DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD.

Syllabus

Of

M.Tech (ELECTRONICS AND

TELECOMMUNICATION ENGINEERING)

[Effective From -2014 – 2015]

DR.BABASAHEB AMBEDKAR MARATHWADA UNIVERITY, AURANGABAD

FACULTY OF ENGINEERING AND TECHNOLOGY

Structure for MTECH [Electronics and Telecommunication]

Sub. Code	Semester - I	Contact Hrs/Week				Examination Scheme (Marks)						
	Subject	L	T	P	Total	CT	TH	TW	P	Total	Duration of Theory Examination	Credit
Part- I												
MT0601	Advanced Digital Signal Processing	3	1	-	4	20	80	-	-	100	3 hrs	4
MT0602	Advanced Digital Communication System	3	1	-	4	20	80	-	-	100	3 hrs	4
MTE603	Reserch Methodology	3	1	-	4	20	80	-	-	100	3 hrs	4
MTE604	Wireless & Mobile Communication Systems	3	1	-	4	20	80	-	-	100	3 hrs	4
MTE(641-643)	Elective -I	3	1	-	4	20	80	-	-	100	3 hrs	4
MTE621	Digital Signal Procesing Simulation Lab	-	-	4	4	-	-	50	-	50	-	2
MTE622	System lab-I	-	-	2	2	-	-	-	50	50	-	1
MTE623	Seminar-I	-	-	2	2	-	-	-	50	50	-	1
Total of Part - I		**15**	**5**	**8**	**28**	**100**	**400**	**50**	**100**	**650**		**24**

L: Lecture hours per week T: Tutorial Hours per week P: Practical hours per week CT: Class Test
TH: University Theory Examination TW: Term Work P: Practical / Oral Examination

Elective I -C
MTE641C- Wave Propogation and Antenna Theory
MTE642C-Microwave Integreated Circuit

Elective I -E
MTE641E- CMOS VLSI Design
MTE642E-Digital Signal Compression

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Structure for MTECH [Electronics and Telecommunication]

Sub	Semester - II	Contact Hrs/Week				Examination Scheme (Marks)						
	Subject	L	T	P	Total	CT	TH	TW	P	Total	Duration of Theory Examination	Credit
Part- II												
MT0651	Optimization Techniques	3	1	-	4	20	80	-	-	100	3 hrs	4
MT0652	Audio Signal Processing & Coding	3	1	-	4	20	80	-	-	100	3 hrs	4
MTE653	High Speed Analog Design Techniques	3	1	-	4	20	80	-	-	100	3 hrs	4
MTE654	Image & Video Processing	3	1	-	4	20	80	-	-	100	3 hrs	4
MTE691-693	Elective -II	3	1	-	4	20	80	-	-	100	3 hrs	4
MTE671	Audio Processing & Coding Lab	-	-	4	4	-	-	50	-	50	-	2
MTE672	System Lab-II	-	-	2	2	-	-	-	50	50		1
MTE673	Seminar-II	-	-	2	2	-	-	-	50	50	-	1
Total of Part - II		**15**	**5**	**8**	**28**	**100**	**400**	**50**	**100**	**650**		**24**

L: Lecture hours per week T: Tutorial Hours per week P: Practical hours per week CT: Class Test

TH: University Theory Examination TW: Term Work P: Practical / Oral Examination

Elective II -

MTE691C-Simulaton of Communication System and Network

MTE692C-Pattern Recognition

MTE693C-Advanced Satellite & Rdar Communication

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Elective II -

MTE691E-Automotive Embedded System Design

MTE692E-Pattern Recognition

MTE693E-RTOS

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Sub		Contact Hrs/Week				Examination Scheme (Marks)						
	Subject	**L**	**T**	**P**	**Total**	**CT**	**TH**	**TW**	**P**	**Total**	**Duration of Theory Examination**	**Credit**
Part- III												
MTE731	Dissertation (Part-I)	-	-	12	12	-	-	50	50	100	-	12
Total of Part - III		-	-	12	12	-	-	50	**50**	**100**	-	12

Structure for MTECH [Electronics and Telecommunication]

Sub		Contact Hrs/Week		Examination Scheme (Marks)								
	Subject	**L**	**T**	**P**	**Total**	**CT**	**TH**	**TW**	**P**	**Total**	**Duration of Theory Examination**	**Credit**
Part- IV												
MTE781	Dissertation (Part-II)	-	-	20	20	-	-	100	200	300	-	20
Total of Part - IV		**-**	**-**	**20**	**20**	**-**	**-**	**100**	**200**	**300**	-	**20**
Grand Total										1700		80

L: Lecture hours per week T: Tutorial Hours per week P: Practical hours per week CT: Class Test

TH: University Theory Examination TW: Term Work P: Practical / Oral Examination

Total :- SEM I + SEM II + SEM III + SEM IV

80

Total Contact Hours

SEM I + SEM II + SEM III + SEM IV

28+28+12+20=88

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Syllabus Of M. Tech. (Electronics And Telecommunication Engg.) Semester-I

Code No.: MT0601
Teaching Scheme: 04Hrs/Week
Theory: 03Hrs/Week
Tutorial: 01Hr/Week
Credits: 04

Title: Advanced Digital Signal Processing
Theory Examination (Duration): 03 Hrs
Class Test (Marks): 20
Theory Examination (Marks): 80

Objectives	**:**	• To Develop and Design Different Filters • To Learn and understand Multirate Signal Processing with Its Applications.
Unit-I	**:**	**LTI Discrete-Time Systems In The Transform Domain** Transfer function Classification, Types of Linear-Phase transfer functions, Simple Digital Filters, Complementary Transfer Function, Inverse Systems, System Identification, Digital Two-Pairs, Algebraic Stability Test. **(04Hrs)**
Unit-II	**:**	**Digital Filter Structure And Design** Block Diagram Representation, Basic FIR,IIR Digital filter structures ,All Pass Filters, Tunable IIR Digital Filter, IIR Tapped Cascade Lattice Structures, FIR Cascaded Lattice Structures, Parallel All Pass Realization of IIR Transfer Functions, State Space Structures, Polyphase Structures, Digital Sine Cosine Generator, Computational Complexity of Digital Filter Structures, Design of IIR Filter using pade' approximation, Least Square Design Methods, Design of Computationally Efficient FIR Filters **(08Hrs)**
Unit-III	**:**	**Multi Rate Signal Processing** Basic Sampling rate Alteration Devices, Mathematical description of change of sampling rate Interpolation and Decimation , Decimation by an integer factor - Interpolation by an integer factor, Sampling rate conversion by a rational factor, Filter implementation for sampling rate conversion- direct form FIR structures, Polyphase filter structures, time-variant structures **(08Hrs)**

Unit-IV	**:**	**Linear Estimation And Prediction** Linear Prediction- Innovations Representation Of A Stationary Random Process, Relationship Between The Filter Parameters And The Autocorrelation Sequence, Autoregressive (AR) & Moving Average (MA) Process, Forward And Backward Predictions, Solutions Of The Normal Equations-Levinson-Durbin Algorithms. Least Mean Squared Error Criterion -Wiener Filter For Filtering And Prediction, FIR Wiener Filter And Wiener IIR Filters. **(08Hrs)**
Unit-V	**:**	**Power Spectral Estimation** Estimation Of Spectra From Finite Duration Observation Of Signals, Non-Parametric Methods: Bartlett, Welch & Blackmann &Tukey Methods. Parametric Methods For Power Spectrum Estimation: Relation Between Auto Correlation & Model Parameters, Yule-Waker& Burg Methods, MA & ARMA Models For Power Spectrum Estimation. **(08Hrs)**
Unit-VI	**:**	**Adaptive Filters** FIR Adaptive Filters -Adaptive Filter Based On Steepest Descent Method-Widrow-Hoff LMS Adaptive Algorithm, Normalized LMS. Adaptive Channel Equalization-Adaptive Echo Cancellation-Adaptive Noise Cancellation-Adaptive Recursive Filters (IIR). **(04Hrs)**

Reference Books:

1. Monson H. Hayes, “Statistical Digital Signal Processing And Modeling”, John Wiley And Sons, Inc., Singapore, 2002.
2. John G. Proakis, Dimitris G. Manolakis, “Digital Signal Processing”, Pearson Education, 2002.
3. John G. Proakis “Algorithms For Statistical Signal Processing”, Pearson Education, 2002.
4. Emmanuel C. Ifeachor, Barrie W. Jervis, “Digital Signal Processing” – A Practical Approach, Addison Wesley, 1993.
5. A.V. Oppenheim And Schafer, “Discrete Time Signal Processing”, Prentice Hall, 1989.
6. “Texas Instruments”, Users Guide TMS320C50.

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Syllabus Of M. Tech. (Electronics And Telecommunication Engg.) Semester-I

Code No.: MT0602	**Title: Advanced Digital Communication System**
Teaching Scheme: 04Hrs/Week	**Theory Examination (Duration): 03 Hrs**
Theory: 03Hrs/Week	**Class Test (Marks): 20**
Tutorial: 01Hr/Week	**Theory Examination (Marks): 80**
Credits: 04	

Objectives	**:**	• To Learn And Understand The Basic Statistics Of Digital Communication • To Learn How To Solve The Limitations Of Digital Communication For Different Channels
Unit-I	**:**	**Introduction** Digital Communication System (Description Of Different Modules Of The Block Diagram), Complex Baseband Representation Of Signals, Gram-Schmidtorthogonalization Procedure. M-Ary Orthogonal Signals, Bi-Orthogonal Signals, Simplex Signal Waveform **(04 Hrs)**
Unit-II	**:**	**Modulation** Pulse Amplitude Modulation (Binary And M-Ary, QAM), Pulse Position Modulation (Binary And M-Ary), Carrier Modulation (M-Ary ASK, PSK, FSK, DPSK), Continuous Phase Modulation (QPSK And Variants, MSK, GMSK). **(08 Hrs)**
Unit-III	**:**	**Receiver In Additive White Gaussian Noise Channels Coherent And No Coherent Demodulation** Matched Filter, Correlator Demodulator, Square-Law, And Envelope Detection; Detector: Optimum Rule For ML And MAP Detection Performance: Bit-Error-Rate, Symbol Error Rate For Coherent And No Coherent Schemes . **(08 Hrs)**

Unit-IV	**:**	**Band-Limited Channels** Pulse Shape Design For Channels With ISI: Nyquist Pulse, Partial Response Signaling (Duo Binary And Modifiedduobinary Pulses), Demodulation; Channel With Distortion: Design Of Transmitting And Receiving Filters For A Known Channel And For Time Varying Channel (Equalization); Performance: Symbol By Symbol Detection And BER, Symbol And Sequence Detection, Viterbi Algorithm. **(10 Hrs)**
Unit-V	**:**	**Synchronization** Different Synchronization Techniques (Early-Late Gate, MMSE, ML And Spectral Line Methods). **(04 Hrs)**
Unit-VI	**:**	**Communication Over Fading Channels** Characteristics Of Fading Channels, Rayleigh And Ricianchannels, Receiver Performance-Average SNR, Outage Probability, Amount Of Fading And Average Bit/Symbol Error Rate. **(06 Hrs)**

Reference Books

1. J. G. Proakis And M. Salehi, Fundamentals Of Communication Systems,Pearson Education, 2005.
2. S. Haykins, Communication Systems, 5th Ed., John Wiley, 2008.
3. M. K. Simon, S. M. Hinedi And W. C. Lindsey, Digital Communication Techniques: Signaling And Detection, Prentice Hall India, N. Delhi, 1995.
4. W. Tomasi, Advanced Electronic Communication Systems, 4th Ed., Pearson Education, 1998.

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Syllabus Of M. Tech. (Electronics And Telecommunication Engg.) Semester-I

Code No.: MT603
Teaching Scheme: 04Hrs/Week
Theory: 03Hrs/Week
Tutorial: 01Hr/Week
Credits: 04

Title: Research Methodology
Theory Examination (Duration): 03 Hrs
Class Test (Marks): 20
Theory Examination (Marks): 80

Objectives	**:**	• To Gain Insights Into How Scientific Research Is Conducted. • To Learn And Understand The Basic Statistics Involved In Data Presentation. • To Identify The Influencing Factor Or Determinants Of Research Parameters. • To Test The Significance, Validity And Reliability Of The Research Results
Unit-I	**:**	**An Introduction** Meaning Of Research, Objectives Of Research ,Motivation In Research, Types Of Research, Research Approaches, Significance Of Research, Research Methods Versus Methodology, Research And Scientific Method, Importance Of Knowing How Research Is Done Research Process, Criteria Of Good Research, Problems Encountered By Researchers. **(08 Hrs)**
Unit-II	**:**	**Research Problem And Research Design** What Is Research Problem, Selecting The Problem, Necessity Of Defining The Problem, Technique Involved In Defining The Problem, Research Design: Meaning Of Research Design, Need For Research Design, Features Of A Good Design, Important Concept Relating To Research Design, Different Research Designs, And Basic Principles Of Experimental Designs. **(08Hrs)**
Unit-III	**:**	**Sampling Design** Implication Of Sample Design, Steps In Sample Design, Criteria Of Selecting A Sampling Procedure, Characteristics Of A Good Sample Design, Different Types Of Sample Design, How To Select A Random Sample, Random Sample From An Infinite Universe, Complex Random Sampling Design. **(04 Hrs)**

Unit-IV	**:**	**Data Collection** Collection Of Primary Data, Observation Method, Interview Method, Collection Of Data Trough Questionnaires, Collection Of Data Through Schedules, Difference Between Questionnaires And Schedules, Other Methods Of Data Collection ,Collection Of Secondary Data, Selection Of Appropriate Method For Data Collection, Case Study Method **(08Hrs)**
Unit-V	**:**	**Statistical Modeling & Analysis, Time Series Analysis** Probability Distribution, Fundamentals Of Statistical Analysis And Inference, Multivariate Methods, Concepts Of Correlation And Regression, Fundamentals Of Time Series Analysis And Spectral Analysis, Error Analysis, Applications Of Spectral Analysis. **(04 Hrs)**
Unit-VI	**:**	**Testing Of Hypotheses** What Is Hypothesis, Procedure For Hypothesis Testing, Flow Diagram For Hypothesis Testing ,Measuring The Power Of A Hypothesis Test, Test Of Hypotheses, Important Parametric Tests, Hypothesis Testing Of Means, Hypothesis Testing For Difference Between Means, Hypothesis Testing For Comparing To Related Samples, Hypothesis Testing Of Proportions, Hypothesis Testing For Differences Between Proportions, Limitations Of Tests Of Hypotheses, Introduction To SPSS **(08 Hrs)**

Reference Books

1 " Research Methodology – Methods And Techniques ",C.R.Kothari, New Age International Publishers

2. "Methodology And Techniques Of Social Research ",Wilkinson & Bhandarkar , Himalaya Publications

3. "Research Methodology", Panneerselvam, Prentice Hall

4. "Scientific Social Surveys And Research", Pauline Vyoung, Prentice-Hall

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Syllabus Of M. Tech. (Electronics And Telecommunication Engg.) Semester-I

Code No.: MT604	**Title: Wireless And Mobile Communication System**
Teaching Scheme: 04Hrs/Week	**Theory Examination (Duration): 03 Hrs**
Theory: 03Hrs/Week	**Class Test (Marks): 20**
Tutorial: 01Hr/Week	**Theory Examination (Marks): 80**
Credits: 04	

Objectives	**:**	• To Understand Basic Concepts Of Cellular Communication • To Learn How To Building A Blocks Of Mobile Communication • To Learn Traffic Routing And Grade Of Service • To Learn And Understand Wireless Systems And Standards
Unit-I	**:**	**Cellular Concept And Wireless Standards** Frequency Reuse, Channel Assignment Strategies, Hand Off Strategies, Interference And System Capacity, Trunking And Grade Of Service, Improving Coverage And Capacity In Cellular Systems, Interference Suppression And Power Control, Multiple Access Schemes Standards - GSM, IS-95,UMTS, IMT-2000. **(8 Hrs)**
Unit-II	**:**	**Wireless Network** 1G, 2G, 3G Wireless Networks, Fixed Network Transmission Hierarchy, Traffic Routing In Wireless Networks, Wireless Data Services, CCS, ISDN, SS7, PCS/Pcns, Protocols For Network Access, Network Data Bases. **(8 Hrs)**
Unit-III	**:**	**Wireless LAN** Types Of Networks, IEEE 802.11, System And Protocol Architecture, Physical And Medium Access Control Layers, MAC Management, 802.11b, 802.11a, HIPERLAN **(4 Hrs)**

Unit-IV	**:**	**Bluetooth** Blue Tooth Architecture, Radio Layer, Base Band Layer, Link Manager Protocol, L2CAP, Security, SDP, Profiles, 802.15. **(4 Hrs)**
Unit-V	**:**	**Mobile Network And Transport Layers** Mobile IP, Mobile Adhoc Network – Routing, DSDV, DSR, Traditional TCP, TCP Improvements, Indirect TCP, Snooping TCP, Mobile TCP, TCP Over 2.5 / 3G Wireless Networks, MAC Layer Scheduling And Connection Admission In Mobile Communication. **(8 Hrs)**
Unit-VI	**:**	**Traffic Modeling** Tele-Traffic Modeling And Queuing Theoretic Analysis Of Cellular Mobile Networks, Resource Allocation And Mobility Management. **(8 Hrs)**

Reference Books:

1. Joschen Schiller , “Mobile Communication”, Pearson Education 2003
2. T.S. Rappaport, “Wireless Communications: Principles And Practice”, Second Edition, Pearson Education/ Prentice Hall Of India, Third Indian Reprint 2003.
3. R. Blake, “Wireless Communication Technology”, Thomson Delmar, 2003.
4. W.C.Y Lee, “Mobile Cellular Telecommunications Systems”, Mcgraw Hill, International Editions 1990.
5. David Tse And Pramod Viswanath, “Fundamentals Of Wireless Communication” Cambridge University Press, 2005.

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Syllabus Of M. Tech. (Electronics And Telecommunication Engg.) Semester-I

Code No.: MTE641C	**Title: Wave Propagation And Antenna Theory (EL-I)**
Teaching Scheme: 04Hrs/Week	**Theory Examination (Duration): 03 Hrs**
Theory: 03Hrs/Week	**Class Test (Marks): 20**
Tutorial: 01Hr/Week	**Theory Examination (Marks): 80**
Credits: 04	

Objectives	**:**	• To Adapt Basic Concepts Of Microwave Communication And Transmission Line. • To Build Blocks Of Microwave Communication • To Learn And Design Different Antenna
Unit-I	**:**	**Fundamental Parameters Of Antennas** Introduction, Isotropic Radiators, Radiation Pattern, Gain, Directive Gain, Directivity, Reciprocity Theorem & Its Applications, Effective Aperture, Radiation Resistance, Terminal Impedance, Noise Temperature, Elementary Ideas About Self & Mutual Impedance, Front-To-Back Ratio, Beam Width, Bandwidth, Beam Efficiency, Beam Area Or Beam Solid Angle, Polarization, Temperature. **(06 Hrs)**
Unit-II	**:**	**Linear Wire Antennas And Arrays** Infinitesimal Dipole, Small Dipole, Half Wave Dipole: Current Distribution, Radiated Field, Power Density And Radiation Resistance. Two Element Array, N-Element Array: Broadside And End Fire Array. Planar Array And Circular Array: Design Consideration, Array Factor **(08 Hrs)**
Unit-III	**:**	**Broadband, Frequency Independent Antennas And Reflector Antennas**: Helical Antenna, Yagi-Uda Array Of Linear Elements, Yagi-Uda Array Of Loops Electric Magnetic Dipole. Log Periodic Antennas. Corner Reflector, Plane Reflector, Parabolic Reflector With Feed System **(06Hrs)**

Unit-IV	**:**	**Aperture Antennas** Rectangular Apertures, Circular Apertures: Uniform Distribution On Infinite Plane, TE Mode Distribution, Beam Efficiency, Design Consideration, Babinets Principle, Fourier Transform I Aperture Antenna Theory, Spectral Domain And Radiation Fields. **(06 Hrs)**
Unit-V	**:**	**Horn Antennas And Micro Strip Antennas** E And H- Plane Spectral Horn, Pyramid Horn, Conical Horn, Corrugated Horn, Aperture Matched Horn, Multimode Horn And Their Aperture Fields, Radiated Fields And Phase Centre. Rectangular Patch, Circular Patch, Basic Characteristics, Feeding Method, TM Mode , Quality Factor, Bandwidth, Input Impedance, Coupling And Efficiency, Arrays And Feed Networks **(08 Hrs)**
Unit-VI	**:**	**Wave Propagation** Calculation Of Great Circle Distance Between Any Two Points On Earth, Ground Wave Propagation, Free-Space Propagation, Ground Reflection, Surface Waves, Diffraction, Wave Propagation In Complex Environments, Tropospheric Propagation, Tropospheric Scatter. Ionospheric Propagation: Structure Of Ionosphere, Sky Waves, Skip Distance, Virtual Height, Critical Frequency, MUF, Electrical Properties Of Ionosphere, Effects Of Earth¡¦S Magnetic Fields, Faraday Rotation, Whistlers. (**06 Hrs)**

Reference Books

1. C. Balanis, “Antenna Theory: Analysis And Design”, Wiley India.
2. G.S.N. Raju, “Antenna And Wave Propagation”, Pearson Education.
3. J.D.Krauss, “Antennas For All Applications”, 3rd Edition, TMH.
4. Jordan And Balmain, “Electromagnetic Wave & Radiating Systems”, PHI Publication.
5. K.D. Prasad, “Antenna & Wave Propagation”, Satyaprakash Publications.
6. A.R.Harish, M.Sachidanada, ¡§Antennas And Wave Propagation¡¨, Oxford University Press, 2007
7. R.E.Collins, ¡§Antenna And Radiowave Propagation¡¨
8. W.L Stutzman And G.A. Thiele, ¡§Antenna Analysis And Design¡¨, John Wiley, 2000

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Syllabus Of M. Tech. (Electronics And Telecommunication Engg.) Semester-I

Code No.: MTE642C	**Title: Micro Wave Integrated Circuit (EL-I)**
Teaching Scheme: 04Hrs/Week	**Theory Examination (Duration): 03 Hrs**
Theory: 03Hrs/Week	**Class Test (Marks): 20**
Tutorial: 01Hr/Week	**Theory Examination (Marks): 80**
Credits: 04	

Objectives	**:**	• To Adapt Basic Concepts Of Microwave Circuit • To study different component of microwave integrated circuit
Unit-I	**:**	**MICRO STRIP LINES-DESIGN & ANAL** Analysis of MIC by conformal transformation, Numerical analysis, Strip line, Parallel Strip line, Mictrostripline, Losses in Micro strip, Slot lines and Coplanar wave guide **(08 Hrs)**
Unit-II	**:**	**COPLANAR WAVE GUIDE TRANSMISSION LINES** Introduction to CPW lines, Analysis, Micromachining for performance improvement of CPW lines, Two examples reported in literature **(06 Hrs)**
Unit-III	**:**	**POWER DIVIDER, DIRECTIONAL COUPLERS AND LUMPED ELEMENTS FOR MICS** Wilkinson power divider, Even and odd analysis, Directional couplers, branch line couplers, Bethe Hole coupler, Couple line coupler, The 180 degree Hybrid,-Ring hybrid, Design of Lumped elements for MICs. **(06Hrs)**
Unit-IV	**:**	**COMPONENTS AND ACTIVE DEVICES FOR MICS** Microwave Transistors, Parametric diodes and amplifiers, PIN diodes, Transferred electron devices, IMPATT, BARITT, Microwave Tunnel diode **(06 Hrs)**
Unit-V	**:**	**MICROVE FILTERS AND IMPEDANCE MATCHING** Impedance transformers, Single stub tuning, Double Stub Tuning, Quarter wave

		transformer , Chebyshev multisection matching Transformer, filters, Periodic Structures, Filter Design by the image parameter method, Constant K filter, m derived filter **(08 Hrs)**
Unit-VI	:	**MMIC TECHNOLOGY** Fabrication process of MMIC, Hybrid Integrated circuit fabrication, thin film technology, planar resistor film, planar inductor film, planar capacitor film**.** **(06 Hrs)**

Reference Books

1. **David M Pozer. "Microwave Engineering" John Wiley & Sons ,New York.**
2. **Gupta K.C. & Amarjit Singh, "Microwave Integrated Circuits" John Willey New York 1971.**
3. **Samuel Y. Liao, "Prentice Hall of India Private Ltd" New Delhi 1995**

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Code No.: MT0641E	**Title: CMOS VLSI Design (EL-I)**
Teaching Scheme: 04Hrs/Week	**Theory Examination (Duration): 03 Hrs**
Theory: 03Hrs/Week	**Class Test (Marks): 20**
Tutorial: 01Hr/Week	**Theory Examination (Marks): 80**
Credits: 04	

Objectives	**:**	• To Make The Students Able To Understand The Concepts Of VLSI Design And To Design Various Analog Systems Including Data Converters- CMOS. • To Acquaint The Students With Bottom-Up And A Top-Down Design View Of Mixed Signal • To Learn Electronic Systems By The Use Of Modern Computer Aided.
Unit-I	**:**	**MOS Inverter** Introduction, MOS Inverter And Its Characteristics: C-V Characteristics, Non Ideal I-V Effect, Dc Transfer Characteristics, Threshold Voltage Equations, Body Effects, MOS Device Design Equations, Basic DC Equations, Latch-Up In CMOS Circuits And Other Second Order Effects. **(04Hrs)**
Unit-II	**:**	**Introduction To CMOS Circuits** CMOS Logic- Complementary CMOS Inverter- DC Characteristics, Noise Margin, Static Load MOS Inverters, Differential Inverter, The Transmission Gate, Tristate Inverter, Bi-CMOS Inverters, SPICE Model; Combination Logic- Static And Dynamic Design Strategies, The NAND And NOR Gates, Compound Gates, Multiplexers. **(04Hrs)**
Unit-III	**:**	**Designing Combinational Logic Gates In CMOS** Static CMOS Design, Dynamic CMOS Design, More Circuit Families: Differential Circuits, Sense Amplifier, Bicmos Circuits. **(08 Hrs)**

Unit-IV	**:**	**Designing Sequential Logic Circuits** Static Latches And Registers, Dynamic Latches And Registers, Non Bistable Sequential Circuits. **(08 Hrs)**
Unit-V	**:**	Datapath Subsystems And Addition, Subtraction, Parity Generator, Comparator, Counters, Shifters, Multiplication And Other Arithmetic Operators; Power And Speed Tradeoffs, Control FSM And Control Logic Implementation. **(08 Hrs)**
Unit-VI	**:**	**Array Subsystems** Memory Cells And Arrays, ROM, RAM- SRAM, DRAM, Clocking Disciplines; Design, Power Optimization, Case Studies In Memory Design. **(08 Hrs)**

Reference Books

1 N. Waste And K. Eshranghian, “Principals Of CMOS VLSI Design”, Addison Wesley

2 Jan Rabaey,Anantha Chandrakasan And Borivoje Nikolic, “Digital Integratedcircuits”

3 Jacob Backer, Harry W. Lie And Devid E. Boyce,“CMOS Circuit Design , Layout And Simulation” Prentice Hall.

4 L.Glaser And Dobberpuhi, “The Design And Analysis Of VLSI Circuits”, Addison Wesley

5 Mnnn, “Introduction To VLSI System” Addison Wesley

6 Dr. K.V.K.K. Prasad, Kattula Shyamala, “VLSI Design Black Book”:

7 John P. Uyemura, “Introduction To VLSI Circuits And Systems” Wiley Pub

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Syllabus Of M. Tech. (Electronics And Telecommunication Engg.) Semester-I

Code No.: MTE642E	**Title: Digital Signal Compression (EL-I)**
Teaching Scheme: 04Hrs/Week	**Theory Examination (Duration): 03 Hrs**
Theory: 03Hrs/Week	**Class Test (Marks): 20**
Tutorial: 01Hr/Week	**Theory Examination (Marks): 80**
Credits: 04	

Objectives	**:**	• To Learn And Understand Different Compression Techniques • To Design And Implement Different Compression Techniques For Different Application
Unit-I	**:**	**Introduction** Overview Of Information Theory - Redundancy. Need For Compression – Evolution Of Data Compression And Its Applications -Taxonomy Of Compression Techniques. **(04 Hrs)**
Unit-II	**:**	**Source Coding Techniques** Overview Of Source Coding, Source Models, Scalar And Vector Quantization Theory, Rate Distribution Theory, Vector Quantisation, Structure Quanitizers. Evaluation Techniques-Error Analysis And Methodologies. **(04 Hrs)**
Unit-III	**:**	**Text Compression** Compaction Techniques – Huffmann Coding – Adaptive Huffmann Coding – Arithmatic Coding – Shannon-Fano Coding – Dictionary Techniques – LZW Family Algorithms. **(08Hrs)**
Unit-IV	**:**	**Audio Compression** Audio Signal Representation, Compression Techniques Frequency Domain And Filtering – Basic Subband Coding – G.722– MPEG Audio, Progressive Encoding For Audio – Silence Compression, Speech Compression Techniques –Vocoders. **(08Hrs)**

Unit-V	**:**	**Image Compression** Predictive Techniques – DM, PCM, DPCM: Optimal Predictors And Optimal Quantization – Contour Based Compression, Quad Trees – Transform Coding – JPEG Standard – Sub-Band Coding Algorithms: Design Of Filter Banks – Wavelet Based Compression: EPIC, SPIHT Coders – JPEG 2000 Standards - JBIG, JBIG2 Standards. **(08Hrs)**
Unit-VI	**:**	**VIDEO COMPRESSION** Video Compression Techniques And Standards – MPEG Video Coding – Motion Estimation And Compensation Techniques – H.261 Standard – DVI Technology – PLV Performance – DVI Real Time Compression. **(08Hrs)**

Reference Books:

1. Khalid Sayood, "Introduction To Data Compression", Morgan Kauffman Harcourt India, 2nd Edition, 2000.
2. David Salomon, " Data Compression", The Complete Reference, Springer Verlag New York Inc., 2nd Edition, 2001.
3. Yun Q.Shi, Huifang Sun, "Image And Video Compression For Multimedia Engineering".
4. "Fundamentals, Algorithms & Standards", CRC Press, 2003.
5. Peter Symes, "Digital Video Compression", Mcgraw Hill Pub., 2004.
6. Mark Nelson, "Data Compression", BPB Publishers, New Delhi,1998.
7. Mark S.Drew, Ze-Nian Li, " Fundamentals Of Multimedia", PHI, 1st Edition, 2003.
8. Watkinson.J, "Compression In Video And Audio", Focal Press, London, 1995.
9. Jan Vozer, "Video Compression For Multimedia", AP Profes, Newyork, 1995.

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad
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Syllabus Of M. Tech. (Electronics And Telecommunication Engg.) Semester-I

Code No.: MTE621	**Title: Digital Signal Processing Simulation Lab- I**
Teaching Scheme:	**Termwork: 50 Marks**
Practical: 04Hrs/Week	**Credits: 02**

Objectives	**:**	• To Learn And Understand Different Signals • To Design And Implement Different Filter Techniques For Different Application

Students Are Instructed To Frame And Perform Laboratory Assignment Based On ADSP Of Theory Course. The Assignment Should Encompass The Hardware And Software Techniques/Tools Introduced In The Concerned Subjects And Should Prove To Be Useful For The PG Program In The Relevant Field. Assignment Should Be A Full-Fledged System Design Problems With Multidimensional Solutions Suggested.

Student Shall Submit A Laboratory Work Document Based On The Assignment Performed At The End Of Semester. The Laboratory Instructor Shall Guide The Students In Framing The Assignments And Defining The Problems Pertaining To The Said Subjects.

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Code No.: MTE622 **Title: System Lab-I**
Teaching Scheme: **Term Work: 50 Marks**
Practical: 02Hrs/Week **Credits: 01**

Objectives	**:**	In this system laboratory students will learn and implement various aspects using different software and simulation tools.

Individual Student Will Perform The Work As Per The Following Guidelines And Submit The Report Based On Result Obtained And /Or Study Performed Under The Guidance Of Respective Guide (Minimum 25 Pages).

The Work Will Be Assessed By Two Examiners Out Of Which One Will Be External Examiner Appointed By The University And Second Examiner (Internal) Will Be Guide Itself.

Work To Be Carried Out By Student,

1) Student Should Perform Experimentation In Any Subject Of The Stream As Assign By The Respective Guide, Leading Towards Concept Understanding.
2) Literature Survey About The Topic, Research And Development Or Thrust Area Subject.
3) Student Should Study Any One Of The Software From Given List And Develop A Specific Software Based Module Using C/C++/Vb/Matlab/VHDL/Microwind/Labview/Pspice/ EDA Or ECAD Etc.

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Code No.: MTE623 **Title: Seminar- I**
Teaching Scheme: **Termwork: 50 Marks**
Practical: 02Hrs/Week **Credits: 01**

Objectives	**:**	• To create awareness amongst students for latest technological aspects. • To improve presentation and communication skill • To motivate students for research in respective area

Student Should Deliver Seminar On The State Of The Art Topic In Front Of The External Examiners And Internal Examiners, Staff And Student Colleagues. Prior To Presentation Student Should Carry The Details Of Literature Survey Form Standard References Such As International Journals And Periodicals, Recently Published Reference Books Etc. Student Should Submit A Report On Same Along With Computer Based Presentation Copy To The Concerned Examiner/Guide At The End Of Seminar. The Assessment Shall Be Based On Selection Of Topic Its Relevance To Present Context, Report Documentation And Presentation Skills.

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Code No.: MTE0651 | **Title: Advanced Optimization Techniques**
Teaching Scheme: 04Hrs/Week | **Theory Examination (Duration): 03 Hrs**
Theory: 03Hrs/Week | **Class Test (Marks): 20**
Tutorial: 01Hr/Week | **Theory Examination (Marks): 80**
Credits: 04

Objectives	**:**	• Students will learn different problem formulation techniques with different algorithm. • Students will learn and understand constrains of optimization in research operations,
Unit-I	**:**	**Introduction** Optimal Problem Formulation, Engineering Optimization Problems, Optimization Algorithms. **(02Hrs)**
Unit-II	**:**	**Single Variable Optimization Algorithms** Optimality Criteria, Bracketing Methods, Region Elimination Methods, Point Estimation Methods, Gradient Base, Root Finding Using Optimization Techniques. **(06Hrs)**
Unit-III	**:**	**Multivariable Optimization Algorithms** Optimality Criteria, Unidirectional Search, Direct Search Methods, Gradient Based Methods, Computer Programs On Above Methods. **(08Hrs)**
Unit-IV	**:**	**Constrained Optimization Algorithms** Kuhn-Tucker Conditions, Transformation Methods, Sensitivity Analysis, Direct Search For Constrained Minimization, Linearised Search Techniques, Feasible Direction Method, Generalized Reduced Gradient Method, Gradient Projection Method, Computer Programs On Above Methods. **(08Hrs)**

Unit-V	**:**	**Special Optimization Algorithms** Integer Programming, Geometric Programming, Genetic Algorithms, Simulated Annealing, Global Optimization, Computer Programs On Above Methods. **(08Hrs)**
Unit-VI	**:**	**Optimization In Operations Research** Linear Programming Problem, Simplex Method, Artificial Variable Techniques, Dual Phase Method, Sensitivity Analysis **(08Hrs)**

Reference Books

1. Deb Kalyanmoy, “Optimization In Engineering Design”, PHI, New Delhi.
2. Rao S.S. “Engineering Optimization”, John Wiley, New Delhi.
3. Deb Kalyanmoy, “Multi-Objective Algorithms Using Evolutionary Algorithms”, John Wiley, New Delhi.
4. Paplambros P.Y. And Wilde D.J., “Principles Of Optimum Design: Modeling And Computation”, Cambridge University Press, UK
5. Chandrupatla, “Optimization In Design”, PHI, New Delhiuniversity Press, UK
6. Chandrupatla, “Optimization In Design”, PHI, New Delhi.

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Code No.: MTE0652 | **Title: Audio Signal Processing And Coding**
Teaching Scheme: 04Hrs/Week | **Theory Examination (Duration): 03 Hrs**
Theory: 03Hrs/Week | **Class Test (Marks): 20**
Tutorial: 01Hr/Week | **Theory Examination (Marks): 80**
Credits: 04

Objectives	**:**	• Students will learn and understand different types of speech signal. • Students will design and implement different algorithm for speech processing
Unit-I	**:**	**Fundamentals Of Speech** Nature Of Speech, Type Of Speech, Voiced An Unvoiced Decision Making, Audio File Formats, Process Of Speech Production, Acoustic Theory Of Speech Production. **(04 Hrs)**
Unit-II	**:**	**Digital Models For The Speech Signal** Lossless Tube Models And Digital Models For Speech Signals, Time Domain Model For Speech Processing, Time Dependent Processing Of Speech, Parameter Of Speech: Pitch &Formats, Fundamental Frequency Or Pitch Frequency, Parallel Processing Approach For Calculation Of Pitch Frequency, Pitch Period Measurement Using Spectral Domain, Cepstral Domain, Estimation Of Formats. **(04 Hrs)**
Unit-III	**:**	**Spectral Parameter Of Speech** Homomorphic Processing, Cepstal Analysis Of Speech, The Auditory System As A Filter Bank, Perceptual Linear Prediction, Log Frequency Power Coefficients, Relative Spetral Perceptual Linear Prediction, Short-Time Spectral Analysis Of Speech, Wavelet Transformation Analysis Of Speech. **(08 Hrs)**

Unit-IV	**:**	**Speech Quantization And Coding** Uniform And Non-Uniform Quantization And Coder, Commanded Quantizer, Waveform Coding Of Speech, Comparison Of Different Waveform Coding Techniques, Parameter Speech Coding Technique, Mixed Excitation Linear Prediction Coder, Multi-Mode Speech Coding, Transform Domain Coding Of Speech. **(08 Hrs)**
Unit-V	**:**	**Short Time Fourier Analysis** Linear Filtering Interpretation, Filter Bank Summation Method, Overlap Addition Method, Design Of Digital Filter Bank, Implementation Using FFT, Spectrographic Displays, Pitch Detection, Analysis By Synthesis, Analysis Synthesis System, Homomorphic Speech Processing: Homomorphic System For Convolution, Complex Spectrum, Pitch Detection, Format Estimation ,Homomorphic Vocoder.
Unit-VI	**:**	**Speech Synthesis And Speech Processing Application** A Text To Speech System, Synthesizer Technologies ,Speech Synthesis Using Other Methods, Speech Transformations, Emotion Recognition From Speech, Speech Recognition For ASR, Statical Sequence Recognition For ASR, VQ-HMM- Based Speech Recognition, Word Spotting/Key-Word Spotting, Speaker Recognition, Speech Enhancement, Adaptive Echo Cancellation, Audio Processing: Auditory Perception And Psychoacoacoustis Masking Frequency And Loudness Perception, Spatial Perception, Digital Audio, Audio Coding, High Quality, Low Bit Rate, Audio Coding Standard, MPEG,AC-3 **(08 Hrs)**

Reference Books:

1. L.R.Rabiner And R.W. Schafer, “Digital Processing Of Speech Signal” Pearson Education (Asia) Pte.Ltd, 2004
2. D.O’Shaughnessy “Speech Communication: Human And Machine”Universities Press2001
3. L.R. Rabiner And B.Juang “Fundamentals Of Speech Recognition”Pearson Education Pte.Ltd, 2004
4. Z.Li And M.S. Drew “Fundamentals Of Multimedia” Pearson Education Pte.Ltd, 2004

5. Shaila D Apte “Speech And Audio Processing” John Wiley & Sons
6. C Becchetti & L P Ricotti,”Speech Recognition Theory & C++ Implementation” John Wiley & Sons
7. B Gold & N. Morga “Speech & Audio Signal Processing”,John Wiley & Sons.

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Code No.: MTE653 | **Title: High Speed Analog Design Techniques**
Teaching Scheme: 04Hrs/Week | **Theory Examination (Duration): 03 Hrs**
Theory: 03Hrs/Week | **Class Test (Marks): 20**
Tutorial: 01Hr/Week | **Theory Examination (Marks): 80**
Credits: 04

Objectives	**:**	• To study different high speed design components • To design and develop a system for different aspects
Unit-I	**:**	**High Speed Operational Amplifiers** Folded Cascode Voltage Feedback Op-Amps, Case Study Of AD847, Current Feedback Op-Amps (CFB), CFB Model And Bode Plot, Study Of AD8011, Comparison Of Specifications Of Current Feedback Op-Amp Family AD8001, AD8002, AD8009 And AD8073, Noise Comparisons Between VFB And CFB OpAmps **(07Hrs)**
Unit-II	**:**	**High-Speed Applications Based On Op-Amps** Optimizing Feedback Network For Maximum Bandwidth Fitness, Driving Capacitive Load, Cable Drivers And Receivers, High Performance Video Line Driver, Differential Line Drivers And Receivers, High Speed Clamping Amplifiers, High Speed Current To Voltage Converters And The Effects Of Inverting Input Capacitance, Low Noise Amplifiers For Communication Systems, Mixers, Power Amplifiers, Liner Drivers, Automatic Gain Control Amplifiers **(07 Hrs)**
Unit-III	**:**	**HIGH SPEED DATA CONVERSION OVERVIEW** Converter Sampling Rate, Resolution, Architectures, And Applications, Successive Approximation Adcs, Pipelined Adcs, Measures Of ADC Dynamic Performance, High Speed ADC Applications In Software Radios, CCD/CIS Imaging For Digital Cameras And Camcorders, ADC Applications In Video, Flat Panel Display Interface Electronics, High Speed ADC Applications In Ultrasound **(06 Hrs)**

Unit-IV	**:**	**OPTIMIZING DATA CONVERTER INTERFACES** Interface Overview, Driving The ADC Analog Input, Single-Ended DC Coupled Amplifier Drivers For Adcs, Differential Amplifier Drivers For Adcs, Equivalent Input Circuit Models For Buffered (Bicmos) And Unbuffered (CMOS) Pipelined Adcs, Transformer Drivers, Transformer Driver Design Example, Sampling Clock Drivers, ADC Data Outputs **(08 Hrs)**
Unit-V	**:**	**Dacs, Ddss, Plls, AND CLOCK DISTRIBUTION** High Speed CMOS Dacs, DAC Applications In Transmitters, Buffering DAC Outputs, Direct Digital Synthesis, Phase Locked Loops, Clock Generation And Distribution, Generating Low Jitter Clocks Using DDS Systems **08 Hrs)**
Unit-VI	**:**	**High Speed RF/IF Subsystems** Dynamic Range Compression, Linear Vcas, Log/Limiting Amplifiers, Receiver Overview, Multipliers, Modulators And Mixers **(04 Hrs)**

Reference Books:

1. Intuitive Operational Amplifiers, Thomas M. Frederiksen, Mcgraw Hill, 1988.

2. B Razavi, "RF Microelectronics", Prentice Hall, 1998

3. T.H. Lee, "The Design Of CMOS Radio-Frequency Integrated Circuits" Cambridge University Press, 1998.

4. High Speed Design Techniques, Manual By Analog Devices, October 1996

5. Modular Low-Power, High Speed CMOS Analog-To-Digital Converter For

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Code No.: MTE654	**Title: Image And Video Processing**
Teaching Scheme: 04Hrs/Week	**Theory Examination (Duration): 03 Hrs**
Theory: 03Hrs/Week	**Class Test (Marks): 20**
Tutorial: 01Hr/Week	**Theory Examination (Marks): 80**
Credits: 04	

Objectives	**:**	• Students Will Learn Proper Image Representation, Enhancement, Filtering, Restoration, Analysis, Reconstruction. • Students Will Learn Advanced Digital Image And Video Processing Techniques, With Its Standards Sand Various Reconstructions From Incomplete Information • To Study Different Application Of Digital Image And Video Processing
Unit-I	**:**	**Image Representations And Image Models** Introduction, Image Perception, Light, Luminance, Brightness And Contrast, Fundamental Steps In Digital Image Processing, Pixels, Image Processing Components ,Visibility Function , Monochrome Vision Models ,Color Representation ,Color Matching And Reproduction ,Color Vision Model Image Sampling And Quantization ,Two Dimensional Sampling Theory ,Reconstruction Of Images From Its Samples ,Multimate Aliasing ,Sampling Theorem. Practical Limits In Sampling Reconstruction. **(08Hrs)**
Unit-II	**:**	**Image And Video Enhancement And Restoration** Image Enhancement, Point Operations, Contrast Stretching, Clipping And Thresholding, Digital Negative Intensity Level Slicing, Bit Extraction. Histogram Modeling, Histogram Equalization, Modification. Spatial Operations, Sharpening And Smoothing Techniques. Magnification And Interpolation. Transform Operations. Color Image Enhancement. Image Restoration, Degradation Model, Unconstrained And Constrained Restoration, Inverse Filtering Removal Of Blur Caused By Uniform Linear Motion, Wiener Filtering Motion Detection And Estimation, Video Enhancement And Restoration **(08Hrs)**

Unit-III	**:**	**Image Compression** Image Compression, Fundamentals, Image Compression Models, Fidelity Criterion Elements Of Information Theory, Error Free Compression, Lossy Compression, DCT And Wavelet Based Compression, Image Compression Standards, JPEG 2000, MPEG 4, Image Evaluation, Subjective Assessment, And Objective Assessment **(06 Hrs)**
Unit-IV	**:**	**Image And Video Acquisition** Basic Of Analog And Digital Video, Video Formation, Video Representation, Video Formats, Video Sampling Rate Conversion, De Interfacing, Conversion Between PAL And NTSC Signal, Video Modeling Image Scanning. Sampling. And Interpolation, Video Sampling And Interpolation **(06 Hrs)**
Unit-V	**:**	**Video Compression** Video Compression Basic Concepts And Techniques Of Video Coding And The H.261 Standard, Object-Based Video Coding, Video Coding Based On Temporal Predication And Transform Coding MPEG- 1 And MPEG-2 Video Standards, Emerging MPEG Standards: MPEG-4 And MPEG-7.Comperssion With Digital TV. Video Telephony, Audiovisual Object **(06 Hrs)**
Unit-VI	**:**	**Image And Video Applications** Image Quality Evaluation, Fingerprint Classification And Matching, Human Face Recognition. Medical Application, **(06 Hrs)**

Reference Books:

1. Al Bovik:Handbook Of Image & Video Processing Academic Press
2. J. W. Woods :Multidimensional Signal, Image And Video Processing And Coding, , AcademicPress
3. A. M. Tekalp :Digital Video Processing, Prentice Hall
4. Y. Wang, J. Ostermann, And Y.-Q. ZhangVideo Processing And CommunicatiPrentice

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Code No.: MTE691E	**Title: Automotive Embedded System Design**
Teaching Scheme: 04Hrs/Week	**Class Test (Marks): 20**
Theory: 03Hrs/Week	**Theory Examination (Duration): 03 Hrs**
Credits: 04	**Theory Examination (Marks): 80**

Objectives	**:**	• To Understand Automotive Embedded System. • To Understand Concepts Of Electronics Used In Automotive. • Automotive Sensor Concepts
Unit-I	**:**	**Introduction:** Introduction To Embedded System, Classifications, Automotive Embedded System Controllers, Simple Block Diagrams, Technologies, Fuel Injection System, Alternator, Applications. **(4 Hours)**
Unit-II	**:**	**Body Electronics:** Instrument Panel Design Using HCS12 CPU Core, System Basis Chip MC33904,Remote Key, Keyless Entry, Door, Window Anti-Pinch System, Lighting, Air Bag, Seat Belt. (**8 Hours)**
Unit-III	**:**	**Chassis And Safety:** Breaking And Stability Control, Pre-Crash Safety, Parking Assistance, Lane Keeping Assistance, Electronic Power Steering. (**8 Hours)**
Unit-IV	**:**	**Powertrain:** Engine, Automatic Transmission, Hybrid Control, Steering, Brake, Suspension. Engine Management System, Drive By Wire System. (**6 Hours)**
Unit-V	**:**	**Diagnosis And Sensors:** OBD-2, Sensors: Crankshaft Position Sensor, MAP Sensor, Manifold Absolute Pressure, Mass Flow Sensor, Or Mass Airflow (MAF) Sensor, Oxygen Sensor,

		Throttle Position Sensor (TPS), Variable Reluctance Sensor. (**8 Hours)**
Unit-VI	**:**	**Vehicle Network:** CAN, Flexray, I2C, Local Interconnect Network, SPI, Power Line Communication. Noise Sources And Protections. **(6 Hours)**

Content Beyond Syllabus:

Industrial Visit To Automotive R & D Labs.

Learning Resources:

Web Resources:

1. Http://Www.Ti.Com/
2. Http://Www.Freescale.Com
3. Http://Www.Atmel.Com

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Code No.: MTE692C/ E	**Title: Pattern Recognition**
Teaching Scheme: 04Hrs/Week	**Class Test (Marks): 20**
Theory: 03Hrs/Week	**Theory Examination (Duration): 03 Hrs**
Credits: 04	**Theory Examination (Marks): 80**

Objectives	**:**	• To learn different patter n recognition techniques
Unit-I	**:**	**Introduction To Pattern Recognition:** Machine Perception, The Classification Model, The Descriptive Approach. **(4Hrs)**
Unit-II	**:**	**Baye's Decision Theory:** Baye's Decision Theory, Minimum Error Rate, Classification, Classifiers, Discriminate Functions And Decision Surfaces, Error Probabilities And Integral, The Normal Density Discriminate Function For The Normal Density Bayesian Decision Theory. **(8Hrs)**
Unit-III	**:**	Parameter Estimation And Supervised Leasning The Mean Of A Normal Density, General Bayesian Learning, Sufficient Statics And Exponential Family, Problems Of Dimensionality, Estimating The ErrorRate. **(8Hrs)**
Unit-IV	**:**	**Nonparametric Technique** Density Estimation Parzen Windows, K Nearest Neighbor Estimation, Estimation Of A Posteriori Probability, The Nearest Neighbor Rule, Approximation By Series Expansion, Approximation For The Binary Case, Fisher's Linear Discriminate, Multiple Discriminate Analysis. **(6Hrs)**

Unit-V	**:**	**Linear Discriminant Functions** Linear Discriminant Functions And Decision Surfaces, Generalised Linear Descriminant Functions, The Two Category Linearly Separable Case, Minimizing The Perception Criterion Function, Relaxation Procedures, Non-Separable Behavior, Minimum Squared Error Procedures, Ho Ka Shyap Procedures, Linear Programming Procedures, The Method Of Potential Function, Multicategory Generalizations. **(7Hrs)**
Unit-VI	**:**	Unsupervised Learning And Clustering: Mixture Densities And Identifiability, Maximum Likelihood Estimates, Application To Normal Mixtures, Unsupervised Bayesian Learning, Data Description And Clustering, Criterion Functions For Clustering, Iterative Optimization, Hierarchical Clustering, Graph Theoretic Methods, Clustering And Dimensionality Reduction. **(7Hrs)**
Reference Books: **1.**Pattern Classifier ,Richard O Duda,Peter E Hert Second Edition John Willey Publications 2.Patter Recognition And Image Analysis, Earl Gose ,Steave Jost ,PHI 2004		

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Code No.: MTE693E	**Title: Real Time Operating System**
Teaching Scheme: 04Hrs/Week	**Class Test (Marks): 20**
Theory: 03Hrs/Week	**Theory Examination (Duration): 03 Hrs**
Credits: 04	**Theory Examination (Marks): 80**

Objectives	**:**	• To get students familiar with the typical problems and constraints that arise while designing and developing embedded systems. • To introduce theoretical and practical solutions to typical problems that the students are expected to master.
Unit-I	**:**	**Unit 1:** Software Architectures, Software Developments Tools, Programming Concepts, Embedded Programming in C and C++ **(4Hrs)**
Unit-II	**:**	**Unit 2:** Queues, Stacks, Optimization of Memory needs, Program Modeling Concepts, Software Development Process Life Cycle and its Model, Software Analysis, Design and Maintenance, Operating System Concepts **(8Hrs)**
Unit-III	**:**	**Unit 3:** Processes, Deadlocks, Memory Management, Input /Output, Files, Security, the Shell, Recycling of Concepts. Operating system structure Monolithic Systems: Layered Systems, Virtual Machines, Exo-kernels, Client-Server Model **(8Hrs)**
Unit-IV	**:**	**Unit 4:** Real Time Operating Systems (µC/OS):Real-Time Software Concepts, Kernel Structure, Task Management, Time Management, Inter task Communication & Synchronization, Memory Management, and Porting µCos-II. REAL TIME KERNEL Principles – Design issues – Polled Loop Systems – RTOS Porting to a Target – Comparison and study of various RTOS like QNX – VX works – PSOS – C Executive – Case studies. **(7Hrs)**

Unit-V	**:**	**Unit 5:** Linux/RT Linux: Features of Linux, Linux commands, File Manipulations, Directory, Pipes and Filters, File Protections, Shell Programming, System Programming, RT Linux Modules, POSIX Threads, Mutex Management, Semaphore Management. **(7Hrs)**
Unit-VI	**:**	**Unit 6:** RTOS APPLICATION DOMAINS vizRTOS for Image Processing – Embedded RTOS for voice over IP – RTOS for fault Tolerant Applications – RTOS for Control Systems **(6Hrs)**

Reference Books:

1. µC/OS-II, The real time Kernel, Jean J. Labrossy, Lawrence: R & D Publications.

2. Embedded Real Time Systems: Concepts, Design & Programming, Dr.K.V.K.K. Prasad, Dreamtech Publication.

3. An Embedded Software Primer, David E. Simon, Pearson Education Publication

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Code No.: MTE691C	**Title: Simulation of Communication System And Networks**
Teaching Scheme: 04Hrs/Week	**Class Test (Marks): 20**
Theory: 03Hrs/Week	**Theory Examination (Duration): 03 Hrs**
Credits: 04	**Theory Examination (Marks): 80**

Objectives	**:**	• To get students familiar with the typical problems and constraints that arises while designing different aspect of communication with different software tools. • To introduce theoretical and practical solutions to typical problems that the students are expected to master. • To Learn communication Systems By The Use Of Modern Computer Aided
Unit-I	**:**	MODELING OF COMMUNICATION SYSTEM Model of speech and picture signals, Pseudo noise sequences, Non-linear sequences, Analog channel model, Noise and fading. **(08 Hrs)**
Unit-II	**:**	**DIGITAL CHANNEL MODELS** Digital channel model-Gilbert model of busty channels, HF, Troposcatter and satellite channels, Switched telephone channels, Analog and Digital communication system models, Light wave system models. **(08 Hrs)**
Unit-III	**:**	**SIMULATION OF RANDOM VARIABLES** Univariate and multivariate models, Transformation of random variables, Bounds and approximation**.** **(08Hrs)**
Unit-IV	**:**	**RANDOM PROCESS** Random process models-Markov AND a ARMA Sequences, Sampling rate for simulation, Computer generation and testing of random numbers. **(04 Hrs)**

Unit-V	**:**	**ESTIMATION OF PERFORMANCE MEASURES** Quality of an estimator, estimator for SNR, Probability density functions of analog communication system, BER of digital communication systems, Montre carlo method and Importance sampling method, estimation of power spectral density of a process **(08 Hrs)**
Unit-VI	**:**	**COMMUNICATION NETWORKS** Queuing models, M/M/I and M/M/I/N queues, Little formula, Burke's theorem, M/G/I queue, Embedded Markov chain analysis of TDM systems, Polling, Random access systems. **(08 Hrs)**

Reference Books:

1. M.C.Jeruchim,Philip Balaban and K.Sam Shanmugam,"*Simulation of communication systems*", Plenum Press, New York, 1992.
2. A.M.Law and W.David Kelton, "*Simulation Modelling and Analysis*", Mc Graw Hill Inc.,New York , 1991.
3. J.F.Hayes, "*Modeling and Analysis of Computer Communication Networks*", Plenum Press, New York, 1984.
4. Jerry Banks and John S.Carson, "*Discrete-event System Simulation*", Prentice Hall, Inc., New Jersey, 1984.

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Code No.: MTE693C	**Title: Advanced Satellite And Radar Communication**
Teaching Scheme: 04Hrs/Week	**Class Test (Marks): 20**
Theory: 03Hrs/Week	**Theory Examination (Duration): 03 Hrs**
Credits: 04	**Theory Examination (Marks): 80**

Objectives	**:**	• To learn and understand satellite communication • To learn design and analysis of satellite ,radar communication • To study role of digital signal processing in radar
Unit-I	**:**	**Introduction** Introduction To Satellite Communication, Frequency Allocations, Kepler's I,II,III Laws, Satellite Orbits- Low, Medium, Geosynchronous, Look Angles, Orbital Perturbations, Orbital Effects, Earth Eclipse Of Satellite, Sun Transit Outage, Satellite Launching Procedures, Placement Of Satellite In GSO. **(04 Hrs)**
Unit-II	**:**	**Satellite Link Analysis** Space Segment- Space Craft Technology, Attitude And Orbit Control, Thermal Control And Propulsion, Communication Payload, Telemetry, Tracking And Command Control Systems, Transponders, Satellite Uplink And Downlink Analysis And Design. Earth Segment- Earth Station Technology, Earth Station Organization, RF Characteristics, Transmitter And Receiver, Antennas And Earth Coverage. **(06 Hrs)**
Unit-III	**:**	**Satellite Access And Applications** Modulation And Multiplexing-Voice, Data. Video, Analog-Digital TransmissionSystem,MultipleAccessFDMA,TDMA,CDMA,SSMA,FM,BPSK, QPSK.,Assignment Methods, Compression-Encryption. VSAT Systems Applications- Mobile Satellite Services: GSM, GPS, Satellite Navigational System, Weather Forecasting, Environmental Monitoring, Fixed Satellite Services, Digital Broadcast Satellite (DBS), DTH, Digital Audio Broadcast

		(DAB), Satellite Radio Broadcasting. **(10 Hrs)**
Unit-IV	**:**	**Radar Systems** Introduction, Radar Block Diagram And Operation, Radar Range Equation, Radar Frequencies, Types Of Radar, Integration Of Radar Pulses, Radar Cross-Section Of Targets And Clutter, Transmitter Power, PRF, Range Ambiguities, Doppler Effect, CW Radar, FMCW Radar, MTI Radar. Fundamentals Of Surveillance Radar, Principles Of Secondary Surveillance Radar: Radar Studies Of The Atmosphere, OHR & Radar Jamming, EC, ECC Measures & Stealth Applications. **(06 Hrs)**
Unit-V	**:**	**Tracking Radar** Tracking And Search Radars, Monopulse Tracking, Conical Scan And Sequential Lobing, Low Angle Tracking, Tracking In Range, Air Surveillance Radar, Radar Antennas, Radar Displays,Duplexer, Propagation Effects-Multipath, Low Altitude And Ionosphere, Radar Networks. Introduction To Synthetic Aperture Radar(SAR) **(06 Hrs)**
Unit-VI	**:**	**Radar Signal Processing** Radar Waveform Design: Waveform Selection, Radar Ambiguity Function And Ambiguity Diagram- Principles And Properties, Single Pulse Of Sine Wave, Periodic Pulse Train, Single Linear FM Pulse, Noise Like Waveforms, Waveform Design Requirements, Pulse Compression: Significance, Types, Characteristics, Reduction Of Time Side Lobes, Stretch Techniques, Generation And Detection Of FM Waveforms, Digital Compression, SAW Pulse Compression, Phase Coding Techniques: Principles, Binary Phase Coding, Minimal Length Sequences, Frank Codes, Costas Codes, Radar Applications. **(08 Hrs)**

Reference Books

1. Timothy Pratt,Charles Bostain & Jeremy Allnutt, “Satellite Communications”, John Willey &Sons, 2004
2. D.C. Aggrawal, “Satellite Communication”, Khanna Publications.
3. Dennis Roddy, “Satellite Communications”, Mc Graw Hill,4th Ed.2006
4. M.L Skolnik, “Introduction To Radar Systems”, Mc Graw Hill.
5. Fred E. Nathanson, “Radar Design Principles-Signal Processing & The Environment”, PHI, 2nd Ed.1999
6. Simon Kingsley & Shaun Quegan,.”Understanding Of Radar Systems” Mcgraw Hill, 1993
7. M.I, Skolnik, “Radar Handbook”, Mcgraw Hill, 2nd Ed., 1991

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Syllabus Of M. Tech. (Electronics And Telecommunication Engg.) Semester-II

Code No.: MTE671	**Title: Audio Signal Processing And Coding-II**
Teaching Scheme:	**Term Work: 50 Marks**
Practical: 02Hrs/Week	**Credits: 02**

Objectives	**:**	• In this laboratory students will learn various aspects of ASP using different software and simulation tools.

Students Are Instructed To Frame And Perform Laboratory Assignment Based On Each Of Theory Course. The Assignment Should Encompass The Hardware And Software Techniques/Tools Introduced In The Concerned Subjects And Should Prove To Be Useful For The PG Program In The Relevant Field. Assignment Should Be A Full-Fledged System Design Problems With Multidimensional Solutions Suggested.

Student Shall Submit A Laboratory Work Document Based On The Assignment Performed At The End Of Semester. The Laboratory Instructor Shall Guide The Students In Framing The Assignments And Defining The Problems Pertaining To The Said Subjects.

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad
(Faculty Of Engineering & Technology)
Syllabus Of M. Tech. (Electronics And Telecommunication Engg.) Semester-II

Code No.: MTE672 **Title: System Lab - II**
Teaching Scheme: **Term Work: 50 Marks**
Practical: 02Hrs/Week **Credits: 01**

Objectives	**:**	• In this system laboratory students will learn various aspects using different software and simulation tools.

Individual Student Will Perform The Work As Per The Following Guidelines And Submit The Report Based On Result Obtained And /Or Study Performed Under The Guidance Of Respective Guide (Minimum 25 Pages).

The Work Will Be Assessed By Two Examiners Out Of Which One Will Be External Examiner Appointed By The University And Second Examiner (Internal) Will Be Guide Itself.

Work To Be Carried Out By Student,

1) Student Should Perform Experimentation In Any Subject Of The Stream As Assign By The Respective Guide, Leading Towards Concept Understanding.
2) Literature Survey About The Topic, Research And Development Or Thrust Area Subject.
3) Student Should Build Any One Of The Software/Hardware Based Mini Project As Per Guidelines Given By Respective Committee And/Or Guide.

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad

(Faculty Of Engineering & Technology)

Syllabus Of M. Tech. (Electronics And Telecommunication Engg.) Semester-II

Code No.: MTE673	**Title: Seminar- II**
Teaching Scheme:	**Termwork: 50 Marks**
Practical: 02Hrs/Week	**Credits: 01**

Objectives	**:**	• To create awareness amongst students for latest technological aspects. • To improve presentation and communication skill • To motivate students for research in respective area.

Student Should Deliver Seminar On The State Of The Art Topic In Front Of The External Examiners And Internal Examiners, Staff And Student Colleagues. Prior To Presentation Student Should Carry The Details Of Literature Survey Form Standard References Such As International Journals And Periodicals, Recently Published Reference Books Etc. Student Should Submit A Report On Same Along With Computer Based Presentation Copy To The Concerned Examiner/Guide At The End Of Seminar. The Assessment Shall Be Based On Selection Of Topic Its Relevance To Present Context, Report Documentation And Presentation Skills.

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad
(Faculty Of Engineering & Technology)
Syllabus Of M. Tech. (Electronics And Telecommunication Engg.) Semester-III

Code No.: MTE731 | **Title: Dissertation - I**
Teaching Scheme: | **Term Work: 50 Marks**
Project: 12Hrs/Week | **Oral: 50 Marks**
Credits: 12

Objectives	**:**	• To motivate students for research in respective area. • Apply filed knowledge to design and develop system for industry or society

The Dissertation Seminar Will Consist Of A Type Written Report Of In Plant Training Covering The Problem Selected For Final Dissertation. This Should Include The Problem Definition, Literature Survey, Objective, Its Limitations, Technical Details And Related Data Required For The Proposed Dissertation Work. The Candidate Shall Deliver The Dissertation Seminar On The Topic Or The Problem Selected For Final Dissertation Which Will Be Judged By Two Examiners (One External And One Internal Guide). The Assessment Shall Be Based On Selection Of Topic Its Relevance To Present Context, Report Documentation And Presentation Skills, Utility Of The Dissertation Work & Publications Based On The Same.

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad
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Syllabus Of M. Tech. (Electronics And Telecommunication Engg.) Semester-IV

Code No.: MTE781 | **Title: Dissertation - II**
Teaching Scheme: | **Term Work: 100 Marks**
Project: 20 Hrs/Week | **Oral: 200 Marks**
Credits: 20

Objectives	**:**	• Apply their knowledge in problem solving and in Project Implementation. • To correlate theory and practical knowledge ,actual practices in the industries and societies

The Student Shall Be Allowed To Submit The Dissertation- II Report Only After The Completion Of Dissertation- I. Student Should Deliver Viva-Voca Presentation On Topic Of Desertion-II In front Of The External Examiners And Internal Examiners, Staff And Student Colleagues The Assessment Shall Be Based On Design And Implementation Aspects, Report Documentation And Presentation Skills, Utility Of The Dissertation Work & Publications Based On The Same.