An Autonomous Institute

Shree Warana Vibhag Shikshan Mandal's

Tatyasaheb Kore Institute of Engineering And Technology, Warananagar

NBA Accredited Institute

Department of Electronics & Telecommunication Engineering

Syllabus for T.Y.B.Tech.

B. Tech. In Electronics &Telecommunication Engineering

Syllabus Structure and Curriculum under Autonomy

Tatyasaheb Kore Institute of Engineering and Technology, Warananagar

An Autonomous Institute

Department of Electronics & Telecommunication Engineering

❖ Vision

To become an academy of excellence in technical education and human resource development.

❖ Mission

- To develop engineering graduates of high repute with professional ethics.
- To excel in academics and research through innovative techniques.
- To facilitate the employability, entrepreneurship along with social responsibility.
- To collaborate with industries and institutes of national recognition.
- To inculcate lifelong learning and respect for the environment.

❖ Quality Policy

To promote excellence in academic and training activities by inspiring students for becoming competent professionals to cater industrial and social needs.

Tatyasaheb Kore Institute of Engineering and Technology, Warananagar

An Autonomous Institute

Department of Electronics & Telecommunication Engineering

PROGRAM EDUCATIONAL OBJECTIVES
Graduates will be able:

[1] To excel in technical education and research in Electronics and Telecommunication engineering.

[2] To make the graduate competent with recent technological development in related field.

[3] To enable the graduates to innovate, design and develop new Electronics and Telecommunication systems.

[4] To provide excellent academic environment for life - long learning.

[5] To embed the Professional and ethical approach, effective communication and team work.

PROGRAM OUTCOMES:

PO1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct investigations of complex problems: Use research-based knowledge and research Methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6. **The engineer and 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.

PO7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multi-disciplinary settings.

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PO10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multi-disciplinary environments.

PO12. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES:

After successful Electronics and Telecommunication engineering graduates will be able to:

PSO 1 (Engineering Knowledge and Analysis):
Analyze specific engineering problems relevant to Electronics & Telecommunication Engineering by applying the knowledge of basic sciences, engineering mathematics and fundamentals.

PSO 2 (System Design):
Design Electronics and Telecommunication systems containing devices, software, and hardware using the significant analytical knowledge and modern tools.

PSO 3 (Application of the knowledge on society/environment):
Apply the contextual knowledge of Electronics and Telecommunication Engineering to assess societal, environmental, health, safety, legal and cultural issues with professional ethics and function effectively as an individual or a leader in a team to manage different projects as the process of life- long learning.

SWVSM'S

Tatyasaheb Kore Institute of Engineering and Technology, Warananagar

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Abbreviations

Sr. No.	Acronym	Definition
1	ISE	In-Semester Examination
2	ISE-I	In-Semester Examination-I
3	ISE-II	In-Semester Examination-II
4	ESE	End Semester Examination
5	ISA	In-Semester Assessment (Term Work)
6	L	Lecture
7	T	Tutorial
8	P	Practical
9	CH	Contact Hours
10	C	Credit

Course/ Subject Categories

Sr. No.	Acronym	Definition
1	BSC	Basic Science Course
2	HSC	Humanity Science Course
3	ESC	Engineering Science Course
4	PCC	Professional Core Course
5	OEC	Open Elective Course
6	MC	Mandatory Course
7	PEC	Professional Elective Course
8	PW	Project Work (Mini and Major Project)
9	II	Industrial Internship

Course/ Subject Code

E	T	C	5	0	1
Branch Code			Semester	Course Number	

Course Term work and POE Code

E	T	C	5	0	1	T / P / A
Branch Code			Semester	Course Number		T- Term work P- POE A- Audit Course

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Warananagar

Third Year B. Tech.

In Electronics & Telecommunication Engineering

Syllabus Structure under Autonomous Status of TKIET, Warananagar
2022-23

Tatyasaheb Kore Institute of Engineering and Technology, Warananagar

An Autonomous Institute

Third Year B. Tech. (Electronics & Telecommunication Engg.)

Semester-V

(Implemented from 2022 - 23)

Credit Scheme

Course Code	Category	Course Title	Teaching and CreditScheme					Examination & Evaluation Scheme			
			L	P	T	CH	C	Components	Marks	Min for Passing	
ETC501	ESC	VLSI Design	3	--	--	3	3	ESE	60	24	40
								ISE	40	16	
ETC502	ESC	Microcontrollers	3	--	--	3	3	ESE	60	24	40
								ISE	40	16	
ETC503	ESC	Digital Communication	3	--	--	3	3	ESE	60	24	40
								ISE	40	16	
ETC504	ESC	Electromagnetic Engineering	3	--	--	3	2	ESE	60	24	40
								ISE	40	16	
ETC505	OEC	Open Elective-I*	3	--	--	3	3	ESE	60	24	40
								ISE	40	16	
ETC501P	ESC	VLSI Design Lab	--	2	--	2	1	ISA	25	10	
								POE	50	20	
ETC502P	ESC	Microcontrollers Lab	--	2	--	2	1	ISA	25	10	
								POE	50	20	
ETC503P	ESC	Digital Communication Lab	--	2	--	2	1	ISA	25	10	
ETC504T	ESC	Electromagnetic Engineering Tutorial	--	--	1	1	1	ISA	25	10	
ETC506P	PW	Mini Project-I (ESD Lab)	2	2	--	4	2	ISA	50	20	
								POE	50	20	
--	--	Mandatory Audit Course V: Seminar/ Paper Presentation#	--	--	--	--	--	--	--	-- --	
			17	**8**	**1**	**26**	**20**	**--**	**800**	**--**	

Note: In theory examination, there will be separate passing of ESE and ISE.

*__Open Elective-I__

1. Computer Architecture and Operating System
2. Industrial Automation
3. Optical Communication

Third Year B. Tech.

(Electronics & Telecommunication Engg.)

Fifth Semester Detailed Syllabus

ETC501- VLSI DESIGN

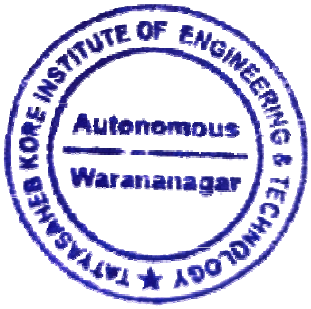
Lectures : 3 Hrs/Week
Credit : 3

Evaluation Scheme
ISE : 40 Marks
ESE : 60 Marks

Course Objectives: The course aims to make the student :	
1	Understand the basic concept of VHDL.
2	Design & implement digital circuits (combinational & sequential) using VHDL
3	Explain students the fundamental concepts of Hardware Description Language and design flow of digital system design.
4	Understand the concept of Programmable Logic Devices.

Course Outcomes:		
COs	**At the end of successful completion of the course the student will be able to**	**Blooms Taxonomy Level**
CO1	Apply Boolean laws/K-Map-method, to reduce a given Boolean function	Apply
CO2	Analyze & realize combinational logic circuits using logic gates and VHDL Codes.	Analyze
CO3	Demonstrate the operation of flip-flops, counters , shift registers Synchronous sequentialmachine using Moore and Mealy machine	Apply
CO4	Design combinational and sequential logic circuits using various description techniques inVHDL	Create

Description:		
This course discusses the principles of VLSI design, which has applications in Embedded systems. It makes students acquainted with use of VHDL coding, design of FSM and Programmable logic devices.		
Prerequisites:	1	Basic Electronics.
	2	Digital Electronics



Course Contents		
Unit No:1	**INTRODUCTION TO VHDL:** Level of abstraction. Need of HDL,VLSI Design flow, Features and capabilities of VHDL, Elements of VHDL (Entity Architecture, Library, Package, and Configuration), Modeling styles in VHDL, Identifiers, operators , Data objects, data types, literals, Delay Models, Concurrent and sequential statement.	**6 Hrs.**
Unit No:2	**COMBINATIONAL LOGIC DESIGN :** Adder, Subtractor, Code converters (binary to gray & gray to binary, BCD to Excess 3 and vice versa, BCD to 7 segment display),Multiplexer and Demultiplexer , Encoder, Priority encoder, Decoder, Comparator , ALU, Barrel shifter. VHDL coding for combinational circuits.	**6 Hrs.**
Unit No:3	**SEQUENTIAL LOGIC DESIGN:** 1-Bit Memory Cell, Latches (SR, JK, D and T), Clocked latches (SR, JK, D and T), flips flop (SR, JK, T and D). Use of preset and clear, Excitation Table for flip flops, and Conversion of flip flops, Timing parameters of FF, Shift registers (SISO, SIPO, PIPO, and PISO). VHDL coding for Sequential circuits.	**8 Hrs.**
Unit No:4	**COUNTERS :** Counter – ripple counters, synchronous counters, Up/down counters, Ring counters, Johnson Counter, MOD-N counter. VHDL coding for Counter circuits.	**5 Hrs.**
Unit No:5	**FINITE STATE MACHINES:** FSM, Moore/Mealy machines, state diagram, state table, state assignment and state reduction,Sequence detector. VHDL coding for FSM.	**5 Hrs.**
Unit No:6	**SEMICONDUCTOR MEMORIES AND PROGRAMMABLE LOGIC DEVICES:** Programmable logic devices: PAL ,PLA,CPLD and FPGA .Logic implementation using Programmable Devices (ROM, PLA)	**7 Hrs.**

Mapping of POs & COs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	If applicable		
													PSO1	PSO2	PSO3
CO1	3	2	1		1									1	
CO2	3	2		1								1			
CO3	3	3	1												2
CO4	2	1													1

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Text Books:	
1	A. Anand Kumar,"Fundamentals of digital circuits",4th edition, PHI publication,2016
2	Stephen Brown and ZvonkoVranesic, "Fundamentals of Digital Logic with VHDL design", Tata Mc-graw Hill

Reference Books:	
1	Wakerly, "Digital Design Principles and Application", Pearson Education
2	M. Morris Mano, " Digital Design", 3rd Edition , Pearson Education
3	Roth John, "Principals of Digital System Design using VHDL", Cengage Learning.
4	R. P. Jain, "Modern digital electronics", 3rd edition, 12th reprint TATA Tata McGraw Hill Publication, 2007

ETC502- MICROCONTROLLERS

Lecture : 3 Hrs/Week
Credit : 3

Evaluation Schemes
ISE : 40 Marks
ESE : 60 Marks

Course Objectives: The course aims to make the student :	
1	Understand fundamentals of 8051 Architecture and Programming.
2	Analyze Real time requirements using ON-Chip resources of 8051.
3	Evaluate need of I/O peripherals to satisfy system design requirements.
4	Develop Embedded 'C' Programs for I/O Peripherals
5	Understand fundamentals of PIC microcontroller architecture and Programming.
6	Analyze Real time requirements using ON-Chip resources of PIC

Course Outcomes:

COs	**At the end of successful completion of the course the student will be able to**	**Blooms Taxonomy Level**
CO1	Describe Architecture of 8051 , write various Programs and Perform experiment using ON-Chip resources of 8051.	Understand
CO2	Write Embedded 'C' Programs for I/O Peripherals.	Apply
CO3	Outline the Architecture of PIC microcontroller and write various Programs	Remember
CO4	Select I/O peripherals to satisfy system design requirements.	Evaluate

Description:

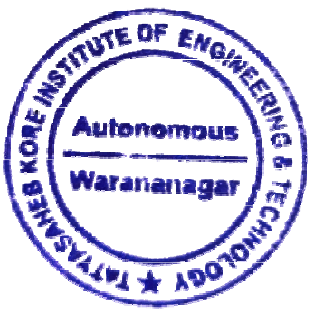
The course has been designed to introduce fundamental principles of embedded systems and robotics. Embedded systems is now a days is everywhere in the field of communication engineering ,home appliances, handheld electronics devises, automobiles ,agriculture etc.

Prerequisites:	1	Digital Electronics and Programming skills.

Course Contents		
Unit No:1	**INTRODUCTION TO MCS51:** Introduction to MCS51Family, Functional Pin out diagram, Architecture, Register Organization, Memory Organization, Reset Circuit, Machine Cycle, Oscillator Circuit, Addressing Modes, Instruction Set, Assembly Language Programming.	**6 Hrs.**
Unit No:2	**HARDWARE OVERVIEW:** Input / Output Ports, Interrupts, Timers/Counters, Serial Communication (Mode-1), (Structure, Related S.F.R and Programming).	**8 Hrs.**
Unit No:3	**INTERFACING & ASSEMBLY LANGUAGE PROGRAMMING:** Keyboard, Seven Segment display, ADC, DAC, stepper motor.	**8 Hrs.**
Unit No:4	**EMBEDDED 'C' PROGRAMMING FOR 8051:** Data types, Programs on Arithmetic & Logical operations, Input / Output Ports, Timer/Counter, Serial communication, ADC, LCD	**8 Hrs.**
Unit No:5	**PIC MICROCONTROLLER:** Overview of PIC 18 family, PIC 18 pin connection, PIC 18 configuration registers, WREG, File registers and SFR, Access bank, Status register, Data formats and directives, PC and program ROM space, RISC architecture, Instruction with default access bank	**6 Hrs.**
Unit No:6	**CLASSIFICATION OF INSTRUCTIONS AND I/O PROGRAMMING:** Arithmetic instruction signed number concepts and arithmetic operations, Logic and Compare instruction, Rotate and data serialization instruction, BCD and ASCII conversion, Branch Instruction and Looping, Call instruction and stack, PIC 18 time delay and instruction pipeline	**8 Hrs.**

Mapping of POs & COs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	If applicable PSO1	PSO2	PSO3
CO1	2	3	1		1									1	
CO2	2	2		1										2	
CO3	3	3	1												
CO4		1				1									1



Text Books:	
1	Muhammad Ali Mazidi, Janice Gillispie, Rolin D. McKinlay , " The 8051 Microcontroller & Embedded Systems Using Assembly and C ", 2nd Edition, Pearson Education.
2	Muhammad Ali Mazidi, Rolin D. McKinlay , Danney Causey "The PIC Microcontroller & Embedded Systems ,Using Assembly and C for PIC18 ", 1st Edition, Pearson Education,

Reference Books:	
1	Kenneth Ayala, "The 8051 Microcontroller" , 3rd Edition , Cengage Learning India Private Limited
2	Ajay V Deshmukh " Microcontrollers ,Theory and applications", Tata McGraw Hill Publication.
3	PIC Microcontroller Data sheets :- Microchips

MOOC / NPTEL Courses:	
	1. NPTEL Course "Microcontroller and Applications" Link of the Course: https://nptel.ac.in/courses/117/104/117104072/ https://nptel.ac.in/courses/108/105/108105102/

ETC503- DIGITAL COMMUNICATION

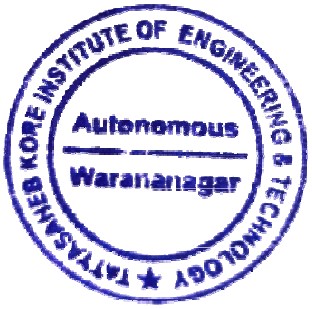
Lectures : 3 Hrs/Week
Credit : 3

Evaluation Scheme
ISE : 40 Marks
ESE : 60 Marks

Course Objectives:	
The course aims to make the student :	
1	Elaborate the different source coding techniques with the help of their block diagrams and function
2	Explain the different digital modulation techniques.
3	Describe the baseband transmission and reception system.
4	Understand the concept of information theory in detail with different coding theorems.

Course Outcomes:		
COs	**At the end of successful completion of the course the student will be able to**	**Blooms Taxonomy Level**
CO1	Understand the basic concept of digital communication system	Understand
CO2	Analyze various digital modulation and coding techniques.	Analyze
CO3	Understand the spread spectrum modulation principles.	Understand
CO4	Solve the problem based on information theory.	Solve

Description:		
This course discusses the principles of digital communication which has applications in different telecommunication systems. It makes students acquainted with use of statistical techniques, source and channel coding, different modulation techniques.		
Prerequisites:	1	Analog Communication
	2	Probability Theory and statistics



Course Contents		
Unit No:1	**DIGITAL SOURCE CODING :** Introduction to Digital Communication System, Sampling, Quantization Pulse Code Modulation(PCM), Differential Pulse Code Modulation (DPCM), Delta Modulation (DM), Adaptive Delta Modulation (ADM), Performance & Comparison of all these techniques	**6 Hrs.**
Unit No:2	**DATA FORMAT & MODULATION TECHNIQUES:** Data formats, Amplitude Shift Keying (ASK), Frequency Shift Keying (FSK), Phase Shift Keying (PSK), Binary Phase Shift Keying (BPSK), Quadrature Phase Shift Keying (QPSK) , Minimum Shift Keying (MSK), Quadrature Amplitude Modulation (QAM), Comparison of all these techniques	**6 Hrs.**
Unit No:3	**BASEBAND TRANSMISSION AND OPTIMUM RECEIVERS:** M-ary Signaling, eye diagram, ISI, scrambler, Unscramble. Optimum Receivers- Matched Filters, Correlation receivers, Optimum detection using ML criteria.	**5 Hrs.**
Unit No:4	**RANDOM SIGNAL THEORY AND SPREAD SPECTRUM:** Discrete random variables, Continuous random variables, Probability Mass Function, Probability Density Function & statistical average, pseudo noise sequence, Discrete Sequence Spread Spectrum, Frequency Hopping Spread Spectrum	**6 Hrs.**
Unit No:5	**INFORMATION THEORY:** information, Entropy, Information Rate, Joint Entropy, Conditional entropy, relation between Joint & Conditional Entropies, Mutual Information: Average Mutual Information, Expression for Mutual information, Relation between Mutual Information & Entropy	**6 Hrs.**
Unit No:6	**CHANNEL CAPACITY AND CODING :** Channel Capacity, Redundancy and Efficiency of channel, Classification of channels, Calculation of channel capacity of channels, Shannon's fundamental theorem, Shannons-Hartley theorem, Shannon Fano Coding, Huffman's Coding	**7 Hrs.**

Mapping of POs & COs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	If applicable		
													PSO1	PSO2	PSO3
CO1	3	2	1		1									1	
CO2	3	2		1											
CO3	3	3	1												2
CO4	2	1													1

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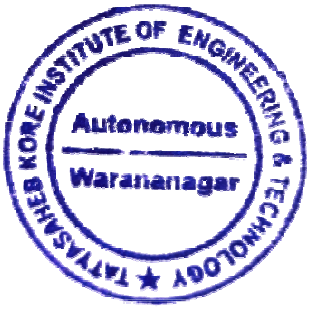
Text Books:	
1	Simon Haykin, “Digital Communication” Jhon Wiley & Sons
2	S.D. Sapre, R. P. Singh, "Communication Systems-Analog and Digital", Tata Mc-Graw Hill, 2nd edition
3	K. Sam Shanmugam, “Digital & Analog Communication” , Wiley India.
4	Muralidhar Kulkarni, K.S. Shivprakasha **,** “Information Theory & Coding”, Wiley (India) Publication 2014

Reference Books:	
1	Wayne Tomasi, “Electronic communications Systems”, 5th edition, Pearson publication
2	John G. Proakis, “Digital Communication”, McGraw Hill Inc 2001.
3	Arijit Saha,Surajit Mandal, “Information Theory, Coding & Cryptography”, Pearson Education, 1st Edition, 2013.

MOOC / NPTEL Courses: 1	
	NPTEL Course on “Digital Communications” Link of the Course: https://nptel.ac.in/courses/108/102/108102096/



ETC504- ELECTROMAGNETIC ENGINEERING

Lectures : 3 Hrs/Week
Credit : 3

Evaluation Scheme
ISE : 40 Marks
ESE : 60 Marks

Course Objectives: The course aims to make the student understand :	
1	The basic mathematical concepts of Vector calculus & co-ordinate systems.
2	Different laws in steady electric & magnetic fields.
3	Apply Maxwell's equations in different forms to Develop wave equations
4	Concepts of electromagnetic waves and transmission lines

Course Outcomes:

COs	**At the end of successful completion of the course the student will be able to**	**Blooms Taxonomy Level**
CO1	Apply the knowledge of vector algebra and co-ordinate system to solve the electromagnetic field problems.	Apply
CO2	Use and apply basics of steady electric and magnetic fields to solve the electrostatic and magneto static problems.	Apply
CO3	Develop field equations from understanding of Maxwell's Equations.	Evaluate
CO4	Solve the transmission line problems and analyze electromagnetic wave propagation in generic transmission line geometries.	Analyze

Description:

The course has been designed to understand the basic mathematical concepts related to electromagnetic vector fields in engineering applications. It aims to establish a firm understanding of the laws of steady electric and magnetic field to obtain solution of problem relating to electric field and magnetic field. Further course deals with application of Maxwell's equations to solutions of problems relating to transmission lines and uniform plane wave propagation.

Prerequisites:	1	Basic laws of physics
	2	Basic knowledge of Scalar and vector
	3	Communication engineering

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Course Contents		
Unit No:1	**VECTOR ALGEBRA:** Review of vector Analysis, Different types of Co-ordinate systems, Basic vector algebra, Line, surface and volume integral, Dot product, Cross product, curl, divergence, Gradient	**6 Hrs.**
Unit No:2	**ELECTROSTATICS FIELDS:** Coulomb's law, electric field intensity, (Numerical Expected), field due to distributed charges (Numerical Expected), Electric Flux density, Gauss's law, divergence theorem, Electrostatic potential, potential gradient, Boundary conditions for electrostatic field..	**6 Hrs.**
Unit No:3	**STEADY MAGNETIC FIELD:** Biot- Savarts law (Numerical Expected), Magnetic field intensity due to infinite straight filament and finite length, field intensity on axis of circular loop (Numerical Expected) Ampere's circuital law, Stroke's Theorem, Magnetic flux density and Vector magnetic potential , Boundary Conditions for magneto static field.	**6 Hrs.**
Unit No:4	**MAXWELL'S EQUATIONS:** Inconsistency of Ampere's law, Faraday's law, Maxwell's equations for static field, time varying field & harmonically varying fields, Comparison of field & circuit theory.	**6 Hrs.**
Unit No:5	**ELECTROMAGNETIC WAVES:** Wave equation for free space and conducting medium, uniform plane wave equation ,general solution of uniform plane wave equation, intrinsic impedance, wave propagation in lossless medium, propagation characteristics of EM waves in free space, conducting medium, good dielectrics and good conductors),Skin depth, Reflection of plane wave, Polarization of wave.	**6 Hrs.**
Unit No:6	**TRANSMISSION LINES:** Characteristic equation, Transmission line equations, Transmission line parameters, Terminated uniform transmission line, Characteristic impedance, propagation constant Reflection coefficient, VSWR, Smith chart, Applications of Smith Chart.	**6 Hrs.**

Mapping of POs & COs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	If applicable		
													PSO1	PSO2	PSO3
CO1	3	1	2										3		
CO2	3		3												
CO3			2	3										2	
CO4		1	2	3											3

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Text Books:	
1	John D. Kraus, “Electromagnetics”, Tata McGraw Hill Publication
2	William Hayt, Buck, “Engineering Electromagnetics”, Tata McGraw Hill Publication.
3	Sadiku, “Elements of Electromagnetics”, 4th edition, Oxford University Press

Reference Books:	
1	Jordan & Balmain, “Electromagnetic Fields & Radiation Systems”, 2nd edition, PHI
2	G.S.N. Raju, “Electromagnetic field theory & Transmission lines”, 1st edition, Pearson Education

MOOC / NPTEL Courses:	
	1. NPTEL Course “Transmission Lines and EM Waves -Video course” Prof. R.K. Shevgaonkar Link of the Course: https://nptel.ac.in/courses/117/101/117101056/ 2. NPTEL Course on “Electromagnetic theory - Video course” Dr. Pradeep Kumar K Link of the Course: https://nptel.ac.in/courses/108/104/108104087/ 3. David Staelin. 6.013 Electromagnetics and Applications. Spring 2009. Massachusetts Institute of Technology: MIT Open Course Ware Link:https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-013-electromagnetics-and-applications-spring-2009/index.htm#

ETC505- COMPUTER ARCHITECTURE AND OPERATING SYSTEM*

Lectures : 3 Hrs/Week
Credit : 3

Evaluation Scheme
ISE : 40 Marks
ESE : 60 Marks

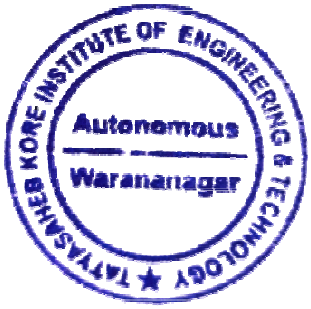
Course Objectives: The course aims to make the student understand :	
1	The structure, function and characteristics of computer systems
2	Various data transfer techniques in digital computer and the I/O interfaces.
3	The performance of various classes of Memories and Relate to arithmetic for ALU implementation
4	The basics of hardwired and micro-programmed control of the CPU, pipelined architectures , Hazards and Superscalar Operations

Course Outcomes:		
COs	**At the end of successful completion of the course the student will be able to**	**Blooms Taxonomy Level**
CO1	Demonstrate computer architecture concepts related to design of modern processors, memories and I/Os.	Apply
CO2	Analyze the performance of commercially available computers.	Analyze
CO3	Develop logic for assembly language programming	Create
CO4	Determine and implement memory requirement.	Apply

Description:

The course has been designed to introduce fundamental principles of Computer architecture and Operating System commonly used in engineering applications. It aims to establish a firm understanding of the basic computer architecture and different operating systems. The course deals with the basic study of architecture of computer and operating systems. The course focuses on design of arithmetic logic unit, processor design and different operating systems like windows, Linux..

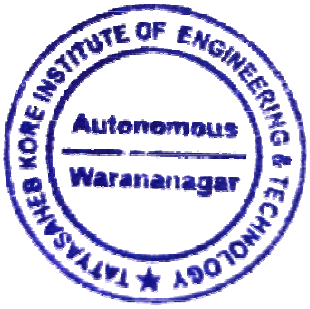
Prerequisites:	1	Basics of Computer Hardware and software



Course Contents		
Unit No:1	**INTRODUCTION:** **Arithmetic Unit Design..** Fixed point arithmetic: Byte and word , Adders, Subtracters, Multipliers: Booth's algorithm, Robertson's algorithms, combinational array multiplier. 32/64 bit floating point arithmetic: (IEEE 754 format), introduction to pipeline processing	**8 Hrs.**
Unit No:2	**PROCESSOR DESIGN:** Introduction, Hard wired control, , GCD processor Design, Design of Control unit for accumulator based CPU, DMA controller, Two's compliment Multiplier control unit design, , Micro programmed control ,Micro Instruction format	**6 Hrs.**
Unit No:3	**FUNDAMENTALS OF OS AND SYSTEM SOFTWARE:** Overview of all system software Operating system- I/O Manager- Assembler- Compiler- Linker- Loader, OS services and components, multitasking, multiprogramming, time sharing, buffering, spooling	**4 Hrs.**
Unit No:4	**PROCESS AND THREAD MANAGEMENT:** Concept of process and threads , process states process management context, switching interaction between processes and OS , multithreading.	**6 Hrs.**
Unit No:5	**CONCURRENCY CONTROL:** Concurrency and race conditions, mutual exclusion requirements , s/w and h/w solutions, semaphores, monitors, classical IPC problem and solutions, Dead locks -characterization , detection ,recovery, avoidance and prevention.	**7 Hrs.**
Unit No:6	**MEMORY MANAGEMENT:** Memory partitioning , swapping, paging, segmentation, virtual memory - Concepts, Overlays, Demand paging, Performance of demand paging , page replacement algorithm, Allocation algorithms	**6 Hrs.**

Mapping of POs & COs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	If applicable		
													PSO1	PSO2	PSO3
CO1	3	2	1		1									1	
CO2	3	2		1											
CO3	3	3	1												2
CO4	2	1													1



Text Books:	
1	J.P. Hayes “Computer Architecture and Organization” McGraw Hill publication.
2	Silberschatz & Galvin,**”** Operating System Concepts**”,**VIII th Wiley 2014.

Reference Books:	
1	William Stallings ,**”Operating System: Internals & Design Principles’**, Prentice Hall of India.
2	Milman Milenkovic,” **Operating systems, concept &design”**
3	Dr.M.Usha ,T.S.Srikanth” Computer System Architecture and Organization

ETC505- INDUSTRIAL AUTOMATION*

Lectures : 3 Hrs/Week
Credit : 3

Evaluation Scheme
ISE : 40 Marks
ESE : 60 Marks

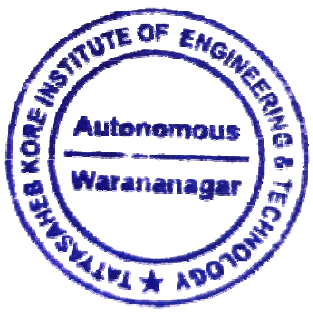
Course Objectives: The course aims to make the student understand :	
1	The fundamentals and importance of industrial automation systems
2	PLC program for an automatic control system and its applications.
3	The mechanism, architecture, working principles and applications of DCS and SCADA..

Course Outcomes:		
COs	**At the end of successful completion of the course the student will be able to**	**Blooms Taxonomy Level**
CO1	Demonstrate the working of PLC,DCS and SCADA	Apply
CO2	Apply the concept; analyze the importance and application of industrial automation.	Analyze
CO3	Compile ideas into new different solutions with the help of programming languages.	Evaluate
CO4	Apply the knowledge of automation for design and development of Graphical user interface for different process..	Create

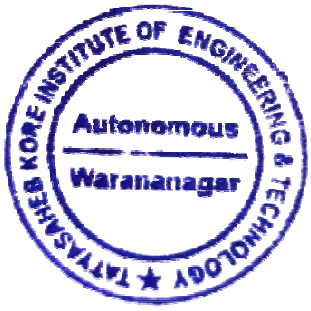
Description:

The course has been designed to understand importance of automation in industry. It aims to learn PLC programming and develop for automatic control system in industry. The course focus is on understanding architecture, working principles and various applications of SCADA and DCS systems in industry as well as development of graphical user interface and various process windows for different process.

Prerequisites:	1	Open loop and closed loop control system
	2	Digital system
	3	Basic programming



Course Contents		
Unit No:1	**INTRODUCTION TO PLC:** Automation: fundamentals of industrial automation, need and role of automation, evolution of automation. PLC introduction :types of processes, comparison, evolution of PLC, definition, functions, advantages, Architecture, DI-DO-AI-AO examples and ratings, I/O module, working of PLC, scan time, Installation of PLC, Rack installation, Grounding and shielding, physical, electrical, maintenance..	**7 Hrs.**
Unit No:2	**PLC PROGRAMMING:** Choosing PLC for application, Types and Specifications. PLC programming: Development of Relay Logic Ladder Diagram, Introduction to PLC Programming, Programming devices and languages as per IEC 61131-3 like IL, ST, FBD, CFC, SFC, PLC Timers and Counters, Troubleshooting, Fault diagnosis techniques. Installation and Troubleshooting	**7 Hrs.**
Unit No:3	**PLC INTERFACING:** PID Control using PLC, PID instruction. PLC Interface to Hydraulic/Pneumatic circuits, solid-state devices, Need of interfacing, PLC Selection, PLC interface to temperature control loop.	**5 Hrs.**
Unit No:4	**SCADA SYSTEM:** SCADA Concept of SCADA systems, Programming techniques for :Creation of pages, Sequencing of pages, Creating graphics & animation, Dynamos programming with variables, Trending, Historical data storage& Reporting, Alarm management, reporting of events and parameters. Comparison of different SCADA packages	**7 Hrs.**
Unit No:5	**INTRODUCTION TO DCS:** DCS Introduction, Location of DCS in Plant, functions, advantages and limitations, Comparison of DCS with PLC, DCS components/ block diagram, Architecture, Functional requirements at each level, Database management, Latest trends and developments of DCS.	**6 Hrs.**
Unit No:6	**DCS HARDWARE:** Layout of DCS, Controller Details, Redundancy, I/O Card Details, Junction Box and Marshalling Cabinets, Operator Interface, Workstation Layout, different types of control panels, types of Operating Station, Advantages, Overview of Programming Languages, Device Signal Tags, Power supply cards details, various display configurations..	**6 Hrs.**



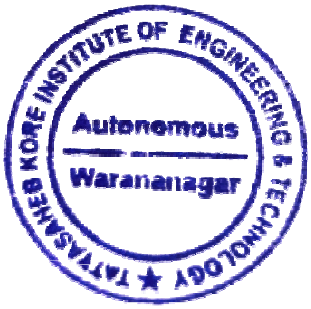
Mapping of POs & COs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	If applicable		
													PSO1	PSO2	PSO3
CO1	2												2		
CO2	2	3	1										3	3	
CO3				1	3	1									
CO4					3	1									3

Text Books:	
1	John Webb, "Programmable Logic Controllers", Prentice Hall of India
2	Gary Dunning, "Introduction to Programmable Logic Controllers", Delmar Thomson Learning..
3	Popovik -Bhatkar, "Distributed Computer Control for Industrial Automation", Dekkar Publications.
4	S. K. Singh, "Computer Aided Process Control", Prentice Hall of India
5	Krishna Kant, "Computer Based Process Control", Prentice Hall of India.

Reference Books:	
1	Richard Cox, "Programmable Controllers", International Thomson Computer Press
2	U B. G. Liptak, "Instrument Engineer"s Handbook – Process Software and Digital Network", CRC Press.

MOOC / NPTEL Courses: 1	
	1. NPTEL Course **"Sensors and Actuators"** Link of the course: **https://nptel.ac.in/courses/108/108/108108147/**



ETC505- OPTICAL COMMUNICATION*

Lectures	**:**	3 Hrs/Week	**Evaluation Scheme**
Credit	**:**	3	**ISE : 40 Marks**
			ESE : 60 Marks

Course Objectives: The course aims to make the student understand :	
1	The basics optical communication along with optical fiber structure and light propagating mechanisms in detail.
2	The signal degradation mechanisms
3	Explain the construction and working of optical sources and detectors.
4	Describe the basics optical communication along with optical fiber structure and light propagating mechanisms in detail.

Course Outcomes:

COs	**At the end of successful completion of the course the student will be able to**	**Blooms Taxonomy Level**
CO1	Explain the different modes of propagation in an optical fiber.	Understand
CO2	Classify the construction and characteristics of optical sources and detectors.	Analyze
CO3	Examine the losses and propagation characteristics of an optical signal.	Evaluate
CO4	Analyze system performance of optical communication systems.	Analyze

Description:

Basic knowledge of Optical fiber. optical fiber structure. Transmission characteristics of optical fiber Structures and Wave guiding fiber .Study of Optical Sources ,Optical Receiver To Acquire knowledge Advances in Optical Fiber System.

Prerequisites:	1	Physics, Optoelectronics

Course Contents		
Unit No:1	**OVERVIEW OF OPTICAL FIBER COMMUNICATION:** Motivation for light wave communication, Basic Network Information Rates, The evolution of Optic System, Elements of Optical Fiber Transmission Link, optical spectral band, The nature of Light, Basic Optical Laws and Definitions, Single Mode Fibers, Graded Index fiber structures.	**6 Hrs.**
Unit No:2	**OPTICAL FIBERS: STRUCTURES AND WAVE GUIDING:** Optical Fiber Modes and Configurations, Mode theory for waveguides, Fiber Materials, Fiber Optic cables.	**6 Hrs.**
Unit No:3	**TRANSMISSION CHARACTERISTICS OF OPTICAL FIBERS:** Attenuation, material absorption losses, Scattering losses, bending losses, dispersion, polarization, nonlinear effects.	**8 Hrs.**
Unit No:4	**OPTICAL SOURCES:** Semiconductor Physics, Light Emitting Diodes (LED),Laser Diodes, Light Source , linearity, Modal, Partition and Reflection Noise, Reliability Consideration.	**7 Hrs.**
Unit No:5	**OPTICAL RECEIVER:** Physical Principal of Photodiodes, Photo detector Noise, Detectors Response Time, Structure for InGaAsAPDs, Temperature effect of Avalanche Gain, Comparison of Photo detectors , Fundamental Receiver Operation, Digital Receiver Performance	**7 Hrs.**
Unit No:6	**ADVANCES IN OPTICAL FIBER SYSTEM:** Operational Principles of WDM, Passive Components, Tunable Sources, Tunable Filters, optical switching, SONET/SDH, Performance of WDM+EDFA Systems, optical CDMA	**8 Hrs.**

Mapping of POs & COs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	If applicable		
													PSO1	PSO2	PSO3
CO1	3	2	1		1									1	
CO2	3	2		1											
CO3	3	3	1												2
CO4	2	1													1

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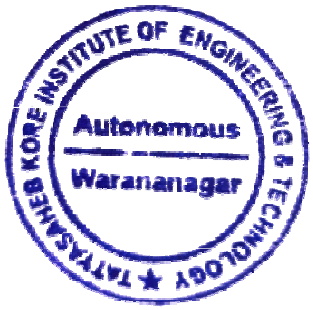
Text Books:	
1	Gerd Keiser, “Optical Fiber Communication”, 5th Edition, Tata Mcgraw Hill Publication.

Reference Books:	
1	Senior, “Optical Communication”, 3rd Edition, Pearson Education.
2	Agarwal, “Optical Fiber Communication”, 3rd edition, Wiley India.
3	Ramaswamy, “Optical Networks” , Elsevier India
4	R. P. Khare, “Fiber optics and optoelectronics”, Oxford University Press
5	Anuradha, “Optical fiber and laser principles and applications”, New Age Publications.
6	Dr .R .K .Singh “Fiber optic communication systems”, Willey India.



ETC501P- VLSI DESIGN LAB

Practical : 2 Hrs/Week
Credit : 1

Evaluation Scheme
ISA : 25 Marks
POE : 50 Marks

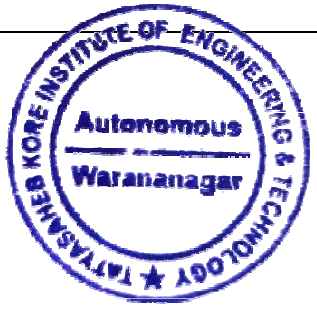
Course Objectives: The course aims to make the student understand :	
1	Understand the basic concept of VHDL.
2	Design & implement digital circuits (combinational & sequential) using VHDL
3	Explain students the fundamental concepts of Hardware Description Language and design flow of digital system design.
4	Understand the concept of Programmable Logic Devices.

Course Outcomes:		
COs	**At the end of successful completion of the course the student will be able to**	**Blooms Taxonomy Level**
CO1	Apply Boolean laws/K-Map-method, to reduce a given Boolean function	Understand
CO2	Design & realize combinational logic circuits using logic gates and VHDL Codes.	Analyze
CO3	Demonstrate the operation of flip-flops, counters , shift registers Synchronous sequentialmachine using Moore and Mealy machine	Understand
CO4	Design combinational and sequential logic circuits using various description techniques inVHDL	Solve

Description:

This course discusses the principles of VLSI design, which has applications in Embedded systems. It makes students acquainted with use of VHDL coding, design of FSM and Programmable logic devices.

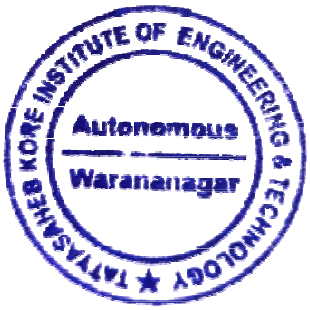
Prerequisites:	1	Basic Electronics.
	2	Digital Electronics



List of Experiments			
Minimum 08 experiments:			
Sr. No.	**Name of the experiment**	**Hrs.**	**Cognitive levels of attainment as per Bloom's**
1	Design and simulate half adder and full adder using VHDL.	2	Simulation
2	Design and simulate Multiplexer and De-multiplexer using VHDL	2	Simulation
3	Design and simulate Comparator using VHDL.	2	Simulation
4	Design and simulate 4 to 2 Encoder using VHDL.	2	Simulation
5	Design and simulate 3to8 decoder using VHDL.	2	Simulation
6	Design and simulate flip-flops using VHDL.	2	Simulation
7	Design and simulate 4-bit up-down counter using VHDL.	2	Simulation
8	Design and simulate Shift register using VHDL.	2	Simulation
9	Design and simulate Sequence detector using VHDL.	2	Simulation
10	Mini project based on above syllabus.	2	Measurement

Mapping of POs & COs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	If applicable		
													PSO1	PSO2	PSO3
CO1	3	2	1		1									1	
CO2	3	2		1								1			
CO3	3	3	1												2
CO4	2	1													1



ETC502P- MICROCONTROLLERS LAB

Practical : 2 Hrs/Week
Credit : 1

Evaluation Scheme
ISA : 25 Marks
POE : 50 Marks

Course Objectives: The objective of the course is to:	
1	Understand fundamentals of 8051 and PIC microcontroller Programming.
2	Analyze Real time requirements using ON-Chip resources of 8051.
3	Evaluate need of I/O peripherals to satisfy system design requirements.
4	Develop Embedded 'C' Programs for I/O Peripherals

Course Outcomes:

COs	**At the end of successful completion of the course the student will be able to**	**Blooms Taxonomy Level**
CO1	Write various Programs and Perform experiment using ON-Chip resources of 8051.	Apply
CO2	Develop Embedded 'C' Programs for I/O Peripherals.	Apply
CO3	Describe Architecture of PIC microcontroller and write various Programs	Understand
CO4	Select I/O peripherals to satisfy system design requirements.	Evaluate

Description:

This has been designed to have hands on 8051 and PIC microcontroller programming.

Prerequisites:	1	Digital Electronics
	2	Programming
	3	Use of IDE

List of Experiments			
Minimum 08 experiments:			
Sr. No.	**Name of the experiment**	**Hrs.**	**Cognitive levels of attainment as per Bloom's**
1	Arithmetic & Logical operations using 8051	2	Understand
2	Data transfer operations using 8051	2	Understand
3	Interface Stepper motor using 8051	2	Understand, Apply
4	Interface relay using 8051	2	Understand, Apply
5	Interface 7 segment display using 8051	2	Understand, Apply
6	Interface LCD display using 8051	2	Understand, Apply
7	Use of Timer & counter operation in 8051 using Embedded C	2	Analysis
8	Interface LCD to 8051 using Embedded C	2	Knowledge
9	Serial Communication with 8051 using Embedded C	2	Knowledge
10	Develop logic in assembly programming to perform 8/16 bit arithmetic operations using PIC Microcontroller	2	Understand
11	Develop logic in assembly programming to perform block transfer operation using PIC Microcontroller	2	Understand
12	Develop logic in assembly programming to perform program memory table read operations.	2	Understand

Mapping of POs & COs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	If applicable		
													PSO1	PSO2	PSO3
CO1	1			1	2				1		2				1
CO2	1	1									2		3		
CO3	2	2			2									3	
CO4		2	2	3					1						

ETC503P- DIGITAL COMMUNICATION LAB

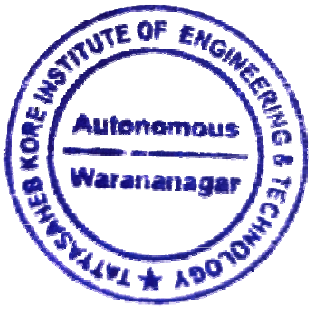
Practical : 2 Hrs/Week
Credit : 1

Evaluation Scheme
ISA : 25 Marks

Course Objectives: The course aims to :	
1	Elaborate the different source coding techniques with the help of their block diagrams and function
2	Explain the different digital modulation techniques.
3	Describe the baseband transmission and reception system.
4	Understand the concept of information theory in detail with different coding theorems.

Course Outcomes:		
COs	**At the end of successful completion of the course the student will be able to**	**Blooms Taxonomy Level**
CO1	Understand the basic concept of digital communication system	Understand
CO2	Analyze various digital modulation and coding techniques.	Analyze
CO3	Understand the spread spectrum modulation principles.	Understand
CO4	Solve the problem based on information theory.	Solve

Description:		
This course discusses the principles of digital communication which has applications in different telecommunication systems. It makes students acquainted with use of statistical techniques, source and channel coding, different modulation techniques.		
Prerequisites:	1	Analog Communication
	2	Probability Theory and statistics



List of Experiments			
(Minimum 08 experiments + 01 Mini Project compulsory):			
Sr. No.	**Name of the experiment**	**Hrs.**	**Cognitive levels of attainment as per Bloom's**
1	Study of Pulse Code Modulation and Demodulation.	2	Knowledge
2	Study of Delta Modulation and Demodulation.	2	Knowledge
3	Study of Adaptive Delta Modulation and Demodulation.	2	Knowledge,
4	Perform Amplitude Shift Keying technique and Demodulation.	2	Knowledge, Evaluation
5	Perform Frequency Shift Keying technique and Demodulation.	2	Knowledge, Evaluation
6	Perform Phase Shift Keying technique and Demodulation.	2	Analysis, Evaluation
7	Write a MATLAB/Simulink program to calculate mean, variance and standard deviation for random variables.	2	Simulation
8	Write a MATLAB/Simulink program togenerate ASK, FSK and PSK waveforms.	2	Simulation
9	Study of Eye Diagram using oscilloscope	2	Study
10	Measurement of bit error rate	2	Measurement

Mapping of POs & COs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	If applicable		
													PSO1	PSO2	PSO3
CO1	1			1	2				1		2	1	2		
CO2	1	1									2	1			
CO3	2	2			2							2		3	
CO4		2	2	3					1						

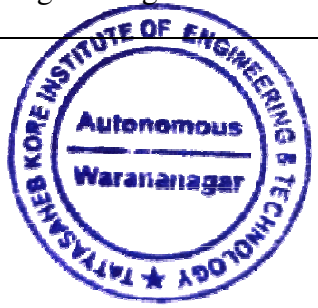
ETC504T- ELECTROMAGNETIC ENGINEERING TUTORIAL

Tutorial	**:** 1 Hrs/Week	**Evaluation Scheme**	
Credit	**:**	**ISA**	**:** 25 Marks

Course Objectives:	
The course aims to make the student understand :	
1	The basic mathematical concepts of Vector calculus & co-ordinate systems.
2	Different laws in steady electric & magnetic fields.
3	Apply Maxwell's equations in different forms to Develop wave equations..
4	Concepts of electromagnetic waves and transmission lines

Course Outcomes:		
COs	**At the end of successful completion of the course the student will be able to**	**Blooms Taxonomy Level**
CO1	Apply the knowledge of vector algebra and co-ordinate system to solve the electromagnetic field problems.	Understand
CO2	Use and apply basics of steady electric and magnetic fields to solve the electrostatic and magneto static problems.	Analyze
CO3	Develop field equations from understanding of Maxwell's Equations..	Evaluate
CO4	Solve the transmission line problems and analyze electromagnetic wave propagation in generic transmission line geometries.	Understand

Description:		
The course has been designed to understand the basic mathematical concepts related to electromagnetic vector fields in engineering applications. It aims to establish a firm understanding of the laws of steady electric and magnetic field to obtain solution of problem relating to electric field and magnetic field. Further course deals with application of Maxwell's equations to solutions of problems relating to transmission lines and uniform plane wave propagation. .		
Prerequisites:	1	Basic laws of physics
	2	Basic knowledge of Scalar and vector.
	3	Communication engineering



Tutorials:	
Sr. No.	**Title of Tutorial**
1	Vector analysis, problems on gradient, divergence and curl
2	Numerical on Columbus law
3	Electric flux density calculations due to point charge, line charge ,surface charge
4	Biot- savart law-problems to find magnetic field intensity due to infinite filament, finite filament etc
5	Maxwell's equations statements and numerical.
6	Field theory and circuit theory comparison
7	Deriving wave equations for free space and conducting media and problems
8	Transmission line parameters, VSWR calculations and Smith chart

ETC506P- MINIPROJECT-I (ESD LAB)

Theory	**:**	2 Hrs/Week	**Evaluation Scheme**
Practical	**:**	2 Hrs/Week	**ISA : 50 Marks**
Credit	**:**	2	**POE : 50 Marks**

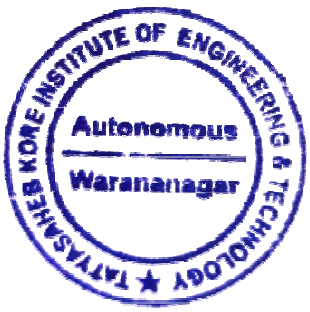
Course Objectives: The objective of the course is to:	
1	To understand basic concepts of electronics system design.
2	To understand concepts of electronic circuits like DVM,PLL and frequency measurements with their design aspects.
3	To understand the different topology and working of switched mode power supply.
4	To implement mini projects based on knowledge of designing of electronics systems

Course Outcomes:		
COs	**At the end of successful completion of the course the student will be able to**	**Blooms Taxonomy Level**
CO1	Identify the key design parameters and select specific electronic components for building the desired electronic system.	Remember
CO2	Design the electronic systems - DVM, PLL and frequency measurements for the given specifications	Create
CO3	Examine Switched mode power supply using given specifications.	Evaluate
CO4	Simulate the circuits using software tools like Proteus	Understand

Description:

The course is designed to understand the "Product Development Process" including budgeting through Mini Project. And to plan for various activities of the project and distribute the work amongst team members. Another objective is to inculcate electronic hardware implementation skills by Learning PCB artwork design using an appropriate EDA tool which will Imbibe good soldering and effective trouble-shooting practices.

Prerequisites:	1	Fundamentals of Electronics, Electronics Devices and Circuits, Linear Integrated Circuits.



Course Contents		
Unit No:1	Digital Voltmeter and PLL: Design of 4-digit numeric display circuit, Design of 3 ½ digit DVM, Study of IC 7107.	**4 Hrs.**
Unit No:2	Design of digital phase locked loops CD4046. Application of PLL - to design frequency multiplier and frequency synthesizer	**3 Hrs.**
Unit No:3	Frequency Measurement: IC555 based frequency generation, Frequency measurement using IC7190 and IC 74C926	**4 Hrs.**
Unit No:4	Design of switch mode power supply: SMPS topologies step down and step up. SMPS controller ICs: 3524 Design of SMPS for industrial applications: battery charger, microcontroller power supply (+5, + - 12V, +24V), design should include selection of power devices and filter design	**3 Hrs.**

Text Books:	
1	Electronics System Design – Mr. S.R. Dhotre, Mahalaxmi Publications
2	Electronic Product design- Kaduskar, Wiley, 2nd edition
3	Operation Amplifier & LIC–Ramakant Gaikwad, Pearson
4	Data sheets of IC7107, PLL 4046, IC7190, SMPS 3524

List of Experiments

(Minimum 08 experiments + 01 Mini Project compulsory):

Sr. No.	Name of the experiment	Hrs.	Cognitive levels of attainment as per Bloom's
1	Design of 3½ digit DVM using IC7107	2	Knowledge
2	Design of Frequency multiplier using IC PLL-4046	2	Knowledge
3	Design of IC555 to generate the signal of desired frequency	2	Knowledge, Application
4	DesignofdecadecounterusingIC7190.	2	Knowledge, Analysis
5	Design Frequency measurement using IC 7190	2	Knowledge
6	Design Frequency measurement using IC74C926	2	Analysis
7	Design of stepup/stepdownSMPSusingIC3524.	2	Analysis
8	Simulate design of DVMIC7107inproteussoftware.	2	Knowledge, Evaluation
9	Simulate design of frequency measurement using IC 7190 in proteus software.	2	Knowledge, Analysis

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Mapping of POs & COs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	If applicable		
													PSO1	PSO2	PSO3
CO1	2						1						3		
CO2		1		3										3	
CO3					2	3								3	
CO4			2												3

Member Secretary

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TATYASAHEB KORE INSTITUTE OF ENGINEERING & TECHNOLOGY
Autonomous
Warananagar

Third Year B. Tech.

(Electronics & Telecommunication Engg.)

Sixth Semester Detailed Syllabus

Tatyasaheb Kore Institute of Engineering and Technology, Warananagar

An Autonomous Institute

Third Year B. Tech. (Electronics & Telecommunication Engg.)

Semester-VI

(Implemented from 2022 - 23)

Credit Scheme

Course Code	Category	Course Title	Teaching and CreditScheme					Examination & Evaluation Scheme			
			L	P	T	CH	C	Components	Marks	Min for Passing	
ETC601	ESC	Signal Processing	3	--	--	3	3	ESE	60	24	40
								ISE	40	16	
ETC602	ESC	Power Electronics	3	--	--	3	3	ESE	60	24	40
								ISE	40	16	
ETC603	ESC	Antenna & Wave Propagation.	4	--	--	4	4	ESE	60	24	40
								ISE	40	16	
ETC604	ESC	Embedded Systems	3	--	--	3	3	ESE	60	24	40
								ISE	40	16	
ETC605	OEC	Open Elective-II**	3	--	--	3	3	ESE	60	24	40
								ISE	40	16	
ETC602P	ESC	Power Electronics Lab	--	2	--	2	1	ISA	25	10	
								POE	50	20	
ETC603P	ESC	Antenna & Wave Propagation. Lab.	--	2	--	2	1	ISA	25	10	
								POE	50	20	
ETC604P	ESC	Embedded Systems Lab	--	2	--	2	1	ISA	25	10	
								POE	50	20	
ETC606P	PW	Mini Project-II	1	2	--	3	1	ISA	25	10	
								POE	50	20	
Mandatory Audit Course VI: Any one Extracurricular Activity participation such as Sport/Cultural/ Social etc. (No semester bounding to Complete)##			-	--	--	--	--	--	--	--	
			17	**08**	**00**	**25**	**20**	**--**	**800**	--	

Note: In theory examination, there will be separate passing of ESE and ISE.

****Open Elective-II**

1. Industrial and Financial Management
2. Mobile Technology
3. Computer Network

ETC601- SIGNAL PROCESSING

Lectures : 4 Hrs/Week
Credit : 4

Evaluation Scheme
ISE : 40 Marks
ESE : 60 Marks

Course Objectives: The course aims to make the student understand :	
1	To understand basic signals and systems. and their representation
2	To analyze signals using Fourier transform
3	To design digital filter
4	To analyze signals using Z-transform

Course Outcomes:		
COs	**At the end of successful completion of the course the student will be able to**	**Blooms Taxonomy Level**
CO1	Demonstrate use of signals and systems	Understand
CO2	Calculate Fourier transform for analysis of CT & DT signals	Apply
CO3	Design digital filter	Create
CO4	Examine the signals using Z-transform	Analyze
CO5	Outline the systems	Remember

Description:

The course has been designed to introduce fundamental principles of signal processing. It aims to establish a firm understanding of basic signals and systems used for processing of signals. The course deals with the CT and DT signal analysis and digital signal processing.

Prerequisites:	1	Engineering Mathematics

Course Contents		
Unit No:1	**INTRODUCTION TO SIGNALS AND SYSTEMS:** Continuous time and discrete time signals, types and properties of signals. Basic signals, Basic operations on signals. System Representation, properties of systems : CT and DT , system with and without memory, causal , non-causal, linear , nonlinear, Time invariant , time variant systems, Stability and Impulse response representation, convolution integral , convolution sum, properties of convolution .	**8 Hrs.**
Unit No:2	**FOURIER TRANSFORM:** Fourier Transform of CT and DT signals, Properties of Fourier Transform, Discrete Time Fourier Transform , Discrete Fourier Transform , Inverse Discrete Fourier Transform(IDFT): Direct method, DFT using Twiddle factor, Properties.	**8 Hrs.**
Unit No:3	**FAST FOURIER TRANSFORM ALGORITHMS:** Computational Complexity of DFT, Fast Fourier transform algorithms – Radix -2 DIT and DIF for DFT and IDFT computations, Circular convolution.	**6 Hrs.**
Unit No:4	**FILTER DESIGN:** Characteristic of FIR filter, properties of FIR filter, Fourier series method, frequency sampling, windowing method. IIR filter, Analog filters approximations, mapping of S-plane to Z-plane, Design of IIR using Impulse Invariance Method, Bilinear Transformation method.	**8 Hrs.**
Unit No:5	**Z TRANSFORM:** Introduction of Z-transform, ROC, properties of ROC, Unilateral Z-transform, properties of Z transform, Inverse Z-transform: long division method, PFE method, residue method.	**6 Hrs.**
Unit No:6	**SYSTEM REALIZATION:** Continuous time system representation by differential equation, discrete time system representation by difference equation , transfer function in Z-domain, Realization of discrete time systems by Direct from I and Direct Form II	**6 Hrs.**

Mapping of POs & COs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	If applicable		
													PSO1	PSO2	PSO3
CO1	3	2	1		1									1	
CO2	3	2		1											
CO3	3	3	1												2
CO4	2	1													1
CO5	2	1	3										2	1	

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Text Books:	
1	S. Palani, “ Signals and Systems”, Ane Books Pvt. Ltd
2	P. Ramesh Babu, R. Ananda Natarajan, “ Signals and Systems ” 4th Edition, SCITECH publication
3	P. Ramesh Babu, “Digital Signal Processing” , SciTech Publication
4	Salivahanam, A Vallavaraj, C. Guanapriya, “Digital Signal Processing”, Tata McGraw Hill Publication.

Reference Books:	
1	Alan Oppenheim, Schafer, “Digital Signal Processing ”, PHI Publication
2	John G Prokis, Manolakis, “Digital Signal Processing Principles, Algorithms and Application”, Pearson Education publication

MOOC / NPTEL Courses: 1	
	1. NPTEL Course on “**Digital Signal Processing**” **Link** of the Course: **https://nptel.ac.in/courses/117/102/117102060/** **2.** NPTEL Course on “**Digital Signal Processing**” **Link** of the Course: **https://nptel.ac.in/courses/108/105/108105055/**

ETC602- POWER ELCTRONICS

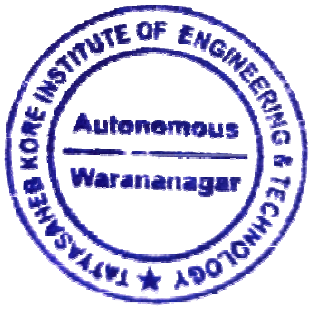
Lectures : 3Hrs/Week
Credit : 3

Evaluation Scheme
ISE : 40 Marks
ESE : 60 Marks

Course Objectives:	
The course aims to make the student understand :	
1	Explain the working of modern power semiconductor devices and their applications
2	Explain the working of power converter circuits like controlled rectifier, inverter, AC voltage controller and chopper and provide the knowledge of performance parameters of converters in the analysis of their performance
3	Explain the use of different power control techniques like converters, choppers, inverters and cyclo converters to control the speed of DC motors .
4	Illustrate to choose an appropriate power electronic circuit and a power semiconductor device while designing an electrical power control system.

Course Outcomes:		
COs	**At the end of successful completion of the course the student will be able to**	**Blooms Taxonomy Level**
CO1	Explain the working of power semiconductor devices such as SCR, GTO, Power MOSFET and IGBT.	Understand
CO2	Analyze the performance of controlled rectifiers, DC to DC converters, Inverters, AC to AC converter.	Analyze
CO3	Evaluate the performance parameters of controlled rectifier, DC to DC converter, DC to AC converter and AC to AC converter.	Evaluate
CO4	Analyze the speed control techniques/ methods for AC and DC motors.	Analyze

Description:		
This course provides basics of power electronics devices with switching on/off technologies. It also deals with power converters such as AC to DC , DC to DC and DC to AC with their analysis and performance parameters. Gate driver circuits are also discussed		
Prerequisites:	1	Basic knowledge of DC-AC circuits ,semiconductor devices theory , linear algebra.



Course Contents		
Unit No:1	**POWER DEVICES :** Construction and V-I Characteristics, Dynamic Characteristics during turn on, turn off of SCR , Series and parallel connections of SCRs, SCR protections dv/dt, di/dt, over voltage and over current protection. Construction, working, & V-I Characteristics of Diac, Triac, GTO, Power MOSFET and IGBT.	**8 Hrs.**
Unit No:2	**SCR TURN ON-OFF METHODS :** **SCR Turn ON Methods(firing circuits)** : Study of single phase firing circuits using UJT, PUT, Diac and Triac triggering circuits, Cosine based firing ,Need of Isolation. Pulse transformer & Opto-coupler based isolation techniques. **SCR Turn OFF Methods**-Natural Commutation and Forced Commutation, Study of different commutation circuits [Class A to Class E]	**6 Hrs.**
Unit No:3	**CONTROLLED RECTIFIERS :** Single Phase Half wave, Full wave, Half controlled and Full controlled converters with R & RL Load, effect of Freewheeling Diode. Calculations of performance parameters and Numerical expected	**8 Hrs.**
Unit No:4	**INVERTERS :** Principle and operation of single phase half bridge and full bridge inverters, Voltage control techniques, harmonic elimination methods -PWM Technique.	**8 Hrs.**
Unit No:5	**DC TO DC CONVERTERS:** Basic principles of chopper, time ratio control and current limit control techniques, voltage commutated chopper circuit, Jones chopper, Morgan's chopper, step-up chopper and AC chopper. Applications of choppers	**6 Hrs.**
Unit No:6	**DC AND AC DRIVES :** **DC Drives**: Basic characteristics of DC motor, operating modes, single-phase half and full converter drives. **AC Drives:** torque-speed characteristics of induction motor, speed control techniques of AC motor: stator-voltage, rotor resistance, and v/f control, basic equations, characteristics.	**8 Hrs.**

Mapping of POs & COs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	If applicable		
													PSO1	PSO2	PSO3
CO1	3	2	1		1									1	
CO2	3	2		1											
CO3	3	3	1												2
CO4	2	1													1

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Text Books:	
1	P.S.Bhimbra , "Power Electronics" , Khanna Publication
2	P.C.Sen , "Power electronics" , MGH publication
3	M.D. Singh & Khan chandani, "Power Electronics" , McGraw Hill publication

Reference Books:	
1	Ned Mohan, "Power Electronics" , Wiley Pub. 3rd Edition
2	Mohammad Rashid , "Power electronics", 3rd edition Pearson Publication

MOOC / NPTEL Courses: 1	
	1. NPTEL Course on **"Power Electronics "** **Link** of the Course: https://nptel.ac.in/courses/108/105/108105066/ https://nptel.ac.in/courses/108/102/108102145/ https://nptel.ac.in/courses/108/107/108107128/ https://nptel.ac.in/courses/108/108/108108077/ https://batteryuniversity.com/

ETC603- ANTENNA & WAVE PROPAGATION.

Lectures : 4 Hrs/Week
Credit : 4

Evaluation Scheme
ISE : 40 Marks
ESE : 60 Marks

Course Objectives: The course aims to make the student understand :	
1	Define different terminologies of antenna & classify
2	Explain measurement schemes of antenna parameters.
3	Design and simulate different types of antenna.
4	To explain different types of RADAR system.

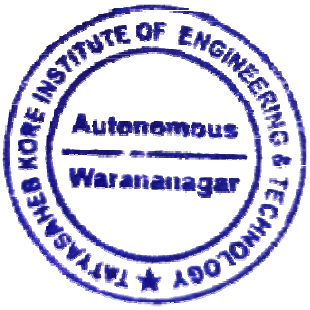
Course Outcomes:

COs	**Upon successful completion of this course, the students will be able to:**	**Blooms Taxonomy Level**
CO1	Understand antenna parameters in order to differentiate the applicability of each type of antenna.	Understand
CO2	Analyze the different types of antenna arrays and make use of them in wide areas of wireless communication.	Analyze
CO3	Illustrate the Implementation of special types of antenna like Micro strip antenna and reflectors.	Analyze
CO4	Solve various problems on design of communication system.	Apply

Description:

This course discusses the different terminologies, parameters of antenna which has applications in different telecommunication and microwave systems. Students should clear understanding of antenna and microwaves circuits with applications.

Prerequisites:	1	Communication Systems
	2	Electromagnetic Engineering



Course Contents		
Unit No:1	**FUNDAMENTALS OF ANTENNA:** Basic antenna radiation mechanism (single & double wire), parameters-radiation resistance, pattern , beam area, radiation intensity, beam efficiency, directivity, gain and resolution, antenna aperture, effective height, Polarrization, radio communication link,field from oscillating dipole, field zones, shape impedance consideration.	**6 Hrs.**
Unit No:2	**ANTENNA ARRAY:** Array introduction, Array of two isotropic point sources (Different cases), non-isotropic but similar point source and the principle of pattern multiplication, Introduction to Frequency independent antenna	**6 Hrs.**
Unit No:3	**ANTENNA TYPES & MEASUREMENTS :** Monopole and Dipole Antenna, Short Dipole, Loop Antenna, Yagi-Uda Antenna, Helical Antenna, Log-Periodic Antenna, Helix Antenna, Microstrip Antenna, Concept of Smart Antenna. Antenna measurement: Antenna ranges, Radiation pattern, Gain measurements, Directivity measurements, Radiation efficiency, Impedance measurements.	**6 Hrs.**
Unit No:4	**GROUND WAVE PROPAGATION:** Plane earth reflection, space wave and the surface wave, elevated dipole antennas above a plane earth, wave tilt of the surface wave, spherical earth propagation,troposphere wave.	**6 Hrs.**
Unit No:5	**IONOSPHERIC PROPAGATION:** The ionosphere, reflection and refraction of the waves by the ionosphere, regular and irregular variations of ionosphere, attenuation factor, sky wave transmission calculations, effect of earth magnetic field, wave propagation in ionosphere, other ionosphere phenomena	**6 Hrs.**
Unit No:6	**RADAR SYSTEM:** Fundamentals, RADAR performance factors, basic pulsed radar system, antennas and scanning, display methods, pulsed radar systems, moving target indication, radar beacons, CW Doppler radar, frequency modulated CW radar, phase array radars, planar array radars.	**6 Hrs.**

Mapping of POs & COs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	If applicable		
													PSO1	PSO2	PSO3
CO1	3	2	1		1									1	
CO2	3	2		1											
CO3	3	3	1												2
CO4	2	1													1

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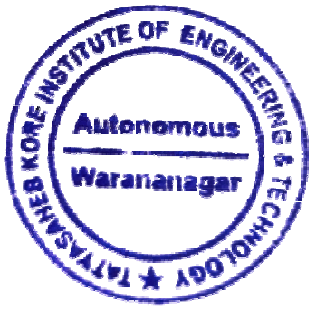
Text Books:	
1	John D Kraus, “Antenna for all Application”, 3rd edition, Tata McGraw Hill Publication
2	Constantine A. Balanis, “Antenna Theory”, 3rd edition, Wiley Publication
3	Jordan and Balmain, “Electromagnetic Waves and Radiation Systems”, 2nd edition, PHI publication
4	Kennedy Davis, “Electronics Communication System”, 5th edition, Tata McGraw Hill Publication

Reference Books:	
1	G. S. N. Raju, “Antennas and Wave Propagation”, 4th edition, Pearson publication
2	K.D. Prasad, “Antennas and Wave Propagation”, 3rd edition, Satya prakashan publication



ETC604- EMBEDDED SYSTEMS

Lectures : 3 Hrs/Week
Credit : 3

Evaluation Scheme
ISE : 40 Marks
ESE : 60 Marks

Course Objectives: The course aims to make the student :	
1	Understand and illustrate the characteristics of Embedded systems and its Architectures
2	Study key features of Microcontroller LPC214X
3	Develop the programming skills on chip resources of LPC214X
4	Understand the concept of real time operating systems.

Course Outcomes:

COs	**At the end of successful completion of the course the student will be able to**	**Blooms Taxonomy Level**
CO1	Differentiate and apply important attributes of Embedded system	Understand & Apply
CO2	Write assembly and C program to configure and use internal peripherals of	Apply
CO3	Design and develop small embedded system using embedded C programming and LPC2148 microcontroller.	Create
CO4	Model Embedded system applications using RTOS	Apply

Description:

The course has been designed to introduce fundamental principles of Embedded System Design commonly used in engineering applications. It aims to establish a firm understanding of the basic programming using Embedded c and assembly language for development of different Embedded System applications used in society. The course deals with the basic study of architecture of ARM and interfacing of different peripherals, The course focuses on Embedded System design of different practical systems.

Prerequisites:	1	Microprocessor and Microcontroller
	2	Assembly programming
	3	Embedded C programming

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Course Contents		
Unit No:1	**INTRODUCTION:** Introduction to Embedded Systems, Classification of Embedded System, processor selection in Embedded System, Components of Embedded systems, Hardware and Software Systems Development tools: Assembler, cross compiler, Simulator, ICE, IDE.	**4 Hrs.**
Unit No:2	**INTRODUCTION TO ARM PROCESSOR:** ARM Core data flow model, registers, operating modes, pipeline, exceptions, interrupts & the vector table, ARM processor families ARM instruction set: conditional execution. Branch and Load/Store, software interrupt instruction, program status register instruction, Thumb instruction set introduction. Exception handling schemes	**10 Hrs.**
Unit No:3	**EMBEDDED NETWORKING:** Concept of data communication Bus: parallel and serial, Serial Bus communication protocols: RS232 standard, RS485, Serial Peripheral Interface (SPI), Inter Integrated Circuits (I2C). CAN Bus	**6 Hrs.**
Unit No:4	**ARM7TDMI-S MICROCONTROLLER LPC 2148:** Features, LPC 214X Device Information, Block Diagram, Memory Maps, Memory Acceleration Module-Block Diagram & Operation, System Control Block(SCB)-Register Description, Fosc. Selection Algorithm, external interrupt logic, phase locked loop, power control, Reset- Block Diagram& RSI register.	**4 Hrs.**
Unit No:5	**LPC 2148ON CHIP RESOURCES:** Features, Block diagram and SFR planning: Pin connect block, GPIO, UART & Architecture, I2C, SPI, Timer, PWM, ADC & DAC, Real time clock, Watchdog timer, Vectored interrupt controller, features of on chip USB	**10 Hrs.**
Unit No:6	**INTRODUCTION TO RTOS** : Architecture of kernel, task and task scheduler, ISR, Semaphores, Mutex, Mailboxes and Pipes, Message Queues, Timers, Memory Management	**6 Hrs.**

Mapping of POs & COs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	If applicable		
													PSO1	PSO2	PSO3
CO1	3	2	1		1									1	
CO2	3	2		1											
CO3	3	3	1												2
CO4	2	1													1

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Text Books:	
1	Rajkamal, **"Embedded Systems :Architecture, Programming and Design",**TMH
2	Sloss, Symes, Wright, "**ARM system developers guide**", Morgan Kaufman (Elsevier) publication
3	Dr. K.V.K.K.Prasad, **"Embedded/ Real time systems: Concepts, Design and Programming",** Dreamtech press

Reference Books:	
1	William Hohel , "**ARM assembly language: fundamentals and Technique**" 2. ARM Architecture Reference Manual By: ARM
2	ARM7TDMI Technical Reference Manual Revision: r4p1 By: ARM 4. LPC214x USER MANUAL By Philips/ NXP semiconductor
3	An Embedded Software Primer. David E. Simon. Pearson Education
4	James k. Peckol, **"Embedded systems A contemporary Design tool",** Wiley

MOOC / NPTEL Courses:	
	http://www.ti.com/product/msp430f5529 http://www.ti.com/product/msp430f438 http://www.ti.com/product/msp430g2302-ep

ETC605- INDUSTRIAL & FINANCIAL MANAGMENT **

Lectures : 3 Hrs/Week
Credit : 3

Evaluation Scheme
ISE : 40 Marks
ESE : 60 Marks

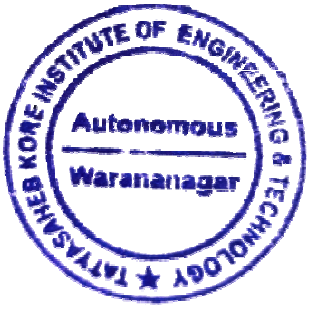
Course Objectives: The course aims to make the student :	
1	Understand the Basics of Project Planning
2	Understand the Financial Estimates and projections in projects
3	Understand the Receivables Management
4	Understand the Inventory Management

Course Outcomes:		
COs	**At the end of successful completion of the course the student will be able to**	**Blooms Taxonomy Level**
CO1	Understand Generation and screening of project ideas, Market , Demand & TechnicalAnalysis	Understand
CO2	Identify the different sources of finance and Appraisal of Loan	Remember
CO3	Describe the Receivables management	Understand
CO4	Illustrate different inventory management techniques	Analyze

Description:

To develop competencies and abilities to work in an industrial organization by studying of the concepts like planning, organizing, directing, controlling and operation research methodologies. Idea is to change their view from job seeker to job provider by changing their abilities to plan and formulate for the entrepreneurship.

Prerequisites:	1	Industrial organizational structure



Course Contents		
Unit No:1	**Project Planning:** Generation and screening of project ideas, Market and Demand Analysis, Technical Analysis, Project Risk Analysis-sensitivity analysis – scenario analysis – Break even Analysis	**6 Hrs.**
Unit No:2	. **Financial Estimates and projections:** Project Financing Long Term Financing, Appraisal of Term Loans by Financial Institutions short TermSources of Finance, other Sources.	**8 Hrs.**
Unit No:3	**Motive for holding Cash:** Objective of cash Management, Factors determine the cash needs, Determining cash Need	**8 Hrs.**
Unit No:4	**Techniques of Cash Management,** Marketable Securities- Treasury Bills, Commercial papers, Certificates of deposit Bankers acceptance, Inter-Corporate deposits	**8 Hrs.**
Unit No:5	**Receivables Management:** Objective, Credit policy, Credit Standards &Credit Analysis, Credit terms; Cash Discount; Collection Policies.	**6 Hrs.**
Unit No:6	**Inventory Management:** Objectives; Benefits of holding inventory, Techniques of inventory control EOQ, stock Levels, Role of Central Government and State Government in promoting Entrepreneurship with various incentives, subsidies, grants etc.	**8 Hrs.**

Mapping of POs & COs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	If applicable		
													PSO1	PSO2	PSO3
CO1	3	2	1		1									1	
CO2	3	2		1											
CO3	3	3	1												2
CO4	2	1													1

Text Books:	
1	Prasanna Chandra (2014),"Projects: Planning, Analysis, Selection, Financing, Implementation, and Review", 8th Edition, McGraw Hill Education.
2	P.V.Kulkarni & B.G.Satyaprasad (2000), "Financial Management", HimalayaPublishing House.

Reference Books:	
1	Dr. R.P.Rustagi (2011), "Financial Management - Theory, Concepts and Problems",5th Edition
2	I.M.Pandey (2009), "Financial Management", 9th Edition, Vikas Publishing HousePvt Limited.

MOOC / NPTEL Courses:	
	1. NPTEL Course **"Project Management for Managers"** **Link** of the Course: **https://nptel.ac.in/courses/110/107/110107081/** **2.** NPTEL Course on **"Intellectual Property Rights and Competition Law"** **Link** of the Course: **https://nptel.ac.in/courses/110/105/110105139/**

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ETC605- MOBILE TECHNOLOGY**

Lectures : 3 Hrs/Week
Credit : 3

Evaluation Scheme
ISE : 40 Marks
ESE : 60 Marks

Course Objectives: The course aims to make the student understand :	
1	Understand the basic concept Mobile Computing.
2	Understand the basic concept Cellular System.
3	Analysis of Mobile IP.
4	Detail study of Application Protocols

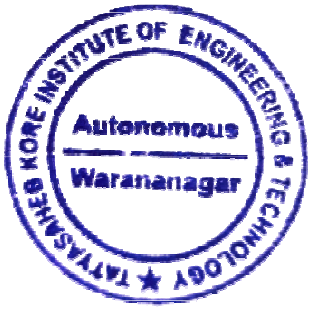
Course Outcomes:

COs	**At the end of successful completion of the course the student will be able to**	**Blooms Taxonomy Level**
CO1	Describe the concepts of Mobile Communication.	Understand
CO2	Analyze next generation Mobile Communication System.	Analyze
CO3	Relate network and transport layers of Mobile Communication.	Evaluate
CO4	Demonstrate various protocols of all layers for mobile and ad hoc wireless communication networks.	Apply

Description:

This course discusses the principles of VLSI design, which has applications in Embedded systems. It makes students acquainted with use of VHDL coding, design of FSM and Programmable logic devices.

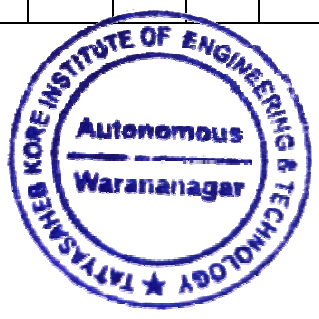
Prerequisites:	1	Computer networking
	2	Digital Electronics



Course Contents		
Unit No:1	**DETAILED INTRODUCTION OF MOBILE COMPUTING:** History, Types, Benefits, Application, Evolution, Security Concern regarding Mobile Computing, Different Propagation Modes, Wireless Architecture and its types, needs of mobile user,	**6 Hrs.**
Unit No:2	**THE CELLULAR CONCEPT:** Cellular system, Hexagonal geometry cell and concept of frequencyreuse, Channel Assignment Strategies Distance to frequency reuse ratio	**6 Hrs.**
Unit No:3	**TELECOMMUNICATION SYSTEM:** **GSM**: - Channel allocation, call routing Architecture, PLMN interface, addresses and identifiers, network aspects, frequency allocation, authentication and security, Handoffs Technique. **GPRS**: network operation, data services, Applications, Billing and charging	**8 Hrs.**
Unit No:4	**MOBILE IP:** Need of mobile IP, IP packet delivery, Agent Discovery, Registration, Tunnelling and encapsulation, Route optimization, IP Handoff	**5 Hrs.**
Unit No:5	**MOBILE TRANSPORT LAYER:** Overview of Traditional TCP and implications of mobility control. Improvement of TCP: Indirect TCP, Snoop TCP, Mobile TCP, Fast Retransmit/fast recovery, Time-out freezing, Selective retransmission, Transaction-oriented TCP.	**5 Hrs.**
Unit No:6	**WIRELESS APPLICATION PROTOCOL:** Introduction of WAP, WAP applications, WAP Architecture, WAP Protocol Stack, Challenges in WAP	**7 Hrs.**

Mapping of POs & COs:

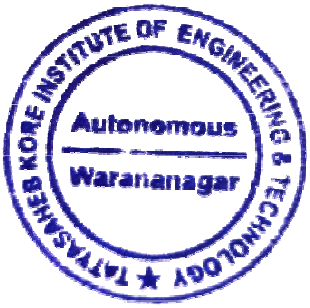
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	If applicable		
													PSO1	PSO2	PSO3
CO1	2	1	1		1									2	
CO2	2	2		1											
CO3	3	3	1												2
CO4	3	1													3



Text Books	
1	Mobile ComputingTechnology,Applications and service creation ,Ashok KTelukder, Roopa R Yavagal by TMH.
2	Mobile Computing,Raj Kamal by Oxford

Reference Books:	
1	Wireless Communications & Networks, Second Edition,William Stallingsby Pearson
2	Mobile Computing Theory and Practice-Kumkum Garg-Pearson
3	TCP/IP Protocol Suite by Behrouz A Forouzan, Third Edition,TMH

MOOC / NPTEL Courses:	
	1. NPTEL Course **"Introduction to Wireless & Cellular Communications"** **Link** of the Course: https://nptel.ac.in/courses/106/106/106106167/ 2. NPTEL Course **"Advanced 3G and 4G Wireless Mobile Communications"** **Link** of the Course: https://nptel.ac.in/courses/117/104/117104099/



ETC605- COMPUTER NETWORK**

Lectures : 3 Hrs/Week
Credit : 3

Evaluation Scheme
ISE : 40 Marks
ESE : 60 Marks

Course Objectives: The course aims to make the student :	
1	Understand the overview of the concepts and fundamentals of data communication and computer networks
2	Able to review the state of art in open research area such as LAN, MAN, WLAN & applications Computer Networking
3	Acquire the required skill to design simple computer networks.
4	Describe various functions and protocols at each layer of OSI and TCP/IP reference models.

Course Outcomes:

COs	**At the end of successful completion of the course the student will be able to**	**Blooms Taxonomy Level**
CO1	Understand fundamentals of OSI and TCP/IP reference model.	Understand
CO2	Illustrate different design issues of HDLC framing and flow control for protocol design	Apply
CO3	Apply knowledge of different routing algorithms and congestion control mechanism .	Apply
CO4	Generalize the protocols of network and transport layer to trace the packet	Understand

Description:

Computer network course describes the basic topology , types of computer network. It gives the concepts of OSI model. Also it describes the detail functioning of each layer.

Prerequisites:	1	Basics of computer hardware
	2	Basics of networking components
	3	Basic of C language

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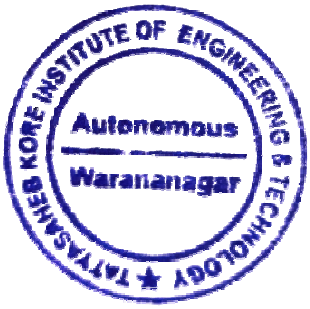
Course Contents		
Unit No:1	**INTRODUCTION TO COMPUTER NETWORK:** History and development of computer network, network application, network software and hardware components, reference models: layer details of OSI,TCP/IP models., Network topology, Transmission media and types, Network Devices: Network Connectors, Hubs, Switches, Routers, Bridges.	**6 Hrs**
Unit No:2	**DATA LINK LAYER:** Design issues, sliding window protocols. HDLC – types of stations, modes of operation & frame formats, Random access Protocols, IEEE 802.3 frame formats.	**6 Hrs.**
Unit No:3	**NETWORK LAYER:** Design issues, Routing algorithms – shortest path, distance vector routing, link state routing. Routing protocols - RIP, OSPF, IP Addressing, Sub netting/super netting, IPv4, IPv6 header format and basic address mode, DHCP, Congestion control, traffic shaping algorithms.	**8 Hrs.**
Unit No:4	**TRANSPORT LAYER:** Transport layer-Process to process delivery, UDP, TCP, TCP services, TCP Segment, TCP Timers, Flow control, congestion control and Quality of Service.	**8 Hrs.**
Unit No:5	**APPLICATION LAYER:** DNS, HTTP, SMTP, Telnet, FTP	**8 Hrs.**
Unit No:6	**MULTIMEDIA IN INTERNET:** Streaming stored audio/video, Real-time interactive audio/video, Real-time transport protocol (RTP), Real-time transport control protocol (RTCP), Voice over IP (VoIP)	**6 Hrs.**

Mapping of POs & COs:

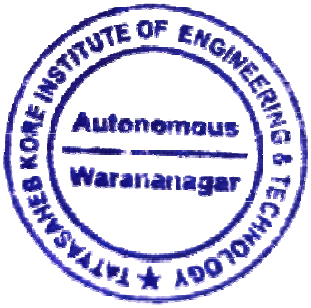
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	If applicable		
													PSO1	PSO2	PSO3
CO1	2		1			3		3							3
CO2		3											2		
CO3		2			2									2	
CO4			3												



Text Books	
1	Forouzan, , “Data Communication and Networking” IIndedition, TataMc-Graw Hill, Publication
2	Tanenbaum, “Computer Neworks”, IVth Edition, pearson Education

Reference Books:	
1	Wayne Tomasi, “Introduction to Data communications and Networking” Pearson Education.
2	Forouzan, “TCP/IP Protocol Suite”, IIIrd Edition Tata Mc-Graw Hill publication.

MOOC / NPTEL Courses:	
	1. Computer Networks - Course (swayam2.ac.in) 2. Introduction to Computer Networks & Internet Protocols - Course (swayam2.ac.in) 3. Computer Networks and Internet Protocol - Course (nptel.ac.in) **4.** NPTEL Course **“Computer Networks”** **Link** of the Course: **https://nptel.ac.in/courses/106/105/106105183/**



ETC602P- POWER ELECTRONICS LAB

Practical : 2 Hrs/Week
Credit : 1

Evaluation Scheme
ISA : 25 Marks
POE : 50 Marks

Course Objectives:	
The objective of the course is to:	
1	To study different types of semiconductor power devices
2	To study different types of firing & commutation circuits of SCR.
3	To study various types of single phase controlled rectifiers & evaluate their performance parameter
4	To study various AC & DC motor control techniques.

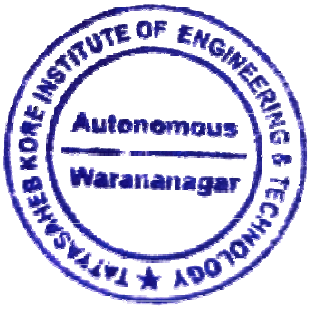
Course Outcomes:		
COs	**At the end of successful completion of the course the student will be able to**	**Blooms Taxonomy Level**
CO1	Illustrate the characteristics of various power devices.	Apply
CO2	Analyze the operation of firing circuits for SCR	Analyze
CO3	Demonstrate operation of controlled rectifiers	Apply
CO4	Make use of controlled rectifiers for speed control of DC motors.	Understand

Description:		
The course aims to Provide knowledge of Power Electronics & its applications		
Prerequisites:	1	Theory of semiconductor device, Fourier series

List of Experiments			
Minimum 10 experiments:			
Sr. No.	**Name of the experiment**	**Hrs.**	**Cognitive levels of attainment As per Bloom's**
1	Study of V-I Characteristics of SCR TRIAC, DIAC.	2	Knowledge
2	Study of V-I Characteristics of MOSFET/IGBT/GTO	2	Knowledge
3	Study of Firing circuits using UJT as relaxation oscillator/RAMP- Pedestal Circuit	2	Knowledge, Application
4	Study of Firing circuits using TRIAC, DIAC	2	Knowledge, Analysis
5	Study of Half controlled Bridge rectifier	2	Knowledge
6	Study of Fully controlled Bridge rectifier	2	Analysis
7	Study of AC voltage Regulator	2	Analysis
8	Study of Jones chopper and Morgan‟s chopper	2	Knowledge, Evaluation
9	Study of Single phase Inverter	2	Knowledge, Analysis
10	Study of SMPS/UPS	2	Knowledge, Application
11	Study of Light dimmer using Diac/Triac	2	Knowledge, Application
12	Study of A.C. Voltage stabilizer	2	Knowledge

Mapping of POs & COs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	If applicable		
													PSO1	PSO2	PSO3
CO1	1			1	2				1		2		2		
CO2	1	1									2			3	
CO3	2	2			2										2
CO4		2	2	3					1						2



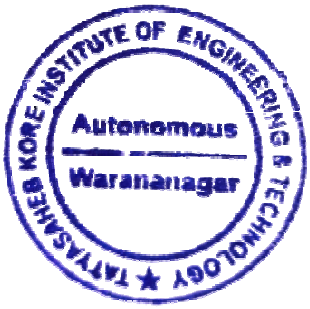
ETC603P- ANTENNA & WAVE PROPAGATION LAB

Practical	**:**	2 Hrs/Week	**Evaluation Scheme**
Credit	**:**	1	**ISA : 25 Marks**
			POE : 50 Marks

Course Objectives: The course aims to make the student :	
1	Define different terminologies of antenna & classify.
2	Explain measurement schemes of antenna parameters.
3	Design and simulate different types of antenna.
4	Explain different types of RADAR system.

Course Outcomes:		
COs	**At the end of successful completion of the course the student will be able to**	**Blooms Taxonomy Level**
CO1	Understand antenna parameters in order to differentiate the applicability of each type of antenna.	Understand
CO2	Analyze the different types of antenna arrays and make use of them in wide areas of wireless communication.	Analyze
CO3	Implement special types of antenna like Microstrip antenna and reflectors.	Analyze
CO4	Solve various problems on design of communication system.	Apply

Description:		
This course discusses the different terminologies, parameters of antenna which has applications in different telecommunication systems. Students should have clear understanding of basics of antenna, design and implement various antennas.		
Prerequisites:	1	Communication Systems
	2	Electromagnetic Engineering



List of Experiments			
Minimum 10 experiments:			
Sr. No.	**Name of the experiment**	**Hrs.**	**Cognitive levels of attainment As per Bloom's**
1	To study and plot the radiation pattern of the dipole antennas	2	Knowledge
2	To study and plot the radiation pattern of the Yagi-Uda antenna.	2	Knowledge
3	To study and plot the radiation pattern of the helical antenna.	2	Knowledge, Application
4	To plot radiation pattern of λ/2 dipole antenna and compare with 3λ/2 dipole antenna.	2	Knowledge, Analysis
5	To study and plot the radiation pattern of the Log-Periodic antenna	2	Knowledge
6	To study and plot the radiation pattern of phase array antenna	2	Knowledge, Analysis
7	To study and plot the radiation pattern of Loop antenna		Knowledge, Analysis
8	To study and plot the radiation pattern of slot/loop/rhombus/log periodic /cut parabolic/ground plane antenna.	2	Knowledge
9	To study and plot the radiation pattern of microstrip patch antenna	2	Knowledge
10	Write a program to find radiation pattern of Broadside array antenna using MATLAB	2	Analysis
11	Write a program to find radiation pattern of End fire array antenna using MATLAB	2	Analysis
12	Simulation of monopole antenna using HFSS software.	2	Analysis
13	Simulation of Microstrip patch antenna using HFSS software.	2	Analysis

Mapping of POs & COs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	If applicable		
													PSO1	PSO2	PSO3
CO1	1			1	2				1		2	1			
CO2	1	1									2	1			
CO3	2	2			2							2			
CO4		2	2	3					1						

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ETC604P- EMBEDDED SYSTEM LAB

Practical : 2 Hrs/Week
Credit : 1

Evaluation Scheme
ISA : 25 Marks
POE : 50 Marks

Course Objectives: The objective of the course is :	
1	To learn and understand the characteristics of Embedded systems and its Architectures
2	To develop skill of ARM programming.
3	To develop skill of programming on chip resources of LPC214X.
4	To understand the concept of real time operating systems.

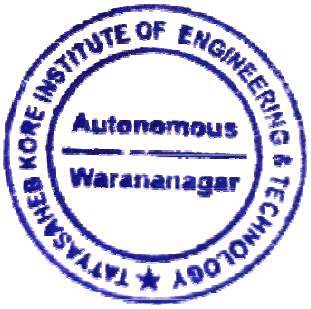
Course Outcomes:

COs	**At the end of successful completion of the course the student will be able to**	**Blooms Taxonomy Level**
CO1	Determine and apply important attributes of Embedded system	Apply
CO2	Model small applications of UART, I2C, SPI	Apply
CO3	Develop small applications of GPIO, Timers, PWM, Real time clock, Watchdog using embedded C	Create
CO4	Analyze Embedded system applications using RTOS	Analyze,

Description:

Course deals with understanding architecture of ARM ,interfacing of different peripherals like buzzer, relay, stepper motor, DC motor using assembly and embedded C programming.

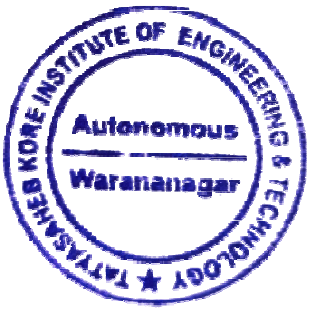
Prerequisites:	1	Microprocessor and Microcontroller
	2	Assembly programming
	3	Embedded C programming



List of Experiments			
List of Experiments (Minimum 08 experiments + 01 Mini Project compulsory):			
Sr. No.	**Name of the experiment**	**Hrs.**	**Cognitive levels of attainment As per Bloom's**
1	Study on ARM architecture	2	Knowledge
2	Practical implementation of arithmetic operations using assembly language..	2	Knowledge
3	Practical implementation of data shift left side and right side using assembly language.	2	Knowledge, Application
4	Practical implementation of running Led using assembly language..	2	Knowledge, Analysis
5	Practical implementation of one's complement using assembly language	2	Knowledge
6	Practical implementation of factorial of given number using assembly language.	2	Analysis
7	Practical implementation of running Led using Embedded C	2	Analysis
8	Practical implementation of Buzzer interfacing	2	Knowledge, Evaluation
9	Practical implementation of relay interfacing	2	Knowledge, Analysis
10	Practical implementation of stepper motor interfacing	2	Knowledge, Application
11	Practical implementation DC motor interfacing	2	Knowledge, Application
12	Practical implementation of serial data transmission.	2	Knowledge
13	Practical implementation of serial data Reception	2	Knowledge, Application

Mapping of POs & COs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	If applicable		
													PSO1	PSO2	PSO3
CO1	2			2	1				2		2				
CO2	1	2									2				
CO3	1	2			2										
CO4		2	2	3					2						



ETC606P- MINIPROJECT-II

Theory	**:**	1 Hrs/Week	**Evaluation Scheme**
Practical	**:**	2 Hrs/Week	**ISA : 25 Marks**
Credit	**:**	1	**POE : 50 Marks**

Course Objectives:
The objective of the course is :
To learn and understand the characteristics of Embedded systems and its Architectures
To develop skill of ARM programming.
To develop skill of programming on chip resources of LPC214X.
To understand the concept of real time operating systems.

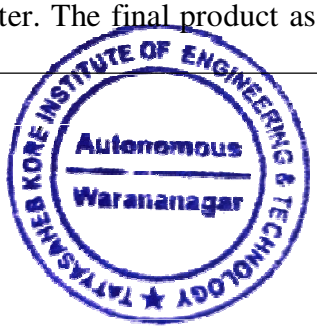
Course Outcomes:		
COs	**At the end of successful completion of the course the student will be able to**	**Blooms Taxonomy Level**
CO1	Identify, Initiate and manage a minor project.	Remember
CO2	Propose research problem and present it in a clear and distinct manner through different oral, written and design techniques.	Application
CO3	Construct the circuit using hardware and/or software	Apply
CO4	Execute the project and comment upon the results of it	Analyze,

Description:

Mini Project Description

A project group shall consist of normally 3 students per group. The mini project will involve the design, construction, and debugging of an electronic system approved by the department. Each student should conceive, design and develop the idea leading to a project/product. **The theme of the project should be based on courses studied in previous semester using microcontroller/Arduino/Raspberry Pi etc.**

Each student must keep a project notebook/logbook. The project notebooks will be checked periodically throughout the semester, as part of in-semester-evaluation. The student should submit a soft bound report at the end of the semester. The final product as a result of mini project should be demonstrated at the time of examination.



Mapping of POs & COs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	If applicable		
													PSO1	PSO2	PSO3
CO1	3	3								2	2		2		
CO2			3		2									2	
CO3			3		2						1			2	
CO4		2							3	3					3

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Tatyasaheb Kore Institute of Engineering and Technology, Warananagar

Honor Degree Course in Cyber Security

(Electronics & Telecommunication Engineering)

Structure and Evaluation Scheme

(To be implemented from 2022 - 23)

Credit scheme

Course Code	Course Title	Semester	Category	Teaching and Credit Scheme					Examination & Evaluation Scheme			
				L	P	T	CH	C	Components	Marks	Min for Passing	
ETC-H-501	Introduction to Cyber Security	V	ESC	4			4	4	ESE	60	24	40
									ISE	40	16	
ETC - H-601	Cyber Laws	VI	ESC	4			4	4	ESE	60	24	40
									ISE	40	16	
ETC-H-701	Network Security	VII	ESC	4			4	4	ESE	60	24	40
									ISE	40	16	
ETC - H-801	Elective*	VIII	ESC	4			4	4	ESE	60	24	40
									ISE	40	16	
ETC-P-801	Seminar	VIII	ESC	--	4	--	4	2	ISA	100	40	
				16	4		20	18	--	500	--	

Student should undergo any one of the following courses by self study/ online certification and should present as seminar.

Electives*

- Network Security
- Applied Cryptography
- Software Engineering
- Cyber Crime Investigation and Digital Forensics
- Intrusion Detection and Prevention System

Evaluation

For each course 100 marks evaluation. (60 marks End Semester Examination and 40 marks In Semester Examination which will consist of test, assignment, and presentations by students.)

Guidelines For Honors Degree

As per the guidelines provided by AICTE APH 20-21 Chapter 7 Section 7.3.2, institute has made the provision to opt for Honors for its students to achieve specialization in the area of his / her interest.

Approval Process Handbook_2021-22.pdf - AICTEhttps://www.aicte-india.org › sites › default › filesPDF 30- Apr-2021 — Courses as per Chapter VII of the Approval Process Handbook. 38 ―Level‖ means Diploma, Post Diploma Certificate, Under Graduate Degree, ...309 pages

Honors Degree:

Under Graduate Degree Courses in EMERGING AREAS shall be allowed as specialization from the same Department or compatible Dept. as specialization in that particular area.

1. Students from same department are eligible for Honor degree.
2. Students can select advanced courses from their respective specialization in which they are perusing the degree.
3. Student can select one subject per semester from the list of Honor courses of a branch in which they are perusing the degree.
4. Online courses as per the AICTE APH are from platforms from nationally/Internationally recognized institutes, Universities, Companies /platforms approved by concern BoS.

ETC-H-501- INTRODUCTION TO CYBER SECURITY

Lectures : 4 Hrs/Week
Credit : 4

Evaluation Scheme
ISE : 40 Marks
ESE : 60 Marks

Course Objectives: The course aims to make the student understand :	
1	To study information security, Computer ethics and security policies.
2	Choosing the best browser and understand different security.
3	To study Smartphone security.
4	To understand online banking, Credit card and UPI security.

Course Outcomes:		
COs	**At the end of successful completion of the course the student will be able to**	**Blooms Taxonomy**
CO1	Understand information security, Computer ethics and security policies.	Understand
CO2	Choose best browser according to the requirement and email security and understand how to secure password and wi-fi security, social media, basic windows security.	Understand
CO3	Understand Smartphone security.	Understand
CO4	Understand online banking, Credit card and UPI security.	Understand

Description:		
This course is geared towards generating and enhancing awareness about cyber security challenges and the concepts of cyber security and cyber ethics among the stake holders to help them become responsible cyber citizens and participate safely and securely in the rapidly evolving information-age society.		
Prerequisites:	1	Fundamental knowledge in Computers.

Course Contents		
Unit No:1	**INTRODUCTION TO CYBER SPACE:** History of Internet, Cyber Crime, Information Security, Computer Ethics and Security Policies.	**4 Hrs.**
Unit No:2	**CHOOSING THE BEST BROWSER ACCORDING TO THE REQUIREMENT AND EMAIL SECURITY:** Guidelines to choose web browsers, Securing web browser, Antivirus, Email security.	**3 Hrs.**
Unit No:3	**GUIDELINES FOR SECURE PASSWORD AND WI-FI SECURITY:** Guidelines for setting up a Secure password, Two-steps authentication, Password Manager, Wi-Fi Security.	**4 Hrs.**
Unit No:4	**GUIDELINES FOR SOCIAL MEDIA AND BASIC WINDOWS SECURITY:** Guidelines for social media security, Tips and best practices for safer Social Networking, Basic Security for Windows, User Account Password.	**4 Hrs.**
Unit No:5	**SMARTPHONE SECURITY GUIDELINES:** Introduction to mobile phones, Smartphone Security, Android Security, IOS Security.	**4 Hrs.**
Unit No:6	**ONLINE BANKING, CREDIT CARD AND UPI SECURITY:** Online Banking Security, Mobile Banking Security, Security of Debit and Credit Card, UPI Security.	**4 Hrs.**

Mapping of POs & COs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	If applicable		
													PSO1	PSO2	PSO3
CO1	3	2	1		1									1	
CO2	3	2		1											
CO3	3	3	1												2
CO4	2	1													1

Text Books:	
1	Introduction to Cyber Security http://uou.ac.in/foundation-course

Reference Books:	
1	William Stallings, Computer Security : Principles and Practices, Pearson 6th Ed, ISBN: 978-
2	Nina Godbole, Sunit Belapure , Cyber Security- Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Wiley India Pvt Ltd, ISBN- 978-81-265-2179-1

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ETC-H- 601- CYBER LAWS

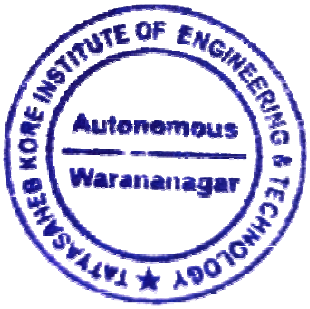
Lectures : 4 Hrs/Week
Credit : 4

Evaluation Scheme
ISE : 40 Marks
ESE : 60 Marks

Course Objectives: The course aims to make the student understand :	
1	To understand IT Act, Genesis and Necessity
2	To understand E – commerce and Laws in India
3	Understand the Cloud Computing & Law.
4	To understand Cyber Law ,Cyber Space Jurisdiction

Course Outcomes:		
COs	**At the end of successful completion of the course the student will be able to**	**Blooms Taxonom**
CO1	Understand IT Act, Genesis and Necessity.	Understand
CO2	Understand E – commerce and Laws in India.	Understand
CO3	Understand Cloud Computing & Law.	Understand
CO4	Understand Cyber Law ,Cyber Space Jurisdiction.	Understand

Description:		
This course is geared towards generating and enhancing awareness about different cyber laws, among the stake holders to help them become responsible cyber citizens and participate safely and securely in the rapidly evolving information-age society.		
Prerequisites:	1	Basics of Cyber Security
	2	Basics of computer Networking



Course Contents		
Unit No:1	**Evolution of the IT Act, Genesis and Necessity:**	**6 Hrs.**
Unit No:2	**Salient features of the IT Act, 2000, various authorities under IT Act and their Powers. ; Penalties & Offences, amendments:**	**6 Hrs.**
Unit No:3	**E – commerce and Laws in India:** a) Digital / Electronic Signature in Indian Laws b) E – Commerce; Issues and provisions in Indian Law c) E – Governance; concept and practicality in India d) E – Taxation issues in Cyberspace e) E – Contracts and its validity in India f) Cyber Tribunal & Appellate Tribunal g) Cyber Regulations	**6 Hrs.**
Unit No:4	**Cloud Computing & Law:**	**6 Hrs.**
Unit No:5	**Cyber Law : International Perspective:** a) EDI: Concept and legal Issues. b) UNCITRAL Model Law. c) Electronic Signature Law's of Major Countries d) Cryptography Laws e) Cyber Law's of Major Countries f) EU Convention on Cyber Crime	**6 Hrs.**
Unit No:6	**Cyber Space Jurisdiction:** a) Jurisdiction issues under IT Act, 2000. b) Traditional principals of Jurisdiction c) Extra terrestrial Jurisdiction d) Case Laws on Cyber Space Jurisdiction	**6 Hrs.**

Mapping of POs & COs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	If applicable		
													PSO1	PSO2	PSO3
CO1	2	3	1		1									1	
CO2	2	3		1											
CO3	2	3	1												2
CO4	1	1													1

Text Books:	
1	Cyber Law & Cyber Crimes By Advocat Prashant Mali; Snow White publications, Mumbai
2	Cyber Law in India by Farooq Ahmad; Pioneer Books

Reference Books:	
1	Guide to Cyber and E – Commerce Laws by P.M. Bukshi and R.K. Suri; Bharat Law House,
2	The Information Technology Act, 2000; Bare Act – Professional Book Publishers,New Delhi
3	List of Websites for more information is available on: Http://www.garykessler.net.library/ forensicsurl.html

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