Government College of Engineering Aurangabad, Chh. Sambhajinagar

(An Autonomous Institute of Maharashtra State)

Teaching and Evaluation Scheme from year 2025-2026

B. Tech. Program in Electronics & Telecommunication Engineering with Minor

Semester – V

Course				Teaching Scheme			Continuous Evaluation in terms of Marks					
Sr No	**Category**	**Course Code**	**Course Name**	**TH**	**T**	**PR**	**Credits**	**ISE I**	**ISEII**	**ISEIII**	**ESE**	**Total (100)**
1	PCC	ETPCC3001	Microprocessor & Microcontroller	3	-	-	3	15	15	10	60	100
2	PCC	ETPCC3002	Lab- Microprocessor & Microcontroller	-	-	2	1	-	-	25	25	50
3	PCC	ETPCC3003	Digital Signal Processing	3	-		3	15	15	10	60	100
4	PCC	ETPCC3004	Lab-Digital Signal Processing		-	2	1	-	-	25	25	50
5	PCC	ETPCC3005[$]	Electromagnetic Theory[$]	3	-	-	3	-	-	-	100	100
6	PCC	ETPCC3006	Thinking System Applications	3	-	-	3	15	15	10	60	100
7	PCC	ETPCC3007	Lab- Thinking System Applications	-	-	2	1	-	-	25	25	50
8	PEC	ETPEC3001	Lab – Professional Skill Development	-	-	2	1	-	-	25	25	50
9	PEC	ETPECXXXX[$]	PEC I[$]	3	-	-	3	--	--	--	100	100
10	MDM I / II		MDM 03	3	-	-	3	15	15	10	60	100
11	MDM I / II		Lab MDM 03	-	-	2	1	-	-	25		25
12	OE	XXOECXXXX	OE III	2	-	-	2	10	10	-	30	50
	Total for B. Tech with one minor			**20**		**10**	**25**	**70**	**70**	**165**	**570**	**875**

[$]This is a MOOC/NPTEL course. Students have to register and appear for the assignments and examinations conducted by MOOC/NPTEL course only. After submitting the Passing certificate of such a course, students will be awarded the 3 credits by virtue of 'Transfer of Credits'.

Semester VI

Sr No	**Category**	**Course Code**	**Course Name**	**TH**	**T**	**PR**	**Credits**	**ISE I**	**ISEII**	**ISEIII**	**ESE**	**Total**
1	PCC	ETPCC3008	Control Systems	3	-	-	3	15	15	10	60	100
2	PCC	ETPCC3009	Lab-Control Systems	-	-	2	1	-	-	25	25	50
3	PCC	ETPCC3010	Embedded Systems	3	-	-	3	15	15	10	60	100
5	PCC	ETPCC3011	Computer Network	3	-	-	3	15	15	10	60	100
6	PCC	ETPCC3012	Lab-Computer Networks	-	-	2	1	-	-	25	25	50
7	PEC	ETPECxxxx	PEC II	3	-	-	3	15	15	10	60	100
8	PEC	ETPECxxxx	Lab PEC II	-	-	2	1	-	-	25	25	50
9	PEC	ETPECxxxx	PEC III	3	-	-	3	15	15	10	60	100
10	PEC	ETPECxxxx	Lab-PEC III	-	-	2	1	-	-	25	25	50
11	MDM I / II		MDM 04	3	-	-	3	15	15	10	60	100
12	VSEC05	ETVSE3001	E-Skill workshop	-	-	2	1	-	-	25	25	50
13	VSEC06	ETVSE3002	Lab-Embedded Systems	-	-	2	1	-	-	25	25	50
14	Experiential Learning Courses	ETPRJ3001	Project Phase I	-	-	4	2	-	-	50	50	100
	Total for B. Tech with one minor			**18**		**16**	**26**	**90**	**90**	**260**	**560**	**1000**

BSC	**(16)**	**IKS**	**(02)**	**PCC**	**26 (50)**	**OE**	**02 (08)**	**MDM-1**	**07 (14)**
ESC	**(14)**	**VEC**	**(04)**	**PEC**	**12(12)**				
CC	**(04)**	**AEC**	**(04)**	**E.L.**	**02(04)**	**Honors**	**08**	**MDM-II**	**07 (14)**
VSEC	**2 (08)**	**HSSM**	**(04)**						

Dr. Sunil Hirekhan
Head E&TC

Dr. Anil Karwankar
Dean Academics

Approved Updated Curriculum in XXXth Academic Council
Dated: 5th July 2025

ETPCC3001: Microprocessor & Microcontrollers		
Teaching Scheme	**Examination Scheme**	
Lectures: 03 hrs/week	**ISE I**	**15 Marks**
Credits: 03	**ISE II**	**15 Marks**
	ISE III	**10 Marks**
	End Semester Examination	**60 Marks**

Prerequisites: Knowledge of Digital Electronics

Course Description: This course deals with the basics of 8086 processor, 8051 microcontroller, architectures, internal organization and their functions. It also caters to the interfacing of peripherals to 8051. Study of open-source hardware like Arduino boards and Raspberry Pi will also be discussed. Class should be divided preferably into groups consisting of 3-5 students per team to build a microcontroller-based system.

Course Objectives:

- To get acquainted with the architecture of microprocessors and microcontrollers.
- To understand the addressing modes & instruction set of 8085 & 8051 and concepts of Assembly and 'C' Language Programming.
- To develop understanding of interrupt structure and serial I/O section.
- To understand the interfacing of different peripherals and develop systems using the same
- To study various open-source microcontroller hardware such as Raspberry Pi, Arduino or similar

Course Outcomes: After completing the course, students will be able to:

CO1	State functions of microprocessors, microcontrollers, allied blocks.
CO2	Describe the architecture, instruction sets of microprocessors and microcontrollers.
CO3	Write programs in assembly language and embedded 'C'.
CO4	Understand timers, interrupts and serial communication.
CO5	Implement interfacing applications with microcontrollers and peripherals.
CO6	Design systems using microcontrollers.

Detailed Syllabus:

Unit 1	**8086 Microprocessor** Programmers Model, Memory segmentation, Addressing Modes, Instruction Set, Assembly Programming.
Unit 2	**Introduction to 8051** Differentiation between Microprocessors and Microcontrollers, Functional block diagram, architecture, pin configuration, SFRs special function registers, stack and stack pointer, Internal memory organization, I/O ports, addressing modes, instruction set and simple programs using Assembly Language.
Unit 3	**Peripherals of 8051** Counters and Timers, Serial data input and output, Interrupts, Power saving modes, Interfacing LED, 7-segment LED, LCD, relay, optocoupler, ADC, DAC, Applications of 8051.

Unit 4	**Introduction to Open-Source Microcontroller Hardware** Introduction to Arduino family, features, architecture and to Open-Source hardware boards like Raspberry Pi.
Unit 5	**Design of microcontroller-based systems** Design of industrial projects based on real time problems using microcontroller from 8051 family, Raspberry Pi, Arduino or suitable controllers

Textbooks, Reference Books and web resources

1. Ramesh Gaonkar, *Microprocessor Architecture, Programming and Applications with 8085/8085A*, 6th ed., Penram International Publishing
2. A.K. Ray and K.M. Bhurchandi, *Advanced Microprocessors and Peripherals*, 3rd ed, McGraw Hill Education.
3. D. V. Hall, SSSP Rao, *Microprocessor and Interfacing*, 3rd ed, McGraw Hill Education
4. Y.C. Liu and A. Gibson, *Microcomputer systems-The 8086/8088Family: Architecture, Programming and Design*, 2nd ed, Prentice Hall India Learning Private Limited
5. B. B. Brey, *The Intel Microprocessor, Architecture, Programming and Interfacing*, 6th ed, Pearson Education
6. M.A. Mazidi, J. G. Mazidi and R. D. McKinlay, "T*he Microcontroller and Embedded Systems*", 2nd ed, Prentice Hall India Learning Private Limited
7. K. J. Ayala, "*8051 Microcontroller: Architecture, Programming and applications*", 2nd ed, Delmar Cengage Learning
8. M.Predko, *Programming and customizing the 8051 Microcontroller*, McGraw Hill Education
9. M. Margolis, *Arduino Cookbook*, O'Reilly Media Inc, 2nd ed (ebook), https://juniorfall.files.wordpress.com/2011/11/arduino-cookbook.pdf
10. J. Purdum, *Beginning C for Arduino* (ebook), sserpA ts1 https://www.mica.edu.vn/perso/Vu-Hai/EE3490/Ref/Beginning.C.for.Arduino.Dec.2012.pdf
11. E. Upton and G. Halfacreene, *Raspberry Pi user guide*, 4th ed, Wiley, (ebook), https://dn.odroid.com/IoT/other_doc.pdf

Mapping of Course outcome with Program Outcomes

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1							1	1	1		3		
CO2	2	2	1						1	1	1	1	3	1	1
CO3	2	2	1	1	1				1	1	1	1	3	1	1
CO4	2	2	1	1	1				1	1	1	1	3	1	1
CO5	2	2	2	2	2				1	1	2	1	3	1	1
CO6	2	2	2	2	2				2	2	3	2	3	2	2

3– High **2 – Medium** **1 - Low**

Assessment:

ISE I: Shall be based on Class Tests/ Assignments/ Quizzes/ Field visits/ Presentations/ Course Projects

ISE II: Shall be based on class test

ISE III: Shall be based on Class Tests/ Assignments/ Quizzes/ Field visits/ Presentations/ Course Projects

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Assessment Pattern

Assessment Pattern Level No.	Knowledge Level	ISE I	ISE II	ISE III	ESE
K1	Remember	05	00	00	06
K2	Understand	10	15	00	42
K3	Apply	00	00	10	12
K4	Analyze	00	00	00	00
K5	Evaluate	00	00	00	00
K6	Create	00	00	00	00
Total Marks 100		15	15	10	60

Assessment table

Assessment Tool	K1	K2	K2	K2	K3	K3
	CO1	**CO2**	**CO3**	**CO4**	**CO5**	**CO6**
ISE I (15 Marks)	05	05	05	00	00	00
ISE II (15 Marks)	00	05	10	00	00	00
ISE III (10 Marks)	00	00	00	00	00	10
ESE (60 Marks)	06	18	12	12	12	00
Total Marks 100	**11**	**28**	**27**	**12**	**12**	**10**

ETPCC3002: Lab Microprocessor and Microcontrollers	
Teaching Scheme **Practical: 2 Hrs/Week** **Credits: 1**	**Examination Scheme** **ISE III : 25 Marks** **End Semester Examination : 25 Marks**

Laboratory Course Outcomes

As an outcome of completing the Laboratory course, students will be able to:

CO1	Write algorithms and assembly language programs.
CO2	Write programs with DOS and BIOS function calls and embedded C.
CO3	Design and implement 8051 based systems with simple I/O devices.
CO4	Design systems with Stepper motor, DAC, LCD to 8051.

List of Experiments (Any 10)

Sr. No.	Title of the Experiments
1	Study of 8086 microprocessor trainer/ debug tool to enter, edit and execute program with simple programs
2	Write and execute ALP for (any three) like addition, subtraction, 16-bit addition
3	Write and execute ALP for (any three) like Logical operations, Multiplication, Division
4	Write and execute ALP for- ● Block transfer of N bytes of data ● Smallest/Largest number from an array ● Count '0s', 1s' in a byte
5	Identification and displaying the activated key, output char/string on display using DOS and BIOS function calls.
6	Practice IDE software and universal programmer to program 8051.
7	Write and execute ALP for addition, subtraction, block transfer ● Addition of two 8-bit no's stored in internal RAM ● Subtraction of two 8-bit no's stored in external RAM ● Block transfer of N bytes of data ● Bit manipulation programs
8	Write an embedded 'C' program to interface LED, keys. Generate various patterns on LEDs (flash, alternate flash, n-bit counter, ring counter). Display status of keys on LEDs
9	Write an embedded 'C' program to interface relay, buzzer, optocoupler
10	Write a program to Interface 7 segment display
11	Write a program to Interface LCD and display messages
12	Write programs and execute to interface stepper motor and rotate it in clockwise, anticlockwise directions, rotate motor by 'N' steps
13	Write program and execute to interface DAC to generate various waveforms like square, ramp, staircase, triangular waveforms

Mapping of Course Outcome with Program Outcomes

Course Outcome	PO1	PO2	PO3	PO 4	PO 5	PO6	PO7	PO8	PO9	PO10	PO1 1	PO12	PSO1	PSO2	PSO3
CO1	1	1		1	2					1			2		
CO2	1	1		1	2					1			3		
CO3	2	2		2	2					2			3	1	1
CO4	2	2		2	2					2			3	1	1

3 – High 2 – Medium 1- Low

Assessment:

ISE III: Shall be based on the assessment of submission work and interaction with students till the end of the term.

Assessment Table

Assessment Tool	S1	S2	S2	S3
	CO1	CO2	CO3	CO4
ISE III (25 Marks)	05	06	07	07
ESE (25 Marks)	07	06	06	06

Assessment Pattern

Assessment Pattern / Level No.	**Skill Level**	**ISE III**	**ESE**
S1	Imitation	05	07
S2	Manipulation	13	12
S3	Precision	07	06
S4	Articulation	00	00
S5	Naturalization	00	00
Total		25	25

ETPCC3003: Digital Signal Processing	
Teaching Scheme	**Examination Scheme**
Lectures: 3Hrs/Week	**ISEI: 15 Marks**
Credits: 03	**ISEII: 15 Marks**
	ISEIII: 10 Marks
	End Semester Exam: 60 Marks

Course description:

The course covers theory and methods for digital signal processing including basic principles governing the analysis and design of discrete time systems as signal processing devices.

- The primary objective of this course is to provide a thorough understanding and working knowledge of design, implementation, and analysis DSP systems.
- This course in digital signal processing develops essential analysis and design techniques required for a broad range of disciplines.
- Student familiar with most important methods in DSP, including digital filter design, transform domain processing and importance of signal processor.
- After completion of the subject, the student should be able to understand the design principles and the implementation of digital filters and DFT/FFT, and be able to make use of signal processing concepts and wavelets to perform some simple applications.

Course Outcomes

After completing the course, students will be able to:

COl	Interpret, represent and process discrete/digital signals and systems.
CO2	Apply transforms for frequency domain analysis of discrete time signals.
CO3	Design digital filters for discrete time signals.
CO4	Demonstrate multirate signal processing.
CO5	Understand the DSP processors with programming skills.
CO6	Illustrate applications of digital signal processing.

Detailed Syllabus

Unit 1	**Introduction to digital signal processing** Review of Signals and systems, Time domain and frequency domain response of a digital system. Relationship between discrete time Fourier transform, discrete Fourier Transform & Z-transform. Fast Fourier Transform (FFT) - Decimation in time (DIT) and decimation in frequency (DIF) radix 2 algorithms. Finding DFT and inverse DFT using FFT
Unit 2	**Design of Infinite Impulse Response Filters** Revision of analog systems, Butterworth filters and Chebyshev filters. Types of digital filters: IIR and FIR. IIR filter design, bilinear transformation, frequency scaling, transformation from prototype low-pass filter to high-pass filter and band-pass filter. Impulse-invariant and/or step-invariant approaches, Applications.
Unit 3	**Design of Finite Impulse Response Filters** FIR filter analysis, Fourier series approach, windowing, Gibbs phenomenon, commonly Used windows, concept of linear phase, frequency transformation, low-pass, band-pass, high-pass filters and filter band design. Applications
Unit 4	**Multirate signal processing** Multirate sampling, Decimation, Interpolation, Various applications of multirate sampling. Introduction to Wavelet Transforms & its application.
Unit 5	**Digital Signal Processors and Applications** Architectures and important instruction sets of TMS320C 5416/6713 FPGA: Architecture, different subsystem, DSP system design flow, mapping DSP algorithm into FPGA.

TEXT AND REFERENCE BOOKS

1. A.V.Oppenheim and Schafer, Discrete Time Signal Processing, Prentice Hall, 1989.
2. L.R. Rabiner and B. Gold, Theory and Application of Digital Signal Processing, Prentice Hall, 1992.
3. J.R.Johnson, Introduction to Digital Signal Processing, Prentice Hall, 1992.
4. D. J. DeFatta, J. G. Lucas and W. S. Hodgkis, Digital Signal Processing Wiley and Sons, Singapore, 1988.
5. G.Proakis and D.G.Manolakis, 'Digital Signal Processing Principles, Algorithms and Applications', Pearson Education, New Delhi, 2003 .
6. S.K.Mitra, 'Digital Signal Processing –A Computer Based Approach,Tata McGraw Hill, New Delhi, 2001

Mapping of Course outcomes with Program Outcomes

CourseOutcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	1	2	2	-	-	2	2	2	-	-	-	-	3
CO2	2	1	1	2	2	1	1	2	2	2	-	-	-	1	3
CO3	2	1	1	1	-	-	1	2	2	1	-	-	-	1	3
CO4	1	1	1	1	1	1	-	1	1	1	-	1	-	1	3
CO5	1	2	3	2	1	2	2	1	-	1	1	1	1	1	3
CO6	2	2	2	1	-	2	1	1	-	1	1	3	1	1	3

3–High 2–Medium 1–Low

Assessment Pattern

Level No.	Knowledge Level	ISEI	ISEII	ISEIII	End Semester Examination
K1	Remember	05	00	00	06
K2	Understand	10	10	05	26
K3	Apply	00	05	05	28
K4	Analyze	00	00	00	00
K5	Evaluate	00	00	00	00
K6	Create	00	00	00	00
Total Marks 100		15	15	10	60

Assessment table

Assessment Tool	K1	K3	K3	K2	K2	K2
	C01	C02	C03	CO4	CO5	CO6
ISE I (15Marks)	05	10	00	00	00	00
ISE II (15 Marks)	00	00	05	10	00	00
ISE III (10Marks)	00	05	05	00	00	00
ESE Assessment (60 Marks)	06	12	16	12	08	06

ETPCC3004: Lab-Digital Signal Processing	
Teaching Scheme	**Examination Scheme**
Practical: 2 Hrs/Week	**ISE III: 25 Marks**
Credits: 01	**ESE: 25 Marks**

Laboratory Course Outcomes

After completing the Laboratory course using MATLAB/CCS/IDE, students will be able to:

CO1	Perform frequency domain analysis of discrete time signals using transforms.
CO2	Sketch frequency response of FIR and IIR filters.
CO3	Demonstrate multi rate signal processing.
CO4	Implement signal processing algorithms on DSP processor

List of Experiments

Sr. No.	Details
1	To observe the output of an LTI system with given impulse function and observe amplitude and delay.
2	Frequency Analysis using DFT
3	Find the FFT of given 1-D signal and plot.
4	Determination of Power Spectrum of a given signal.
5	Obtain the convolution of two signals using frequency transform techniques.
6	Plot the Fequency Response of the IIR filter for the given pole-zero pair.
7	Design of Butterworth LPF for the given specification
8	Design of Butterworth HPF for the given specification
9	Design of Butterworth BPF for the given specification
10	Design of Butterworth BSF for the given specification
11	Design of FIR LPF using frequency sampling method
12	Design of FIR LPF using Rectangular window
13	Design of FIR LPF using different window.
14	Filter design using filter design analysis tool (FDA tool).
15	Demonstrate the effect of up sampling and down sampling on DTFT.
16	Implementation of Interpolation process in multi-rate digital signal processing.
17	Implementation of decimation process in multi-rate digital signal processing.
18	Study of Architecture of fixed point and floating point DSP processor.
19	Perform MAC operation using various addressing modes.
20	Generating different waveforms using the Hardware and Software Tools for the TI TMS320C6713 DSP Processor

Mapping of Course outcome with Program Outcomes

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

3–High 2–Medium 1–Low

Assessment Table

Assessment Pattern

Level No.	Skill Level	Term Work	Practical Examination &viva voce
S1	Imitation	08	08
S2	Manipulation	05	05
S3	Precision	10	10
S4	Articulation	02	02
S5	Naturalization	00	00
Total		25	25

ETPCC3006: Thinking Systems Application

Teaching Scheme		Evaluation Scheme	
Lectures	03Hrs/Week	ISE I	15Marks
Total Credits	03	ISE II	15Marks
		ISE III	10Marks
		ESE	60Marks

Course description:

This course introduces students with the emerging field of artificial intelligence (AI) with a practical based approach. Here the meaning of the word 'thinking system' is a system which may include both hardware and software. It can be trained to make it think on the incoming data and do the necessary decision making. The thinking system normally categorizes the problems as searching problem or reasoning problem. The reasoning may be based on knowledge representation or probabilistic.

After introducing the different search techniques, logic and reasoning the course enters into the introduction of machine learning algorithms. It provides a concise introduction to the fundamental concepts in machine learning and popular machine learning algorithms. It covers standard and most popular supervised learning algorithms including linear regression, logistic regression, decision trees, k-nearest neighbor, naïve Bayes algorithm, support vector machines and kernels. It also covers the basic clustering algorithms and introduces the field of artificial neural network. At the end the course provides an introductory remark on Deep learning and Generative AI.

The course prepares students to take a variety of focused, advanced courses related with AI.

Course Objectives:

1. To understand various concepts & models related to thinking systems.
2. To understand various supervised & unsupervised learning algorithms in ML.
3. To apply the model of AI and algorithms in ML to real world problems.

Course Outcomes

After completing the course, students will able to:

CO1	Learn various concepts in artificial intelligence.
CO2	Represent the given problem as searching or reasoning (logic & probabilistic)
CO3	Understand various supervised and unsupervised machine learning algorithms.
CO4	Understand how to evaluate models generated from data.
CO5	Apply the machine learning models to a real-world problem.
CO6	Apply the concepts learned to understand the modular Application building.

Detailed Syllabus:

Unit 1	**Introduction to Thinking Systems** Thinking system Definition, Modeling a Problem as Search Problem, Uninformed Search: Depth First Search, Breadth First Search, Heuristic Search: Best First Search, Hill Climbing, Stochastic Local Search, Finding Optimal Paths: Branch & Bound, A*
Unit 2	**Evolution of Thinking Systems** Game Theory, Game Trees, Algorithm Minimax, Alpha Beta pruning. Introduction to Constraint Satisfaction problem. Application-Graph colouring Problem, Genetic Algorithms, Application to get the multiple solutions for the given problem, Propositional & First order logic & satisfiability. Its application in building "Model based diagnosis"

Unit 3	**Introduction to Machine learning** Probabilistic reasoning, Bayesian Networks, Decision Theory, Markov Decision Processes (MDP), and Application of MDP in determining optimum policy for charging a solar panel unit mounted on Rover. Basic definitions, types of learning, hypothesis space and inductive bias, evaluation, cross-validation.
Unit 4	**Supervised learning Methods** Linear regression, Decision trees, over-fitting & under-fitting, Logistic Regression, k-nearest neighbor, naïve Bayes algorithm, Support Vector Machine, Kernel function and Kernel SVM Application: Character recognition system [and converting to multiple language character]
Unit 5	**Unsupervised & semi supervised learning Methods** Clustering: k-means, hierarchical clustering, Neural network: Perceptron, multilayer network, feed forward & back propagation algorithm, introduction to deep neural network & Generative AI. Application: Object detection, Face detection system, Face recognition system, Object tracking system.

Mapping of Course outcomes with Program Outcomes

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO 2	PSO 3
CO1	1	1	1	-	3	2	-	-	-	1	-		-	-	1
CO2	2	3	2	2	1	1	-	-	-	-	-	-	1	-	1
CO3	2	3		2	1		1	-	-	-	-	-	-	-	1
CO4	1	2	1	2	3		2	-	2	1	1	1	-	-	1
CO5	1	3	2	2	3	-	-	-	3	2	2	1	-	-	1
CO6	1	2	2	2	2	1	1	-	2	-	-	1	1	-	1

3 – High 2 – Medium 1–Low

Assessment Pattern:

Level No.	**Knowledge Level**	**ISEI**	**ISEII**	**ISEIII**	**ESE**
K1	Remember	00	00	00	00
K2	Understand	05	05	00	24
K3	Apply	10	10	05	36
K4	Analyze	00	00	05	00
K5	Evaluate	00	00	00	00
K6	Create	00	00	00	00
TotalMarks100		15	15	10	60

Assessment table:

Assessment Tool	**K1**	**K3**	**K2**	**K2**	**K3**	**K3**
	CO1	**CO2**	**CO3**	**CO4**	**CO5**	**CO6**
ISE I (15Marks)	05	05	05	00	00	00
ISE II (15 Marks)	00	00	05	05	05	00
ISE III(10Marks)	00	00	00	00	05	05
ESE Assessment (60 Marks)	00	12	06	18	12	12

ETPCC3007: Lab Thinking Systems Applications

Teaching Scheme		Evaluation Scheme	
Lectures	02Hrs/Week	ISE III	25 Marks
Total Credits	01	ESE	25 Marks

Course Outcomes:

Student will able to

CO1	Implement different AI algorithms.
CO2	Apply AI algorithms on different types of data.
CO3	Understand different classifiers in machine learning.
CO4	Apply classifiers in Machine learning on different dataset.

List of Experiments (Any 10)

01	Implementation of different uninformed search strategis: i) Depth First Search Algorithm , ii) Breadth First Search Algorithm
02	Implementation of local search algorithm.
03	Obtaining Multiple solutions to the problem using different crossover techniques in Genetic algorithm.
07	Implementation of constraint satisfaction problem through Map coloring algorithm.
08	Predicting the optimum policy for the Solar panel mounted on rover using Markov decision process.
09	Application to Predict the root cause of the effect using Bayesian network model.
10	Fit the given set of data points using Linear regression algorithm. Plot the graph and estimate the value for unknown input.
11	Application to predict the performance of a stock based on its past data.
12	Classify the Given dataset using Logistic regression algorithm. Find out the accuracy of the algorithm. (Dataset: Iris dataset or any other dataset with 2to4 features)
13	Implement Naïve Bayes Classifier (Dataset: with 2 to 4features).Comment on accuracy, precision and recall rate obtained.
14	Using K-nearest neighbour classifier, classify the mnist dataset (Dataset of 10 numbers). Comment on the misclassified data.
15	Classify the data using SVM classifier.
16	Classify the data using kernel SVM classifier.
17	Evaluate and Compare different Classifiers Experimentally on given dataset (Dataset:

	1) Iris dataset or any other dataset with 2 to 4 features 2. Digit 0 to 9).
18	Building a modular system to recognize handwritten Character in both i) online mode & ii) offline mode
19	Face detection system
20	Face recognition system.
21	Study of Large Language Model in AI.
22	Study of Generative Model in AI.

Mapping of Course outcome with Program Outcomes:

PO → 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	PSO1	PSO2	PSO3
CO1	2	1	3	1	1	-	1	-	-	-	1	1	1	-	1
CO2	2	1	3	1	3	-	2	-	-	-	1	2	1	-	1
CO3	2	3	2	1	2	-	1	-	-	-	1	1	1	-	1
CO4	2	3	2	2	2	-	2	-	-	-	1	2	1	-	1

3 –High 2–Medium 1-Low

Assessment Table:

Assessment Tool	S1	S2	S3	S3
	CO1	CO2	CO3	CO4
ISE III (25 Marks)	05	05	10	05
ESE (25 Marks)	05	10	-	10

Assessment Pattern

Level No.	**Skill Level**	**ISE III**	**ESE**
S1	Imitation	05	05
S2	Manipulation	10	10
S3	Precision	10	10
S4	Articulation	00	0
S5	Naturalization	00	0
Total		25	25

Preparation(S1)	05
Conduct of Experiment(S2)	10
Observation and Analysis of Results (S3)	05
Mini-Project/Presentation/Viva-Voce (S3)	05
Total	**25**

ETPEC3001: Lab – Professional Skill Development

Teaching Scheme		Evaluation Scheme	
Lectures	02Hrs/Week	ISE III	25Marks
Total Credits	01	ESE	25 Marks

Course Outcomes: This curriculum aims to provide a strong foundation in practical electronics and telecommunication skills, preparing students for real-world engineering challenges.

Students will be able to

CO1	Identify and formulate the problem statement
CO2	Acquire skills to develop the prototype
CO3	Apply Knowledge to develop electronics systems
CO4	Test and analyze the modules developed

Students must choose any one track of the following:

Track 1: Obtain a professional skill certificate in following areas of minimum duration at least 30 Hours. Credits will be transferred after submission of professional skill certificate

Areas:

1. **FPGA/CPLD Programming:** Introduction to Hardware Description Languages (HDL) like VHDL/Verilog and implementation of digital logic on FPGAs.
2. **IoT (Internet of Things) Applications:** Connecting embedded systems to the internet, cloud platforms, and mobile applications.
3. **Wireless Communication Protocols:** Deeper dive into Wi-Fi, Bluetooth, Zigbee, LoRa, and their practical implementation.
4. **Digital Signal Processing (DSP) Applications:** Implementing basic DSP algorithms on microcontrollers or dedicated DSP processors (e.g., filtering, FFT).
5. **RF Circuit Design Fundamentals:** Introduction to high-frequency circuit design, impedance matching, and S-parameters.
6. **Power Electronics:** Design and analysis of DC-DC converters, inverters, and power management circuits.
7. **Robotics & Automation:** Integrating sensors, actuators, and control algorithms for robotic applications.
8. **Certification on Network and Cyber security**
9. **Certification on Cloud Computing**
10. **Certification on Full stack development**
11. **Certification from Cisco**
12. **Certification from MATLAB**

Track – II : Complete an open ended project on following ideas or finalized by department as community projects

Open-Ended Project Ideas:

1. **Smart Home Automation System:** Design and implement a system that controls lights, fans, and appliances using a microcontroller, sensors (e.g., PIR, temperature), and a mobile app interface.
2. **Environmental Monitoring Station:** Build a device that measures environmental parameters (temperature, humidity, air quality) and transmits data wirelessly to a cloud platform for visualization.
3. **Gesture-Controlled Robot / Drone:** Develop a system where a robot or drone can be controlled using hand gestures detected by a sensor (e.g., accelerometer, IR sensor).
4. **Software Defined Radio (SDR) Receiver / Transmitter:** Explore basic SDR concepts by building a simple receiver or transmitter using a low-cost SDR dongle and open-source software (e.g., GNU Radio).
5. **Biomedical Sensor Interface:** Design a circuit to acquire and process signals from basic biomedical sensors (e.g., ECG, PPG) and display them.
6. **Energy Harvesting System:** Develop a small-scale system that harvests energy from ambient sources (e.g., solar, vibration) to power low-power electronic devices.
7. **Customizable LED Display / Matrix:** Design and build a programmable LED matrix display for animations, text scrolling, or simple games, controlled via a microcontroller.
8. **Wireless Power Transfer System:** Explore the principles of wireless power transfer by building a small-scale inductive coupling system to charge a low-power device.
9. **Automated Plant Watering System:** Create an embedded system that monitors soil moisture and automatically waters plants when needed, with options for manual override and notifications.
10. **Object Tracking System:** Implement a system using a camera module and a microcontroller to detect and track objects, potentially controlling a pan-tilt mechanism.
11. **Machine Learning at the Edge Device:** Implement a simple machine learning model (e.g., for anomaly detection or classification) on a microcontroller or a low-power embedded device.
12. **Li-Fi Communication System:** Design and build a basic visible light communication (VLC) system to transmit data wirelessly using LEDs and photodiodes.
13. **Smart Grid Monitoring Node:** Develop a prototype for a smart grid

monitoring node that measures power consumption, voltage, and current, and transmits data for analysis.

14. **Wearable Health Monitor:** Design a wearable device that integrates multiple sensors (e.g., heart rate, SPO2, temperature) to monitor vital signs and provide alerts.
15. **Autonomous Navigation Robot (SLAM):** Build a small robot capable of basic autonomous navigation using sensors (e.g., ultrasonic, LiDAR), incorporating concepts of Simultaneous Localization and Mapping (SLAM).
16. **5G/Next-Gen Communication Simulation:** Use simulation tools (e.g., MATLAB, NS-3) to model and analyze aspects of 5G or future wireless communication systems.
17. **Cyber-Physical System Security:** Explore vulnerabilities in a simple IoT or embedded system and implement basic security measures (e.g., encryption, secure boot).
18. **Augmented Reality (AR) Assisted Maintenance:** Develop a proof-of-concept AR application (e.g., using a smartphone) that overlays technical information or instructions onto physical electronic components for maintenance tasks.
19. **Industry need based project**
20. **Any other project recommended by the department**

Recommended Software & Tools:

- **Circuit Simulation:** LTSpice, Multisim, Proteus, TinkerCAD Circuits
- **PCB Design:** KiCad, Eagle, Altium Designer (for advanced exposure)
- **Microcontroller IDEs:** Arduino IDE, Platform IO, MPLAB IDE
- **Programming Languages:** C/C++ (for microcontrollers), Python (for data analysis/automation)
- **Measurement Equipment:** Digital Multi-meters, Oscilloscopes, Function Generators, DC Power Supplies, Spectrum Analyzers (if available).
- **Prototyping:** Breadboards, Soldering Stations, Desoldering tools, Component kits
- **Any other similar tools**

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CO2	2	1	3	1	3	-	2	-	-	-	1	2	2	2	1
CO3	2	3	2	1	2	-	1	-	-	-	1	1	2	2	1
CO4	2	3	2	2	2	1	2	1	1	1	1	2	2	2	1

3 –High 2–Medium 1-Low

Dr. Sunil Hirekhan
Head E&TC
Dr. Anil Karwankar
Dean Academics
Approved Updated Curriculum in XXXth Academic Council
Dated: 5th July 2025

Assessment Table:

Assessment Tool	S1	S2	S3	S3
	CO1	CO2	CO3	CO4
ISE III (25 Marks)	05	05	05	10
ESE (25 Marks)	05	05	05	10

Assessment Pattern

Level No.	**Skill Level**	**ISE III**	**ESE**
S1	Imitation	05	05
S2	Manipulation	05	05
S3	Precision	15	15
S4	Articulation	00	00
S5	Naturalization	00	00
Total		**25**	**25**

Preparation(S1)	05
Conduct of Experiment(S2)	05
Observation and Analysis of Results (S3)	05
Mini-Project /Presentation/ Viva-Voce (S3)	10
Total	**25**