SCHEME & SYLLABUS

(Choice Based Credit System)

for

M. TECH.

in

ELECTRONICS & COMMUNICATION ENGINEERING

(w.e.f. Session 2019-20)

Program Code: ECE-401

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

SCHOOL OF ENGINEERING

RIMT UNIVERSITY, MANDI GOBINDGARH, PUNJAB

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SECTION 1

Vision & Mission of the University

VISION

To become one of the most preferred learning places a centre of excellence to promote and nurture future leaders who would facilitate in desired change in the society

MISSION

- To impart teaching and learning through cutting edge technologies supported by the world class infrastructure
- To empower and transform young minds into capable leaders and responsible citizens of India instilled with high ethical and moral values

SECTION 2

Vision and Mission of the Department

VISION

To contribute to the society through excellence in knowledge-based education utilizing the potential of engineering and technology with a deep passion for wisdom, culture and values.

MISSION

- To provide quality education to meet the current needs of industry and society.
- To provide a learning ambience by enhancing innovations, problem solving skills, leadership qualities, team-spirit and ethical responsibilities.
- To provide exposure to latest tools and technologies and promoting research and development-based activities in the emerging areas of engineering and technology.

SECTION 3

About the Program

Electronics and Communication engineering is one of the core field of engineering which deals in communication, fibre optics, microwave antenna & radar engineering, analog & digital electronics, digital signal processing and signals & system and related to design, innovations and development of various devices like smart radios, LED TVs, smartphones, robotics solutions and computer & accessories etc. Electronics and Communication engineers play a critical role in healthcare, home appliances, transport systems, cell phones, core manufacturing, automation, IT, control, pharmaceutical and many other industries. There is drastic growth in Electronics, Communication and computing due to upcoming MAKE IN INDIA, DIGITAL INDIA and SKILL INDIA campaign. Without electronics, it is impossible to work. There is a great demand of Electronics and Communication Engineers due to the development of new technologies like IoT, Artificial intelligence and Robotics all over the world.

SECTION 4

Program Educational Objectives (PEOs), Program Outcomes (POs) and Program Specific Outcomes (PSOs)

PROGRAMME EDUCATION OBJECTIVES (PEOs).

PEO.1. To prepare learners with a solid foundation in mathematics, sciences, and technical skills needed to analyze and design in engineering problems.

PEO.2. To be able to explore areas of research, application & innovation and make impact in different types of institutional settings such as corporate entities, government bodies, NGOs, inter-government organizations, & start-ups.

PEO.3. To prepare learners to apply knowledge, strong reasoning, and quantitative skills to design and implement creative and sustainable solutions.

PEO.4. To prepare learners to effectively use modern equipment's & programming tools to solve real life problems that are technically sound, economically feasible and socially acceptable.

PEO.5. To prepare learners for successful professional career, to excel in higher studies and or to become entrepreneur.

PEO.6. To be able to continuously learn and update one's knowledge, engage in lifelong learning habits and acquire latest knowledge to perform in current work settings.

PEO.7. To prepare learners to become responsible citizens by serving the community locally, nationally, and internationally.

PROGRAMME OUTCOMES (POs)

PO1. Scholarship of knowledge: An ability to discriminate, evaluate, analyze & synthesize the existing and new knowledge of electronics and communication engineering and to integrate the same for enhancement of knowledge

PO2. Critical Thinking: An ability to analyze a problem and formulate intellectual & creative framework for conducting research for its solution in a theoretical, practical and policy context.

PO3. Problem Solving: An ability to evaluate alternative solution of an electronics & communication engineering related problem to find the feasible and optimal solution with appropriate consideration for public health and safety, cultural, societal and environmental issues.

PO4. Research Skill: An ability to use research based techniques and skills including literature survey, experiments, research methodologies, analysis and interpretation of data and development of scientific/technical knowledge to provide valid conclusions by contributing individually or in groups.

PO5. Usage of Modern tools: An ability to develop appropriate models, techniques, skills using modern engineering & software tools for solving electronics & communication engineering problems.

PO6. Collaborate Multidisciplinary Work: An ability to perform effectively in diverse and Multidisciplinary teams as a member / leader and take objective & rational decisions to achieve common goals.

PO7. Project Management and Finance: An ability to comprehend and apply engineering and management principles to manage individual and team projects with appropriate consideration to economical & financial aspects.

PO8. Communication: An ability to communicate effectively, clearly and confidently with a range of audience through oral and written presentations

PO9. Life-long learning: an ability to recognize the need for and engage in continuous professional development and life-long learning

PO10. Ethical Practices and Social Responsibility: An understanding of professional, ethical, intellectual issues, practices, and social responsibilities as a researcher and member of society.

PO11. Independent and Reflective Learning: An ability for critical self-analysis and self-correction.

PO12. The Engineering for Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

PSO 1. Apply advanced concepts of Communication Engineering to design and develop more efficient next generation communication systems.

PSO 2. Use modern technologies in both hardware, software to solve real-world multidisciplinary, scientific and business application problems by applying best design and innovation principles.

PSO 3. Independently carry out research on diverse communication strategies to address practical problems, innovate the ideas, industry defined problems and present a substantial technical report.

SECTION 5

Curriculum / Scheme with Examination Grading Scheme

SEMESTER WISE SUMMARY OF THE PROGRAMME: M.TECH. (ELECTRONICS & COMMUNICATION ENGINEERING)

S. No.	Semester	No. of Contact Hours	Marks	Credits
1.	I	16	500	16
2.	II	20	500	18
3	III	14	500	26
4	IV	2	Satisfactory / Unsatisfactory	20
Total		**52**	**1500**	**80**

EXAMINATION GRADING SCHEME

Marks Percentage Range	Grade	Grade Point	Qualitative Meaning
80-100	O	10	Outstanding
70-79	A^+	9	Excellent
60-69	A	8	Very Good
55-59	B^+	7	Good
50-54	B	6	Above Average
45-49	C	5	Average
40-44	P	4	Fail
0-39	F	0	Fail
ABSENT	AB	0	Fail

Percentage Calculation: CGPA *10

Study Scheme

M.Tech Electronics & Communication Engg. (1st Semester)

Total Contact Hours = 16 Total Marks =500 Total Credits = 16

COURSE		Contact Hours/Week			Credit	% of Total Marks					Exam Duration (Hours)
Code	Course Title	L	T	P		CWA	LWA	MTE	ETE	Total	
MTEC-101	Advanced Communication systems	3	1	0	4	16	-	24	60	100	3
MTEC-102	Data Communication Network	3	1	0	4	16	-	24	60	100	3
MTRM-101	Research Methodology	3	1	0	4	16	-	24	60	100	3
MTRM-102	Lab I (ORM Lab)	-	-	4	2	-	60	-	40	100	3
MTEC-181	Seminar on advanced topics	-	-	0	2	-	60	-	40	100	3
Total		9	3	4	16					500	

M.Tech Electronics & Communication Engg. (2nd Semester)

Total Contact Hours = 20 Total Marks = 500 Total Credits = 18

COURSE		Contact Hours/Week			Credit	% of Total Marks					Exam Duration (Hours)
Code	Course Title	L	T	P		CWA	LWA	MTE	ETE	Total	
MTEC-103	Optical Communication Systems	3	1	0	4	16	-	24	60	100	3
MTEC-104	Electronic System Design	3	1	0	4	16	-	24	60	100	3
MTEC-105	Information Theory and Coding	3	1	0	4	16	-	24	60	100	3
MTEC-106	Lab II(Research Lab)	0	0	4	2	-	100	-	-	100	3
	Elective-I										
MTEC-140	VLSI Design	3	1	0	4	16	-	24	60	100	3

MTEC-141	Advanced Microprocessor & Embedded Systems										
Total		**12**	**4**	**4**	**18**					**500**	

M.Tech Electronics & Communication Engg. (3rd Semester)

Total Contact Hours = 12 **Total Marks = 500** **Total Credits = 26**

COURSE		Contact Hours/Week			Credit	% of Total Marks					Exam Duration (Hours)
Code	Course Title	L	T	P		CWA	LWA	MTE	ETE	Total	
MTEC-107	Digital Speech &Image Processing	3	1	0	4	16	-	24	60	100	3
MTEC-108	Neural Network and Fuzzy Logic	3	1	0	4	16	-	24	60	100	3
MTEC-182	Pre Synopsis Seminar	-	-	-	4	-	100	-	-	100	3
MTEC-183	Project	-	-	2	10	-	60	-	40	100	3
	Elective-II										
MTEC-142	Wireless Communication & Networks	3	1	0	4	16	-	24	60	100	3
MTEC-143	Multimedia Communication Systems										
Total		**9**	**3**	**2**	**26**					**500**	

M.Tech Electronics & Communication Engg. (4th Semester)

COURSE		Contact Hours/Week			Credit	% of Total Marks					Exam Duration (Hours)	Evaluation Criterion
Code	Course Title	L	T	P		CWA	LWA	MTE	ETE	Total		
MTEC-190	**Dissertation**	**0**	**0**	**2**	20	-	-	-	-	-	-	**Satisfactory/Unsatisfactory**
Total		**0**	**0**	**0**	**20**							

Overall

Semester	Marks	Credits
1st	500	16
2nd	500	18
3rd	500	26
4th	--	20

L-- Lecture T-- Tutorial P---Practical

CWA Class work Assessment

LWA Lab work Assessment

MTE Mid Term Exam

Total	**1500**	**80**	ETE	End Term Exam

SYLLABUS

SEMESTER-I

SUBJECT TITLE: RESEARCH METHODOLOGY
SUBJECT CODE: MTRM-101
SEMESTER: 1
CONTACT HOURS/WEEK:

Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
4	-	-	4

Internal Assessment: 40
End Term Exam: 60

Duration of Exam: 3 Hrs
Course Objectives:
The course has been designed to cover the basic concepts of research i.e. meaning, definition, process and research design. The students should be able to understand the data collection methods, questionnaire designing, construction and sampling design & techniques.

S No.	Content	Contact Hrs.
1.	Introduction to Research: Meaning, Definition, Objective and Process Research Design: Meaning, Types - Historical, Descriptive, Exploratory and Experimental Research Problem: Necessity of Defined Problem, Problem Formulation, Understanding of Problem, Review of Literature Design of Experiment: Basic Principal of Experimental Design, Randomized Block, Completely Randomized Block, Latin Square, Factorial Design. Hypothesis: Types, Formulation of Hypothesis, Feasibility, Preparation and Presentation of Research Proposal	11 Hrs
2	Sources of Data: Primary and Secondary, Validation of Data Data Collection Methods: Questionnaire Designing, Construction Sampling Design & Techniques – Probability Sampling and Non Probability Sampling Scaling Techniques: Meaning & Types Reliability: Test – Retest Reliability, Alternative Form Reliability, Internal Comparison Reliability and Scorer Reliability Validity: Content Validity, Criterion Related Validity and Construct Validity	10 Hrs
3	Data Process Operations: Editing, Sorting, Coding, Classification and Tabulation Analysis of Data: Statistical Measure and Their Significance, Central Tendency, Dispersion, Correlation: Linear and Partial, Regression: Simple and Multiple Regression, Skewness, Time series Analysis, Index Number Testing of Hypothesis: T-test, Z- test, Chi Square, F-test, ANOVA	11 Hrs
4	Multivariate Analysis: Factor Analysis, Discriminant Analysis, Cluster Analysis, Conjoint Analysis, Multi-Dimensional Scaling Report Writing: Essentials of Report Writing, Report Format Statistical Software: Application of Statistical Softwares like SPSS, MS Excel, Mini Tab orMATLAB Software in Data Analysis	11 Hrs

COURSE OUTCOMES: On completion of this course, the students will be able to

CO1	MTRM-101.1	Develop understanding on various kinds of research, objectives of doing research, research process, research designs and sampling.
CO2	MTRM-101.2	Have basic knowledge on qualitative research techniques
CO3	MTRM-101.3	Have adequate knowledge on measurement & scaling techniques as well as the quantitative data analysis
C04	MTRM-101.4	Have basic awareness of data analysis-and hypothesis testing procedure.

Suggested Readings / Books:

1. Statistics for Management by R.I. Levin and D.S. Rubin, 7thEdn., Pearson Education, New Delhi, 2007.
2. Marketing Research–An Applied Orientation by N.K. Malhotra, 4thEdn., Pearson Education, New Delhi, 2000.
3. Business Research Methods by Donald Cooper, Tata McGraw Hill, New Delhi, 2001.
4. Research Methodology in Social Sciences, Sadhu Singh, Himalaya Publishers, 2007.
5. Research Methodology Methods & Techniques by C.R. Kothari, 2ndEdn., New Age International Publishers, 2008.

SUBJECT TITLE: Advanced Communication Systems
SUBJECT CODE: MTEC-101
SEMESTER: I
CONTACT HOURS/WEEK:

Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
3	1	0	4

Internal Assessment: 40
End Term Exam: 60
Duration of Exam; 3 Hrs

Course Objective
To familiarize with the working of advanced communication systems.

S No.	Content	Contact Hrs.
1.	**Introduction** Introduction to communications systems, analog and digital communication systems, Applications of communication systems.	5 Hrs
2.	**Digital Communication** Introduction, Digital Modulation techniques, BPSK, QPSK, PCM, DPCM, Delta Modulation, Digital Transmission and Transmission Impairments.	8 Hrs
3.	**Optical Networks** WDM, TDM, Telecommunication Infrastructure, Switching, 3G systems, SONET, SDH, Architecture of Optical Transport Network, Link Management Protocols, Solutions.	10 Hrs
4.	**Satellite Communication** Basic Transmission Theory, System Noise Temperature and G/T Ratio, Design Of Down Links, Domestic Satellite Systems Using Small Earth Stations, Uplink Design, Design Of Satellite Link For Specified (C/N). Multiple Access Techniques, Frequency Division Multiple Access (FDMA), TDMA, CDMA, Estimating Channel Requirements, Practical Demand Access Systems, Random Access, Multiple Access With On Board Processing. VSAT	15 Hrs
5.	**Mobile Communications** Mobile telephone service, Transmission protocols, Introduction to GSM, GPRS, CDMA, Switching techniques, Fading, Quality of service (QOS).	8 hrs

Books Recommended:

1. Advanced Communication Systems - by Wayne Tomasi; Pearson.
2. Digital Communication - by Proakis; PHI
3. Optical Networks - by Uyless Black; Pearson
4. Satellite Communication - by Timothy Pratt; Addison Wesley.

COURSE OUTCOMES: On completion of this course, the students will be able to

CO1	**MTEC-101.1**	Differentiate between analog and digital communication systems
CO2	**MTEC-101.2**	Implement the Digital Modulation Techniques
CO3	**MTEC-101.3**	Understand optical and satellite communication systems

SUBJECT TITLE: Data Communication Networks

SUBJECT CODE: MTEC-102

SEMESTER: I

CONTACT HOURS/WEEK:

Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
3	1	0	4

Internal Assessment: 40

End Term Exam: 60

Duration of Exam; 3 Hrs

Unit No.	Content	Contact Hrs.
1.	**Data Transmission** : Overview of Data Communication and networking, Analog And Digital Data Transmission, Transmission Impairments, Various Transmission Media, Data Encoding.	**5 Hrs**
2.	**Digital Data Communication Techniques** : Asynchronous And Synchronous Transmission, Error Detection and correction techniques, Physical interfaces	**5 Hrs**
3.	**Data Link Control** : Link Configurations, Protocol principles (Error control, Flow control), Bit Oriented and character oriented protocol, Data link layer services, Link Control.	**5 hrs**
4.	**Multiplexing** : F.D.M. Synchronous TDM, Statistical TDM	**3 hrs**
5.	**Switching and Computer Networks** : Communication Networks, Circuit Switching, Message Switching, Packet Switching, X.25, Virtual circuits and Data gram's, LAN/MAN Technologies, Medium Access control protocols (CSMA/CD, Token ring, FDDI, DQDB)	**8 hrs**
6.	**Computer Communication Architecture** : OSI and TCP/IP Model, Protocol And Architecture, Inter Networking, IP addressing, structure of IP, IPv4, IPv6, Transport layer Protocols, Session Service And Protocols, and Presentation/Application Controls.	**8 hrs**
7.	**ATM Networks** : Concepts, history, Architecture, Convergence and challenges	**3 hrs**
8.	**Network Operating Systems** : Overview of network operating systems (Windows NT/Unix/Linux), Mobile IP33N Operating System	**3 hrs**
9.	**Network security** : Security issues, concept of firewalls, intrusion detection Systems	**5 hrs**

Books Recommended:

1. Data And Computer Communication - by William Stallings, Prentice Hall, 4th Ed.

2. Computer Networking - by Andrew Tanenbaum.

3. Data communications and networking - by Forouzan

5. Engg. approach to Computer Networking - by Srinivasan Keshav, Pearson Edu.

COURSE OUTCOMES: On completion of this course, the students will be able to

CO1	**MTEC-102.1**	Transmit the Data in digital and analog form over different protocols
CO2	**MTEC-102.2**	Understand and Implement multiplexing, switching and computer networking
CO3	**MTEC-102.3**	Understand the operating systems while solving the security issues.

SUBJECT TITLE: ORM LAB

SUBJECT CODE: MTRM-102

SEMESTER: I

Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
0	0	4	2

CONTACT HOURS/WEEK:

Internal Assessment: 100

Objective

To understand the limitations of particular research methods. Develop skills in qualitative and quantitative data analysis and presentation

Contents of Syllabus:

Contents	Contact Hours
Statistical Software: Application of Statistical Softwares like SPSS, MS Excel, Mini Tab or MATLAB Software in Data Analysis *Each Student has to Prepare Mini Research Project on Topic/ Area of their Choice and Make Presentation. The Report Should Consist of Applications of Tests and Techniques Mentioned in The Research Methodology UNITs	**40**

Course Outcome:

CO1	MTRM102.1	Demonstrate the ability to choose methods appropriate to research aims and objectives
CO2	MTRM102.2	Understand the limitations of particular research methods. Develop skills in qualitative and quantitative data analysis and presentation
CO3	MTRM102.3	Develop advanced critical thinking skills.
CO4	MTRM102.4	Assess the basic function and working of analytical instruments used in research

Suggested Books

1. R.I. Levin and D.S. Rubin, 'Statistics for Management', 7th Edition, 2013.
2. N.K.Malhotra, 'Marketing Research–An Applied Orientation', 6th Edition, 2010.
3. C.R.Kothari, 'Research Methodology Methods & Techniques', 2nd Edition, 2014.

SUBJECT TITLE: SEMINAR ON ADVANCED TOPICS
SUBJECT CODE: MTEC-181
SEMESTER: 1
CONTACT HOURS/WEEK:

Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
-	-	-	2

Internal Assessment: 100

Students has to prepare a ppt. along with file for any respective research topic

COURSE OUTCOMES: On completion of this course, the students will be able to

CO1	**MTEC181.1**	Understand the potential of presenting through seminar
CO2	**MTEC181.2**	Able to Understand the selection of topic and its presentation
CO3	**MTEC181.3**	Understand the use of seminar at different areas and places

SYLLABUS

SEMESTER-II

SUBJECT TITLE: Optical Communication Systems
SUBJECT CODE: MTEC-103
SEMESTER: 2
CONTACT HOURS/WEEK:

Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
3	1	0	4

Internal Assessment: 40
End Term Exam: 60
Duration of Exam; 3 Hrs

Course Objectives

This Course provides knowledge about various types of optical sources and detectors available at receivers. It also imparts knowledge about communication system based on optical fiber and various techniques of multiplexing. Apart from this, various networking models for optical communication taught to complete all aspects of this subject.

Unit No.	Content Detail	Contact Hours
1.	**Introduction to optical fibers** Wave propagation Dispersion and its limitations, losses and non-linear effects	**5 Hrs**
2.	**Optical transmitters** LEDs Semiconductor lasers and their characteristics. Transmitter Design	**4 hrs**
3.	**Optical receiver** Photo detectors and their characteristics. Receiver Design. Noise and Sensitivity in Optical Receivers Sensitivity degradation	**6 Hrs**
4.	**Optical Amplifiers** Semiconductor Optical Amplifier Raman Amplifier. EDFA	**5 Hrs**
5.	**Dispersion management** Need Pre-compensation Schemes Best Compensation Techniques. Dispersion Compensatory Fibers Optical Filters Fiber Bragg Grating	**8 hrs**
6.	**Multichannel Systems** WDM Light wave Systems WDM Components System Performance tissues TDM. CDM	**5 hrs**
7.	**Solution Systems** Fiber Solutions Soliton based Communications Loss Managed Solitons Dispersion -Managed Solitons High Speed Soliton Systems WDM Soliton Systems	**8 hrs**

Books Recommended:

1. Fiber-Optic Communication Systems - by GP Aggarwal - John Wiley & Sons
2. Fiber-Optic Communication Systems - by Mynbev - John Wiley & Sons
3. Related IEEE/IEE publications

COURSE OUTCOMES: On completion of this course, the students will be able to

CO1	**MTEC-103.1**	Students will attain various skills to develop different optical networks for single user and multiuser and can also attain the maximum benefit of this domain w. r. t. maximum data rate and available bandwidth.
CO2	**MTEC-103.2**	Contribute in the areas of optical network and various optical sources, fibres
CO3	**MTEC-103.3**	Implement simple optical network and understand further technology developments for future enhanced network.

SUBJECT TITLE: Electronics System Design
SUBJECT CODE: MTEC-104
SEMESTER: 2
CONTACT HOURS/WEEK:

Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
3	1	0	4

Internal Assessment: 40
End Term Exam: 60
Duration of Exam; 3 Hrs

Course Objective

The objective of this course is to provide students with opportunities to learn different types of digital systems and to understand and deal with various practical issues related to their design

Unit No.	Content Detail	Contact Hours
1.	**Review of Digital electronics concept**	**2 hrs**
2.	**MSI and LSI Circuits And Their Applications:** Arithmetic Circuits, Comparators, Multiplexers, Code Converters, XOR And AND-OR INVERTER Gates, Wired Logic, Bus Oriented Structures, Tri-State Bus System, Propagation Delay.	**6 hrs**
3.	**Sequential Machines:** The Concept Of Memory, The Binary Cell, The Cell And The Bouncing Switch, Set / Reset, D, Clocked T, Clocked JK Flip Flop, Design Of Clock F/F, Conversion, Clocking Aspects, Clock Skew, State Diagram Synchronous Analysis Process, Design Steps For Traditional Synchronous Sequential Circuits, State Reduction, Design Steps For Next State Decoders, Design Of Out Put Decoders, Counters, Shift Registers and Memory.	**10 hrs**
4.	**Multi Input System Controller Design:** System Controllers, Design Phases And System Documentation, Defining The System, Timing And Frequency Considerations, Functional, Position And Detailed Flow Diagram Development, MDS Diagram, Generation, Synchronizing Two System And Choosing Controller, Architecture, State Assignment, Next State Decoders And Its Maps, Output Decoders, Clock And Power Supply Requirements, MSI Decoders, Multiplexers In System Controllers, Indirect Addressed Multiplexers Configurations, Programmable System Controllers, ROM, PLA And PAL Based Design.	**12 hrs**
5.	**Asynchronous Finite State Machines:** Scope, Asynchronous Analysis, Design of Asynchronous Machines, Cycle and Races, Plotting and Reading, The Excitation Map, Hazards, Essential Hazards Map Entered Variable, MEV Approaches, To Asynchronous Design, Hazards In Circuit Developed By MEV Method, Electromagnetic Interference And Electromagnetic Compatibility Grounding And Shielding of Digital	**12 Hrs**

	Circuits. Interfacing digital system with different media like fiber cable, co-axial cable etc.	

Books Recommended:

1. An Engineering Approach To Digital Design - by Fletcher PHI 1990
2. Designing with TTL Circuits - by Texas Instruments

COURSE OUTCOMES: On completion of this course, the students will be able to

CO1	**MTEC-104.1**	Understand concept of embedded system design and challenges in designing an embedded system
CO2	**MTEC-104.2**	appreciate the advantages/disadvantages between the implementations using standard logic (SSI, MSI) and programmable logic (PLDs, PGAs).
CO3	**MTEC-104.3**	Understand and Implement the A-FSM on different applications

SUBJECT TITLE: Information Theory & Coding
SUBJECT CODE: MTEC-105
SEMESTER: 2
CONTACT HOURS/WEEK:

Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
3	1	0	4

Internal Assessment: 40
End Term Exam: 60
Duration of Exam; 3 Hrs

Course objectives: The aims of this course are to introduce the principles and applications of information theory. The course will study how information is measured in terms of probability and entropy, and the relationships among conditional and joint entropies; how these are used to calculate the capacity of a communication channel, with and without noise; coding schemes, including error correcting codes.

Unit No.	Content Detail	Contact Hours
1.	**Elements of information theory** Source coding theorem, Huffman coding, Channel coding theorem, channel capacity theorem, Shenonfano theorem, entropy	**7 Hrs**
2.	**Sampling Process** Base band and band pass sampling theorems reconstruction from samples, Practical aspects of sampling and signal recovery TDM	**10 hrs**
3.	**Waveform Coding Techniques** PCM Channel noise and error probability DPCM and DM Coding speech at low bit rates Prediction and adaptive filters. Base band shaping for data transmission, PAM signals and their power spectra Nyquist criterion ISI and eye pattern Equalization.	**10 Hrs**
4.	**Digital Modulation Techniques** Binary and M-ary modulation techniques, Coherent and non-coherent detection, Bit Vs symbol error probability and bandwidth efficiency. Bit error analysis, using orthogonal Signaling	**10 Hrs**
5.	**Error Control Coding** Rationale for coding Linear block codes, cyclic codes and convolution codes Viterbi decoding algorithm and trellis codes.	**8 hrs**

Books Recommended:

1. Principles of digitals communication: J. Dass. , S.K. Malik & P.K. Chatterjee, 1991.

2. Introduction to the theory of Error correcting codes: Vera Press, 1992

3. Information Theory and Reliable Communication: Robert G. Gallanger Mc Graw Hill, 1992

4. Related IEEE/IEE publications

COURSE OUTCOMES: On completion of this course, the students will be able to

CO1	**MTEC-105.1**	Characterize and apply probabilistic techniques in modern digital communication systems, such as information systems, receivers, filtering and statistical operations
CO2	**MTEC-105.2**	Comparatively evolve key results developed in this course for applications to signal processing, communications systems.
CO3	**MTEC-105.3**	Develop frameworks based in error coding and modulating techniques

SUBJECT TITLE: RESEARCH LAB - 2
SUBJECT CODE: MTEC-106
SEMESTER: 2
CONTACT HOURS/WEEK:

Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
-	-	4	2

Internal Assessment: 60
End Term Exam: 40
Duration of Exam: 3 Hrs

S No.	Content	Contact Hrs.
1	Introduction to Python / Rand its environment	**2 hrs**
2	Basic Python, data types	**2 hrs**
3	Programs for branching statement and loops	**2 hrs**
4	Program for inbuilt and user defined functions	**2 hrs**
5	Program for plots, arrays, input/outputs, etc.	**2 hrs**
6	Image Processing using Python Libraries	**2 hrs**
7	Signal Processing using Python Libraries	**2 hrs**
8	Speech Processing using Python Libraries	**2 hrs**

COURSE OUTCOMES: On completion of this course, the students will be able to

CO1	**MTEC-106.1**	Understand the potential of presenting through Python / R
CO2	**MTEC-106.2**	Image Processing, Speech Processing and Signal Processing
CO3	**MTEC-106.3**	Implement optimization technique to find the optimal use of different algorithms

SUBJECT TITLE: VLSI Design
SUBJECT CODE: MTEC-140
SEMESTER: 2
CONTACT HOURS/WEEK:

Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
3	1	0	4

Internal Assessment: 40
End Term Exam: 60
Duration of Exam; 3 Hrs

Course Objectives

This course deals with knowledge and background required for better understanding of VLSI Design and its concepts.

Unit No,	Content	Contact Hrs.
1.	**Overview:** Overview of combinational and sequential circuits, timing analysis of combinational and sequential circuits, meta-stability, methods to eliminate meta-stability single synchronizer and double synchronizer, MTBF Clocking strategies.	**8 Hrs**
2.	**Sequential Machine Design:** State diagram, state minimization, state assignments, design of mealy and Moore machines, design of RAM, SDR, SRAM, DRAM, ROM. Charge Coupled Devices (CCD's).	**8 Hrs**
3.	**Programmable logic Devices:** Basic concepts, programmable logic array (PLA), Programmable Array Logic (PAL), Structure of standard PLD's Complex (PLD's), Complex PLD's (CPLD), Xilinx Xc-9500. Introduction to field programmable gate arrays-types of FPGA's, Configurable logic Block (CLB) Input/ Output Block (IOB). Introduction to Xilinx series. FPGA, XC4000 family, Implementation of Design in PLD's.	**10 Hrs**
4.	**VHDL:** Need for HDL's, Design flow, overview of VHDL, data types, Logic Operators, Data flow Modeling, Structural Modeling, Behavioral Modeling, Mixed Modeling, Modeling of combinational and sequential circuits.	**10 Hrs**
5.	**Verilog:** Verilog as HDL, HDL model abstraction-behavioral, RTL, structural, switch model, verification, Modeling of combinational logic, sequential logic, tasks and functions, Advanced Modeling concepts, User defined primitives.	**10 Hrs**

Books Recommended:

1. Fundamentals of Digital Design - by Charles. H. Roth, Jr., Jaico Publishing House

2. Digital Design Principle & Practice – by John. F. Wakerly, PHI

3. VHDL Analysis & Modeling of Digital Systems – by Z Navabi, Mc. Graw Hill

4. An Engg. Approach to Digital Design - by William. I. Fletcher

5. Verilog HDL: Digital Design & Synthesis – by Samir Palnitker

COURSE OUTCOMES: On completion of this course, the students will be able to

CO1	**MTEC-140.1**	Understand the concepts and various processes related to VLSI
CO2	**MTEC-140.2**	Code using VHDL over ModelSim, Xillinx
CO3	**MTEC-140.3**	Code using Verilog over Xilinix

SUBJECT TITLE: Advanced Microprocessor & Embedded Systems
SUBJECT CODE: MTEC-141
SEMESTER: 2
CONTACT HOURS/WEEK:

Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
3	1	0	4

Internal Assessment: 40
End Term Exam: 60
Duration of Exam; 3 Hrs

1. Microprocessor Architectural Concepts Review of 16-bit Microprocessor Architecture, Word Lengths, Addressable Memory, Microprocessor Speed, Architecture Characteristics, Registers, Instructions, Memory Addressing Architecture, ALU, GPR's, Control Logic And Internal Data Bus, Introduction to Pentium Architecture.
2. Microprocessor Instructions And Communications Instruction Set, Mnemonics, Basic Instruction Types, Addressing Modes, Interfacing I/O Microprocessor, Polling And Interrupts, Interrupts And DMA.
3. Microprocessor I/O Data Communication, Parallel I/O Serial Communication, Serial Interface And UART, Modem, I/O Devices, D/A & A/D Interface, Interface, Special I/O Devices.
4. Embedded Controllers & Systems Architecture of 80186 & 80188 CPU subsystems, Addressing Modes, Instruction set, Basic IO subsystems, Memory Subsystem, Example embedded controllers.

Books Recommended:

1. Intel Series Of Microprocessors: By Berry B. Bray, TMH.
2. 8086 microprocessor & Architecture by Liu, Gibson; PHI.
3. Embedded Microprocessor System Design by Kenneth L. Short, Pearson Education.
4. Embedded Controllers by Berry B. Bray Pearson Education.
5. Related IEEE/IEE publications

COURSE OUTCOMES: On completion of this course, the students will be able to

CO1	**MTEC-141.1**	Understand architecture &functionalities of different building block of advanced microprocessor.
CO2	**MTEC-141.2**	Understand and implement the serial communication with advance microprocessors
CO3	**MTEC-141.3**	Understand and use the advanced embedded controller along with microprocessor

SYLLABUS

SEMESTER-II

SUBJECT TITLE: Digital Speech & Image Processing
SUBJECT CODE: MTEC-107
SEMESTER: 3
CONTACT HOURS/WEEK:

Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
3	1	0	4

Internal Assessment: 40
End Term Exam: 60
Duration of Exam; 3 Hrs

Course Objective:

While understanding the signal processing techniques to study the image and speech fundamentals and mathematical transforms necessary for image and speech processing. To study the image enhancement techniques and image restoration procedures.

Unit No.	Content Detail	Contact Hours
1	**Review of Filter design:** Linear phase FIR filters. Methods of FIR filter design. Methods of IIR filter design. Applications of FIR & IIR filters in speech, image, seismic, medical and other areas.	**12 Hrs**
2.	**Speech Processing:** Review of human speech and Acoustic theory, nature of sound, harmonics, resonance measurement, virtual display. Music theory, pitch, duration, intervals, rhythm. Human speech production, the vocal tract, the Larynx, the source filter. Speech signal processing-the phasor mode, Fourier transfer, DFT, FFT. The hardware use of FIR & IIR filters. Software, Elements of speech Synthesis-speech Recognition-speech in the computer-human interface	**15 hrs**
3.	**Image Processing:** Characterization of images as two-dimensional discrete fields, unitary transforms—DFT. Hadamard, slant and cosine transforms, compression schemes-Karhunen Loeve compression predictive coding schemes. Image enhancement-gray scale modification, edge enhancement, restoration-Wiener filtering, constrained deconvolution, recursive filtering. Segmentation, edge detection, thresholding, textural properties, geometry and shape description.	**15 Hrs**

Books Recommended:

1. Digital Signal Processing - by Proakis & Manolakis

2. Speech and Audio Processing for multimedia PC's - by Iain Murray

3. Digital Image Processing - by Keenneth R Castleman, Pearson Education Society.

4. Digital Image Processing - by Rafact Gonzalez and Richard E. Woods, Pearson Education Society.

COURSE OUTCOMES: On completion of this course, the students will be able to

CO1	**MTEC-107.1**	Review the fundamental concepts of a digital image processing system
CO2	**MTEC-107.2**	Evaluate the techniques for image enhancement , segmentation and image restoration.
CO3	**MTEC-107.3**	Evaluate the techniques for speech processing using different digital filters

SUBJECT TITLE: Neural Networks & Fuzzy Logics

SUBJECT CODE: MTEC-108

SEMESTER: 3

CONTACT HOURS/WEEK:

Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
3	1	0	4

Internal Assessment: 40

End Term Exam: 60

Duration of Exam; 3 Hrs

Course Objective:

The principal objective of this subject is to introduce students to neural networks and fuzzy theory from an engineering perspective. In the identification and control of dynamic systems, neural networks and fuzzy systems can be implemented as model-free estimators and/or controllers.

Unit No.	Content Detail	Contact Hours
1.	Neural networks characteristics, History of development in neural networks principles, Artificial neural net terminology, Model of a neuron, Topology, Learning, types of learning, Supervised, Unsupervised, Re-inforcement learning. Knowledge representation and acquisition.	**8 Hrs**
2.	Basic Hop field model, Basic learning laws, Unsupervised learning, Competitive learning, K-means clustering algorithm, Kohonen`s feature maps.	**7 hrs**
3.	Radial basis function neural networks, Basic learning laws in RBF nets, Recurrent back propagation, Introduction to counter propagation networks, CMAC network, and ART networks.	**8 Hrs**
4.	Applications of neural nets such as pattern recognition, Optimization, Associative memories, speech and decision-making. VLSI implementation of neural networks.	**7 Hrs**
5.	Fuzzy Logic: Basic concepts of fuzzy logic, Fuzzy vs. Crisp set, Linguistic variables, Membership functions, Operations of fuzzy sets, Fuzzy IF-THEN rules, Variable inference techniques, De-Fuzzification, Basic fuzzy inference algorithm, Fuzzy system design, FKBC & PID control, Antilock Breaking system (ABS), Industrial applications.	**12 hrs**

Books Recommended:

1. Neural Networks - by Simon Haykin

2. Fuzzy logic with engineering application - by ROSS J.T (Tata Mc)

3. Neural Networks & Fuzzy Logic - by Bart Kosko

4. Neural computing theory & practice - by P.D. wasserman (ANZA PUB).

5. Introduction to applied Fuzzy Electronics-Ahmad M.Ibrahim (PHI)

6. Introduction to artificial neural systems - by J.M. Zurada.(Jaico Pub)

7. An introduction to Fuzzy control - by D. Driankor, H. Hellendorn, M. Reinfrank (Narosa Pub.)

COURSE OUTCOMES: On completion of this course, the students will be able to

CO1	**MTEC-108.1**	Explore the functional components of neural network classifiers or controllers,
CO2	**MTEC-108.2**	Understand the functional components of fuzzy logic classifiers or controllers
CO3	**MTEC-108.3**	Develop and implement a basic trainable neural network or a fuzzy logic system for VLSI, computing application or biomedical application

SUBJECT TITLE: Wireless Communication and Networks
SUBJECT CODE: MTEC-142
SEMESTER: 3
CONTACT HOURS/WEEK:

Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
3	1	0	4

Internal Assessment: 40
End Term Exam: 60
Duration of Exam; 3 Hrs

Course Objective:

The principal objective of this subject is to introduce students to wireless communication and network. To study capacity of wireless channels and MIMO Communications.

Unit No.	Content Detail	Contact Hours
1.	**WIRELESS CHANNEL PROPAGATION AND MODEL:** Propagation of EM signals in wireless channel – Reflection, diffraction and Scattering-freespace, two ray. Small scale fading- channel classification- channel models – COST -231 Hata model, Longley-Rice Model, NLOS Multipath Fading Models: Rayleigh, Rician, Nakagami, Composite Fading – shadowing Distributions, Link power budget Analysis	**12 Hrs**
2.	**CAPACITY OF WIRELESS CHANNELS:** Capacity in AWGN, capacity of flat fading channel, capacity of frequency selective fading channels.	**5 hrs**
3.	**DIVERSITY:** Realization of independent fading paths, Receiver Diversity: selection combining, Threshold Combining, Maximum-ratio Combining, Equal gain Combining. Transmitter Diversity: Channel known at transmitter, channel unknown at the transmitter.	**8 Hrs**
4.	**MIMO COMMUNICATIONS:** Narrowband MIMO model, Parallel decomposition of the MIMO channel, MIMO channel capacity, MIMO Diversity Gain: Beam forming, Diversity-Multiplexing trade-offs, Space time Modulation and coding: STBC, STTC, Spacial Multiplexing and BLAST Architectures.	**8 Hrs**
5.	**MULTI USER SYSTEMS:** Multiple Access: FDMA, TDMA, CDMA, SDMA, Hybrid techniques, Random Access: ALOHA, SALOHA, CSMA, Scheduling, power control, uplink downlink channel capacity, multiuser diversity, MIMO-MU systems.	**10 hrs**

Books Recommended:

1. Andrea Goldsmith, Wireless Communications, Cambridge University Press, 2007.
2. HARRY R. ANDERSON, “Fixed Broadband Wireless System Design” John Wiley – India, 2003.
3. Andreas.F. Molisch, “Wireless Communications”, John Wiley – India, 2006.
4. Simon Haykin& Michael Moher, “Modern Wireless Communications”, Pearson Education, 2007.
5. Rappaport. T.S., “Wireless communications”, Pearson Education, 2003.
6. Gordon L. Stuber, “Principles of Mobile Communication”, Springer International Ltd., 2001.

COURSE OUTCOMES: On completion of this course, the students will be able to

CO1	**MTEC-142.1**	Deploy the right Wireless communication channels
CO2	**MTEC-142.2**	Understand the functional of MIMO Communication
CO3	**MTEC-142.3**	To develop the multi user systems

SUBJECT TITLE: Multimedia Communication Systems

SUBJECT CODE: MTEC-143

SEMESTER: 3

CONTACT HOURS/WEEK:

Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
3	1	0	4

Internal Assessment: 40

End Term Exam: 60

Duration of Exam; 3 Hrs

Unit No.	Content Detail	Contact Hours
1.	**Multimedia Communications** Introduction to various multimedia comm. Techniques, Applications, Networks, Protocols and Standards, bandwidth and compression issues.	**7 Hrs**
2.	**Digital Communication basics** Source encoding, Channel encoding, Circuit switched Networks; Packet switched networks, ATM, Frame Relay.	**7 hrs**
3.	**Multimedia Information Representation** Different types of multimedia information, Information representation.	**4 Hrs**
4.	**Compression Techniques** Encoding and decoding techniques, Text compression techniques, Image compression techniques, Audio and Video Compression, Standards for Multimedia Compression, Huffman, Run length, Variable length, Lossy/ Lossless compression.	**12 Hrs**
5.	**Multimedia File Formats** Various files formats for multimedia and their applications, BMP, PNG, TIFF, JPEG, DFX, AVI, MPEG Audio/ Video Standards, Challenges for encryption and decryption.	**5 hrs**
6.	**World Wide Web** The Internet, Internet Multimedia Applications, Enterprise networks, Entertainment Networks, High Speed Modems, Application Support Functions, Audio/ Video Streaming, Video Conferencing.	**5 hrs**

Books Recommended:

1. Multimedia Communications by Fred Halsall, Prentice Hall.

2. Digital Communication by Proakis, Prentice Hall.

3. Internet Resources.

4. Related IEEE/IEE publications.

COURSE OUTCOMES: On completion of this course, the students will be able to

CO1	**MTEC-143.1**	Deploy the right multimedia communication models
CO2	**MTEC-143.2**	Apply Audio Video Compression Techniques
CO3	**MTEC-143.3**	Develop the real-time multimedia network applications

SUBJECT TITLE: PRE-THESIS SEMINAR
SUBJECT CODE: MTEC-182
SEMESTER: 3
CONTACT HOURS/WEEK:

Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
-	-	-	4

Internal Assessment: 100

Students should present the research topic which should be carried out in final thesis

COURSE OUTCOMES: On completion of this course, the students will be able to

CO1	**MTEC-182.1**	Understand the potential of presenting through seminar
CO2	**MTEC-182.2**	Able to Understand the selection of topic and its presentation
CO3	**MTEC-182.3**	To effectively use of seminar for selecting the research area

SUBJECT TITLE: PROJECT
SUBJECT CODE: MTEC-183
SEMESTER: 3
CONTACT HOURS/WEEK:

Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
-	-	-	10

Internal Assessment: 60
External Assessment: 40

Students should make a project and thereafter submit the file along with ppt.

COURSE OUTCOMES: On completion of this course, the students will be able to

CO1	**MTEC-183.1**	Understand the method of concept learning through practical skills
CO2	**MTEC-183.2**	Able to Understand the potential of practical demonstration
CO3	**MTEC-183.3**	To effectively use the practical skills for project management

SYLLABUS

SEMESTER-IV

SUBJECT TITLE: DISSERTATION
SUBJECT CODE: MTEC-190

Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
-	-	2	4

Students should do the research thesis and submit a report file to the department. The ppt. is compulsory for the same.

COURSE OUTCOMES: On completion of this course, the students will be able to

CO1	**MTEC-190.1**	Understand the potential of doing the research
CO2	**MTEC-190.2**	Able to Understand the selection of topic and its presentation
CO3	**MTEC-190.3**	To effectively use the different tools, report writing and present in schematically way the research area selected