YESHWANTRAO CHAVAN COLLEGE OF ENGINEERING

B.E. (Electronics and Telecommunication Engineering)

SCHEME OF EXAMINATION

Sl. No.	Sub Code	Subject	Contact Hours				Credits	% Weightage				ESE Duration
			L	T	P	Total		MSE I	MSE II	TA	ESE	
SEMESTER VII												
1	GE409	Engg. Management	3	0	0	3	3	15	15	10	60	3 Hrs
2	ET401	RF & Microwave	4	0	0	4	4	15	15	10	60	3 Hrs
3	ET402	RF & Microwave Lab	0	0	2	2	1			40	60	
4	ET403	Principles of Image Processing	4	0	0	4	4	15	15	10	60	3 Hrs
5	ET404	Principles of Image Processing Lab	0	0	2	2	1			40	60	3 Hrs
6		Prof. Elective 3	3	0	0	3	3	15	15	10	60	3 Hrs
7		Prof. Elective 3 Lab	0	0	2	2	1			40	60	
8		Free Elective 2	4	0	0	4	4	15	15	10	60	3 Hrs
9	ET413	Industrial Training	0	0	**0**	**0**	**2**			100		
10	ET414	Project phase -I	0	0	4	4	4			40	60	
		Total	**18**	**0**	**10**	**28**	**27**					

	ET405	PE3 : Optical Communication	3	0	0	3	3	15	15	10	60	3 Hrs
	ET406	PE3 : Optical Communication Lab	0	0	2	2	1			40	60	
	ET407	PE3 : Microwave Integrated circuit	3	0	0	3	3	15	15	10	60	3 Hrs
	ET408	PE3 : Microwave Integrated circuit Lab	0	0	2	2	1			40	60	
	ET409	PE3 : Communication Networks	3	0	0	3	3	15	15	10	60	3 Hrs
	ET410	PE3 : Communication Networks Lab	0	0	2	2	1			40	60	

	EL412	FE2 : Electrical Energy Audit and Safety	4	0	0		4	15	15	10	60	
	EL413	FE2 : Utilisation of Electrical Energy	4	0	0		4	15	15	10	60	
	CV418	FE 2 : Elements of Earthquake Engineering	4	0	0	4	4	15	15	10	60	
	CV419	FE 2 : Air Pollution & Solid Waste Management	4	0	0	4	4	15	15	10	60	
	ME429	FE 2 : Total Quality Management	4	0	0	4	4	15	15	10	60	
	ME430	FE 2 : Reliability Engineering	4	0	0	4	4	15	15	10	60	
	CT411	FE2 : Multimedia and Animation	4	0	0	4	4	15	15	10	60	100
	CT412	FE2 : Current Trends and Technologies	4	0	0	4	4	15	15	10	60	100
	IT408	FE2 : Applications of Computer Networking	4	0	0	4	4	15	15	10	60	3 Hrs

SEMESTER VIII

1	ET415	Antenna Theory & Design	4	0	0	4	4	15	15	10	60	3 Hrs
2	ET416	Antenna Theory & Design Lab	0	0	2	2	1			40	60	
3	ET417	CMOS VLSI Design	4	0	0	4	4	15	15	10	60	3 Hrs
4	ET418	CMOS VLSI Design Lab	0	0	2	2	1			40	60	
5		Prof. Elective 4	3	0	0	3	3	15	15	10	60	3 Hrs
6		Prof. Elective 5	3	0	0	3	3	15	15	10	60	3 Hrs
7		Prof. Elective 5 Lab	0	0	2	2	1			40	60	
8	ET428	Project Phase-II	0	0	6	6	6			40	60	
9	ET429	Comprehensive viva voce	0	0	0	0	3			40	60	
10	ET430	Extra Curricular /Competitive Exam	0	0	0	0	2			100		
		Total	**14**	**0**	**12**	**26**	**28**					

	ET419	PE4 : Power Electronics	3	0	0	3	3	15	15	10	60	3 Hrs
	ET420	PE4 : Wireless & Mobile Communication	3	0	0	3	3	15	15	10	60	3 Hrs
	ET421	PE4 : Satelite Communication	3	0	0	3	3	15	15	10	60	4 Hrs

	ET422	PE5 : Fuzzy Logic & Neural Networks	3	0	0	3	3	15	15	10	60	3 Hrs
	ET423	PE5 : Fuzzy Logic & Neural Networks Lab	0	0	2	2	1			40	60	
	ET424	PE5 : RF Circuit Design	3	0	0	3	3	15	15	10	60	3 Hrs
	ET425	PE5 : RF Circuit Design Lab	0	0	2	2	1			40	60	
	ET426	PE5 : Multimedia Commuincations	3	0	0	3	3	15	15	10	60	3 Hrs
	ET427	PE5 : Multimedia Commuincations. Lab	0	0	2	2	1			40	60	

Chairperson		**Date of Release**	May 2013	**Applicable for**
Dean (Acad. Matt.)		**Version**	**1.03**	**AY 2013-14 On wards**

GE409	Engineering Management	L= 3	T = 0	P = 0	Credits = 3

Evaluation Scheme	MSE-I	MSE-II	TA	ESE	Total	ESE Duration
	15	15	10	60	100	3 Hrs

Objectives:

This subject helps student to understand the Functions of management, Marketing Management, Personnel Management, Plant Management, Inventory Control and Finance Management in the organization

UNIT-1: Principles of management

Concepts of management, development of scientific management, Taylor Principles Fayol, functions of management

such as planning, decision making, organizing, communication, controlling, span of control .

06 Hrs

UNIT-2: Personnel & Human Resource Management

Concept and evolution of personnel management and HRM, Difference between PM and HRM. Functions of HRM Concept of HRD. HR Planning, Concept, Objective, Importance, and Process. Recruitment: Meaning, process, Recruitment Agencies, selection process, test, and types of test, interview, and types of interview. Recruitment Agencies, Training and Development.

06 Hrs

UNIT-3: Project management

Types of projects, various phases of project, Project Proposal, Components of planning, Objectives of planning, Factors affecting planning, Organizational setup, Network techniques Introduction and Use of CPM &PERT for planning. Estimation of critical path and project duration. Resource planning, Resource Allocation, Resource leveling, Optimization of project cost, Cost slope concept

06 Hrs

UNIT-4: Marketing Management:-

Definition & scope, selling & modem concepts of marketing, market research, rural marketing, Customer Behaviors, marketing strategies, product launching, product life cycle, sales promotion, pricing, channels of distribution, Advertising, market segmentation, marketing mix, positioning, targeting

06 Hrs

UNIT-5: Inventory Management :-

Principles of Inventory Management , Importance & objectives of Effective Inventory Management , Types of Inventory Control Systems, Inventory Control Procedures, Concept of ABC Analysis Benefits of ABC Analysis.

06 Hrs

UNIT -6: Financial Management:-

Definition & Functions of Finance department Sources of finance ,financing organizations, types of capital, elements of costs & allocations of indirect expenses, cost control, break even analysis, budgets & budgetary control, equipment replacement policy, make or buy analysis, balance sheet, ratio analysis, profit & loss statement.

06 Hrs

Text books:

1	Industrial Management	2nd Edition 1999	by I.K. Chopde, A.M. Sheikh.	S Chand & Company
2	Operations Research	2002	by L.C. Jhamb	Everest Publishing house

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Dean (Acad. Matters)		Version	1.00	

GE409	Engineering Management	L= 3	T = 0	P = 0	Credits = 3

Evaluation Scheme	MSE-I	MSE-II	TA	ESE	Total	ESE Duration
	15	15	10	60	100	3 Hrs

Reference books:				
1	Business Organisation and Management	Second Edition 2002	by S.A. Sherlekar	BRAND NEW FROM PUBLISHER
2	Management Information Systems	Date: 2009 11th International Edition	by Laudon and Laudon	Publisher: Prentice Hall.

Course Outcomes:

After completion of the course, the students will be able to:

1. Develop leadership qualities and managerial skills.
2. Apply their managerial skills in the areas such as Personnel & Human Resource Management, Project management, rketing Management, Inventory Management & Financial Management

Mapping of POs & PSOs with PEOs

		a	b	c	d	e	f	g	h	i	j	k	l	m
Program Educational Objectives	I						√	√	√					
	II													
	III								√					
	IV						√	√	√					
	V								√					

ET401	RF & Microwave	L= 4	T = 0	P = 0	Credits = 4

Evaluation Scheme	MSE-I	MSE-II	TA	ESE	Total	ESE Duration
	15	15	10	60	100	3 Hrs

Course Objectives:

1. To understand the basic concepts of klystron amplifier & oscillator
2. To study RF energy sources.
3. To learn microwave passive components like couplers, tees, attenuators, circulators, etc
4. To study concepts of s-matrix.
5. To study microwave filters and different microwave measurement techniques
6. To introduce different microwave solid state devices

UNIT-1:

Microwave linear beam tubes (O type)

High frequency limitations of conventional microwave devices,Two cavity Klystron Amplifier – Mechanism and mode of Operation, Power output and Efficiency, Applegate diagram, applications, Reflex Klystron Oscillator – Mechanism and mode of Operation Power output, efficiency, mode curve, Electronic Admittance, Modulation of Reflex Klystron; Applications, Helix TWT, BWO. Slow wave structures.

08Hrs

UNIT-2:

Microwave cross-field tubes (M Type):

Magnetron Oscillator – Hull cut-off voltage, Mechanism of Operation, Mode separation, Phase focusing effect, Power output and Efficiency,

Cylindrical magnetron, parallel plate magnetron, split anode magnetron, Types of strapping, Tuning of magnetron. Applications, Numerical Problems

08Hrs

UNIT-3:

Microwave passive Devices (Reciprocal and Non reciprocal):

Wave guide Tees - E plane Tee, H plane Tee, Magic Tee and their applications, , Directional couplers, Wave guide Corners, Bends and Twists ,Attenuators, Isolators, Gyrators, Circulators, Phase shifter, Rectangular cavity resonator, Transmission line resonators

08Hrs

UNIT-4:

Microwave Network Analysis

Introduction, Symmetrical Z and Y matrices for reciprocal network, Scattering matrix representation of multi port networks, comparison between [S], [Z] and [Y] matrices. Inter relationship between impedance matrix, admittance matrix and Scattering matrix, properties of scattering matrix. Scattering matrix of transmission lines, ABCD parameters with S parameters, Scattering matrix derivation for all components, Numerical Problems

08Hrs

UNIT-5:

Microwave measurement:

Introduction, Tunable detector, Slotted line Carriage, VSWR meter, Power measurements sensor, Bolo meter sensor, power sensor, Low and High power measurement, Insertion loss and Attenuation measurement, VSWR measurement – Low and High VSWR, Impedance measurement. Frequency measurement, Measurement of cavity Q, Dielectric measurement, Antenna Measurement – radiation pattern, Phase and gain. Types of Microwave filters: Image parameter method, Insertion loss method

07Hrs

ET401	RF & Microwave	L= 4	T = 0	P = 0	Credits = 4

Evaluation Scheme	MSE-I	MSE-II	TA	ESE	Total	ESE Duration
	15	15	10	60	100	3 Hrs

UNIT-6:

Microwave solid state devices and circuits:

Microwave diodes – Gunn diode – Mode of operation, Crystal diode, PIN diode –, IMPATT diodes, Application as Oscillator and Amplifiers, Varactor diode, parametric amplifier, Microwave transistors, MASER, Strip lines: Micro strip lines, parallel strip lines. Coplanar, shielded

07Hrs

Text books:				
1	Microwave device and circuits	Third Edition	Samuel Y.Lio	Pearson Education
2	Foundations of microwave engineering	Second Edition 1992	R.E. Collins	Tata Mc-Graw Hill
3	Microwave engineering	Second Edition 1992	R Chatterjee.	
4	Microwave Engineering	Third Ed. 2007	David Pozar	Wiley Ind. Pub.

Reference books:				
1	Microwave communication	1989	Hund	
2	Microwave theory and measurement		G. Lance	
3	Microwave Engineering	2nd Edition Reprint 2001	Annapurna Das, Sisir. K.Das	Tata McGraw-Hill Co., Ltd.
4	Microwave	1978	Reich J.H.et al	East West Press,

Course Outcome:

After completion of the course, the students will be able to:

1. Explore behavior of active devices like klystron, magnetron, TWT & BWO
2. Analyze behavior of different passive components using s-matrix
3. Measure various parameters like power, VSWR, attenuation, Q factor & impedance
4. Design microwave filters
5. To explore different microwave solid state devices

Mapping of POs & PSOs with PEOs

		a	b	c	d	e	f	g	h	i	j	k	l	m
Program Educational Objectives	I	√				√			√			√	√	√
	II	√	√			√				√		√	√	√
	III		√			√			√			√		
	IV								√					
	V								√	√			√	√

Chairperson		Date of Release	May 2013	Applicable for AY 2013-14 Onwards
Dean (Acad. Matters)		Version	1.00	

ET402	RF & Microwave Laboratory	L = 0	T = 0	P = 2	Credits = 1
Evaluation Scheme	Continuous Evaluation	ESE		Total	ESE Duration
	40	60		100	2 Hrs
OBJECTIVES:					
Analysis of various active and passive RF microwave devices.					

Sr. No.	TEN EXPERIMENTS BASED ON
1	Active RF Devices
2	Passive RF Devices
3	Microwave Measurement
4	MIC Components

ET403	Principles of Image Processing	L= 4	T = 0	P = 0	Credits = 4

Evaluation Scheme	MSE-I	MSE-II	TA	ESE	Total	ESE Duration
	15	15	10	60	100	3 Hrs

Course Objectives

1. To introduce the concept of sampling theory and quantization in image processing.
2. To interpret the digital images in frequency domain by using various transform techniques.
3. To understand basic algorithms for the enhancement of digital images.
4. To learn the various processes of image compression.
5. To learn segmentation of digital images through various algorithms.

UNIT-1:

Digital image fundamentals-Digital Image through scanner, digital camera, Concept of gray levels, Gray level to binary image conversion, Sampling and quantization, Relationship between pixels, Imaging Geometry

08Hrs

UNIT-2:

Image enhancement, Point processing, Histogram processing, Two dimensional fourier transform, Spatial filtering and its frequency domain interpretation, Enhancement in frequency domain, Image smoothing, Image sharpening

08Hrs

UNIT-3

Image segmentation, Detection of discontinuities, Edge linking and boundary detection, Thresholding, Region oriented segmentation

08Hrs

UNIT-4:

Image Restoration Degradation model, Algebraic approach to restoration, Inverse filtering, Least mean square filters, Constrained Least Squares Restoration, Interactive Restoration

08Hrs

UNIT-5

Image Transforms 2-D FFT, Properties. Walsh transform, Hadamard Transform, Discrete cosine Transform, Haar transform, Slant transform, Hoteling transform

07Hrs

UNIT-6:

Image compression, Redundancies and their removal methods, Fidelity criteria, Image compression models, Source encoder and decoder, Error free compression, Lossy compression

07Hrs

Text books:				
1	Digital Image processing	2nd Education, 2002.	R.C. Gonzalez & R.E. Woods	Addison Wesley/ Pearson education
2	Fundamentals of Digital Image processing	1989	A.K.Jain	PHI

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ET403	Principles of Image Processing	L= 4	T = 0	P = 0	Credits = 4

Evaluation Scheme	MSE-I	MSE-II	TA	ESE	Total	ESE Duration
	15	15	10	60	100	3 Hrs

Reference books:				
1	Digital Image processing using MAT LAB	Edition, PEA, 2004	Rafael C. Gonzalez, Richard E Woods and Steven L	Pearson
2	Digital Image Processing	3rd Edition, 2004	William K. Pratt, John Wiley	

Course Outcome:

Upon successfully completing the course, the student will be able to:

1. Process digital images using image enhancement technique.
2. Demonstrate the application of image processing algorithms to real life problems
3. To represent & describe of digital images using different techniques.
4. Implement image processing algorithms in CAD Tools.

Mapping of POs & PSOs with PEOs

		a	b	c	d	e	f	g	h	i	j	k	l	m
Program Educational Objectives	I	√		√		√			√				√	√
	II	√		√		√				√			√	√
	III			√		√			√					
	IV								√					
	V								√	√			√	√

ET404	Principles of Image Processing Laboratory	L = 0	T = 0	P = 2	Credits = 1
Evaluation Scheme	Continuous Evaluation	ESE		Total	ESE Duration
	40	60		100	2 Hrs

Course Objectives

1. Cover the basic theory and algorithms that are widely used in digital image processing
2. Expose students to current technologies and issues that are specific to image processing systems
3. Develop hands-on experience using software and hardware to process images
4. Familiarize with MATLAB Image Processing Toolbox

Sr. No.	Ten Experiments Based on
1.	Statistical properties of image and displaying histogram and profile
2.	Histogram modification.
3.	Image smoothing operations.
4.	Edge detection.
5.	Segmentation using threshold.
6.	Region based segmentation.
7.	Image transforms.
8.	MATLAB Interface with hardware

ET405	Optical communication	L= 3	T = 0	P = 0	Credits = 3

Evaluation Scheme	MSE-I	MSE-II	TA	ESE	Total	ESE Duration
	15	15	10	60	100	3 Hrs

Course Objectives

1. To study the behavior of optical systems
2. To Learn concept of operation of active and passive optical communication components, the principles of designing optical communication systems
3. To understand operation of light sources in optical systems.
4. To study the principles of single and multi mode optical fiber.
5. To learn transmitter, receiver sections of optical system.

UNIT-1:

INTRODUCTION TO OPTICAL FIBERS

Evolution of fiber Optic system. Principle of optical communication-Attributes and structures of various fibers such as step index, graded index mode and multi mode fibers. Propagation in fibers-Ray mode, Numerical aperture and multipath dispersion in step index and graded index fibers structure. Electromagnetic wave equation in step index and graded index fibers Modes and Power flow in fibers

06 Hrs

UNIT-2:

SIGNAL DEGRADATION IN OPTICAL FIBERS

Attenuation – Absorption losses, Scattering losses, Bending Losses, Core and Cladding losses, Signal Distortion in Optical Wave guides – Information Capacity determination – Group Delay – Material Dispersion, Wave guide Dispersion, Signal distortion in SM fibers – Polarization Mode dispersion, Intermodal dispersion, Pulse Broadening in GI fibers – Mode Coupling – Design Optimization of SM fibers – RI profile and cut-off wavelength

06 Hrs

UNIT-3

FIBER OPTICAL SOURCES

Direct and indirect Band gap materials – LED structures – Light source materials – Quantum efficiency and LED power, Modulation of a LED, Laser Diodes – Modes and Threshold condition – Rate equations – External Quantum efficiency – Resonant frequencies – Laser Diodes structures and radiation patterns – Single Mode lasers – Modulation of Laser Diodes, Temperature effects, Source launching and coupling. Fabry Perot cavity Quantum laser

06 Hrs

UNIT-4:

FIBER OPTICAL RECEIVERS

PIN and APD diodes – Photo detector noise, SNR, Detector Response time, Avalanche Multiplication Noise – Comparison of Photo detectors – Fundamental Receiver Operation – pre-amplifiers - Error Sources – Receiver Configuration – Probability of Error – The Quantum Limit

06 Hrs

UNIT-5

DIGITAL TRANMISSION SYSTEM

– Fiber Splicing and connectors – Noise Effects on System Performance – Operational Principals of WDM,SONET,LAN 1000 baseSX, LX and Passive Components

06 Hrs

ET405	Optical communication	L= 3	T = 0	P = 0	Credits = 3

Evaluation Scheme	MSE-I	MSE-II	TA	ESE	Total	ESE Duration
	15	15	10	60	100	3 Hrs

UNIT-6:

MEASUREMENT IN OPTICAL FIBERS

Attenuation, Time domain dispersion and Frequency domain dispersion, NA measurement Refractive index profile and optical source characteristic measurements, OTDR

06 Hrs

Text books:				
1	Optical Fiber Communication	2008	Gerd Keiser	McGraw-Hill International, Singapore
2	Optical Communication, Principles and Practice.	1992	J.Senior	
Reference books:				
1	Optical Communication System		J. Gower	Prentice Hall of India
2	Fiber-Optic Communication System	Third Edition	Govind Agrawal	John Willy & Sons

Course Outcome:

The student will be able to:

1. Explore fiber optics and electro-optical components.
2. Design of optical communication links.
3. Apply the geometrical optics technique to analyze ray propagation in optical systems
4. Analyze an Optical Communication System.

Mapping of POs & PSOs with PEOs

		a	b	c	d	e	f	g	h	i	j	k	l	m
Program Educational Objectives	I	√				√			√					
	II	√				√				√				
	III					√			√					
	IV								√					
	V								√	√				

Chairperson		Date of Release	May 2013	Applicable for AY 2013-14 Onwards
Dean (Acad. Matters)		Version	1.00	

ET406	Optical communication Laboratory	L = 0	T = 0	P = 2	Credits = 1
Evaluation Scheme	Continuous Evaluation	ESE		Total	ESE Duration
	40	60		100	2 Hrs

Course Objectives

1.To observe and analyze various fiber optic data links when used for both digital and analog data transmission.

2. To learn proper fiber splicing techniques and to become familiar with the use of optical time domain reflectometry in characterizing optical fibers.

Sr. No.	Ten Experiments Based on
1.	Optical Sources Characteristics
2.	Numerical Aperture
3.	Fiber Attenuation
4.	Optical detector Characteristics
5.	Fiber Bandwidth/ Data Rate

ET407	Microwave Integrated Circuits	L= 3	T = 0	P = 0	Credits = 3

Evaluation Scheme	MSE-I	MSE-II	TA	ESE	Total	ESE Duration
	15	15	10	60	100	3 Hrs

Course Objectives

Students will achieve a broad understanding of the current trends in Micro strip technologies. They will learn Micro strip line, Micro strip line devices, Micro strip Antennas, Design of micro strip circuits and Hybrid MICs, which will clear their fundamentals & vision up to final IC fabrication

UNIT-1:

Micro strip line:

Analysis using conformal transformation and Hybrid mode method. Characteristic impedance, Guide wavelength and loss, Slot line – Wave-guide analysis, coupling coaxial and micro strip lines Coplanar line: analysis using conformal transformation and Hybrid mode method

06 Hrs

UNIT-2:

Micro strip line devices:

Directional couplers, Micro strip coupler and branch-line couplers, even and odd mode analysis, coupling coefficient and bandwidth. Impedance transformers and filters, Lumped elements for MIC design and fabrication of inductors, resistors and capacitors, Non-reciprocal components, micro strip circulators, isolators, phase shifters

06 Hrs

UNIT-3:

Micro strip Antennas:

Radiation mechanism, radiation fields, patch antennas, traveling wave antennas, slot antennas, excitation techniques, surface waves

06 Hrs

UNIT-4:

Design of micro strip circuits:

High power circuits – Transistor Oscillator, step recovery diode frequency multiplier, avalanche diode oscillator, PIN diode switch, low power circuits Schottky diode, Balanced mixer, parametric amplifier, PIN diode limiter, Diode phase shifter

06 Hrs

UNIT-5:

Hybrid MICs:

Dielectric Substrates, thick film technology, thin film technology, methods of testing, encapsulation of devices, mounting

06 Hrs

UNIT-6:

Monolithic MICs fabrication:

Epitaxial growth, Diffusion, Ion implantation, Electron Beam technology for pattern delineation

06 Hrs

ET407	Microwave Integrated Circuits	L= 3	T = 0	P = 0	Credits = 3

Evaluation Scheme	MSE-I	MSE-II	TA	ESE	Total	ESE Duration
	15	15	10	60	100	3 Hrs

Text books:				
1	Antennas and Radio Wave Propagation	1985	R.E.Collin	McGraw Hill Publishers
2	Microwave Devices and Circuits	Third Edition	Samuel Liao	Prentice-Hall of India Ltd
3	Microwave Engineering	Third Edition	David Pozar	Wiley Ind. Pub.

Reference books:				
1	Microwave Integrated Circuits	1974	K. C. Gupta and Amarjit Singh	Wiley East. Ltd
2	Micro strip Antennas	1980	I.J. Bahl and P. Bhartia	Artech House
3	Strip line Transmission Line for MIC		Bharti Bhat, S. K. Koul	New Age International

Course Outcome:

The student will be able to:
1.Analyze and synthesis different antennas starting from microstrip antennas, Hybrid MICs and antenna arrays.
2.Fabricate using the different technologies available as well as testing and mounting it.

Mapping of POs & PSOs with PEOs

		a	b	c	d	e	f	g	h	i	j	k	l	m
Program Educational Objectives	I	√		√		√						√	√	√
	II	√	√	√		√						√	√	√
	III		√	√		√						√		
	IV													
	V												√	√

Chairperson		Date of Release	May 2013	Applicable for AY 2013-14 Onwards
Dean (Acad. Matters)		Version	1.00	

ET408	Microwave Integrated Circuits Laboratory	L = 0	T = 0	P = 2	Credits = 1
Evaluation Scheme	Continuous Evaluation	ESE		Total	ESE Duration
	40	60		100	2 Hrs

Course Objectives

1. To understand the concept of various microwave Integrated circuites..
2. Develop hands-on experience on EM simulation Software.
3. To analyze and Design various Filters and Microstrip antennas.

Sr. No.	Ten Experiments Based on
1.	Directional coupler
2.	Power Divider
3.	Measurement of antenna pattern : parabolic antenna, slot antenna, Horn antenna
4.	A micro strip antenna
5.	Ferrite Devices / Components
6.	Micro strip Filters.

ET409	Communication Networks	L= 3	T = 0	P = 0	Credits = 3

Evaluation Scheme	MSE-I	MSE-II	TA	ESE	Total	ESE Duration
	15	15	10	60	100	3 Hrs

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Course Objectives:

1. To understand the concept of computer communications and functions of OSI and TCP/IP layers.
2. To study how communication works in data networks and the Internet.
3. To study internetworking devices and their functions.
4. To understand the role of protocols in networking
5. To study the features and operations of various application layer protocols.

UNIT-1:

Introduction, network and services: communication network, approaches to network design, types of network, two stage and three stage network. Uses of computer networks, LAN, MAN, WAN, design issues for layers, connection oriented and connectionless services, service primitives, Application and layered architecture, OSI reference model,

05 Hrs

UNIT-2 :

LAN network and medium access layer: LAN structure, random access, multiple access protocols, IEEE standard 802 for LAN and MAN, high speed LANS, repeaters, hubs, bridges, fast Ethernet, Wireless LAN

05 Hrs

UNIT-3 :

Physical layer and data link layer: transmission media, PSTN.

Data link layer design issues, error detection and correction methods, elementary data link protocols, sliding window protocols.

06 Hrs

UNIT-4:

Network layer and transport layer: network layer design issues, routing, congestion, internetworking, transport layer design issues, transport service primitives, internet transport protocol, TCP/IP architecture, TCP/IP protocol, IP packets, IP addressing, TCP/IP utilities ,wireless TCP and UDP, routers and gateways

06 Hrs

UNIT-5: Network Applications

Application layer: domain name system, electronic mail system, multimedia, real time transport protocol, electronic mail, world wide web.

07 Hrs

UNIT-6: Network Security:

network security cryptography, secrete key, public key, digital signature, e-mail security, web security, communication security,

07 Hrs

ET409	Communication Networks			L= 3	T = 0	P = 0	Credits = 3
Evaluation Scheme	MSE-I	MSE-II	TA	ESE		Total	ESE Duration
	15	15	10	60		100	3 Hrs

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Text books:				
1	Computer networks	3rd Edition	Tanenbaum	*Amazon*
2	Computer communication	2003	by W. Stanlling	Prentice Hall
3	Data Communication and Networking	4th Edition	Forouzan	McGrawHill

Reference books:				
1	Telecommunication switching systems and networks	Paperback	by vishwanathan	PHI
2	Computer Networks	Third Edition 2003	Larry Peterson, Bruce Davie	MKP
3	Top down approach		Galo & Hancock	Pearson

Course Outcome:

The students will be able to

1. Compare communication topologies and network architectures.
2. Utilize interfacing standards and communication protocols in computer communication network.
3. Design computer communication network systems.
4. Apply the knowledge of network securities in computer networks.

Mapping of POs & PSOs with PEOs

		a	b	c	d	e	f	g	h	i	j	k	l	m
Program Educational Objectives	I	√							√					
	II	√								√				
	III								√					
	IV								√					
	V								√	√				

Chairperson		Date of Release	May 2013	Applicable for AY 2013-14 Onwards
Dean (Acad. Matters)		Version	1.00	

ET410	Communication Networks Laboratory	L = 0	T = 0	P = 2	Credits = 1
Evaluation Scheme	Continuous Evaluation	ESE		Total	ESE Duration
	40	60		100	2 Hrs

Course Objectives

1. To understand the concept of various networking protocols.
2. To analyze the need of security in the computer network.

Sr. No.	Ten Experiments Based on
1.	Network design LAN, MAN ,WAN
2.	PC to PC communication using RS-232 port
3.	Sliding window protocol
4.	Wireless TCP and UDP protocols
5.	Bluetooth
6.	Network security cryptography
7.	Communication networks like Wi-Fi, Wimax
8.	Routing protocols

ET411	Soft computing	L= 4	T = 0	P = 0	Credits = 4

Evaluation Scheme	MSE-I	MSE-II	TA	ESE	Total	ESE Duration
	15	15	10	60	100	3 Hrs

Course Objectives

1. To familiarize with soft computing concepts.
2. To describe the basics of Soft computing and its application areas particularly to intelligent systems
3. To introduce the ideas of Neural networks.
4. To introduce the concepts of Fuzzy Logic.
5. To introduce the concepts of Genetic algorithm

UNIT-1:

Introduction of Soft Computing Methods, Fundamentals of Genetic Algorithms, Encoding, Fitness function, Genetic modeling, Applications of GA

06 Hrs

UNIT-2:

Introduction of neural networks, learning methods, perceptrons, perceptron training algorithm, single layer perceptron, multiplayer perceptron, neural network architectures, ADALINE, MADALINE

07 Hrs

UNIT-3

Adaptive filtering, LMS algorithm, Back propagation algorithm, RBF networks,ART Networks, self-organizing feature maps, Applications of ANN

08 Hrs

UNIT-4:

Overview of Crisp Sets, Concepts of Fuzzy sets, representation of fuzzy sets, extension principle, fuzzy compliments, t-norms and t- conforms

07 Hrs

UNIT-5

Fuzzy numbers, arithmetic operation on intervals and on fuzzy sets, lattice of fuzzy numbers, fuzzy equations, fuzzy relations, projections and cylendric extensions, binary fuzzy relations, fuzzy equivalence, compatibility and ordering relations, fuzzy morphism

08 Hrs

UNIT-6:

Fuzzy controllers, Defuzzification Methods , Fuzzy Inference Techniques, applications of fuzzy logic in pattern recognition and image processing

08 Hrs

Text books:				
1	Fuzzy sets and Fuzzy logic	1995	by George Klir, Bo Yuan	PHI
2	Neural Networks, Fuzzy logic and Genetic Algorithms, Synthesis and applications	2003	By S. Rajsekharan, Vijayalaxmi Pai	PHI
3	Elements of Artificial Neural Network	1997	K. Mehrotra	MIT Cognet

Chairperson		Date of Release	May 2013	Applicable for AY 2013-14 Onwards
Dean (Acad. Matters)		Version	1.00	

ET411	Soft computing	L= 4	T = 0	P = 0	Credits = 4

Evaluation Scheme	MSE-I	MSE-II	TA	ESE	Total	ESE Duration
	15	15	10	60	100	3 Hrs

Reference books:				
1.	Neural Networks, a comprehensive foundation	1999	By Simon Haykins	PHI
2.	Artificial Neural Networks	2004	By B. Yegnanarayana	PHI
3.	Fuzzy Logic & Applications	2003	J. Ross, TMH/Mc	Mc Graw Hill

Course Outcome

1. Identify and describe soft computing techniques and their roles in building intelligent machines
2. Recognize the feasibility of applying a soft computing methodology for a particular problem
3. Apply fuzzy logic and reasoning to handle uncertainty and solve engineering problems
4. Apply genetic algorithms to combinatorial optimization problems
5. Apply neural networks to pattern classification and regression problems
6. Evaluate and compare solutions by various soft computing approaches for a given problem.

Mapping of POs & PSOs with PEOs

		a	b	c	d	e	f	g	h	i	j	k	l	m
Program Educational Objectives	I	√			√							√		√
	II	√										√		√
	III				√							√		
	IV				√									
	V													√

ET412	INDUSTRIAL INSTRUMENTATION			L= 4	T = 0	P = 0	Credits = 4
Evaluation Scheme	MSE-I	MSE-II	TA	ESE	Total		ESE Duration
	15	15	10	60	100		3 Hrs

Course Objectives

To learn various techniques used for the measurement of industrial parameters. To learn pressure transducers, temperature standards, calibration and signal conditioning used in RTD's, thermocouples and pyrometry techniques, load cells, torque meter and various velocity pick-ups.

UNIT-1:

INTRODUCTION

Block diagram of instrumentation system, static and dynamic characteristics of instruments, functions of instruments, Definition of Transducers- Role of transducers in instrumentation- Advantages of electrical transducers - Classification of transducers- Analog and Digital, Active and passive, Primary and Secondary transducers- Inverse transducer- Sensitivity and specification for transducers - Characteristics and Choice of transducer-Factors influencing choice of transducer. Need of transducers, Classification, selection criteria,

07 Hrs

UNIT-2:

PRESSURE MEASUREMENT

Units of pressure - Manometers – Different types – Elastic type pressure gauges – Bourdon type bellows – Diaphragms – Electrical methods – Elastic elements with LVDT and strain gauges – Capacitive type pressure gauge – Piezo resistive pressure sensor –Testing and calibration of pressure gauges – Dead weight tester.

08 Hrs

UNIT-3 :

TEMPARATURE MEASUREMENT:1

Different types of filled in system thermometer , Bimetallic thermometers – Electrical methods of temperature measurement – Signal conditioning of industrial RTDs and their characteristics – Three lead and four lead RTDs.

07 Hrs

UNIT-4:

TEMPARATURE MEASUREMENT:2

THERMOCOUPLES AND PYROMETERS

Thermocouples – Laws of thermocouple – Signal conditioning of thermocouples output –cold junction compensation – Response of thermocouple, Radiation methods of temperature measurement – Radiation fundamentals – Total radiation & selective radiation pyrometers – Optical pyrometer – Two color radiation pyrometers.

08 Hrs

UNIT-5

FLOWMETERS

Variable head type flow meters: – Orifice plate – Venturi tube – Pitot tube.

Area flow meter: – Rotameter, Principle and constructional details of electromagnetic flow meter – Ultrasonic flow meters, flow measurements for gases

08 Hrs

UNIT-6:

MISCELLANEOUS MEASUREMENT

Electrical level gauge: – Resistive - capacitive – Nuclear radiation - Ultrasonic type, Radar type ,Speed measurement D.C and A.C tacho generators ,rotary encoder, Proximity sensors- Inductive and capacitive. Soil & water pH measurements.

07 Hrs

ET412	INDUSTRIAL INSTRUMENTATION			L= 4	T = 0	P = 0	Credits = 4
Evaluation Scheme	MSE-I	MSE-II	TA	ESE		Total	ESE Duration
	15	15	10	60		100	3 Hrs

Text books:				
1	Industrial Instrumentation and Control	2003	S.K. Singh	Tata McGraw Hill, 2003.
2	Transducers and Instrumentation		D V S Murthy	prentice Hall of India Pvt. Ltd., New Delhi

Reference books:				
1	Principles of Industrial Instrumentation		D. Patranabis	Tata McGraw Hill Publishing Company Ltd, 1996.
2	Instrumentation Measurement & Analysis	2004.	B.C. Nakra & K.K.Chaudary	Tata McGraw Hill Publishing Ltd
3	Measurement Systems – Application and Design	2003	E.O. Doebelin	Tata McGraw Hill publishing company
4	Industrial Instrumentation		D.P. Eckman	Wiley Eastern Ltd.

Course Outcome

1. The students will be equipped with the basic knowledge of Pressure, Temperature, flow, level, density and viscosity measurements.
2. The students will be able to calibrate various instruments.

Mapping of POs & PSOs with PEOs

		a	b	c	d	e	f	g	h	i	j	k	l	m
Program Educational Objectives	I	√			√							√		√
	II	√										√		√
	III				√							√		
	IV				√									
	V													√

Chairperson		Date of Release	May 2013	Applicable for AY 2013-14 Onwards
Dean (Acad. Matters)		Version	1.00	

ET413	Industrial Training	L = 0	T = 0	P = 0	Credits = 2

Evaluation Scheme	Continuous Evaluation	ESE*	Total	ESE Duration
		100	100	

* **Evaluation Based on Seminar / Report.**

Course Objectives
To provide students with industry exposure, so that they can work efficiently in industry.

Course Outcome
Students will be able to apply the knowledge gained in industry, so that they could effectively use this knowledge while doing their projects.

Mapping of POs & PSOs with PEOs

		Program Outcome and Program Specific Program Outcome												
		a	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**	**l**	**m**
Program Educational Objectives	**I**	√		√	√	√	√	√	√			√	√	√
	II	√	√	√		√						√	√	√
	III		√	√	√	√						√		
	IV				√		√	√	√		√			
	V								√	√	√		√	√

ET414	Project Phase -I	L = 0	T = 0	P = 4	Credits = 4

Evaluation Scheme	Continuous Evaluation	ESE	Total	ESE Duration
	40	60	100	2 Hrs

Course Objectives

1. To identify the project problem statement by doing the literature survey
2. To define and prepare road map to get a desired output.
3. To gain knowledge and implement it to get a desired output for project problem statement.

Course Outcome

Students will be able to complete their framework of project and start working for project phase-II, where the focus will be about implementation of project.

Mapping of POs & PSOs with PEOs

		Program Outcome and Program Specific Program Outcome												
		a	b	c	d	e	f	g	h	i	j	k	l	m
Program Educational Objectives	I	√		√	√	√	√	√	√			√	√	√
	II	√	√	√		√						√	√	√
	III		√	√	√	√						√		
	IV				√		√	√	√		√			
	V								√	√	√		√	√

ET415	Antenna Theory and Design	L= 4	T = 0	P = 0	Credits = 4

Evaluation Scheme	MSE-I	MSE-II	TA	ESE	Total	ESE Duration
	15	15	10	60	100	3 Hrs

Course Objectives

1. Ability to calculate antenna parameters (radiation pattern, beam width, lobes, directivity, gain,
2. impedance, efficiency, polarization)
3. Ability to analyze wire antennas (monopoles, dipoles, and loops).
4. Ability to analyze and design antenna arrays.
5. 4 Understand the operation of broadband and traveling wave antennas.
6. 5 Understand the operation of aperture and reflector antennas.
7. Ability to analyze and design microstrip antennas.

UNIT-1:

BASIC ANTENNA CONCEPTS:

Types of antennas, Radiation mechanism, Beam solid angle, radiation intensity, Directivity, effective aperture, beam efficiency, Antenna field zones, Polarization, impedance, bandwidth, impedance, effective length, antenna temperature

07Hrs

UNIT-2:

DIPOLE ANTENNA RADIATION:

Scalar and vector potentials, retarded potentials, field due to a current elements, power radiated and radiation resistance for field due to a dipole, power radiated and radiation resistance, Earth curvature, Half wave dipole antenna radiated fields of short dipole, small loop and helical Antenna, Radiation resistance, Directivity and Design Feature. Half wave dipole: radiated fields and other feature

07Hrs

UNIT-3

LOOP ANTENNAS AND ARRAYS:

circular loop ,polygonal loop and ferrite loop antenna**,** circular loop antenna with constant current, Two element array, linear array, N- element array ,uniform ,broad side, end fire ,Non uniform Amplitude antenna array**,** planar and circular array

08Hrs

UNIT-4:

TRAVELING WAVE AND BROAD BAND DIPOLE

Introduction, traveling wave antenna, long wire, V antenna, rhombic antenna, Broadband antennas, Helical antenna, Electric-Magnetic Dipole, Yagi-Uda array of linear Elements, Yagi array of loops

08Hrs

UNIT-5

SPECIAL ANTENNAS:

Aperture Antennas: Rectangular aperture, Circular aperture, Babinet's principle, Horn antenna: conical horn, corrugated Horn, Multimode horn reflector antenna: plane reflector, corner reflector, corner, parabolic, spherical, Patch Antenna

08Hrs

UNIT-6:

ANTENNA MEASUREMENTS:

Antenna Range, Radiation Pattern, Gain Measurement, Directivity Measurement, Radiation Efficiency, Impedance Measurement, Current Measurement, Polarization Measurement

07Hrs

ET415	Antenna Theory and Design	L= 4	T = 0	P = 0	Credits = 4

Evaluation Scheme	MSE-I	MSE-II	TA	ESE	Total	ESE Duration
	15	15	10	60	100	3 Hrs

Text books:				
1	Antenna Theory Analysis and Design Technology	1982 Third edition	Balanis E.S.	Wiley India
2	Antennas	II edition 1988	John D.Krauss	McGraw-Hill International edition
Reference books:				
1	Electromagnetic waves and Radiating systems	1993	Edward C.Jordan, Keith G.Balmain	Prentice Hall of India 1Td
2	Antennas and Radio Propagation	1985	R.E. Collins	McGraw-Hill

Course Outcome

1. Ability to calculate antenna parameters (radiation pattern, beam width, lobes, directivity, gain, impedance, efficiency, polarization)
2. Ability to analyze wire antennas (monopoles, dipoles, and loops).
3. Ability to analyze and design antenna arrays.
4. Understand the operation of broadband and traveling wave antennas.
5. Understand the operation of aperture and reflector antennas. Lectures,
6. Ability to analyze and design microstrip antennas

Mapping of POs & PSOs with PEOs

		a	b	c	d	e	f	g	h	i	j	k	l	m
Program Educational Objectives	I	√		√		√						√	√	√
	II	√	√	√		√				√		√	√	√
	III		√	√		√						√		
	IV													
	V									√			√	√

Chairperson		Date of Release	May 2013	Applicable for AY 2013-14 Onwards
Dean (Acad. Matters)		Version	1.00	

ET416	Antenna Theory and Design Laboratory	L = 0	T = 0	P = 2	Credits = 1
Evaluation Scheme	Continuous Evaluation	ESE		Total	ESE Duration
	40	60		100	2 Hrs
Course Objective					
To plot and analyze the characteristics of the following antennas					

Expt. No	Ten Experiments Based on
1	Dipole
2	Half Wave Dipole
3	Monopole
4	Yagi Antenna
5	Boardside array
6	Endfire array
7	Loop Antenna
8	Crossed Dipole
9	Lock Periodic Antenna
10	Slot Antenna
11	Helix Antenna
12	Microstrip Antenna

ET 417	CMOS VLSI Design	L= 4	T = 0	P = 0	Credits = 4

Evaluation Scheme	MSE-I	MSE-II	TA	ESE	Total	ESE Duration
	15	15	10	60	100	3 Hrs

Course Objectives

The objective of this subject is to study detailed treatment of the MOS transistor with all its relevant aspects; to the static and dynamic operation principles, analysis, and design of basic inverter circuit; and to the structure and operation of combinational and sequential logic gates.

UNIT-1: Introduction of MOSFETs

MOS Physics, NMOS Enhancement Transistor, MOS Transistor Operations, PMOS Enhancement Transistor, Regions of Operations, Threshold Voltage, MOS Device Equations, Small Signal Modeling of MOSFETs.

08 Hrs

UNIT-2: Physical Structure and Fabrication of CMOS IC

Integrated Circuit Layers, MOSFETs, CMOS Layers, Overview of Silicon Processing, N-Well Process, P-Well Process, Basic Physical Design of Simple Logic Gates, Stick Diagram, Euler's Path, Twin Tub Process, Silicon on Insulator (SOI) Process, Latch-up Effect.

07 Hrs

UNIT-3: Logic Design With MOSFETs

Ideal Switches and Boolean Operations, MOSFETs as Switches, Basic Logic Gates in CMOS , Compound Gates in CMOS , Transmission Gate Circuits(TG),Pass Transistor, Multiplexers.

07 Hrs

UNIT-4: MOS inverter Characteristics:

Resistive load inverter, Inverters with n type MOSFET load, CMOS inverter, Principle of operation, DC characteristics, Tristate Inverter, Noise Margin, Introduction to Bi-CMOS Inverter.

07 Hrs

UNIT-5 : Analysis of CMOS Logic Gates

MOS Device Capacitance, Switching Characteristics, Rise Time, Fall Time, Propagation Delay, Power Dissipation in CMOS, Charge Sharing, Fan-in , Fan-out, Combinational circuit design, static CMOS, Ratioed Logic circuits, sequential circuit, Latches and Flip Flops

07 Hrs

UNIT-6: Advanced Techniques in CMOS Logic Circuits

Complex Logic Structures, Complementary Static CMOS, Pseudo NMOS Logic, Dynamic CMOS Logic, CMOS Domino Logic, CMOS Pass Transistor Logic and Flip-Flops.

08 Hrs

Text books:				
1	Introduction to VLSI Circuits and Systems	First Edition	John P. Uyemura	Wiley Publication
2	Principle of CMOS VLSI Design	2nd Edition, 1994	Neil H. E. Weste, K. Eshraghian	Addison Wesley VLSI Series

Chairperson		Date of Release	May 2013	Applicable for AY 2013-14 Onwards
Dean (Acad. Matters)		Version	1.00	

ET 417	CMOS VLSI Design	L= 4	T = 0	P = 0	Credits = 4

Evaluation Scheme	MSE-I	MSE-II	TA	ESE	Total	ESE Duration
	15	15	10	60	100	3 Hrs

Reference books:				
1	CMOS VLSI Design	3rd Edition, 2005	Pucknell , K. Eshraghian	Prentice Hall
2	CMOS Digital Integrated circuits Analysis and Design	Third edition, 2008	Sung-Mo Kang, Yusuf leblebici	TataMc Graw Hill

Course Outcome

1. Be able to use mathematical methods and circuit analysis models in analysis of CMOS digital electronics circuits, including logic components and their interconnect.
2. Be able to create models of moderately sized CMOS circuits that realize specified digital functions.
3. Be able to apply CMOS technology-specific layout rules in the placement and routing of transistors and interconnect, and to verify the functionality, timing, power, and parasitic effects.

Mapping of POs & PSOs with PEOs

		a	b	c	d	e	f	g	h	i	j	k	l	m
Program Educational Objectives	I	√		√								√	√	√
	II	√	√	√								√	√	√
	III		√	√								√		
	IV													
	V												√	√

ET418	CMOS VLSI Laboratory	L = 0	T = 0	P = 2	Credits = 1
Evaluation Scheme	Continuous Evaluation	ESE		Total	ESE Duration
	40	60		100	2 Hrs

Course Objectives	
1. To introduce the fundamental principles of VLSI circuit design & layout 2. To provide hands-on design experience using tanner tool.	
Sr. No.	**Ten Experiments Based on**
1	Introduction to EDA Tool.
2	Plot the transfer characteristics of NMOS using EDA Tools
3	Plot the transfer characteristics of PMOS transistor using EDA Tools
4	Plot the transfer characteristics of CMOS Inverter using EDA Tools
5	Gate Level Analysis of NAND Gate
6	Gate Level Analysis of NOR Gate
7	Gate Level Analysis of Transmission Gate
8	Designing of low power D Flip-flop

ET419	Power Electronics	L= 3	T = 0	P = 0	Credits = 3

Evaluation Scheme	MSE-I	MSE-II	TA	ESE	Total	ESE Duration
	15	15	10	60	100	3 Hrs

Course Objectives

To make familiar with the SCR & other power devices, power controller, various techniques of improving power factor, different methods of commutation

UNIT-1:

Power Semiconductor Diodes and Circuits, control Characteristics of power devices, power modules, power diodes, reverse recovery, series, shunt connected diodes, Diode Rectifiers—single phase, three phase rectifiers, bride rectifiers, design of rectifiers

05 Hrs

UNIT-2:

Power Transistors, Switching characteristics of BJT, Power MOSFETs, IGBTs, limitations, Power Thyristors

06 Hrs

UNIT-3:

Pulse-width Modulated Inverters: Principle, single phase, multiple phase, PWM Forced commuted inverters, current source inverters, design of inverter, DC-DC Converters, Step up, stepdown, SMPS, thyrister Choppers, design of choppers

06 Hrs

UNIT-4:

Resonant Pulse Inverters—Series, parallel, resonant inverters, Class E resonant inverter, Zero voltage/current Switching resonant inverter Multilevel Inverters

06 Hrs

UNIT-5:

Controlled Rectifiers: phase control converter, single phase, three phase converters, power factor improvement. AC Voltage Controllers. Principle of ON-OFF control, Phase control, Single phase controllers, three phase controllers, cyclo-converters

06 Hrs

UNIT-6:

Power Supplies, SMPS, SM ac power supplies, power factor conditioning Gate Drive Circuits- Protection of Devices and Circuits Snubber, reverse recovery transients, protection devices varisters, Introduction to AC and DC drives.

06 Hrs

Text books:

1	Power Electronics:Circuits,Devices and Applications	Second Edition 1993	M. Rashid	PHI

Reference books:

1	Power Electronics and its application	Second Edition, 2004	Alok Jain	Penram International Publishing Pvt Ltd

Course Outcome

1. Learn the principles of operation of power electronic converters
2. Understand how to design inverter, dc-dc power converters
3. Introduce the concept of switching losses
4. Understand the principles of operation of Controlled Rectifiers

Chairperson		Date of Release	May 2013	Applicable for AY 2013-14 Onwards
Dean (Acad. Matters)		Version	1.00	

ET420	Wireless Mobile Communication Systems	L= 3	T = 0	P = 0	Credits = 3

Evaluation Scheme	MSE-I	MSE-II	TA	ESE	Total	ESE Duration
	15	15	10	60	100	3 Hrs

Course Objectives:

1. To study cellular concept and techniques to improve capacity in cellular system.
2. To study mobile radio environment and its different parameters.
3. To learn different modulation techniques for mobile communication.
4. To study fundamentals of equalization, diversity & its techniques.
5. To study multiple access techniques.

UNIT-1: Introduction to Wireless Communication Systems:

Evolution of Mobile Radio Communications Mobile Radio Systems around the world. Examples of Wireless Communication Systems, Comparison of common wireless communication systems, trends of cellular radio and personal communications, Second generation (2G) cellular Networks, Third generation (3G) cellular Networks, wireless local loops and LMDS

05 Hrs

UNIT-2: The Cellular Concept :

Evolution of mobile radio communication, Cellular telephone system, frequency reuse, channel assignment and handoff strategies, interference and system capacity, trunking and grade of service, improving capacity in cellular system

06 Hrs

UNIT-3: Mobile Radio Propagation- Large & Small Scale Path Loss & Fading:

Introduction to Radio Wave Propagation, Reflection, Diffraction, Scattering Practical Link Budget Design Using Path Loss Models, Signal Penetration into Buildings, Ray Tracing & Site Specific Modeling. Small Scale Multipath Propagation, Small Scale Multipath Measurements, Parameters of Mobile Multipath Channels, Types Of Small Scale Fading, Rayleigh & Rician Distribution

06 Hrs

UNIT-4: Equalization & Diversity:

Fundamentals of equalization, space polarization, frequency and time diversity techniques, space diversity, polarization diversity, frequency and time diversity. RAKE Receiver

06 Hrs

UNIT-5: Wireless Systems and Standards:

GSM- global system for mobile: services and features, GSM system architecture, GSM radio subsystem, GSM channel types, GSM frame structure, signal processing in GSM, introduction to CDMA digital cellular standard(IS-95)

06 Hrs

UNIT-6: Wireless Networking:

Introduction to wireless networks, Differences Between Wireless & Fixed Telephone Networks, Development of wireless networks, Traffic routing in wireless networks, Wireless data services, Common channel signaling, Signaling System No 7.An Example of SS7, SIP -Global Cellular Network Interoperability

06 Hrs

ET420	Wireless Mobile Communication Systems	L= 3	T = 0	P = 0	Credits = 3

Evaluation Scheme	MSE-I	MSE-II	TA	ESE	Total	ESE Duration
	15	15	10	60	100	3 Hrs

Text books:				
1	Wireless Communication – Principles and practice	Second edition	by T S. Rappaport	(Prentice Hall PTR, upper saddle river, New Jersey.)
2	Digital Communication		Proakis	

Reference books:				
1	Wireless digital communication	1995	by Kamilo Feher	PHI
2	Mobile Communications Design fundamentals	1993	by William C. Y. Lee	John Willey
3	Mobile Cellular Communication	2005	by W .C .Y. Lee	Mc Graw Hill

Course Outcome:

After learning this subject the students will be able to:

1. Design a model of cellular system communication and analyze their operation and performance.
2. Quantify the causes and effects of path loss and signal fading on received signal characteristics.
3. The students will construct and analyze the GSM system

Mapping of POs & PSOs with PEOs

		a	b	c	d	e	f	g	h	i	j	k	l	m
Program Educational Objectives	I	√				√			√					
	II	√				√				√				
	III					√			√					
	IV								√					
	V								√	√				

Chairperson		Date of Release	May 2013	Applicable for AY 2013-14 Onwards
Dean (Acad. Matters)		Version	1.00	

ET421	Satellite Communication	L= 3	T = 0	P = 0	Credits = 3

Evaluation Scheme	MSE-I	MSE-II	TA	ESE	Total	ESE Duration
	15	15	10	60	100	3 Hrs

Course Objectives

Students will achieve a broad understanding of the current trends in satellite communications systems and technologies as well as the future directions of the subject area. They will be able to plan satellite systems for quality of service and understand how new technology will enhance and open up new markets

UNIT-1:

ORBIT DYNAMICS

Kepler's Laws, Newton's law, orbital parameters, orbital perturbations, Orbit Dynamics, station keeping, geo stationary and non Geo-stationary orbits, frequency allocation, frequency co-ordination and regulatory services, sun transit outrages, limits of visibility, launching vehicles and propulsion

06 Hrs

UNIT-2:

SPACE SEGMENT

Space craft configuration, communication Payload and supporting subsystems, satellite up link, down link, link power budget, c/no. G/T, Noise temperature, System noise, propagation factors, rain and ice effects, polarization

06 Hrs

UNIT-3

SATELLITE ACCESS:

Modulation and Multiplexing , Multiple Access Techniques : Voice, Data, Video, Analog – digital transmission system, Digital video Broadcast, FDMA, TDMA, CDMA, Assignment Methods, Spread Spectrum communication, compression – encryption

06 Hrs

UNIT-4:

EARTH SEGMENT

Transmitters, receivers, Antennas, Terrestrial Interface, TVRO, MATV, CATV, Test Equipments Measurements on G/T, C/No, EIRP, Antenna Gain

06 Hrs

UNIT-5

SATELLITE APPLICATIONS :

INTELSAT Series, INSAT, VSAT, Facsimile system, Weather service, Remote sensing, mobile satellite services: GSM, GPS, INMARSAT, LEO, MEO, Satellite Navigational System

06 Hrs

UNIT-6:

DIRECT BROADCAST

Direct Broadcast satellites (DBS), Direct to home Broadcast (DTH), Digital audio broadcast (DAB), Business TV(BTV), GRAMSAT, Specialized services – E –mail, Video conferencing, internet

06 Hrs

ET421	Satellite Communication	L= 3	T = 0	P = 0	Credits = 3

Evaluation Scheme	MSE-I	MSE-II	TA	ESE	Total	ESE Duration
	15	15	10	60	100	3 Hrs

Text books:				
1	Satellite Communication	1989	Dennis Rody	Regents/Prentice Hall, Englewood cliffs, New Jersey
2	Satellite Communication Systems Engineering	1993	Wilbur L. Pritchard, Hendri G. Suyderhoud, Robert A. Nelson	Prentice Hall, II Edition
Reference books:				
1	Design of Geosynchronous Space Craft	1986	N. Agarwal	Prentice Hall
2	The Satellite Communication Applications	1997	Bruce R. Elbert	Hand Book, Artech House Bostan London
3	Digital Satellite Communication'	II edition, 1990	Tri T. Ha	
4	Manual of Satellite Communications'	1984	E manuel Fthenakis	McGraw Hill Book Co
			Pratt	

Course Outcome:

1. Identify the fundamentals of orbital mechanics, the characteristics of common orbits used by communications and other satellites, and be able to discuss launch methods and technologies.
2. Understand and apply the knowledge of satellite communication to various broadcast techniques like DTH,DA,BTV.

Mapping of POs & PSOs with PEOs

		a	b	c	d	e	f	g	h	i	j	k	l	m
Program Educational Objectives	I	√				√			√					
	II	√				√				√				
	III					√			√					
	IV								√					
	V								√	√				

Chairperson		Date of Release	May 2013	Applicable for AY 2013-14 Onwards
Dean (Acad. Matters)		Version	1.00	

ET422	Fuzzy Logic & Neural Network	L= 3	T = 0	P = 0	Credits = 3

Evaluation Scheme	MSE-I	MSE-II	TA	ESE	Total	ESE Duration
	15	15	10	60	100	3 Hrs

Course Objectives

Soft computing refers to principle components like fuzzy logic, neural networks, which have their roots in Artificial Intelligence. Healthy integration of all these techniques has resulted in extending the capabilities of the technologies to more effective and efficient problem solving methodologies

UNIT-1:

Introduction of neural networks, NN Architecture Neural learning and laws, Applications of ANN Evaluation of network,

Supervised Learning :

Single layer network : MP neuron, Perceptron, Perceptron training algorithm, LMS algorithm , ADALINE

06 Hrs

UNIT-2:

Supervised Learning :

Multiplayer network: Multilevel Discrimination, Backpropogation Algorithm, Setting the parameter values, Accelerating the learning Process, MADALINE, Adaptive Multilayer Networks, Recurrent Network, RBF networks

06 Hrs

UNIT-3:

Unsupervised Learning : Winner Take Network, Learning Vector Quantizer, ART Networks, self-organizing feature maps, Associate Models

06 Hrs

UNIT-4:

Overview of Crisp Sets, Concepts of Fuzzy sets, representation of fuzzy sets, extension principle, fuzzy compliments, t-norms and t- conforms

06 Hrs

UNIT-5:

Fuzzy numbers, arithmetic operation on intervals and on fuzzy sets, lattice of fuzzy numbers, fuzzy equations, fuzzy relations, projections and cylendric extensions, binary fuzzy relations, fuzzy equivalence, compatibility and ordering relations, fuzzy morphism

06 Hrs

UNIT-6:

Fuzzy controllers, Defuzzification Methods , Fuzzy Inference Techniques, applications of fuzzy logic in pattern recognition and image processing

06 Hrs

Text books:				
1.	Fuzzy sets and Fuzzy logic	1995	by George Klir, Bo Yuan	PHI
2.	Elements of Artificial Neural Network	1997	K. Mehrotra	MIT Cognet

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ET422	Fuzzy Logic & Neural Network	L= 3	T = 0	P = 0	Credits = 3

Evaluation Scheme	MSE-I	MSE-II	TA	ESE	Total	ESE Duration
	15	15	10	60	100	3 Hrs

Reference books:				
1.	Neural Networks, a comprehensive foundation	1999	By Simon Haykins	PHI
2.	Artificial Neural Networks	2004	By B. Yegnanarayana	PHI
3.	Fuzzy Logic & Applications	2003	J. Ross, TMH/Mc	Mc Graw Hill
4.	Neural Networks, Fuzzy logic and Genetic Algorithms, Synthesis and applications	2003	By S. Rajsekharan, Vijayalaxmi Pai	PHI
			Timothy Ross	

Course Outcome:

After learning this subject the students will be able to:

1. To learn the various architectures of building an ANN and its applications
2. Fundamentals of Crisp sets, Fuzzy sets and Fuzzy Relations
3. Apply fuzzy logic and reasoning to handle uncertainty and solve engineering problems

Mapping of POs & PSOs with PEOs

		a	b	c	d	e	f	g	h	i	j	k	l	m
Program Educational Objectives	I	√			√							√		√
	II	√										√		√
	III				√							√		
	IV				√									
	V													√

Chairperson		Date of Release	May 2013	Applicable for AY 2013-14 Onwards
Dean (Acad. Matters)		Version	1.00	

ET423	Fuzzy Logic & Neural Network Laboratory	L = 0	T = 0	P = 2	Credits = 1
Evaluation Scheme	Continuous Evaluation	ESE		Total	ESE Duration
	40	60		100	2 Hrs

Course Objectives

Develop and implement a basic trainable neural network or a fuzzy logic system for a typical control, computing application or biomedical application.

Sr. No.	Ten Experiments Based on
1.	Perceptron , LMS and Adaline
2.	Backpropogation Algorithm
3.	Unsupervised Learning:
4.	Fuzzy sets and representation of fuzzy sets
5.	Fuzzy numbers
6.	Arithmetic operation on fuzzy sets
7.	Fuzzy Controller

ET424	R.F. Circuit Design	L= 3	T = 0	P = 0	Credits = 3

Evaluation Scheme	MSE-I	MSE-II	TA	ESE	Total	ESE Duration
	15	15	10	60	100	3 Hrs

Course Objectives

Students will achieve a broad understanding of the current trends in RF circuit design. Student will learn the fundamentals of RF circuit design along with broad understanding of design of CMOS Radio-Frequency Integrated Circuits. Thus they will be finally able to design application based RF circuit

UNIT-1:

Introduction, History of wireless Communication, Noncellular wireless Applications, Shannon , Modulations, Propagation, Parallel RLC Tank Circuit, Series RLC Circuit , RLC Network as Impedance Transformer ,Skin Effect, Resistor,Capactor, Inductor, Transformer

06 Hrs

UNIT-2:

MOSFET Physics, MOS Device Physics in Short Channel Regime , Other Effects, Link Between Lumped and Distributed Regime ,Driving Point impedance at iterated structures , Transmission line , Behavior of finite length Transmission line, Artificial lines

06 Hrs

UNIT-3:

Review of Smith Chart and S- Parameter, Bandwidth Estimation Techniques , Rise time , Delay , Open Circuit Time Constant , Short Circuit Time constant

06 Hrs

UNIT-4:

Introduction to High Frequency Amplifier Design, Zeros as Bandwidth Enhancer , The shunt series Amplifier, Tuned Amplifiers, Neutralization and Unilateralization Cascaded Amplifiers, AM-PM Conversion

06 Hrs

UNIT-5:

Introduction to Voltage references and Biasing, Review of Diode Behavior, Diodes and Bipolar transistors in CMOS Technology Supply independent bias circuits, Band gap Voltage References, Amplifier linearity, Noise and Noise Figure analysis, Introduction to Mixers

06 Hrs

UNIT-6:

Introduction to RF Power Amplifiers, Classification of Power Amplifiers, Modulation of Power Amplifiers, Introduction to Phase lock loops , Linear zed PLL Model, Phase Detector, Sequential Phase Detector, Loop Filters and Charge Pumps

06 Hrs

Text books:				
1	The Design of CMOS Radio-Frequency Integrated Circuits	Second Edition	by Thomas H. Lee	
2	RF Circuit Design Theory and Applications		R. Ludwig & P. Bretchko	

ET424	R.F. Circuit Design	L= 3	T = 0	P = 0	Credits = 3

Evaluation Scheme	MSE-I	MSE-II	TA	ESE	Total	ESE Duration
	15	15	10	60	100	3 Hrs

Reference books:				
1	Analysis and Design of Analog Integrated Circuits		By Paul R. Gray	
			Razavi	

Course Outcome:

Students will be equipped with the knowledge of basic circuit theory and/or an exposure to microelectronics and will be able to cover the entire spectrum from the basic principles of transmission and microstrip lines to the various high-frequency circuit design procedures.

Mapping of POs & PSOs with PEOs

		a	b	c	d	e	f	g	h	i	j	k	l	m
Program Educational Objectives	I	√		√		√				√		√	√	√
	II	√	√	√		√						√	√	√
	III		√	√		√						√		
	IV													
	V									√			√	√

Chairperson		Date of Release	May 2013	Applicable for AY 2013-14 Onwards
Dean (Acad. Matters)		Version	1.00	

ET425	R.F. Circuit Design Lab	L = 0	T = 0	P = 2	Credits = 1
Evaluation Scheme	Continuous Evaluation	ESE		Total	ESE Duration
	40	60		100	2 Hrs
Course Objectives					
Design and Testing of RF Circuits					

Sr. No.	Ten Experiments Based on
1	RF Tuned Amplifier
2	RF Oscillator
3	RF Crystal Oscillator
4	IF Amplifier
5	RF Mixer
6	RF Filters (LP, HP, BP, Notch Filter)
7	RLC circuits
8	S parameters

ET426	Multimedia Communications	L= 3	T = 0	P = 0	Credits = 3

Evaluation Scheme	MSE-I	MSE-II	TA	ESE	Total	ESE Duration
	15	15	10	60	100	3 Hrs

Course Objectives

1. To learn the basics of analog and digital video: video representation and transmission
2. To analyze analog and digital video signals and systems
3. To acquire the basic skill of designing video compression
4. To familiarize with video compression standards

UNIT-1:

Fundamental concepts in Text and Image: Multimedia and hypermedia, world wide web,overview of multimedia software tools. Graphics and image data representation graphics/image data types, file formats, Color in image and video: color science, color models in images, color models in video

06 Hrs

UNIT-2:

Fundamental concepts in video and digital audio: Types of video signals, analog video,digital video, digitization of sound, MIDI, quantization and transmission of audio

06 Hrs

UNIT-3:

Multimedia data compression: Lossless compression algorithm: DCT, Wavelet- Based Coding, Embedded Zerotree of Wavelet Coefficients Set Partitioning in Hierarchical Trees (SPIHT), Basic Audio Compression Techniques

06 Hrs

UNIT-4:

Basic Video Compression Techniques: Introduction to video compression, video compression based on motion compensation, search for motion vectors, MPEG, MPEG2, MPEG4

06 Hrs

UNIT-5:

Multimedia Networks: Basics of Multimedia Networks, Multimedia Network Communications and Applications : Quality of Multimedia Data Transmission, Multimedia over IP, RTCP,RTP,SIP-Transport of MPEG-4, Media-on-Demand(MOD) **,**

06 Hrs

UNIT-6:

Content-Based Retrieval in Digital Libraries C-BIRD— A Case Study ,C-BIRD GUI Color Histogram Color Density Color Layout Texture Layout Search by Illumination Invariance Search by Object Model

06 Hrs

Text books:				
1	Fundamentals of Multimedia	2004	Ze-Nian Li , Mark S Drew	PHI/Pearson Education
2	Multimedia Applications	2004	Steinmetz, Nahrst	Springer

Chairperson		Date of Release	May 2013	Applicable for AY 2013-14 Onwards
Dean (Acad. Matters)		Version	1.00	

ET426	Multimedia Communications	L= 3	T = 0	P = 0	Credits = 3

Evaluation Scheme	MSE-I	MSE-II	TA	ESE	Total	ESE Duration
	15	15	10	60	100	3 Hrs

Reference books:				
1	Multimedia Communications: Applications, Networks, Protocols and Standars	2001	Fred Halsall	Addison-Wesley

Course Outcome:

Students will be able to do

1.Graphics/image/video/audio data representations, including color models, HDTV, MIDI, and audio coding

2.Compression formats and standards for data, images, audio, and video, including both lossless and lossy formats

3.Multimedia networks, considering QoS, VoIP, media-on-demand, and multimedia over wireless networks

4.Content-based retrieval in digital libraries

Mapping of POs & PSOs with PEOs

		a	b	c	d	e	f	g	h	i	j	k	l	m
Program Educational Objectives	I	√		√		√				√		√	√	√
	II	√	√	√		√						√	√	√
	III		√	√		√						√		
	IV													
	V									√			√	√

ET427	Multimedia Communications Laboratory	L = 0	T = 0	P = 2	Credits = 1
Evaluation Scheme	Continuous Evaluation	ESE		Total	ESE Duration
	40	60		100	

Course Objectives
Develop hands-on experience using software on multimedia communication techniques.

Sr. No.	Ten Experiments Based on
1.	Sampling and Reconstruction
2.	Compression Techniques
3.	Image and video formats
4.	Content based image retrieval
5.	Network Simulations (NS2)

ET428	Project Phase-II	L = 0	T = 0	P = 6	Credits = 6

Evaluation Scheme	Continuous Evaluation	ESE	Total	ESE Duration
	40	60	100	

Course Objectives
1. Implementation of project problem statement. 2. Testing, verification and validation of results.

Course Outcome
At the end of Project phase II , the student will be able to demonstrate the knowledge gained and Apply the same in practice .

Mapping of POs & PSOs with PEOs

		Program Outcome and Program Specific Program Outcome												
		a	b	c	d	e	f	g	h	i	j	k	l	m
Program Educational Objectives	I	√		√	√	√	√	√	√			√	√	√
	II	√	√	√		√						√	√	√
	III		√	√	√	√						√		
	IV				√		√	√	√		√			
	V								√	√	√		√	√

ET429	Comprehensive Viva-Voce	L = 0	T = 0	P = 0	Credits = 3

Evaluation Scheme	Continuous Evaluation	ESE	Total	ESE Duration
		100	100	

Course Objectives
To prepare the students for various competitive exams and personal interviews

Course Outcome
The students will be able to demonstrate their technical knowledge which they have learnt throughout the program.

		Program Outcome and Program Specific Program Outcome												
		a	b	c	d	e	f	g	h	i	j	k	l	m
Program Educational Objectives	I						√	√	√					
	II													
	III													
	IV						√	√	√		√			
	V								√		√			

ET430	Competitive Exam/Extra Curricular	L = 0	T = 0	P = 0	Credits = 2

Evaluation Scheme	Continuous Evaluation	ESE	Total	ESE Duration
		100	100	

Course Objectives
To develop the students personality to face the challenges in life.

Course Outcome
The students will be able to demonstrate their technical knowledge which they have learnt throughout the program.

		Program Outcome and Program Specific Program Outcome												
		a	b	c	d	e	f	g	h	i	j	k	l	m
Program Educational Objectives	I	√		√		√	√	√	√					
	II	√		√		√								
	III			√		√								
	IV						√	√	√		√			
	V								√	√	√			