Shree Warana Vibhag Shikshan Mandal's

Tatyasaheb Kore Institute of Engineering And Technology, Warananagar

Tatyasaheb Kore Institute of Engineering and Technology, Warananagar

First Year M. Tech. Electronics and Telecommunication Engg. (Semester-I)

(To be implemented from 2021-22)

Credit Scheme

Course Code	Category	Course Title	Teaching Scheme				Credit Scheme			
			TH	Tut	P	Total Contact Hours	TH	Tut	P	Total Credit Assigned
ETC-PCC-1011	PCC	Advanced Embedded System	3	1	--	4	3	1	--	4
ETC-PCC-1021	PCC	Error control Coding Techniques	3	1	--	4	3	1	--	4
ETC-PE-1031	PE	Program Elective-I	3	--	--	3	3	-	--	3
ETC- PE - 1041	PE	Program Elective-II	3	--	--	3	3	--	--	3
ETC- PE 1051	PE	Program Elective-III	3	--	--	3	3	--	--	3
ETC- LC -1061	LC	Laboratory Practice	--	--	4	4	--	--	2	2
ETC- SW -1071	SW	Seminar-I	--	--	2	2	--	--	--	1
			15	02	06	23	15	2	2	20

Evaluation Scheme

Course Code	Category	Course Title	Examination Scheme							
			ISE			ESE	TW	O	P	Total
			ISE -I	ISE -II	Avg.					
ETC-PCC-1011	PCC	Advanced Embedded System	40	40	40	60	25	--	--	125
ETC-PCC-1021	PCC	Error control Coding Techniques	40	40	40	60	25	--	--	125
ETC-PE-1031	PE	Program Elective-I	40	40	40	60	--	--	--	100
ETC- PE - 1041	PE	Program Elective-II	40	40	40	60	--	--	--	100
ETC- PE 1051	PE	Program Elective-III	40	40	40	60	--	--	--	100
ETC- LC -1061	LC	Laboratory Practice	--	--	--	--	25	25	--	50
ETC- SW -1071	SW	Seminar-I	--	--	--	--	50	--	--	50
			--	--	200	300	125	25	--	650

First Year M. Tech. Electronics and Telecommunication Engg. (Semester-I)					
Course Code	**Program Elective-I**	**Course Code**	**Program Elective-II**	**Course Code**	**Program Elective-III**
ETC-PE-10311	Advanced Wireless Communication	**ETC- PE - 10411**	Random Process	**ETC- PE 10511**	Mobile Computing
ETC-PE-10312	Optimization Techniques	**ETC- PE - 10412**	Digital Data Compression	**ETC- PE 10512**	Design of VLSI Systems
ETC-PE-10313	Internet Traffic Engineering	**ETC- PE - 10413**	Advanced Biomedical Signal Processing	**ETC- PE 10513**	Advanced Antenna Theory

Tatyasaheb Kore Institute of Engineering and Technology, Warananagar

First Year M. Tech. Electronics and Telecommunication Engg. (Semester-II)

(To be implemented from 2021-22)

Credit Scheme

Course Code	Category	Course Title	Teaching Scheme				Credit Scheme			
			TH	Tut	P	Total Contact Hours	TH	Tut	P	Total Credit Assigned
ETC-PCC-2011	PCC	Computer Vision	3	1	--	4	3	1	--	4
ETC-PCC- 2021	PCC	Adhoc & wireless Sensor networks	3	1	--	4	3	1	--	4
ETC- PE -2031	PE	Program Elective-IV	3	--	--	4	3	--	--	3
ETC- PE -2041	PE	Program Elective-V	3	--	--	3	3	--	--	3
ETC- OEC -2051	OEC	Open Elective Course	3	--	--	3	3	--	--	3
ETC- LC -2061	LC	Laboratory Practice	--	--	4	4	--	--	2	2
ETC- SW -2071	SW	Seminar-II	--	--	2	2	--	--		1
ETC- 2081		Comprehensive Viva	--	--	--	--	--	--	--	--
			15	02	06	23	15	02	2	20

Evaluation Scheme

Course Code	Category	Course Title	Examination Scheme							
			ISE			ESE	TW	O	P	Total
			ISE -I	ISE -II	Avg.					
ETC-PCC-2011	PCC	Computer Vision	40	40	40	60	25	--	--	125
ETC-PCC- 2021	PCC	Adhoc & wireless Sensor Networks	40	40	40	60	25	--	--	125
ETC- PE -2031	PE	Program Elective-IV	40	40	40	60	--	--	--	100
ETC- PE -2041	PE	Program Elective-V	40	40	40	60	--	--	--	100
ETC- OEC -2051	OEC	Open Elective Course	40	40	40	60	--	--	--	100
ETC- LC -2061	LC	Laboratory Practice	--	--	--		25	--	--	25
ETC- SW -2071	SW	Seminar-II	--	--	--	--	50	--	--	50
ETC- 2081		Comprehensive Viva	--	--	--	--	--	25	--	25
			--	--	200	300	125	25	--	650

First Year M. Tech. Electronics and Telecommunication Engg. (Semester-II)					
Course Code	**Program Elective-IV**	**Course Code**	**Program Elective-V**	**Course Code**	**Open Elective Course**
ETC-PE-20311	Cryptography andNetwork Security (20311)	**ETC-PE-20411**	Advanced Microwave circuit Design (20411)	**ETC- OEC - 20511**	Cryogenics(20511)
ETC-PE-20312	Multi Rate System (20312)	**ETC-PE-20412**	SDR & Cognitive Radio Technology (20412)	**ETC- OEC - 20512**	Design for Manufacture and Assembly (20512)
ETC-PE-20313	Advanced Light Wave Communication (20313)	**ETC-PE-20413**	Industry automation & processControl (20413)	**ETC- OEC - 20513**	Waste To Energy. (20513)
				ETC- OEC - 20514	Water Power Engineering. (20514)
				ETC- OEC - 20515	Advanced Operating Systems (20515)
				ETC- OEC - 20516	Cyber Security (20516)
				ETC- OEC - 20517	Project Management(20517)
				ETC- OEC - 20518	Operational Research(20518)

Shree Warana Vibhag Shikshan Mandal's

Tatyasaheb Kore Institute of Engineering And Technology, Warananagar

Second Year M. Tech. Electronics and Telecommunication Engg. (Semester-III)

(To be implemented from 2021-22)

Credit Scheme

Course Code	Category	Course Title	Teaching Scheme				Credit Scheme			
			TH	Tut	P	Total Contact Hours	TH	Tut	P	Total Credit Assigned
ETC- MC -3011	MC	Research Methodology & Intellectual Property Rights	2			2	2			2
ETC- II -3021	II	Industrial Training	--	--	4	4	--	--	2	2
ETC- SLC/AC -3031	SLC/AC	One Course from MOOC/SWAYAM	--	--			--	--	--	--
ETC-PC-3041	PC	Dissertation Phase-I	--	--	16	16	--	--	8	8
			2	--	20	22	02	--	10	12

Evaluation Scheme

Course Code	Category	Course Title	Examination Scheme							
			ISE			ESE	TW	O	P	Total
			ISE -I	ISE -II	Avg.					
ETC- MC - 3011	MC	Research Methodology & Intellectual Property Rights	40	40	40	60				100
ETC- II - 3021	II	Industrial Training	--	--	--	--	50	--	--	50
ETC- SLC/AC - 3031	SLC	One Course from MOOC/SWAYAM	--	--	--	--	50	--	--	50
ETC-PC- 3041	PC	Dissertation Phase-I	--	--	--	--	50	50	--	100
			--	--	30	70	150	50	--	300

** Candidate who has unable to get passing marks in certification course has to reappear forimprovement at institute level test/ **MOOC/SWAYAM**

Tatyasaheb Kore Institute of Engineering and Technology,Warananagar

Second Year M. Tech. Electronics and Telecommunication Engg.(Semester-IV)

(To be implemented from 2021-22)

Credit Scheme

Course Code	Cate gory	Course Title	Teaching Scheme				Credit Scheme			
			TH	Tut	P	Total Contact Hours	TH	Tut	P	Total Credit Assigned
ETC-PC- 4011	PC	Dissertation Phase-II	--	--	32	32	--	--	16	16
			--	--	32	32	--	--	16	16

Evaluation Scheme

Course Code	Cate gory	Course Title	Examination Scheme							
			ISE			ESE	TW	O	P	Total
			ISE -I	ISE -II	Avg.					
ETC-PC- 4011	PC	Dissertation Phase-II	--	--	--	--	100	100	--	200
			--	--	--	--	100	100	--	200

Tatyasaheb Kore Institute of Engineering & Technology, Warananagar

First Year M. Tech Electronics and Telecommunication Engineering Semester- I

(PCC) ETC1011: Advanced Embedded System

Teaching Scheme			**Examination Scheme**	
Lectures	03 Hrs./Week		ISE	40 Marks
Tutorials	01 Hrs./Week		ESE	60 Marks
Total Credits	04		TW	25Marks
			Duration of ESE	02 Hrs.30 Min.

Course Objectives (CO):

1. Understand the architecture of ARM family.
2. Understand On chip peripherals of ARM controller.
3. Understand basic concepts of RTOS and µCOS.
4.

	Course Contents	Hours
Unit 1	**ARM9 Architecture & programming:** ARM9 architecture, Memory organization, Programmers model, instructions and assembly programming.	(06)
Unit 2	**ARM caches MPU and MMU:** Cache architecture, Cache policy, Coprocessor15 and caches, protected region, Initializing MPUs, caches and write buffer, virtual memory, ARM MMU, page tables, TLB, Coprocessor15 and MMU Configuration	(08)
Unit 3	**ARM Peripherals and Programming:** On chip peripherals, GPIO, Event router, Interrupts, vectored interrupt controller (VIC), timers, RTC, Watchdog, UART, I2C, CAN, LIN. programming of GPIO using Embedded "C" (LPC 29xx series Example 2921/23/25)	(08)
Unit 4	**Introduction to RTOS:** RTOS basics, RTOS architecture, share data problem, critical section, shared resources, Task states multitasking, context switching, Kernels, pre-emptive & non-pre-emptive schedulers, mutual exclusion, semaphores, Interrupt Latency, pipes & mails boxes. Message queues, timer functions, events.	(05)
Unit 5	**µCOS:** Kernel Structure: Tasks, Task State, Task Level Context Switching, Locking and unlocking of scheduler, Idle Task, Statistics Task, Interrupts, Clock Tick, Initialization, Starting the OS, Task Management: Creating/deleting and suspending/ Resuming Task, Task S t a c k s and checking, Changing Task's	(06)
Unit 6	**Time Management and Event Control Blocks:** Time Management: Delaying/Resuming Task, System Time, Event Control Blocks: Initialization of ECB, Placing/Removing Task from ECB waitlist, Finding Highest Priority Task, List of Free ECB, Task State Management. Communication in µCOS-II.	(03)

Term Work:
Minimum Six assignments based on above topics

Course Outcomes (CO): At the end of course, students will

1. Design the ARM based systems.
2. Implement use of ON CHIP peripherals of ARM

Reference Books	
1	ARM System Developers Guide , Designing & Optimizing System Software, Andrew sloss, Dominic symes, Chris Wright, 1st Edition 2004.
2	Micro C/OSII the Real Time Kernel, Jean Labarosse, CMP Books, PIC C Manual, CCS Inc, 2ndEdition.
3	Embedded software primer, David Simon, Pearson Education, 1stEdition 2005.
4	ARM LPC 29xx series data sheet, ARM Datasheet

Tatyasaheb Kore Institute of Engineering & Technology, Warananagar

First Year M. Tech Electronics and Telecommunication Engineering Semester- I

(PCC) ETC1021: Error Control Coding Techniques

Teaching Scheme			**Examination Scheme**	
Lectures	03 Hrs./Week		ISE	40 Marks
Tutorials	01 Hrs./Week		ESE	60 Marks
Total Credits	04		TW	25Marks
			Duration of ESE	02 Hrs.30 Min.

Course Objectives (CO):

1. Understand basic concept & need of Error Control Coding
2. Study of various encoding & decoding techniques through block codes
3. Study of various encoding & decoding techniques through Convolution Codes.
4.

	Course Contents	**Hours**
Unit 1	**Linear block codes:** Need, Objective & Approaches of Error Control Coding, Introduction, Structure, Parameters, Generator& Parity Check Matrix, Encoding circuit for (n-k) Linear Block Code, Syndrome & Error detection, Syndrome circuit, Distance Properties, Error detecting & Correction Capabilities, Standard Array & Syndrome decoding for (n, k) linear Block Code. Hamming Codes, Product codes, Repetition code, Hada mard codes (Wash Code), Dual Code, Shortened and Extended linear Codes, Reed Muller (RM) Codes.	(07)
Unit 2	**Cyclic codes:** Algebraic structure, Polynomial representation of codeword, Generator polynomial, Non-systematic & Systematic Cyclic Codes, Generator & Parity Check Matrices, Structure of Cyclic Encoder & Syndrome Calculator, Encoding of cyclic code using (n- k) & K shift register, Syndrome computation and Error detection, Decoding of Cyclic code, Error- Trapping Decoding. Cyclic Redundancy Check Code, Cyclic Hamming Codes, Golay Code, Shortened Cyclic Codes, Cyclic Product Code, Quasi Cyclic Code.	(07)
Unit 3	**Bose Chaudhuri Hocquenghem CODE (BCH):** Groups, Rings & its properties, Fields: Binary Field Arithmetic, Primitive element and primitive polynomial, Primitive BCH Code, Construction of Galois Field GF(2m), Properties of Galois Field GF(2m), Minimal & Generator Polynomial for BCH Code. Decoding of BCH Code, Peterson-Gorenstein-Zierler decoder, Error location and Error Evaluation Polynomials, Implementation Correction of Galois Field Arithmetic, Implementation of Error	(8)
Unit 4	**Reed-Solomon codes & decoding algorithms:** Introduction, Error correction capability of RS code, RS code in Nonsystematic &Systematic form, Syndrome decoding, The Euclidean Algorithm: Error location & Error Evaluation Polynomials, Decoding of RS using the Euclidean Algorithm, Decoding of RS &Nonbinary BCH codes using the Berlekamp Algorithm	(07)
Unit 5	**Convolutional Codes:** Introduction, Convolutional Encoder, Generation of Output code sequence using Time domain & Transform domain approach, Convolutioanal code representation: Code Tree, State diagram & Trellis diagram, Structural & Distance properties of Convolutional codes, Transfer Function of Convolution Code. Optimum decoding of Convolutional Codes: Maximum Likelihood decoding, The Viterbi Algorithm, Suboptimal Decoding: Sequential Decoding, Majority Logic Decoding.	(06)
	Iteratively decoded codes: TURBO CODE: Introduction, Basic Turbo Encoding Structure, Decoding	

	Decoding LDPC Code: Hard & Soft decoding, Vertical Step updating, Horizontal Step Updating, Terminating & Initializing the decoder algorithm.	

Term Work:
Minimum Six assignments based on above topics

Course Outcomes (CO): At the end of course, students will

1. Understand and identify the role of Error Control Coding techniques.
2. Capable to Analyze & design the encoder & decoder of Block Codes.
3. Analyze the concept of encoding & decoding procedures in convolutional codes.

Reference Books

1	Shu Lin, Daniel J. Costello, Jr., "Error Control Coding", IInd Edition, Pearson Education
2	Todd K Moon," Error Correction Coding", Wiley student, Edition 2006
3	Salvatore Gravano, "Introduction to Error Control Codes", South Asia Edition, Oxford University Press.
4	Jorge Castineira Moreira, Patrick Guy Farrell," Essentials of Error Control
5	W. Cary Huffman and Vera Press," Fundamentals of Error correcting Codes", First Edition, Cambridge University Press.

Tatyasaheb Kore Institute of Engineering & Technology, Warananagar

First Year M. Tech Electronics and Telecommunication Engineering Semester- I

(PE-I) ETC10311: Advanced Wireless Communication

Teaching Scheme			**Examination Scheme**	
Lectures	03 Hrs./Week		ISE	40 Marks
Tutorials	---		ESE	60 Marks
Total Credits	03		TW	-----
			Duration of ESE	02 Hrs.30 Min.

Course Objectives (CO):

1. Acquire fundamental knowledge of Wireless Communications
2. Study the wireless channel capacities and different channel models
3. Understand the basic concepts of OFDM
4. Study multiple input multiple output (MIMO) communication techniques

	Course Contents	**Hours**
Unit 1	**Wireless channel:** Physical modeling for wireless channels, input/output model of wireless channel, time and frequency response, statistical models.	(07)
Unit 2	**Point to point communication:** Detection in rayleigh fading channel, time diversity, Antenna diversity, frequency diversity, impact of channel uncertainty.	(07)
Unit 3	**Wideband Modulation Techniques: OFDM (Multicarrier Modulation):** Basic Principles of orthogonality, single vs multicarrier systems, OFDM block diagram and ITS Explanation, OFDM signal mathematical representation, selection parameters for modulation	(06)
Unit 4	**Capacity of wireless channels:** AWGN channel capacity, resources of AWGN channel, Linear time invariant gaussian channels, capacity of fading channels.	(07)
Unit 5	**MIMO and multicarrier modulation:** Narrowband MIMO model-parallel decomposition of MIMO channel-MIMO channel capacity-MIMO diversity gain Space-Time modulation and coding, Smart	(06)
Unit 6	**MIMO IV –multiuser communication:** Uplink with multiple receive antennas, MIMO uplink, Downlink with multiple receive antennas, MIMO downlink	(07)

Course Outcomes (CO): At the end of course, students will

1. Understand fundamentals as well as advanced concepts in wireless communications. They will be able to understand the wireless channel characteristics and modeling.
2. Quantify the wireless channel capacities and degrees of freedom regions for different channel models, such as point-to-point channels, multiple access channels, broadcast channels, interference channels, etc.
3. Understand fundamentals of Wideband Modulation Techniques
4. Learn the recent developments such as opportunistic and multiple input multiple output (MIMO) communication techniques

Reference Books

1	Fundamentals of wireless communication, David Tse, P. Viswanath, Cambridge, 5th Edition 2005
2	Andreas Molisch, Andreas Molisch, Wiley, 2nd Edition 2012
3	Wireless communications, Principles and Practice, Theodore S. Rappaport, Pearson, 2nd Edition 2010
4	Wireless communication, Upen Dalal, Oxford, 1st Edition, 2009

Tatyasaheb Kore Institute of Engineering & Technology, Warananagar

First Year M. Tech Electronics and Telecommunication Engineering Semester- I

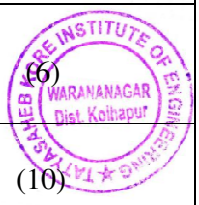
(PE-I) ETC10312: Optimization Techniques

Teaching Scheme			**Examination Scheme**	
Lectures	03 Hrs./Week		ISE	40 Marks
Tutorials	--		ESE	60 Marks
Total Credits	03		TW	--
			Duration of ESE	02 Hrs.30 Min.

Course Objectives (CO):

1. Students should understand the concept of Optimization Techniques.
2. Students should understand the concept of linear programming, Nonlinear programming, Geometric programming, Dynamic programming.
3. Students should understand the method for formulation of problem and assignment of models.
4. Students should understand single-dimensional and Multi-dimensional Search Methods.

	Course Contents	**Hours**
Unit 1	**Introduction:** Historical development, Application to Engineering Problems, Statement Of Optimization problems, Classification of Optimization, Multivariable optimization with and without constraints.	(5)
Unit 2	**Linear Programming:** Formulation, Geometry, Graphical solution, standard and matrix form of linear programming problems, Simplex programming and its flow chart, revised simplex algorithm, Two-phase Simplex method, Degeneracy. Duality in linear programming: Definition of Dual Problem, General Rules for converting any Primal into its Dual Simplex method and its flow chart. Decomposition principle, Transportation problem.	(7)
Unit 3	**Nonlinear programming:** Unimodal functions, single dimensional minimization methods, Exhaustive search, Fibonnaci method, Golden section, Comparison of Elimination method, Quadrature interpolation, Cubic interpolation, Direct root method, Random search method, Steepest decent method, Fletcher-Reeves method, David- Fletcher- Powell Method, Convex sets and convex functions, Kuhn-Tucker conditions.	(6)
Unit 4	**Geometric programming:** Problems with coefficients up to one degree of difficulty, Generalized for the positive and negative coefficients dynamic programming: Discrete & continuous dynamic programming (simple illustrations). Multistage decision problems, computation procedure and case studies	(6)
Unit 5	**Assignment Models:** Formulation of problem, Hungarian Method for Assignment Problem, Unbalanced Assignment Problems	(6)
Unit 6	**Genetic Algorithms:** Introduction, Representation of design variables, Representation of objective function and constraints, Genetic operators, Application procedure and case studies.	(10)



	Course Outcomes (CO): After the completion of course, students will be able to
1.	Students should be able to apply Optimization Techniques to Engineering Problems.
2.	Students should be able to implement Linear/Nonlinear, Dynamic, Geometric programming.
3.	Students should be able to apply single-dimensional and Multi-dimensional Search Methods in constrained and Unconstrained problem environments..
Reference Books	
1	Linear Programming and Network Flows- Mokhtar S. Bazaraa, John J. Jarvis,
2	Chong, E. P. & Zak S. H. An introduction to optimization, John Wiley
3	Peressimi A.L., Sullivan F.E., Vhi, J.J..Mathematics of Non-linear Programming, Springer– Verlag
4	Optimization: Theory and Practices, S.S Rao, New Age Int. P Ltd. Publishers, New Delhi

5	Optimization concepts & application in Engg. -A. D. Belegundu, Tirupati R. Chandrupatla Pearson Edn.

Tatyasaheb Kore Institute of Engineering & Technology, Warananagar

First Year M. Tech Electronics and Telecommunication Engineering Semester- I

(PE-I) ETC10313: Internet Traffic Engineering

Teaching Scheme			**Examination Scheme**	
Lectures	03 Hrs./Week		ISE	40 Marks
Tutorials	---		ESE	60 Marks
Total Credits	03		TW	-----
			Duration of ESE	02 Hrs.30 Min.

Course Objectives (CO):

1. Determine link weights for IP traffic engineering for an interior gateway protocol (IGP) such as OSPF or IS-IS
2. To discuss traffic engineering for intra domain networks
3. Develop the platform for understanding the basics of routers and types of routers, and as the background material to understand more details about a router's critical functions, such as address lookup and packet class classification
4. Make student to understand algorithms for efficient packet classification to offer differentiated services-based agreements

	Course Contents	**Hours**
Unit 1	**IP traffic engineering**: Evolution of Traffic engineering in internet domain, Taxonomy and recommendation for internet traffic engineering, Performance Measures and characteristics, applications view and traffic models, Architectural frame work, link weight determination, Duality of the MCNF Problem	(05)
Unit 2	**Internet Routing and Router Architectures**: Architectural View of the Internet, Allocation of IP Prefixes and AS Number, Policy-Based Routing, Point of Presence, Traffic Engineering Implications, Internet Routing Instability. Router Architectures: Functions, Types, Elements of a Router, Packet Flow, Packet Processing: Fast Path versus Slow Path, Router Architectures	(07)
Unit 3	**Analysis of IP address lookup Algorithms**: Network Bottleneck, Network Algorithmics, Strawman solutions, Thinking Algorithmically, Refining the Algorithm, Cleaningup, Characteristics of Network Algorithms. IP Address Lookup Algorithms : Impact, Address Aggregation, Longest Prefix Matching, Naïve Algorithms, Binary , Multibit and Compressing Multibit Tries.	(05)
Unit 4	**IP Packet Filtering and Classification** Search by Length Algorithms, Search by Value Approaches, Hardware Algorithms, Comparing Different Approaches IP Packet Filtering and Classification: Classification, Classification Algorithms, Naïve Solutions, Two-Dimensional Solutions, Approaches for d Dimensions.	(07)
Unit 5	**Quality of Service Routing**: QoS Attributes, Adapting Routing: A Basic Framework. Update Frequency, Information Inaccuracy, and Impact on Routing, Dynamic Call Routing in the PSTN, Heterogeneous Service, Single Link Case, A General Framework for Source-Based QoS Routing with Path Caching, Routing Protocols for QoS Routing, QOSPF: Extension to OSPF for QoS Routing, ATM PNNI.	(08)

Unit 6	**Routing and Traffic Engineering with MPLS**: Traffic Engineering of IP/MPLS Networks, VPN Traffic Engineering, Problem Illustration: Layer 3 VPN, LSP Path Determination: Constrained Shortest Path Approach, LSP Path Determination: Network Flow Modeling Approach, Layer2 VPN Traffic Engineering, Observations and	(08)

Course Outcomes (COs): At the end of course, students will

1. Estimate traffic in the network, as well as what performance measures might be of interest in IP networks.
2. Evaluate various IP router architectures and highlight their advantages and disadvantages
3. Evaluate performance requirements of a packet classification algorithm in terms of number of memory accesses and the amount of storage requirement
4. Solve set of routing and traffic engineering problems in which MPLS can be used by giving due consideration to path management, traffic assignment, network information dissemination, and network management.,

Reference Books

1	Network Routing: Algorithms, Protocols, and Architectures
2	Network Algorithmic: An Interdisciplinary Approach to Designing Fast Networked Devices George Varghese (Morgan Kaufmann Series in Networking
3	Network Analysis, Architecture, and Design, James D. McCabe, Morgan Kaufmann

Tatyasaheb Kore Institute of Engineering & Technology, Warananagar

First Year M. Tech Electronics and Telecommunication Engineering Semester- I

(PE-II) ETC10411: Random Process

Teaching Scheme			**Examination Scheme**	
Lectures	03 Hrs./Week		ISE	40 Marks
Tutorials	--		ESE	60 Marks
Total Credits	03		TW	--
			Duration of ESE	02 Hrs.30 Min.

Course Objectives (CO):

1. Develop the logical concepts of probability theory
2. Understand basic concepts of Random variables & Random Processes
3. Study concept of Markov Chain and Queuing Theory
4.

	Course Contents	**Hours**
Unit 1	**Probability Theory:** The concept of Probability; the axioms of Probability; sample space and events; Conditional probability and Baye's theorem, Independence of events, Bernoulli trails.	(07)
Unit 2	**Random variables:** Introduction to Random Variables, Discrete Random Variable, Continuous Random Variable, Expectation of Random Variable, Moments of Random Variable (mean, mode variance, skewness, Kurtosis)	(06)
Unit 3	**Multiple Random Variables:** Cumulative distribution function and probability density function of single and multiple Random Variables, statistical properties, jointly distributed Gaussian random variables, Conditional probability density, properties of sum of random variables, Central limit theorem, estimate of population means, Expected value and variance and covariance.	(07)
Unit 4	**Random Processes:** Classification of Processes; Properties, Auto correlation and cross correlation function; Estimate of auto correlation function. Spectral Density: Definition, Properties, white noise, Estimation of auto-correlation function using frequency domain technique, Estimate of spectral density, cross spectral density and its estimation, coherence.	(06)
Unit 5	**Markov Chains:** Chapman Kolmogorov equation, Classification of states, Limiting probabilities, Stability of Markov system, Reducible chains, Markov chains with continuous state space.	(07)
Unit 6	**Queuing Theory:** Elements of Queuing System Little's Formula, M/M/1 Queue, Multi server system	(07)

Course Outcomes (CO): At the end of course, students will

1. Solve Probability Problems
2. Classify Random Variables
3. Apply statistical measures in Practical problems
4. Apply Markov Chain & Queuing Theory to solve Problems

Text Books

3	Probability and Random Processes for Electrical Engg., Alberto Lean, Pearson, 2nd edition 2009
4	Probability, Random Variables and Stochastic Processes, Athanasios Papoulis, S. Unnikrishnan Pillai, PHI, 4thb edition 2010

Tatyasaheb Kore Institute of Engineering & Technology, Warananagar

First Year M. Tech Electronics and Telecommunication Engineering Semester- I

(PE-II) ETC10412: Digital Data Compression

Teaching Scheme			**Examination Scheme**	
Lectures	03 Hrs./Week		ISE	40 Marks
Tutorials	--		ESE	60 Marks
Total Credits	03		TW	--
			Duration of ESE	02 Hrs.30 Min.

Course Objectives (CO):

1. Provide students with contemporary knowledge in Data Compression and Coding.
2. Equip students with skills to analyze and evaluate different Data Compression and Coding methods

	Course Contents	**Hours**
Unit 1	**Introduction:** Definitions, Historical background, Applications, Taxonomy, Intuitive Compression. Run-Length Encoding, RLE Text Compression, RLE Image Compression, Move- to Front Coding, Scalar Quantization.	(6)
Unit 2	**Statistical methods:** Information Theory Concepts, Variable-Size Codes, Prefix Codes, Golomb Codes, The Kraft-MacMillan Inequality, The Counting Argument, S hannon-Fano Coding, Huffman Coding, Adaptive Huffman Coding, MNP5, MNP7, Arithmetic	(7)
Unit 3	**Dictionary Methods** String Compression, Simple Dictionary Compression, LZ77 (Sliding Window), LZSS, Repetition Times, QIC-122, LZX, File Differencing: VCDIFF, LZ78, LZFG, LZRW1, LZRW 4, LZW, LZMW, LZAP, LZY, LZP	(7)
Unit 4	**Image Compression Approaches to Image Compression**; Image Transforms, Orthogonal Transforms. The Discrete Cosine Transform JPEG, JPEG-LS. Progressive Image Compression, JBIG, JBIG2, Vector Quantization, Adaptive Vector Quantization, Block Matching, Block Truncation Coding, Context- Based Methods, Wavelet Methods.	(6)
Unit 5	**Video Compression:** Analog Video,Composite and Components Video,Digital Video, Video Compression, MPEG, MPEG-4, H.261	(7)
Unit 6	**Audio Compression:** Sound, Digital Audio, The Human Auditory System, µ-Law and A-Law Companding, ADPCM Audio Compression, MLP Audio, Speech Compression, Shorten MPEG-1 Audio Layers	(7)

Course Outcomes (CO): After the completion of course, students will be able to

1. Explain the evolution and fundamental concepts of Data Compression and Coding techniques.
2. Analyze the operation of arrange of commonly used Coding and Compression techniques
3. Identify the basic software and hardware tools used for data compression.

Reference Books	
1	The Data Compression- Mark Nelson, Jean-Ioup Gailly, 2nd edition, M&T pub.
2	Introduction to Data Compression-Khalid Sayood, 2nd edition, Academic press ltd.
3	Introduction to Information Theory and Data Compression- Darrel Hankerson, 2nd ed, Chapman and Hall/CRC publications.
4	Handbook of Image and video Processing-Al Bovik Academic press ltd. Publication.
5	Compression Algorithms for Real Programmers- Peter Wayner Academic press ltd.
6	Data compression: the complete reference- David Salomen D, Springer Publication

Tatyasaheb Kore Institute of Engineering & Technology, Warananagar

First Year M. Tech Electronics and Telecommunication Engineering Semester- I

(PE-II) ETC10413: Advanced Biomedical Signal Processing

Teaching Scheme			**Examination Scheme**	
Lectures	03Hrs./Week		ISE	40 Marks
Tutorials	--		ESE	60 Marks
Total Credits	03		TW	--
			Duration of ESE	02 Hrs.30 Min.

Course Objectives (CO):

1. Introduce students to the principles of signal processing techniques and its application to biomedical signals
2. Understanding methods and tools for extracting information from biomedical signals.
3. Understand analysis of biomedical signals

	Course Contents	**Hours**
Unit1	**Introduction To Biomedical Signals:** Examples of Biomedical signals - ECG, EEG, EMG etc. - Tasks in Biomedical Signal Processing - Computer Aided Diagnosis. - Review of linear systems- Fourier Transform and Time Frequency Analysis (Wavelet) of biomedical signals- Processing of Random & Stochastic signals – spectral estimation– Properties and effects o f noise in biomedical instruments - Filtering in	(7)
Unit2	**Concurrent, Coupled and Correlated Processes:** Illustration with case studies – Adaptive and optimal filtering - Modeling of Biomedical signals - Detection of biomedical signals in noise -removal of artifacts of one signal embedded in another -Maternal-Fetal ECG – Muscle contraction interference. Event detection - case studies with ECG & EEG – Independent component Analysis	(6)
Unit3	**Cardio logical Signal Processing and Applications:** Basic Electrocardiography (ECG) - Electrical Activity of the heart- ECG data acquisition– ECG Lead System- ECG parameters & their estimation - Use of Multi-Scale analysis for parameters estimation of ECG Waveforms - Noise & Artifacts- ECG Signal Processing: Baseline Wandering, Power line interference, Muscle noise filtering – QRS detection - Arrhythmia analysis	(5)
Unit4	**Data Compression:** Lossless &Lossy- Heart Rate Variability – Time Domain measures -Heart Rhythm representation - Spectral analysis of heart rate variability interaction without her physiological signals.	(4)
Unit5	**Introduction to EEG:** The Electroencephalogram - EEG rhythms & waveform-categorization of EEG activity - recording techniques - EEG applications- Epilepsy, sleep disorders, Brain Computer Interface..	(7)

Unit6	**EEG Modeling:** Linear, stochastic models – Nonlinear modeling of EEG - artifacts in EEG& their characteristics and processing – Model based spectral analysis - EEG segmentation -Joint Time-Frequency analysis – correlation analysis of EEG channels - coherence analysis of EEG channels.	(7)

Course Outcomes (CO): After the completion of course, students will be able to

1. Understand different types of biomedical signals and their properties.
2. Understand different artifacts in biomedical signals and the process to remove it.
3. Understand ECG signal and its analysis.
4. Systematically apply advanced methods to extract relevant Information from biomedical signal measurements..
5. Understand EEG signal and its analysis.

Reference Books

1	Biomedical Signal Processing: Principles and techniques, D.C.Reddy, Tata McGraw-Hill, New Delhi,
2	Biomedical Signal Processing, Willis J Tompkins, ED, Prentice Hall, 1993
3	Compression Algorithms for Real Programmers- Peter Wayner Academic press ltd.
4	Biomedical Signal Analysis, R. Rangayan, Wiley, 2002
5	Biomedical Signal Processing and Signal Modeling, Eugene N. Bruce, Wiley, 2001
6	Introduction to Biomedical Engineering, John D. Enderle, Elsevier, 2005
7	Advanced Bio signal Processing, Amine Nait-Ali, Springer, 2009

Tatyasaheb Kore Institute of Engineering & Technology, Warananagar

First Year M. Tech Electronics and Telecommunication Engineering Semester- I

(PE-III) ETC10511: Mobile Computing

Teaching Scheme			**Examination Scheme**	
Lectures	03 Hrs./Week		ISE	40 Marks
Tutorials	--		ESE	60 Marks
Total Credits	03		TW	--
			Duration of ESE	02 Hrs.30 Min.

Course Objectives (CO):

1.Define Mobile Computing study its applications and look at current trends

2. Distinguish between different types of Mobility.

3. Analyze the performance of MAC protocols used for wired network and wireless networks.

4. Explore Theory and Research areas related to Mobile Computing

	Course Contents	**Hours**
Unit 1	**Introduction to wireless communication**: Need and Application of wireless communication. Wireless Data Technologies Market for mobile.	(07)
Unit 2	**Wireless transmission and medium access Control:** Frequency for radio transmission signal antennas, signal propagation Multiplexing Modulation, Spread and Cellular systems. Medium access control: Specialized MAC, SDMA, FDMA, TDMA & CDMA.	(06)
Unit 3	**Telecommunications systems:** GSM: Mobile services, System architecture, Radio interface, Protocols, Localization and calling, Handover, Security, New data services. UMTS and IMT-2000: UMTS releases and standardization, UMTS	(07)
Unit 4	**Wireless LAN:** Introduction, Infrared v/s Radio transmission, Infrastructure and ad-hoc Network, IEEE 802.11, Blue Tooth.	(07)
Unit 5	Mobile Network Layer and Transport Layer: Mobile IP, DHCP, Mobile ad-hoc networks, Traditional TCP, Classical TCP improvements, TCP over 2.5/3G wireless networks.	(07)
Unit 6	**Wireless application protocol:** Architecture, Wireless datagram protocol, Wireless transport layer, security Wireless transaction protocol, Wireless session protocol, Wireless application environment , Wireless markup language, WML Script, Mobile communications, Wireless telephony application, Push architecture, Push/pull services, Example stacks with WAP 1.x 429	(06)

Course Outcomes (CO): At the end of course students will be able to

1. Grasp the concepts and features of mobile computing technologies and applications;

2. Have a good understanding of how the underlying wireless and mobile communication networks work, their technical features, and what kinds of applications they can

3. Identify the important issues of developing mobile computing systems and applications;

4. Organize the functionalities and components of mobile computing systems into different layers and apply various techniques for realizing the functionalities;

Text Books

1	Mobile Communications - Jochen Schiller - 2nd edition, Publication-Pearson Education.

3	Mobile Computing – Ashok K Talukdar, Roopa R Yavagal, Publication-TATA MGH

Tatyasaheb Kore Institute of Engineering & Technology, Warananagar

First Year M. Tech Electronics and Telecommunication Engineering Semester- I

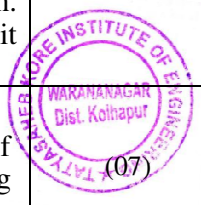
(PE-III) ETC10512: Design of VLSI Systems

Teaching Scheme			**Examination Scheme**	
Lectures	03 Hrs./Week		ISE	40 Marks
Tutorials	---		ESE	60 Marks
Total Credits	03		TW	-----
			Duration of ESE	02 Hrs.30 Min.

Course Objectives (CO):

1. Understand the design of logic circuits
2. Provide exposure to ASIC, CPLD & FPGA
3. Provide exposure to VHDL Programming.
4. Understand simulation issues & test benches.
5. Understand the synthesis issues.

	Course Contents	**Hours**
Unit1	**Fundamentals of Sequential Logic Design:** Concept of FSM and use of state diagrams, use of ASM charts, S- R Latch, D Latch J-K flip-flop, Master Slave Flip-flops and their characteristic equations, excitation tables and timing diagrams, metastability. Moore, Melay and mixed type synchronous state machines, synchronous design procedure, sync. using programmable devices.	(05)
Unit2	**Asynchronous Sequential logic Circuit Design:** Asynchronous design fundamentals, differences with synchronous design, Timing diagram specification, merger diagrams, making race- free state assignment using transition diagram, essential	(07)
Unit3	**ASIC, FPGA and CPLD:** Concept of ASIC, architecture of Xilinx 95XX series CPLD, 4XXX series FPGA, specifications and noise considerations, Typical applications, choice of target devices, speed grade, I/O pins & various resources.	(08)
Unit4	**Introduction to VHDL and Elements of VHDL:** Features o f VHDL, concurrency, sequential behavior, used as test language, design hierarchies, levels of abstraction. Basic building blocks like entity, architecture, language elements, concurrent statements, sequential statements, signals and variables, configuration, operators, operator overloading, data types, component instantiation. Generate statement, process, loop statements, case statements, next statements, exit statements.	(07)
Unit5	**Simulation Issues and Test Benches:** Steps in simulation, simulation process, simulation delta, types of delays, types of simulation. Function of test bench, design methodologies for test benches, interpreting the test bench reports.	(07)
Unit6	**Synthesis Issues:** Introduction to synthesis, synthesis tools and their features, hardware modeling examples, synthesis guidelines.	(06)



Course Outcomes (CO): At the end of course, students will

1. Design the sequential logic circuits
2. Differentiate between synchronous & asynchronous logic circuit design
3. Design VLSI based systems using CPLD/FPGA

5. Use test benches for updating the design.	
Reference Books	
1	Digital Design- principles and practices J. F. Wakerly PHI 3rd edition
2	Digital Principles and Design, Donald Givone, TMH
3	Digital Logic Design Principles, Bradley Carlson, Wiley
4	Introductory VHDL from Simulation to Synthesis, Sudhakar Yalamanchil, Pearson
5	Digital System Design using VHDL, Charles Roth, TMH

Tatyasaheb Kore Institute of Engineering & Technology, Warananagar

First Year M. Tech Electronics and Telecommunication Engineering Semester- I

(PE-III) ETC10513: Advanced Antenna Theory

Teaching Scheme			**Examination Scheme**	
Lectures	03 Hrs./Week		ISE	40 Marks
Tutorials	---		ESE	60 Marks
Total Credits	03		TW	-----
			Duration of ESE	02 Hrs.30 Min.

Course Objectives (CO):

1. Get an idea regarding various types of arrays
2. Achieve the knowledge regarding aperture antenna with ground plane effects
3. Get the brief knowledge. of smart antenna concept
4. Get information and design ability for the reduction of size of micro strip antenna

	Course Contents	**Hours**
Unit 1	**Array Antenna:** Array factor for linear array, uniformly equally spaced linear array, Pattern multiplication, directivity of uniformly excited equally spaced linear array, Nonuniformly excited equally spaced linear array, mutual impedance.	(04)
Unit 2	**Aperture Antenna:** Field equivalence Principle: Huygens Principle, radiation equations, directivity, rectangular apertures, circular apertures, design considerations, Babinet"s Principle, fourier transforms in aperture antenna theory, Ground plane Edge effect: The geometrical theory of diffraction.	(07)
Unit 3	**Smart Antenna:** Smart antenna analogy, cellular Radio system evolution, signal propagation, smart antenna benefits, smart antenna drawbacks, antenna, antenna beamforming, mobile Ad hoc Networks (MANETs), smart antenna system: design, simulation and Results, Beamforming, diversity combining, Rayleigh-fading and Trellis-coded modulation, other geometries.	(08)
Unit 4	**Compact Microstrip Antenna:** Compact Microstrip Antennas ,Compact Broadband Microstrip Antennas ,Compact Dual-Frequency Microstrip Antennas ,Compact Dual-Polarized Microstrip Antennas ,Compact Circularly Polarized Microstrip Antennas ,Compact Microstrip Antennas with Enhanced Gain ,Broadband Microstrip Antennas , Broadband Dual- Frequency and Dual-Polarized Microstrip Antennas , Broadband and Dual- Band Circularly Polarized Microstrip Antennas Use of a Shorted Patch with a Thin Dielectric Substrate , Use of a Meandered Patch ,Use of a Meandered Ground Plane ,Use of a Planar Inverted-L Patch ,Use of an Inverted U Shaped or Folded Patch	(07)
Unit 5	**Compact Broadband Microstrip Antennas:** Use of a Shorted Patch with a Thick Air Substrate, Use of Stacked Shorted Patches, Use of Chip-Resistor and Chip-Capacitor Loading Technique, Use of a Slot-Loading Technique, Use of a Slotted Ground.	(06)
Unit 6	**Compact Dual-Frequency and Dual-Polarized Microstrip Antennas:** Some Recent Advances in Regular-Size Dual-Frequency Designs, Compact Dual-Frequency Operation with Same Polarization Planes, Compact Dual-Frequency Operation, Dual-Band or Triple-Band PIFA, Compact Dual-Polarized Designs.	(08)

Course Outcomes (CO): At the end of course students will

3. Get the knowledge of smart antenna	
4. Design broadband, multiple resonating compact micro strip antenna	
Reference Books	
1	Antenna Theory and design, Stutzmen, warren L, wiley, 3rd edition, 1981
2	Broad band Microstrip Antenna by Girishkumar, K.P. Ray Artech House, Inc. 2003
3	Compact And broadband microstrip Antennas by kin-Lu Wong A Wiley-Interscience Publication John Wiley & Sons, Inc. 2002
4	Antenna Theory analysis And Design by constantine A. Balanis 3rd Edition. A John Wiley & Sons, Inc., Publication 2005.
5	Microstrip antenna design handbook, Ramesh garg, prakash Bhatia, Inderbahl, Artech house, boston, london
6	Antenna engineering handbook, Richard c. johnson, MGH

Tatyasaheb Kore Institute of Engineering & Technology, Warananagar

First Year M. Tech Electronics and Telecommunication Engineering Semester- I

(LC) ETC1061: Laboratory Practice

Teaching Scheme			**Examination Scheme**	
Lectures	----		ISE	----
Tutorials	----		ESE (Oral)	25
Practical	04Hrs./Week		TW	25
Total Credits	02		Duration of ESE	------.

Course Objectives (CO):

1. To acquire basic understanding of Matlab implantation.
2. To acquire complete knowledge of probability.
3. To make students understand and learn about Experimental design of processes.
4. To acquire knowledge of different models.

	Course Contents	**Hours**
1	Probability Calculation	(04)
2	Gaussian Distribution Function	(04)
3	Dice Experiment..Relative Frequency Approach	(04)
4	Uniform Probability Density Function...	(04)
5	Gaussian Joint Probability Density Function...	(04)
6	Poisson Probability Density Function...	(04)
7	Power Spectral Density. . . .	(04)
8	Autocorrelation Function	(04)
9	Cross correlation Function...	(04)
10	Bernoulli Trials	(04)

Course Outcomes (CO): At the end of course, students will

1. Able to design the mathematical functions.
2. Able to calculate the distribution functions.
3. Design the processes.
4. Analyze the random processes.

Reference Books

1	Kandaswamy- Queing Theory

Tatyasaheb Kore Institute of Engineering & Technology, Warananagar

First Year M. Tech Electronics and Telecommunication Engineering Semester- I

(SW) ETC1071: Seminar-1

Teaching Scheme			**Examination Scheme**	
Lectures	-----		ISE	-----
Tutorials	-----		ESE (Oral)	-----
Practical	02Hrs./Week		TW	50
Total Credits	01		Duration of ESE	-----.

Course Objectives (CO):

1. To Identify, understand and discuss current, real-world issues.
2. To Distinguish and integrate differing forms of knowledge and academic disciplinaryapproaches (e.g., humanities and sciences) with that of the student 's own academic discipline (e.g., in agriculture, architecture, art, business, economics, education, engineering, natural resources, etc.). And apply a multidisciplinary strategy to address current, real-world issues.
3. To Improve oral and written communication skills.
4. To Improve presentation skills

	Course Contents	**Hours**
1	Seminar-I should be based on the literature survey on any topic relevant to Design Engineering (should be helpful for selecting a probable title of the dissertation). Each student has to prepare a write up of about 25-30 pages of –A4 size sheets and submit it in IEEE format in duplicate as the term work. The student has to deliver a seminar talk in front of the faculty of the department and his classmates. The concerned faculty should assess the students based on the quality of work carried out, preparation and understanding of the candidates. Some marks should be reserved for the attendance of a student in the seminars of other students.	(--)

Course Outcomes (CO): At the end of course, students will

1. Apply principles of ethical leadership, collaborative engagement, socially responsible behavior, respect for diversity in an interdependent world, and a service-orientedcommitment to advance and sustain local and global communities.
2. Learn and integrate. Through independent learning and collaborative study, attain, use, and develop knowledge in the arts, humanities, sciences, and social sciences, with disciplinary specialization and the ability to integrate information across disciplines.
3. Think and create. Use multiple thinking strategies to examine real-world issues, explore creative avenues of expression, solve problems, and make consequentialdecisions
4. Communicate. Acquire, articulate, create and convey intended meaning using verbal and non-verbal method of communication that demonstrates respect andunderstanding in a complex society.

Tatyasaheb Kore Institute of Engineering & Technology, Warananagar

First Year M. Tech Electronics and Telecommunication Engineering Semester- II

(PCC) ETC2011: Computer Vision

Teaching Scheme			**Examination Scheme**	
Lectures	03 Hrs./Week		ISE	40 Marks
Tutorials	01 Hrs./Week		ESE	60 Marks
Total Credits	04		TW	25Marks
			Duration of ESE	02 Hrs.30 Min.

Course Objectives (CO):

1. Study wavelets for image processing.
2. Provide basics for CBIR systems.
3. Provide logical base for Feature Extraction
4. Study different Classifiers

	Course Contents	**Hours**
Unit 1	**Wavelets and Multi resolution Processing** Background: Image Pyramids, Sub band Coding, Haar Transform, Multi resolution Expansion: Series Expansion, Scaling Function, Wavelet Function Discrete Wavelet Transform in one Dimension, and DWT in 2 Dimensions. Fast wavelet Transform, wavelet packets	(07)
Unit 2	**Representation and Description:** Representation: Boundary Following Algorithm, Chain Codes, Polygonal Approximation, Signatures, Boundary segments, Skeletons. Descriptors: Boundary descriptors; Regional descriptors; Relational descriptors	(07)
Unit 3	**Pattern Recognition:** Overview of pattern recognition; Patterns and pattern Classes	(06)
Unit 4	**Classifier:** Matching: Minimum distance classifier, Matching by Correlation, Matching shape numbers, String matching statistical classifier: Bayes classifier, Nearest Neighbor classifier	(07)
Unit 5	**Image Mining and Content-Based Image Retrieval:** Introduction, Image Mining, Image Features for Retrieval and Mining: Color Features, Texture Features, Shape features, Topology, Multidimensional Indexing Simple CBIR System, Video mining	(06)
Unit 6	**Artificial neural networks:** Human Recognition system; Artificial neural networks; Different models of Artificial neural networks; Perception and learning;	(07)

Term Work:

Minimum Seven assignments based on above topics

Course Outcomes (CO): At the end of course, students will

1. Apply wavelets for image processing
2. Develop content-based image retrieval systems
3. Extract the features from objects/Image
4. Apply classifier technique.

Reference Books

3	Image Processing Principles and Applications, Tinku Acharya, Ajoy K. Ray, Wiley, 2005
4	Fundamentals of Digital Image processing, by A. K. Jain PHI
5	Digital image processing and analysis by B. Chanda, D. Dutta Mujumdar PHI
6	processing, analysis and machine vision by Milan sonka , V. Hlavac , R. Boyle Thomson learning

Tatyasaheb Kore Institute of Engineering & Technology, Warananagar

First Year M. Tech Electronics and Telecommunication Engineering Semester- II

(PCC) ETC2021: Adhoc & Wireless Sensor Networks

Teaching Scheme			**Examination Scheme**	
Lectures	03 Hrs./Week		ISE	40 Marks
Tutorials	01 Hrs./Week		ESE	60 Marks
Total Credits	04		TW	25Marks
			Duration of ESE	02 Hrs.30 Min.

Course Objectives (CO):

1. Explain the constraints of physical layer that affect the design and performance of Adhoc network
2. Discuss the operations and performance of various MAC layer protocols proposed for Adhoc networks.
3. Discuss the operations and performance of various routing protocols proposed for ad hoc networks.
4. Explain challenges in Wireless Sensor Network and its applications.

	Course Contents	**Hours**
Unit 1	Introduction to Adhoc networks – definition, characteristics features, applications. Characteristics of Wireless channel, Adhoc Mobility Models, Indoor and outdoor models	(07)
Unit 2	**Medium Access Protocols:** MAC Protocols: design issues, goals and classification, Contention based protocols- with reservation, scheduling algorithms, protocols using antennas, IEEE standards: 802.11a, 802.11b, 802.1g, 802.15, HIPERLAN	(07)
Unit 3	**Network Protocols:** Routing Protocols: Design issues, goals and classification. Proactive Vs reactive routing, Unicast routing algorithms, Multicast routing algorithms, hybrid routing algorithm, Energy aware routing algorithm, Hierarchical Routing, QoS aware routing	(06)
Unit 4	**Overview of Wireless Sensor Networks:** Challenges for Wireless Sensor Networks, Enabling Technologies for Wireless Sensor Networks, Single-Node Architecture - Hardware Components, Energy Consumption of Sensor Nodes, Operating Systems and Execution Environments	(07)
Unit 5	**Cross Layer Design and Integration of Adhoc for 4G:** Cross layer Design: Need for cross layer design, cross layer optimization, parameter optimization techniques, Cross layer cautionary perspective, Integration of Adhoc with Mobile IP networks.	(06)
Unit 6	**Sensor Network Platforms and Tools:** Sensor Node Hardware – Berkeley Motes, Programming Challenges, Node-level software platforms, Node-level Simulators, State-centric programming.	(07)

Term Work:

Minimum Seven assignments based on above topics

Course Outcomes (CO): At the end of course, students will

1. Discuss basics and need of Adhoc network
2. Recognize challenges in design of wireless ad hoc networks
3. Understand fundamentals of Wideband Modulation Techniques
4. Use proposed protocols at MAC of Ad hoc networks

Reference Books	
1	Ad hoc Wireless Networks Architectures and protocols, Da C. Siva Ram Murthy and B.S. Manoj, 2nd edition, Pearson Education. 2007
2	Adhoc Networking, Charles E. Perkins, Addison − Wesley, 2nd edition, 2000
3	Mobile Adhoc networking, Stefano Basagni, Marco Conti, Silvia Giordano and Ivan, 2nd edition, 2000
4	The handbook of Adhoc wireless networks, Mohammad Ilyas, CRC press,2002
5	ÉCLAIR; An Efficient Cross-Layer Architecture for wireless protocol stacks, V. T. Raisinhani and S. Iyer, World Wireless cong., San Francisco, CA, 3rd edition,

Tatyasaheb Kore Institute of Engineering & Technology, Warananagar

First Year M. Tech Electronics and Telecommunication Engineering Semester- II

(PE-IV) ETC20311: Cryptography & Network Security

Teaching Scheme			**Examination Scheme**	
Lectures	03 Hrs./Week		ISE	40 Marks
Tutorials	01 Hrs./Week		ESE	60 Marks
Total Credits	04		TW	25Marks
			Duration of ESE	02 Hrs.30 Min.

Course Objectives (CO):

1. Understand Block Chiper and DES principles
2. Understand Symmetric Encryption Methods
3. İdentify network security threat
4. Understand Key Resources and management resources.

	Course Contents	**Hours**
Unit 1	**Overview:** Services, Mechanisms, and attacks, The OSI Security Architecture, A model for network security, Classical Encryption Techniques: Symmetric Cipher Model, Substitution Techniques, Transposition Techniques, Rotor Machines, and Steganography	(07)
Unit 2	**Block Ciphers and the Data Encryption Standard**: Simplified DES, Block Cipher Principles, The Data Encryption Standard, The Strength of DES, Differential Linear Cryptanalysis, Block Cipher Design Principles, Block Cipher Modes of Operation.	(07)
Unit 3	**Contemporary symmetric Ciphers:** Triple DES, Blowfish, RC5, Characteristics of Advanced Symmetric Block Ciphers, confidentially using symmetric Encryption: Placement of Encryption Function, Traffic Confidentiality, Key Distribution, and Random Number Generation	(06)
Unit 4	**Public Key Cryptography and RSA:** Principles of Public Key cryptosystems, The RSA Algorithm, Key Management, other Public Key Cryptosystems key Management, Diffle-Hellman Key exchange	(07)
Unit 5	**Message Authentication and hash functions:** Authentication Requirements, Authentication Function, Message Authentication Codes, Hash Functions, Security of Hash Functions and MACs. **Hash Algorithms:** MD5 Message Digest Algorithm, Secure Hash Algorithm. Digital signatures and Authentication protocols: Digital signatures, Authentication protocols and Digital signature Standard	(06)
Unit 6	**Authentication Applications:** Kerberos, X. 509 Authentication Service. Electronic Mail Security: Pretty Good Privacy, S/MIME, IP Security Overview, IP Security Architecture, Authentications, Header, Encapsulating Security Payload, Combining Security Associations, Key Management. **Web Security:** Web Security Considerations, Secure socket layer and Transport layer security. Secure electronic transaction. System Security: Intruders, Intrusion detection, password management. Malicious Software, Viruses, Viruses and Related Threats, Firewalls: Firewall Design Principles, Trusted systems.	(07)

Course Outcomes (CO): At the end of course, students will

1. Implement Cryptography methods on Network Security concepts and Application

4. Identify the attacks and methods of web security	
Reference Books	
1	Willam Stallings, Cryptography and Network Security, Third Edition, Pearson Education
2	Network Algorithmic: An Interdisciplinary Approach to Designing Fast Networked Devices George Varghese (Morgan Kaufmann Series in Networking
3	Atul Kahate, Cryptography and Network Security, Tata McGraw-Hill, 2003

Tatyasaheb Kore Institute of Engineering & Technology, Warananagar

First Year M. Tech Electronics and Telecommunication Engineering Semester- II

(PE-IV) ETC20312: Multirate Systems

Teaching Scheme			**Examination Scheme**	
Lectures	03 Hrs./Week		ISE	40 Marks
Tutorials	01 Hrs./Week		ESE	60 Marks
Total Credits	04		TW	25Marks
			Duration of ESE	02 Hrs.30 Min.

Course Objectives (CO):

1. To provide basic concepts of Multirate systems
2. To give inputs regarding details of Multirate filter banks and their types.
3. To provide concepts of Multidimensional Multirate Systems
4. To provide information of different applications of Multirate Systems

	Course Contents	**Hours**
Unit 1	**Fundamentals of Multi-rate Systems:** Basic multi-rate operations, interconnection of building blocks, polyphase representation, multistage implementation.	(07)
Unit 2	**Multirate Filter Banks:** Maximally decimated filter banks: Errors created in the QMF bank, alias-free QMF system, power symmetric QMF banks, M-channel filter banks, poly-phase representation, perfect reconstruction systems, alias-free filter banks, tree structured filter banks, transmultiplexers.	(07)
Unit 3	**Para-unitary Perfect Reconstruction Filter Banks**: Lossless transfer matrices, filter bank properties induced by paraunitariness, two channel Para-unitary lattices, M- channel FIR Para-unitary QMF banks, transform coding.	(06)
Unit 4	**Linear Phase Perfect Reconstruction QMF Banks**: Necessary conditions, lattice structures for linear phase FIR PR QMF banks, formal synthesis of linear phase FIR PR QMF lattice. Cosine Modulated Filter Banks: Pseudo-QMF bank and its design, efficient polyphase structures, properties of cosine matrices, cosine modulated perfect reconstruction systems	(07)
Unit 5	**Multidimensional Multirate Systems:** Introduction, Multidimensional signals and their sampling, minimum sampling density, Multirate fundamentals, Alias free decimation. Cascade connections, Multirate filter design. Special filters and filter banks.	(06)
Unit 6	**Applications:** FSK Modems, OMC data transmission, DAB and ADSL, Asynchronous conversion of sampling rates, Speech and audio coding, Image and video coding, Simulation of room acoustics using Wavelets, Multirate techniques with sensors	(07)

Course Outcomes (CO): At the end of course, students will

1. Understand the basic multi-rate operations.
2. Apply the concept of Multirate filter banks.
3. Implement the design of Multirate filter banks
4. Understand the role of Multirate systems in different applications.

Reference Books

1	P. Vaidyanathan, "Multirate Systems and Filter Banks," Pearson Education (Asia) Third impression, 2010.
2	N. J. Fliege, "Multirate Digital Signal Processing," John Wiley & Sons, USA, 2000.engineeringand network design, oliver heckmann john wiley & sons ltd,

4	R. E. Crochiere, L.R. Rabiner, "Multirate Digital Signal Processing," Prentice Hall..
5	3. Gilbert Strang and Truong Nguyen, "Wavelets and Filter Banks," Wellesley-Cambridge Press,

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First Year M. Tech Electronics and Telecommunication Engineering Semester- II

(PE-IV) ETC20313: Advanced Light Wave Communication

Teaching Scheme			**Examination Scheme**	
Lectures	03 Hrs./Week		ISE	40 Marks
Tutorials	01 Hrs./Week		ESE	60 Marks
Total Credits	04		TW	25Marks
			Duration of ESE	02 Hrs.30 Min.

Course Objectives (CO):

1. To expose the students to the basics of signal propagation through optical fiber impairments, components and devices and system design. fibers,
2. To provide an in-depth understanding needed to perform fiber-optic communication system engineering calculations, identify system tradeoffs, and apply this knowledge to modern fiber optic systems.

	Course Contents	**Hours**
Unit 1	**Introduction to guided optical communication:** Optical Fibers, types of fibers & optical Cables, Study of losses during transmission through viz. Attenuation by Absorption & Scattering, Consideration of losses in designing of High Speed / High bandwidth optical communication systems, Selection of fiber for such systems.	(07)
Unit 2	**Optical Sources:** Types of LEDs used in optical communication, their construction & operating principle, Types of Lasers. Principle of working of Lasers, solid state & injection Lasers, Optical amplifiers, EDFA, Soliton Systems & design of system required in LAN & WAN type of applications. Calculations of Power budgets and feasibility of system design for above optical sources.	(07)
Unit 3	**Optical Detectors:** Introduction & study of type of detectors characteristics. Spectral spread and availability of detectors for 980 nm, 1.3 µm & 1.55 µm λ systems. Calculation of detector sensitivity and design considerations of suitable receivers for LAN, WAN applications.	(06)
Unit 4	**Multiplexing Components & Techniques:** Concepts of WDM, DWDM system design parameters, Optical multiplex / Demultiplex design considerations- Angular dispersive devices, Dielectric thin film filter type devices, Hybrid & planer wave guide devices, Active WDM devices, Wavelength non selective devices, System application.	(07)
Unit 5	**Long Haul High Band Width Tx System:** Designing systems for long haul high band width consideration-Outage, Bit error rate, Cross connect, Low & high-speed interphases, Multiplex / Demultiplex consideration, Regenerator spacing, Degeneration & Allowances, Application consideration.	(06)

Course Outcomes (CO): At the end of course, students will

1. Understand the basics of Optical Fibers
2. Understand the construction & role of sources & detectors in light wave communication.
3. Analyze different multiplexing techniques
4. Design long haul high band width transmission system

Reference Books	
1	.Optical Communication Systems by John Gowar (PHI)
2	Optical Fiber Communication by Gerd Keiser (MGH)
3	.Optical Fiber Communication Principles & Practice by John M. Senior (PHI pub. 1996.)

Tatyasaheb Kore Institute of Engineering & Technology, Warananagar

First Year M. Tech Electronics and Telecommunication Engineering Semester- II

(PE-V) ETC20411: Advanced Microwave Circuit Design

Teaching Scheme			**Examination Scheme**	
Lectures	03 Hrs./Week		ISE	40 Marks
Tutorials	01 Hrs./Week		ESE	60 Marks
Total Credits	04		TW	25Marks
			Duration of ESE	02 Hrs.30 Min.

Course Objectives (CO):

1. Analyze transmission line circuits at RF and microwave frequencies.
2. Design impedance matching in transmission line networks
3. Perform Scattering parameter analysis of RF networks
4. Design RF Filters, Amplifiers, Oscillators & mixers

	Course Contents	**Hours**
Unit 1	**Introduction:** Importance of Radio frequency design, RF behavior of passive components, Chip components and circuit board consideration. Transmission line Analysis: Strip line & micro strip line, Smith Chart	(07)
Unit 2	**Microwave Network Analysis:** Interconnecting Networks, Network properties & applications, scattering parameters, impedance matching using discrete components, micro strip line matching networks, biasing networks.	(07)
Unit 3	**RF Filter Design:** Basic resonator &Filter configurations, special filter realizations, Filter implementation, Coupled filters.	(06)
Unit 4	**RF Transistor Amplifier Design:** Active RF components, Active RF component modeling, Matching and biasing network, Characteristics of amplifiers, Amplifier power relations, Stability considerations, Constant gain, Noise figure circles, Constant VSWR circles, Broadband High power & Multistage Amplifiers.	(07)
Unit 5	**Oscillator and Mixture Design:** Basic Oscillator Model, High frequency Oscillator configuration, Basic characteristics of Mixers & mixer design.	(06)
Unit 6	**Microwave Integrated Circuits:** Materials &basic fabrications technologies of Hybrid ICs & monolithic ICs, Examples of IC Fabrication flow, MICs- amplifiers, Oscillators, Mixers, Frequency dividers, Digital modulators, Switches, Phase shifters, Multipliers & Up-converters.	(07)

Course Outcomes (CO): At the end of course, students will

1. Analyze transmission line circuits at RF and microwave frequencies.
2. Design impedance matching in transmission line networks
3. Perform Scattering parameter analysis of RF networks
4. Design RF Filters, Amplifiers, Oscillators & mixers

Reference Books

1	Reinhold Ludwig and Pavel Bretshko Circuit Design Theory & Applications", Pearson Education.
2	D. M. Pozar, "Microwave Engineering", John Wiley & sons
3	Yoshihiro Konishi, "Microwave Integrated Circuits" BSP Books Pvt. Ltd

5	Robert E.Colin,2 “Foundations for Microwave Engineering”, Mc Graw Hill.

Tatyasaheb Kore Institute of Engineering & Technology, Warananagar

First Year M. Tech Electronics and Telecommunication Engineering Semester- II

(PE-V) ETC20412: SDR & Cognitive Radio Technology

Teaching Scheme			**Examination Scheme**	
Lectures	03 Hrs./Week		ISE	40 Marks
Tutorials	01 Hrs./Week		ESE	60 Marks
Total Credits	04		TW	25Marks
			Duration of ESE	02 Hrs.30 Min.

Course Objectives (CO):

1. Understand concept of SDR and Cognitive radios.
2. Know COBRA, SCA, JTRS
3. Understand concept of smart antenna

	Course Contents	**Hours**
Unit 1	SDR concepts & history, Benefits of SDR, SDR Forum, Ideal SDR architecture, SDR Based End-to-End Communication, Worldwide frequency band plans, Aim and requirements of the SCA.	(07)
Unit 2	Architecture Overview, Functional View, Networking Overview, Core Framework, Real Time Operating Systems, Common Object Request Broker Architecture (CORBA), SCA and JTRS compliance.	(07)
Unit 3	Radio Frequency design, Baseband Signal Processing, Radios with intelligence, Smart antennas, Adaptive techniques, Phased array antennas, Applying SDR principles to antenna systems, Smart antenna architectures.	(06)
Unit 4	Low Cost SDR Platform, Requirements and system architecture, Convergence between military and commercial systems, The Future For Software Defined Radio .	(07)
Unit 5	Cognitive radio concepts & history, Benefits of Cognitive radio, Cognitive radio Forum. Ideal Cognitive radio architecture, Cognitive radio Based End-to-End Communication, Worldwide frequency band plans. Low Cost Cognitive radio Platform, Requirements and system architecture, Convergence between military and commercial	(06)
Unit 6	Radio Frequency design, Baseband Signal Processing, Radios with intelligence, Smart antennas, Adaptive techniques, Phased array antennas, Applying Cognitive radio principles to antenna systems, Smart antenna architectures.	(07)

Course Outcomes (CO): At the end of course, students will

1. Enable the student to understand the evolving paradigm of cognitive radio communication and the enabling technologies for its implementation.
2. Enable the student to understand the essential functionalities and requirements in Designing software defined radios and their usage for cognitive.
3. Expose the student to the evolving next generation wireless networks and their Associated challenge

Reference Books

1	Dillinger, Madani, Alonistioti (Eds.): Software Defined Radio, Architectures, Systems and Wiley 2003
2	Software Defined Radio for 3G, 2002, by Paul Burns.

Tatyasaheb Kore Institute of Engineering & Technology, Warananagar

First Year M. Tech Electronics and Telecommunication Engineering Semester- II

(PE-V) ETC20413: Industry Automation & Process Control

Teaching Scheme			**Examination Scheme**	
Lectures	03 Hrs./Week		ISE	40 Marks
Tutorials	01 Hrs./Week		ESE	60 Marks
Total Credits	04		TW	25Marks
			Duration of ESE	02 Hrs.30 Min.

Course Objectives (CO):

1. Explain the General function of Industrial Automation, List basic Devices in Automated Systems, Distinguish Different Controllers Employed In Automated Systems.
2. Identify Practical Programmable Logic Controller Applications, Know the History of the PLC, Demonstrate Basic PLC Skills
3. To study basics fuzzy logic and control for industrial atomization

	Course Contents	**Hours**
Unit 1	**Process characteristics:** Incentives or process control, Process Variables types and selection criteria, process degree of freedom, The period of Oscillation and Damping, Characteristics of physical System: Resistance, Capacitive and Combination of both. Elements of Process Dynamics, Types of processes- Dead time, Single/multi-capacity, self- Regulating/non-self-regulating, Interacting/non-interacting, Linear/nonlinear, and Selection of control action for them. Study of Liquid Processes, Gas Processes, Flow Processes, Thermal Processes in respect to above concepts	(07)
Unit 2	**Control Systems and Automation Strategy:** Evolution of instrumentation and control, Role of automation in industries, Benefits of automation, Introduction to automation tools PLC, DCS, SCADA, Hybrid DCS/PLC, Automation strategy evolution, Control system audit, performance criteria, Safety Systems	(07)
Unit 3	**Intelligent Controllers:** Stepan analysis method for finding first, second and multiple time constant sanddead time**.** Model Based controllers: Internal Model control, Smith predictor, optimal controller, Model Predictive controller, Dynamic matrix controller (DMC). Self-Tunning Controller. Fuzzy logic systems and Fuzzy controllers, Introduction, Basic Concepts of Fuzzy Logic, Fuzzy Sets, Fuzzy Relation, Fuzzy Graphs, and Fuzzy Arithmetic, Fuzzy If- Then Rules, Fuzzy Logic Applications, Neuro-Fuzzy Artificial Neural networks and ANN controller	(06)
Unit 4	**Distributed Control Systems:** DCS introduction, functions, advantages and limitations, DC Susan automation Tool to support Enterprise Resources Planning, DCS Architecture of different makes, specific at ions, configuration and programming, functions including database	(07)
Unit 5	**Programmable logic controllers (PLC):** Introduction, architecture, definition of discrete state process control, PLCVs PC, PLCVs DCS, relay diagram, ladder diagram, ladder diagram examples, relay sequencers, timers/counters, PLC design, Study of at least one industrial PLC	(06)

Unit 6	Automation for following industries– Power, Water and Waste Water Treatment, Food and Beverages, Cement, Pharmaceuticals, Sugar, Automobile and Building Automation.	(07)

Course Outcomes (CO): At the end of course, students will
1. Apply basic knowledge of process control techniques.
2. Develop a PLC program for automatic control systems..
3. Select the right hardware for a given application
4. Consider such aspects of the automation system as network communication, human machine interface, safety and protection against interference.

Reference Books	
1	Donald Eckman–Automatic Process Control, Wiley Eastern Limited
2	Thomas E Marlin-Process Control- Design in processes and Control Systems for Dynamic Performance, McGraw- Hill International Editions
3	Process control Systems-F. G. Shinskey, TMH
4	Programmable Logic Controllers: Principles and Applications- Webb & Reis PHI
5	

Tatyasaheb Kore Institute of Engineering & Technology, Warananagar

First Year M. Tech Electronics and Telecommunication Engineering Semester- II

(OEC) ETC20515: Advanced Operating Systems

Teaching Scheme			**Examination Scheme**	
Lectures	03 Hrs./Week		ISE	40 Marks
Tutorials	01 Hrs./Week		ESE	60 Marks
Total Credits	04		TW	25Marks
			Duration of ESE	02 Hrs.30 Min.

Course Objectives (CO):

1. Understand the Concept of hardware interface and OS Interface
2. Understand parallel System along with Multiprocessor
3. Understand IPC patterns
4 Understand concept of distributed operating system
4. Understand the concept of Process along with I/O devices and System

	Course Contents	**Hours**
Unit 1	**Fundamentals Of Operating Systems:** Overview of all system software Operating Systems-I/O Manager-assembler,compiler,linker,loader,OS services & components,multitasking,multiprogramming,time sharing ,buffering, spooling, Scheduling criteria, Scheduling algorithms, Deadlocks- Method for handling deadlocks, prevention, avoidance and detection, Memory Management- Swapping, Contiguous Memory Allocation, Paging, Segmentation	(09)
Unit 2	**Process:** Concept of process & threads, Process Scheduling, Process states, Process management, context switching, Interaction between process & operating system	(07)
Unit 3	**Parallel systems:** Parallel Hardware, An OS for Two Processor System, Race condition with a shared process table, atomic actions, Multiprocessor OS: Grouping Shared variables, using two process tables, threads, Implementation of Mutual Exclusion, varieties of computer models..	(06)
Unit 4	**Inter process Communication (IPC) Patterns** Using IPC, Patterns of IPC, Problems when Process complete, Race conditions and atomic actions, IPC pattern: Mutual Exclusion, Signaling, Rendezvous, procedure consumer, Client Server, Database access and update, review of IPC pattern	(07)
Unit 5	**Distributed Operating Systems**: Types of Distributed OS, Advantages of distributed operating system, Design goals of distributed Operating system, Distributed system structure, CommunicationProtocols,	(04)
Unit 6	**I/O Devices & System:** Principles of I/O hardware-I/O Devices-device controller-direct memory access, Principles of I/o software-goals-interrupt handlers-device drivers-device independent I/O software Secondary storage structure, Disk structure, Disk scheduling, disk management, disk reliability, stable storage implementation ,File Concept, File support, access methods, Allocation methods, Directory systems, File protection	(07)

Course Outcomes (CO): At the end of course, students will

1. Implement hardware interface along with addressing and interrupts
2. Implement System calls and OS Interface
3. Implement Parallel System for two process system.

-Reference Books	
1	Modern Operating System- Andrew S. Tanenbaum
2	Operating Systems A concept-based Approach - Dhananjay M. Dhamdhere
3	Operating System by John Crowley
4	Operating System by William Stallings
5	Operating System by Achyut S Godbole

Tatyasaheb Kore Institute of Engineering & Technology, Warananagar

First Year M. Tech Electronics and Telecommunication Engineering Semester- II

(OEC) ETC20516: Cyber Security

Teaching Scheme			**Examination Scheme**	
Lectures	03 Hrs./Week		ISE	40 Marks
Tutorials	01 Hrs./Week		ESE	60 Marks
Total Credits	04		TW	25Marks
			Duration of ESE	02 Hrs.30 Min.

Course Objectives (CO):

1. Understand the Concept of Cyber security.
2. Understand Cyber offenses & Cybercrimes.
3. Understand Tools and Methods Used in Cybercrime
4. Understand the concept of Cyber Security Laws and Legal Perspectives.

	Course Contents	**Hours**
Unit 1	**Introduction to Cyber Security:** Cybercrime definition and origins of the world, Cybercrime and information security, Classifications of cybercrime, Cybercrime and the Indian ITA 2000, A global Perspective on cybercrimes.	(07)
Unit 2	**Cyber offenses & Cybercrimes:** How criminal plan the attacks, Social Engg, Cyber stalking, Cybercafé and Cybercrimes, Botnets, Attack vector, Cloud computing, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit Card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices	(07)
Unit 3	**Tools and Methods Used in Cybercrime:** Phishing, Password Cracking, Keyloggers and Spywares, Virus and Worms, Steganography, DoS and DDoS Attacks, SQL Injection, Buffer Over Flow, Attacks on Wireless Networks, Identity Theft (ID Theft)	(06)
Unit 4	**Security Risk Assessment and Risk Analysis:** Risk Terminology, Laws, Mandates, and Regulations, Risk Assessment Best Practices, The Goals and Objectives of a Risk Assessment, Best Practices for Quantitative and Qualitative Risk Assessment.	(07)
Unit 5	**Vulnerability Assessment and Penetration Testing (VAPT):** VAPT An Overview, Goals and Objectives of a Risk and Vulnerability Assessment, Vulnerability Assessment Phases-Discovery, Exploitation/Analysis, Reporting Penetration Testing Phases-Discover/Map, Penetrate Perimeter, Attack Resources, Network and Web VAPT	(06)
Unit 6	**Cyber Security Laws and Legal Perspectives:** The Concept of Cyber space E-Commerce, The Contract Aspects in Cyber Law, The Security Aspect of Cyber Law, The Intellectual Property Aspect in Cyber Law, The Evidence Aspect in Cyber Law, The Criminal Aspect in Cyber Law, Global Trends in Cyber Law, Legal Framework for Electronic Data Interchange Law Relating to Electronic Banking, The Need for an Indian Cyber Law	(07)

Course Outcomes (CO): At the end of course, students will

1. Implement Exploitation/Analysis.
2. Implement SQL Injection
3. Implement Security Challenges Posed by Mobile Devices.
4. Implement Cybercrime and the Indian ITA 2000

1	Nina Godbole, Sunit Belapure, Cyber Security, Wiley India, New Delhi.
2	The Indian Cyber Law by Suresh T. Vishwanathan; Bharat Law House New Delhi
3	The Information technology Act, 2000; Bare Act- Professional Book Publishers, New Delhi.
4	Cyber Law & Cyber Crimes By Advocate Prashant Mali; Snow White Publications, Mumbai
5	Nina Godbole, Information Systems Security, Wiley India, New Delhi

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First Year M. Tech Electronics and Telecommunication Engineering Semester- II

(LC) ETC2061: Laboratory Practice

Teaching Scheme			**Examination Scheme**	
Lectures	----		ISE	----
Tutorials	----		ESE (Oral)	25
Practical	04Hrs./Week		TW	25
Total Credits	02		Duration of ESE	------.

Course Objectives (CO):

1. To acquire basic understanding of Matlab coding for Ciphers.
2. To acquire complete knowledge of Security.
3. To make students understand and learn about algorithms of Cryptography.
4. To acquire knowledge Transportation technique.

	Course Contents	**Hours**
1	Implement Ceaser Cipher	(04)
2	Implement Affine Cipher with equation c=3x+12	(04)
3	Implement Playfair Cipher with key l drp	(04)
4	Implement polyalphabetic Cipher	(04)
5	Implement Auto Key Cipher	(04)
6	Implement Hill Cipher	(04)
7	Implement Rail fence technique	(04)
8	Implement Simple Columnar Transposition Technique	(04)
9	Implement Advanced Columnar Transposition technique	(04)
10	Implement Euclidean Algorithm	(04)

Course Outcomes (CO): At the end of course, students will

2. Implement Cryptography methods on Network Security concepts and Application
2. Implement Symmetric methods
3. Implement Message authentication and Hash Functions
4. Identify the attacks and methods of web security

Reference Books

1	Willam Stallings, Cryptography and Network Security, Third Edition, Pearson Education
2	Network Algorithmic: An Interdisciplinary Approach to Designing Fast Networked Devices George Varghese (Morgan Kaufmann Series in Networking
3	Atul Kahate, Cryptography and Network Security, Tata McGraw-Hill, 2003

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First Year M. Tech Electronics and Telecommunication Engineering Semester- II

(SW) ETC2071: Seminar-II

Teaching Scheme			**Examination Scheme**	
Lectures	-----		ISE	-----
Tutorials	-----		ESE (Oral)	-----
Practical	02Hrs./Week		TW	50
Total Credits	01		Duration of ESE	-----.

Course Objectives (CO):

1. To Identify, understand and discuss current, real-world issues.
2. To Distinguish and integrate differing forms of knowledge and academic disciplinaryapproaches (e.g., humanities and sciences) with that of the student 's own academic discipline (e.g., in agriculture, architecture, art, business, economics, education, engineering, natural resources, etc.). And apply a multidisciplinary strategy to address current, real-world issues.
3. To Improve oral and written communication skills.
4. To Improve presentation skills

	Course Contents	**Hours**
1	Seminar-I should be based on the literature survey on any topic relevant to Design Engineering (should be helpful for selecting a probable title of the dissertation). Each student has to prepare a write up of about 25-30 pages of –A4 size sheets and submit it in IEEE format in duplicate as the term work. The student has to deliver a seminar talk in front of the faculty of the department and his classmates. The concerned faculty should assess the students based on the quality of work carried out, preparation and understanding of the candidates. Some marks should be reserved for the attendance of a student in the seminars of other students.	(--)

Course Outcomes (CO): At the end of course, students will

1. Apply principles of ethical leadership, collaborative engagement, socially responsible behavior, respect for diversity in an interdependent world, and a service-orientedcommitment to advance and sustain local and global communities.
2. Learn and integrate. Through independent learning and collaborative study, attain, use, and develop knowledge in the arts, humanities, sciences, and social sciences, with disciplinary specialization and the ability to integrate information across disciplines.
3. Think and create. Use multiple thinking strategies to examine real-world issues, explore creative avenues of expression, solve problems, and make consequentialdecisions
4. Communicate. Acquire, articulate, create and convey intended meaning using verbal and non-verbal method of communication that demonstrates respect andunderstanding in a complex society.

Tatyasaheb Kore Institute of Engineering & Technology, Warananagar

Second Year M.Tech Electronics & Telecommunication Semester- III

(MC) ETC-3011: Research Methodology and Intellectual Property Rights

Teaching Scheme			**Examination Scheme**	
Lectures	02 Hrs/Week		ISE	30 Marks
Tutorials	--		ESE	70 Marks
Total Credits	02		TW	--
			Duration of ESE	02 Hrs.30 Min.

Course Objectives (CO):

1. To acquire basic understanding of research problem formulation.
2. To acquire complete knowledge of ethical practices.
3. To make students understand and learn about intellectual property right.
4. To acquire knowledge of economics & social benefits.

	Course Contents	**Hours**
Unit 1	**Introduction to Research:** Meaning of research, types of research, process of research, Sources of research problem, Criteria / Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem, formulation of research hypotheses. Search for causation, Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, necessary instrumentations.	(07)
Unit 2	**Literature survey:** Definition of literature and literature survey, need of literature survey, sources of literature, elements and objectives of literature survey, styles of literature survey, and strategies of literature survey.	(06)
Unit 3	**Plagiarism:** Plagiarism research ethics, Effective technical writing, how to write report, Paper. Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee	(07)
Unit 4	**Introduction to IPR:** Concepts Property and Intellectual Property, Nature and Importance of Intellectual Property Rights, Objectives and Importance of understanding Intellectual Property Rights.	(07)
Unit 5	**Understanding the types of Intellectual Property Rights:** -Patents-Indian Patent Office and its Administration, Administration of Patent System – Patenting under Indian Patent Act , Patent Rights and its Scope, Licensing and transfer of technology, Patent information and database. Provisional and Non Provisional Patent Application and Specification, Plant Patenting, Idea Patenting, Integrated Circuits, Industrial Designs, Trademarks (Registered and unregistered trademarks), Copyrights, Traditional Knowledge, Geographical Indications, Trade Secrets, Case Studies.	(08)
Unit 6	**Innovations in IPR**: New Developments in IPR, Process of Patenting and Development: technological research, innovation, patenting, development, International Scenario: WIPO, TRIPs, Patenting under PCT.	(05)

Course Outcomes (CO): At the end of course students will

1. Understand research problem formulation and approaches of investigation of solutions for research problems.
2. Learn ethical practices to be followed in research and apply research methodology in ca acquire skills required for presentation of research outcomes.
3. Discover how IPR is regarded as a source of national wealth and mark of an economic context of global market scenario

	of new and better products and generation of economic and social benefits
Text Books	
1	Aswani Kumar Bansal : Law of Trademarks in India.
2	C. R. Kothari: Research Methodology: Methodes & Techniques.
3	B L Wadehra : Law Relating to Patents, Trademarks, Copyright, Designs and Geographical Indications.
4	Satyawrat Ponkse: The Management of Intellectual Property.
5	Intellectual Property Rights under WTO by T. Ramappa, S. Chand.
6	Applied Statistics and Probability for Engineers
7	Probability and Statistics for Engineers –Miller, Freund
8	Applied Mathematics for Engineers and Physiscists
Reference Books	
1	Research Methodology: concepts and cases—Deepak Chawla and Neena Sondhi.
2	Research Methods for Business—Sekaran—Wiley.
3	Research Methodology: Methods and Trends'
4	Research Methods in Education---Louis Cohen
5	Principles of Engineering Economy by Grant Ireson/Leavenworth.
6	Resisting Intellectual Property by Halbert ,Taylor & Francis.
7	Intellectual Property in New Technological Age by Robert P. Merges, Peter S. Menell, Mark A. Lemley
Useful Links	
1	freevideolectures.com
2	http://www.youtube.com/

Tatyasaheb Kore Institute of Engineering & Technology, Warananagar

Second Year M.Tech Electronics & Telecommunication Semester- III

(II) ETC-3021: Industrial Training

Teaching Scheme			**Examination Scheme**	
Lectures	--=--		ISE	----
Tutorials	--		ESE	------
Practical	04 Hrs/Week		TW	50
Total Credits	02		Duration of ESE	-----.

Course Objectives (CO):

1. To expose the students to actual working environment and enhance their knowledge and skill from what they have learned in the college.

2.To instill the good qualities of integrity, responsibility and self confidence. All ethical values and good working practices must be followed by student.

3.To help the students about the safety practices and regulations inside the industry and to instill the spirit of teamwork and good relationship between students and employees.

	Course Contents	**Hours**
Unit 1	The student has to prepare the report of training undergone in the industry. It shall include the brief details of assignment completed by the candidate and general observation and analysis. The student has to make a presentation in front of panel of experts as decided by departmental head. The term work should be based on report and departmental oral examination. The training should be of minimum two weeks from reputed industries and certificate of the same should be a part of the report.	---

Course Outcomes (CO): At the end of course students will

1. Ability to demonstrate the use, interpretation and application of an appropriate international engineering standard in a specific situation.
2. Ability to analyze a given engineering problem, identify an appropriate problem solving methodology, implement the methodology and propose a meaningful solution.
3. Ability to apply prior acquired knowledge in problem solving
4. Ability to identify sources of hazards, and assess/identify appropriate health & safety measures
5. Ability to work in a team and take initiatives
6. Ability to effectively communicate solution to problems (oral, visual, written)
7. Ability to manage a project within a given time frame
8. Ability to adopt a factual approach to decision making and to take engineering decision

Tatyasaheb Kore Institute of Engineering & Technology, Warananagar

Second Year M.Tech Electronics & Telecommunication Semester- III

(SLC/AC) ETC-3031: MOOC/Swayam / Center of Excellence

Teaching Scheme			**Examination Scheme**	
Lectures	----		ISE	----
Tutorials	--		ESE	------
Total Credits	--		TW	50
			Duration of ESE	----

Course Objectives (CO):

1. To teach the use of MOOC/Swayam/ Center of Excellence as a learning platform designed to provide educators, administrators and learners with a single robust, secure and integrated system to create personalized learning environment.

	Course Contents	**Hours**
Unit 1	Students should select the course in consultation with the guide from MOOC/Swayam/ Center of Excellence and course should be in acquaintance with recent developments in Mechanical Design Engineering beyond the syllabus **The term work under this course submitted by the student shall include.** 1) Certificate issued by MOOC/Swayam/ Center of Excellence authorities. 2) The student has to make a presentation in front of panel of experts as decided by departmental head. .	--

Course Outcomes (CO): At the end of course students will

Students will be able to choose course of their choice from MOOC/Swayam and to be acquaintance with recent developments in Electronics and Telecommunication Engineering beyond syllabus.

Tatyasaheb Kore Institute of Engineering & Technology, Warananagar

Second Year M.Tech Electronics & Telecommunication Semester- III

(PC) ETC-3041: Dissertation Phase-I

Teaching Scheme			**Examination Scheme**	
Lectures	-----		ISE	----
Tutorials	----		ESE (Oral)	50
Practical	16Hrs/Week		TW	50
Total Credits	08		Duration of ESE	-----.

Course Objectives (CO):

1. To grow deeper knowledge, understanding, capabilities and attitudes in the context of the programme of study.
2. To investigate more deeply into and synthesize knowledge acquired in previous studies.

	Course Contents	**Hours**
Unit 1	At the end of semester, student has to prepare the report as per the guidelines provided below. **Format of dissertation report:** The dissertation work report shall be typed on A4 size bond paper. The total number of pages shall not be less than 35. Figures, graphs, annexure etc be as per the requirement. **The report should be written in the standard format.** 1. Title sheet 2. Certificate 3. Acknowledgement 4. List of figures, Photographs/Graphs/Tables 5. Abbreviations. 6. Abstract 7. Content. 8. Text with usual scheme of chapters. Bibliography (the source of illustrative matter be acknowledged clearly at appropriate place as per IEEE/ASME/Elsevier Format) Student should present his work in front of a panel having internal examiner and external examiner.	---

Course Outcomes (CO): At the end of course students will

1. Design and engage in, an independent and sustained critical investigation and evaluation of a chosen research topic.
2. Systematically identify relevant theory and concepts, relate these to appropriate methodologies and evidence, apply correct techniques and draw suitable conclusions.
3. Involve in systematic finding and critical review of appropriate and relevant information sources
4. Understand and apply ethical standards of conduct in the collection and evaluation of data and other resources
5. Present research concepts and contexts clearly and effectively both in writing and orally

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Second Year M.Tech Electronics & Telecommunication Semester- IV

(PC) ETC-4011: Dissertation Phase-II

Teaching Scheme			**Examination Scheme**	
Lectures	-----		ISE	----
Tutorials	----		ESE (Oral)	100
Practical	32Hrs/Week		TW	100
Total Credits	16		Duration of ESE	-----.

Course Objectives (CO):

1. To grow deeper knowledge, understanding, capabilities and attitudes in the context of the programme of study.
2. To investigate more deeply into and synthesise knowledge acquired in previous studies.

	Course Contents	**Hours**
Unit 1	**The dissertation submitted by the student on the topic, already approved by the Departmental Post Graduate Committee (DPGC) shall be according to following guidelines.** The dissertation work report shall be typed on A4 size bond paper. The total number of pages shall not be less than 60. Figures, graphs, annexure etc be as per the requirement. **The report should be written in the standard format.** 1. Title sheet 2. Certificate 3. Acknowledgement 4. List of figures, Photographs/Graphs/Tables 5. Abbreviations. 6. Abstract 7. Contents. 8. Text with usual scheme of chapters. 9. Discussion of the results and conclusions Bibliography (the source of illustrative matter be acknowledged clearly at appropriate place as per IEEE/ASME/Elsevier Format) The students should publish at least one paper in a reputed journal (UGC approved/ SCOPUS Indexed etc.) The student should make presentation in front of Departmental Post Graduate Committee (DPGC) and incorporate the suggestions in the report provided by the committee. The student should undergo plagiarism process of his report. The student has to appear for final viva voce examination in front of panel of experts as appointed by examination section.	---

Course Outcomes (CO): At the end of course students will

1. Design and engage in, an independent and sustained critical investigation and evaluation of a chosen research topic.
2. Systematically identify relevant theory and concepts, relate these to appropriate methodol evidence, apply correct techniques and draw suitable conclusions.
3. Involve in systematic finding and critical review of appropriate and relevant information

resources
5. Present research concepts and contexts clearly and effectively both in writing and orally

APPROVED BY

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