Indoor Propagation Models), Small Scale Fading : Small Scale Multipath Fading, Types of Small Scale Fading and Parameters of Mobile Multipath Channels.

UNIT IV - MODULATION AND SIGNAL PROCESSING (11 hours)

Overview of Analog and Digital Modulation Techniques, Equalization – Classification, Algorithms for Adaptive Equalization, Diversity Techniques, Rake Receiver Concepts. Fundamentals of Channel Coding.

UNIT V - INTELLIGENT NETWORK FOR WIRELESS COMMUNICATION (9 hours)

Intelligent Cell Concept, Application for intelligent microcell Systems, In-Building Communication, MIMO, Advanced Intelligent Network(AIN) for Mobile Communication, Mesh Network/ Adhoc Network – Introduction to Cooperative Communication Networks – Body Area Networks – Cognitive RadioNetworks – Wireless Sensor Networks.

TEXT BOOKS

1. Rappaport T.S, "*Wireless Communications; Principles and Practice*", Pearson Education, 2010.
2. William C.Y. Lee, "*Wireless and Cellular Communication",* McGraw Hill, Third edition, 2006.

REFERENCES

1. Kaveh Pahlavan & Allen H. Levesque, "*Wireless Information Networks"*, by John Wiley & Sons, 2005.
2. William Stallings, "*Wireless Communication & Networking*", Pearson Education Asia, 2010.
3. Gordan L. Stuber, "*Principles of Mobile Communication*", Springer, 2011.

TE1023 WIRELESS & CELLULAR TELECOMMUNICATION												
Course designed by		**Department of Telecommunication 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			
3	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts (E)				Professional Subjects (P)		
										X		
4	Broad Area	Circuit Analysis and Programming			System Design		Communication Engineering			Networking		
						x				x		
5	Approval	23rd meeting of Academic Council, May 2013										

TE1024	**WIRELESS COMMUNICATION LABORATORY**	**L**	**T**	**P**	**C**
	Total Contact Hours - 30	**0**	**0**	**3**	**2**
	Prerequisite				
	NIL				

PURPOSE

To provide a comprehensive coverage of different wireless services and adequate knowledge in cellular communication, adequate mastery in solving technical problems. This comprehensive course addresses all major segments of wireless & cellular telecommunication.

INSTRUCTIONAL OBJECTIVES

1.	To solve problems in wireless communication systems.
2.	To identify, formulate and solve problems in MATLAB

LIST OF EXPERIMENTS

Study of wireless Communications using Communication Trainer Kits

1. Baseband Communication
2. Adaptive Linear Equalizer
3. Code Division Multiple Access (Multipath)
4. Global System for Mobile Communication (GSM)(Using WiCOMM-T - Wireless Digital Communication Training System – SDR Platform)
5. Spread Spectrum – DSSS Modulation & Demodulation (Using Emona 101 Tranier Kit)

Wireless Path loss Computations and Signal Processing Computations (Using MATLAB Programming)

1. Free Space Propagation – Path Loss Model
2. Ground Ray Reflection Model – Power Received
3. Outdoor Propagation Models
4. Indoor Propagation Models
5. Adaptive Equalization – ZF, LMS, RLS

REFERENCES

1. LAB MANUAL, Department of TCE, SRM University.
2. WICOMM – T Trainer Kit Manual.
3. Rappaport T.S, "*Wireless Communications; Principles and Practice*", Pearson Education, 2010.
4. Stephen.J.Chapman, *"Programming in MATLAB for Engineers"*, Cengage Learning, 2011.

TE1024WIRELESS COMMUNICATION LABORATORY												
Course designed by		Department of Telecommunication Engineering										
1	Student outcome	a	b	c	d	e	f	g	h	i	j	k
		X	X			X						X
2	Mapping of instructional objectives with student outcome	1	1,2			2						1,2
3	Category	General (G)		Basic Sciences (B)			Engineering Sciences and Technical Arts (E)				Professional Subjects (P)	
											X	
4	Broad Area	Circuit Analysis and Programming			System Design			Communication Engineering			Networking	
							x				x	
5	Approval	23rd meeting of Academic Council, May 2013										

TE1048	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 / office, planning or design where Telecommunications Engineering projects are carried out

INSTRUCTIONAL OBJECTIVES

1. Students have to undergo one/two – week practical training in Telecommunications Engineering related projects at site or office, design / planning 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 Telecommunications Engineering related projects at site or office, design / planning 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.

TE1048 INDUSTRIAL TRAINING II												
Course designed by		Department of Telecommunication Engineering										
1.	Student outcome	a	b	c	d	e	f	g	h	i	j	k
					X	X	X	X	X	X	X	
2.	Mapping of instructional objectives with student outcome				1	1	1	1	1	1	1	
3.	Category	General (G)	Basic Sciences (B)			Engineering Sciences and Technical Arts (E)					Professional Subjects (P)	
											x	
4.	Broad Area	Antenna Engineering			Modulation, Switching Techniques			Tx /Rx Architecture Engineering			Hardware Software for Telecom Engg.	
		--			--			--			--	
5	Approval	23rd meeting of Academic Council, May 2013										

SEMESTER -VIII

TE1050	**MAJOR PROJECT / PRACTICE SCHOOL**	**L**	**T**	**P**	**C**
	Total Contact Hours - 360	**0**	**0**	**24**	**12**
	Prerequisite				
	--				

PURPOSE

To simulate real life situations related to Telecommunication Engineering and impart adequate training so that confidence to face and tackle any problem in the field is developed in the college itself.

INSTRUCTIONAL OBJECTIVES

1.	To guide the students such a way that the they carry out a comprehensive work on the chosen topic which will stand them in good stead as they face real life situations. The project work so chosen by the student shall culminate in gaining of major design experience in the related area of specialization

MAJOR PROJECT

Each project will cover all the aspects (to the extent possible) like investigation, planning, designing, detailing and estimating of a Telecommunication engineering in which the aspects like analysis, application of relevant codes, etc., will find a place. Alternately, a few research problems also may be identified for investigation and the use of laboratory facilities to the fullest extent may be taken as a project work. The project shall be driven by realistic constraints like that related to economic, environmental, social, political, ethical, health & safety, manufacturability and sustainability. The outcomes to be attained by students by doing the project work shall be spelt out clearly. A project report is to be submitted on the topic which will be evaluated during the final review. Assessment will be as per the regulations of SRM University.

PRACTICE SCHOOL

Alternately, a student is encouraged to take an industrial project with Telecommunication Engineering organizations or firms chosen by the institute. In such cases the student will stay with the firm and carry out the project. The project will be guided by the faculty member and the concerned officer in the industry. All the requirements spelt out under 'MAJOR PROJECT' above, shall be incorporated under this work also. However reviews will be conducted in the institute which the student shall attend.

TE1050 MAJOR PROJECT												
Course designed by		**Department of Telecommunication 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	
2	Mapping of instructional objectives with student outcome	1										
3	Category	General (G)		Basic Sciences (B)			Engineering Sciences and Technical Arts (E)			Professional Subjects (P)		
										x		
4	Broad Area	Antenna Engineering		Modulation Switching Techniques			Tx /Rx Architecture Engineering			Hardware Software for Telecom Engg.		
		X		X			X			X		
5	Approval	23rd meeting of Academic Council, May 2013										

DEPARTMENT ELECTIVES

TE1101	**INFORMATION THEORY AND CODING**	**L**	**T**	**P**	**C**
	Total Contact Hours - 45	**3**	**0**	**0**	**3**
	Prerequisite				
	MA1024				

PURPOSE

This course introduce the notion of entropy and information, discuss the fundamental limits of data compression source coding) and transmission systems (channel coding).The course aims to propose, design and analyze suitable coding/decoding scheme for a particular digital communication application.

INSTRUCTIONAL OBJECTIVES

1.	Evaluate and analyze the mathematics of Information Theory and its physical meaning
2.	Understand various channel coding techniques
3.	Can apply the knowledge to real problems in communication applications
4.	Ability to design the projects in error correction techniques
5.	Ability to code for error control and correction methods.

UNIT I - INFORMATION THEORY (10 hours)

Information – Entropy, Information rate, classification of codes, Kraft McMillan inequality, Source coding theorem, Shannon-Fano coding, Huffman coding, Extended Huffman coding - Joint and conditional entropies, Mutual information - Discrete memoryless channels – BSC, BEC – Channel capacity, Shannon limit.

UNIT II - SOURCE CODING: TEXT, AUDIO AND SPEECH (9 hours)

Text: Adaptive Huffman Coding, Arithmetic Coding, LZW algorithm – Audio: Perceptual coding, Masking techniques, Psychoacoustic model, MEG Audio layers I,II,III, Dolby AC3 - Speech: Channel Vocoder, Linear Predictive Coding

UNIT III - CHANNEL AND NOISY CODING (10 hours)

Discrete memoryless channel - Classification of channels & channel capacity - Calculation of channel capacity - Decoding schemes - Fano's inequality - Shannon's fundamental theorem - Capacity of a band limited Gaussian channel. Implication of the information capacity theorem - Information capacity of coloured noise channel - Rate distortion theory - Data compression

UNIT IV - ERROR CONTROL CODING: BLOCK CODES (10 hours)

Definitions and Principles: Hamming weight, Hamming distance, Minimum distance decoding - Single parity codes, Hamming codes, Repetition codes - Linear block codes, Cyclic codes - Syndrome calculation, Encoder and decoder - CRC

UNIT V - ERROR CONTROL CODING: CONVOLUTIONAL CODES (9 hours)

Convolutional codes – code tree, trellis, state diagram - Encoding – Decoding: Maximum likelihood decoding of convolutional codes , Sequential search and Viterbi algorithm – Principle of Turbo coding

TEXT BOOKS

1. Simon Haykin, "*Communication Systems*", John Wiley & Sons, 2008.
2. R Bose, "*Information Theory, Coding and Crptography"*, TMH 2007.
3. K Sayood, *"Introduction to Data Compression" 3/e,* Elsevier 2006.

REFERENCES

1. Fred Halsall*, "Multidedia Communications: Applications, Networks, Protocols and* Standards", Perason Education Asia, 2002.
2. S Gravano, *"Introduction to Error Control Codes",* Oxford University Press 2007.

TE1101 INFORMATION THEORY AND CODING												
Course designed by		**Department of Telecommunication 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 , 2				3,4,5						
3.	Category	General (G)		Basic Sciences (B)			Engineering Sciences and Technical Arts (E)			Professional Subjects (P)		
										X		
4.	Broad Area	Circuit Analysis and Programming			System Design		Communication Engineering			Networking		
							x			x		
5.	Approval	23rd meeting of Academic Council, May 2013										

TE1102	NETWORK ANALYSIS AND SYNTHESIS	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite				
	EC1003				

PURPOSE

The purpose of this course is to enable students to have a firm grasp on the basic principles of analyzing and synthesizing Networks. It lays emphasis on the basic techniques of network analysis which helps students to design practical circuits.

INSTRUCTIONAL OBJECTIVES

1.	Ability to analyse networks in S Domain
2.	Ability to analyse Computer Aided Networks
3.	Ability to design active and passive filters

UNIT I - ANALYSIS OF NETWORKS IN 'S' DOMAIN (9 hours)

Network elements, Transient and sinusoidal steady state analysis, Network analysis using Laplace transformation, Network functions, Two port networks: Parameters and transfer function, Interconnection of two ports. T and π representation, terminated two port networks, lattice networks.

UNIT II - METHODS FOR COMPUTER AIDED NETWORK ANALYSIS (9 hours)

State variable method, Analytic and numerical solutions, Graph theoretic analysis for large scale networks, Formulation and solution of network graph of simple networks, State space representation, DC & AC Analysis and control statements, using PSPICE.

UNIT III - ELEMENTS OF NETWORK SYNTHESIS (9 hours)

Network reliability, Hurwitz Polynomials, Positive real functions, Synthesis of RC, RL & LC networks, Foster and Cauer forms of realization, Transmission zeroes, Synthesis of transfer functions.

UNIT IV - PASSIVE FILTER DESIGN (9 hours)

Butter worth and Chebyshev approximations, Normalized specifications, Frequency transformations, Frequency and impedance demoralization, Types of frequency selective filters, Linear phase filters.

UNIT V - ACTIVE FILTER DESIGN (9 hours)

Controlled sources, Op-amp as a controlled source, Sallen and key structure, Single amplifier LP, HP, BP & BR filters, Principle of design, Sensitivity.

TEXT BOOKS

1. Leonard, *"Circuit Analysis - with computer applications to problemsolving*", Delmar 2005.ISBN: 9780766806221.
2. Louis Weinberg," *Network Analysis and Synthesis* ", McGraw Hill Book Company Inc., 1962. Reprint Digitized 2007 ISBN: 9780882753218.

REFERENCES

1. Aartre K, "*Network Theory and Filter Design",* Wiley-Eastern Ltd., Second Edition, Reprint 2003.
2. Franklin F. Kuo, "*Network Analysis and Synthesis"*, John Wiley Second Edition, Reprint 2009.
3. Vanvalkenburg, "*Network Analysis"*, Pearson Education, 2006, ISBN:9788131701584.

TE1102 NETWORK ANALYSIS AND SYNTHESIS												
Course designed by		Department of Telecommunication 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 , 2				3						
3.	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts (E)					Professional Subjects (P)	
											X	
4.	Broad Area	Circuit Analysis and Programming				System Design		Communication Engineering			Networking	
		x										
5.	Approval	23rd meeting of Academic Council, May 2013										

TE1103	DIGITAL DESIGN AND MODELLING USING VHDL	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite				
	TE1001				

Purpose

The purpose of this course is to enable students develop programs using VHDL to model Digital Systems. Also students are exposed to behavioral, structural style of modeling and methodology for simulating VHDL models.

1.	Enable students to model a digital System
2.	Ability of the student to write VHDL model independently

UNIT I – INTRODUCTION **(9 hours)**

Introduction to Computer-aided design tools for digital systems. Hardware description languages ; introduction to VHDL data objects, classes and data types, Operators, Overloading, logical operators. Types of delays Entity and Architecture declaration.

UNIT II - VHDL STATEMENTS **(9 hours)**

Assignment statements, sequential statements and process, conditional statements, case statement Array and loops, resolution functions, Packages and Libraries, concurrent statements. Subprograms: Application of Functions and Procedures, Structural Modelling, component declaration, structural layout and generics.

UNIT III – MODELLING **(9 hours)**

Behavioral modeling – process statement, multiple processes, Dataflow modeling and structural modeling.

UNIT IV - COMBINATIONAL & SEQUENTIAL CIRCUIT DESIGN **(9 hours)**

VHDL Models and Simulation of combinational circuits such as Multiplexers, Demultiplexers, encoders, decoders , code converters, comparators, implementation of Boolean functions etc. VHDL Models and Simulation of Sequential Circuits Shift Registers, Counters etc.

UNIT V - DESIGN OF MICROCOMPUTER & PROGRAMMABLE DEVICE (9 hours)

Basic components of a computer, specifications, architecture of a simple microcomputer system, implementation of a simple microcomputer system using VHDL Programmable logic devices : ROM, PLAs, PALs, GAL, PEEL, CPLDs and FPGA. Design implementation using CPLDs and FPGAs

TEXT BOOKS

1. Brown and Vranesic, *"Fundamentals of Digital Logic with VHDL Design"*, ISBN – 9780077221430, McGraw Hill, 3rdEdition 2008.
2. Navabi, *"Vhdl Modular Design"*, ISBN– 9780070223516, McGraw Hill 2008.

REFERENCES

1. Ercegovac, Lang & Moreno; John Wiley, *"Introduction to Digital Systems"*, ISBN - 9780471527992, Digitized 2009.
2. KC Chang, *"Digital Design and Modelling with VHDL and Synthesis – An Integrated Approach",* IEEE Computer Society Press, ISBN – 9789812531612, 2005.

3. Jayaram Bhasker; *"A VHDL Primer"*, Prentice Hall 1999.

TE1103 DIGITAL DESIGN AND MODELLING USING VHDL												
Course designed by		**Department of Telecommunication 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 , 2				1 , 2						
3.	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts (E)				Professional Subjects (P)		
										X		
4.	Broad Area	Circuit Analysis and Programming		System Design		Communication Engineering				Networking		
				x								
5.	Approval	23rd meeting of Academic Council, May 2013										

TE1104	SPREAD SPECTRUM & MULTI CARRIER TECHNIQUES	L	T	P	C
	Total Contact Hours - 45	**3**	**0**	**0**	**3**
	Prerequisite				
	TE1012				

PURPOSE

To provide a comprehensive coverage of spread spectrum, multi-carrier techniques and multiple antenna systems.

INSTRUCTIONAL OBJECTIVES

1.	To understand and gain complete knowledge about different types of Spread Spectrum and their Commercial Applications.
2.	To learn about multicarrier Techniques-Orthogonal Frequency Division Multiplexing and Multiple antenna systems.

UNIT I - INTRODUCTION TO SPREAD SPECTRUM SYSTEMS (9 hours)

Application and Advantage of Spread Spectrum - Pseudo noise sequence, Pulse - Noise Jamming, Low Probability of Detection, Classifications : Direct Sequence SS, Frequency hopped SS, Hybrid SS. Fast Hopping Versus Slow Hopping, time Hopping SS systems.

UNIT - II SPREAD SPECTRUM TECHNIQUE ANALYSIS (9 hours)

Synchronization of SS systems - Acquisition, Tracking. Jamming Consideration - Broadband, Partial band, multiple tone, Pulse-repeat band, jamming blade systems.

UNIT III - APPLICATIONS OF SPREAD SPECTRUM (9 hours)

Commercial applications - CDMA, Multipath channels, The FCC Part 15 rules - Direct sequence CDMA, IS-95 CDMA Digital cellular systems. Spread Spectrum applications in cellular, PCS and mobile communication.

UNIT IV - MULTI CARRIER TECHNIQUES (9 hours)

Introduction to Multi Carrier Modulation- Advantages, and Limitations of MCM, Single carrier versus multi carrier modulation. OFDM - Introduction, OFDM principles , Structure of OFDM symbol, Sub-carrier symbol structure, Generation of OFDM symbols using the IFFT / FFT, OFDM Modulation and Demodulation, Cyclic prefix (guard interval), Bit and Power Allocation in OFDM, OFDM dynamic range considerations, Peak to-average power ratio (PAPR).

UNIT V- MULTIPLE ANTENNA SYSTEMS (9 hours)

Channel models for Multiple Antenna Systems - Signal transmission through a Slow Fading Frequency - Non selective MIMO channel and Slow Fading Frequency Selective MIMO Channel. Capacity of MIMO channel .Spread Spectrum Signals and Multicode Transmission - Orthogonal Spreading Sequences, Multiple Gain Versus Diversity Gain, Multicode MIMO Systems (Concept only).

TEXT BOOK

1. John G. Proakis, MasoudSalehi, *"Digital Communications"*, McGraw Hill International Edition, 5th edition, 2008.

REFERENCES

1. Bernard Sklar, *"Digital Communication - Fundamental and Application"*, Pearson Education, 2001.
2. Richard Van Nee and Ranjee Prasad, "*OFDM for Wireless Multimedia Communication"*, Artech House, 2000.

TE1104 SPREAD SPECTRUM & MULTI CARRIER TECHNIQUES												
Course designed by		Department of Telecommunication 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		1 , 2								
3.	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts (E)				Professional Subjects (P)		
										X		
4.	Broad Area	Circuit Analysis and Programming		System Design		Communication Engineering				Networking		
						x						
5.	Approval	23rd meeting of Academic Council, May 2013										

TE1105	SATELLITE COMMUNICATIONS	L	T	P	C
	otal Contact Hours – 45	3	0	0	3
	Prerequisite				
	TE1011				

PURPOSE

The course will cover all aspects of satellite communication like orbital mechanics, launching techniques, satellite link design, earth station technology and different access systems towards a satellite. It will explain the terms necessary for calculating basic parameters in a satellite communication system.

INSTRUCTIONAL OBJECTIVES

1	To explain the essential elements of satellite communications systems and services.
2	To describe the characteristics, strength, and weaknesses of various satellite orbits.
3	To provide the configuration of a typical earth& space segment
4	To compare various multiple access techniques.

UNIT I - OVERVIEW OF SATELLITE SYSTEMS & ORBITS (9 hours)

Introduction - Frequency allocations and bandwidth - Kepler's laws - LEO - MEO - Geostationary orbit - Geo synchronous orbit - Definitions of terms for Earth-Orbiting satellites -Orbital elementals - Apogee and perigee Heights - Orbital perturbations - Inclined Orbits - Antenna look angles – The Polar Mount Antenna - Limits of visibility - Sun Transit Outage- Launching Orbits & Methods.

UNIT II - SPACE AND EARTH SEGMENT (9 hours)

Power Supply - Attitude Control - Station Keeping - Thermal Control - TT&C subsystem -Transponders – Antenna Subsystem Receive-Only Home TV Systems - Master Antenna TV System - Community Antenna TV System - Transmit-Receive Earth Stations

UNIT III - SPACE LINK (9 hours)

EIRP - Transmission losses - Link Power Budget Equation - System noise - Antenna Noise -Amplifier Noise Temperature - Overall system noise temperature - Carrier-to-Noise Ratio - Uplink - Saturation flux density - Input back off - Earth station HPA - Downlink - Output back-off - Satellite TWTA output - Effects of Rain - Combined uplink and downlink C/N ratio- Intermodulation noise - Inter-Satellite Links.

UNIT IV - SATELLITE ACCESS (9 hours)

Single Access – Preassigned FDMA – Demand-Assigned FDMA - SPADE system - FDMA downlink analysis - TDMA: Reference Burst, Preamble and Postamble, Carrier recovery - Network Synchronization - Unique Word Detection - Traffic data - Frame efficiency and channel capacity, Pre assigned TDMA - Demand-assigned TDMA - On-Board Signal Processing for FDMA/TDMA Operation- Satellite-Switched TDMA - Code Division Multiple Access.

UNIT V - SATELLITE SERVICES (9 hours)

DBS Television - Introduction - Orbital spacing - Transponder Capacity - MPEG Compression Standards - Forward Error Correction - Home receiver out door unit (ODU) - Home receiver indoor unit (IDU) - High Definition Television (HDTV) - Satellite Mobile Services - VSAT - Radarsat - GPS - Orbcomm - Iridium

TEXT BOOK

1. Dennis Roddy, *"Satellite Communications"*, McGraw Hill International, 4th Edition, 2009.

REFERENCES

1. Wilbur L. Pritchard, Hendri G. Suyderhoud,Robert A. Nelsonb "*Satellite Communication Systems Engineering*", Prentice Hall/Pearson, 2007.
2. Timothy Pratt, Charles Bostian& Jeremy Allmuti, *"Satellite Communications"*, John Wily & Sons (Asia) Pvt. Ltd. 2004.

TE1105 - SATELLITE COMMUNICATIONS												
Course designed by		Department of Telecommunication Engineering										
1.	Student outcome	a	b	c	d	e	f	g	h	i	j	k
		X				X		X				X
2.	Mapping of instructional objectives with student outcome	1				2		3				4
3.	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts (E)					Professional Subjects (P)	
											X	
4.	Broad Area	Circuit Analysis and Programming			System Design		Communication Engineering				Networking	
							x					
5.	Approval	23rd meeting of Academic Council, May 2013										

TE1106	RADAR SYSTEMS AND RADIO AIDS TO NAVIGATION	L	T	P	C
	Total contact hours – 45	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

The purpose of this course is to understand radar technologies, its design, operation, applications and navigational aids. To help students who have interest in electronics, electromagnetics, RF and signal processing to apply the concepts for a design and development of a radar.

INSTRUCTIONAL OBJECTIVES

1.	Various Radar Technologies, design and navigational aids.
2.	Applications of Radar and Navigational aids

UNIT I - RADAR EQUATIONS (9 hours)

RADAR Block Diagram & operation- RADAR Frequencies- RADAR Equation- Detection of signals in Noise- RADAR cross section of targets- RADAR cross section fluctuations- transmitter power- pulse repetition frequency- system losses and propagation effects.

UNIT II - MTI AND PULSE DOPPLER RADAR (9 hours)

Introduction to Doppler & MTI RADAR- Delay Line canceller- Moving Target Detector- Pulse Doppler RADAR- Non-Coherent MTE- CW RADAR- FMCW

RADAR- Tracking RADAR- Monopulse Tracking - Conical Scan and Sequential Lobing.

UNIT III - RADAR SIGNAL DETECTION AND PROPAGATION ON WAVES(9 hours)

Detection criteria- automatic detection- constant false alarm rate receiver- information available from a RADAR- ambiguity diagram- pulse compression- introduction to clutter- surface clutter RADAR equation- anomalous propagation and diffraction. Representation - minimization of Boolean expressions using algebraic, k-map and tabulation methods.

UNIT IV - RADIO NAVIGATION (9 hours)

Adcock directional finder- automatic directional finder- hyperbolic Systems of Navigation- Loren and Decca Navigation System- Tactical Air Navigation.

UNIT V - RADAR TRANSMITTER AND RECEIVER (9 hours)

Linear beam power tubes- Solid state RF power sources- solid state devices used in RADAR- Magnetron crossed field amplifiers- other aspects of radar transmitter- RADAR Receiver- Receiver noise figure- super heterodyne receiver- dynamic range- RADAR Displays.

TEXT BOOKS

1. Skolnik M.I, "*Introduction to RADAR systems"*, 3rd edition, McGraw Hill, 2003.
2. Jim Scheer, Mark A. Richards, James A. Scheer, William A. Holm, *"Principles of Modern Radar: Basic Principle",* SciTech Publishing, Incorporated, 2010, ISBN – 9781891121524.

REFERENCES

1. Harold Roy Raemer, "*Radar Systems Principles*", CRC Press Inc, 1997.
2. Nagaraja N.S, "*Elements of Electronic Navigation"*, Tata McGraw Hill, 1993, Reprint - 2006.

TE1106 RADAR SYSTEMS AND RADIO AIDS TO NAVIGATION												
Course designed by		Department of Telecommunication 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	1	2								2
3.	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts (E)					Professional Subjects (P)	
											X	
4.	Broad Area	Circuit Analysis and Programming			System Design		Communication Engineering				Networking	
					x		x					
5.	Approval	23rd meeting of Academic Council, May 2013										

TE1107	MULTIMEDIA SIGNAL PROCESSING	L	T	P	C
	Total Contact Hours 45	3	0	0	3
	Prerequisite				
	EC1017				

PURPOSE

The purpose of this course is to introduce to students to the emerging areas of multimedia communications. This will enable the students to acquire a solid understanding of different components involved in the multimedia compression techniques and different ways of distributing the multimedia data.

INSTRUCTIONAL OBJECTIVES

1.	Students can develop and implement simple algorithms for speech/audio coding
2.	Students should be able to decide upon appropriate hardware resources to choose for implementing digital audio and video applications
3.	To design and implement an applications and solve problems
4.	Able to analyze the principles and techniques in processing of digital audio and video

UNIT I - MULTIMEDIA COMMUNICATIONS (9 hours)

Introduction, Multimedia Information Representation-digitization principles, Text, Images, audio, Video, Multimedia networks, Multimedia applications, Application and Networking Technology, Gateways-PSTN, VoIP, IPTel.

UNIT II - TEXT COMPRESSION **(9 hours)**

Introduction, Compression Principles, source Encoders and Destination decoders, Lossless and lossy Compression, Entropy Encoding and Source Encoding, Text Compression- Static and Dynamic Huffman Coding, Arithmetic Coding, Lempel-Ziv Coding, Lempel-Ziv-Welsh Coding

UNIT III - IMAGE COMPRESSION **(9 hours)**

Introduction, Image Compression- Graphics Interchange Format, Tagged Image File Format, Digitized Documents, Digitized Pictures, JPEG. JBIG, Various types of Animations

UNIT IV - AUDIO COMPRESSION **(9 hours)**

Introduction, Audio Compression- PCM, DPCM, ADPCM, Linear Predictive Coding, Code Excited LPC, Perceptual Coding, MPEG audio Coders, Dolby Audio Coders, MIDI, Audio Synthesizers.

UNIT V - VIDEO COMPRESSION **(9 hours)**

Video Compression Principles- H.261, H.263, MPEG model-MPEG VideoMPEG-1, MPEG-2, Temporal Prediction, Frequency Domain decomposition, Quantization, Variable length Coding, MPEG-4, MPEG-7.

TEXT BOOKS

1. Saeedv vaseghi, *"Multimedia signal processing theory and application in speech, music and Communications"*, John Wiley & Sons , 2007.
2. Jerry D Gibson, *"Digital compression for multimedia principles and standards",* Elsevier, Morgan Kaufmann Publishers, 2006.

REFERENCES

1. Fred Halsall, *"Multimedia Communications, Applications, Networks, Protocols and Standards",* Pearson Education, 2004.
2. Ralf Steinmetz and Klara Nahrstedt, *"Multimedia Computing, Communication and Applications",* Pearson Education, 2004.
3. Jerry D Gibson, *"Multimedia Communications, Directions and Innovations",* Academic press, 2001.
4. Sayood K, *"Introduction to Data Compression"* 3/e, Elsevier 2006.

TE1107 MULTIMEDIA SIGNAL PROCESSING												
Course designed by		Department of Telecommunication 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		1,2					1				
3.	Category	General (G)		Basic Sciences (B)			Engineering Sciences and Technical Arts (E)				Professional Subjects (P)	
											X	
4.	Broad Area	Circuit Analysis and Programming		System Design			Communication Engineering				Networking	
							x					
5.	Approval	23rd meeting of Academic Council, May 2013										

TE1108	COMMUNICATION SYSTEMS AND SIMULATION	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite				
	TE1012				

PURPOSE

This course is intended to provide a comprehensive coverage on Simulation Concept, Random numbers and random variables generation, modeling of channel, noise, fading and receiver and performance evaluation in terms of probability of error and bit error rate.

INSTRUCTIONAL OBJECTIVE

1.	To generate and test the properties of random variables and random processes
2.	To understand Channel, filter and noise models of Communication systems
3.	To anayze a receiver based on estimation of various parameters like SNR, BER etc.,
4.	To Analyze cellular radio system as case studies through simulation.

UNIT I - INTRODUCTION TO SIMULATION (9 hours)

Concept of Simulation and Modeling, Roles of Simulation, Types of Simulation, Limits of Simulation, Mapping a problem into a simulation Model, Real-time Simulation, Efficient Simulation Techniques.

UNIT II - SIMULATION OF RANDOM VARIABLES AND RANDOM PROCESS (9 hours)

Generation of random numbers and sequence, Gaussian and uniform random numbers Correlated random sequences, Testing of random numbers generators Random process models-Markov and ARMA Sequences

UNIT III - MODELING OF COMMUNICATION SYSTEMS (9 hours)

Modeling of Individual Communication block - Channel Model - Filter Model - Noise and Fading Model - Receiver Model.

UNIT IV - ESTIMATION OF PERFORMANCE MEASURE (9 hours)

Quality of an estimator, estimation of SNR, Probability density functions of analog communication system, BER of digital communication systems, Monte Carlo method and Importance sampling method, estimation of power spectral density of a process.

UNIT V - SIMULATION OF CELLULAR RADIO SYSTEM (9 hours)

System level Description Modeling a Cellular Communication System - Simulation Methodology - Processing the Simulation Results.

TEXT BOOK

1. Jeruchim M.C, Philip Balboan and Sam Shanmugam K, "*Simulation of Communication System, modeling methodology and techniques"*, Plenum Press, New York, 2009.

REFERENCES

1. Law M, and Davide Kelton W, "*Simulation Modeling and Analysis"*, McGraw Hill Inc., New York, 2010.
2. William H. Tranter, K. Sam Shanmugam, Theodore S. Rappaport, Kurt L. Kosbar , "*Principles of Communication System Simulation with Wireless Application"*, Pearson Education Private Limited, 2010.

TE1108COMMUNICATION SYSTEMS AND SIMULATION												
Course designed by		Department of Telecommunication Engineering										
1.	Student outcome	a	b	c	d	e	f	g	h	i	j	k
				x								
2.	Mapping of instructional objectives with student outcome			1								
3.	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts (E)					Professional Subjects (P)	
											x	
4.	Broad Area	Circuit Analysis and Programming			System Design		Communication Engineering				Networking	
							x					
5.	Approval	23rd meeting of Academic Council, May 2013										

TE1109	BROADBAND COMMUNICATIONS	L	T	P	C
	Total contact hours - 45	3	0	0	3
	Prerequisite				
	TE1012				

PURPOSE

This course is intended to gain complete knowledge about Basics of ISDN and B-ISDN together with key networking technologies of frame relay. To gain the knowledge about the concept of ATM Switching and transmission. To understand the concept SONET and its operations. To understand the Design of broadband networks. To have knowledge on broad band technologies.

INSTRUCTIONALOBJECTIVES

1.	Discuss and analyze the latest technologies in broadband communications including wireless components
2.	Analyze different techniques and technologies required for the development of broadband communications.
3.	Discuss the recent development of fiber-optic communication and next generation Internet protocols in current and emerging broadband communications.
4.	Identify and evaluate challenges and opportunities concerning the applications of the latest broadband communications technologies.

UNIT I - INTRODUCTION AND OVERVIEW (9 hours)

X.25, Frame relay, Integration of Transmission and Switching, Analog and Digital switching, Principles of ISDN, Architecture, ISDN standards, ISDN interface and

Functions, ISDN protocol architecture, ISDN connections, Addressing, Interworking.

UNIT II - B-ISDN SERVICES AND PROTOCOL (9 hours)

B-ISDN protocols -User plane, management plane, control plane, signaling plane, Other aspects of B-ISDN: Broadcast service aspects, Network aspects and user network interface aspects, SONET- An overview.

UNIT III - ATM TRANSMISSION AND SWITCHING (9 hours)

Overview, Virtual channels, Virtual paths, VP & VC switching, ATM cells, Header format, Generic flow control, Header error control, Transmission of ATM cells, Adaptation layer, AAL services and protocols. ATM switching building blocks, Input, Output buffering, Central buffering, Performance aspects of buffering switching networks.

UNIT IV - BROAD BAND NETWORK DESIGN (9 hours)

Broad band Access network: Design-Requirements, and topology, Backbone network: design-requirement and topologies

UNIT V - WIRELESS BROADBAND (9 hours)

Introduction to Broadband Wireless, Evolution of Broadband Wireless; Fixed & Mobile Broadband Wireless; WiMAX and Other Broadband Wireless Technologies: overview.

TEXT BOOKS

1. William Stallings, *"ISDN and Broadband ISDN with Frame and ATM"*, Pearson 4th edition, 2009.
2. Robert C Newman *"Broadband Communications"*, Prentice Hall, 2002, ISBN 0-13-089321-8.

REFERENCES

1. Jeffrey G. Andrews, Arunabha Ghosh & Rias Muhamed, "*Fundamentals of WiMAX: Understanding Broadband Wireless Networking",* Prentice Hall, 2007.
2. John R Vacca, *"Wireless Broadband Networks Handbook"*, Tata McGrawHill, 2001.

TE1109 BROADBAND COMMUNICATIONS												
Course designed by		**Department of Telecommunication 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			3						
3.	Category	General (G)	Basic Sciences(B)			Engineering Sciences and Technical Arts (E)					Professional Subjects (P)	
											x	
4.	Broad Area	Circuit Analysis and Programming			System Design		Communication Engineering				Networking	
						x						
5.	Approval	23rd meeting of Academic Council, May 2013										

TE1110	MOBILE AND PERVASIVE COMPUTING	L	T	P	C
	Total contact hours - 45	3	0	0	3
	Prerequisite				
	NIL				

PURPOSE

Discover the basic problems, performance requirements of pervasive computing applications, and the trends of pervasive computing and its impacts on future computing applications and society; analyze the strengths and limitations of the tools and devices for development of pervasive computing systems

INSTRUCTIONALOBJECTIVES

1.	Understand the basic technology used in modern mobile and pervasive applications, and to gain knowledge on the programming model.
2.	Perform basic analysis to determine the value of integrating mobile and routing technology into an existing business process.

UNIT I - MOBILE AND WIRELESS NETWORKS (9 hours)

wireless cellular network - GSM - GPRS - WLAN & WPAN - HIPERLAN- Bluetooth - WiFi – WiMAX

UNIT II - LAYERS AND ROUTING (9 hours)

Mobile IP - DHCP - Adhoc - Proactive and reactive - Multicast routing - Mobile TCP - WAP architect - WDP - WTLS - WTP - WSP - WAE – WTA architecture.

UNIT III - MOBILE ADAPTIVE COMPUTING (9 hours)

Mobile computing definition - adaptability - mechanism of adaptation - mobility management - location identification techniques – case studies - mobile data caching - mobile web caching.

UNIT IV - PERVASIVE COMPUTING (9 hours)

context ware computing - application - mobile middleware - introduction - adaptation -mobile agent services - challenges - protocols - approaches and solutions - routing - fault Tolerance and reliability energy efficiency - wireless security - attacks.

UNIT V - PROGRAMMING MODELS (9 hours)

Pervasive Web application architecture - access from PC and PDA's - wireless standard software - WML - WML scripts – Exercise Programs

TEXT BOOKS

1. Jochen Burkhardt, "*Pervasive Computing: Technology and Architecture of Mobile Internet Applications*", Addison-Wesley Professional; 3rd edition, 2007.
2. Frank Adelstein, Sandeep KS Gupta, Golden Richard, *"Fundamentals of Mobile and Pervasive Computing",* McGraw-Hill 2005.

REFERENCES

1. Jochen Schiller, *"Mobile Communications",* PHI, Second Edition, 2003.
2. Debashis Saha, *"Networking Infrastructure for Pervasive Computing: Enabling Technologies",* Kluwer Academic Publisher, Springer; First edition, 2002.
3. Agrawal and Zeng, Brooks / Cole, *"Introduction to Wireless and Mobile Systems"*, Thomson Learning, First edition, 2002.

<table>
<tr><td colspan="14">TE1110 MOBILE AND PERVASIVE COMPUTING</td></tr>
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TE1111	NANOTECHNOLOGY FOR TELECOMMUNICATIONS	L	T	P	C
	Total Contact Hours – 45	3	0	0	3
	Prerequisite				

PURPOSE

The course will cover all aspects of Nanotechnology for Telecommunications like Nanotubes, Power Control Applications, Nanophotonics, RF MEMS and NEMS and Industrial Perspectives. It will also explain the concepts of Nanotechnology for Fiber optic communications.

INSTRUCTIONAL OBJECTIVES

1.	To explain the essential elements of Nanotechnology.
2.	To describe the characteristics, strength, and weaknesses of Nanotubes and applications.
3.	To provide the configuration of a Nanophotonics.
4.	To compare MEMS and NEMS.
5.	To introduce the commercialization opportunities and issues

UNIT I - INTRODUCTION (9 hours)

Nanotechnology - Nanotechnology Evolution - How Did the Field of Nanotechnology Evolve - Characteristics of Bulk and Nano-Sized Materials - Applications of Nanotechnology - Nanotechnology and Education and Workforce of the Future - Social Implications of Nanotechnology - Dimensions: A Snapshot - Global Standards - Impact and Promise of Nanotechnology for Telecommunications - Transparent Transaction: A Scenario - Ongoing Research and Nanotechnology: Some Samples - The Promise and Future of Nanotechnology - Concerns about Nanotechnology - Preparing Students for Nanotechnology.

UNIT II - NANOTUBES AND THEIR APPLICATIONS IN TELECOMMUNICATIONS (9 hours)

Fabrication Methods of Nanotubes - Chemical Vapor Deposition - Arc Discharge - High Pressure Carbon Monoxide Conversion - Laser Ablation or Vaporization - Characteristics of Carbon Nanotubes - Characterization of Carbon Nanotubes Using Raman Microspectroscopy - Standard Test Methods for Measurement of Electrical - Properties of Carbon Nanotubes - Schrödinger–Hamiltonian Dynamical of Particles Motion along Nanotubes - Carbon Nanotubes in Telecommunications - Resistivity of Nanotubes - Carbon Nanotubes as Neural Communicators - Nanotubes as Microwave Diodes in Spacecrafts and Satellites - Carbon

Nanotubes in Fiber-Optics Telecommunications - Carbon Nanotubes for Wireless Communications and Radio Transmission.

UNIT III - NANOTECHNOLOGY IN FIBER-OPTIC TELECOMMUNICATIONS& NANOPHOTONICS (9 hours)

Background - Nanostructures and Their Interaction with Light - Single Nanoparticle – Nanostructure - Nanostructure Construction - Nanostructures as Optical Power-Control Devices -
Optical Fuses - Optical Limiters – Standardization - Chip-to-Chip Communication - Intra-Chip Communication.

UNIT IV - PROCESSING OF MEMS & NEMS AND MEMS BASED WIRELESS COMMUNICATIONS (9 hours)

Scaling - Materials - Design and Modeling of MEMS - Applications of MEMS - Processing of MEMS and NEMS - Fabrication of NEMS Structures - Reliability of MEMS and NEMS Structures - RF MEMS - MEMS-Based Inductors - MEMS Variable Capacitor - RF MEMS Switch - Problems and Solutions - Packaging of RF MEMS - Fabrication of RF MEMS

UNIT V - COMMERCIALIZATION OF NANOTECHNOLOGY: OPPORTUNITIES AND ISSUES (9 hours)

Main Focus - University-Based Research and Development Activities - Overview of Nanotechnology-Based Commercial Products - Path to Nanotechnology Commercialization - Barriers to Nanotechnology Commercialization - Key Success Factors for Nanotechnology Commercialization.

TEXT BOOK

1. Sohail Anwar, Yasin Akhtar Raja M, Salahuddin Qazi, Mohammad Ilyas, "*Nanotechnology for Telecommunications"*, CRC Press, Taylor & Francis Group, 2010.

REFERENCES

1. Daniel Minoli, Nanotechnology Applications to Telecommunications and Networking, Wiley 2005.

TE1111 NANOTECHNOLOGY FOR TELECOMMUNICATIONS												
Course designed by		**Department of Telecommunication 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 , 5
3.	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts (E)				Professional Subjects (P)		
												x
4.	Broad Area	Circuit Analysis and Programming		System Design		Communication Engineering				Networking		
				X								
5.	Approval	23rd meeting of Academic Council, May 2013										

TE1112	ULTRA WIDE BAND TECHNOLOGIES	L	T	P	C
	Total Contact Hours 45	**3**	**0**	**0**	**3**
	Prerequisite				
	TE1012				

PURPOSE

To provide an adequate mastery of technical knowledge in Ultrawide band signal and its features and applications in Wireless communication.

INSTRUCTIONAL OBJECTIVES

1.	To understand the operational characteristics of UWB and the study the working principle UWB technologies and to understand the working concept of all the Blocks Standards of UWB.
2.	Graduates will demonstrate knowledge of UWB signal characteristics , mask features, fundamentals and standards to demonstrate the ability to identify, formulate the radio channel, and to demonstrate the Wireless OFDM and RFID

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

History of Ultra Wide Band – Ultra wide band for wireless communication Definition, Signal Characteristics - FCC Mask and Features and fundamentals of UWB -Ultra Wide band Standards - UWB radio Channels - UWB technology and its features - UWB applications and its standard.

UNIT II - UWB SIGNALS **(9 hours)**

UWB antennas and requirements. Propagation of UWB impulses in multipath-Radiation Mechanism and link Budget -Impulse Response Modelling of UWB -

Short Range analysis of UWB antennas - Wireless Channels - IEEE UWB Channel Model - UWB signal Processing Overview - Propagation of UWB Signals - Signal Propagation in free space.

UNIT III - WIRELESS CHANNEL (9 hours)

Infra-red and radio transmission – IEEE 802.11 - Infrastructure and ad-hoc network – system architecture – protocol architecture – Physical layer – Medium Access Layer – Medium Access Management – HiperLAN – WATM.

UNIT IV - UWB TECHNOLOGIES (9 hours)

UWB Signal Definitions - Introduction to UWB Modulation & Multiple Access Modulation - Impulse Radio, Pulsed Multiband - Multiband OFDM : Complexity, Security - Pulsed Multiband - Comparison of UWB Technologies - UWB System Limits - Capacity Overview.

UNIT V - UWB APPLICATIONS (9 hours)

UWB Wireless Sensor Networks – RFID - Consumer Electronics - RADAR Display Device - RADAR Receiver - Super heterodyne receiver - Receiver noise figure.

TEXT BOOKS

1. Homayoun Nikookar & Ramjee Prasad, *"Introduction to Ultra Wideband for Wireless Communications"*, Springer, 2009.
2. Kazimierz Siwiak & Debra McKeown "*Ultra-Wideband Radio Technology"*, John Wiley & Sons Ltd, 2004.

REFERENCES

1. Jeffrey H. Reed, *"An Introduction to Ultra Wideband Communication Systems",* Prentice Hall, 2005.
2. Ghavami M, Michael L.B. & Kohno R, *"Ultra Wideband Signals and Systems in Communication Engineering"* John Wiley & Sons Ltd, 2007.
3. Matti Hamalainen & Jari *Iinatti, "UWB Theory and Applications, Ian Oppermann",* John Wiley & Sons Ltd, 2004.
4. Faranak Nekoogar, *"Ultra-Wideband Communications: Fundamentals and Applications"*, Prentice Hall, 2005.

TE1112 ULTRA WIDE BAND TECHNOLOGIES												
Course designed by		Department of Telecommunication 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	2			1 , 2			1	1 , 2		

3.	Category	General (G)	Basic Sciences (B)	Engineering Sciences and Technical Arts (E)	Professional Subjects (P)
					x
4.	Broad Area	Circuit Analysis and Programming	System Design	Communication Engineering	Networking
				x	
5.	Approval	23rd meeting of Academic Council, May 2013			

TE1113	**EMI/EMC ISSUES IN TELECOMMUNICATIONS**	**L**	**T**	**P**	**C**
	Total Contact Hours - 45	**3**	**0**	**0**	**3**
	Prerequisite				
	Nil				

PURPOSE

The purpose of this course is to expose the students to the issues relating to Electromagnetic Interference and Electromagnetic Compatibility in communication system design.

COURSE OBJECTIVES

1.	To analyze the unintentional generation, propagation and reception of EM
2.	To identify and address EMI/EMC issues in PCB prior to prototyping
3.	To explore issues covering, earthing equipotential bonding and electrical
4.	To know about the EMC standards

UNIT I - INTRODUCTION TO EMI/EMC (9 hours)

Concepts of Electromagnetic Interference - EMI/EMC Definitions- mechanisms of EMI generation, EMI testing, Methods of elimination of EMI and Biological effects of EMI. Sources of EMI lightening discharge, electro static discharge (ESD), electromagnetic pulse (EMP).

UNIT II - EMI COUPLING (9 hours)

Capacitive coupling - Inductive coupling- Common Impedance Ground Coupling-Ground Loop coupling-Transients in power supply lines- Radiation coupling-Conduction coupling-Common – mode and Differential-mode interferences-Conducted EM noise on power supply lines.

UNIT III - EMI MEASUREMENTS (9 hours)

EMI from apparatus / Circuits and open area test sides: Electromagnetic emissions, noise from relays and switches, non-linearities in circuits, passive inter modulation, transients in power supply lines, EMI from power electronic

equipment, EMI as combination of radiation and conduction - Open area test sides: OATS measurements- Radiated interference measurements: anechoic chamber, TEM cell, reverberating chamber, GTEM cell.

UNIT IV - EMI CONTROL TECHNIQUES (9 hours)

Grounding and Cabling: Safety and signal grounds, low and high frequency grounding methods, grounding of amplifiers and cable shields, isolation, shield grounding at high frequencies- EMI Filters Effectiveness of shielding, near and far fields / impedances, methods of analysis, total loss due to absorption and reflection effects, magnetic materials as a shield, conductive gaskets Electrical Bonding, Shape and Material for Bond straps, General Characteristics of good bonds.

UNIT V - EMC STANDARDS (9 hours)

Components for EMC and EMC Standards: Choice of capacitors, inductors, transformers and resistors - National / International EMC standards, military and civilian standards.

TEXT BOOKS

1. Henry W. Ott ,*"Electromagnetic Compatibility Engineering",* John Wiley & Sons, 2009.

REFERENCES

1. Prasad Kodali W, *"Engineering Electromagnetic Compatibility–Principles, Measurements, and Technologies, and Computer models",* 2nd Edition, Wiley - IEEE press, 2001.
2. Henry W. Ott ,*"Noise Reduction Techniques in Electronic Systems",* John Wiley & Sons, 2nd Edition, Digitized 2011, ISBN – 9780471850687, 1988.

TE1113 EMI/EMC ISSUES IN TELECOMMUNICATIONS												
Course designed by		Department of Telecommunication 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						1,2,3
3.	Category	General (G)	Basic Sciences (B)				Engineering Sciences and Technical Arts (E)				Professional Subjects (P)	
											x	
4.	Broad Area	Circuit Analysis and Programming				System Design		Communication Engineering			Networking	
						x						
5.	Approval	23rd meeting of Academic Council, May 2013										

TE1114	WIRELESS NETWORK SECURITY	L	T	P	C
	Total contact hours - 45	3	0	0	3
	PREREQUISITE				
	Nil				

PURPOSE

The main purpose of this course is to introduce to students to the emerging areas of Wireless Network security. This will enable the students to acquire a solid understanding of different components involved in the Wireless Network security techniques and different ways of distributing the multimedia data.

INSTRUCTIONAL OBJECTIVES

1.	The Students will be enabled to understand and acquire knowledge in security mechanism of wireless systems/ networks.
2.	To emphasis on knowledge-building to solve problems in communication systems.
3.	To provide a complete understanding on concepts, to identify how the algorithm is designed to provide security, as well as what are its pros and cons.

UNIT I – INTRODUCTION (9 hours)

Security Services, Mechanisms and attacks, Network Security Model, Classical Encryption Techniques, Steganography, Data Encryption Standard (DES)

UNIT II - NETWORK SECURITY (9 hours)

Kerbros- X.509, Public Key certificate format, PGP, IPSec, SSL, SET

UNIT III - WIRELESS LANS (9 hours)

802.11 Architecture, Wireless LAN Components, Security of 802.11 Wireless LANs, Security Features of 802.11 Wireless LANs per the Standard, Problems With the IEEE 802.11 Standard Security, Security Requirements and Threats, Emerging Security Standards and Technologies.

UNIT IV - WIRELESS PERSONAL AREA NETWORKS (9 hours)

Bluetooth Overview, Security of Bluetooth, Security Features of Bluetooth per the Specifications, Problems with the Bluetooth Standard Security, Security Requirements and Threats, Loss of Confidentiality, Loss of Integrity, Loss of Availability.

UNIT V - WIRELESS HANDHELD DEVICES (9 hours)

Wireless Handheld Device Overview, Benefits, Security Requirements and Threats, Loss of Confidentiality, Loss of Integrity, Loss of Availability, Risk Mitigation, Management Countermeasures, Operational Countermeasures, Technical Countermeasures.

TEXT BOOK

1. William Stallings, *"Cryptography and Network Security",* 3rd Edition, Pearson Education, New Delhi, 2003.

REFERENCES

1. Tom Karygiannis, Les Owens,*"Wireless Network Security 802.11, Bluetooth and Handheld Devices",* National Institute of Standards and Technology, US Dept. of Commerce Special Publication 800-48, 2002.
2. Forouzan B.A, *"Cryptography & Network Security",* TaTaMcGrawHill, 2007.

TE1114 - WIRELESS NETWORK SECURITY												
Course designed by		Department of Telecommunication 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	2
3.	Category	General (G)	Basic Sciences (B)			Engineering Sciences and Technical Arts (E)					Professional Subjects (P)	
											x	
4.	Broad Area	Circuit Analysis and Programming			System Design		Communication Engineering				Networking	
											x	
5.	Approval	23rd meeting of Academic Council, May 2013										

	DIGITAL VIDEO BROADCASTING	L	T	P	C
TE1115	Total contact hours – 45	3	0	0	3
	Prerequisite				
	NIL				

PURPOSE

The main purpose of this course is to give the students a wide exposure of Digital Video Broadcasting. This will enable the students to acquire knowledge in JPEG & MPEG coding in DVB.

INSTRUCTIONAL OBJECTIVES

1.	To gain Knowledge about Digital Video Broadcasting

2.	To learn about JPEG & MPEG source coding of Audio and Video Signals
3.	To understand DVB data broadcasting

UNIT I - DIGITAL TELEVISION A FIRST SUMMARY (9 hours)

Definitions and range of application-Objectives in the Development of Digital Television- Data Reduction - Possible Means of Transmission for Digital Television- Standards and Norms of Digital Television- The New DVB Project.

UNIT II - MPEG SOURCE CODING OF AUDIO SIGNALS (9 hours)

Psychoacoustic Basics- Masking-Source Coding of Audio Signals Utilizing the Masking Qualities of the Human Ear- Basic Structure of the MPEG Coding Technique-Coding in Accordance with Layer 1& Layer 2-Decoding-MPEG2 Audio Coding.

UNIT III - JPEG AND MPEG SOURCE CODING OF VIDEO SIGNALS (9 hours)

Coding in Accordance with JPEG- Discrete Cosine Transform-Quantization-Redundancy Reduction- Specific Modes- Interchange Format Coding in Accordance with the MPEG Standards- Block Diagrams of Encoder and Decoder-Motion Estimation- Reordering of Pictures- Datarate Control- Special Features of MPEG 1 & MPEG2.

UNIT IV - THE STANDARD FOR TERRESTRIAL TRANSMISSION AND ITS DECODING TECHNIQUE (9 hours)

Basics of Terrestrial Television Transmission- User Requirements for a System for Terrestrial Transmission of DVB Signals- Encoder Signal Processing- Decoding Technique- Hierarchical Modulation- Features of the Standard.

UNIT V - DVB DATA BROADCASTING (9 hours)

Data Piping- Data Streaming- Synchronised Data Streaming- DataObject Carousel- Multiprotocol Encapsulation- System Software Update - DVB Solutions for Interactive Services- NetworkIndependent Protocols for DVB Interactive Services- NetworkDependent Solutions for PSTN ISDN DECT GSM-NetworkDependent Solutions for DVBC DVBS and DVBT.

TEXT BOOK

1. Ulrich Reimers DVB: *"The Family of International Standards for Digital Video Broadcasting"* (Signals and Communication Technology) Springer; 2nd edition, 2005.

REFERENCES

1. Fischer W, *"Digital Video and Audio Broadcasting Technology: A Practical Engineering Guide"*, Springer; 2nd edition 2008.
2. Walter. Fischer *"Digital Television: A Practical Guide for Engineers"*, Springer 2004.

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<tr><th colspan="13">TE1115 DIGITAL VIDEO BROADCASTING</th></tr>
<tr><td colspan="2">Course designed by</td><td colspan="11">Department of Telecommunication engineering</td></tr>
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<tr><td>5.</td><td>Approval</td><td colspan="11">23rd meeting of Academic Council, May 2013</td></tr>
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AMENDMENTS

S.No.	Details of Amendment	Effective from	Approval with date