D. Y. Patil College of Engineering and Technology

Kasaba Bawada, Kolhapur

T.Y. B. Tech Autonomous Syllabus

(Department of Electronics & Telecommunication Engineering)

w.e.f. 2024-25

Third Year (B.Tech.) Electronics & Tele communication SEM-V

Sr. No.	Course Code	Course Type	Name of the Course	Teaching Scheme				Total Mark	Evaluation Scheme			
				Lecture	Tutorial	Practical	Credits		Type	Max. Marks	Min. for Passing	
1	201ETL301	PCC	Microprocessor and Microcontroller	3	-	-	3	100	ISE MSE ESE	20 30 50	20 20	40
2	201ETL302	PCC	Information Theory & Coding	3	1	-	4	100	ISE MSE ESE	20 30 50	20 20	40
3	201ETL303	PCC	Digital Signal processing	3		-	3	100	ISE MSE ESE	20 30 50	20 20	40
4	201ETL304 - 06	PEC	Professional Elective-I	3	1	-	4	100	ISE MSE ESE	20 30 50	20 20	40
5	201ETL307	HSC	Project Management and Economic Policy	3	1	-	4	100	ISE MSE ESE	20 30 50	20 20	40
6	201ETP308	PCC – LC	Microprocessor and microcontroller - Lab	-	-	2	1	50	ISE ESE POE	25 25	10 10	20
7	201ETP309	PCC – LC	Digital Signal Processing - lab	-	-	2	1	25	ISE	25	10	10
8	201ETP310	ESC - LC	Programming Practice	2	-	2	3	50	ISE ESE POE	25 25	10 10	20
9	201ETL311	MC	Industrial Marketing	2	Non Credit Mandatory Course with 50 marks ESE							
TOTAL				19	3	6	23	675		675		
Total Contact Hours				**29**								

Third Year (B.Te ch.) Electronics & Telecommunication SEM-VI													
Sr. No.	Course Code	Course Type	Name of the Course	Teaching Scheme				Total Mark	Evaluation Scheme				
				Lecture	Tutorial	Practical	Credits		Type	Max. Marks	Min. for Passing		
10	201ETL312	PCC	Cellular & Mobile Communication	3	-	-	3	100	ISE	20	20	40	
									MSE	30			
									ESE	50	20		
11	201ETL313	PCC	Embedded Systems	3	-	-	3	100	ISE	20	20	40	
									MSE	30			
									ESE	50	20		
12	201ETL314	HSC	Industrial Management and Start-ups	3	-	-	3	100	ISE	20	20	40	
									MSE	30			
									ESE	50	20		
13	201ETL315-17	PEC	Professional Elective-II	3	1	-	4	100	ISE	20	20	40	
									MSE	30			
									ESE	50	20		
14	201ETL318-19	OEC	Open Elective I 1. Sensor Technology 2.Electronic Instrumentation	3	1	-	4	100	ISE	20	20	40	
									MSE	30			
									ESE	50	20		
15	201ETP320	PCC -LC	Cellular & Mobile Communication Lab.	-	-	2	1	50	ISE	25	10	20	
									ESEOE	25	10		
16	201ETP321	PCC -LC	Embedded Systems - Lab	-	-	2	1	50	ISE	25	10	20	
									ESEPOE	25	10		
17	201ETP322	PROJ	Mini Project-II	-	-	2	1	50	ISE	25	10	20	
									ESE	25	10		
Total				15	2	6	20	650		650			
Total Contact Hours				**23**									

Summer Internship: The students are expected to undergo 4 to 6 weeks internship in the industry and work on the relevant areas assigned by the industry. The work done should be monitored and evaluated by the concerned industry expert based on the report prepared by the student. The department has to assign one faculty mentor, who has to communicate with the industry and monitor the entire internship related work periodically,

- The weightage of evaluation will be as under.
  - Industry Expert/ Supervisor: 70%
  - Department & Faculty Mentor: 30 % (includes presentation & submission of report to the department at the beginning of the subsequent semester)
- The Internship can be availed by the students during the summer vacations after completion of sem IV or VI.
- The credits of the internship will be considered in Sem VII.
- The industry expert/ Supervisor is excepted to assign the work worth minimum 100-200 hrs for 4 to 6 weeks duration & should monitor & evaluate periodically.
- At the completion of the internship work, the student is expected to prepare a report on the work done & get certificate from the industry expert.

Course assessment:
The course assessment is to be done on the basis of ISE **(**In Semester Evaluation), MSE (Mid Semester Examination) and ESE (End Semester Examination). The weightage of components are as follows.

ISE	MSE	ESE
20%	**30%**	**50%**

1. ISE (Theory) 20 marks

ISE-1 and ISE-2 can be done by using following modes

1. Online test (on Moodle) 6) Case study
2. Surprise test 7) Demonstrations
3. Open book exam 8) Seminars
4. Active learning method as per OBE requirement 9) Assignments
5. Self-learning topic 10) Self Study

ISE (Lab) 20 marks: Lab assessment is to be done using continuous assessment method in which faculty has to
Evaluate student's performance based upon defined rubrics only and shown to the students

2. MSE will be conducted for 30 marks.

3. **ESE (End Semester Examinations)50 marks:**-ESE will be conducted on entire syllabus for 100 marks for 3 hours duration and converted to 50 marks

*** Industrial Marketing (Non-Credit Mandatory Course):**

1. Course will be assessed by conducting objective type examination for 50 marks for which criteria for passing is 40% (20 marks).
2. **Result of student will be declared only if student passes this course.**

LIST OF ELECTIVES AS PER PROPOSED STRUCTURE

Professional Elective:

Professional Elective					
I	**II**	**III**	**IV**	**V**	**VI**
Digital Image Processing	Image Processing & Analysis	Computer Vision and Pattern Recognition	Speech Processing	Machine learning	Deep Learning
Electromagnetic Engg.	Satellite Communication	Wireless Sensor Network	Micro-wave Theory	Cyber Security	Internet of Things
VLSI design	ASIC Design	System on Chip	MEMS Technology	Nano Electronics	Consumer Electronics

Open Elective I:

Open elective courses are offered to gain the knowledge of multidisciplinary areas. Students must choose one open elective course from the list of courses offered by other departments (excluding open elective courses offered by their department). Following is the list of open elective courses. The detailed syllabus is available on the college website under the academic tab.

Sr. No.	Department	Course Code	Open Elective-I Course
1	Chemical	201CHL318	Industrial Safety and Act
		201CHL319	Energy Conservation and Audit
2	Mechanical	201MEL313	Human Resource Management
		201MEL314	Electric Vehicle
3	Civil	201CEL330	Disaster Management
		201CEL331	Green Building
4	Architecture	201ARL318	Residential Gardening
		201ARL319	Role of Art & Technology in Interior Design
5	Computer Science & Engineering	201CSL319	E- Commerce & Digital Marketing
		201CSL320	Python Programming
6	Computer Science & Engineering (Artificial Intelligent & Machine Learning)	201AIML320	Applications of AI ML
		201AIML321	Augmented Reality and Virtual Reality
7	Computer Science & Engineering (Data Science)	201DSL319	Basics of Data Science
		201DSL320	Basics of Database

T. Y. B. Tech. Curriculum

w.e.f. 2024-2025

Course Title: Microprocessor and Microcontroller	
Course Code: 201ETL301	**Semester : V**
Teaching Scheme : L-T-P : 3-0-0	**Credit: 3**
Evaluation Scheme : ISE + MSE Marks : 20 + 30	**ESE Marks : 50**

Course Description:

The "Microprocessor and Microcontroller" course provides a comprehensive understanding of the architecture, programming, and interfacing of microprocessors and microcontrollers. Students will explore the fundamentals of assembly and embedded "C" language programming, hardware design, and practical applications in embedded systems. Emphasis is placed on real-world problem-solving and developing skills for designing efficient, reliable, and scalable embedded solutions

Course Objectives:

1.	To introduce the fundamental concepts of the 8085 microprocessor, including its architecture, pin functions, and basic programming.
2.	To understand the stack operations, interrupt handling, and interfacing techniques of the 8085 microprocessor
3.	To provide a comprehensive overview of the MCS51 family, covering its architecture, functional pinout, and assembly language programming.
4.	To explore the hardware components and peripherals of microcontrollers, such as I/O ports, timers, and serial communication.
5.	To develop practical skills in interfacing various external devices with the 8051 microcontroller.
6.	To learn and apply Embedded 'C' programming for the 8051 microcontroller, focusing on data types, arithmetic and logical operations, and hardware interfacing.

Course Outcomes (COs):

At the end of the course the student should be able to:

301.1	**Explain** the fundamental concepts of the 8085 microprocessor, including its architecture, pin functions, and basic programming
301.2	**Apply** stack operations, interrupt handling, and interfacing techniques of the 8085 microprocessor in practical scenarios.
301.3	**Analyze** the architecture, functional pinout, and assembly language programming of the

301.4	**Design** interfaces for I/O ports, timers, and serial communication modes using
301.5	**Develop** skills in interfacing external devices such as keyboards, displays, ADCs,
301.6	**Create** and **evaluate** Embedded 'C' programs for the 8051 microcontroller, focusing on data types, arithmetic and logical operations, and hardware interfacing.

Prerequisite:	Digital Electronics and C programming

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSO)

Course Outcomes (COs) / Program Outcomes (POs)	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2	BTL
301.1	2	1	1	1	-	-	-	-	-	-	-	-	2	1	II
301.2	2	2	3	2	-	-	-	-	-	-	-	-	1	2	III
301.3	1	1	2	2	-	-	-	-	-	-	-	-	1	2	IV
301.4	1	1	1	1	-	-	-	-	-	-	-	-	1	2	VI
301.5	1	1	2	2	-	-	-	-	-	-	-	-	1	2	VI
301.6	1	1	1	1	-	-	-	-	-	-	-	-	1	2	V

Course Contents	**Hrs**
Unit 1.– Introduction to 8085 Microprocessor Functional Pin out, CPU Architecture, Register Organization, Reset Circuit, Clock Circuit, De- multiplexing of Address/Data bus, Generation of control signals, Addressing Modes, Instruction set and programming.	9
Unit 2: 8085 Stack, Interrupts and Interfacing Stack &Subroutines, Interrupts structure of 8085, Memory mapped I/O, I/O mapped	4

I/O, Memory interfacing with 8085.	
Unit 3: 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.	8
Unit 4: Hardware overview Input / Output Ports, Interrupts, Timers/Counters, Serial Communication (Mode-1), (Structure, Related S.F.R and Programming).	6
Unit 5: Interfacing & Assembly Language Programming with 8051 Microcontroller Keyboard, Seven Segment display, ADC, DAC, stepper motor.	4
Unit 6: Embedded 'C' Programming for 8051 Data types, Programs on Arithmetic & Logical operations, Input / Output Ports, Timer/Counter, Serial communication, LCD..	5

Text Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Microprocessor Architecture Programming and Applications with the 8085"	5th Edition	Ramesh Gaonkar	Penram International Publication	2002
2	8051 microcontroller and embedded systems : using Assembly and C	2nd Edition	Muhammad Ali Mazid	Pearson Prentice Hall,	2012

Reference Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Microprocessor & Interfacing	2nd Edition	Douglas Hall	TMH	2006
2	The 8051 Microcontroller	3rd Edition	Kenneth J. Ayala	Cengage Learning Publication,	2007

Web Resources:

1. Nptel Web course on Microprocessor by Dr. Pramod Agarwal, IITRoorkee.
   https://nptel.ac.in/courses/108/107/108107029/

2. Nptel Web course on Microcontrollers and Applications by Dr. S. P. Das, IITKanpur.
https://nptel.ac.in/courses/117/104/117104072/

D. Y. Patil College of Engineering and Technology
Kasaba Bawada, Kolhapur
(An Autonomous Institute)
Department of Electronics & Telecommunication Engineering

T.Y. B. Tech. Curriculum

w.e.f. 2024-2025

Course Title: Information Theory and Coding	
Course Code: 201ETL302	**Semester : V**
Teaching Scheme : L-T-P :3-1-0	**Credit: 4**
Evaluation Scheme : ISE + MSE Marks : 20 + 30	**ESE Marks : 50**

Course Description:

Information is the source of a communication system, whether it is analog or digital. Information theory is a mathematical approach to study the coding of information along with the quantification, storage and communication of information.

Course Objectives:

1	To understand information theory, estimate information content of a random variable from its probability distribution.
2	To analyze communication channels, their capacities and develop construct efficient codes for data on imperfect communication channels.
3	To analyze the need & objective of error control coding with encoding & decoding procedure .

Course Outcomes (COs):

At the end of the course the student will be able to:

302.1	Demonstrate basic concepts of information theory and entropy coding.
302.2	Analyze communication channel models & channel capacity.
302.3	Analyze the error detecting and correcting capability of different coding schemes.
302.4	Design encoder and decoder for various coding techniques as per the need and specifications.

Prerequisite:	Digital Communication, Probability & Mathematics

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	BTL
302.1	3	2	2	2	2	2							2	2	III
302.2	3	3	3	3	2	2							3	3	IV
302.3	3	3	3	3	2	2							2	2	IV
302.4	2	2	3	2	2	2							2	2	VI

Content	**Hrs.**
Unit 1: Information Theory Introduction, Concept of information, Entropy, Mathematical expression, Entropy of Binary Source, Properties and Information Rate, Joint Entropy, Conditional entropy, relation between Joint & Conditional Entropy, Mutual Information: Average Mutual Information, Expression for Mutual information, Relation between Mutual Information & Entropy	7
Unit 2: Channel Capacity And Coding Channel Capacity, Redundancy and Efficiency of channel, Discrete memory less channel – Channel Matrix, Classification of channels: lossless Channel, Deterministic Channel, Noise free channel, Binary Symmetric Channel (BSC), Cascaded Channels and Binary Erasure Channel (BEC), Shannon's fundamental theorem, Entropy Coding: Shannon Fano Coding, Huffman's Coding, Coding Efficiency Calculations.	7
Unit 3: Linear Block Codes Introduction, Error Control Coding: Need, Objectives & Approaches of Error Control Coding, Classification, Error Detection and Error Correction Techniques, Linear Block	7

Code: Structure, Matrix Description of Linear Block Code, Generator and Parity Check Matrices, Encoder and Syndrome decoder for (n, k) block Code.	
Unit 4: Cyclic Codes Algebraic structure, Properties, Polynomial representation of Code-word, Generator Polynomial, Generation of Code Vector in Nonsystematic and Systematic form, Generator and Parity check matrices in Systematic form, Encoding of Cyclic Code, Syndrome decoding for Cyclic code, Hardware Representation of (n, k) cyclic code. Cyclic Redundancy Check Code.	7
Unit 5: BCH & RS Code Binary Field Arithmetic, BCH Code: Properties, Primitive element and primitive polynomial, Primitive BCH Code, Generator Polynomial for BCH Code, Decoding of BCH Code, Reed-Solomon code: Introduction, Error correction capability of RS code, RS code inNon-systematic & Systematic form, Decoding of RS code.	7
Unit 6: CONVOLUTIONAL CODE Introduction, Encoding of Convolutional Codes, Generation of Output code sequence : Time Domain Approach, Transform Domain Approach, Generator Matrix, Graphical Approach – Code Tree, State diagram and Trellis Diagram, Decoding of Codes : Maximum Likelihood Decoding -Viterbi Algorithm, Sequential Decoding .	7

Text Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Information Theory & Coding	2nd Edition.	Muralidhar Kulkarni, K. S. Shivprakasha	Wiley (India) Publication	2014
2	Information Theory, Coding & Cryptography	1st Edition	Arijit Saha, Surajit Mandal	Pearson Education	2013

Reference Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Communication Systems Analog & Digital	2nd Edition	R. P. Singh & S. D. Sapre	MC Graw Hill	2001
2	Information Theory Coding & Cryptography	2nd Edition	Ranjan Bose	MC Graw Hill	2008
3	Introduction to Error Control Codes	2st Edition	Salvatore Gravano	Oxford University Press	2001

Useful Link /Web Resources:

NPTEL Course: https://nptel.ac.in/courses/117101053

List of tutorials		
Sr. No.	**Name of Tutorials**	**Unit No.**
1	Find out the mutual and conditional entropy	1
2	Differentiation between various channels	2
3	Analysis of entropy coding using shanon fano coding	2
4	Analysis of entropy coding using huffman's coding	2
5	Generation of linear block codes and parity matrix	3
6	Error Detection and Error Correction Techniques	3
7	Generation of Code Vector in Nonsystematic and Systematic form	4
8	Problems for encoding of Cyclic Code	4
9.	Solve Generator Polynomial for BCH Code and decoding of BCH Code	5
10	Encoding and decoding of Reed Soleman code	5
11	Encoding of Convolutional Codes	6
12	Maximum Likelihood Decoding & Sequential Decoding	6

(The instructor may choose minimum 10 tutorials**)**

T. Y. B. Tech. Curriculum

w.e.f. 2024-2025

Course Title : Digital Signal Processing	
Course Code : 201ETL303	**Semester : V**
Teaching Scheme : L-T-P : 3-0-0	**Credits : 3**
Evaluation Scheme : ISE + MSE Marks : 20 + 30	**ESE Marks : 50**

Course Description:

This is prerequisite course for Image and Speech Processing. In this students will learn FFT algorithms. The Digital filter design and multi-rate digital signal processing will be studied as the application of digital signal processing.

Course Objectives:

1	To impart the knowledge to classify FFT algorithms and implementation of it for linear filtering of signal.
2	To expose the students about the Digital filter design.
3	To impart the skill for realization of digital filters.
4	To make the students aware about Multi-rate signal processing

Course Outcomes (COs):

At the end of the course the student will be able to:

303.1	Implement FFT algorithms for linear filtering.
303.2	Design digital filters by various methods.

303.3	Test the methods of realization of filters
303.4	Use knowledge of multi-rate signal processing for its applications

Prerequisite: Signals and Systems

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

Course Outcomes (COs)	PO												PSO		BTL
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
303.1	2	2	2	2								1	2	2	IV
303.2	3	3	3	3								1	3	3	VI
303.3	2	2	2	2	-							1	2	2	III
303.4	2	2	2	2	-				1	1		1	3	3	II

Course Contents	Hours
Unit 1. Efficient computation of the DFT Fast Fourier Transform Algorithms Radix -2 DIT and DIF for DFT and IDFT computations, Circular convolution, Fast Convolution : Overlap-Add and Overlap-save algorithm.(Numerical)	7
Unit 2. Design of FIR Filter Symmetric and anti symmetric FIR filters, Design of FIR filter by Fourier series method, windowing method , frequency sampling method	7

Unit 3. Design of IIR Filter Analog filters approximations, mapping of S-plane to Z-plane, Design of IIR filter using Impulse Invariance Method, Bilinear Transformation method, Frequency Transformation, Filter design methods: Butterworth filters, Chebyshev filters and its conversion to digital filter	7
Unit 4. Realization of Digital filters FIR and IIR filter realization in cascade form and parallel form, Effect of finite word length on realization.	7
Unit 5. Multi-rate digital signal processing Need of Multi-rate digital signal processing , decimation by factor D, two stage decimator, interpolation by factor I , two stage Interpolator , sampling rate conversion by rational factor I/D	7
Unit 6. Applications of Multi-rate signal processing Digital phase filter, Interfacing of digital systems with different sampling rate, Implementations of narrowband low pass filters, Implementation of digital filter bank , Subband coding of speech signals	7

Text Books:

1. John G.Proakis and Dimitris G.Manolakis, “Digital Signal Processing: Principles, Algorithms and Applications”, Prentice Hall India,3rd Edition
2. Salivahanam, A Vallavaraj, C. Guanapriya, “Digital Signal Processing”, Tata McGraw Hill Publication

Reference Books:

1. Anand Kumar, “ Digital Signal Processing”, PHI Publications
2. P. Ramesh Babu, “Digital Signal Processing” , SciTech Publication

D.Y.PATIL COLLEGE OF ENGINEERING & TECHNOLOGY

KASABA BAWADA KOLHAPUR-416006

2024-25 SEM-V

Department of Electronics and Telecommunication Engineering

T. Y. B. Tech. Curriculum

w.e.f. 2024-2025

Course Title: Professional Elective –I Digital Image Processing	
Course Code: 201ETL304	**Semester : V**
Teaching Scheme : L-T-P :3-1-0	**Credit: 4**
Evaluation Scheme : ISE + MSE Marks : 20 + 30	**ESE Marks : 50**

Course Description:

In this course students will learn digital image processing fundamentals includes image acquisition representation, image transforms, image enhancement, image smoothing and sharpening, image segmentation and basics of color image processing.

Course Objectives:

1	To learn the fundamental concepts of Digital Image Processing and study basic image processing operations.
2	To understand the basic analytical methods which are widely used in image processing, linear and nonlinear filtering and image transformations
3	To introduce various image segmentation techniques.
4	To introduce basic color image processing.

Course Outcomes (COs):

At the end of the course the student should be able to:

304.1	List fundamental steps involved in Digital Image Processing.
304.2	Apply different transforms and filtering techniques on an image.
304.3	Perform image segmentation.
304.4	Perform various operations on color image.

Prerequisite:	Basic probability theory

D.Y.PATIL COLLEGE OF ENGINEERING & TECHNOLOGY

KASABA BAWADA KOLHAPUR-416006

2024-25 SEM-V

Department of Electronics and Telecommunication Engineering

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

Course Title: Digital image Processing	Semester: V
Course Code: 201ETL304	Year: 2024-2025

Course Outcomes (COs) / Program Outcomes (POs)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	PSO1	PSO2	BTL
304.1	2	2	2										1		I
304.2	3	3	2										2		III
304.3	2	2	2										1		III
304.4	2	2	2										1		III

Content	**Hrs**
Unit 1. INTRODUCTION Concept of digital image processing, steps in image processing, components of image processing system, Applications areas.	5
Unit. 2 DIGITAL IMAGE FUNDAMENTALS Image sensing and acquisition, Basic concept of sampling and quantization, representations of digital image, spatial and gray level resolution, zooming and shrinking of image, Basic relationship between pixels.	8
Unit. 3 – IMAGE ENHANCEMENT IN SPATIAL DOMAIN Basic gray level transformations: image negation, log transformations, power law transformations, piece wise linear transformations, Histogram processing: histogram equalization, histogram matching, Image enhancement using arithmetic and logical operations.	8

Unit 4.- SPATIAL FILTERS Smoothing spatial filters: smoothing linear, order statistic filters, sharpening spatial filters: Use of second derivatives for enhancement, Use of first derivatives for enhancement.	7
Unit. 5 - EDGE DETECTION AND SEGMENTATION Detection of discontinuities: point, line and edge detection, Thresholding, Region based segmentation.	7
Unit.6- COLOR IMAGE PROCESSING Color fundamentals, color models, RGB color model, CMY color model, HSI color model, pseudocolor image processing: intensity slicing, gray level to color transformation.	7

Text Books:

1. Rafael C. Gonzalez and Richard E. Woods, "Digital Image Processing", (Pearson Education publication)

Reference Books:

1) S. Sridhar, "Digital Image Processing", (Oxford)
2) Malay K. Pakhira, "Digital Image Processing and Pattern Recognition", (PHI)

T. Y. B. Tech. Curriculum

w.e.f. 2024-2025

Course Title: (Professional Elective-I) Electromagnetic Engineering	
Course Code: 201ETL305	**Semester: V**
Teaching Scheme: L-T-P : 3-1-0	**Credit:4**
Evaluation Scheme: ISE + MSE Marks : 20 + 30	**ESE Marks : 50**

Course Description:

This course aims to provide the basic knowledge of electronic device operation and the characteristics for various devices along with the basic designing parameters for different applications.

Course Objectives:

1.	To explain basic of vector calculus & co-ordinate systems
2.	To define & derive different laws in steady electric & magnetic fields.
3.	To apply Maxwell's equations in different forms to develop wave equations.
4.	To explain the basic concepts of antenna.

Course Outcomes(COs):

At the end of the course the student should be able to:

305.1	Apply the fundamentals of mathematical skills related with differential, integral and vector calculus.
305.2	Apply and analyze the concepts of steady electric & magnetic fields.
305.3	Analyse field equations from understanding of Maxwell's Equations.
305.4	Extend the knowledge of basic properties of electromagnetic wave propagation for Antenna concepts.

Prerequisite:	Physics, Fundamentals of Electrical Electronics Engg.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSO)

	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO1 2	PS O1	PS O2	BT L
305.1	2	2	2	1	-	-	-	-	-	-	-	-	2	2	III
305.2	2	2	2	1	-	-	-	-	-	-	-	-	2	2	III
305.3	2	2	2	1	-	-	-	-	-	-	-	-	2	2	IV
305.4	2	2	2	1	-	-	-	-	-	-	-	-	2	2	II

Course Contents	Hrs
Unit 1 –Vector Algebra Review of vector Analysis and coordinate systems, Basic vector algebra, Dot product, Cross product, curl, divergence, Gradient.	5
Unit 2 – Electrostatics Coulomb's law & electric field (Numerical Expected) , field due to distributed charges (Numerical Expected), Flux density (Numerical Expected), Gauss's law, divergence theorem, Electrostatic potential, potential gradient, electric dipole.	7
Unit 3 - Steady Magnetic Field Biot Savarts law (Numerical Expected), Ampere's circuital law (Numerical Expected), Stoke's Theorem, Magnetic flux density & Vector magnetic potential, Energy stored in magnetic field, Boundary conditions for magneto static field.	7
Unit 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.	7
Unit 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 equation in phasor form, wave propagation in lossless medium, propagation characteristics of EM waves in free space, conducting medium, good dielectrics and good conductors.	8
Unit 6 -Fundamentals of Antenna Basic Antenna parameters, pattern, beam area, radiation intensity, beam efficiency, directivity, gain and resolution, antenna aperture, effective height, radio communication link, field from oscillating dipole, field zones. Linear, Elliptical	8

Text Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Electromagnetics	2nd Edition.	John D. Kraus	Tata Mc Graw Hill	2007
2	Engineering Electromagnetics	2nd Edition	William Hayt, Buck	Tata Mc Graw Hill	2003

Reference Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Elements of Electromagnetics	4th edition	Sadiku	Oxford University Press	2006
2	Antenna and Wave Propagation	2nd Edition	G.S.N. Raju	Pearson Education	1995

Useful Link /Web Resources:

https://archive.nptel.ac.in/courses/115/104/115104088/

T. Y. B. Tech. Curriculum

w.e.f. 2024-2025

Course Title: Professional Elective-I VLSI Design	
Course Code: 201ETL306	**Semester : V**
Teaching Scheme : L-T-P : 3-1-0	**Credit: 4**
Evaluation Scheme : ISE + MSE Marks : 20 + 30	**ESE Marks : 50**

Course Description:

The course focuses on basics of VLSI design. This creates an integrated circuit (IC) by combining millions of MOS (Metal Oxide Silicon transistor) transistors over a single chip.

Course Objectives:

1.	To understand VLSI design and challenges in VLSI technology
2.	To understand the fabrication steps involved in the MOS transistor.
3.	To analyse modes of operation of MOS transistor and its basic electrical properties.
4.	To measure the performance parameters like threshold voltage, noise margins, time
5.	delays etc of CMOS inverter.
6.	To design static CMOS combinational logic at the transistor level.

Course Outcomes (COs):

At the end of the course the student should be able to:

306.1	Understand VLSI design and challenges in VLSI technology
306.2	Understand the fabrication steps involved in the MOS transistor.
306.3	Analyse modes of operation of MOS transistor and its basic electrical properties.
306.4	Measure the performance parameters like threshold voltage, noise margins, time delays etc of CMOS inverter.
306.5	Demonstrate the ability to design static CMOS combinational logic at the transistor level.
306.6	Demonstrate the ability to design static CMOS sequential logic at the

Prerequisite:	Basic device electronics, MOSFET properties, and logic circuits.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSO)

Course Outcomes (COs) / Program Outcomes (POs)	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2	BTL
306.1	3	2	2	2	2	-	-	-	-	-	-	2	2	2	II
306.2	3	2	2	2	2	-	-	-	-	-	-	2	2	2	II
306.3	2	2	2	2	2	-	-	-	-	-	-	2	2	2	IV
306.4	3	2	3	2	2	-	-	-	-	-	-	2	2	2	IV
306.5	3	3	3	2	3	-	-	-	-	-	-	3	3	3	III
306.6	3	3	3	2	3	-	-	-	-	-	-	3	3	3	III

Course Contents	**Hrs**
Unit 1: Introduction to VLSI design Introduction to VLSI Design; Moore's Law; Scale of Integration; Types of VLSI Chips; Design principles (Digital VLSI); Design Domains(Y-Chart), Challenges of VLSI design- power, timing area, noise, testability reliability, and yield; CAD tools for VLSI design.	7
Unit 2: Introduction to VLSI Technology VLSI Technology-An Overview-Wafer Processing, Oxidation, Epitaxial Deposition, Ion-implantation and Diffusion; The Silicon Gate Process- Basic CMOS Technology; basic n-well CMOS process, p-well CMOS process; Twin tub process.	7
Unit 3: Introduction To MOS Transistor Introduction to MOS Transistor Theory: nMOS, pMOS Enhancement Transistor, MOSFET as a Switch, Threshold voltage, Body effect. MOS Device Design Equations, Basic DC equations, Short Channel Effects and Device Models –	7

Scaling Theory	
Unit 4: MOS Inverters Introduction, Voltage Transfer Characteristic (VTC), Noise Immunity and Noise margins, Resistive-Load Inverter, Inverters with n-Type MOSFET Load and CMOS Inverter, DC Characteristics of CMOS Inverter, Calculation of VIL, VIH, VOL, VOH and Vth, Design of CMOS Inverters, Supply Voltage Scaling in CMOS Inverters, Power and Area considerations**,** Switching Characteristics of CMOS Inverter	7
Unit 5: Combinational MOS Logic Circuits CMOS Logic Circuits (NAND, NOR and Complex Logic Gates, Multiplexers etc.), CMOS Transmission Gates (Pass Gates), Pseudo nMOS logic, Dynamic CMOS logic, Clocked CMOS logic and CMOS Domino logic.	7
Unit 6: Sequential MOS Logic Circuits Behavior of Bistable Elements, The SR Latch Circuit, Clocked Latch and Flip-Flop Circuits, CMOS D-Latch and Edge-Triggered Flip-Flop. Subsystem design process-design of 4-bit shifter, arithmetic building blocks like adders, multipliers and ALU.	7

Text Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Essentials of VLSI Circuits and Systems	--	Kamran Eshraghian, Eshraghian Dougles, A.Pucknell	Prentice Hall India	2005
2	Modern VLSI Design	3rd Edition	Wayne Wolf	Pearson Education	1997

Reference Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Basic VLSI Design	--	Pucknell	Prentice Hall of India Publication	1995
2	Modern VLSI Design System on chip	--	Wayne Wolf	Pearson Education	2002
3	CMOS VLSI Design-A Circuits and Systems Perspective	3rd Edition	Neil H.E Weste, DavidHarris, Ayan Banerjee	Pearson Education	2009

List of tutorials		
Sr. No.	**Name of Tutorial**	**Unit No.**
1	Introduction to VLSI Design	1
2	Design Domain & challenges of VLSI Design	1
3	CAD tools for VLSI Design	1
4	VLSI technology	2
5	Basic CMOS technology	2
6	Introduction to MOS transistor	3
7	Short Channel effects & Scaling theory	3
8	MOS inverter characteristics	4
9	Design of MOS inverter	4
10.	Design of CMOS logic circuits	5
11.	CMOS Logic Structure	5
12.	Clocked CMOS Logic, CMOS Domino logic	5
13.	Design of CMOS latches and flipflops	6
14.	Design of 4 bit shifter	6
15.	Subsystem Design	6

T. Y. B. Tech. Curriculum

w.e.f. 2024-2025

Course Title: Project Management and Economic Policy	
Course Code: 201ETL307	**Semester : V**
Teaching Scheme : L-T-P : 3-1-0	**Credit: 4**
Evaluation Scheme : ISE + MSE Marks : 20 + 30	**ESE Marks : 50**

Course Description:

This is a prerequisite course for Electronics and telecommunication students. In this, students will learn Project management and the process of leading the work of a team to achieve all project goals within the given time. Its main objective is to produce a complete project that combines the client's objective and to make aware of government policy for E&TC and recent trends in a global market in E&TC.

Course Objectives:

1.	To impart the knowledge to conduct a project in the management aspect systematically and scientifically to carry the project development activity.
2.	To make aware of problems analysis and its conversion in to project to resolve problems with effective risk management technique.
3.	To make aware of project management tools and techniques for cost and time-effective project management.
4.	To make aware of Resources requirements and their proper management for successful design development and deployment in projects & to understand the importance of team and teamwork activity and to be able to construct an effective team for a project.
5.	To make aware of ethics in project management for sponsors, funding agencies, project partners, also the ethical, lawful and effective closing of projects.
6.	To make aware of government policy for E&TC and recent trends in Electronics and telecommunication all over the world.

Course Outcomes (COs):

At the end of the course, the student should be able to:

307.1	Understand project management principles and practice during project work.
307.2	Identify and analyse needs, which shall be converted into a Problem statement of project and risk management in the project.

307.3	Apply effective handling of a project in time with help of time management tools and techniques for cost-effective project management.
307.4	Analyse the cost and effective use of project resources, Team building with effective use of talents, and strengths while minimizing individual weaknesses and/or gaps of team members.
307.5	Apply and practice project ethics and the proper closing of a project.
307.6	Understand government policy for E&TC and discover recent trends in the global market.

Prerequisite:	Commercial aspects of Project Management.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSO)

Course Outcomes (COs) / Program Outcomes (POs)	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2	BTL
307.1	1	2	1	-	-	-	-	-	-	-	2	2	-	2	II
307.2	2	2	2	2	-	-	-	-	1	-	2	2	-	-	II
307.3	1	2	2	1	-	-	-	-	-	-	2	-	-	-	III
307.4	-	1	1	1	-	-	-	-	2	2	2	1	-	-	IV
307.5	-	-	-	-	-	-	1	2	-	1	2	-	-	-	III
307.6	-	-	-	-	-	1	-	1	-	1	-	-	-	-	II

Course Contents	Hrs
Unit 1 – Fundamentals of Project Management: Definition, Need of Project management, Project Management process and its importance, Phases of Project Management. Role of project manager, Negotiations and resolving conflicts, various organization structures, Impact of Delays in Project Completions, Project Management Principles, Introduction to project execution plan.	7
Unit 2 -Project Identification, Selection and Risk Management: Introduction, Project Identification Process, Project Initiation, Pre-Feasibility Study, Feasibility Studies, Project Break-even point. Introduction to Project Risk Management, Role of Risk Management in Overall Project Management,Steps in Risk Management, Risk Identification, Reducing Risks	7
Unit 3 – Project Management tools and techniques: PERT and CPM: Introduction, Development of Project Network, Time Estimation, Determination of the Critical Path, PERT Model, CPM Model, Network Cost System Resources Considerations in Projects, Gantt Chart.	7
Unit 4- Resource Allocation in the project: Introduction to resource management: - 7 M's of Management in context with Project Management. Estimating Cost, Manpower, Skill, Technology and Raw material Requirement, Estimate and Budgeting project Cost Forecasts, Financial Management in Projects: Project Finance structure, Process of Project Financial Management: Conducting Feasibility Studies, Planning the Project Finance, Controlling Financial Risk,Team building practices.	7
Unit 5 - : Ethics and Project Closer A.) Project Leadership and Ethics: Introduction to project leadership, ethics in projects, Multicultural and virtual projects, Ethical issues and solutions in project management. B.) Closing the Project: Customer acceptance; Reasons for project termination, various types of project terminations (Extinction, Addition, Integration, and Starvation), Process of project termination, completing a final report, Project management templates	7

and other resources; Managing without authority; Ethical moral and financial responsibility after project closing.	
Unit 6- Recent Trends and Government Policy for E&TC The national policy of government on Electronics, Present situation and budgetary funds and schemes provided to electronics and telecommunication sector, Various trends in present E&TC sector in the local and global market.	7

Text Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Project Management: A Systems Approach to Planning, Scheduling, and Controlling	10th Edition	H.Kerzer	John Wiley & Sons, Inc	2009
2	Projects	8th Edition	Chandra, P	Tata McGraw-Hill Education	2009

Reference Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	The Wiley Guide to Managing Projects	--	Morris, P. W. G. and Pinto, J. K.	John Wiley & Sons	2004
2	The Practical Guide to Project Management	1st Edition,	Christine Petersen	PMP	2013
3	Project Management from Simple to Complex",	--	Russell W. Darnall, John M. Preston	The Saylor Foundation.	--
4	Project Management: Strategic Design and Implementation,	5th Edition.	Lewis, R.	McGraw- Hill,	2006

List of Tutorials:-

Sr.No.	Name of Tutorial	Unit No.
1	Assignment on project management	1
2	Assignment on project Risk management	2
3	Case Study on project Risk management	2
4	Numerical on Properties of CPM/PERT	3
5	Problem illustration using Project Management tools	3
6	Assignment on Conducting Feasibility Studies	4
7	Prepare cost and efforts estimation of a sample project	4

8	Prepare a Business plan for a sample Product/ Service to be Launched.	4
9	Effective Team building practice with a group activity	4
10	Assignment on Project management templates and other resources	4
11	Assignment on Process of project termination	5
12	Case Study on project ethics and project closing	5
13	Assignment on ethical moral and financial responsibility after project closing.	5
14	Study of National policy of the government for Electronics	6
15	Case study on recent trends in E&TC	6

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w.e.f. 2024-2025

Course Title: Microprocessor and Microcontroller - Lab	
Course Code: 201ETP308	**Semester: V**
Teaching Scheme: L-T-P: 0-0-2	**Credit: 1**
Evaluation Scheme: ISE Marks: 25	**ESE Marks: 25**

Lab Course Description: This lab course offers hands-on experience with microprocessors and microcontrollers, emphasizing programming, interfacing, and debugging. Students will work on various experiments, including assembly and "C" language programming, peripheral interfacing, and embedded systems applications. The course aims to bridge theoretical knowledge with practical skills essential for careers in embedded systems..

Course Objectives:

1.	To gain comprehensive understanding of microprocessor and microcontroller architectures and operations through practical experimentation..
2.	To develop proficiency in assembly language programming for the 8085 and 8051 microcontrollers.
3.	To learn to interface microcontrollers with various peripherals such as ADC, DAC, and stepper motors.
4.	To acquire skills in embedded C programming tailored for microcontroller applications.

Course Outcomes (COs):

At the end of the course the student should be able to:

308.1	Apply practical knowledge of microprocessor and microcontroller architectures through hands-on experiments and projects.
308.2	Execute assembly language programs effectively on the 8085 and 8051 microcontrollers.
308.3	Successfully interface and utilize peripherals like ADC, DAC, and stepper motors
308.4	Implement robust embedded C programs for microcontroller applications, including serial communication and timer operations.

Prerequisite:	Digital Electronics and C programming

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSO)

Course Outcomes (COs) / Program Outcomes (POs)	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2	BTL
308.1	1	1	1	1	-	-	-	-	-	-	-	-	-	1	III
308.2	2	2	2	2	2	-	-	-	-	-	-	-	-	-	III
308.3	1	1	2	1	2	-	-	-	-	-	-	-	-	2	III
308.4	1	1	1	1	-	-	-	-	-	-	-	-	-	-	III

List of Experiments			
Expt. No.	**Name of Experiment**	**Type**	**Hours**
1	To design and simulate the assembly code to perform arithmetic & logical operations using 8085	O	2
2	To design and simulate the assembly code to perform the data transfer & exchange using 8085	O	2
3	To design and simulate the assembly code for data conversions using 8085	O	2
4	To design and simulate the assembly code for interrupts Programming using 8085	O	2
5	To design and simulate the assembly code for arithmetic & logical operations using 8051	O	2
6	To design and simulate the assembly code for ascending/ descending order sorting using 8051	O	2
7	To design, simulate and demonstrate the assembly code for interfacings ADC using 8051	O	2
8	To design, simulate and demonstrate the assembly code for interfacings DAC using 8051	O	2

9	To design, simulate and demonstrate the assembly code for interfacings Stepper motor using 8051	O	2
10	To design, simulate and demonstrate the embedded C code for use of timer & counter operation in 8051	O	2
11	To design, simulate and demonstrate the embedded C code for Serial Communication with 8051.	O	2
12	To design, simulate and demonstrate the embedded C code for LCD to 8051	O	2

S: indicates Study type and O: Operational type

* Minimum ten (10) experiments and one Mini project should be completed to teach the entire curriculum of course.

Text Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Microprocessor Architecture Programming and Applications with the 8085"	5th Edition	Ramesh Gaonkar	Penram International Publication	2002
2	8051 microcontroller and embedded systems : using Assembly and C	2nd Edition	Muhammad Ali Mazid	Pearson Prentice Hall,	2012

Reference Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Microprocessor & Interfacing	2nd Edition	Douglas Hall	TMH	2006
2	The 8051 Microcontroller	3rd Edition	Kenneth J. Ayala	Cengage Learning Publication,	2007

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w.e.f. 2024-2025

Course Title : Fundamental of Digital Signal Processing –Lab	
Course Code : 201ETP309	**Semester : V**
Teaching Scheme : L-T-P : 0-0-2	**Credits : 1**
Evaluation Scheme : ISE Marks: 25	**ESE Marks: -**

Course Description:

This is prerequisite course for Image and Speech Processing. In this students will learn FFT algorithms. The Digital filter design and multi-rate digital signal processing will be studied as the application of digital signal processing.

Course Objectives:

1	To impart the knowledge to classify FFT algorithms and implementation of it for linear filtering of signal.
2	To expose the students about the Digital filter design.
3	To impart the skill for realization of digital filters.
4	To make the students aware about Multi-rate signal processing

Course Outcomes (COs):

At the end of the course the student will be able to:

309.1	Implement FFT algorithms for linear filtering.
309.2	Design digital filters by various methods.

309.3	Test the methods of realization of filters
309.4	Use knowledge of multi-rate signal processing for its applications

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

Course Outcomes (COs)	PO												PSO		BTL
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
309.1	2	2	2	2	2							1	2	2	IV
309.2	3	3	3	3	2							1	3	3	IV
309.3	2	2	2	2	2							1	2	2	III
309.4	2	2	2	2	2				1	1		1	3	3	II

List of Experiments			
Experiment No.	**Name of Experiment**	**S/O**	**Hours**
1	Generation of DT signals a) Study of Unit impulse sequence b) Study of Unit step sequence c) Study of	O	2

	Exponential sequence d) Study of Sinusoidal sequence		
2	Convolution and correlation of signals	O	2
3	Computation of DFT & IDFT using standard formula	O	4
4	Computation of DFT using FFT algorithms	O	2
5	Computation of circular convolution	O	2
6	Design of FIR LPF, HPF, BPF, BRF filter using Kaiser window	O	2
7	Design of FIR LPF, HPF, BPF, BRF filter using Hamming window	O	2
8	Design of FIR filter using frequency sampling method	O	2
9	Design of IIR LPF, HPF, BPF, BRF filter using impulse invariance method	O	2
10	Design of IIR LPF, HPF, BPF, BRF filter using bilinear transformation method	O	2
11	Design of Multi-rate FIR filter	O	2
12	Study of FIR & IIR filter using TMS320C67XX processor	S	2

S: Study, O: Operational

Text Books:

1. John G.Proakis and Dimitris G.Manolakis, “Digital Signal Processing: Principles,Alogorithms and Applications”, Prentice Hall India,3rd Edition
2. Salivahanam, A Vallavaraj, C. Guanapriya, “Digital Signal Processing”, Tata McGraw Hill Publication

Reference Books:

1. Anand Kumar, “ Digital Signal Processing”, PHI Publications
2. P. Ramesh Babu, “Digital Signal Processing” , SciTech Publication

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T. Y. B. Tech. Curriculum
w.e.f. 2024-2025

Course Title: Programming Practice	
Course Code: 201ETP310	**Semester: V**
Teaching Scheme: L-T-P : 2-0-2	**Credits: 3**
Evaluation Scheme: ISE Marks : 25	**ESE Marks: 25**

Course Description: This course aims to provide fundamental knowledge of Java programming, object-oriented principles, and practical applications. The course will cover core Java concepts, data structures, exception handling, and database connectivity using JDBC.

Course Objective:

1	To understand and apply the basic concepts of Java programming and object-oriented design.
2	To develop problem-solving skills using Java data structures and algorithms.
3	To implement error handling and file I/O operations in Java applications.
4	To integrate Java applications with databases using JDBC for data manipulation and retrieval.

Course Outcomes (COs):

At the end of the course the student should be able to:

310.1	Write, compile, and execute Java programs using fundamental concepts.
310.2	Implement and manipulate data structures such as arrays, lists, and maps in Java.
310.3	Handle exceptions and perform file I/O operations effectively.
310.4	Develop Java applications that interact with databases using JDBC.

Prerequisite- Basic understanding of programming concepts and logic

Course Articulation Matrix:
Mapping of Course Outcomes (COs) with Program Outcomes (POs)

Course Outcomes (COs) / Program Outcomes (POs)	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2	BTL
310.1	3	2	2	1	2	-	-	-	-	-	-	2	1	1	III
310.2	3	3	2	1	2	-	-	-	-	-	-	2	1	1	IV
310.3	3	3	2	1	2	-	-	-	-	-	-	2	1	1	III
310.4	3	3	3	2	2	-	-	-	-	-	-	2	1	1	IV

Course Content	Hours
Unit 1: Introduction to Java Programming Overview of Java; Java Development Kit (JDK) and Java Runtime Environment (JRE); Basic syntax, variables, data types, and operators; Control statements: if-else, switch-case, loops (for, while, do-while); Introduction to classes, objects, and methods	8
Unit 2: Object-Oriented Programming in Java Principles of Object-Oriented Programming (OOP): encapsulation, inheritance, polymorphism, abstraction; Constructors and method overloading; Inheritance: super keyword, method overriding; Polymorphism: compile-time and runtime; Abstract classes and interfaces	8
Unit 3: Unit 3: Java Data Structures and Exception Handling Arrays, Array List, Linked List, Hash Map, Hash Set; Iterators and enhanced for-loop;	5

Exception handling: try, catch, finally, throw, throws; Custom exceptions; File I/O: reading from and writing to files	
Unit 4: Database Connectivity with JDBC Introduction to JDBC; JDBC architecture and API; Establishing a connection to a database; Executing SQL queries: Statement, Prepared Statement, Callable Statement; Result Set and Result Set MetaData; Transactions and batch processing	7

List of Practicals

Assignment No.	Name of Assignment	S/O	Hours
1	Study of JAVA basics.	S	2
2	Writing basic Java programs using control statements	O	2
3	Implementing classes, objects, and methods in Java	O	4
4	Designing a program using inheritance and polymorphism	O	2
5	Handling exceptions in Java programs	O	2
6	Reading from and writing to files using Java I/O	O	2
7	Implementing data structures: ArrayList, LinkedList, HashMap	O	2
8	Implementing custom exceptions and file I/O	O	2
9	Establishing a JDBC connection to a database	O	2
10	Executing SQL queries using JDBC Statement and PreparedStatement	O	2
11	Handling ResultSet and ResultSetMetaData in JDBC	O	2
12	Mini Project: Developing a Java application to solve a real-world problem	O	2

S-STUDY, O-OPERATIONAL

Note: The instructor may choose minimum 10 assignments from assignment no. 1 to 11 & assignment no. and 12 is mandatory and should start working on 6th assignment after mid semester as home assignment.

Text Books:

1. Herbert Schildt, "Java: The Complete Reference," McGraw-Hill Education.
2. Cay S. Horstmann, "Core Java Volume I–Fundamentals," Prentice Hall.

Reference Books:

1. Bruce Eckel, "Thinking in Java," Prentice Hall.
2. Joshua Bloch, "Effective Java," Addison-Wesley.
3. Kathy Sierra, Bert Bates, "Head First Java," O'Reilly Media.

Online Resources:

1. https://docs.oracle.com/en/java/
2. https://www.geeksforgeeks.org/java/
3. https://www.w3schools.com/java/
4. https://www.javatpoint.com/java-programs

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Department of Electronics & Telecommunication Engineering

T. Y. B. Tech. Curriculum

w.e.f. 2024-2025

Course Name: Industrial Marketing	
Course Code: 201ETL311	**Semester : V**
Teaching Scheme: L-T-P :2-0-0	**Credit: Non Credit Mandatory**
Evaluation Scheme: ISE+MSE : -	**ESE: 50 marks**

Course Description:

In this the students will learn Industrial marketing which is required by companies for industrial marketing especially those who are not in the FMCG sector and selling technology and selling a consumer products In E&TC Engg. maximum marketing is done under B2B form and sometimes B2C with professionals for retailing in electronic goods. but it is a specific course which teaches how to do non-retail marketing may be for technology gadgets spare parts and many more electronic stuff to target NET ZERO Imports and maximise the sales of electronic goods and technology all across the globe to make India Electronic Export Hub.

Course Objectives:

1	To impart the knowledge of Industrial Marketing to Engineering Students
2	To make aware of organisational buying process
3	To make aware of industry segments and find out the exact position of business
4	To make aware of distribution channels and product promotion policy in Industrial Market
5	To make aware of market intelligence and market research

6	To make aware of industrial strategy planning, product development strategy and product price policy in a competitive Industrial market

Course Outcomes (COs):

At the end of the course the student will be able to:

311.1	understand industrial Marketing and Find Its need in E&TC.
311.2	analyse and Identify organizational buying process and Estimate the Strategic Policy accordingly.
311.3	understand Market segmentation and Apply better positioning in market
311.4	judge various distribution and promotion channels and Choose a proper product promotion policy
311.5	understand Industrial market Intelligence and Develop, Apply and practice Industrial market research.
311.6	understand strategy planning for Industrial marketing, Evaluate product development strategy and Estimate the product pricing

Prerequisite:	Commercial aspects

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

Course Outcomes (COs) / Program Outcomes (POs)	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2	BTL
311.1	2	1	-	-	2	2	-	-	-	-	-	2	3	2	II
311.2	1	-	1	2	-	3	2	3	3	2	-	2	3	2	VI
311.3	1	1	2	1	2	-	-	-	-	-	2	-	3	2	III
311.4	-	3	3	2	3	-	-	-	3	3	2	2	3	2	VI
311.5	2	2	2	2	2	-	-	-	1	3	-	2	1	2	VI
311.6	1	2	3	3	-	-	3	1	2	-	2	3	2	2	VI

Content	Hrs
Unit 1: Nature of Industrial Marketing: Industrial Marketing Vs. Consumer Marketing Relational approach to Industrial Marketing- The Nature of Industrial Demand & Industrial Customer. Introduction to different types of Industrial Products: Major Equipment; Accessory Equipment; Raw and Processed Materials; Component Parts and Sub- Assemblies; Operating Supplies; Standardized and Non-standardized parts, Out Sourcing, Innovation of assembly and parts Industrial services Characteristics of services Service Strategy Value Creation Service Assets Service Provider.	5
Unit 2: Organizational Buying structure and Ethics Phases in purchasing decision process & their marketing implications, Buying centres, value analysis & vendor analysis. Factors influencing Organizational	5

Buying: Buying Roles; Organizational Buying Decision Process; Environmental & organizational Influences Organizational Influences on Buying Behaviour	
Unit 3: Industrial market segmentation: Bases for segmenting industrial market-macro and micro variables. Targeting the industrial product, positioning the industrial product. Industrial product life cycle, product mix, Service component Industrial Product Decisions: Industrial Product Life Cycle Industrial Product Mix determinants.	5
Unit 4: Distribution channel and product promotions: The distribution channel component Industrial distributors, Formulation of channel strategy conditions influencing channel structure. A brief introduction to Marketing Logistics. Channel Structure for Industrial Products Geographical, size, operating characteristics manufacturers' and sales agents Brokers Channel Logistics.	4
Unit 5: Market Intelligence and Research MARKET INTELLIGENCE a) Market Intelligence System definition Benefits Key Elements Information Management Processes Intelligence Development Processes Purpose of Market Intelligence b) INDUSTRIAL MARKETING RESEARCH c) Industrial Marketing Research Definition Studying the business trends New Product Studies Sales quota determination and forecasting Market potential and market share analysis Differences in Industrial and Consumer Marketing Research Industrial Marketing Research	5
Unit.6: Strategy planning and pricing policy A) STRATEGY PLANNING Market Selection Segmentation criteria Targeting and Positioning and	

Targeting Strategy Undifferentiated, Differentiated &Concentrated Marketing Customized Marketing B) PRODUCT DEVELOPMENT STRATEGY Developing product strategy Product Policy New Product Development Define product Identify market needs Identify key issues and approaches Idea Generation Idea Screening Concept development & testing Business Analysis Product Development Marketing Testing Commercialization Environmental sustainability of a product. C) PRICING IN INDUSTRIAL MARKETING Pricing Environment Characteristics of Price The Pricing Process in Industrial Marketing Factors affecting industrial pricing decision Pricing Objectives Market Skimming Market Penetration.	4

Text Books:

1. Industrial Marketing – P.K.Ghosh
2. Industrial Marketing – Hawaldar

Reference Books:

1. Alexander, R.S. Cross, J.S. & Hill, M.: Industrial Marketing, Richard Irwin, Homewood, Illinois.
2. Reeder & Reeder: Industrial Marketing, Prentice-Hall, India.
3. Cox. F. (Jr.): Industrial Marketing Research, John-Willey & Sons, New York, 1971.
4. Fisher, L.: Industrial Marketing, Business Books, 1969.

T. Y. B. Tech. Curriculum

w.e.f. 2024-2025

Course Title: Cellular and Mobile Communications	
Course Code: 201ETL312	**Semester : VI**
Teaching Scheme : L-T-P : 3-0-0	**Credit: 3**
Evaluation Scheme : ISE + MSE Marks : 20 + 30	**ESE Marks : 50**

Course Description:

Cellular communication is a form of communication technology that enables the use of mobile phones. Cellular communication is based on the geographic division of the communication coverage area into cells, and within cells. This course is useful for better understanding of cellular communication this course is useful.

Course Objectives:

1.	To understand the evolution of Mobile communication and cell concept to improve capacity of the system
2.	To study the concepts of wireless transmission and to study different types of Equalizers and Diversity techniques.
3.	To study and understand the concept of multiple access techniques
4.	To understand the types of channel coding techniques, data transmission modes and services of GSM& CDMA.

Course Outcomes (COs):

At the end of the course the student should be able to:

312.1	Demonstrate cellular concepts like frequency reuse, fading, equalization, mobile radio propagation, GSM, CDMA.
312.2	Apply various concepts of Wireless transmission
312.3	Apply the concept of multiple access techniques
312.4	Apply the concept of GSM & CDMA in real time applications.

Prerequisite:	Basic knowledge of analog and digital communication

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSO)

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	BTL
312. 1	3	2	2	2	2	-	-	-	-	-	-	-	2	2	III
312. 2	2	2	2	3	2	-	-	-	-	-	-	-	3	3	III
312. 3	3	3	2	3	2	-	-	-	-	-	-	-	2	2	III
312. 4	2	2	3	2	2	-	-	-	-	-	-	-	2	2	III

Course Contents	Hrs
Unit 1: Introduction to Mobile Communication Evolution of Mobile Radio Communication, Paging system, Cordless telephone systems, Cellular telephone Systems, Cellular concept: Frequency reuse, Channel Assignment strategies, Hand off strategies. Interference and System capacity.	7
Unit 2: Wireless transmission Signal propagation, Three basic propagation mechanisms, Reflection, Diffraction, Scattering, Large scale fading, small scale fading, Signal Multiplexing, Spread Spectrum, Equalization & Diversity Techniques.	6
Unit 3: Multiple Access Techniques FDMA, TDMA, CDMA Systems, FDM / TDM Cellular systems, Cellular CDMA, comparison of FDM / TDM systems and Cellular CDMA	8
Unit 4: GSM System Overview GSM: GSM Network architecture, identifiers used in GSM system, GSM channels, frame structure for GSM, GSM speech coding, authentication and security in GSM, GSM hand-off procedures, GSM services and features	7
Unit 5: Telecommunications system DECT: System architecture, Protocol architecture, TETRA, UMTS and IMT-2000: UMTS releases and standardization, UMTS system architecture, UMTS radio interface, UTRAN, Core network, Handover	7
Unit 6: GSM Evolution GPRS And EDGE- architecture, radio specifications, channels. IS-95: Architecture of	7

CDMA system, CDMA air interface, power control in CDMA system, power control, handoff, rake receive	

Text Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Mobile Communications	2nd Edition.	Jochen H. Schiller	Pearson Education	2007
2	Wireless Communications Principles and Practice	2nd Edition	Theodore S. Rappaport	Pearson Education	2003

Reference Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Wireless Communications	2nd Edition	Andreas F. Molisch	John Wiley	2006
2	Mobile Cellular Communications	2nd Edition	W.C.Y. Lee	MC Graw Hill	1995

Useful Link /Web Resources:

https://www.youtube.com/watch?v=oBiGDhnRl8M

https://www.youtube.com/watch?v=Qgm7LsIuYfY

T. Y. B. Tech. Curriculum

w.e.f. 2024-2025

Course Title: Embedded Systems	
Course Code: 201ETL313	**Semester : VI**
Teaching Scheme : L-T-P : 3-0-0	**Credit: 3**
Evaluation Scheme : ISE + MSE Marks : 20 + 30	**ESE Marks : 50**

Course Description:

This is a core course which gives the detailed knowledge of Embedded Systems. It gives the introduction & design of embedded systems. It also gives the exposure of assembly language programming for ARM Processor and Embedded C programming for ARM LPC 2148 Microcontroller. It also gives the introduction to real time operating system.

Course Objectives:

1.	To understand the characteristics of Embedded systems and its Architectures.
2.	To develop skills of ARM programming.
3.	To introduce devices and buses used for embedded networking.
4.	To study key features of Microcontroller LPC214X.
5.	To develop skills of programming on chip resources of LPC214X.
6.	To understand the concept of real time operating systems.

Course Outcomes (COs):

At the end of the course the student should be able to:

313.1	Apply important attributes of Embedded system.
313.2	Develop a meaningful assembly language program using the ARM programmer's model.
313.3	Design small applications of UART, I^2C, SPI.
313.4	Demonstrate the use of on chip resources of LPC 2148.
313.5	Design small applications of ON CHIP resources using embedded C.
313.6	Apply the concepts of RTOS in the Embedded system design.

Prerequisite:	Microprocessors & Microcontrollers, C programming

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSO)

Course Outcomes (COs) / Program Outcomes (POs)	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2	BTL
313.1	2	1	1	1	-	-	-	-	-	-	-	-	-	2	III
313.2	2	2	3	2	-	-	-	-	-	-	-	-	-	2	VI
313.3	1	1	2	2	-	-	-	-	-	-	-	-	-	2	VI
313.4	1	1	1	1	-	-	-	-	-	-	-	-	-	-	III
313.5	1	1	2	2	-	-	-	-	-	-	-	-	-	2	VI
313.6	1	1	1	1	-	-	-	-	-	-	-	-	-	-	III

Course Contents	Hrs
Unit 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	7
Unit 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	7
Unit 3: Embedded Networking Serial Bus communication protocols: RS232 standard, RS485, Serial Peripheral Interface (SPI), Inter Integrated Circuits (I2C). CAN Bus	7

Unit 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, power control, Reset- Block Diagram& RSI register.	7
Unit 5: LPC 2148 On 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	7
Unit 6: Introduction to RTOS Architecture of kernel, task and task scheduler, ISR, Semaphores, Mutex, Mailboxes and Pipes, Message Queues, Timers, Memory Management.	7

Text Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Embedded Systems Architecture, Programming and Design	Third edition	Rajkamal	TMH	2017
2	ARM system developers guide	--	Sloss, Symes, Wright	Morgan Kaufman (Elsevier) publication.	2004

Reference Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	ARM assembly language: fundamentals and Technique	Second edition	William Hohl, Christopher Hinds	CRC Press, Taylor & Francis group	2015
2	ARM Architecture Reference Manual	--	--	ARM	--
3	LPC214x User Manual	Vol-1 Rev-2	Philips/ NXP semiconductor	--	2006
4	An Embedded Software Primer.	Eight edition	David E. Simon.	Pearson Education	2009

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(An Autonomous Institute)
Department of Electronics & Telecommunication Engineering

B. Tech. Curriculum

w.e.f. 2024-2025

Course Name: Industrial Management and Start-ups	
Course Code: 201ETL314	**Semester : VI**
Teaching Scheme: L-T-P :3-0-0	**Credits: 3**
Evaluation Scheme: ISE + MSE Marks : 20 + 30	**ESE Marks: 50**

Course Description:

Management has become inevitable for students of engineering to learn Industrial Management and its application. The basic goal is to aware students of industrial revolution 4.0 and makes them ready for Industrial revolution 5.0 to introduce the students to the fundamentals of Management and aware them with the jargon commonly used Management techniques. This course for E&TC engineering students will clear the concepts of management, especially Industry related management and processes. That will effectively motivate them to be an Entrepreneur. also empowering them to utilize various management concepts for new business start-ups management problems and risk involved in it and steps involved in new business start-ups with various Government Schemes

Course Objectives:

1	To impart the knowledge on business management and strategic management systematically
2	To make aware of innovation and engineering designing process in management aspect.
3	To make aware of quality control and its methods
4	To make aware of entrepreneur skills and motivate them for a new business venture
5	To make aware of financial policies and legal perspective required for a business
6	To make aware of MSME, SSI, and DPIIT Schemes for new start-ups

Course Outcomes (COs):

At the end of the course the student should be able to:

314.1	Understand fundamentals of management and strategic management to Build new skill sets for Entrepreneurship
314.2	Analyse and identify needs of innovation and engineering designing process in the management aspect
314.3	Understand and Apply effective quality control techniques and Evaluate the quality control with help of various tools of QC.
314.4	Understand entrepreneurship and Identify the qualities to improve and enhance to be a successful entrepreneur and Apprise the business.
314.5	Apply various effective financial policies and Understand various legal prospective businesses to Plan for cost-effective legal start-up
314.6	Understand government policy of MSME, SSI, and DPIIT for E&TC or any new start-ups and able to plan for new Start-up

Prerequisite:	Commercial aspects

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

Course Outcomes (COs) / Program Outcomes (POs)	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2	PSO3	BTL
314.1								2			2	2		1	1	II
314.2								2			2	2		1	1	IV

314.3								2			2	2		1	1	III
314.4								2			2	2		1	1	II
314.5								2			2	2		1	1	III
314.6								2			2	2		1	1	II

Content	Hrs
Unit 1: Fundaments of management History of industrial development, Introduction, Definition of management, characteristics of management, functions of management, Principles of Management, Administration and management, Nature and levels of management, managerial skills, managerial roles, Forms of Organization. Forms of ownerships introduction to Globalisation	7
Unit 2: Fundamentals of Innovation and Engineering Design Process Introduction to Engineering Design Process; Design Approaches Forward and Reverse Engineering and goal of Reverse engineering (RE); Methods and techniques of Reengineering, Redesign and Engineering Product Development; Innovative Product Design and Engineering Optimization. Benchmarking and establishing engineering specifications; Design Requirement Analysis and Planning; Integrated Product and Process Design;	7
Unit 3: Quality Control Management Definition of quality, goalpost view of quality, continuous improvement definition of quality, types of quality based on design, conformance and performance, phases of quality management, Juan's and Deming's view of quality, Quality Management Assistance Tools: Ishikawa diagram – Pareto Analysis – Pokka Yoke (Mistake Proofing).quality circles, TQM, Kaizen, Five S (5S), Six Sigma Quality Management Standards (Introductory aspects only)- The	7

ISO 9001:2000 Quality Management System Standard- The ISO 14001:2004 Environmental Management System Standard- ISO 27001:2005 Information Security Management System	
Unit 4: Fundamentals of Entrepreneurship Definition characteristics of entrepreneur Entrepreneurial traits, true motivation & leadership, understanding of the Entrepreneurial process, Opportunity assessment for new ventures, creating a business model with technology differentiators, launching and managing venture, Human resource aspects, understanding of personal aspirations, Entrepreneurial personality development, Entrepreneurial communication, determinants of winning business model, building a balanced team, and sources of capital for creating fixed and working assets including government incentives Entrepreneurship in Indian Scenario and Future prospects in India and emerging economies.	7
Unit 5 :Financial and Legal Aspects of Business Process for effective financial planning, where to start, types of budgets preparation, budget a value-added activity, Concise overview of specific ratios to measure financial performance, liquidity, asset management, profitability, leverage, market value ratios, and comparative analysis, Venture capital and its relation to grants and loan opportunities, business laws enshrined in the Indian constitution, the policies of the state, Income tax structure, the labour laws, Indian commercial laws, EXIM policies, Intellectual property rights (IPR)	7
Unit 6: MSME, DPIIT and various government schemes for start-ups Challenges of MSMEs, Preventing Sickness in Enterprises Specific Management Problems; Industrial Sickness; Industrial Sickness in India Symptoms, process and Rehabilitation of Sick Units. Various schemes of government for new start-ups, Process of applying for MSME, SSI proposal and writing a project proposal for a new business start-up	7

Text Books:

1. Fred R. David Jun 2010 "Fundamentals of Strategic Management, Volume 1", Merrill Publishing Company, 1986 , ISBN 0675205514
2. Stephen P. Robbins, Mary ,June 2016, "Fundamentals of Management 9th edition Pearson Education India.
3. Dr. N. Mishra, Dr. O. P. Gupta , 2022 "Fundamentals Of Management 1st Edition ",SBPD Publishing House

Reference Books:

1. Shuchen B. Thakore Bharat I. Bhatt July 2017 "Introduction to Process Engineering and Design" McGraw Hill Education; Second edition
2. Hardcover, Mehregany Mehran"Innovation for Engineers "
3. Barry Hyman Nov2002, "Fundamentals of Engineering Design", Pearson; IIed edition
4. Yousef Haik Jan2017 "Engineering Design Process" CL Engineering; 3nd edition
5. Kenneth Rose May 2014"Project Quality Management", J Ross Publishing; 2nd edition
6. David L. Goetsch Apr 2002 "Introduction to Total Quality Management for Production, Processing, and Services" Pearson; 4th edition
7. Ravinder Kuamr July 2016 Legal Aspects of Business Cengage Learning India Private Limited; Fourth edition
8. Prasanna Chandra , "Financial Management: Theory and Practice" McGrawHill
9. Rashmi Aggarwal "Legal Aspects of Business" Pearson Education First Edition

T. Y. B. Tech. Curriculum

w.e.f. 2024-2025

Course Title: Image Processing and Analysis (Professional Elective –II)	
Course Code: 201ETL315	**Semester : VI**
Teaching Scheme : L-T-P :3-1-0	**Credit:4**
Evaluation Scheme : ISE + MSE Marks : 20 + 30	**ESE Marks : 50**

Course Description: To familiarize students with image enhancement in frequency domain , morphological processing techniques and image compression methods at the same time the learn how images are described and represented.

Course Objectives:

1	To introduce frequency domain approach for image processing.
2	To study fundamentals of wavelet transform
3	To understand different morphological operations and image compression methods
4	To learn image representation & description techniques.

Course Outcomes (COs):

At the end of the course the student should be able to:

315.1	Apply frequency domain approach for image enhancement.
315.2	Compare compression techniques.
315.3	Apply morphological operations
315.4	Represent and describe images in various methods.

Prerequisite:	Basics of image processing

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

Course Outcomes (COs) / Program Outcomes (POs)	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2	BTL
315.1	2	2	2										2		III
315.2	2	2	2										1		IV
315.3	2	2	2										1		III
315.4	2	2	2										2		II

Content	Hrs
Unit 1.– FREQUENCY DOMAIN FILTERS Basics of filtering in the Frequency Domain , Smoothing: Ideal low pass filter, Butterworth, Gaussian low pass filters, Sharpening in frequency domain: Ideal high pass filter, Butterworth high pass filters, Gaussian high pass filters. Laplacian in frequency domain.	7
Unit. 2 WAVELETS AND MULTIRESOLUTION PROCESSING Image pyramids, Sub-band coding, the Haar transform, Series expansions, scaling functions, wavelet functions, the discrete wavelet transform.	7
Unit. 3 – IMAGE COMPRESSION Fundamentals, coding redundancy, inter pixel redundancy, psycho visual redundancy, fidelity criteria, image compression models, elements of information theory, lossless predictive coding, Lossy predictive coding.	7
Unit 4.- MORPHOLOGICAL IMAGE PROCESSING Dilation & erosion, opening and closing operation, Hit- or – miss transformation. Basic morphological algorithms: Boundary extraction, region filling, thinning and thickening, skeletons	8
Unit. 5 - IMAGE REPRESENTATION Introduction to Boundary, Chain Code, Polygonal Approximation, signature, boundary Segments, skeletons	6

Unit.6- IMAGE DESCRIPTION Boundary Descriptors: Simple Descriptor, shape numbers, Fourier descriptors, statistical moments, Regional Descriptors: Simple Descriptors, Topological Descriptors and Relational Descriptors.	7

Text Books:

1. Rafael C. Gonzalez and Richard E. Woods, "Digital Image processing", Pearson Education publication

Reference Books:

1 . S. Sridhar , "Digital Image Processing", Oxford
2. M. K. Pakhira , "Digital Image Processing and Pattern Recognition",PHI
3. B.Chanda , D. Dutta Majumder , "Digital Image Processing and Analysis", PHI

T. Y. B. Tech. Curriculum

w.e.f. 2024-2025

Course Title: Satellite Communication (Professional Elective –II)	
Course Code: 201ETL316	**Semester : VI**
Teaching Scheme : L-T-P :3-1-0	**Credit: 4**
Evaluation Scheme : ISE + MSE Marks : 20 + 30	**ESE Marks : 50**

Course Description:

The course introduces the students to the basic concept in the field of satellite communication. This will enable the students to know how to place a satellite in an orbit and about the earth & space segment. Satellite telecommunication systems with an emphasis on modern systems and their link budgets. Topics will include a historical perspective, orbital mechanics and constellations, choice of orbital parameters, propagation considerations, link budgets, interference issues and other obstacles.

Course Objectives:

1	To understand the basics of satellite orbits.
2	To understand the satellite segment and earth segment
3	To analyse the various methods of satellite access
4	To understand the applications of satellites.
5	To understand the basics of satellite Networks
6	To understand the basics of satellite orbits

Course Outcomes (COs):

At the end of the course the student should be able to:

316.1	Understand Orbital aspects involved in satellite communication.
316.2	Understand various subsystems in satellite communication system.

316.3	Explain and Analyse Link budget calculation.
316.4	Understand Satellite Network System
316.5	Explain Non Geostationary Satellite Systems
316.6	Explain different applications of Satellite Systems

Prerequisite:	Analog & Digital Communication system

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

Course Title: Satellite Communication	Semester: II
Course Code: 201ETL316	Year: 2024-2025

Course Outcomes (COs) / Program Outcomes (POs)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	PSO1	PSO2	BTL
316.1	3	2	3	-	2	-	-	-	-	2	1	1	1	3	II
316.2	3	2	3	-	2	-	-	-	-	2	1	1	1	3	II
316.3	3	2	3	-	2	-	-	-	-	2	1	1	1	3	II
316.4	3	2	3	-	2	-	-	-	1	2	1	1	1	3	II
316.5	3	2	3	-	2	-	-	-	2	2	1	1	2	3	II
316.6	3	2	3	-	2	-	-	-	2	2	1	1	2	3	II

Content	**Hrs**
Unit 1: Introduction Of Satellite: Introduction, Basic Concept Of Satellite Communication, Satellite Orbits, Keple€s Laws, Newton€s Law, Orbital Parameters Orbital Mechanics, Look Angle Determination, Orbital Perturbation, Orbital Determination Launchers And Launch Vehicles, Orbital Effects in Communication System Performance..	8
Unit 2: Satellite Space Segment Subsystem: Introduction, Attitude And Control System (AOCS), Telemetry, Tracking, Command And Monitoring, Power Systems, Communication Subsystem, Satellite Antennas, Telemetry ,Equipment Reliability And Space Qualification, The Antenna Subsystem	8
Unit 3: Satellite Link Design: Introduction, Basic Transmission Theory, System Noise Temperature And G/T	7

Ration, Design Of Downlinks, Uplink Design, Design Of Specified C/N : Combining C/N And C/I Values in Satellite Links. Link Design With And Without Frequency Reuse **(Numerical Expected)**.	
Unit 4: Satellite Networks: Reference Architecture For Satellite Networks, Basic Characteristics of Satellite Networks, Onboard Connectivity With Transparent Processing, Analogue Transparent Switching, Frame Organization, Window Organization, On Board Connectivity With Beam Scanning.	7
Unit 5: Low Earth Orbit And Non Geo-Stationary Satellite System: Introduction, Orbit Considerations, Coverage And Frequency Consideration, Delay And Throughput Consideration, Operational NGSO Constellation Design: Iridium, Teledesic.	5
Unit 6: Satellite Applications: Communication Satellite-Digital DBS TV, Mobile Satellite Services: GSM, GPS, Inmarsat, LEO, MEO, Satellite Radio Broadcasting, Navigation Satellite, GPS Position Location Principles, GPS Receivers and Codes. Military Satellite- Directed Energy Laser Weapons, Weather Forecasting Satellite Application.	7

Text Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Satellite Communications	1st Edition.	Timothy Pratt, Charles Bostian, Jeremy Allnut John Wiley &Sons		
2	Satellite Communications	2nd Edition	Anil K. Maine And Varsha Agaraval	Wiley Publications	

Reference Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Satellite Communications	2nd Edition.	Gerard Maral And Michel Bousquet	Wiley	2007
2	Satellite Communications Systems Engineering	2nd Edition	Wilbur L. Pritchard, Henri G.Suyderhoud And		2003

			Robert A. Nelson		

Useful Link /Web Resources:

https://www.nptelvideos.com/communications/?pn=6

T. Y. B. Tech. Curriculum

w.e.f. 2024-2025

Course Title: ASIC Design (Professional Elective-II)	
Course Code: 201ETL317	**Semester : VI**
Teaching Scheme : L-T-P : 3-1-0	**Credit: 4**
Evaluation Scheme : ISE + MSE Marks : 20 + 30	**ESE Marks : 50**

Course Description:

This course provides a comprehensive exploration of Application-Specific Integrated Circuit (ASIC) design, covering fundamental concepts, physical design considerations, logic synthesis techniques, simulation, testing methodologies, and an in-depth study of programmable ASICs and Field-Programmable Gate Arrays (FPGAs).

Course Objectives:

1	To study the design flow of different types of ASIC.
2	To familiarize the different types of programming technologies and logic devices.
3	To gain knowledge about partitioning, floor planning, placement and routing including circuit extraction of ASIC
4	To analyse the synthesis, Simulation and testing of systems
5	To know about different high performance algorithms and its applications in ASIC
6	To study the basic of FPGA.

Course Outcomes (COs):

At the end of the course the student should be able to:

317.1	Understand the design flow of different types of ASIC.
317.2	Understand the different types of programming technologies and logic devices.
317.3	Apply the knowledge about partitioning, floor planning, placement and routing
317.4	Analyse the synthesis, Simulation and testing of systems
317.5	Understand the different high performance algorithms and its applications in ASIC
317.6	Understand the basic of FPGA.

Prerequisite:	Digital System Design

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSO)

Course Outcomes (COs) / Program Outcomes (POs)	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2	BTL
317.1	2	2	1												II
317.2	2	1	1												II
317.3	1	2	3												III
317.4	1	2	2	3											IV
317.5	1	2													II
317.6	1	2													II

Course Contents	Hrs
Unit 1 Introduction to ASIC Types of ASICs ,Design flow ,Economics of ASICs ,ASIC cell libraries ,CMOS logic cell data path logic cells,I/O cells ,cell compilers	7
Unit 2 ASIC Physical Design System partition ,partitioning ,partitioning methods , interconnect delay models and measurement of delay, floor planning, placement , Routing: global routing , detailed routing, special routing , circuit extraction , DRC	7
Unit. 3 Logic Synthesis Design systems , Logic Synthesis ,Half gate ASIC ,Schematic entry, Low level design language, PLA tools, EDIF,CFI design representation. Verilog and logic synthesis ,VHDL and logic synthesis	7
Unit4: **Simulation And Testing** Types of simulation ,fault models ,stuck at faults ,boundary scan test ,fault simulation ,	7

automatic test pattern generation.	
Unit 5-Programmable ASICs, Programmable ASIC Logic Cells And Programmable ASIC I/O Cells Anti fuse, static RAM , EPROM and EEPROM technology , Actel ACT , Xilinx LCA, Altera FLEX, Altera MAX DC & AC inputs and outputs Clock & Power inputs Xilinx I/O blocks.	7
Unit 6– FPGA Field Programmable gate arrays- Logic blocks, routing architecture, Design flow technology – mapping for FPGAs, Xilinx XC4000 – ALTERA's FLEX 8000/10000, ACTEL's ACT-1,2,3 and their speed performance	7

Text Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Application – Specific Integrated Circuits		J.S.Smith	Pearson Education	2008
2	HDL Chip Design		Douglas J. Smith	Doone Publications	1996

Reference Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Digital Design Using Field Programmable Gate Array		K.Chan& S. Mourad	Prentice Hall,	1994
2	Timing Verification of Application-Specific Integrated Circuits (ASICs).		Nekoogar	Prentice Hall PTR,	1999

T. Y. B. Tech. Curriculum

w.e.f. 2024-2025

Course Title: Sensor Technology (Open Elective-I)	
Course Code: 201ETL318	**Semester : VI**
Teaching Scheme : L-T-P : 3-1-0	**Credit: 4**
Evaluation Scheme : ISE + MSE Marks : 20 + 30	**ESE Marks : 50**

Course Description:

The aim of the course is to provide students with the knowledge of transduction principles, sensors, transducer technology and measurement systems. To provide better familiarity with theoretical concepts of sensors. To provide familiarity with different sensors and their application.

Course Objectives:

1.	To provide basic knowledge in transduction principles, sensors and transducer technology.
2.	To provide better familiarity with the theoretical and practical concepts of Transducer.
3.	To provide familiarity with different sensors and their application in real life.
4.	To provide knowledge of various measurement methods of physical and electrical parameters.
5.	To analyse the experimental applications to engineering modules and practices for the industry/society needs.
6.	To analyse the need of a suitable sensor for distance, acoustic parameter measurement.

Course Outcomes (COs):

At the end of the course the student should be able to:

318.1	Identify suitable sensors and transducers for real time applications.
318.2	Use the theoretical concepts into working models.
318.3	Analyse the experimental applications to engineering modules and practices.
318.4	Analyse the experimental applications for the industry/society needs.
318.5	Use the suitable sensor for appropriate physical parameter measurement.

318.6	Analyse the need of a suitable sensor for distance, acoustic parameter measurement.

Prerequisite:	knowledge of Basic Electronics & Semiconductor Physics

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSO)

Course Outcomes (COs) / Program Outcomes (POs)	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2	BTL
318.1	1	2	1	2	-	-	-	-	-	-	-	-	1	1	II
318.2	2	2	1	1	-	-	-	-	-	-	-	-	-	-	III
318.3	1	2	1	2	-	-	-	-	-	-	-	-	1	2	IV
318.4	1	2	1	2	-	-	-	-	-	-	-	-	-	2	IV
318.5	2	2	1	2	-	-	-	-	-	-	-	-	-	-	III
318.6	2	1	2	2	-	-	-	-	-	-	-	-	1	2	IV

Course Contents	**Hrs**
Unit No 1: Sensor fundamentals and characteristics Sensor, Sensor Classification, Performance and Types, Error Analysis characteristics.	5
Unit No 2: Optical Sources and Detectors Electronic And Optical properties of semiconductor as sensors, LED, Semiconductor lasers, Fiber optic sensors, Thermal detectors, Photo multipliers, photoconductive detectors, Photo diodes, CCDs.	9
Unit No 3: Velocity and Acceleration sensors Capacitive Accelerometer, Piezo resistive Accelerometers, Piezoelectric Accelerometer,	7

Piezoelectric cables.	
Unit No 4: Strain, Force, and Pressure sensors Strain gauges, Potentiometric and capacitive sensors, Piezoelectric sensor, load cell, optoelectronic pressure sensors, bellows, MEMS Sensors, Piezoelectric force sensors.	7
Unit No 5: Position, Displacement and Level sensors Potentiometric sensor, capacitive sensor, Inductive and magnetic sensor: LVDT and RVDT, Hall effect sensors. Optical sensors: Optical bridge, Proximity detector, linear optical sensor, Ultrasonic sensor.	7
Unit No 6: Flow, Temperature, Humidity and Acoustic sensors Flow sensors: Ultrasonic, electromagnetic and Breeze sensor., Temperature sensors-thermoresistive, thermoelectric, semiconductor and optical. Piezoelectric temperature sensor. Acoustic sensors- microphones-resistive, capacitive, piezoelectric, fiber optic. Concept of Humidity, capacitive sensor, Optical Hygrometer.	7

Text Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Sensors, Actuators, and their Interfaces: A Multidisciplinary Introduction	First edition	Nathan Ida	SciTech Publishing, an imprint of IET	2014
2	Measurement, Instrumentation and sensor Handbook	Second edition	John G Webster	CRC Press	2014
3	Sensors and Actuators	First edition	Francisco André Corrêa Alegria	World scientific publishing Co. Pvt. Ltd.	2021

Reference Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Sensor & Instrumentation	Second edition	Sawhney A.K.	Dhanpat Rai & Co.	--
2	Fiber optic sensors: An introduction for engineers And scientists	Second edition	Eric Udd and W.B. Spillman	Wiley, New Jersey	2013

Sr. No	Title	Edition	Author(s)	Publisher	Year
3	Hand Book of Modern Sensors: physics, Designs and Applications	Third edition	Jacob Fraden	Springer, New York	2015

List of Tutorials

Sr. No.	Name of Tutorial	Unit No.
1	Explain the classification of sensor	1
2	Explain characteristics of sensor	1
3	Study of optical sources	2
4	Study of optical detectors	2
5	Study of Photomultiplier, CCDs.	2
6	Study of velocity sensors	3
7	Study of Acceleration Sensors	3
8	Study of MEMs Sensor, Piezoelectric force sensors	3
9	Study of Strain sensors	4
10	Study of Torque and pressure sensors	4
11	Study of Position sensors	5
12	Study of displacement and level sensors	5
13	Study of flow and Temperature sensor	6
14	Study of acoustic sensor	6
15	Study of Ultrasonic sensors, electromagnetic & breeze sensors.	6

(The instructor may choose minimum 10 tutorials)

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T. Y. B. Tech. Curriculum

w. e .f. 2022-2023

Course Title : Electronic Instrumentation (Open Elective I)	
Course Code : 201ETL319	**Semester : VI**
Teaching Scheme : L-T-P : 3-1-0	**Credits : 4**
Evaluation Scheme : ISE +MSE Marks : 20+30	**ESE: 50 marks**

Course Description:

Instrumentation system plays primary role in the designing of measurement applications. In today's telecommunication world knowing physical parameter is very important to forecast certain things, and this is possible only when we study instrumentation and control system subject. The students will learn different types of Measuring instrument, Virtual Instrumentation along with basic concepts of measurement systems.

Course Objectives:

At the end of the course the student will be able to

1	explain student types of Measuring Instruments along with working principles the digital voltmeter
2	motivate the students to study Virtual instrument with lab view
3	motivate students to study AC and DC bridges
4	explain students the study of Digital storage oscilloscope, signal generators and analysers

Course Outcomes (COs):

At the end of the course the student should be able to:

319.1	Understand and identify the instrument suitable for specific measurements.
319.2	Use and identify the basic principles of Virtual instrument
319.3	Understand construction, working principle of AC and DC bridges
319.4	Acquire knowledge of analysing different types of Digital storage oscilloscope, signal generators and Analysers.

Prerequisite:	Physics

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSO)

Course Outcomes (COs) / Program Outcomes (POs)	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2	BTL
319.1	3	3	3	3	-	-	-	-	-	-	-	-	2	2	II
319.2	3	3	3	3	-	-	-	-	-	-	-	-	3	3	II
319.3	1	1	1	1	-	-	-	-	-	-	-	-	1	1	II
319.4	3	3	3	3	-	-	-	-	-	-	-	-	3	3	IV

Content	Hrs
Unit 1: Introduction to Measurement Systems and Measuring Instruments: Measurements, significance of measurements, methods of measurements- Direct & indirect method, elements of generalized measurement system, measurement system performance, Performance characteristics- static and dynamic characteristic, Errors- Types & source of error.	**7**
Unit 2: **Digital voltmeters** Introduction, Dual Slope Integrating type DVM, Integrating type DVM & successive approximation principles, general specifications of DVM, digital multimeter	**6**
Unit 3: Virtual Instrumentation Introduction to virtual instrumentation, Role of Software in Virtual Instrumentation, Virtual Instrumentation with Lab VIEW, Components of Lab VIEW application	**5**
Unit 4: AC and DC Bridges DC bridges: Introduction , wheatstone's bridge, Kelvin bridge, guarded Wheatstone bridge, AC bridges : Condition for bridge balance .Maxwell bridge	**5**
Unit 5: Digital Storage Oscilloscope and Spectrum Analyser Digital Storage oscilloscope blocks diagram, sampling rate, and bandwidth. 10X Probe Spectrum analyzer block diagram	**6**
Unit 6: Signal Generators and Analysers Signal generators: Function generators, Sweep, pulse and square wave generator. Wave Analyzers: Introduction, basic wave analyzer, heterodyne harmonic distortion analyzer, spectrum analyser, Wobbluscope	**7**

Text Books:

1. Sawhney A.K., Electrical and Electronics Measurements and Instruments, Dhanpat Rai & Co.02ndEd.
2. W. D. Cooper & A. D. Helfrick, Electronic Instrumentation and Measurement Techniques", PHI, 4the/d,1987.
3. David Bell ," Electronic Instrumentation and Measurements",PHI,2e/d

Reference Books:

1. Hewlett Packard, Tektronics, Advantest, Aplab,"Application Noteson Measurement".
2. Bouwens A.J. Digital Instrumentation, McGraw-Hill, second edition
3. Ogata Katsuhiko, "Modern Control Engineering",5thEdition,PHI
4. NagrathI .J.andM. Gopal,"Control Systems Engineering",6th edition, New Age international

List of tutorials		
Sr. No.	**Name of Tutorial**	**Unit No.**
1	Explain the methods of measurements	1
2	Explain static and dynamic characteristics	1
3	Study of Digital voltmeters	2
4	Study of virtual instrumentation	3
5	Study of components of lab view application	3
6	Study of DC bridges	4
7	Study of AC bridges	4
8	Study of digital storage oscilloscope	5
9.	Study of 10x probe spectrum analyzer	5
10	Study of signal generator	6
11	Study of function generator	6
12	Study of wave analyzer	6

(The instructor may choose minimum 10 tutorials**)**

T. Y. B. Tech. Curriculum

w.e.f. 2024-2025

Course Title: Cellular and Mobile Communications -Lab	
Course Code: 201ETP320	**Semester : VI**
Teaching Scheme : L-T-P : 0-0-2	**Credit: 1**
Evaluation Scheme : ISE: 25	**ESE OE Marks : 25**

Course Description:

Cellular communication is a form of communication technology that enables the use of mobile phones. Cellular communication is based on the geographic division of the communication coverage area into cells, and within cells. This course is useful for better understanding of cellular communication this course is useful.

Course Objectives:

1.	To understand the evolution of Mobile communication and cell concept to improve capacity of the system
2.	To study the concepts of wireless transmission and to study different types of Equalizers and Diversity techniques.
3.	To study and understand the concept of multiple access techniques
4.	To understand the types of channel coding techniques, data transmission modes and services of GSM& CDMA.

Course Outcomes (COs):

At the end of the course the student should be able to:

320.1	Demonstrate cellular concepts like frequency reuse, fading, equalization, mobile radio propagation, GSM, CDMA.
320.2	Apply various concepts of Wireless transmission
320.3	Apply the concept of multiple access techniques
320.4	Apply the concept of GSM & CDMA in real time applications.

Prerequisite:	Basic knowledge of analog and digital communication

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSO)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	BTL
320.1	3	2	1	1	2			2	1			2	2	3	III
320.2	3	2	1	2	1			1	1				2	2	III
320.3	3	1	2	1	2			2	1			1	2	1	III
320.4	2	2	2	2	2			2	1				2	2	III

List of Experiments			
Expt. No.	**Name of Experiment**	**Type**	**Hours**
1	Develop a mobile application for wireless technology using any wizards	O	2
2	Transfer an image, audio and video file using Bluetooth protocol with varying distance between two devices and analyse the performance	O	2
3	Configure Wi-Fi setting in mobile devices using mobile tethering	O	2
4	Simulate the Binary Phase shift keying using MATLAB and Simulink.	O	2
5	Simulate the Direct Sequence Spread Spectrum using MATLAB and Simulink	O	2
6	Study of Multiple Access Techniques	O	2
7	Study & Observe Transmitted & Received IQ Signals	O	2
8	Study & Measurement Voltage & Power Management Unit	O	2
9	Study of switch faults in battery management Systems	O	2
10	Study & Observe LCD display Section	O	2
11	Study & Observe Key pad Section	O	2
12	Study & Observe sound section	O	2

S: indicates Study type and O: Operational type

Text Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Mobile Communications	2nd Edition.	Jochen H. Schiller	Pearson Education	2007
2	Wireless Communications Principles and Practice	2nd Edition	Theodore S. Rappaport	Pearson Education	2003

Reference Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Wireless Communications	2nd Edition	Andreas F. Molisch	John Wiley	2006
2	Mobile Cellular Communications	2nd Edition	W.C.Y. Lee	MC Graw Hill	1995

Useful Link /Web Resources:

https://www.youtube.com/watch?v=oBiGDhnRl8M

https://www.youtube.com/watch?v=Qgm7LsIuYfY

T. Y. B. Tech. Curriculum

w.e.f. 2024-2025

Course Title: Embedded System Lab	
Course Code: 201ETP321	**Semester: VI**
Teaching Scheme: L-T-P: 0-0-2	**Credit: 1**
Evaluation Scheme: ISE Marks: 25	**ESE Marks: 25**

Lab Course Description: This lab-oriented course introduces the assembly language programming of ARM processor as well as Embedded C programming of ARM LPC 2148 Microcontroller useful for the design & development of Embedded System.

Course Objectives:

1.	To understand the characteristics of Embedded systems and its Architectures.
2.	To develop skills of ARM programming.
3.	To introduce devices and buses used for embedded networking.
4.	To study key features of Microcontroller LPC214X.
5.	To develop skills of programming on chip resources of LPC214X.

Course Outcomes (COs):

At the end of the course the student should be able to:

321.1	Apply important attributes of Embedded system.
321.2	Develop a meaningful assembly language program using the ARM programmer's model.
321.3	Design small applications of UART, I^2C, SPI.
321.4	Demonstrate the use of on chip resources of LPC 2148.
321.5	Design small applications of ON CHIP resources using embedded C.

Prerequisite:	Microprocessors & Microcontrollers, C programming

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSO)

Course Outcomes (COs) / Program Outcomes (POs)	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2	BTL
321.1	1	1	1	1	-	-	-	-	-	-	-	-	-	1	III
321.2	2	2	2	2	2	-	-	-	-	-	-	-	-	-	VI
321.3	1	1	2	1	2	-	-	-	-	-	-	-	-	2	VI
321.4	1	1	1	1	-	-	-	-	-	-	-	-	-	-	III
321.5	1	1	1	1	1	-	-	-	-	-	-	-	-	1	VI

List of Experiments			
Expt. No.	**Name of Experiment**	**Type**	**Hours**
1	To design and simulate the assembly code for ALU operations for ARM Processor.	O	2
2	To design and simulate the assembly code for block move operations for ARM Processor.	O	2
3	To design and simulate the assembly code for block exchange operations for ARM Processor.	O	2
4	To design and simulate the assembly code to find largest of data words for ARM Processor.	O	2
5	To design and simulate the assembly code for Pre-index with write-back addressing mode.	O	2
6	To design and simulate the assembly code for ascending order sorting for ARM Processor.	O	2
7	To design, simulate and demonstrate the embedded C code for LED blinking using GPIO of ARM LPC 2148.	O	2

8	To design, simulate and demonstrate the embedded C code for key pad interface using GPIO of ARM LPC 2148.	O	2
9	To design, simulate and demonstrate the embedded C code for stepper motor interface using GPIO of ARM LPC 2148.	O	2
10	To design, simulate and demonstrate the embedded C code for relay interface using GPIO of ARM LPC 2148.	O	2
11	To design, simulate and demonstrate the embedded C code for Buzzer interface using GPIO of ARM LPC 2148.	O	2
12	To design, simulate and demonstrate the embedded C code for On chip I2C interface of ARM LPC 2148.	O	2
13	To design, simulate and demonstrate the embedded C code for On chip ADC interface of ARM LPC 2148.	O	2
14	To design, simulate and demonstrate the embedded C code for On chip DAC interface of ARM LPC 2148.	O	2
15	To design, simulate and demonstrate the embedded C code for On chip Timer interface of ARM LPC 2148.	O	2

S: indicates Study type and O: Operational type

* Minimum twelve (12) experiments should be performed to teach the entire curriculum of course.

Text Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Embedded Systems Architecture, Programming and Design	Third edition	Rajkamal	TMH	2017
2	ARM system developers guide	--	Sloss, Symes, Wright	Morgan Kaufman (Elsevier) publication.	2004

Reference Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	ARM assembly language: fundamentals and Technique	Second edition	William Hohl, Christopher Hinds	CRC Press, Taylor & Francis group	2015
2	ARM Architecture Reference Manual	--	--	ARM	--
3	LPC214x User Manual	Vol-1 Rev-2	Philips/ NXP semiconductor	--	2006

Sr. No	Title	Edition	Author(s)	Publisher	Year
4	An Embedded Software Primer.	Eighth edition	David E. Simon.	Pearson Education	2009

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T. Y. B. Tech. Curriculum

w.e.f. 2024-2025

Course Title : Mini-Project-II	
Course Code : 201ETP322	**Semester : VI**
Teaching Scheme : L-T-P : 0-0-2	**Credits : 1**
Evaluation Scheme : ISE Marks : 25	**POE Marks : 25**

Lab Course Description: This course gives introduction of electronic hardware systems and provides hands-on training with identification, testing, assembling, dismantling, and fabrication of new electronics project.

Course Objectives:

1	To analyze and define a project problem statement in consultation with a guide.
2	To create a detailed implementation plan using PERT/CPM charts.
3	To design and simulate electronic circuits using tools like eSim, OrCAD, and Matlab.
4	To evaluate and select components, and apply skills in fabricating, assembling, and testing electronic circuits.
4	To compose project documentation, including writing a synopsis, project report, and creating a Bill of Material.

Course Outcomes (COs):

At the end of the course the student should be able to:

322.1	Evaluate project ideas and finalize them through effective consultation with a guide.
322.2	Create and manage a project timeline and implementation plan using PERT/CPM charts.
322.3	Design and simulate electronic circuits, ensuring functionality and performance through tools like eSim, OrCAD, and Matlab.
322.4	Construct, assemble, and test electronic circuits, demonstrating practical skills

	in electronics projects.
322.5	Prepare comprehensive project report, including a detailed Bill of Material, and present project outcomes effectively.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

Course Outcomes (COs) / Program Outcomes (POs)	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2	BTL
322.1	3	-	-	-		-	-	-	-	-	-	1	1	-	IV
322.2	3	1	-	-	1	-	-	-	-	-	-	1	1	-	VI
322.3	3	2	1	-	2	-	-	-	-	-	-	1	1	-	VI
322.4	3	2	1	-	2	-	-	-	1	1	-	1	1	-	III
322.5	3	2	1	-	2	-	-	-	1	1	-	1	1	-	VI

Mini project work should consist of following steps.

Sr. No.	Mini project work should consist of following steps
1	Students should propose project ideas & finalize the project idea in consultation with guide. (Problem statement).
2	Students should submit implementation plan in the form of PERT/CPM chart. This will cover weekly activity of project report.
3	Problem definition and specification development in the form of synopsis.
4	Design of circuit with calculation & should include a) Analog part b) digital part c) Power supply d) Test strategy if firmware is required produce flow chart.
5	Simulation of design using tools like eSim, OrCAD, Matlab, etc.

6	Design calculation component selection.
7	Fabrication & assembly of PCB & enclosure.
8	Testing, Measurement of specifications& calibration.
9	Bill of Material.
10	Final Demo and Project Report.

References:

1. The First Book of Electronics Workshop: Can't Beat a Practical Approach – River Publishers Series in Communications.
2. Handbook of Electronic projects, by Arsath Natheem.
3. Fundamentals of Electrical Engineering – Bharati Dwivedi and Anurasg Tripathi – Willey Precise
4. Electronics Devices and Circuit Theory- Robert L. Boylestad and Louis Nashelsky, Pearson Education Publication

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