K.K. Wagh Institute of Engineering Education and Research, Nashik

Curriculum
S.Y. B. Tech

Electronics and Telecommunication Engineering

w.e.f.: AY 2024-2025

S.Y. B.Tech Electronics and Telecommunication Engineering wef AY 2024-25															
SEM-III															
Course Code	**Course Type**	**Title of Course**	**Teaching Scheme**			**Evaluation Scheme and Marks**						**Credits**			
			TH	**TU**	**PR**	**INSEM**	**ENDSEM**	**CCE**	**TUT /TW**	**PR /OR**	**TOTAL**	**TH**	**TU**	**PR**	**TOTAL**
2300201E	BSC	Advanced calculus and Transform Techniques	3	-	-	20	60	20			**100**	3	-	-	**3**
2302202	PCC	Electronic Devices and Circuits	3	-	-	20	60	20			**100**	3	-	-	**3**
2302203	PCC	Digital System Design with HDL	3	-	-	20	60	20			**100**	3	-	-	**3**
2302204	PCC	Lab work in Digital System Design with HDL	-	-	2	-	-	-	25	25	**50**	-	-	1	**1**
2302205	PCC	Lab work in Electronic Devices and circuits	-	-	4				50	50	**100**	-	-	2	**2**
2302206	MDM	Introduction to IoT	3	-	-	20	60	20	-	-	**100**	3	-	-	**3**
2302207	MDM	Lab work in IoT	-	-	2	-	-	-	25	25	**50**	-	-	1	**1**
2302208	OE	Industrial Management	2	-	-	-	-	50	-	-	**50**	2	-	-	**2**
2302209	VEC	Democracy, Election & Governance	-	2	-	-	-	50	-	-	**50**	-	2	-	**2**
2302210	VSEC	Problem solving using Python	1	-	2	-	-	-	50	-	**50**	1	-	1	**2**
Total			**15**	**02**	**10**	**80**	**240**	**180**	**150**	**100**	**750**	**15**	**2**	**5**	**22**

S.Y. B. Tech Electronics and Telecommunication Engineering wef AY 2024-25															
SEM-IV															
Course Code	**Course Type**	**Title of Course**	**Teaching Scheme**			**Evaluation Scheme and Marks**						**Credits**			
			TH	**TU**	**PR**	**INSEM**	**ENDSEM**	**CCE**	**TUT /TW**	**PR /OR**	**TOTAL**	**TH**	**TU**	**PR**	**TOTAL**
2302211	PCC	Control systems	3	-	-	20	60	20			**100**	3	-	-	**3**
2302212	PCC	Microcontrollers	3	-	-	20	60	20			**100**	3	-	-	**3**
2302213	PCC	Analog and Digital Communication	3	-	-	20	60	20			**100**	3	-	-	**3**
2302214	PCC	Lab work in Analog and Digital Communication	-	-	2	-	-	-	25	25	**50**	-	-	1	**1**
2302215	PCC	Lab work in Control systems and Microcontrollers	-	-	4				50	50	**100**	-	-	2	**2**
2302216	MDM	IoT Protocols and security	3	-	-	20	60	20	-	-	**100**	3	-	-	**3**
2302217	MDM	Lab work in IoT Protocols and security	-	-	2	-	-	-	25	25	**50**	-	-	1	**1**
2302218	OE	Project management	2	-	-	-	-	50	-	-	**50**	2	-	-	**2**
2302219	VEC	UHV-II	-	2	-	-	-	50	-	-	**050**	-	2	-	**2**
2302220	AEC	Hardware and software tools for Electronics Engineer	1	-	2	-	-	-	50	-	**050**	1	-	1	**2**
Total			**15**	**02**	**10**	**80**	**240**	**180**	**150**	**100**	**750**	**15**	**2**	**5**	**22**

Electronics and Telecommunication Engineering Exit Courses (To award Certificate)															
Course Code	**Couse Type**	**Title of Course**	**Teaching Scheme**			**Evaluation Scheme and Marks**						**Credits**			
			TH	**TU**	**PR**	**INSEM**	**ENDSEM**	**CCE**	**TUT /TW**	**PR /OR**	**TOTAL**	**TH**	**TU**	**PR**	**TOTAL**
2302221	EXIT	Internship*	0	0	0	0	0	0	100	0	100	0	2	0	2
2302222	EXIT	Data Communication and Networking (Exit Course-1)	2	0	2	20	30	0	50	0	100	2	0	1	3
2302223	EXIT	Electronic Servicing and Maintenance (Exit Course-2)	2	0	2	20	30	0	50	0	100	2	0	1	3
Total			4	0	4	40	60	0	200	0	300	4	2	2	8

*Internship in industry for 2-weeks

→To get certificate student should get following credits

- Internship →2 credits
- Exit course-1 →3 credits
- Exit course-2 →3 credits
- **Total credits →8 credits**

Semester-I

K. K. Wagh Institute of Engineering Education and Research, Nashik

(Autonomous from Academic Year 2022-23)

S. Y. B. Tech.
Pattern 2023 Semester: III (E&TC, Electrical)
2300201E : Advanced calculus and Transform Techniques

Teaching Scheme:	**Credit Scheme:**	**Examination Scheme:**
Theory :03hrs/week	**03**	**Continuous Comprehensive Evaluation: 20Marks** **InSem Exam: 20Marks** **EndSem Exam: 60Marks**

Prerequisite: - Linear Algebra, Vector algebra, Differential calculus and Integral calculus.

Course Objectives:

To make the students familiarize with concepts and techniques in Ordinary differential equations,Laplace transform, Fourier transform & Z-Transform and Vector Calculus .The aim is to equip them with the techniques to understand advanced level mathematics and its applications that would enhance analytical thinking power, useful in their disciplines.

Course Outcomes: On completion of the course, students will be able to

	Course Outcomes	**Bloom's Level**
CO1	Define and understand basic concept of LDE, Transforms, Fourier Series and vector calculus.	2-Understanding
CO2	Solve the problems on LDE, Transforms, Fourier Series and vector calculus using appropriate method.	3- Apply
CO3	Apply concept of transform techniques to continuous & discrete systems.	3- Apply
CO4	Analyze complex engineering problems by using concepts of advanced calculus and transform techniques.	4 -Analyze
CO5	Evaluate the real life problems by using concepts of advanced calculus and transform techniques.	5- Evaluate

COURSE CONTENTS

Unit I	**Linear Differential Equations (LDE)and Applications**	**(08hrs)**	**COs Mapped -CO1, CO2, CO4, CO5**

LDE of nth order with constant coefficients, Complementary Function, Particular Integral, General method, Short methods, Method of variation of parameters, Cauchy's and Legendre's DE Simultaneous and Symmetric simultaneous DE. Modeling of Electrical circuits

Unit II	**Vector Calculus**	**(07hrs)**	**COs Mapped CO1, CO2, CO4, CO5**

Vector Differentiation: Physical interpretation of Vector differentiation, Vector differential operator, Gradient, Divergence and Curl, Directional derivative, Solenoidal, Irrotational and Conservative fields, Scalar potential, Vector identities.

Vector Integration: Line, Surface and Volume integrals, Work-done, Green's Lemma, Gauss's Divergence theorem, Stoke's theorem. Applications to problems in Electro-magnetic field.

Unit III	**Laplace Transform (LT)**	**(07hrs)**	**COs Mapped CO1, CO2, CO3, CO4, CO5**

Laplace Transform: Definition of LT, Inverse LT, Properties & theorems, LT of standard functions. Applications of LT for solving Linear differential equations.

Unit IV	Fourier Series & Fourier Transform(FT)	(07hrs)	COs Mapped CO1, CO2, CO3, CO4, CO5

Fourier Series: Definition, Dirichlet's conditions, Full range Fourier series, Half range Fourier series, Harmonic analysis, Parseval's identity and Applications to problems in Engineering.
Fourier Transform (FT): Complex exponential form of Fourier series, Fourier integral theorem, Fourier Sine & Cosine integrals, Fourier transform, Fourier Sine and Cosine transforms and their inverses.

Unit V	Z -Transform (ZT)	(07hrs)	COs Mapped CO1, CO2, CO3, CO4,CO5

Z -Transform (ZT): Introduction, Definition, Standard properties, ZT of standard sequences and their inverses. Solution of difference equations

Text Books

1. B.V. Ramana, " Higher Engineering Mathematics ", Tata McGraw-Hill.
2. B. S. Grewal, " Higher Engineering Mathematics ", Khanna Publication, Delhi.
3. Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley Eastern Ltd.

Reference Books

1. Advanced Engineering Mathematics,7e, by peter V.O. Neil(Thomson Learning)
2. P. N. Wartikar and J. N. Wartikar, "Applied Mathematics" (Volumes I and II), Pune VidyarthiGriha Prakashan, Pune.
3. Advanced Engineering Mathematics, 2e, by M. D. Greenberg (Pearson Education).
4. Advanced Engineering Mathematics with MATLAB, 2e, by Thomas L. Harman, James Dabney and Norman Richert (Brooks/Cole, Thomson Learning).

Strength of CO-PO Mapping													PO-PSO mapping	
	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	-	-	-	-	-	-	-	-	-	3	-	-
CO2	3	3	-	-	2	-	-	-	-	-	-	3	-	-
CO3	3	2	-	2	2	-	-	-	-	-	-	3	-	-
CO4	3	2	2	3	2	-	-	-	-	-	-	3	-	-
CO5	3	-	-	-	2	-	-	-	-	-	-	3	2	-

Guidelines for Continuous Comprehensive Evaluation of Theory Course		
Sr. No.	**Components for Continuous Comprehensive Evaluation**	**Marks Allotted**
1	Tests on each unit using LMS (Each test for 15 M and total will be converted out of 05 M)	05
2	Problem solving through Computational Software	05
3	Tutorial (1 tutorial on each unit for 15 marks and total will be converted out of 05 M)	05
4	Group presentation on real life problem	05

Topics for Tutorial		
Sr. No.	**Title**	**CO Mapped**
1	Examples on LDE of nth order with constant coefficients.	**CO1, CO2, CO4, CO5**
2	Examples on Vector Calculus.	**CO1, CO2, CO4, CO5**
3	Examples on Laplace Transforms.	**CO1, CO2, CO3, CO4, CO5**
4	Examples on Fourier series & Fourier Transforms.	**CO1, CO2, CO3, CO4, CO5**
5	Examples on Z-Transform	**CO1, CO2, CO3, CO4, CO5**

K. K. Wagh Institute of Engineering Education and Research, Nashik
(Autonomous from Academic Year 2022-23)

S. Y. B. Tech. E&TC Pattern 2023
2302202: Electronic Devices and Circuits

Teaching Scheme:	Credit Scheme:	Examination Scheme:
Theory :03 hrs/week	**03** **02**	**Continuous Comprehensive Evaluation: 20 Marks** **InSem Exam: 20 Marks** **EndSem Exam: 60 Marks**

Prerequisite Courses, if any: Fundamentals of Electronics Engineering

Companion course, if any: Lab work in Electronic Devices and circuits

Course Objectives:

1. To make the students acquainted with semiconductor devices- MOSFET and Op-amp, their Characteristics and operations.
2. To make them able to analyze and assess the performance of various circuits and applications.

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	Bloom's Level
CO1	Analyze DC and AC circuits of MOSFET.	4-Analysis 2-Understand
CO2	Apply and explain the concepts of both positive and negative feedbacks in electronic circuits and their applications.	3-Apply, 2-Understand
CO3	Analyze and design the applications of op-amp for performing various operations.	6-Design 4-Analysis 2-Understand
CO4	Design and analyze the application of op-amp as an Active Filter.	6-Design 4-Analysis 2-Understand
CO5	Understand and compare the principles of various data conversion techniques. Also Analyze and assess the performance of linear and switching regulators, with their variants, towards applications in regulated power supplies.	3-Apply 2-Understand

COURSE CONTENTS

Unit I	**Basic MOSFET Applications**	**(07 hrs)**	**COs Mapped - CO1**
Introduction, E-MOSFET Common source circuit, DC Circuit analysis, Load line and modes of operation, MOSFET Applications: Switch, Digital logic gate, MOSFET CS small signal amplifier, Small signal equivalent circuit, parameters and analysis			
Unit II	**Feedback amplifiers and oscillators**	**(08 hrs)**	**COs Mapped - CO2**
Basic feedback concepts, Ideal feedback topologies, Voltage Amplifier and Transconductance amplifier, Current amplifier and Trans résistance amplifier, FET feedback amplifier, Stability of feedback circuits, Barkhausen criteria LC and RC oscillator, Hartley and Colpitts oscillators, Crystal Oscillator			
Unit III	**Applications and design of operational amplifier circuits**	**(07 hrs)**	**COs Mapped – CO3**

Introduction to operational amplifier, Summing averaging and scaling amplifier, Ideal and practical integrator, Ideal and practical differentiator, Difference amplifier, Instrumentation amplifier, Square and triangular wave generator, Zero crossing detector (ZCD)			
Unit IV	**Active filters**	**(07 hrs)**	**COs Mapped – CO4**
Introduction to filters, First and second order LPF: Design and applications, First and second order HPF: Design and applications, First and second order BPF: Design and applications, Wide and narrow band Butterworth filter: Design and applications, Notch and All pass filter: Design and applications			
Unit V	**Data converters and voltage regulators**	**(07 hrs)**	**COs Mapped – CO5**
Voltage to Current, Current to Voltage converters. , DAC: Resistor weighted and R-2R ladder DAC, SAR, Flash and dual slope , ADC Types / Techniques, Characteristics, block diagrams, Circuits, Specifications, Merits, Demerits, Comparisons, PLL: Block Diagram, Characteristics, phase detectors, Details of PLL IC 565 applications, Typical circuits, Block diagram of linear voltage regulator, IC 317 and IC337, Features and specifications, typical circuits, current boosting, Low Dropout Regulator (LDO). SMPS: Block diagram, Types, features and specifications, typical circuits buck and boost converter, PWM Generator ICs (IC 3524 or equivalent)			

Text Books

1. Electronic Circuit Analysis and Design, Donald Neaman, Tata McGraw Hill, 3rd Edition.
2. Op Amps and Linear Integrated Circuits, Ramakant A. Gaikwad, Pearson Education
3. Linear Integrated Circuits, Salivahanan and Kanchana Bhaskaran, Tata McGraw Hill.

Reference Books

1. Electronic Devices and Circuits , David A. Bell, Oxford press
2. Operational Amplifiers, George Clayton and Steve Winder, 5th Edition.
3. Linear Integrated Circuits, Bali , Tata McGraw-Hill, New Delhi
4. Electronic Devices and Circuits, David A. Bell, Oxford press.

Strength of CO-PO Mapping													PO-PSO mapping	
	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	-	-	-	-	-	-	-	-	-	3	3	-
CO2	3	3	-	-	-	-	-	-	-	-	-	3	3	-
CO3	3	3	3	-	-	-	-	-	-	-	-	3	3	-
CO4	3	3	3	-	-	-	-	-	-	-	-	3	3	-
CO5	3	3	-	-	-	-	-	-	-	-	-	3	3	-

Guidelines for Continuous Comprehensive Evaluation of Theory Course		
Sr. No.	**Components for Continuous Comprehensive Evaluation**	**Marks Allotted**
1	Assignments	10
2	Performance in Unit Tests	10
	Total	**20**

K. K. Wagh Institute of Engineering Education and Research, Nashik

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S. Y. B. Tech. E&TC Pattern 2023

2302203: Digital System Design with HDL

Teaching Scheme:	**Credit Scheme:**	**Examination Scheme:**
Theory :03hrs/week	**03**	**Continuous Comprehensive Evaluation: 20Marks** **InSem Exam: 20Marks** **EndSem Exam: 60Marks**

Prerequisite Courses, if any: -Fundamentals of Electronics Engineering

Companion course, if any: Lab work in Digital System Design with HDL

Course Objectives:

1. To analyze logic processes and implement logical operations using combinational logic circuits.
2. The principles of logic design and use of simple memory devices, flip-flops, and sequential circuits.
3. Concepts of sequential circuits and to analyze sequential systems in terms of state machines
4. System design approach using VHDL program and statements
5. To understand VHDL program structure and be able to write VHDL programs in different modeling styles.

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	**Bloom's Level**
CO1	Design and implement combinational logic circuits.	3-Apply
CO2	Design and implement sequential circuits	3-Apply
CO3	Design sequential circuits using Mealy, Moore state machines.	3-Apply
CO4	Understand structure of VHDL program and statements.	2-Understand
CO5	Design and test digital logic circuits using VHDL.	3-Apply

COURSE CONTENTS

Unit I	**Combinational Logic Design**	**(08hrs)**	**COs Mapped -CO1**

Standard representation of logic function (SOP, POS), Minimization of logic functions for min terms, Minimization of logic functions for max terms, Design examples: half adder, full adder, subtractor using adder Codes and code converters-BCD, Gray, XS-3, 7 Segment ,ALU design (using 7487) ,Digital Comparator, Parity checker, parity generator Multiplexer and Demultiplexer, Quine McCluskey method (only for advanced learners)

Unit II	**Sequential Logic Design**	**(07hrs)**	**COs Mapped -CO2**

Flip flops-1 Bit Memory Cell, Clocked SR, JK, MS J-K flip flop, D and T flip-flops. Use of preset and clear terminals, Excitation Table for flip flops. Conversion of flip flops.
Application of Flip flops: Registers, Shift registers, Counter part1: Counters (ring counters, twisted ring counters), Counter part 2: Ripple counters, up/down counters Counter part 3: Synchronous counters, Modulo counter Issues in sequential design: Lock out, Clock Skew, Clock jitter. Effect on synchronous designs.

Unit III	**State Machines**	**(07hrs)**	**COs Mapped – CO3**

Introduction to state machines, Mealy and Moore machine, State machine design, State diagram, state table, State reduction, State assignment, Design of Sequence detector, Design of Sequence generator, ASM

chart and realization for sequential circuits			
Unit IV	**Introduction to HDL**	**(08hrs)**	**COs Mapped – CO4**
Introduction to Logic Families TTL and CMOS, VLSI Design Flow, Types of Design Entry- Schematic, State flow, HDL-Verilog and VHDL, Basic elements of VHDL-Entity, Architecture, VHDL Objects-constants, variables, signals, VHDL Data types- scalar, compound, VHDL Operators- Logical, relational, arithmetic, shift VHDL Statements- Concurrent Statements-Process, Block, Sequential statements (If, case, loop, Exit, Assert, Wait, Null etc.)			
Unit V	**VHDL Modeling styles**	**(06hrs)**	**COs Mapped – CO5**
Modelling styles-Dataflow Modelling, Behavioural Modelling and Structural Modelling, Full adder program using Dataflow, Behavioural and Structural Modelling, Test Bench, Simulation, Synthesis VHDL code for counter and its test bench, VHDL code for ALU and its test bench, VHDL code for Shift register and its test bench			

Text Books

1. R.P. Jain, “Modern Digital Electronics”, Tata McGraw Hill Publication, 3 rd Edition
2. M. Morris Mano, “Digital Logic and Computer Design”, Prentice Hall of India, 4 th Edition
3. Douglas Perry, "VHDL", TMH, 4th Edition, 2002
4. Stephen Brown & Zvonko Vranesic, "Fundamentals of Digital Logic with Verilog Design", TMH.
5. Nazeih M.Botros, "HDL Programming (VHDL and Verilog)", Dreamtech Press (Available through John Wiley – India and Thomson Learning), 2006 Edition

Reference Books

1. Anand Kumar, “Fundamentals of Digital Circuits”, Prentice Hall of India, 1st Edition
2. J. F. Wakerly, “Digital Design- Principles and Practices,” Pearson, 3rd Edition.

Strength of CO-PO Mapping													PO-PSO mapping	
	PSO												PSO	
	1	1	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	2	-	-	2	-	-	-	-	-	-	-	3	-
CO2	3	2	-	-	3	-	-	-	-	-	-	3	3	-
CO3	3	3	3	-	3	-	-	-	-	-	-	3	3	-
CO4	3	3	3	-	3	-	-	-	-	-	-	3	-	-
CO5	3	3	3	-	3	-	-	-	-	-	-	3	3	3

Guidelines for Continuous Comprehensive Evaluation of Theory Course		
Sr. No.	**Components for Continuous Comprehensive Evaluation**	**Marks Allotted**
1	**Assignment:** Assignment No. 1 - Unit 1, 2 (10 Marks) Assignment No. 2 - Unit 3, 4, 5 (10 Marks)	**10**
2	**Quiz (Using Learnico):** Unit No. 1 (10 Questions - 10 Marks) Unit No. 2 (10 Questions - 10 Marks) Unit No. 3 (10 Questions - 10 Marks) Unit No. 4 (10 Questions - 10 Marks) Unit No. 5 (10 Questions - 10 Marks)	**10**

K. K. Wagh Institute of Engineering Education and Research, Nashik

(Autonomous from Academic Year 2022-23)

S. Y. B. Tech. E&TC Pattern 2023

2302204: Lab work in Digital System Design with HDL

Teaching Scheme:	**Credit Scheme:**	**Examination Scheme:**
Practical : 02hrs/week	**01**	**Practical : 25 Marks** **Term Work: 25 Marks**

Prerequisite Courses, if any: -Fundamentals of Electronics Engineering

Companion course, if any: Digital System Design using HDL

Course Objectives:

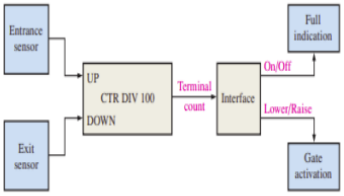
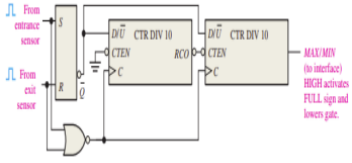
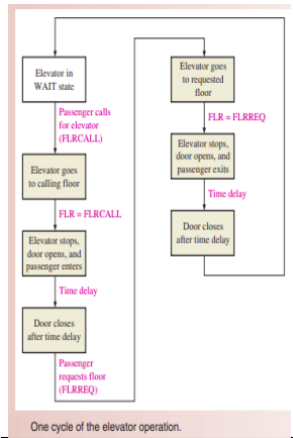
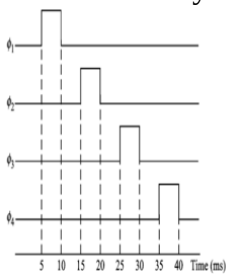
6. To analyze logic processes and implement logical operations using combinational logic circuits.
7. The principles of logic design and use of simple memory devices, flip-flops, and sequential circuits.
8. Concepts of sequential circuits and to analyze sequential systems in terms of state machines
9. System design approach using VHDL program and statements
10. To understand VHDL program structure and be able to write VHDL programs in different modeling styles.

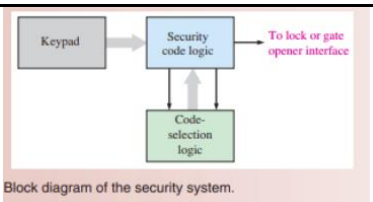
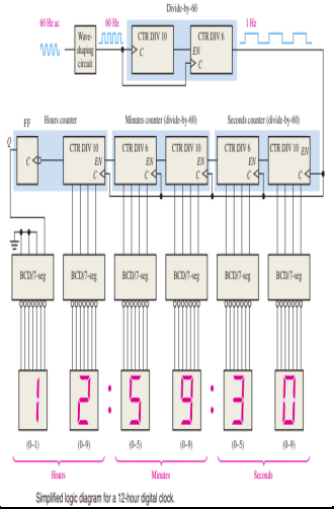
Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	**Bloom's Level (Cognitive domain)**	**Bloom's Level (Psychomotor domain)**
CO1	Design, implement and test combinational logic circuits.	3-Apply	**4-Mechanism**
CO2	Design, implement and test sequential circuits.	3-Apply	**4-Mechanism**
CO3	Write and simulate VHDL codes to implement digital circuits	3-Apply	**4-Mechanism**

List of Laboratory Experiments / Assignments

Sr. No.	**Laboratory Experiments / Assignments**	**CO Mapped**
1	A staircase light is controlled by Two switches, one at the top of the stairs and another at the bottom of the stairs. (a) Make a truth table for this system (b) Write the logic equation in SOP form (c) Realize the circuit using AND-OR gates (d) Realize the circuit using NAND gates only.	**CO1**
2	Automobile parking control: The problem is to devise a means of monitoring available spaces in a one-hundred space parking garage and provide for an indication of a full condition by illuminating a display sign and lowering a gate bar at the entrance. A general block diagram of this system is shown in Figure below:	**CO3**

	 Functional block diagram for parking garage control. A logic diagram of the up/down counter is shown in Figure below. It consists of two cascaded up/down decade counters.  Logic diagram for modulus-100 up/down counter for automobile parking control Analyse and implement using HDL code.	
3	Solve the problem with multiple methods for data processing circuits which can be used to compare two 2-bit numbers, A1A0 & B1B0 to generate two outputs, A>B and A=B	**CO1**
4	Design elevator control using VHDL: This Applied Logic describes the operation and implementation of a service elevator controller for a seven-story building. The controller consists of logic that controls the elevator operation, a counter that determines the floor at which the elevator is located at any given time, and a floor number display. For simplicity, there is only one floor call and one floor request for each elevator cycle. A cycle occurs when the elevator is called to a given floor to pick up a passenger and the passenger is delivered to a requested floor. The elevator sequence for one cycle is shown in Figure  One cycle of the elevator operation.	**CO3**
5	Design sequence Generator to provide necessary signal to drive stepper motor 	**CO2**
6	Develop a security system that provides coded access to a secured area.	**CO1, CO2**

	 Block diagram of the security system. Once a 4-digit security code is stored in the system, access is achieved by entering the correct code on a keypad. A block diagram for the security system is shown in Figure above. The system consists of the security code logic, the code-selection logic, and the keypad. The keypad is a standard numeric keypad.	
7	Realize the diagram explained here with suitable software: A common example of a counter application is in timekeeping systems. Figure below is a simplified logic diagram of a digital clock that displays seconds, minutes, and hours. First, a 60 Hz sinusoidal ac voltage is converted to a 60 Hz pulse waveform and divided down to a 1 Hz pulse waveform by a divide-by-60 counter formed by a divide-by-10 counter followed by a divide-by-6 counter. Both the seconds and minutes counts are also produced by divide-by-60 counters. These counters count from 0 to 59 and then recycle to 0; synchronous decade counters are used in this particular implementation. Notice that the divide-by-6 portion is formed with a decade counter with a truncated sequence achieved by using the decoder count 6 to asynchronously clear the counter. The terminal count, 59, is also decoded to enable the next counter in the chain.  Simplified logic diagram for a 12-hour digital clock.	**CO1, CO2**
8	Simulate all types of Flip-Flops using VHDL	**CO3**
9	Simulate Shift Register (Left and Right shift) using VHDL	**CO3**
	Write HDL code to implement traffic light controller shown in the figure below: Note: Timing Requirements: The control logic establishes the sequencing of the lights for a traffic signal at the intersection of a busy main street and an occasionally used side street. The following are the timing requirements: u The green light for the main street will stay on for a minimum of 25 s or as long as there is no vehicle on the side street. u The green light for the side street will stay on until there is no vehicle on the side street up to a maximum of 25 s. u The yellow caution light will stay on for 4 s between changes from green to red on both the main street and the side street.	**CO3**

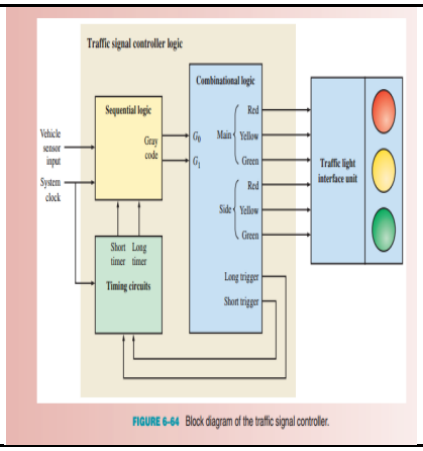


FIGURE 6-64 Block diagram of the traffic signal controller.

Guidelines for Laboratory Conduction

1. Experiments should be performed in a group of two students only.
2. Avoid contacting circuits with wet hands or wet materials.
3. Double check circuits for proper connections and polarity prior to applying the power.
4. Observe polarity when connecting polarized components or test equipment.
5. Make sure test instruments are set for proper function and range prior to taking a measurement.

Guidelines for Student's Lab Journal

Student's lab journal should contain following related things -
Title, Objectives, Hardware/ Software requirement, Theory, Circuit Diagram, Observation table, Graph, Calculations, Results, Conclusion and Assignment questions

Guidelines for Term work Assessment

1. R1: Timely completion of experiment (10 Marks)
2. R2: Understanding of experiment (10 Marks)
3. R3: Presentation / clarity of journal writing (10 Marks)
4. Total 30 marks for each experiment and average marks of all experiments will be converted into 25 marks of term work.

Strength of CO-PO Mapping													PO-PSO mapping	
	PSO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	3	-	3	-	-	-	-	-	-	3	3	2
CO2	3	3	3	-	3	-	-	-	-	-	-	3	3	2
CO3	3	3	3	-	3	-	-	-	-	-	-	3	3	3

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S. Y. B. Tech. E&TC Pattern 2023
2302205: Lab work in Electronic Devices and Circuits

Teaching Scheme:	Credit Scheme:	Examination Scheme:
Practical : 04 hrs/week	02	Practical: 50 Marks Term Work:50 Marks

Prerequisite Courses, if any: - Fundamentals of Electronics Engineering

Companion course, if any: - Electronic Devices and Circuits

Course Objectives:

1. To make the students acquainted with semiconductor devices- MOSFET and Op-amp, their Characteristics and operations.
2. To make them able to analyze and assess the performance of various circuits and applications.

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	Bloom's Level (Cognitive domain)	Bloom's Level (Psychomotor domain)
CO1	Design, build and test the applications of op-amp for performing various operations.	6-Design	6-Adaptation
CO2	Implement and test the circuits for amplifier and voltage regulator applications.	3-Apply	4-Mechanism
CO3	Carry out experiments as an individual and in a team, comprehend and write a laboratory record and draw conclusions at a technical level.	5-Evaluate	3-Guided Response

List of Laboratory Experiments / Assignments

Sr. No.	Laboratory Experiments / Assignments	CO Mapped
1.	An amplifier to amplify the AC signals is to be designed. Suggest the suitable FET amplifier configuration for the same. Design and implement the circuit. Also verify DC operating point.	CO2, CO3
2.	An amplifier to amplify the AC signals is to be designed. Design and implement the circuit. Also measure AC parameters of the amplifier.	CO2, CO3
3.	Generate audio frequency signals to be used in musical instruments. Design and simulate the circuit.	CO1, CO3
4.	The op-amp amplifier is to be operated at very high frequency. Suggest suitable op-amp for the same. Which parameter is important for this application? Measure that parameter for IC 741.	CO1, CO3
5.	Most biomedical sensors generate tiny signals, such as blood pressure sensors, ultrasound transducers, polarized and non-polarized electrodes. Suggest a suitable amplifier using op-amp for this medical application. For example, in electrocardiography machines, or ECGs; which monitor the changes in the heart's dipole electric field. Also simulate the circuit.	CO1, CO3
6.	Can Square waves be generated using op-amp? Design, build & test such circuit. Also Suggest suitable circuit to produce triangular waveforms from square waveform.	CO1, CO3

7.	Design an integrator circuit for given frequencies. Build the integrator using op-amp and verify the results using frequency response.	CO1, CO3
8.	Design an op-amp circuit to get the amplified sum of the inputs given. Implement the circuit using any simulation software.	CO1, CO3
9.	A radio signal is having high frequency noise. How will you design the circuit which will remove the high frequency noise? Also build & test the circuit using Op-amp.	CO1, CO3
10.	An industrial motor requires the variable DC supply which provides output up to 5 V. Design and test the circuit for this application using simulation software.	CO3
11.	An industrial motor requires the variable DC supply from AC input applied. Design, implement and test the circuit for this application.	CO3
12.	Can we convert digital signals to analog using op-amp? Implement 2-bit DAC using simulation software and verify the results.	CO1, CO3

Guidelines for Laboratory Conduction

1. Teacher will brief the given experiment to students, its procedure, observations calculation, and outcome of this experiment.
2. Apparatus and equipment required for the allotted experiment will be provided by the lab assistants using SOP.
3. Students will perform the allotted experiment in a group (two students in each group) under the supervision of faculty and lab assistants.
4. After performing the experiment students will check their readings, calculations.

After checking they have to write the conclusion of the final result.

Guidelines for Student's Lab Journal

Write-up should include title, aim, diagram, working principle, procedure, observations, graphs, calculations, conclusion and questions, if any.

Guidelines for Term work Assessment

1. R1: Timely completion of experiment (10 Marks)
2. R2: Understanding of experiment (10 Marks)
3. R3: Presentation / clarity of journal writing (10 Marks)
4. Total 30 marks for each experiment and average marks of all experiments will be converted into 50 marks of term work.

Strength of CO-PO Mapping													PO-PSO mapping	
	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	-	-	2	-	-	-	-	-	-	-	3	-
CO2	3	3	-	-	3	-	-	-	-	-	-	-	3	-
CO3	3	-	-	-	-	-	-	-	3	3	-	3	-	-

K. K. Wagh Institute of Engineering Education and Research, Nashik
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S. Y. B. Tech. E&TC Pattern 2023

2302206: MDM1: Introduction to IoT

Teaching Scheme:	**Credit Scheme:**	**Examination Scheme:**
Theory :03hrs/week	**03**	**Continuous Comprehensive Evaluation: 20Marks** **InSem Exam: 20Marks** **EndSem Exam: 60Marks**

Prerequisite Courses, if any: Basic Electronics Engineering, Programming and Problem Solving

Companion course, if any: Lab work in Introduction to IoT

Course Objectives:

1. To study fundamental concepts of IoT.
2. To understand roles of sensors in IoT.
3. To Learn different protocols used for IoT design.
4. Understand different Communication Technologies used in IoT.
5. Understand IoT applications in different domains.

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	**Bloom's Level**
CO1	Understand the various concepts, terminologies and architecture of IoT systems.	2- Understand
CO2	Use sensors and actuators for design of IoT.	2- Understand
CO3	Understand and apply various protocols for design of IoT systems	3-Apply
CO4	Use various techniques of data storage and analytics in IoT	3-Apply
CO5	Understand various applications of IoT	4-Analyze

COURSE CONTENTS

Unit I	**Fundamentals of IoT**	**(08hrs)**	**COs Mapped CO1, CO3, CO5**

Introduction, Definitions & Characteristics of IoT, IoT Architectures, Physical & Logical Design of IoT, Enabling Technologies in IoT, History of IoT, About Things in IoT, The Identifiers in IoT, About the Internet in IoT, IoT frameworks, IoT and M2M.

Unit II	**Sensors Networks**	**(07hrs)**	**COs Mapped – CO2, CO3, CO5**

Definition, Types of Sensors, Types of Actuators, Examples and Working, RFID Principles and components, Wireless Sensor Networks: History and Context, The node, Connecting nodes, Networking Nodes, WSN and IoT.

Unit III	**IoT Communication Protocols**	**(07hrs)**	**COs Mapped - CO3, CO5**

WPAN Technologies for IoT: IEEE 802.15.4, Zigbee, HART, NFC, Z-Wave, BLE, Bacnet, Modbus. RFID, Bluetooth, Internet Communication- IP Addresses IPv6, 6LowPAN, RPL, REST, AMPQ, CoAP, MQTT,MAC Addresses , I/O interfaces Software Components.

Unit	**IoT Application Development**	**(07hrs)**	**COs Mapped -**

IV			CO4, CO5
IoT Platform overview: Overview of IoT supported Hardware platforms such as: Raspberry pi, Arduino Board details Frame work for IoT Applications-Implementation of Device integration, Data acquisition and Integration, Device data storage on cloud/local server, Authentication, authorization of Devices			
Unit V	**Applications of IoT**	**(07hrs)**	**COs Mapped - CO5**
Home Automation, Smart Cities, Energy, Retail Management, Logistics, Agriculture, Health and Lifestyle, Industrial IoT, IoT design Ethics, IoT in Environmental Protection.			

Text Books

1.AdrianMcewen, HakinCassimally, "Designing The Internet of Things", First Edition, Wiley, 2014.
2. Keysight Technologies, "The Internet of Things: Enabling Technologies and Solutions for Design and Test", Application Note, 2016.
3. Vijay Madisetti, ArshdeepBahga," Internet of Things A Hands-On- Approach",2014, ISBN:978 0996025515.

Reference Books

1. Raj Kamal , " Internet of Things: Architecture and Design", McGraw Hill.2nd edition June 2022
2. Pethuru Raj, Anupama C. Raman ," The Internet of Things Enabling Technologies, Platforms, and Use Cases", Taylor and Francis group. February 2017
3. Peter Waher, "Mastering Internet of Things: Design and create your own IoT applications using Raspberry Pi 3", First Edition, Packt Publishing, 2018.

Strength of CO-PO Mapping													PO-PSO mapping	
	PSO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	-	-	-	2	-	-	-	-	-	-	-	-	-
CO2	3	-	-	-	2	-	-	-	-	-	-	-	-	-
CO3	3	2	-	-	2	-	-	-	-	-	-	-	-	-
CO4	3	2	-	-	2	-	-	-	-	-	-	-	-	-
CO5	-	2	-	-	-	-	-	-	-	-	-	-	-	-

Guidelines for Continuous Comprehensive Evaluation of Theory Course		
Sr. No.	**Components for Continuous Comprehensive Evaluation**	**Marks Allotted**
1	**Assignment:** Assignment No. 1 - Unit 1, 2 (10 Marks) Assignment No. 2 - Unit 3, 4, 5 (10 Marks)	**10**
2	**Quiz (Using Learnico):** Unit No. 1 (10 Questions - 10 Marks) Unit No. 2 (10 Questions - 10 Marks) Unit No. 3 (10 Questions - 10 Marks) Unit No. 4 (10 Questions - 10 Marks) Unit No. 5 (10 Questions - 10 Marks)	**10**

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S. Y. B. Tech. E&TC Pattern 2023 **2302207: MDM1: Lab Work in Introduction to IoT**		
Teaching Scheme:	**Credit Scheme:**	**Examination Scheme:**
Practical : 02hrs/week	**01**	**Practical:25 Marks** **Term Work: 25 Marks**
Prerequisite Courses, if any Programming and Problem Solving		
Companion course, if any: Introduction to IoT		
Course Outcomes: On completion of the course, students will be able to–		

	Course Outcomes	**Bloom's Level (Cognitive domain)**	**Bloom's Level (Psychomotor domain)**
CO1	Compare different development boards for IoT.	4-Analyze	1-Perception
CO2	Demonstrate the working of simple IoT task of LED control.	3-Apply	3-Guided Response
CO3	Apply IoT concept in simple real life applications.	3-Apply	4-Mechanism
CO4	Apply IoT concepts in advance applications	3-Apply	4-Mechanism
CO5	Design IoT system to transfer data to the cloud and in between cloud providers.	6-Create	6-Adaptation

List of Laboratory Experiments / Assignments		
Sr. No.	**Laboratory Experiments / Assignments**	**CO Mapped**
1	Study & Survey of various development boards for IoT.	**CO1**
2	LED blinking with Arduino Uno.	**CO2**
3	IoT sensors interface with Arduino (Temperature/Light sensors)	**CO3**
4	Interfacing Sensors and actuators with Raspberry Pi 2.	**CO4**
5	Integration of Actuators with node MCU (Servo motor/Relay).	**CO4**
6	IoT based Stepper Motor Control with Raspberry Pi	**CO4**
7	To interface LCD and real time clock with Arduino.	**CO5**
8	Build a cloud-ready temperature sensor with the Arduino Uno and the any IoT Platform.	**CO5**
9	Upload/download sensor data on cloud and server.	**CO5**
	Virtual Lab Links:- 1. https://docs.simuli.co/getting-started/arduino/arduino-ide-and-vlab 2. https://docs.simuli.co/getting-started/raspberry-pi/setting-up-iotify-virtual-lab	

Strength of CO-PO Mapping													PO-PSO mapping	
	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	3	-	-	-	-	-	-	-	-	3	-	-
CO2	3	3	3	-	-	-	-	-	-	-	-	3	-	-
CO3	3	3	3	-	-	-	-	-	-	-	-	3	-	-
CO4	3	3	3	-	-	-	-	-	-	-	-	3	-	-
CO5	3	3	3	-	-	-	-	-	-	-	-	3	-	**3**

Guidelines for Laboratory Conduction

1.Teacher will brief the given interfacing of embedded system to students
2. Kits and interfacing modules will be provided in the Lab
3. Students will perform the allotted experiment in a group (two students in each group) under the supervision of faculty and lab assistant.
4. After performing the interfacing and programming students will check their results from the teacher.
5. After checking they have to write the conclusion of the final result

Guidelines for Student's Lab Journal

Write-up should include title, aim, interfacing diagram, algorithm, procedure, calculations, waveform, conclusion and questions, if any

Guidelines for Term work Assessment

Each experiment from the lab journal is assessed for thirty marks based on three rubrics.

1. R1: Timely completion of experiment (10 Marks)
2. R2: Understanding of experiment (10 Marks)
3. R3: Presentation / clarity of journal writing (10 Marks)

Total 30 marks for each experiment and average marks of all experiments will be converted into 25 marks of term work.

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S. Y. B. Tech. E&TC Pattern 2023

2302208 : OE1: Industrial Management

Teaching Scheme:	**Credit Scheme:**	**Examination Scheme:**
Theory :02 hrs/week	**02**	**Continuous Comprehensive Evaluation: 50Marks**

Prerequisite Courses: -

Course Objectives:

1. Students are exposed to know the importance of Industrial Management.
2. Get the idea about concept of Entrepreneurship
3. To provide a basis of understanding to the students with reference to working of business organization, small scale industries.

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	**Bloom's Level**
CO1	Get Comprehensive theoretical knowledge about Management & organization.	2-Understanding
CO2	Explain principle role & operation of Business sectors & organizations.	2- Understanding
CO3	Recognize the need for work-study and importance of quality control.	2- Understanding
CO4	Discuss role of IT tools & MIS in supply chain management .	2- Understanding

COURSE CONTENTS

Unit I	**Management**	**(06hrs)**	**COs Mapped - CO1**

Introduction-Thought and its Development, Functional areas of management, Management and Administration, Roles of Management, Levels of Management, functions of Management, Contribution of F.W.Taylor, Henri Fayol, Elton Mayo, Structure of an industrial organization, Hierarchy of various job positions in Electronics & IT industries, Functions of different departments.

Unit II	**Business sectors & organizations**	**(06hrs)**	**COs Mapped - CO2**

Private sector, Cooperative sectors, public sector, joint sector, Services sector, Various forms of business organizations – Sole Proprietorship, Partnership firms, Joint stock companies –their features, relative merits, demerits& suitability. Charter documents of Companies Decisions in setting up an Enterprise – opportunity and idea generation, Business Plan, Business size and location decisions, Setting up of Business outside India**.**

Unit III	**Work Study & Quality control**	**(06hrs)**	**COs Mapped –CO3**

Introduction, definition, objectives, steps in work study, Method study: definition, objectives, steps of method study, Work Measurement: purpose, types of study, stopwatch methods, steps, allowances, standard time, Calculations, work sampling, Production Planning and Control
Quality control: statistical quality control, Introduction to TQM.

Unit IV	**Supply chain management & MIS**	**(06hrs)**	**COs Mapped – CO4**

Inventory management, Role of IT,ERP tools, agile and reverse supply chain, Areas & practices of Supply Chain Management for Electronic Manufacturing, supply chain challenges, Digital supply chain. Types of Management Information Systems, Innovation Policy of India, Start-up India Policy

Textbooks

1. Industrial Engineering & Management, O.P.Khanna, Dhanpat Rai, 4th, 2018
2. Challenges to Modern Business by Michael J Dixon
3. Starting a Business outside India By Taxmann

Reference Books

1. Management, Stephen Robbins, Pearson Education, 17th Edition, 2003
2. Management Fundamentals Concepts, Application, Skill Development, Roberts Lusier Thomson, SAGE publication, 6th, 2014
3. The Founder's Dilemmas: Anticipating and Avoiding the Pitfalls That Can Sink a Startup,' by Noam Wasserman

Strength of CO-PO Mapping													PO-PSO mapping	
	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	-	-	-	-	-	-	-	**2**	**3**	**2**	-	**3**	-	-
CO2	-	-	-	-	-	-	-	**2**	**3**	-	-	**3**	-	-
CO3	-	-	-	-	-	-	-	-	**3**	-	**3**	**3**	-	-
CO4	-	-	-	-	-	-	-		**3**	**2**	**2**	**3**	-	-

Guidelines for Continuous Comprehensive Evaluation of Theory Course		
Sr. No.	**Components for Continuous Comprehensive Evaluation**	**Marks Allotted**
1	**Assignment:** No. 1 - Unit 1, 2 No. 2 - Unit 3, 4	**15**
2	**Test:** No. 1 - Unit 1, 2 No. 2 - Unit 3, 4	**15**
3	**Seminar:** Students will deliver a seminar in a group of 3 students on allotted topic.	**20**

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S. Y. B. Tech. E&TC Pattern 2023

2302209: VEC: Democracy, Election and Governance

Teaching Scheme:	Credit Scheme:	Examination Scheme:
Tutorial: 02 hrs/week	02	Continuous Comprehensive Evaluation: 50 Marks

Prerequisite Courses, if any: NA

Course Objectives:

1. To understand the idea and concept of Democracy
2. Acquire knowledge about our constitution and the Preamble
3. Familiarization with types, different models, and dimensions of democracy
4. Understand federalism, decentralization, governance, and good governance
5. Acquire knowledge about the contributions of local government bodies toward Indian democracy
6. Familiarization with the challenges to Indian democracy

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	Bloom's Level
CO1	Understand Democracy and its features	2- Understand
CO2	Understand federalism and decentralization, and governance	2- Understand
CO3	Familiarize with the challenges to the Indian Democracy	2- Understand

COURSE CONTENTS

Unit I	Democracy – Foundation and Dimensions	(08hrs)	COs Mapped CO1

Introduction to Democracy- Salient features, advantages of democracy, Constitution of India – Preamble, need for the constitution, amendments to the constitution, types of Democracy, evolution of democracy – different models, dimensions of the democracy- Social, Economic, and Political

Unit II	Decentralization	(08hrs)	COs Mapped CO2

Indian Democracy- Aspect of Federalism, objectives and major features of Federalism, decentralization in India- Progress of India's decentralization, Advantages of decentralization, issues with decentralization in India, 73rd and 74th amendments, history of Panchayati Raj Institutions- post-independence period, challenges to Indian democracy- gender, caste, religion, and communalism

Unit III	Governance	(08hrs)	COs Mapped - CO1, CO2, CO3

Introduction to Governance - Processes in governance, actors, and structures in governance systems,
Good governance, its characteristics and components – World Bank, OECD, UNDP, Challenges in good governance, Government- core purpose of the government, government and governance, Government of India and good governance, e-governance, and its benefits, social exclusion index- UNDP, Inclusion and Inclusive growth- the importance of inclusive growth, government policies/programs for inclusive growth

Text Books

1. Ameya Anil Patil, "Democracy, Election and Governance," Nirali Prakashan, 2021, ISBN: 978-93-5451-162-2
2. Alpana Sharma, "Democracy, Election and Governance," Namya Press, 2021, ISBN: 9390445906, 9789390445905

Reference Book

Abhay Prasad & Krishna Murari, "Constitutional Government and Democracy in India," Pearson India Education, 2019. ISBN: 978-93-534-3228-7

Strength of CO-PO Mapping													PO-PSO mapping	
	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	-	-	-	-	-	2	-	-	2	-	-	2	-	-
CO2	-	-	2	-	-	-	-	-	2	-	-	-	-	-
CO3	-	-	2	-	-	2	-	-	-	-	-	-	-	-

Guidelines for Continuous Comprehensive Evaluation of Theory Course		
Sr. No.	**Components for Continuous Comprehensive Evaluation**	**Marks Allotted**
1	**Assignments:** Assignment No. 1 - Unit 1 Assignment No. 2 - Unit 2 Assignment No. 3 - Unit 3	**30**
2	**Group presentations on syllabus topics**	**20**

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S. Y. B. Tech. E&TC Pattern 2023

2302210: VSEC: Problem solving using Python

Teaching Scheme:	Credit Scheme:	Examination Scheme:
Theory :01hrs/week **Practical : 02hrs/week**	**01** **01**	**Term Work: 25Marks** **Tutorial: 25 Marks**

Prerequisite Courses, if any: basic understanding of programming concepts in C

Course Objectives:

- To understand core python programming.
- To understand python looping, control statements and string manipulations
- To understand the basic concepts of functions.

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	Bloom's Level (Cognitive domain)	Bloom's Level (Psychomotor domain)
CO1	Use the core concepts to write a python program	3-Apply	3-Guided Response
CO2	Apply control structure and loops to build a solution for a given problem	3-Apply	3-Guided Response
CO3	Develop python program for string manipulation.	3-Apply	3-Guided Response
CO4	Build a solution for a given problem using lists, sets, tuples, and dictionaries.	3-Apply	3-Guided Response
CO5	Develop programs using functions	3-Apply	3-Guided Response

COURSE CONTENTS

Unit I	Basics of Python Programming	(03hrs)	COs Mapped - CO1

Features of Python, History and Future of Python, Writing and executing Python program, Data-types in Python, Variables in Python, Identifiers, Data Types, Constants, Input / Output, Operators (Arithmetic, relational, logical, bitwise), Expressions, Precedence and Associativity, Type conversions, Taking User Input (Console)

Unit II	Decision Control Statement	(03hrs)	COs Mapped – CO2

Conditional algorithmic constructs: if, if-else, nested if-else, cascaded if-else and switch statement

Iterative algorithmic constructs : 'for', 'while' statements, nested loops, Continue, break statements

Unit III	Arrays	(03hrs)	COs Mapped - CO3

One- dimensional, multidimensional array, character arrays (Strings), Built in string methods and functions

Unit IV	Mutable and immutable data structure	(03hrs)	COs Mapped - CO4

Mutable data structures : lists, sets, dictionaries Immutable data structure: Tuple			
Unit V	**Functions**	**(03hrs)**	**COs Mapped – CO5**
definition, call, variable scope and lifetime, the return statement. Defining functions, Lambda or anonymous function			

Text Books

1. Reema Thareja, "Python Programming Using Problem Solving Approach", Oxford University Press, ISBN 13: 978-0-19-948017-6
2. R. Nageswara Rao, "Core Python Programming", Dreamtech Press, ISBN-13: 978-9386052308

Reference Books

3. R. G. Dromey, "How to Solve it by Computer", Pearson Education India, ISBN-13: 978-8131705629
4. Maureen Spankle, "Problem Solving and Programming Concepts", Pearson, ISBN-13: 978-013249264

Strength of CO-PO Mapping													CO-PSO mapping	
	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	-	-	2	-	-	-	-	-	-	3	-	-
CO2	3	3	2	-	2	-	-	-	-	-	-	3	-	-
CO3	3	3	2	-	2	-	-	-	-	-	-	3	-	-
CO4	3	3	2	-	2	-	-	-	-	-	-	3	-	-
CO5	3	3	2	-	2	-	-	-	-	-	-	3	-	-

List of Laboratory Experiments / Assignments		
Sr. No.	**Laboratory Experiments / Assignments**	**CO Mapped**
1	Write a python program that accepts seconds as input of type integer. The program should convert seconds in hours, minutes and seconds. Output should like this : Enter seconds: 12200 Hours: 3 Minutes: 23 Seconds: 2	**CO1**
2	Conditional Structures: The marks obtained by a student in 3 different subjects are input by the user. Python program should calculate the average marks obtained in 3 subjects and display the grade. The student gets a grade as per the following rules: Average Grade 90-100 O 80-89 A 70-79 B 60-69 C 40-59 D 0-39 F	**CO2**

3	Control structures: Floyd's triangle is a right-angled triangular array of natural numbers as shown below: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 Write a python program to print the Floyd's triangle.	**CO2**
4	String: Write a python program that accepts a string to setup a password with following requirements: • The password must be at least eight characters long • It must contain at least one uppercase letter • It must contain at least one lowercase letter • It must contain at least one numeric digit The program checks the validity of password.	**CO3**
5	List: Write a python program to • Find the sum and average of given numbers using lists • Display elements of list in reverse order • Find the minimum and maximum elements in the lists	**CO4**
6	Tuple: Write a Python program to sort a tuple by its float element. Sample data: [('item1', '13.10'), ('item2', '17.10'), ('item3', '25.3')] Expected Output: [('item3', '25.3'), ('item2', '17.10'), ('item1', '13.10')]	**CO4**
7	Dictionary: Write a python program to read string from user and create a dictionary having key as word length and value is count of words of that length. For example, if user enters 'I scream you scream we all scream for ice cream' Word Word length I 1 scream 6 you 3 scream 6 we 2 all 3 scream 6 for 3 ice 3 cream 5 The content of dictionary should be {1:1, 6:3, 3:4, 2:1, 5:1}	**CO4**
8	Set: Write a python program for operations on set	**CO4**
9	Function: Write a function in python to display the elements of list thrice if it is a number and display the element terminated with '#' if it is not a number. Suppose the following input is supplied to the program: ['23','MAN','GIRIRAJ', '24','ZARA'] The output should be 232323 MAN#	**CO5**

	GIRIRAJ# 242424 ZARA#	

Guidelines for Laboratory Conduction

•Use of coding standards and Hungarian notation, proper indentation and comments.

•Operating System recommended:- Linux/Windows or its derivative

Guidelines for Student's Lab Journal

Student's lab journal should contain following related things -
Title, Objectives, Software requirement, Theory, and Conclusion

Guidelines for Termwork Assessment

- R1: Timely completion of experiment (10 Marks)
- R2: Understanding of experiment (10 Marks)
- R3: Presentation / clarity of journal writing (10 Marks)
- Total 30 marks for each experiment and average marks of all experiments will be converted into 50 marks of term work.

Semester-II

K. K. Wagh Institute of Engineering Education and Research, Nashik

(Autonomous from Academic Year 2022-23)

S. Y. B. Tech. E&TC Pattern 2023
2302211: Control Systems

Teaching Scheme:	Credit Scheme:	Examination Scheme:
Theory :03hrs/week	**03**	**Continuous Comprehensive Evaluation: 20 Marks** **In Sem Exam: 20 Marks** **End Sem Exam: 60 Marks**

Prerequisite Courses, if any: Laplace Transform and Differential Equations

Companion course, if any: Lab work in Control systems and Microcontroller

Course Objectives:

1. To introduce elements of control system and their modeling using various Techniques.
2. To get acquainted with the methods for analyzing the time response and Stability of System
3. To introduce and analyze the frequency response and Stability of System
4. To introduce concept of root locus, Bode plots, Nyquist plots.
5. To introduce State Variable Analysis method.
6. To get acquainted with concepts of sensors, actuators and controllers in control systems.

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	Bloom's Level
CO1	Determine and use models of physical systems in forms suitable for use in the analysis and design of control systems.	1-Knowledge
CO2	Determine the (absolute) stability of a closed-loop control system.	3-Apply
CO3	Perform time and frequency domain analysis of control systems required for stability analysis.	4-Analyze
CO4	Express and solve system equations in state variable form.	3-Apply
CO5	Differentiate between various sensors, actuators and controllers Also understand the role of the controllers in industrial automation.	2-Understand

COURSE CONTENTS

Unit I	Control system modelling	(08 hrs)	COs Mapped - CO1

Basic Elements of Control System, Open loop and Closed loop systems, Differential equations and Transfer function, Modelling of Electric systems, Translational and rotational mechanical systems, Block diagram reduction Techniques, Signal flow graph

Unit II	Stability Analysis	(06 hrs)	COs Mapped - CO2

Concept of pole and zero, concept of stability absolute stability, relative stability, Routh Hurwitz stability criterion, Root locus, Root locus, Application of root locus for stability analysis.

Unit III	Time and Frequency domain analysis	(08 hrs)	COs Mapped-CO3

Standard test inputs, order and type of a system, transient analysis of first and second order systems, transient analysis of first and second order systems, time domain specifications of second order system, Steady state error and static error constants. Frequency response and frequency domain specifications, correlation between time domain and frequency domain specifications, stability analysis using Bode plot

Unit IV	State Variable Analysis	(07 hrs)	COs Mapped- CO4
State space advantages and representation, Transfer function from State space, physical variable form, phase variable forms: controllable canonical form, observable canonical form, Solution of homogeneous state equations, state transition matrix and its properties, computation of state transition matrix by Laplace transform method only, Concepts of Controllability and Observability			
Unit V	**Sensors, Actuators and Controllers**	**(07 hrs)**	**COs Mapped -CO5**
Sensor static and dynamic characteristics, Sensor selection criteria, Sensor operating principle: Temperature, displacement, optical, pressure and strain gauge, Smart sensors. Classification of actuators, Relays and solenoids, Relay circuits, Pneumatic and Hydraulic linear and rotary actuators, Control circuits for actuators. Concept of Controller, Introduction to ON-OFF and PID controller, Concept of Zeigler-Nicholas method.			

Text Books

1. N. J. Nagrath and M. Gopal, "Control System Engineering", New Age International Publishers, 5th Edition.
2. K. Ogata, "Modern Control Engineering", Prentice Hall India Learning Private Limited; 5th Edition.

Reference Books

1. Benjamin C. Kuo, "Automatic control systems", Prentice Hall of India, 7th Edition.
2. M. Gopal, "Control System – Principles and Design", Tata McGraw Hill, 4th Edition.
3. Schaum's Outline Series, "Feedback and Control Systems" Tata McGraw -Hill.
4. John J. D'Azzo and Constantine H. Houpis, "Linear Control System Analysis and Design", Tata McGraw-Hill, Inc.
5. Richard C. Dorf and Robert H. Bishop, "Modern Control Systems", Addison – Wesley.
6. Process Control Instrumentation Technology, C. D. Johnson

Strength of CO-PO Mapping													PO-PSO mapping	
	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	-	-	1	-	-	-	-	-	-	-	-	-
CO2	3	3	-	-	2	-	-	-	-	-	-	-	3	-
CO3	3	3	-	-	2	-	-	-	-	-	-	-	3	-
CO4	3	2	-	-	-	-	-	-	-	-	-	-	3	-
CO5	3	3	-	-	-	-	-	-	-	-	-	-	3	-

Guidelines for Continuous Comprehensive Evaluation of Theory Course		
Sr. No.	**Components for Continuous Comprehensive Evaluation**	**Marks Allotted**
1	**Assignment:** Assignment No. 1 - Unit 1, 2 (10 Marks) Assignment No. 2 - Unit 3, 4, 5 (10 Marks)	**10**
2	**Quiz (Using Learnico):** Unit No. 1 (10 Questions - 10 Marks) Unit No. 2 (10 Questions - 10 Marks) Unit No. 3 (10 Questions - 10 Marks) Unit No. 4 (10 Questions - 10 Marks) Unit No. 5 (10 Questions - 10 Marks)	**10**

K. K. Wagh Institute of Engineering Education and Research, Nashik
(Autonomous from Academic Year 2022-23)

S. Y. B. Tech. Pattern 2023 Semester: IV
2302212: Microcontrollers

Teaching Scheme:	**Credit Scheme:**	**Examination Scheme:**
Theory :03 hrs/week	03	Continuous Comprehensive Evaluation: 20 Marks InSem Exam: 20 Marks EndSem Exam: 60 Marks

Prerequisite Courses, if any: -Digital Electronics

Companion course, if any: Lab work in Control systems and Microcontroller

Course Objectives:
1. To study features and architecture of 8 bit microcontroller
2. To learn peripherals of 8 bit microcontroller
3. To study software used in 8 bit microcontroller

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	**Bloom's Level**
CO1	Understand the architecture of 8-bit 8051 microcontroller..	2- Understand
CO2	Develop 8051 assembly language program.	3-Apply
CO3	Acquire knowledge of various peripherals such as I/O ports and timers, and interfacing techniques with the 8051 microcontroller..	3-Apply
CO4	Interface different real word devices to 8 bit microcontroller	3-Apply
CO5	Compare the architecture of 8-bit PIC 18xxx microcontrollers with 8051 microcontroller	3-Apply

COURSE CONTENTS

Unit I	**Introduction to 8051 Microcontroller**	**(08hrs)**	**COs Mapped CO1**

Difference between microprocessor and microcontroller Introduction to the Microcontroller, classification of 8051 family, 8051 Architecture, Registers, Pin diagram,, Memory organization, External Memory (ROM & RAM) interfacing, Interrupt structure of 8051

Unit II	**Assembly Language Programming**	**(07hrs)**	**COs Mapped – CO2**

Addressing Modes, Data Transfer instructions, Arithmetic instructions, Logical instructions, Branch instructions (Jump), Bit manipulation instructions, assembly language programs

Unit III	**Different Peripherals (I/O and Timers)**	**(07hrs)**	**COs Mapped – CO3**

Basic concepts of I/O port (sourcing and sinking, specification and isolation), **Timers and Counters**: Mode 0, Mode 1,Mode 2and Mode 3 of timers, program using timer 1 & 2 , Interfacing of simple switch and LED to I/O ports

Unit IV	**Interfacing with real word devices**	**(07hrs)**	**COs Mapped ,CO4**

Interfacing of LCD and 7segment display, Interfacing of DAC0808, Interfacing ADC0808, Interfacing of stepper motor, serial communication in 8051. (Programs in embedded C and Assembly language)

Unit V	Introduction to PIC controller	(07hrs)	COs Mapped – CO5

Comparison of PIC family, Criteria for Choosing Microcontroller, features, PIC18FXX architecture with generalized block diagram. MCU, Program and Data memory organization, Bank selection using Bank Select Register, Pin out diagram,

Text Books

1. Subrata Ghoshal ―8051 Microcontroller Internals, Instructions, Programming And Interfacing, Pearson.
2 .Mahumad Ali Mazadi, ―The 8051 microcontroller & embedded systems‖ 2nd Edition ,PHI .
3.Mahumad Ali Mazadi, ―PIC microcontroller & embedded systems‖ 2nd Edition ,PHI.

Reference Books

1.Shibu K.V. ―Introduction Embedded System, McGraw Hill

Strength of CO-PO Mapping

	PO/PSO													
	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2
CO1	2	2	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	-	-	-	3	-	-	-	-	-	-	-	2	2
CO3	2	2	-	-	3	-	-	-	-	-	-	-	2	2
CO4	3	2	-	-	3	-	-	-	-	-	-		2	2
CO5	2	2	-	-	-	-	-	-	-	-	-	-	-	-

Guidelines for Continuous Comprehensive Evaluation of Theory Course

Sr. No.	Components for Continuous Comprehensive Evaluation	Marks Allotted
1	**Assignment:** Assignment No. 1 - Unit 1, 2 (10 Marks) Assignment No. 2 - Unit 3, 4, 5 (10 Marks)	**10**
2	**Quiz**	**10**

K. K. Wagh Institute of Engineering Education and Research, Nashik

(Autonomous from Academic Year 2022-23)

S. Y. B. Tech. E&TC Pattern 2023
2302213 : Analog and Digital Communication

Teaching Scheme:	Credit Scheme:	Examination Scheme:
Theory :03hrs/week	**03**	**Continuous Comprehensive Evaluation: 20Marks** **In Sem Exam: 20Marks** **End Sem Exam: 60Marks**

Prerequisite Courses, if any: Fundamentals of Electronics Engineering

Companion course, if any: Lab work in Analog and Digital Communication

Course Objectives:

1. To understand the building blocks of analog and digital communication system .
2. Describe and analyze the mathematical techniques of generation, transmission and reception of amplitude modulation (AM) and frequency modulation (FM)
3. Evaluate the performance levels (Signal-to-Noise Ratio) of AM and FM systems in the presence of additive white noise.
4. Convert analog signals to digital format and describe Pulse and digital Modulation techniques.

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	Bloom's Level
CO1	Improve the ability to understand the performance of a AM & FM transmitter.	3-Apply
CO2	Identify various components and analyze the Performance Characteristics of AM & FM receiver	3-Apply
CO3	Explore different pulse modulation techniques and design of scramblers in digital communication.	5-Evalute
CO4	Analyze the performance of a pass band digital communication system in terms of error probability and power spectra	3-Apply
CO5	Explain & calculate signal to noise ratio, noise figure and noise temperature for single and cascaded stages in a communication system	2- Understand

COURSE CONTENTS

Unit I	**AM & FM Transmission**	**(08hrs)**	**COs Mapped CO1**

Base band & Carrier communication, Generation of AM (DSBFC), DSBSC ,SSBSC, Power relations , Introduction to ISB & VSB, Instantaneous frequency, Concept of Angle modulation, Generation of FM and PM, frequency spectrum & Eigen Values, Narrow band & wide band FM, , Bessel's Function and its mathematical analysis, Generation of FM (Direct & Indirect Method)

Case study: Implementation of AM & FM transmitter using GNU radio

Unit II	**AM & FM Reception**	**(07hrs)**	**COs Mapped- CO12**

Block diagram of TRF AM Receivers, Super Heterodyne Receiver, Concept of Series & Parallel resonant circuits for Bandwidth & Selectivity. Performance Characteristics of receiver, Tracking, Mixers. AM Detection Block diagram of FM Receiver, FM detection using Phase lock loop (PLL).

Case study: Implementation of AM & FM receiver using GNU radio

Unit III	**Pulse modulation (Analog & Digital)**	**(07hrs)**	**COs Mapped - CO3,**

Data formats ,synchronization: Bit Synchronization, Scramblers, Frame Synchronization. Inter-symbol interference, Equalization.
Sampling theorem in time domain, Nyquist criteria, Types of sampling- ideal, natural, flat top, Aliasing & Aperture effect. PAM, PWM & PPM.
Pulse Code Modulation and reconstruction, Delta Modulation, Adaptive Delta Modulation
Case study: Implementation of PCM system using GNU radio

Unit IV	**Digital modulation techniques**	**(07hrs)**	**COs Mapped - CO4**

Pass band transmission model, Signal space diagram, Generation and detection, Error Probability derivation and Power spectra of coherent BPSK, BFSK and QPSK.
Case study: Implementation of Digital modulation techniques using GNU radio

Unit V	**Random Process and Noise**	**(07hrs)**	**COs Mapped – CO5**

Review of a random process, Stationary processes, Ergodic processes, Sources and types of Noise, Signal to Noise Ratio, Noise Figure, Noise Temperature, Friss formula for Noise Figure, Noise Bandwidth, Behavior of Baseband systems and Amplitude modulated systems in presence of noise.
Case study: Implementation of any communication system in presence of noise using GNU radio

Text Books

1. George Kennedy, "Electronic Communication Systems" Tata McGraw Hill
2. Dennis Roddy ,John Coolen, "Electronic Communications" , Pearson , 4th Edition

Reference Books

1. B P Lathi, Zhi Ding, "Modern Analog and Digital Communication System", Oxford University Press, 4th Edition
2. Louis E. Frenzel Jr. , "Principles of Electronic Communication Systems" , McGraw-Hill Education , 4th Edition
3. Taub& Schilling, "Principles of Communication Systems" , Tata McGraw Hill
4. Simon Haykin, "Communication Systems", John Wiley & Sons

Strength of CO-PO Mapping													PO-PSO mapping	
	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	-	-	3	-	-	-	-	-	-	-	-	**3**
CO2	3	3	-	-	-	-	-	-	-	-	-	-	-	**3**
CO3	3	3	3	-	3	-	-	-	-	-	-	-	-	**3**
CO4	3	3	-	-	3	-	-	-	-	-	-	-	-	**3**
CO5	3	3	-	-	-	-	-	-	-	-	-	-	-	**3**

Guidelines for Continuous Comprehensive Evaluation of Theory Course		
Sr. No.	**Components for Continuous Comprehensive Evaluation**	**Marks Allotted**
1	**Assignment:** Assignment No. 1 - Unit 1, 2 (10 Marks) Assignment No. 2 - Unit 3, 4, 5 (10 Marks)	**10**
2	**Quiz (Using Learnico):** Unit No. 1 (10 Questions - 10 Marks) Unit No. 2 (10 Questions - 10 Marks) Unit No. 3 (10 Questions - 10 Marks) Unit No. 4 (10 Questions - 10 Marks) Unit No. 5 (10 Questions - 10 Marks)	**10**

K. K. Wagh Institute of Engineering Education and Research, Nashik
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S. Y. B. Tech. E&TC Pattern 2023
2302214: Lab work in Analog and Digital Communication

Teaching Scheme:	Credit Scheme:	Examination Scheme:
Practical : 02hrs/week	**01**	**Practical Exam: 25 Marks** **Term Work: 25 Marks**

Prerequisite Courses, if any: Semiconductor Theory, Mathematics

Companion course, if any: Analog and Digital Communication

Course Objectives:

1. To understand the building blocks of analog and digital communication system.
2. Describe and analyze the mathematical techniques of generation, transmission and reception of amplitude modulation (AM) and frequency modulation (FM)
3. Evaluate the performance levels (Signal-to-Noise Ratio) of AM and FM systems in the presence of additive white noise.
4. Convert analog signals to digital format and describe Pulse and digital Modulation techniques..

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	Bloom's Level (Cognitive domain)	Bloom's Level (Psychomotor domain)
CO1	Demonstrate the generation and detection of FM systems and compare with AM systems.	3-Apply, 4-Analyze	3-Guided response
CO2	Analyze Pulse modulation and different data formats	4-Analyze	3-Guided response
CO3	Implement different analog and digital modulation techniques.	3-Apply	4-Mechanism

List of Laboratory Experiments

Sr. No.	Laboratory Experiments	CO Mapped
1	Discuss the type of modulation used to broadcast a single signal, such as a monophonic audio signal with maximum bandwidth of 10 KHz. Generate the modulated signal, Observe the frequency Spectrum and calculate the power required to transmit the modulated signal.	**CO1**
2	Select type of modulation to broadcasts of music in the VHF range with high SNR. Generate the modulated signal, Observe the frequency Spectrum and calculate the frequency deviation of the modulated signal.	**CO1**
3	Discuss the type of modulation used to record audio signals digitally on Compact Disc. Generate the modulated signal and determine the bits required to encode the signal.	**CO2**
4	Study of line codes (NRZ, RZ, POLAR RZ, AMI, MANCHESTER) & their spectral analysis.	**CO2**
5	Discuss the type of modulation used in various wireless standards such as CDMA. Also discuss the modulation used for telemetry, caller ID, garage door openers. Compare the performance of both modulation techniques.	**CO3**

6	Generate and compare the performance of AM and FM system using MATLAB	**CO3**
7	Implementation of AM and FM transmitter using GNU radio	**CO3**
8	Implementation of any digital modulation technique using GNU radio	**CO3**

Guidelines for Laboratory Conduction

1. Teacher will brief the given experiment to students, its procedure, observations calculation, and outcome of this experiment.
2. Equipment and kits required for the allotted experiment will be provided by the lab assistants using SOP.
3. Students will perform the allotted experiment in a group (two students in each group) under the supervision of faculty and lab assistants.
4. After performing the experiment students will check their readings, calculations from the teacher.
5. After checking they have to write the conclusion of the final result.

Guidelines for Student's Lab Journal

Write-up should include title, aim, and diagram, working principle, procedure, observations, graphs, calculations, conclusion and questions, if any.

Guidelines for Term work Assessment

1. R1: Timely completion of experiment (10 Marks)
2. R2: Understanding of experiment (10 Marks)
3. R3: Presentation / clarity of journal writing (10 Marks)
4. Total 30 marks for each experiment and average marks of all experiments will be converted into 25 marks of term work.

Strength of CO-PO Mapping													PO-PSO mapping	
	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	-	-	3	-	-	-	-	-	-	-	-	**3**
CO2	3	3	-	-	-	-	-	-	-	-	-	-	-	**3**
CO3	3	3	-	-	3	-	-	-	-	-	-	-	-	**3**

K .K. Wagh Institute of Engineering Education and Research, Nashik
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S. Y. B. Tech. E&TC Pattern 2023 **2302215: Lab work in Control Systems and Microcontrollers**		
Teaching Scheme:	**Credit Scheme:**	**Examination Scheme:**
Practical : 04 hrs/week	**02**	**Practical: 50 Marks** **Term Work: 50 Marks**
Prerequisite Courses, if any: - Advance mathematics for Engineers, Digital Electronics		
Companion course, if any: Control systems**,** Microcontroller		

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	**Bloom's Level (Cognitive domain)**	**Bloom's Level (Psychomotor domain)**
CO1	Evaluate the various parameters of transient analysis of a control system	5- Evaluate	3-Guided response
CO2	Examine the stability criteria for a control system using various techniques.	4 Analyze	4-Mechanism
CO3	Interface real word devices to 8051 microcontroller	3-Apply	3-Guided Response
CO4	Write program for different devices in assembly language and embedded C	3-Apply	6-Adaptation

Part A

List of Laboratory Experiments / Assignments

Sr. No.	**Laboratory Experiments / Assignments**	**CO Mapped**
1	Plot the pole-zero configuration in s-plane for the given transfer function.	CO 2
2	Determine the transfer function for given closed loop system in block diagram representation	CO 1
3	Plot unit step response of given transfer function and finds delay time, rise time, peak time and peak overshoot.	CO 1
4	Determine the time response of given system subjected to any arbitrary input.	CO 1
5	Plot root locus of given transfer function, locate closed loop poles for different values of k	CO 2
6	Determine the steady state errors of a given transfer function.	CO 1
7	Plot bode plot of given transfer function. Also determine the relative stability by measuring gain and phase margins.	CO 2
8	Plot Nyquist plot for given transfer function and to discuss closed loop stability. Also determine the relative stability by measuring gain and phase margin.	CO 2

Guidelines for Laboratory Conduction

1. Ensure you have a basic understanding of MATLAB before starting the experiments.
2. Before starting each experiment, carefully read the lab manual or experiment instructions to understand the objectives, procedures, and expectations.

3. Utilize online resources, MATLAB documentation, and forums for additional support if necessary. 4. Pay attention to syntax errors, runtime errors, and logical errors in your code.
Guidelines for Student's Lab Journal
Student's lab journal should contain following related things - Title, Objectives, Hardware/ Software requirement, Theory, Results, Conclusion and Assignment questions
Guidelines for Termwork Assessment
5. R1: Timely completion of experiment (10 Marks) 6. R2: Understanding of experiment (10 Marks) 7. R3: Presentation / clarity of journal writing (10 Marks) 8. Total 30 marks for each experiment and average marks of all experiments will be converted into 25 marks of term work.

Part B

List of Laboratory Experiments / Assignments		
Sr. No.	**Laboratory Experiments / Assignments**	**CO Mapped**
1	Write assembly and C program for blinking of LEDs of 8051	**CO1,CO2**
2	Interface 7segment with 8051 and Write assembly and C program to display number 00 to 99.	**CO1,CO2**
3	Develop a token system in the bank such that the cashier presses the key for the token number that will get displayed. Display will be such that the customer can see the display from at least 10 m. Draw interfacing diagram and write a program in embedded C.	**CO1,CO2**
4	Develop a system for bottle manufacturing plant for counting a bottle, available in a belt. Reject the bottle if it is faulty. Display number of bottles. If count reaches 20 then start count from 01. Draw interfacing diagram and write a program in embedded C.	**CO1,CO2**
5	Design a robotic arm using 8 bit microcontroller. Draw interfacing diagram and write a program in embedded C.	**CO1,CO2**
6	Develop an arbitrary waveform generator for frequency 1HZ to 10 MHZ. Output voltage vary from 0 to 10V. Draw interfacing diagram and write a program in embedded C.	**CO1,CO2**
7	Collect temperature data using a sensor and transmit it serially to a desktop computer. Provide a schematic diagram and develop an embedded C program to facilitate this process.	**CO1,CO2**
8	Develop Home automation system using PIC 18xx microcontroller. Provide a schematic diagram and develop an embedded C program to facilitate this process.	**CO1,CO2**
Guidelines for Laboratory Conduction		

1. Teacher will brief the given interfacing of embedded system to students
2. Microcontroller Kits and interfacing modules will be provided in the Lab
3. Students will perform the allotted experiment in a group (two students in each group) under the supervision of faculty and lab assistant.
4. After performing the interfacing and programming students will check their results from the teacher.
5. After checking they have to write the conclusion of the final result.

Guidelines for Student's Lab Journal

Write-up should include title, aim, interfacing diagram, algorithm, procedure, calculations, waveform, conclusion and questions, if any

Guidelines for Termwork Assessment

1. R1: Timely completion of experiment (10 Marks)
2. R2: Understanding of experiment (10 Marks)
3. R3: Presentation / clarity of journal writing (10 Marks)
4. Total 30 marks for each experiment and average marks of all experiments will be converted into 25 marks of term work.

Strength of CO-PO Mapping													PO-PSO mapping	
	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	-	-	3	-	-	-	-	-	-	-	**3**	-
CO2	3	3	-	-	3	-	-	-	-	-	-	-	**3**	-
CO3	3	-	-	-	3	-	-	-	-	-	-	-	**3**	**3**
CO4	3	-	-	-	3	-	-	-	-	-	-	-	**3**	**3**

K. K. Wagh Institute of Engineering Education and Research, Nashik

(Autonomous from Academic Year 2022-23)

S. Y. B. Tech. E&TC Pattern 2023
2302216: MDM2: IoT Protocols & Security

Teaching Scheme:	**Credit Scheme:**	**Examination Scheme:**
Theory :03 hrs/week	**03**	**Continuous Comprehensive Evaluation: 20Marks** **InSem Exam: 20Marks** **EndSem Exam: 60Marks**

Prerequisite Courses, if any: Internet of Things

Companion course, if any: Lab work in IoT Protocols & Security

Course Objectives:

1. To learn about the security issues in IoT and cloud computing.
2. To learn about the cryptography solutions and issues in IoT.
3. To learn about the security measures taken in IoT and Cloud systems to improve security.

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	**Bloom's Level**
CO1	Understand IoT data link and network layer protocols and their application in IoT systems.	2- Understand
CO2	Understand IoT transport and session layer protocols for efficient and secure data transmission.	2- Understand
CO3	Apply IoT security principles to design hardware, software, and network components that mitigate potential threats and ensure the integrity of IoT systems.	3-Apply
CO4	Apply knowledge of cloud computing models to assess their suitability for different IoT deployments, considering factors such as scalability, resource management, and data privacy.	3-Apply
CO5	Identify and mitigate system-specific attacks targeting IoT ecosystems.	4-Analyze

COURSE CONTENTS

Unit I	IoT Data Link and Network Layer Protocols	**(08hrs)**	**COs Mapped -CO1**

Overview of IoT Data Link Layer, PHY/MAC Layer Protocols: 3GPP MTC, IEEE 802.11, IEEE 802.15. Wireless communication standards: Wireless HART, ZWave, Bluetooth Low Energy, Zigbee Smart Energy,Overview of IoT Network Layer,IPv4, IPv6, 6LoWPAN, 6TiSCH protocols, Neighbor Discovery (ND), Internet Control Message Protocol (ICMP)

Unit II	IoT Transport and Session Layer Protocols	**(07hrs)**	**COs Mapped -CO2**

Introduction to IoT Transport Layer,Transport Layer Protocols: TCP, Multipath TCP (MPTCP), UDP, Datagram Congestion Control Protocol (DCCP), Stream Control Transmission Protocol (SCTP),Secure Transport Protocols: Transport Layer Security (TLS), Introduction to IoT Session Layer, Session Layer Protocols: HTTP, Constrained Application Protocol (CoAP), Extensible Messaging and Presence Protocol (XMPP)

Unit III	Fundamentals of IoT Ecosystem	**(07hrs)**	**COs Mapped - CO3**

IoT security issues, how to design an IoT system, Hardware, software and network security related to IoT systems - Basics of cryptographic solutions to IoT systems.			
Unit IV	Overview of Cloud Computing and its Services	**(07hrs)**	**COs Mapped - CO4**
Cloud Computing Fundamental: Cloud computing definition, private, public and hybrid cloud. Cloud types; IaaS, PaaS, SaaS. Benefits and challenges of cloud computing - Public vs. Private clouds, Role of virtualization in enabling the cloud.			
Unit V	IoT Security Threats and Mitigation Strategies	**(07hrs)**	**COs Mapped – CO5**
System-Specific Attacks: Guest hopping, attacks on the VM (delete the VM, attack on the control of the VM, code or file injection into the virtualized file structure), VM migration attack, hyper jacking.			

Text Books

1. B. Russell and D. Van Duren, "Practical Internet of Things Security," Packt Publishing, 2016
2. FeiHU, "Security and Privacy in Internet of Things (IoTs): Models, Algorithms, and Implementations", CRC Press, 2016

Reference Books

1. David Etter, " IoT Security: Practical guide book " Create Space, 1st Edition, 2016.
2. Drew Van Duren, Brian Russell, "Practical Internet of Things Security", Packt, 1st Edition, 2016.
3. Sean Smith, "The Internet of Risky Things", O'Reilly Media, 1st Edition, 2017.
4. Brian Russell, Drew Van Duren, "Practical Internet of Things Security: Design a security framework for an Internet connected ecosystem", 2nd Edition, 2018.

Strength of CO-PO Mapping													CO-PSO mapping	
	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	3	2	-	3	-	-	-	-	-	-	-	-	3
CO4	3	3	2	-	3	-	-	-	-	-	-	-	-	3
CO5	3	3	2	-	3	-	-	-	-	-	-	-	-	3

Guidelines for Continuous Comprehensive Evaluation of Theory Course		
Sr. No.	**Components for Continuous Comprehensive Evaluation**	**Marks Allotted**
1	**Assignment:** Assignment No. 1 - Unit 1, 2 (10 Marks) Assignment No. 2 - Unit 3, 4, 5 (10 Marks)	**10**
2	**Quiz (Using Learnico):** Unit No. 1 (10 Questions - 10 Marks) Unit No. 2 (10 Questions - 10 Marks) Unit No. 3 (10 Questions - 10 Marks) Unit No. 4 (10 Questions - 10 Marks) Unit No. 5 (10 Questions - 10 Marks)	**10**

K. K. Wagh Institute of Engineering Education and Research, Nashik

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S. Y. B. Tech. E&TC Pattern 2023

2302217: MDM2: Lab Work in IoT Protocols & Security

Teaching Scheme:	**Credit Scheme:**	**Examination Scheme:**
Practical : 02hrs/week	**01**	**Practical: 25 Marks** **Term Work: 25 Marks**

Prerequisite Courses, if any: IoT

Companion course, if any: IoT Protocols & Security

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	**Bloom's Level (Cognitive domain)**	**Bloom's Level (Psychomotor domain)**
CO1	Analyze Open Source Tools for IoT Security and Privacy Issues	4-Analyze	1-Perception
CO2	Implement Secure IoT Solutions using Eclipse IoT Project	3-Apply	3-Guided Response
CO3	Explore AWS IoT Device Defender for IoT Security	2-Understand	3- Guided Response
CO4	Develop IoT Solutions with Raspberry Pi, Arduino, and ESP32	3-Apply	4-Mechanism
CO5	Implement Cloud-based Temperature Logging with ThingSpeak	6-Create	4-Mechanism

List of Laboratory Experiments / Assignments

Sr. No.	**Laboratory Experiments / Assignments**	**CO Mapped**
1	Explore Open Source tools for Security and Privacy issues in IoT.	**CO1**
2	Implement Eclipse IoT Project with Emphasis on Security related issues	**CO2**
3	Explore the working of AWS IoT Device Defender.	**CO3**
4	Using raspberry pi a. Calculate the distance using a distance sensor. b. Basic LED functionality.	**CO4**
5	Using Arduino a. Calculate the distance using a distance sensor. b. Basic LED functionality. c. Calculate temperature using a temperature sensor.	**CO4**
6	Using ESP 32 a. Calculate the distance using a distance sensor. b. Calculate temperature using a temperature sensor	**CO4**
7	IoT based Temperature logger using ThingSpeak (Or any other cloud service) Arduino, LM35 and ESP8266.	**CO5**

Guidelines for Laboratory Conduction
1.Teacher will brief the given interfacing of embedded system to students 2. Kits and interfacing modules will be provided in the Lab 3. Students will perform the allotted experiment in a group (two students in each group) under the supervision of faculty and lab assistant. 4. After performing the interfacing and programming students will check their results from the teacher. 5. After checking they have to write the conclusion of the final result
Guidelines for Student's Lab Journal
Write-up should include title, aim, interfacing diagram, algorithm, procedure, calculations, waveform, conclusion and questions, if any
Guidelines for Term work Assessment
Each experiment from the lab journal is assessed for thirty marks based on three rubrics. Rubric R-1 for timely completion, R-2 for understanding and R-3 for presentation/journal writing where each rubric carries ten marks.

Strength of CO-PO Mapping													PO-PSO mapping	
	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	**3**	**3**	**-**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**-**
CO2	**3**	**3**	**-**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**3**
CO3	**3**	**3**	**-**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**-**
CO4	**3**	**3**	**-**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**3**
CO5	**3**	**3**	**-**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**3**

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S. Y. B. Tech. E&TC Pattern 2023

2302218 : OE2:Project Management

Teaching Scheme:	Credit Scheme:	Examination Scheme:
Theory :02hrs/week	02	Continuous Comprehensive Evaluation: 50 Marks

Prerequisite Courses, if any: Industrial Management

Course Objectives:

1. To study basics of project management and the project initiation phase.
2. To understand activities associated with project planning phase.
3. To use network techniques, resource allocation methods in project planning phase.
4. To learn the work to be carried out in project execution phase.

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	Bloom's Level
CO1	Understand fundamentals of project management.	2-Understand
CO2	Explain activities involved in project planning.	2-Understand
CO3	Apply principles of planning.	3-Apply
CO4	Describe execution of a project.	2-Understand

COURSE CONTENTS

Unit I	Project Initiation	(08hrs)	COs Mapped CO1

Definition of Project, Why Project Management?, Project Life Cycle
Project Initiation: Project Selection and Criteria of Choice, Project Selection Models, Types
Project Manager: Special Demands, Selection
Negotiation and Conflict: Nature, Partnering, Chartering, and Scope Change, Conflict and Project Life Cycle, Requirements and Principles of Negotiation
Project in the Organizational Structure: Types of organizational structure, Choosing an Organizational Form,
The Project Team, Human Factors and the Project Team

Unit II	Project Planning - I	(05hrs)	COs Mapped – CO2

Project activity planning: Initial Project Coordination and the Project Plan, Systems Integration, The Action Plan, The Work Breakdown Structure and Linear Responsibility Chart, Interface Coordination through Integration Management

Budgeting and Cost estimation: Estimating Project Budgets, Improving the Process of Cost Estimation

Unit III	Project Planning - II	(05hrs)	COs Mapped – CO3

Scheduling: Network Techniques: PERT (ADM) and CPM (PDM), Risk Analysis Using Simulation with Crystal Ball

Resource allocation: Critical Path Method—Crashing a Project, Resource Allocation Problem, Resource Loading, Resource Leveling, Constrained Resource Scheduling, Multi-project Scheduling

and Resource Allocation, Goldratt's Critical Chain			
Unit IV	**Project Execution**	**(06hrs)**	**COs Mapped – CO4**
Monitoring and Information Systems: The Planning-Monitoring-Controlling Cycle, Information Needs and Reporting, Earned Value Analysis, PMIS (Project Management Information Systems) Project Control: Purposes, Types, Design & Control Project auditing: Purpose, Audit, Use, Life Cycle Project termination: Types, When to terminate?, Process			
Text Books			
1. Project Management: A Managerial Approach, Jack R. Meredith, Samuel J. Mantel, Jr., John Wiley & Sons, 7th edition 2. Projects: Planning, Analysis, Selection, Financing, Implementation, and Review, Dr Prasanna Chandra, McGraw Hill Education, 9th edition			
Reference Books			
1. Project Management: A Systems Approach to Planning, Scheduling, and Controlling, Kerzner Harold, John Wiley & Sons, 8th edition 2. The Practical Guide to Project Management, C. Petersen, Bookboon, 2nd edition			

Strength of CO-PO Mapping													CO-PSO mapping	
	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	-	-	-	-	3	3	3	3	3	3	3	-	-
CO2	3	-	-	-	-	3	3	3	3	3	3	3	-	-
CO3	3	-	-	-	-	3	3	3	3	3	3	3	3	3
CO4	3	-	-	-	-	3	3	3	3	3	3	3	-	-

Guidelines for Continuous Comprehensive Evaluation of Theory Course		
Sr. No.	**Components for Continuous Comprehensive Evaluation**	**Marks Allotted**
1	**Assignment:** No. 1 - Unit 1, 2 No. 2 - Unit 3, 4	**15**
2	**Test:** No. 1 - Unit 1, 2 No. 2 - Unit 3, 4	**15**
3	**Seminar:** Students will deliver a seminar in a group of 3 students on allotted topic.	**20**

K. K. Wagh Institute of Engineering Education and Research, Nashik

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S. Y. B. Tech. E&TC Pattern 2023
2302219: VEC: UHV-2

Teaching Scheme:	**Credit Scheme:**	**Examination Scheme:**
Tutorial : 02 hrs/week	**02**	**CCE: 50 Marks**

Prerequisite Courses: NA

Course Objectives:

• To help the students appreciate the essential complementarity between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.

• To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of existence. Such a holistic perspective forms the basis of Universal Human Values and movement towards value-based living in a natural way.

• To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behavior and mutually enriching interaction with Nature.

Thus, this course is intended to provide a much-needed orientational input in value education to the young enquiring minds.

Course Methodology

1. The methodology of this course is explorational and thus universally adaptable. It involves a systematic and rational study of the human being vis-à-vis the rest of existence.
2. The course is in the form of 28 lectures (discussions) and 14 practice sessions.
3. It is free from any dogma or value prescriptions.
4. It is a process of self-investigation and self-exploration, and not of giving sermons. Whatever is found as truth or reality is stated as a proposal and the students are facilitated to verify it in theirown right, based on their Natural Acceptance and subsequent Experiential Validation – the whole existence is the lab and every activity is a source of reflection.
5. This process of self-exploration takes the form of a dialogue between the teacher and the students to begin with, and then to continue within the student in every activity, leading to continuous self-evolution.
6. This self-exploration also enables them to critically evaluate their pre-conditionings and present beliefs.

Course Outcomes: At the end of the course, the students will be able to

	Course Outcomes	**Bloom's Level**
CO1	**Evaluate** the significance of value inputs in formal education and start applying them in their life and profession	Evaluate-5
CO2	**Distinguish** between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intentionand Competence of an individual.	Distinguish-4
CO3	**Analyze** the value of harmonious relationship based on trust and respect in their life and profession	Analyze-4

CO4	**Examine** the role of a human being in ensuring harmony in society and nature.	Examine-4
CO5	**Apply** the understanding of ethical conduct to formulate the strategy for ethical life and profession.	Apply-3

COURSE CONTENTS

Unit 1: Introduction-Basic Human Aspiration, its fulfilment through All-encompassing Resolution The basic human aspirations and their fulfilment through Right understanding and Resolution, Right understanding and Resolution as the activities of the Self, Self being central to Human Existence; All-encompassing Resolution for a Human Being, its details and solution of problems in the light of
Resolution

Unit 2: Right Understanding (Knowing)- Knower, Known & the Process
The domain of right understanding starting from understanding the human being (the knower, the experiencer and the doer) and extending up to understanding nature/existence – its interconnectedness and co-existence; and finally understanding the role of human being in
existence (human conduct).

Unit 3: Understanding Human Being
Understanding the human being comprehensively as the first step and the core theme of this course; human being as co-existence of the self and the body; the activities and potentialities of the self; Basis for harmony/contradiction in the self

Unit 4: Understanding Nature and Existence
A comprehensive understanding (knowledge) about the existence, Nature being included; the needand process of inner evolution (through self-exploration, self-awareness and self-evaluation), particularly awakening to activities of the Self: Realization, Understanding and Contemplation in the Self (Realization of Co-Existence, Understanding of Harmony in Nature and Contemplation of Participation of Human in this harmony/ order leading to comprehensive knowledge about the existence).

Unit 5: Understanding Human Conduct, All-encompassing Resolution & Holistic Way of Living Understanding Human Conduct, different aspects of All-encompassing Resolution (understanding,wisdom, science etc.), Holistic way of living for Human Being with All-encompassing Resolutioncovering all four dimensions of human endeavor viz., realization, thought, behavior and work(participation in the larger order) leading to harmony at all levels from Self to Nature and entire
Existence

Text Book

1. R R Gaur, R Asthana, G P Bagaria, 2019 (2nd Revised Edition), A Foundation Course inHuman Values and Professional Ethics. ISBN 978-93-87034-47-1, Excel Books, New Delhi.

Reference Books

1. Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and Harper Collins, USA
2. E.F. Schumacher, 1973, Small is Beautiful: a study of economics as if people mattered, Blond &Briggs, Britain.
3. Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991
4. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limitsto Growth – Club of Rome's report, Universe Books.
5. A Nagraj, 1998, Jeevan Vidya EkParichay, Divya Path Sansthan, Amarkantak.
6. P L Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Publishers.
7. A N Tripathy, 2003, Human Values, New Age International Publishers.

8. Subhas Palekar, 2000, How to practice Natural Farming, Pracheen (Vaidik) Krishi Tantra Shodh,Amravati.
9. E G Seebauer& Robert L. Berry, 2000, Fundamentals of Ethics for Scientists &Engineers, OxfordUniversity Press
10. M Govindrajran, S Natrajan& V.S. Senthil Kumar, Engineering Ethics (including Human Values),Eastern Economy Edition, Prentice Hall of India Ltd.
11. B P Banerjee, 2005, Foundations of Ethics and Management, Excel Books.
12. B L Bajpai, 2004, Indian Ethos and Modern Management, New Royal Book Co., Lucknow.Reprinted 2008.

Mode of Evaluation

Based on participation of student in classroom discussions/Self-assessment/Peer assessment/Assignments/ Seminar/Continuous Assessment Test/Semester End Exam Socially relevant project/Group Activities/Assignments may be given importance in this course

Guidelines for Term work Assessment

Sr. No.	Components for Term work Assessment	Marks Allotted
1	Assignments-(3 nos.)	30
2	Group Discussion	10
3	Quiz	10
		50

Strength of CO-PO Mapping													PO-PSO mapping	
	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	-	-	-	-	-	-	-	**3**	-	-	-	-	-	-
CO2	-	-	-	-	-	-	-	**3**	**3**	-	-	-	-	-
CO3	-	-	-	-	-	-	-	**3**	-	-	-	-	-	-
CO4	-	-	-	-	-	**3**	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	**3**	-	-	-	-	-	-

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S. Y. B. Tech. E&TC Pattern 2023
2302220: AEC: Hardware and software tools for Electronics Engineer

Teaching Scheme:	Credit Scheme:	Examination Scheme:
Tutorial: 01hrs/week **Practical : 02hrs/week**	**01** **01**	**Term Work: 25 Marks** **Tutorial: 25 Marks**

Prerequisite Courses, if any: Fundamentals of electronics Engineering, Applied Mathematics-III, Electronic Communication, Control System

Course Objectives:

1. To introduce the Integrated Development Environment of various simulation software.
2. To learn basic features of modeling tools and techniques
3. To implement and verify knowledge of the fundamental concepts of different electronic circuits and simulate it using suitable software (hands-on).

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	Bloom's Level (Cognitive domain)	Bloom's Level (Psychomotor domain)
CO1	**Understand** the fundamental syntax, data types, and basic operations in MATLAB and **Apply** MATLAB to solve a variety of mathematical and engineering problems.	2-Understand 3-Apply	3-Guided response 4-Mechanism
CO2	**Interprete** with the GNU Radio software framework and its components. **Explore** basic modulation and demodulation techniques using GNU Radio	2-Understand 3-Apply	3-Guided response 4-Mechanism

COURSE CONTENTS

Unit I	**MATLAB Simulink**	**(08hrs)**	**COs Mapped CO1**

Overview of MATLAB ,Simulink Environment Fundamentals, Study of various simulation Libraries Introduction to MATLAB Academic Online Training Suite ,MATLAB user interface , MATLAB Variables and Expressions, Matrices and Arrays Writing Script, Function Files Importing data Processing data ,Introduction to Simulink Graphical Environment Creating a SIMULINK model using Equations , Modeling and Simulation with Simulink

Unit II	**Getting Started with GNU Radio**	**(08hrs)**	**COs Mapped – CO2**

Getting Started with GNU Radio

Installing GNU Radio on various platforms (Windows, macOS, Linux),Setting up dependencies and environment, Getting Started with GNU Radio – Searching of blocks, modifying block properties, constructing flow graphs, output testing,GNU Radio Companion (GRC Features) Overview of GRC, Creating flow graphs using GRC, Blocks and connections

Text Books

1.John Larmer, John R. Mergendoller, and Suzie Boss, “Setting the Standard for Project Based Learning”. 2. John Larmer and Suzie Boss, “Project Based Teaching: How to Create Rigorous and Engaging Learning Experiences”.
Reference Books
1. https://www.mathworks.com 2. https://www.gnuradio.org

Strength of CO-PO Mapping													**CO-PSO mapping**	
	PO												**PSO**	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**
CO1	3	-	-	-	3	-	-	-	-	-	-	2	3	-
CO2	3	-	-	-	3	-	-	-	-	-	-	2	-	3

Guidelines for Continuous Comprehensive Evaluation of Theory Course		
Sr. No.	**Components for Continuous Comprehensive Evaluation**	**Marks Allotted**
1	**Assignment:** Assignment No. 1 - Unit 1 (10 Marks) Assignment No. 2 - Unit 2 (10 Marks)	**10**
2	**Quiz (Using Learnico):** Unit No. 1 (10 Questions - 10 Marks) Unit No. 2 (10 Questions - 10 Marks)	**10**

List of Laboratory Experiments / Assignments		
Sr. No.	**Laboratory Experiments / Assignments**	**CO Mapped**
1	Analyze the time response of dynamic systems to different input signals (step, ramp, impulse).Compute and plot system responses, including time domain specifications such as rise time, peak time, and settling time	**CO1**
2	Perform frequency domain analysis using MATLAB to compute and plot Bode plots, Nyquist plots, and frequency response data.	**CO1**
3	Use MATLAB to generate root locus plots and analyze the behavior of closed-loop systems as controller parameters vary.	**CO1**
4	Model a simple open-loop system (e.g., first-order system, second-order system) using Simulink.	**CO1**
5	Implement Amplitude Modulation (AM) and Frequency Modulation (FM) using GNU Radio blocks. Transmit and receive modulated signals using GNU Radio.	**CO2**
6	Implement digital modulation schemes such as Phase Shift Keying (PSK), and Frequency Shift Keying (FSK).	**CO2**
7	Build a simple FM receiver using GNU Radio. Tune to different FM radio stations and demodulate the signals.	**CO2**
8	Build any project based on MATLAB and GNU Radio	**CO1, CO2**

Guidelines for Laboratory Conduction
1. Experiments should be performed in a group of two students only. 2. Double circuits for proper Program in MATLAB and Flow diagram in GNU Radio 3. Observe proper output
Guidelines for Student's Lab Journal
Student's lab journal should contain following related things - Title, Objectives, Hardware/ Software requirement, Theory, Circuit Diagram, Results, Conclusion and Assignment questions
Guidelines for Termwork Assessment
1. R1: Timely completion of experiment (10 Marks) 2. R2: Understanding of experiment (10 Marks) 3. R3: Presentation / clarity of journal writing (10 Marks) 4. Total 30 marks for each experiment and average marks of all experiments will be converted into 50 marks of term work.

Exit Courses

K. K. Wagh Institute of Engineering Education and Research, Nashik
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S. Y. B. Tech. E&TC Pattern 2023 **2302222: Exit course 1:Data Communication and Networking**		
Teaching Scheme:	**Credit Scheme:**	**Examination Scheme:**
Theory :02 hrs/week **Practical: 02 hrs/week**	**02** **01**	**InSem Exam: 20Marks** **EndSem Exam: 30Marks** **Term Work: 50 Marks**
Prerequisite Courses, if any: - Fundamentals of Electronics Engineering		
Companion course, if any: - NA		

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	**Bloom's Level (Cognitive domain)**	**Bloom's Level (Psychomotor domain)**
CO1	**Understand** flow of data, categories of network, different topologies	2-Understanding	1- Perception
CO2	**Understand** various devices associated with networks	2-Understanding	1-Perception

COURSE CONTENTS

Introduction to data communication and networking	**(08hrs)**	**COs Mapped- CO1**

Why study data communication?, Data Communication, Networks, Protocols and Standards, Standards Organizations. Line Configuration, Topology, Transmission Modes, Categories of Networks Internet works Study of OSI and TCP/IP protocol suit: The Model, Functions of the layers, TCP/IP Protocol Suites

Introduction to networks and devices:	**(08hrs)**	**COs Mapped - CO2**

Introduction to networks and devices: Network classes, Repeaters, Hub, Bridges , Switches, Routers, Gateways Routers Routing Algorithms, Distance Vector Routing , Link State Routing
Network Interconnections – LAN-to-LAN connections – LAN-to-Host connections – Repeaters – Bridges – Routers and Gateways – Interconnection utilities – Electronic mail – VoIP – DNS – HTTP – Networks management- WLAN.

Text Books:
1. Data communication & Networking by Bahrouz Forouzan.
2. Computer Networks by Andrew S. Tanenbaum

Reference Books:
1. Data and Computer Communications by William Stallings

List of Laboratory Experiments / Assignments		
Sr. No.	**Laboratory Experiments / Assignments**	**CO Mapped**
Group A		
1.	Study of Network Components.	CO1
2.	Study of Network Topologies.	CO1
3.	To connect two pc's using peer to peer communication.	CO1, CO2
4.	Implementation of small network using hub and switch.	CO2
5.	Basic study of Network classes.	CO2

Guidelines for Laboratory Conduction

1. Teacher will brief the given computer network related problem statement to students
2. Software and hardware related to particular lab assignment will be provided in the Lab
3. Students will perform the allotted experiment in a group (two students in each group) under the supervision of faculty and lab assistant.
4. After performing the experiment students will check their results from the teacher.
5. After checking they have to write the conclusion of the final result.

Guidelines for Student's Lab Journal

Write-up should include title, aim, connection diagram, procedure, conclusion and questions, if any

Guidelines for Teamwork Assessment

Each experiment from the lab journal is assessed for thirty marks based on three rubrics.
Rubric R-1 for timely completion, R-2 for understanding and R-3 for presentation/journal writing where each rubric carries ten marks

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S. Y. B. Tech. E&TC Pattern 2023 **2302223:Exit course 2: Electronic Servicing and Maintenance**		
Teaching Scheme:	**Credit Scheme:**	**Examination Scheme:**
Theory :02 hrs/week **Practical: 02 hrs/week**	**02** **01**	**InSem Exam: 20Marks** **EndSem Exam: 30Marks** **Term Work: 50 Marks**
Prerequisite Courses, if any: - Fundamentals of Electronics Engineering		
Companion course, if any: - NA		

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	**Bloom's Level (Cognitive domain)**	**Bloom's Level (Psychomotor domain)**
CO1	**Identify** various active and passive electronic components and **select** proper components as per applications based on datasheet specifications.	3-Apply	1- Perception
CO2	**Use** various electronic equipment and tools for building, testing and troubleshooting of electronic circuits	5-Evaluate	4-Mechanism
CO3	**Identify** various core components of PC	3-Apply	3-Guided Response
CO4	**Use** various troubleshooting preventive maintenance tools for maintenance of PC and peripherals	5-Evaluate	4-Mechanism

COURSE CONTENTS		
Electronic equipment and tools for testing and troubleshooting	**(08hrs)**	**COs Mapped CO1, CO2**
Transducers - Definition and classification. LVDT, Electromagnetic and Ultrasonic flow meters, Piezoelectric transducers-modes of operation-force transducer, Load cell, Strain gauge. Oscilloscopes- Principal of operation of general purpose CRO-basics of vertical and horizontal deflection system, sweep generator etc. DSO-Characteristics-Probes and Probing techniques. Digital voltmeters and frequency meters using electronic counters, DMM, Clamp on meters		
Maintenance of PC and peripherals	**(08hrs)**	**COs Mapped – CO3, CO4**

General block diagram of a peripheral device, different types of peripheral devices used in modern computers and their purpose. Block diagram of keyboard, different types of keyboards, operation and working principle of mouse and different mouse.
Various test equipment used for PC servicing, reasons for failure of components like resistors, capacitors etc. reasons for failure of a disk drive, reasons for display failure, reason for the keyboard failure, reasons for the printer failure, reasons for the power supply failure, safety precautions to be taken during trouble shooting.

List of Laboratory Experiments / Assignments		
Sr. No.	**Laboratory Experiments / Assignments**	**CO Mapped**
	Group A	
1.	Use of Data sheets for Component Selection and Specification ● Find Specifications and package of following components from Datasheet. (as a guideline only): a. Diodes 1N4001 to 1N4007, IN4148, 2N5402, 2N5408,BY127 b. Zener Diode - 5V6 c. Photodiode - BPW10 d. LED - LED 55 e. Varactor diode f. Thermistor g. Trimmer h. Opto-coupler i. Relay j. Seven segment LED k. Photocell l. Transistors BC107, BC177, BC547/548, m. Transistors SL100, SK100, AC127/128, BF194, TIP122 n. IC 78XX, 79XX o. LM317 p. SMD components: Resistor, Capacitor, Inductor & Diode- q. LL4148, SM4007, Chip transistor, Chip Darlington transistor,Bridge rectifier ● Select the appropriate component for a given circuit application. ● Select specification of Surface Mount Device (SMD) components as required.	**CO1**
2.	Use the following instruments to measure the parameters of any electronic circuit: Function Generator, Frequency counter, CRO, and DSO, with all safety precautions.	**CO1**
3.	Provide some exercises so that the following electronics hardware tools and materials are learned to be used by the students (as a guideline only): a. Bread board b. Copper clad laminate sheet c. Solder iron, solder-stand d. Solder-wire, flux e. Flexible wire f. Hookup wire g. Cutter h. Nose plier	**CO2**

	i. Screwdriver set j. Wire stripper k. De-solder pump l. De-solder wick m. Drilling machine	
4.	Sketch, mount and test at least one from following electronic circuits on breadboard (Circuits given as a guideline only): a. T type attenuator b. π-type attenuator c. Forward/reverse biased PN Junction diode d. Zener diode as shunt regulator e. Opto coupler using LED & Photo diode f. Half wave Rectifier, Full wave & Bridge rectifier g. Light operated relay h. Diode clipper i. Diode clamper j. Transistorized series regulator k. +/- 5V Regulated power supply with LED indication l. Low pass filter, High pass filter m. Band pass filter, Band elimination filter n. Variable power supply using LM317.	**CO2**
5.	➢ Sketch, mount, wire, solder and test at least one electronic circuit (mentioned in Sr.No. 6 above) on a general purpose board. ➢ De-solder given circuit(s) from general purpose printed circuit board.	**CO2**
	Group B	
6.	a) Identify basic components of a personal computer. Prepare a list of various computer peripherals. (e.g. CPU, Monitor, Keyboard, Mouse, Speaker, Web cam, Printer, Scanner, microphone, speakers, modem, projector etc). b) Identify common ports, associated cables, and their connectors. Observe various connectors, ports back and front side of the computer. Write their purpose and specifications. (e.g. Power, PS/2 keyboard and mouse, Serial and parallel, USB, VGA, LAN, Audio & microphone, Firewire, HDMI, games, SATA etc.)	**CO3**
7.	Observe different types of printers (dot matrix, inkjet & laser, multifunction). Install driver and interface the printers with PC/Laptop on any operating system (connect the printer to one PC directly using USB/Serial/Parallel ports as per the availability; test the functioning of the printer.) Write detailed comparative analysis of different types of printer available in the market and suggest a printer with good features and best price as per need. Justify your printer selection.	**CO3, CO4**
8.	Open at least 2 to 3 different types of keyboard and mouse and observe the internal circuits. Observe and write steps to troubleshoot, maintain and clean the diskette drives, keyboard, mouse, etc.	**CO3, CO4**
9.	Observe the interfacing, installation and working of various devices such as scanner, projector, web cam etc. Connect all these devices with the given PC, install & test them.	**CO3, CO4**
10.	How to format a PC? How to change the CMOS battery in a PC? How to install/uninstall a program?	**CO3, CO4**

Guidelines for Laboratory Conduction

1. Teacher will brief the given problem statement to students
2. Software, hardware, components, equipoments and various tools related to particular lab assignment will be provided in the Lab
3. Students will perform the allotted experiment in a group (two students in each group) under the supervision of faculty and lab assistant.
4. After performing the experiment students will check their results from the teacher.
5. After checking they have to write the conclusion of the final result.

Guidelines for Student's Lab Journal

Write-up should include title, aim, procedure, calculations, waveform, conclusion and questions, if any

Guidelines for Teamwork Assessment

Each experiment from the lab journal is assessed for thirty marks based on three rubrics.
Rubric R-1 for timely completion, R-2 for understanding and R-3 for presentation/journal writing where each rubric carries ten marks