GOVERNMENT COLLEGE OF ENGINEERING, AURANGABAD

(An Autonomous Institute of Government of Maharashtra)

Department of Electronics& Telecommunication Engineering

Teaching and Evaluation Scheme

ME (Full-Time) in Electronics Engineering

SEMESTER-I

THEORY COURSES													
S. No.	**Course Code**	**Subject**	**Scheme of Teaching (Hrs/Week)**			**Total Credits**	**Scheme of Evaluation (Marks)**					
							Theory			**Term Work**	**Practical/Viva-voce**	**Total**
			L	**T**	**P**		**Test**	**TA**	**ESE**			
1	ET 541	Advance Digital Signal Processing	3	1	-	4	20	20	60	-	-	100
2	ET 542	Digital System Design	3	1	-	4	20	20	60	-	-	100
3	ET 543	Advance Industrial Automation	3	1	-	4	20	20	60	-	-	100
4	ET 544	Digital Communication System	3	1	-	4	20	20	60	-	-	100
5	ET 545-548	Elective-I	3	1	-	4	20	20	60	-	-	100
LABORATORY COURSES												
6	ET 549	Seminar-I	-	-	4	2	-	-	-	50	-	50
7	ET 550	System Lab-I	-	-	4	2	-	-	-	-	50	50
			15	**5**	**8**	**24**	**100**	**100**	**300**	**50**	**50**	**600**

Elective I: ET 545 (i) VLSI Design ET 546(ii) Digital Image Processing and Applications

ET 547(iii) Advance Antennas & Arrays ET 548(iv) Solid State Devices

SEMESTER-II

THEORY COURSES													
S. No.	**Course Code**	**Subject**	**Scheme of Teaching (Hrs/Week)**			**Total Credits**	**Scheme of Evaluation (Marks)**					
							Theory			**Term Work**	**Practical/Viva-voce**	**Total**
			L	**T**	**P**		**Test**	**TA**	**ESE**			
1	ET 551	Computer Network and Information Security	3	1	-	4	20	20	60	-	-	100
2	ET 552	Embedded System Design	3	1	-	4	20	20	60	-	-	100
3	ET 553	Industrial Drives and Control	3	1	-	4	20	20	60	-	-	100
4	ET 554	Wireless and Mobile Communication	3	1	-	4	20	20	60	-	-	100
5	ET 555-558	Elective-II	3	1	-	4	20	20	60	-	-	100
LABORATORY COURSES												
6	ET 559	Seminar-II	-	-	4	2	-	-	-	50	-	50
7	ET 560	System Lab-II	-	-	4	2	-	-	-	-	50	50
			15	**5**	**8**	**24**	**100**	**100**	**300**	**50**	**50**	**600**

Elective-II: ET 555 (i) CMOS Based RF Design ET 556 (ii) Pattern Recognition

ET 557 (iii) Wireless Sensor Network ET 558 (iv) Nanotechnology

GOVERNMENT COLLEGE OF ENGINEERING, AURANGABAD

(An Autonomous Institute of Government of Maharashtra)

Department of Electronics& Telecommunication Engineering

Teaching and Evaluation Scheme

ME (Full-Time) in Electronics Engineering

SEMESTER-III

THEORY COURSES													
S. No.	**Course Code**	**Subject**	**Scheme of Teaching (Hrs/Week)**			**Total Credits**	**Scheme of Evaluation (Marks)**					
			L	**T**	**P**		**Theory**			**Term Work**	**Practical/ Viva-voce**	**Total**
							Test	**TA**	**ESE**			
1	ET561	Institute Elective	03	01	-	04	20	20	60			100
2	GE612	Environmental Studies	03	-	-	03	20	20	60			100
LABORATORY COURSES												
1	ET603	Dissertation-I			20	10				100		100
			03	**01**	**20**	**14**	**20**	**20**	**60**	**100**		**200**

SEMESTER-IV

LABORATORY COURSES												
S. No.	**Course Code**	**Subject**	**Scheme of Teaching (Hrs/Week)**			**Total Credits**	**Scheme of Evaluation (Marks)**					
			L	**T**	**P**		**Theory**			**Term Work**	**Practical/ Viva-voce**	**Total**
							Test	**TA**	**ESE**			
1	ET604	Dissertation-II			28	14				100	100	200
						14						200

L-Lectures, T-Tutorials, P-Practical, TA-Teacher Assessment, ESE-End-Semester Examination

ET561 – Soft Computing

GOVERNMENT COLLEGE OF ENGINEERING, AURANGABAD

(An Autonomous Institute of Government of Maharashtra)

Department of Electronics& Telecommunication Engineering

Teaching and Evaluation Scheme

ME (Part-Time) in Electronics Engineering

THEORY COURSES												
S. No.	**Course Code**	**Subject**	**Scheme of Teaching (Hrs/Week)**			**Total Credits**	**Scheme of Evaluation (Marks)**					
							Theory			**Term Work**	**Practical/Viva-voce**	**Total**
			L	**T**	**P**		**Test**	**TA**	**ESE**			
		SEMESTER-I										
1	ET541	Advance Digital Signal Processing	3	1	-	4	20	20	60	-	-	100
2	ET542	Digital System Design	3	1	-	4	20	20	60	-	-	100
3	ET544	Digital Communication System	3	1	-	4	20	20	60	-	-	100
		Total Credit for Sem-I	**9**	**3**	**-**	**12**	**60**	**60**	**180**	**-**	**-**	**300**
		SEMESTER-II										
1	ET543	Advance Industrial Automation	3	1	-	4	20	20	60	-	-	100
2	ET545-548	Elective-I	3	1	-	4	20	20	60	-	-	100
3	ET554	Wireless and Mobile Communication	3	1	-	4	20	20	60	-	-	100
		Total Credit for Sem-II	**9**	**3**	**-**	**12**	**60**	**60**	**180**	**-**	**-**	**300**
		SEMESTER-III										
1	ET552	Embedded System Design	3	1	-	4	20	20	60	-	-	100
2	ET551	Computer Network and Information Security	3	1	-	4	20	20	60	-	-	100
LABORATORY COURSES												
3	ET549	Seminar-I	-	-	4	2	-	-	-	50	-	50
4	ET550	System Lab-I	-	-	4	2	-	-	-	-	50	50
		Total Credit for Sem-III	**06**	**2**	**8**	**12**	**40**	**40**	**120**	**50**	**50**	**300**
		SEMESTER-IV										
1	ET553	Industrial Drives and Control	3	1	-	4	20	20	60	-	-	100
2	ET555-558	Elective-II	3	1	-	4	20	20	60	-	-	100
LABORATORY COURSES												
3	ET559	Seminar-II	-	-	4	2	-	-	-	50	-	50
4	ET560	System Lab-II	-	-	4	2	-	-	-	-	50	50
		Total Credit for Sem-IV	**6**	**2**	**8**	**12**	**40**	**40**	**120**	**50**	**50**	**300**
		SEMESTER-V										
1	ET561	Institute Elective (SOFT COMPUTING)	03	01	-	04	20	20	60			100
2	GE612	Environmental Studies	03	-	-	03	20	20	60			100
LABORATORY COURSES												
3	ET603	Dissertation-I	-	-	20	10	-	-	-	100		100
		Total Credit for Sem-V	**03**	**01**	**20**	**17**	**20**	**20**	**60**	**100**		**200**
		SEMESTER-VI										
1	ET604	Dissertation-II			28	14	-	-	-	100	100	200
		Total Credit for Sem-VI			**28**	**14**	**-**	**-**	**-**	**100**	**100**	**200**

L-Lectures, T-Tutorials, P-Practical, TA-Teacher Assessment, ESE-End-Semester Examination

Elective-I: ET545 -(i) VLSI Design , ET-546-(ii) Digital Image Processing and Applications
ET547-(iii)Advance Antennas &Arrays, ET548- (iv) Solid State Devices

Elective-II: ET555-(i) CMOS Based RF Design , ET556 (ii) Pattern Recognition
ET557-(iii)Wireless Sensor Network , ET558 (iv) Nanotechnology

ET541: Advance Digital Signal Processing
Compulsory

Teaching Scheme			**Evaluation Scheme**	
Lectures	:	3 Hrs/Week	Test	20 Marks
Tutorials	:	1 Hrs/Week	Teacher Assessment	20 Marks
Total Credits	:	4	End-Semester Examination	60 Marks

Prerequisites :

Course Educational Objectives:

- To provide comprehensive coverage of Signal Processing
- To study spectral estimation methods
- To analyze and design filters
- To analyze multi-rate Digital Signal Processing Systems
- To study Wavelet transform
- To implement DSP algorithms using DSP Processors

Course Outcomes : Students will be able to

- Apply spectral estimation techniques for signals
- Analyze and design filters
- Apply Transform concepts to signal
- Analyze and design various real world problems using transforms and multirate Digital Signal Processing

UNIT-1

Spectral estimation: Estimation of spectra from finite duration signals, Nonparametric methods, Periodogram, Modified periodogram, Bartlett, Welch and Blackman-Tukey methods, Parametric methods: ARMA, AR and MA model based spectral estimation, Solution using Levinson-Durbin algorithm.

UNIT-2

Adaptive filters

Adaptive Signal Processing, Adaptive filters, Concepts: Adaptive filter as a Noise Canceller, Other configurations of the adaptive filter, Main components of the adaptive filter, Basic Wiener filter theory Wiener filter for filtering and prediction, FIR and IIR Wiener filters, Discrete Kalman filter, The basic LMS adaptive algorithm, Practical limitations of the basic LMS algorithm, Recursive Least Square Algorithm, Limitations, Factorization Algorithm Linear prediction, Forward and Backward prediction.

UNIT-3

Multi rate digital signal processing

Introduction to Multi-rate Digital Signal Processing, Sample rate reduction, decimation by integer factors, sampling rate increase, interpolation by integer facto, Design of practical sampling rate converters Filter Specification, filter requirement for individual stages, Determining the number of stages and decimation factors, Sampling rate conversion using poly-phase filter structure, poly-phase implementation of interpolators

UNIT-4

Wavelets

Wavelet Analysis, The Continuous Wavelet Transform, scaling, shifting, scale and frequency, The Discrete Wavelet Transform, One Stage filtering, Approximation and Details, Filter bank analysis, Multilevel Decomposition, Number of levels, Wavelet reconstruction, Reconstruction filter, Reconstructing Approximations and details Multilevel Reconstruction, Wavelet packet synthesis- Typical Applications

UNIT-5

DSP processor

General and special purpose DSP Processors, Computer Architecture for signal processing, Havard Architecture,

Pipelining, Hardware Multiply and Accumulate, Special Instructions, Replication, On-chip Memory Cache, Extended Parallelism, SIMD, VLIW and static super-scalar Processing, Brief study of TMS320C XX and ADSP 2106 processors

TEXT AND REFERENCE BOOKS

1. Proakis, J. G., Rader, C. M., Ling, F., and Nikias, C. L, Advanced Digital Signal Processing, Macmillan, 1992
2. J.G. Proakis & D. G. Manotakis Digital signal Processing, Principles algorithms & applications, PHI
3. Monson H. Hayes, Statistical Digital Signal Processing and Modeling, John Wiley and Sons, Inc, Singapore,2002
4. John J. Proakis, Dimitris G. Manolakis, Digital Signal Processing, Pearson Education, 2002
5. Rabiner, L. R. and Schafer, R. W Theory and Application of Speech Processing, PHI,1978
6. Widrow, B. and Stearns, S. D Adaptive Signal Processing, PHI,1985
7. Haykin, S, Adaptive Filter Theory,PHI,2001
8. Emmanuel C Ifeachor, Barrie W Jrevis, Digital Signal Processing, Pearson Education
9. Analog Devices & Texas Instruments Users Manuel of TMS320CX and ADSP 2106x.

Teacher Assessment:

Teachers Assessment is based on one of the or combination of few of following

1) Simulation
2) Application Development
3) Power point presentation
4) Question & Answer / Numerical solution
5) Study of Industry processes and its presentation
6) Mini projects

Designed by- Prof. R P Chaudhari

ET542: Digital System Design
Compulsory

Teaching Scheme			**Evaluation Scheme**	
Lectures	:	3Hrs/Week	Test	20 Marks
Tutorials	:	1Hrs/Week	Teacher Assessment	20 Marks
Total Credits	:	4	End-Semester Examination	60 Marks

Prerequisites :

Course Educational Objectives:

- To provide experience in designing integrated circuits using software tools
- To introduce the fundamental principles of VLSI circuit design
- To model, simulate, verify and synthesize with Hardware Description Languages
- To examine the basic building blocks of large-scale digital integrated circuits
- To develop different memory and programmable devices
- To design for testability concepts

Course Outcomes : Students will be able to

- Analyze the operation and performance of a finite state machine (FSM) design
- Simulate hardware description language-based digital systems designs through modern electronic design automation software.
- Design of simple SSI and MSI combinational and sequential circuits for a targeted problem
- verify and test digital logic circuits and work upon testability
- Synthesize large-scale digital systems designs suitable for Implementation on programmable device technologies.

UNIT-1

Analysis of Sequential systems: State tables and Diagrams, latches, flip flops, sequential machine analysis and design, Algorthmic State Machine diagrams, Design using ASM

UNIT-2

Design using VHDL: Hardware Description Languages, HDL Design Flow, Hardware Simulation, Hardware Synthesis, Levels of Abstraction, Entities and architectures, Data objects, types, design description, libraries, synthesis basics, mapping statements to Gates, model optimization, verification, test benches, Architectural synthesis, optimization.

UNIT-3

Combinational and sequential circuit designs:

Use VHDL to design adders, decoders, multiplexers, comparators, code converters, latches, flip-flops, shift registers, counters, ALU, CPU

UNIT-4

Memory, PAL, PLA, CPLDs and FPGAs

Design using ROM, Programmable Logic Arrays (PLA) and Programmable Array Logic (PAL).Types of memory devices, Read-Only Memory (ROM), Read / write memory, Static RAM, Dynamic RAM, Introduction to Xilinx XC9500 CPLD family and Xilinx XC 4000 FPGA family

UNIT-5

Design for testability

Testing combinational and sequential logic, Boundary scan testing, compression techniques and Built-in self test.

TEXT AND REFERENCE BOOKS

1. William I Fleatcher, An Engineering Approach To Digital Design, PHI
2. Giovanni De Micheli, Synthesis and Optimization of Digital Circuits, McGraw Hill
3. Alan B. Marcovitz, Introduction to Logic and Computer Design, Tata McGraw Hill
4. Charles H Roth, Jr., Digital System Design using VHDL, Brooks/Cole Thomson learning
5. VHDL Programming by examples, Perry, Tata McGraw Hill
6. J.P. Hayes, Computer Architecture and Organization, McGraw Hill
7. John F. Wakerley, Digital Design Principles and Practices, Pearson Education
8. Stephen Brown & Zvonko Vranesic, Fundamentals of Digital Logic with VHDL Design, McGraw Hill
9. Melvin A Breuer, Arthur D. Friedem, Miron Abra Movici, Digital System Design and Testability, JAICO publishing.

Teacher Assessment:

Teachers Assessment is based on one of the or combination of few of following

1) Simulation
2) Application Development
3) Power point presentation
4) Question & Answer / Numerical solution
5) Study of Industry processes and its presentation
6) Mini projects

Designed by- Prof. S S Agrawal

ET543: Advance Industrial Automation
Compulsory

Teaching Scheme			**Evaluation Scheme**	
Lectures	:	3Hrs/Week	Test	20 Marks
Tutorials	:	1Hrs/Week	Teacher Assessment	20 Marks
Total Credits	:	4	End-Semester Examination	60 Marks

Prerequisites :

Course Educational Objectives:

- To analyze and provide solutions to industrial problems
- To interact with industry to reciprocate knowledge and innovative ideas to serve the community and economy
- To Study various Industrial Protocols
- To use latest technology of controllers
- To get Involve in high quality research solutions to the needs of the Indian industry
- To understand plant, sub plant and instrumentation process used in various process industries

Course Outcomes : Students will be able to

- To understand the principles of Programmable Logic Controllers (PLCs), Virtual Instrumentation, SCADA, MMI (Man Machine Interface)
- To Study Industrial Automation using computer control systems
- To apply fuzzy controllers in real world industrial processes
- To use various Industrial Protocols
- To apply plant, sub plant and instrumentation process used in various process industries

UNIT-1

Controllers and Distributed Control Systems

Basic concepts, Mathematical modeling, controllers ON/OFF, P,PI,PD,PID controllers, Distributed control systems (DCS): Definition, Local Control (LCU) architecture, LCU communication facilities, configuration of DCS, displays - case studies in DCS.

UNIT-2

Industrial Control System

Data loggers, Data Acquisition Systems (DAS), Direct Digital Control (DDC). Supervisory Control and Data Acquisition Systems (SCADA). Functional block diagram of computer control systems. Alarms, interrupts, controller software, Digital controller modes.

UNIT-3

Industrial Communication Protocols

Use of fieldbuses in industrial plants, functions, international standards, performance, use of Ethernet networks, Fieldbus advantages and disadvantages. Fieldbus design, installation, sensor networks. Global system architectures, advantages and limitations of open networks, HART network and Foundation field bus network.

UNIT-4

Process and Plant Control

NC, CNC, and DNC machines. Simulation and process control Study of plant, sub plant and instrumentation process used in thermal power station, sugar cement paper and pharmaceutical industries.

UNIT-5

Fuzzy Controllers

Fuzzy sets and Basic notions, Fuzzy relation calculations, Fuzzy members, Indices of Fuzziness, comparison of Fuzzy quantities, Methods of determination of membership functions. Fuzzy Logic Based Control: Fuzzy Controllers, case studies

TEXT AND REFERENCE BOOKS

1. B.G. Liptak, Instrumentation Engineer Hand Book
2. B.G. Liptak, Process software and digital networks, CRC press,3rd Edition
3. Noltingk B. E., Instrumentation Reference Book, Butterworth, 2nd Edition
4. Kosco B, Neural Networks and Fuzzy Systems: A Dynamic Approach to Machine Intelligence, PHI
5. Curtis D. Johnson, Process Control Instrumentation Technology, PHI, 4th Edition
6. P.B. Deshpande and Raymond H. Ash Computer Process Control
7. Rolf Insermann, Digital Computer System, Vol I Fundamental Deterministic control

Teacher Assessment:

Teachers Assessment is based on one of the or combination of few of following

1) Simulation
2) Application Development
3) Power point presentation
4) Question & Answer / Numerical solution
5) Study of Industry processes and its presentation
6) Mini projects

Designed by – Dr. A R Karwankar

ET544: Digital Communication System
Compulsory

Teaching Scheme			**Evaluation Scheme**	
Lectures	:	3Hrs/Week	Test	20 Marks
Tutorials	:	1Hrs/Week	Teacher Assessment	20 Marks
Total Credits	:	4	End-Semester Examination	60 Marks

Prerequisites :

Course Educational Objectives:

- To give overview of Digital Modulation Techniques
- To use the concept of entropy to analyze performance of Digital Communication System
- To study waveform coding techniques
- To emphasize the conceptual understand of Error control coding and decoding
- To study Spread Spectrum techniques

Course Outcomes : Students will be able to

- Analyze Digital modulation techniques and compare
- Analyze waveform coding techniques and their performance in presence of noise
- Simulate error control coding
- Examine performance of Digital Communication System and its limitations
- Learn efficient utilization of band width and power of Digital Communication Systems

UNIT-1

Sampling Process

Sampling theorem, Quadrature sampling of bandpass signals, Reconstruction of a message processes from its samples, Signal distortion in sampling, Practical aspects of sampling and signal recovery, Pulse amplitude modulation, Time division multiplexing

UNIT-2

Waveform Coding Techniques

Pulse -code modulation, Channel noise and error probability, Quantization Noise and signal-to-noise ratio, robust quantization, differential PCM, delta modulation, coding speech at low bit rates, applications

UNIT-3

Digital Modulation Techniques

Digital modulation formats, coherent binary modulation techniques, coherent quadrature modulation technique, non coherent binary modulation technique, comparison of binary and quaternary modulation technique, M-ary modulation techniques, power spectra, Bandwidth efficiency, M-array modulation format viewed in light of the channel capacity theorem, effect of inter symbol interference, bit versus symbol error probabilities, synchronization, applications

UNIT-4

Error Control Coding

Rationale for coding, types of codes, Discrete memory less channels, linear block codes, cyclic codes, convolution codes, maximum likelihood decoding of convolution codes, distance properties of convolution codes, sequential decoding of convolution codes, Trellis codes, applications

UNIT-5

Spread Spectrum Modulation

Pseudo noise sequences, a notion of spread spectrum, direct sequence coherent binary phase shift keying, signal space dimensionality and processing gain, probability of error, Frequency Hop spread spectrum, applications

TEXT AND REFERENCE BOOKS

1. Simon Hykin: Digital Communication ,Wiely Publication
2. J.Das, S. K. Mulliek and P.K Chatterjee: Principal of Digital Communication, Wiley Eastern Ltd. Second Reprint -1992
3. P. Chakrabarti : Principles Of Digital Communication Dhanpat Rai and Co First Ed.1999
4. Bearnard SKLAR : Digital Communication Fundamentals and Applications, Pearson Education Asia, Ed.2001
5. K.Shunmugham- Digital Communication Systems, Wiely Publication

Teacher Assessment:

Teachers Assessment is based on one of the or combination of few of following

1) Simulation
2) Application Development
3) Power point presentation
4) Question & Answer / Numerical solution
5) Study of Industry processes and its presentation
6) Mini projects

Designed by- Dr. A S Bhalachandra

ET 545 : VLSI Design
Elective

Teaching Scheme			**Evaluation Scheme**	
Lectures	:	3 Hrs/Week	Test	20 Marks
Tutorials	:	1 Hrs/Week	Teacher Assessment	20 Marks
Total Credits	:	4	End-Semester Examination	60 Marks

Prerequisites :

Course Educational Objectives:

- To lay a strong base in design methodologies required for semiconductor devices
- To develop concept of transistor level design of digital circuits
- To review CMOS processes , static and dynamic logic
- To understand the CMOS circuit construction
- To design static CMOS combinational and sequential logic at the transistor level, including mask layout
- To describe the general steps required for processing of CMOS integrated circuits

Course Outcomes : Students will be able to

- Use mathematical methods in analysis of CMOS Digital Electronics circuits, to verify the functionality, timing, power, and parasitic effects.
- Create models of CMOS circuits for realization of specified digital functions.
- Design and implement a working system for given specification
- Use EDA tools to design a digital system

UNIT-1

Digital Integrated Circuit Design

Issues and Quality Metrics of a digital design. Manufacturing Process: CMOS ICs, Design Rules, Packaging, and Trends in Process Technology

UNIT-2

Design Methodology

Devices: Diode, MOSFET, Process Variations, Technology Scaling. Circuit Simulation: The Wire, Interconnect Parameters – capacitance, resistance and Inductance, Electrical Wire Models, SPICE Wire Models

UNIT-3

CMOS Inverter

Static CMOS Inverter, robustness of the CMOS Inverter, static behavior, dynamic behavior, Power, Energy and energy delay

UNIT-4

Designing Combinational Logic Gates in CMOS

Static CMOS Design, Dynamic CMOS Design, Logic style selection and logic design for reduced Supply Voltages

UNIT-5

Designing Sequential Logic circuits

Static Latches and Registers, Dynamic Latches and registers, Pulse and sense amplifier based registers, Pipelining, Non-bistable Sequential circuits, clocking strategy.

Introduction to Implementation Strategies for digital ICs, driving large capacitors, issues related to transmission line effects in wires, interconnect parasitic and noise in supply networks

TEXT AND REFERENCE BOOKS

1. S. M. Kang and Y. Leblebici, CMOS Digital Integrated Circuits: Analysis and Design, McGraw–Hill
2. W. Wolf, Modern VLSI Design: System on Chip, Third Edition, PHI
3. N. Weste, K. Eshraghian and M. J. S. Smith, Principles of CMOS VLSI Design: A Systems Perspective, 2nd Edition (Expanded), AW/Pearson
4. J. M. Rabaey, A. P. Chandrakasan and B. Nikolic, Digital Integrated Circuits: A Design Perspective, 2nd Edition, PH/Pearson
5. D. A. Pucknell and K. Eshraghian, Basic VLSI Design: Systems and Circuits, PHI
6. J. P. Uyemura, CMOS Logic Circuit Design, Kluwer
7. J. P. Uyemura, Introduction to VLSI Circuits and System, Wiley
8. R. J. Baker, H. W. Li and D. E. Boyce, CMOS Circuit Design, Layout and Simulation, PHI
9. Ken Martin, Digital Integrated Circuit Design, Oxford University Press

Teacher Assessment:

Teachers Assessment is based on one of the or combination of few of following

1) Simulation
2) Application Development
3) Power point presentation
4) Question & Answer / Numerical solution
5) Study of Industry processes and its presentation
6) Mini projects

Designed by- Prof. M H Nerker

ET 546: Digital Image Processing and Applications
Elective

Teaching Scheme			**Evaluation Scheme**	
Lectures	:	3 Hrs/Week	Test	20 Marks
Tutorials	:	1 Hrs/Week	Teacher Assessment	20 Marks
Total Credits	:	4	End-Semester Examination	60 Marks

Prerequisites :

Course Educational Objectives:

- To understand the principles of Digital Image Processing
- To analyze the image signal in Spatial and Spatial frequency domain
- To understand various Image Processing techniques for enhancement, segmentation, restoration, compression and implement using MATLAB
- To apply Image Processing techniques to solve real world problems

Course Outcomes : Students will be able to

- Apply image processing techniques in spatial and frequency domain
- To apply various transforms on images and simulate its application to 2 D signals
- Apply image restoration and encoding techniques
- Study and implement various image segmentation approaches
- To perform various image processing tasks and simulate them
- Apply image processing techniques for real world applications

UNIT-1

Introduction

Digital Image Representation, Sampling and Quantization, some basic relationship between Pixels, Image Geometry, Image Enhancement in spatial domain, spatial filtering

UNIT-2

Image Transformation

Fourier Transform, The discrete Fourier Transform, properties of the Two dimensional Fourier Transform, The Fast Fourier Transform, Hadamand-Hough-Hotelling transform, Wavelet transforms, Enhancement in the Frequency Domain, Color Image Processing

UNIT-3

Image Restoration

Degradation Model, Diagonalisation of Circulant and Block circulant Matrices, Algebraic approach to Restoration, Inverse Filtering, Least Mean SquareFilter, Geometric Transformation.

Image Compression: Fundamentals Image Compression Models, Error-free Compression Lossy Compression

UNIT-4

Image Segmentation

Edge Detection, Thresholding, Region based and motion based Segmentation, Morphology, Representation and Description:- Representation Schemes, Boundary Descriptors, Regional Descriptions, Relation Descriptors

UNIT-5

Engineering Applications of Image Processing Multimodal Biometrics, Industrial Applications etc

TEXT AND REFERENCE BOOKS

1. Gonzalez and Woods, Digital Image Processing, Pearson Education
2. A.K. Jain- Fundamentals of Digital Image Processing, PHI 1007

3. W.K. Pratt – Digital Image Processing- Wiley New Delhi. 1987
4. Vasudev Bhaskaran- Image and video Coding Standards- Cluwer Academic

Teacher Assessment:

Teachers Assessment is based on one of the or combination of few of following

1) Simulation
2) Application Development
3) Power point presentation
4) Question & Answer / Numerical solution
5) Study of Industry processes and its presentation
6) Mini projects

Designed by- Dr. V R Ratnaparkhe

ET 547: Advance Antennas and Arrays
Elective

Teaching Scheme			**Evaluation Scheme**	
Lectures	:	3 Hrs/Week	Test	20 Marks
Tutorials	:	1 Hrs/Week	Teacher Assessment	20 Marks
Total Credits	:	4	End-Semester Examination	60 Marks

Prerequisites :

Course Educational Objectives:

- To identify antenna array types
- To analyze antenna performance parameters
- To introduce and illustrate antenna pattern synthesis methods
- To expose to the concept of microstrip antenna
- To analyze radiation patterns for design of different smart antennas

Course Outcomes : Students will be able to

- Calculate antenna parameters
- Analyze and design antenna arrays
- Explain factors affecting the design of antenna systems
- Know working of smart antenna and microstrip antenna
- Simulate the digital beam formation concept

UNIT-1

Review of wired antennas

Antenna Parameters, Infinitesimal dipole ,antenna, half wave half wave dipole antenna, small loop antenna, helical antenna

UNIT-2

Antenna Arrays

N element linear arrays, uniform amplitude and spacing, Directivity of Broadside and End fire arrays. Three dimensional characteristics, Pattern multiplication- Binomial arrays and olph- Tchebycheff arrays. Circular array, Mutual coupling in arrays, multidimensional arrays, phased arrays and array feeding techniques.

UNIT-3

Antenna Synthesis

Synthesis problem-Line source based beam, synthesis methods, Fourier transform and Woodward-Lawson sampling method, Linear array shaped beam synthesis method, Low side lobe, narrow main beam synthesis methods-discretization of continuous sources. Schelkunoff polynomial method.

UNIT-4

Microstrip antennas

Introduction, Rectangular Patch, Circular Patch, Quality Factor, Bandwidth, and Efficiency, Input Impedance, Coupling, Circular Polarization, Arrays and Feed Networks, Corporate and Series Feeds, Reflect array

UNIT-5

Smart Antenna

Smart antennas Introduction, Smart-Antenna Analogy, Cellular Radio Systems Evolution, Signal Propagation, Smart Antennas' Benefits and draw backs, Antenna Beam forming, Multiple-Input Multiple-Output (MIMO) System, Reconfigurable Arrays

TEXT AND REFERENCE BOOKS

1. Girish Kumar and K.P. Ray, Broadb and Microstrip Antennas, Artech House
2. C. A. Balanis Antenna Theory Wiley and Sns
3. John. D. Krauss Antennas TMH References
4. By Randy L, Antenna Arrays: A Computational Approach

Teacher Assessment:

Teachers Assessment is based on one of the or combination of few of following

1) Simulation
2) Application Development
3) Power point presentation
4) Question & Answer / Numerical solution
5) Study of Industry processes and its presentation
6) Mini projects

Designed by- V.R.Ratnaparkhe

ET 548: Solid State Devices
Elective

Teaching Scheme			**Evaluation Scheme**	
Lectures	:	3 Hrs/Week	Test	20 Marks
Tutorials	:	1 Hrs/Week	Teacher Assessment	20 Marks
Total Credits	:	4	End-Semester Examination	60 Marks

Prerequisites :

Course Educational Objectives:

- To provide basis for understanding the characteristics, operation and limitations of semiconductor devices
- To provide exposure to electrostatistics of pn junctions
- To expose to the concepts about non-equilibrium characteristics of semiconductor materials
- To analyze the structure and characteristics of MOSFET and BJT
- To expose to physical structure and space charge region of pn junction

Course Outcomes : Students will be able to

- Demonstrate characteristics of various solid state devices
- Explain crystal structure of semiconductor material
- Get exposure to basic physics of electrons in solids and carriers and carrier transport in semiconductors

UNIT-1

Review of Physics of Semiconductor Theory: Introduction, crystal structure of solids, types of solids, Space lattices, Atomic bonding, Imperfections and impurities in solids, growth of semiconductor materials, theory of solids, principles of quantum mechanics, Energy quantization and probability concepts, energy band theory, density of states function, statistical mechanics

UNIT-2

Semiconductors in equilibrium: charge carriers in semiconductors, dopant atoms and energy levels, carrier distributions in extrinsic semiconductor, statistics of donor and acceptors, carrier concentrations-effects of doping, position of Fermi energy level-effects of doping and temperature, Carrier transport and excess carrier phenomenon-carrier drift, carrier diffusion, graded impurity distribution, carrier generation and recombination, hall effect

UNIT-3

The pn junction and metal semiconductor contact- basic structure of pn junction, zero bias applied, metal semiconductor contact-rectifying junction, forward bias, metal semiconductor ohmic contacts, non uniformly doped pn junction, device fabrication technique

UNIT-4

MOSFET- MOS field effect transistor action, MOS capacitor-potential difference, CV characteristics, MOSFET operation, small signal equivalent circuits and frequency limitation factors, Device fabrication techniques, MOSFET scaling, non ideal effects, threshold voltage modification, electrical characteristics, device fabrication techniques

UNIT-5

Non-equilibrium Excess Carriers in Semi Conductor- carrier generation and recombination, analysis of excess carriers, ambipolar transport, Quasi-Fermi energy levels, excess carrier life time, surface effects

TEXT AND REFERENCE BOOKS

1. Donald Neamen, Introduction to semiconductor devices, International Edition, McGraw Hill, 2006
2. Ben G. Streetman and Sanjay Banergee, Solid Slate Electronic Devices, Prentice Hall, 1999
3. Simon M. Sze, Physics of Semiconductor Devices, John Wiley and Sons, 1999

4. Gary S. May and Simon M. Sze, Fundamentals of Semiconductor Fabrication,Wiley,2004
5. BebradRazavi, Fundamentals of Micro-electronics, Wiley, 2008

Teacher Assessment:

Teachers Assessment is based on one of the or combination of few of following

1) Simulation
2) Application Development
3) Power point presentation
4) Question & Answer / Numerical solution
5) Study of Industry processes and its presentation
6) Mini projects

Designed by –N.R.Kolhare

ET 549: Seminar I
Compulsory

Teaching Scheme			**Evaluation Scheme**	
Practicals	:	4 Hrs/Week	Term Work	50
Total Credits	:	2	Practical/ Vice-voce	-----

Prerequisites :

Course Educational Objectives:

- To make the students collect, compile, comprehend and present research literature in any field of Electronics Engineering
- To apply effective strategies in literature searches
- To document properly according to a prescribed style

Course Outcomes : Students will be able to

- Practice finding relevant course material
- Identify concepts and terminology of the topic
- Know existing scenario of the topic
- Deliver talk
- Prepare report with design computation circuits/ block diagram if any

Seminar at the end of first semester in Full Time M.E. (Electronics) course and at the end of the third semester in the part time M.E. (Electronics) course shall be the term work submitted by the candidate in the form of a technical essay or a report or analysis and/ or design on any current topic in the field of Electronics or in the allied field. The candidates will deliver a talk on that topic and assessment will be made on the basis of term work and talk there on by two internal examiners, one of whom will be the guide and the other being appointed by the principal of the institution.

ET550: System Lab - I

Compulsory

Teaching Scheme			**Evaluation Scheme**	
Practical	:	4 Hrs/Week	Term Work	----
Total Credits	:	2	Practical/ Vice-voce	50

Prerequisites :

Course Educational Objectives:

- To implement new ideas with suitable testability and analysis
- To develop proficiency in specific lab techniques
- To design and build hardware / software for given task

Course Outcomes : Student will be able to

- Comprehend, illustrate, explain and apply concepts and theories
- To write analytical technical report
- To present and discuss the technical work
- To develop capability to perform lab work in order to gain expertise

Individual student or group of two (max)student will perform the work as per following and submit the report based on result obtained and/or study perform under the guidance of respective guide (min 25 pages)
The work will be assessed by oral/practical examination of two hours duration by two examiners out of which one will be respective guide or the teacher nominated by head of the department in the absence of respective guide on schedule .second examiner will be eminent teacher or professional / expert from industry.

Work will be carried out by the student:

i) Student will perform experimentation in any subject laboratory of the department/institute as assigned by the respective guide, leading towards concept understanding, development of laboratory set up and/or learning resources

OR

ii) Student will perform literature survey about the topic and /or concerned subject laboratory assign by respective guide, leading towards the details for modernization, research and development or thrust area subject laboratories
(Thrust area should be as per Government of Maharashtra / Govt. of India policies and AICTE/UGC/DST/DRDO/ISRO etc guide lines)

OR

iii) Student will develop ,specific software using C/C++/VB/VC/JAVA etc which will improve functions of system (Subject Laboratory/ Library /Student Section/ Office/ Exam System etc) as assigned by respective guide

OR

iv) Student will perform detailed hardware and software designing of product /system concerned to the subject laboratory leading towards post graduate dissertation

ET 551: Computer Network & Information Security
Compulsory

Teaching Scheme			**Evaluation Scheme**	
Lectures	:	3 Hrs/Week	Test	20 Marks
Tutorials	:	1 Hrs/Week	Teacher Assessment	20 Marks
Total Credits	:	4	End-Semester Examination	60 Marks

Prerequisites :

Course Educational Objectives:

- To inculcate fundamental knowledge of Application Layer Protocol
- To lay a strong base of , Peer-to-Peer network architectures
- To develop conceptual understanding of Cryptography and security protocols
- To understand web based bio authentication and legal aspects of data communication

Course Outcomes : Students will be able to

- Analyze the requirements for a given organizational structure and select the most appropriate Networking architecture
- Understand client-server, socket programming and develop web applications
- Have a basic knowledge of the use of cryptography and network security
- Understand and apply the concepts for administrating security to corporate network.
- Get knowledge of available legal framework such as IT Act 2005

UNIT-1

Client-server, Web, HTTP, FTP, SMTP, POP3, and DNS, Peer-to-peer file sharing networks, Networking simulation and modeling techniques,

UNIT-2

Managing network devices such as switch, Router, Firewall & modems.
Sockets Programming and Implementation. Client-server implementation, Web server implementation, Case Studies

UNIT-3

Advanced IP multicast, including IPv6 multicast and SSM, Peer-to-Peer network architectures
IP network management and monitoring, Host configuration methods, Trends in network threats Information security principles

UNIT-4

Cryptography, Goals, Attacks, Services and mechanisms Design principle of Block Ciphers & Block Cipher algorithms, Modern symmetric key ciphers, DES $ AES Public Key Cryptography RSA, Elliptic curve cryptosystems

UNIT-5

System Security: Computer virus, Firewall and Intrusion detection, Electronic commerce security Introduction to web based bio authentication, Smart card, RF ID, Cyber laws related to E – commerce, IT Act-2005

TEXT AND REFERENCE BOOKS

1. William Stallings, Data and Computer Communications, 7th edition, PH, 2004.
2. Andrew S. Tanenbaum, Computer Networks, 4th edition, PH, Inc., 2003
3. Behrouz Forouzan, Cryptography and Network Security, McGraw-Hill.
4. H. Bidgoli, Handbook of Information Security, Vols. 1-3, John Wiley & Sons, January 2006.
5. H. Bidgoli, The Internet Encyclopedia, Vols. 1-3, John Wiley & Sons, Jan. 2004
6. Behrouz Forouzan, Data Communications McGraw-Hill IVth Edition

7. Request For Comments, Network Standards, available from http://www.rfc-editor.org/rfcsearch.html

Teacher Assessment:

Teachers Assessment is based on one of the or combination of few of following

1) Simulation
2) Application Development
3) Power point presentation
4) Question & Answer / Numerical solution
5) Study of Industry processes and its presentation
6) Mini projects

Designed by- Dr. A R Karwankar

ET 552: Embedded System Design
Compulsory

Teaching Scheme			**Evaluation Scheme**	
Lectures	:	3 Hrs/Week	Test	20 Marks
Tutorials	:	1 Hrs/Week	Teacher Assessment	20 Marks
Total Credits	:	4	End-Semester Examination	60 Marks

Prerequisites :

Course Educational Objectives:

- Understand modern embedded systems and the interface issues related to it.
- learn latest microcontrollers and their hardware interfacing
- Learn RTOS

Course Outcomes : Students will be able to

- Understand and implement the key technology building blocks one need to master to design embedded systems
- Interface the hardware to the controller used
- Take on the challenges of the changing scenario in embedded system

UNIT-1

Introduction:

Overview of embedded systems, embedded system design challenges, common design metrics and optimizing them. Survey of different embedded system design technologies, trade-offs, Custom Single-Purpose Processors, Design of custom single purpose processors.

UNIT-2

Advanced Microcontrollers:

Only brief general architecture of AVR and PIC; Instruction Set Architecture, CISC and RISC instruction set architecture, timers, memory, I/O port expansions, Interrupts, programming with AVR and PIC, Hardware interfacing.

UNIT-3

ARM Processor :

ARM Design Philosophy, ARM Architecture, Registers, Program Status Register, Instruction Pipeline, Interrupts and Vector Table, ARM Processor Families.

UNIT-4

Programming

Instruction Set: Data Processing Instructions, Addressing Modes, Branch, Load, Store Instructions, PSR Instructions, Conditional Instructions,

Thumb Instruction Set: Register Usage, Other Branch Instructions, Data Processing Instructions, Single-Register and Multi Register Load-Store Instructions, Stack, Software Interrupt Instructions, case studies.

UNIT-5

Introduction To RTOS

Introduction of real time Operating System, features of operating system, kernel scheduling and data structures, RTOS design issues, Examples using Real-time OS- VxWorks /RT-Linux/ µCOS, RTOS porting on Embedded system.

TEXT AND REFERENCE BOOKS

1. Frank Vahid, Tony Givargis Embedded System Design: A Unified Hardware/Software Introduction , John Wiley & Sons, Inc.2002

2. David E. Simon An Embedded software Primer*, Pearson Education, 1999*
3. Myke Predko Programming And Customizing Pic Microcontroller-, *Mc- Graw Hill.*
4. John.B. Peatman, "Design With Pic Micro Controller", *Pearson Education, 2003*.
5. Steave Furber, "Arm System – On – Chip Architecture*" Addison Wesley, 2000.Mt-Vles -506 Low Power Vlsi Design.*
6. Raj Kamal Embedded Systems: Architecture and Programming, *TMH 2012*

Teacher Assessment:

Teachers Assessment is based on one of the or combination of few of following

1) Simulation
2) Application Development
3) Power point presentation
4) Question & Answer / Numerical solution
5) Study of Industry processes and its presentation
6) Mini projects

Designed by- Prof. N R Kolhare

ET 553: Industrial Drives & Control
Compulsory

Teaching Scheme			**Evaluation Scheme**	
Lectures	:	3 Hrs/Week	Test	20 Marks
Tutorials	:	1 Hrs/Week	Teacher Assessment	20 Marks
Total Credits	:	4	End-Semester Examination	60 Marks

Prerequisites :

Course Educational Objectives:

- To impart knowledge of industrial controls and drives
- To develop awareness about closed loop control system

Course Outcomes : Students will be able to

- Analyze chopper fed and converter fed drives
- Describe special drives
- Design and use P, PI and PID controllers

UNIT-1

CONVERTER FED DC DRIVES

Converter Fed DC Drives: General analysis of Single phase and three phase semi converter and full converter fed drives, separately excited and series motor drives, Evaluation of performance parameters, Dual converter fed drives

UNIT-2

CHOPPER FED DC DRIVES

Chopper Fed DC Drives: Single quadrant chopper controlled drives - evaluation of performance parameters for separately excited and series motor drives, Two quadrant and four quadrant chopper controlled drives

UNIT-3

AC MOTOR DRIVES

Induction Motor Drives :Stator control: Stator voltage control of 3 phase induction motors, effect of voltage variation on motor performance by ac voltage controllers, Variable frequency square wave VSI drives -Twelve step inverters for induction motors , PWM drives

Rotor control: Static rotor resistance control - DC equivalent circuit, Torque equation - slip power recovery, static Kramer drive - AC equivalent circuit, Torque expression

UNIT-4

SPECIAL DRIVES

Synchronous Motor Drives: Scalar control, True synchronous and self modes, Vector control, Permanent magnet machine control, Switched reluctance motor and stepper motor drives

UNIT-5

CLOSED LOOP CONTROL

Motor transfer function - P, PI, and PID controllers, Current control - Design procedure, Phase locked loop (PLL) control, Microcomputer control

TEXT AND REFERENCE BOOKS

1. R. Krishnan, Electrical Motor Drives, PHI-2003
2. G.K.Dubey, Power semiconductor controlled drives, Prentice Hall- 1989
3. G.K.Dubey, Fundamentals of Electrical Drives, Narosa- 1995
4. W. Leohnard, Control of Electric Drives,-Springer- 2001

5. Murphy and Turnbull, Power Electronic Control of AC motors, Pergamon Press
6. Vedam Subrahmaniam, Electric Drives, TMH-1994
7. W. Shepherd, D. T. W. Liang and L.N. Hulley: Power Electronics and Motor Control, 2nd Edition, Cambridge Univ. Press, 1995.

Teacher Assessment:

Teachers Assessment is based on one of the or combination of few of following

1) Simulation
2) Application Development
3) Power point presentation
4) Question & Answer / Numerical solution
5) Study of Industry processes and its presentation
6) Mini projects

Designed by- Prof. R P Choudhari

ET 554: Wireless & Mobile Communication
Compulsory

Teaching Scheme			**Evaluation Scheme**	
Lectures	:	3 Hrs/Week	Test	20 Marks
Tutorials	:	1 Hrs/Week	Teacher Assessment	20 Marks
Total Credits	:	4	End-Semester Examination	60 Marks

Prerequisites :

Course Educational Objectives:

- To describe different types of diversity and how they improve performance for mobile radio channels
- To enable the student to synthesis and analyze wireless channel modelling and mobile cellular communication systems
- To understand the Multicarrier modulation and OFDM issues
- To learn the MIMO communication and its types
- To explore the Ultra Wide Band modulation and Wireless Standards.

Course Outcomes : Students will be able to

- To identify and know various mobile and Cellular telephony systems with standards and working algorithms
- To understand multiple access schemes in mobile and Wireless networks
- To understand the OFDM and MIMO communication systems.
- To deal with Diversity modeling for Wireless Communications

UNIT-1

Wireless Communications and Diversity

Fast Fading Wireless Channel Modeling, Rayleigh/Ricean Fading Channels, BER Performance in Fading Channels, Diversity modeling for Wireless Communications, BER Performance Improvement with diversity, Types of Diversity – Frequency, Time, Space.

UNIT-2

Broadband Wireless Channel Modeling

WSSUS Channel Modeling, RMS Delay Spread, Doppler Fading, Jakes Model, Autocorrelation, Jakes Spectrum, Impact of Doppler Fading.

Cellular Communications

Introduction to Cellular Communications, Frequency reuse, Multiple Access Technologies, Cellular Processes -Call Setup, Handover etc, Tele traffic Theory.

UNIT-3

OFDM

Introduction to OFDM, Multicarrier Modulation and Cyclic Prefix, Channel model and SNR performance, OFDM Issues – PAPR, Frequency and Timing Offset Issues.

UNIT-4

MIMO

Introduction to MIMO, MIMO Channel Capacity, SVD and Eigenmodes of the MIMO Channel, MIMO Spatial Multiplexing – BLAST, MIMO Diversity – Alamouti, OSTBC, MRT, MIMO,OFDM

UNIT-5

UWB (Ultrawide Band)

UWB Definition and Features, UWB Wireless Channels, UWB Data Modulation, Uniform Pulse Train, Bit-Error Rate Performance of UWB

3G and 4G Wireless Standards

GSM, GPRS, WCDMA, LTE, WiMAX

TEXT AND REFERENCE BOOKS

1. David Tse and PramodViswanath, Fundamentals of Wireless Communications ,Cambridge University Press.
2. Andrea Goldsmith, Wireless Communications, Cambridge University Press.
3. Theodore Rappaport, Wireless Communications: Principles and Practice , Prentice Hall.
4. EzioBiglieri, MIMO Wireless Communications, Cambridge University Press.
5. John G Proakis, Digital Communications, McGraw Hill Science/Engineering/Math.

Teacher Assessment:

Teachers Assessment is based on one of the or combination of few of following

1) Simulation
2) Application Development
3) Power point presentation
4) Question & Answer / Numerical solution
5) Study of Industry processes and its presentation
6) Mini projects

Designed by- Dr. M H Nerker

ET 555: CMOS Based RF Design

Elective

Teaching Scheme			**Evaluation Scheme**	
Lectures	:	3 Hrs/Week	Test	20 Marks
Tutorials	:	1 Hrs/Week	Teacher Assessment	20 Marks
Total Credits	:	4	End-Semester Examination	60 Marks

Prerequisites :

Course Educational Objectives:

- To understand and differentiate between RF and analog circuit design.
- To understand the characteristics of various transceiver architectures.
- To be able to analyze the effect of frequency on circuit components.
- To understand the device modeling for circuit design and learn to put these circuits onto one chip to build sub-systems.
- To understand the device/circuit nonlinearity and noise.
- To design these circuits using computer software.

Course Outcomes : Students will be able to

- Develop the student's core competence in design and analysis CMOS RF design
- Analyze and examine CMOS analog circuit building blocks
- Apply analog design methodology and flow for designing integrated circuits.
- Design and verify CMOS analog circuits by using state of art computer aided tools
- Identify, formulate and model CMOS integrated circuit related engineering problems
- Apply CMOS analog circuits' knowledge on to analyze advanced analog circuits such as fully integrated compensated multistate OPAMP.

UNIT-1

Introduction to RF Design and Wireless Technology:

Design and Applications, Complexity and Choice of Technology. Basic concepts in RF design: Nonlinearly and Time Variance, Inter symbol interference, random processes and noise. Sensitivity and dynamic range, conversion of gains and distortion passive/active IC devices, Passive RLC network, Distributed systems, Smith chart, Bandwidth estimation, RF amplifier design, Voltage reference & biasing, Noise, LNA design, Mixers, RF power amplifiers

UNIT-2

RF Modulation:

Analog and digital modulation of RF circuits, Comparison of various techniques for power efficiency, Coherent and non-coherent detection, Mobile RF communication and basics of Multiple Access techniques.
Receiver and Transmitter architectures, Direct conversion and two-step transmitters

UNIT-3

RF Circuits Design:

Overview of RF Filter design, Active RF components & modeling, Matching and Biasing Networks. Basic blocks in RF systems and their VLSI implementation, Low noise Amplifier design in various technologies, Design of Mixers at GHz frequency range, Various mixers-working and implementation.

UNIT-4

Oscillators topologies VCO and phase noise

Oscillators-Basic topologies VCO and definition of phase noise, Noise power and trade off. Radio frequency Synthesizers-PLLS, Various RF synthesizer architectures and frequency dividers, Design issues in integrated RF filters.
RF Testing: RF testing for heterodyne, Homodyne, Image reject, Direct IF and sub sampled receivers.

UNIT-5

BJT and MOSFET behavior at RF Frequencies:

BJT and MOSFET behavior at RF frequencies, modeling of the transistors and SP ICE model, Noise performance and limitations of devices, integrated parasitic elements at high frequencies and their monolithic implementation

TEXT AND REFERENCE BOOKS

1. B. Razavi, RF Microelectronics, PHI 1998
2. R. Jacob Baker, H.W. Li, D.E. Boyce, CMOS Circuit Design, layout and Simulation, PHI 1998.
3. Thomas H. Lee, Design of CMOS RF Integrated Circuits, Cambridge University press 1998.
4. Y.P. Tsividis, Mixed Analog and Digital Devices and Technology, TMH 1996

Teacher Assessment:

Teachers Assessment is based on one of the or combination of few of following

1) Simulation
2) Application Development
3) Power point presentation
4) Question & Answer / Numerical solution
5) Study of Industry processes and its presentation
6) Mini projects

Designed by – Prof. S S Agrawal

ET 556: Pattern Recognition

Elective

Teaching Scheme			**Evaluation Scheme**	
Lectures	:	3 Hrs/Week	Test	20 Marks
Tutorials	:	1 Hrs/Week	Teacher Assessment	20 Marks
Total Credits	:	4	End-Semester Examination	60 Marks

Prerequisites :

Course Educational Objectives:

- To understand concepts of Statistical and Non parametric Decision making
- To gain knowledge about clustering
- To learn image analysis techniques

Course Outcomes : Students will be able to

- Understand and analyze methods for automatic training of classification system
- Design systems and algorithms for Pattern Recognition
- Implement typical Pattern Recognition algorithms using MATLAB
- Implement algorithms for real world problems

UNIT-1

Introduction to Pattern Recognition

Pattern Recognition, Classification and description, Patterns and Feature extraction, training and learning in PR system, Pattern Recognition approaches.

UNIT-2

Statistical Decision Making

Probability, random variables, Joint Distribution and Densities, Minimum Risk Esimators, Bayes' Theorem, Multiple Features, Conditionally Independent Features, Decision Boundaties, Unequal Costs Of Errors, Estimation Of Error Rates, The Leaving-One-Out Technique, Characteristic Curves, Estimating The Composition Populations

UNIT-3

Nonparametric Decision Making

Histograms, Kernel and Window Estimators, Nearest Neighbor Classification Techniques, Adaptive Decision Boundaries, Adaptive Squared Error Discriminant Functions, Choosing A Decision Making Techniques

UNIT-4

Clustering

Various clustering techniques, cluster analysis, Hierarchical Clustering, Partitional Clustering, algorithms for clustering data

UNIT-5

Applications

Applications of Pattern Recognition, typical case studies of Pattern Recognition in data mining, medical imaging, industrial automation.

TEXT AND REFERENCE BOOKS

1. E. Gose, R. Johnson baugh, S. Jost, Pattern Recognition & Image Analysis, PHI
2. R. O. Duda and P. E. Hart, Pattern classification and scene analysis, Wiley Inter science publications.
3. Robert Schaloff, Pattern recognition: statistical, structural and neural approaches, John Wiley and Sons. Inc

Teacher Assessment:

Teachers Assessment is based on one of the or combination of few of following

1) Simulation
2) Application Development
3) Power point presentation
4) Question & Answer / Numerical solution
5) Study of Industry processes and its presentation
6) Mini projects

Designed by- Dr. A S Bhalachandra

ET 557: Wireless Sensor Network

Elective

Teaching Scheme			**Evaluation Scheme**	
Lectures	:	3 Hrs/Week	Test	20 Marks
Tutorials	:	1 Hrs/Week	Teacher Assessment	20 Marks
Total Credits	:	4	End-Semester Examination	60 Marks

Prerequisites :

Course Educational Objectives:

- To learn the concepts and principles behind WSN
- To learn WSN network design, sensor node embedded system design and implementation
- To understand WSN network management, different protocols and architecture
- To introduce sensor network platforms, operating systems and programming tools for sensor networks.
- To study wireless sensor network solutions with practical implementation examples and case studies.

Course Outcomes : Students will be able to

- Understand the fundamental concepts of wireless and sensor networks
- Develop simple wireless sensor network applications using actual motes and sensor devices
- Develop simple wireless sensor network applications using hardware, software platforms
- Get an overview of the various network level protocols for MAC, routing, time synchronization, aggregation, consensus and distributed tracking
- Program sensor network platforms using Tiny OS, C and Java and to develop applications on wireless motes, smart phones and other embedded platforms

UNIT-1

Introduction

Introduction of wireless sensor networks, Comparison of sensor network with ad hoc network, Single node architecture – Hardware components, energy consumption of sensor nodes, Network architecture – Sensor network scenarios, types of sources and sinks, single hop versus multi-hop networks, multiple sinks and sources, design principles, Development of wireless sensor networks.

UNIT-2

Wireless Sensor Node Architecture

System level -Main components with detailed description ,Microcontroller, Communication (RF) module , Sensors (depending on application) and signal conditioning ,Memory, Power Supply, Battery Management, Energy Harvesting, Topology/Network Structure, Power Management, Physical, MAC, Routing

UNIT-3

Networked Wireless Control Systems

Implementation and Considerations, Design Principles of Wireless Sensor Networks Protocols for Control Applications, Adaptive IEEE 802.15.4, Medium Access Control Protocol for Control and Monitoring Applications.

UNIT-4

Sensor Network Platforms

Testbeds, Operating Systems: Tiny OS, Contiki, Hardware testbeds: IITH Motes, Libelium, WASP motes, Crossbow Motes

Case Study: Security in Sensor networks, Localization ,IEEE 802.15.4 low rate WPAN, Practical implementation issues

UNIT-5

WSN Applications

Target detection tracking, Habitat monitoring, Military battlefield awareness Environmental disaster monitoring, Underwater Acoustic and Deep space networks, Wireless Body Area Networks (WBAN) for health-monitoring, Open issues and Design challenges

TEXT AND REFERENCE BOOKS

1. Principles of Embedded Networked Systems Design Gregory Pottie, William Kaiser Hardback (ISBN-10: 0521840120 | ISBN-13: 9780521840125)
2. Wireless Sensor Networks: An Information Processing Approach, Feng Zhao and Leonidas Guibas
3. Wireless Communications & Networks, 2nd Edition, William Stallings. ISBN: 0131918354
4. Elements of network protocol design, Mohammed G. Gouda
5. Elements of distributed computing, Vijay K. Garg

Teacher Assessment:

Teachers Assessment is based on one of the or combination of few of following

1) Simulation
2) Application Development
3) Power point presentation
4) Question & Answer / Numerical solution
5) Study of Industry processes and its presentation
6) Mini projects

Designed by- Prof. N R Kolhare

ET 558: Nano Technology

Elective

Teaching Scheme			**Evaluation Scheme**	
Lectures	:	3 Hrs/Week	Test	20 Marks
Tutorials	:	1 Hrs/Week	Teacher Assessment	20 Marks
Total Credits	:	4	End-Semester Examination	60 Marks

Prerequisites :

Course Educational Objectives:

- To understand concepts of Nano Technology
- To gain knowledge of structure, properties, manufacturing and applications of Silicon and Carbon materials
- To learn fabrication methods in Nano Technology

Course Outcomes : Students will be able to

- Describe smart materials and sensors
- Design and Simulate MEMs technology for applications
- Get exposure to applications of Nano Technology

UNIT-1

The fundamental science behind nanotechnology, bio systems, molecular recognition, quantum mechanics & quantum ideas, optics

UNIT-2

Smart materials & Sensors, self healing structures, heterogeneous Nano structures & composites, encapsulations, Natural Nano Scale Sensors, electromagnetic sensors, biosensors, electronic noses. Nanostructures, Micro/Nano devices

UNIT-3

Nano materials Synthesis and Applications, Molecule-Based Devices. Introduction to Carbon Nanotubes, Nanowires. Introduction to Micro/Nanofabrication, Stamping Techniques. Methods and Applications

UNIT-4

Materials Aspects of Micro- and Nano electromechanical Systems,- MEMS/NEMS Devices and Applications, Nano devices

UNIT-5

Scanning Probe Microscopy, Noncontact Atomic Force Microscopy and Its Related Topics, Low Temperature Scanning Probe Microscopy, Dynamic Force, and Microscopy. Nanolithography, Lithography using photons, electron beams soft lithography. Bio-medical applications.

TEXT AND REFERENCE BOOKS

1. Springer Handbook of Nanotechnology ISBN: 978-3-540-35172-6
2. Mark Ratner, Daniel Rattner, Nanotechnology: A Gentle Introduction to the Next Big Idea, ISBN-10:0-13-101400-5
3. Sulbha K. Kulkarni, Nanotechnology :Principals & practices, Capital publishing company ISBN:-81-85589-29-1

Teacher Assessment:

Teachers Assessment is based on one of the or combination of few of following

1) Simulation

2) Application Development
3) Power point presentation
4) Question & Answer / Numerical solution
5) Study of Industry processes and its presentation
6) Mini projects

Designed by- N.R.Kolhare

ET 559: Seminar II
Compulsory

Teaching Scheme			**Evaluation Scheme**	
Practicals	:	4 Hrs/Week	**Term Work**	**50**
Total Credits	:	2	**Practical/ Vice-voce**	**----**

Prerequisites :

Course Educational Objectives:

- To make the students collect, compile, comprehend and present research literature in any field of Electronics Engineering
- To apply effective strategies in literature searches
- To document properly according to a prescribed style

Course Outcomes : Students will be able to

- Practice finding relevant course material
- Identify concepts and terminology of the topic
- Know existing scenario of the topic
- Deliver talk
- Prepare report with design computation circuits/ block diagram if any

Seminar at the end of first semester in Full Time M.E. (Electronics) course and at the end of the third semester in the part time M.E. (Electronics) course shall be the term work submitted by the candidate in the form of a technical essay or a report or analysis and/ or design on any current topic in the field of Electronics or in the allied field . The candidates will deliver a talk on that topic and assessment will be made on the basis of term work and talk there on by two internal examiners, one of whom will be the guide and the other being appointed by the principal of the institution.

ET 560: System Lab II

Compulsory

Teaching Scheme			**Evaluation Scheme**	
Lectures	:	4 Hrs/Week	Term Work	---
Total Credits	:	2	Practical/ Vice-voce	50

Prerequisites :

Course Educational Objectives:

- To implement new ideas with suitable testability and analysis
- To develop proficiency in specific lab techniques
- To design and build hardware / software for given task

Course Outcomes *:* Students will be able to

- Comprehend, illustrate, explain and apply concepts and theories
- To write analytical technical report
- To present and discuss the technical work
- To develop capability to perform lab work in order to gain expertise

Individual student or group of two (max)student will perform the work as per following and submit the report based on result obtained and/or study perform under the guidance of respective guide (min 25 pages)

The work will be assessed by oral/practical examination of two hours duration by two examiners out of which one will be respective guide or the teacher nominated by head of the department in the absence of respective guide on schedule .second examiner will be eminent teacher or professional / expert from industry.

Work will be carried out by the student:

i) Student will perform experimentation in any subject laboratory of the department/institute as assigned by the respective guide ,leading towards concept understanding ,development of laboratory set up and/or learning resources

OR

ii) Student will perform literature survey about the topic and /or concerned subject laboratory assign by respective guide, leading towards the details for modernization, research and development or thrust area subject laboratories

(Thrust area should be as per government of Maharashtra / govt. of India policies and AICTE/UGC/DST/DRDO/ISRO etc. guide lines)

OR

iii) Student will develop ,specific software using C/C++/VB/VC/JAVA etc. which will improve functions of system (Subject Laboratory/ Library /Student Section/ Office/ Exam System etc.) as assigned by respective guide

OR

iv) Student will perform detailed hardware and software designing of product /system concerned to the subject laboratory leading towards post graduate dissertation

ET 561 Soft Computing
Elective

Teaching Scheme			**Evaluation Scheme**	
Lectures	:	03Hrs/Week	Test	20 Marks
Tutorials	:	01Hrs/Week	Teacher Assessment	20 Marks
Total Credits	:	04	End-Semester Examination	60 Marks

Prerequisites :

Course Educational Objectives:

- To introduce students about Soft Computing Techniques.
- To explain students Fuzzy sets & its Applications.
- To introduce students to Genetic Algorithm fundamentals.
- To explain students concepts and categories of Neural Network

Course Outcomes : Students will be able to

- Describe Soft Computing Techniques
- Gain knowledge of Fuzzy sets
- Understand the Neural Network concepts.
- Understand and apply Genetic Algorithms.

UNIT-1

Fuzzy Logic

Basic concepts of Fuzzy systems, Conventional and fuzzy sets, fuzzy relations, fuzzy operations, fuzzy operators and operations, fuzzification, defuzzificaztion methods, application of fuzzy logic.

UNIT-2

Neurocomputing

Feed forward, feedback and competitive neural network. Models of Neurocomputing: Perceptron Training, Back propagation learning, Hopfield nets. Additional models.

UNIT 3:

Adaptive Resonance Theory I & II

Self-organizing feature map, ADALINE. Applications in pattern classification and image understanding.

UNIT-4

Genetic Algorithms

The basic operators, Schema theorem, convergence analysis, stochastic models, applications in search and optimization. Learning with GA & NN.

UNIT-5

Composite use of fuzzy logic

Neural network & Genetic Algorithms. Chaos Theory, Fusion of Neuro, Fuzzy, GA and Chaos theory and applications

TEXT AND REFERENCE BOOKS

1. David E. Goldberg: Genetic Algorithms in search optimization, and machine learning, Addition Wesley, MA
2. S. Haykin, Neural Networks – A comprehensive Foundation, Macmillan College Publishing Company, New York
3. H.J. Zimmermann, Fuzzy set theory and its application, 2nd revised edition, Allied Publishers Ltd
4. G.J. Klir, B. Yuan: Fuzzy sets and Fuzzy Logic, Theory and applications, PHI
5. R.L. Devaney, An Introduction to Chaotic Dynamical Systems, Addition Wesley, 2nd ed
6. B. Yegnanarayana, Artificial Neural Networks, PHI
7. Resource available on e-learning site http://www.e-gecaect.com

Teacher Assessment:

Teachers Assessment is based on one of the or combination of few of following

1) Simulation
2) Application Development
3) Power point presentation
4) Question & Answer / Numerical solution
5) Study of Industry processes and its presentation
6) Mini projects

Designed by-A.R.Karwankar

GE612: Environmental Studies
Compulsory

Teaching Scheme			**Evaluation Scheme**	
Lectures	:	3 Hrs/Week	Test	20 Marks
Tutorials	:	--	Teacher Assessment	20 Marks
Total Credits	:	3	End-Semester Examination	60 Marks

Prerequisites :

Course Educational Objectives:

- To become aware of the importance of soil, water and air for humans and other life forms on the earth
- To become aware of the species extinction and loss of biodiversity
- To become aware of the various national and international efforts that are in place for conserving the environment
- To get acquainted with national laws, global environmental conservation guidelines

Course Outcomes : Students will be able to

- Understand the physical and chemical foundations of the earth and it's environment
- Understand the evolution of human societies and the major transformation brought by industrialization
- Learn about the basics of environmental economics

UNIT-1

Natural resources, water resources. Use and over utilization of surface and ground water, floods, droughts, conflicts over water, dams, benefits and problems, energy resources, growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, land resources, land degradation, soil erosion, and desertification. role of an individual in conservation of natural resources

UNIT-2

Global level efforts towards environment, conservation and pollution control. Role of India in global level of population , conservation and policies of government of India towards the control of river pollution, policy of government of Maharashtra towards a control of various pollution ,environment protection act, vehicular emission standards, noise pollution,(regulation and control)rules, concepts of ISO 14000.

UNIT-3

Bio diversity and its conservation, bio geographical classification of India, bio diversity, National and local levels India as a mega diversity nation, Hotspots of biodiversity, Endangered and endemic species of India. Conservation of biodiversity, In-situ and Ex-situ conservation of biodiversity, forest

UNIT-4

Environmental Pollution: Definition, Cause , effects and control measures of air pollution, water pollution, noise pollution, Thermal pollution, Nuclear hazards, Electronic wastes, Solid waste management: causes, effects and control measures of urban and industrial wastes

UNIT-5

(Civil engineering)

Urban problems related to water and energy, Water conservation, rain water harvesting and watershed management .Climate change, nuclear accident, Role of an individual in prevention.

OR

(For CSE)

Introduction, Need for green computing, Activities of green computing, Approaches to green computing, green revolution, power management, five steps to green computing

OR

(Electronic Engineering)

Waste prevention, Reuse and recycle need, Reduction and Reuse of wastes, recycling electronics and computers ,steps and issues in recycling , Government policies and industrial involvement, RF radiation and Electromagnetic field hazards: Exposure, Interference with medical devices, specific absorption rate, Thermal effects of RF energy. Case study: cell phone and Base station, Microwave ovens, antennas.

OR

(Electrical Engineering)

Impact of EMI radiations on human being, study of equipment EMI radiation for various Electrical equipment, Study of various engineering material used in electrical equipment and their impact on environment , study of bio-energy, Impact of technology on environment, Impact of power generation on environment

OR

(Mechanical Engineering)

Sustainability challenges, ambient air quality monitoring, gravity settling chamber storm, Sewer system, waste water treatment, water treatment plant, noise monitoring device, noise absorbers, anti-noise device, carbon credits, ecological footprint, climate change, green house effect, automobile exhaust chemistry, aerodynamics, bio based engineering, industrial safety rules, new technologies to harvest solar power, recent advancement in mechanical engineering to reduce environmental loss, role of mechanical engineer to protect and conserve environment

TEXT AND REFERENCE BOOKS

1. Textbook of Environment Studies for Undergraduate Courses by Erach Bharucha, University Grants Commission, New Delhi
2. Environmental Studies by R Rajagopalan, Oxford University Press
3. Environment Protection Act 1986
4. Green computing for dummies Katherrien Murry Willey publishing

TEACHER ASSESSMENT:

Teachers Assessment is based on one of the or combination of few of following

1) Power point presentation
2) Question & Answer / Numerical solution

Designed by-

ET603 : DISSERTATION I

Compulsory

Teaching Scheme	**Evaluation Scheme**
Total Credits : 10	Term Work: 100 Marks

Dissertation I phase will consist of following:

1. Identification of Project title
2. Literature survey and database collection (if needed)
3. Preparation of list of components for hardware projects and decision of methodology for software projects
4. Feasibility study
5. Scheduling and planning of entire project

Students will present a seminar on the dissertation work carried out as a part of term work. The department will constitute a committee of minimum two members to evaluate the presentation. The committee will monitor the quality of the dissertation work.

Approximately 40% of the project work will be completed during the dissertation I phase.

ET604 : DISSERTATION II

Compulsory

Teaching Scheme		**Evaluation Scheme**	
Total Credits :	14	Term Work:	100
		Practical/ Viva-voce:	100

This work will be in continuation with the work done in dissertation I phase.

Students will present a progress seminar on the dissertation work carried out as a part of term work. The department will constitute a committee of two members to evaluate the presentation. The committee will monitor the quality of the dissertation work. Minimum one publication is mandatory for students on their project area/work. There will be pre final demonstration of project by the student which is for internal faculty members. After satisfactory completion of project work and dissertation report, student may be permitted for viva-voce.