



**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	MDM1	3	-	-	20	60	20	-	-	100	3	-	-	3
2302207	MDM	Lab work in MDM1	-	-	2	-	-	-	25	25	50	-	-	1	1
2302208	OE	OE 1: 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	INSE M	ENDSE M	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	MDM2	3	-	-	20	60	20	-	-	100	3	-	-	3
2302217	MDM	Lab work in MDM2	-	-	2	-	-	-	25	25	50	-	-	1	1
2302218	OE	OE 2: 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

K. K. Wagh Institute of Engineering Education and Research, Nashik
Department of Electronics and Telecommunication Engineering
Minor Offered in 2024 – 2025 (Cyber Security)

Sem	Course Code	Course Type	Title of Course	Teaching Scheme		Insem	Endsem	Evaluation Scheme and Marks				Credits		
				TH	PR			CCE	TW	PR	Total	TH	PR	Total
III	2302206A	MDM	MDM 1: Privacy and Security in Online Social Media	3		20	60	20			100	3		3
	2302207A	MDM	Lab work in Privacy and Security in Online Social Media		2				25	25	50		1	1
IV	2302216A	MDM	MDM 2: Foundations of Cyber Physical Systems	3		20	60	20			100	3		3
	2302217A	MDM	Lab work in Foundations of Cyber Physical Systems		2				25	25	50		1	1
V	2302309A	MDM	MDM 3: Cyber Security, Tools, Techniques and Counter Measures	3		20	60	20			100	3		3
VI	2302317A	MDM	MDM 4: Cyber Crime Administration	3		20	60	20			100	3		3
			Total	9	4	80	240	80	50	50	500	12	2	14

Minor Offered in 2024 – 2025 (Data Science)

Sem	Course Code	Course Type	Title of Course	Teaching Scheme		Insem	Endsem	Evaluation Scheme and Marks				Credits		
				TH	PR			CCE	TW	PR	Total	TH	PR	Total
III	2302206B	MDM	MDM 1: Data Analytics with Python	3		20	60	20			100	3		3
	2302207B	MDM	Lab work in Data Analytics with Python		2				25	25	50		1	1
IV	2302216B	MDM	MDM 2: Machine Learning for Engineering and science applications	3		20	60	20			100	3		3
	2302217B	MDM	Lab work in Machine Learning for Engineering and science applications		2				25	25	50		1	1
V	2302309B	MDM	MDM3 : Data Science Using Python	3		20	60	20			100	3		3
VI	2302317B	MDM	MDM4 : Deep Learning	3		20	60	20			100	3		3
			Total	9	4	80	240	80	50	50	500	12	2	14

Open Elective: Open Elective courses offered by E&TC Department

Sr. No.	Semester	Course Title	
1	III	OE 1 (2302208)	Industrial Management
2	IV	OE 2 (2302218)	Project Management
3	V	OE 3 (2302308)	Digital Business Management
4	VI	OE 4 (2302318)	Digital Marketing

Electronics and Telecommunication Engineering Exit Courses (To award Certificate)															
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
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-III



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 Vidyarthi Griha 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 resistance 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, 3 rd 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, 5 th 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

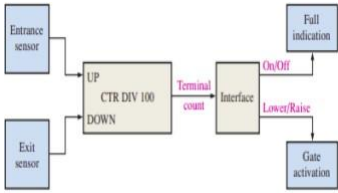
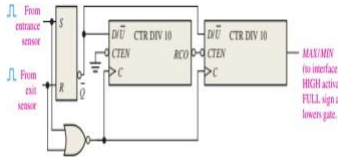
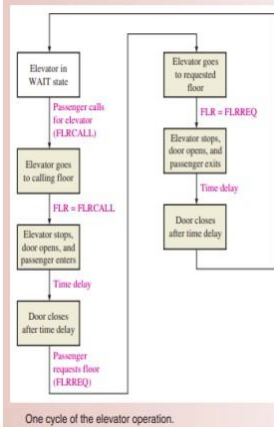
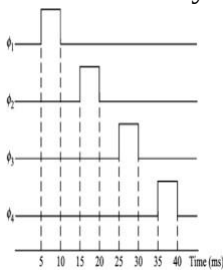
Guidelines for Continuous Comprehensive Evaluation of Theory Course		
Sr. No.	Components for Continuous Comprehensive Evaluation	Marks Allotted
1	Assignment: Assignment No. 1 - Unit 1, 2 (10 Marks) Assignment No. 2 - Unit 3, 4, 5 (10 Marks)	10
2	Quiz (Using Larnico): Unit No. 1 (10 Questions - 10 Marks)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

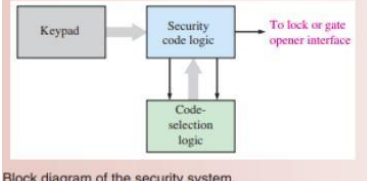
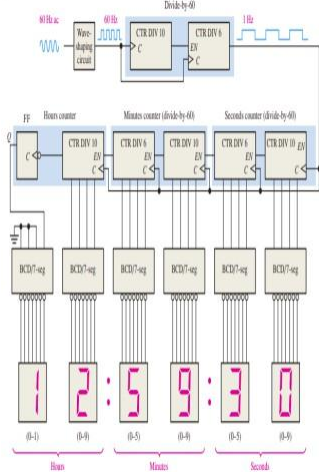


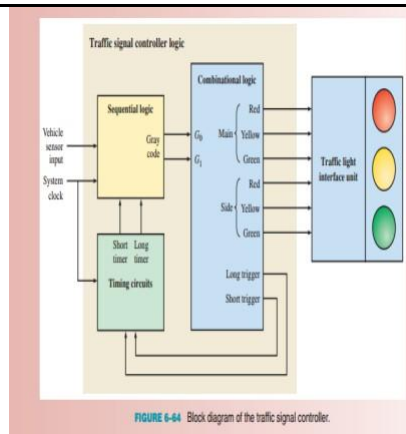
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S. Y. B. Tech. E&TC Pattern 2023 2302204: Lab work in Digital System Design with HDL			
Teaching Scheme:		Credit Scheme:	Examination Scheme:
Practical : 02hrs/week		01	Practical : 25 Marks Term Work: 25 Marks
Prerequisite Courses, if any: -Fundamentals 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



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.

[illegible]



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

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			
2302206A: MDM1: Privacy & Security in Online Social Media			
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 / Intermediate programming course. Understanding of Python will be necessary for the course. Should be able to quickly learn APIs, and to collect data from social networks.			
Companion course, if any: Lab work in Privacy & Security in Online Social Media			
Course Objectives: 1. To understand Privacy Risks 2. To implement Security Measures. 3. Analyze Privacy Settings. 4. Recognize and Respond to Threats. 5. Follow Legal and Ethical Guidelines.			
Course Outcomes: On completion of the course, students will be able to–			
	Course Outcomes		Bloom’s Level
CO1	Understand the Fundamental Concepts of Privacy and Security		2- Understand
CO2	Analyze Privacy Risks in Online Social Media Platforms.		4- Analyze
CO3	Evaluate Security Measures and Best Practices		5- Evaluate
CO4	Examine Legal and Ethical Issues		4-Analyze
CO5	Develop Strategies for Enhancing Privacy and Security		6- Create
COURSE CONTENTS			
Unit I	Introduction to Online Social Networks	(08hrs)	COs Mapped CO1
History and Evolution of Online Social Networks, What is Online Social Networks, Types of Online Social Networks, data collection from social networks, Tools and Techniques for Social Network Analysis, challenges, opportunities, and pitfalls in online social networks, APIs Impact of APIs on Data Collection			
Unit II	Social Media Data Collection and Analysis	(07hrs)	COs Mapped – CO2
Collecting data from Online Social Media, Data Collection Methods and Tools, Data Cleaning and Pre-processing, Trust, credibility, and reputations in social systems, Ethical and Legal Issues, Future Trends and Challenges			
Unit III	Social Media and Policing	(07hrs)	COs Mapped - CO3
What is Online social Media, Policing, Surveillance and Monitoring, Community Engagement, Crisis Management, Investigative Techniques			

Unit IV	Privacy and Disclosure in Online Networks	(08hrs)	COs Mapped - CO4
Information privacy disclosure, Data Privacy Laws and Regulations , Ethical Considerations in Data Sharing , Privacy by Design , revelation and its effects in OSM and online social networks, Technological Tools for Privacy Protection			
Unit V	OSM Phishing & Fraud Detection: Research Insights	(06hrs)	COs Mapped - CO5
Phishing in OSM & Identifying fraudulent entities in online social networks, Case Studies of Real-World Phishing Attacks in OSM, Detection and Prevention Techniques, Legal and Ethical Considerations, Impact on Reputation and Trust, Research paper discussion.			
Text Books			
1. Security and Trust in Online Social Networks by Barbara Carminati, Elena Ferrari, Springer International Publishing AG			
Reference Books			
1. Introduction to Embedded Systems: A Cyber-Physical Systems Approach, by E.A.Lee, Sanjit Seshia, MIT Press			
2. Principles of cyber-physical systems, rajeev alur, The MIT Press Cambridge, London.			
NPTEL Link			
https://onlinecourses.nptel.ac.in/noc24_cs04/preview			

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	-	-	-	-	-	-	-	-	-
CO2	3	3	-	-	-	3	-	3	-	-	-	-	-	-
CO3	3	-	-	3	3	3	-	-	-	-	-	-	-	2
CO4	3	3	-	-	-	3	-	3	-	-	-	-	-	-
CO5	3	-	3	-	3	3	-	-	-	-	-	3	-	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



2302207A: MDM1: Lab Work in Privacy & Security in Online Social Media

List of Laboratory Experiments / Assignments		
Sr. No.	Laboratory Experiments / Assignments	CO Mapped
1	Introduction to Online Social Networks Tool: Postman	CO1
2	Data Collection from Online Social Media Tool: NodeXL, Gephi	CO2
3	Trust, Credibility, and Reputations in Social Systems Tool: TrustRank	CO2
4	Online Social Media and Policing Tool: Hootsuite Insights	CO3, CO4
5	Information Privacy Disclosure and Its Effects Tool: Privacy Badger	CO4
6	Phishing and Fraudulent Entities Identification Tool: PhishTank	CO5
7	Refresher for All Topics Tool: Kahoot!	CO1, CO2, CO3
8	Research Paper Discussion Tool: Mendeley	CO5

[illegible]

CO4	3	-	3	-	3	3	-	-	-	-	-	-	2
CO5	3	3	-	-	3	-	-	-	-	-	-	-	2

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.



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

S. Y. B. Tech. E&TC Pattern 2023			
2302206B: MDM-Data Science: Data Analytics with Python			
Teaching Scheme:		Credit Scheme:	Examination Scheme:
Theory :03hrs/week		03	Continuous Comprehensive Evaluation: 20Marks InSem Exam: 20Marks EndSem Exam: 60Marks
Prerequisite Courses, if any: Python Programming, basics of probability and statistics			
Companion course, if any:			
Course Objectives: On completion of this course students will be able to understand data analytics and Python fundamentals, probability, hypothesis testing, regression, introduction to cluster analysis, classification and Regression Trees (CART).			
Course Outcomes: On completion of the course, students will be able to–			
	Course Outcomes		Bloom's Level
CO1	Understand and apply Python fundamentals for data analysis		2- Understand
CO2	Understand the concepts of probability and sampling		2- Understand
CO3	Perform linear and multiple regression analysis		3-Apply
CO4	Understand the concepts of Maximum Likelihood Estimation (MLE) and logistic regression		2- Understand
CO5	Understand and apply Classification and Regression Trees (CART)		2- Understand
COURSE CONTENTS			
Unit I	Introduction to data analytics and Python fundamentals	(07hrs)	COs Mapped CO1
Introduction to python, python fundamentals Central tendency and dispersion: Measure of dispersion, Mean , median, mode, Range, percentile, standard deviation, range, variance, absolute deviation Measure of central tendency, skewness, kurtosis, discrete analysis Python Demo, box plot			
Unit II	Introduction to probability, Sampling and sampling distributions	(08hrs)	COs Mapped – CO2
Introduction to probability Random variables, Probability density function, cumulative distribution function, Discrete Distributions, variance and Standard deviation of discrete function, correlation coefficient. Probability Distributions, Continuous distribution, Discrete Distributions, Types of distributions, Binomial distribution, Poisson distribution, exponential distribution, uniform distribution, Normal distribution, Hypergeometric distribution. Python demo for Distribution Sampling and Sampling distributions Distribution of sample means, proportion and variance Confidence Interval Estimation : Single population proportion			
Unit III	Hypothesis testing, Two sample testing and introduction to ANOVA	(07hrs)	COs Mapped - CO3
Hypothesis testing and Errors in Hypothesis testing Hypothesis Testing about the Difference in Two Sample Means Hypothesis Testing : Two sample test ANOVA and Two Way ANOVA Post Hoc Analysis(Tukey's test) Randomize block design (RBD) Linear Regression Estimation, Prediction of Regression Model Residual Analysis Multiple Regression Model			
Unit IV	Concepts of MLE and Logistic regression, ROC and Regression Analysis Model Building	(07hrs)	COs Mapped - CO4

Concepts of MLE and Logistic regression Maximum likelihood estimation Logistic regression Linear regression Vs Logistic regression Model Confusion matrix and ROC Performance of Logistic Model-III Regression Analysis Model Building

Unit V	Chi-square Test and introduction to cluster analysis, Clustering analysis Classification and Regression Trees (CART)	(07hrs)	COs Mapped - CO5
Chi - Square Test of Independence Chi-Square Goodness of Fit Test Cluster analysis: Introduction K-Means Clustering Hierarchical method of clustering Classification and Regression Trees (CART : I& II) Classification and Regression Trees (CART- III)			
Text Books			
1. McKinney, W. (2012). Python for data analysis: Data wrangling with Pandas, NumPy, and IPython. " O'Reilly Media, Inc." 2. Douglas C. Montgomery, George C. Runger (2002). Applied Statistics & Probability for Engineering. "John Wiley & Sons, Inc" 3. Ken Black, "Business Statistics for Contemporary Decision Making" Wiley India Pvt Ltd,6th edition			
Reference Books			
3. David W. Hosmer, Stanley Lemeshow (2000). Applied logistic regression (Wiley Series in probability and statistics). "Wiley-Interscience Publication" 4. Leonard Kaufman, Peter J. Rousseeuw (1990). Finding Groups in Data: An Introduction to Cluster Analysis. "John Wiley & Sons, Inc".			

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	3
CO2	3	3	-	2	3	-	-	-	-	-	-	-	2	2
CO3	3	3	3	3	3	-	-	-	-	-	-	3	2	2
CO4	3	3	2	3	2	-	-	-	-	-	-	3	2	2
CO5	3	3	2	3	2	-	-	-	-	-	-	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 (10 Marks) Assignment No. 2 - Unit 2 (10 Marks) Assignment No. 3 - Unit 3 (10 Marks) Assignment No. 4 - Unit 4 (10 Marks) Assignment No. 5 - Unit 5 (10 Marks)	10
2	Test (Using LMS): 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			
2302207B: MDM1: Lab work in Data Analytics with Python			
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:			
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 Numpy , Pandas and Matplotlib . Develop Python programs for Numpy, Pandas data frames and Matplotlib.	2-Understand	2-Manipulation
CO2	Develop python program for Correlation, scatterplots and Correlation coefficient. Perform the Data Preprocessing operations using Python on any open source dataset (e.g., data.csv)	2-Understand	2-Manipulation
CO3	Create a Linear Regression Model, logistic regression model and Simple CART classification model using Python with the help of given data set.	3-Apply	3-Precision

List of Laboratory Experiments / Assignments		
Sr. No.	Laboratory Experiments / Assignments	CO Mapped
1	(a) Write a python program to determine type, shape, dimension and size of the input array using Numpy. (b) Write a python program to perform array slicing rowwise and column wise on the input array using Numpy.	CO1
2	(a) Write a python program to create a data frame using a list of elements using Pandas data frames. (b) Develop python program for Basic plots using Matplotlib	CO1
3	(a) Develop python program for Correlation and scatter plots (b) Develop python program for Correlation coefficient	CO1
4	Perform the following operations using Python on any open source dataset (e.g., data.csv) 1. Import all the required Python Libraries. 2. Locate an open source data from the web (e.g. https://www.kaggle.com). Provide a clear description of the data and its source (i.e., URL of the web site). 3. Load the Dataset into pandas data frame.	CO2

	4. Data Preprocessing: check for missing values in the data using pandas isnull(), describe() function to get some initial statistics. Provide variable descriptions. Types of variables etc. Check the dimensions of the data frame. 5. Summarize the types of variables by checking the data types (i.e., character, numeric, integer, factor, and logical) of the variables in the data set. If variables are not in the correct data type, apply proper type conversions. 6. Turn categorical variables into quantitative variables in Python.	
5	Create a Linear Regression Model using Python to predict home prices using Boston Housing Dataset (https://www.kaggle.com/c/boston-housing). The Boston Housing dataset contains information about various houses in Boston through different parameters. The objective is to predict the value of prices of the house using the given features.	CO2
6	Create a logistic regression model using Python to perform classification on Social_Network_Ads.csv dataset. Compute Confusion matrix to find TP, FP, TN, FN, Accuracy, Error rate, Precision. Recall on the given dataset.	CO3
7	Create a Simple CART classification model using Python on iris.csv dataset. Compute Confusion matrix to find TP, FP, TN, FN, Accuracy, Error rate, Precision. Recall on the given dataset.	CO3

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	2	2
CO2	3	3	2	2	3	-	-	-	-	-	-	2	2	2
CO3	3	3	3	3	3	-	-	-	-	-	-	3	2	2

Guidelines for Laboratory Conduction
Use of open source software is to be encouraged. All the assignments should be implemented using python programming language
Guidelines for Student's Lab Journal
The laboratory assignments are to be submitted by students in the form of a journal. Journal consists of Certificate, table of contents, and handwritten write-up of each assignment (Title, problem statement, theory Concepts in brief, algorithm, test cases and conclusions). Program codes with sample outputs shall be submitted in soft form.
Guidelines for Term work Assessment
Each experiment from the lab journal is assessed for thirty marks based on three rubrics. 4. R1: Timely completion of experiment (10 Marks) 5. R2: Understanding of experiment (10 Marks) 6. 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.



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

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



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



K. K. Wagh Institute of Engineering Education and Research, Nashik
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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: <pre>1 2 3 4 5 6 7 8 9 10 11 12 13 14 15</pre> 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' <table><thead><tr><th>Word</th><th>Word length</th></tr></thead><tbody><tr><td>I</td><td>1</td></tr><tr><td>scream</td><td>6</td></tr><tr><td>you</td><td>3</td></tr><tr><td>scream</td><td>6</td></tr><tr><td>we</td><td>2</td></tr><tr><td>all</td><td>3</td></tr><tr><td>scream</td><td>6</td></tr><tr><td>for</td><td>3</td></tr><tr><td>ice</td><td>3</td></tr><tr><td>cream</td><td>5</td></tr></tbody></table> The content of dictionary should be {1:1, 6:3, 3:4, 2:1, 5:1}	Word	Word length	I	1	scream	6	you	3	scream	6	we	2	all	3	scream	6	for	3	ice	3	cream	5	CO4
Word	Word length																							
I	1																							
scream	6																							
you	3																							
scream	6																							
we	2																							
all	3																							
scream	6																							
for	3																							
ice	3																							
cream	5																							
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 <pre>232323 MAN#</pre>	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
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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, 5 th 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 2 and 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
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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



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			
2302216A: MDM2: Foundations of Cyber Physical Systems			
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: Introduction to Computer Science or Programming, Introduction to Embedded Systems			
Companion course, if any: Lab work in Foundations of Cyber Physical Systems			
Course Objectives: 1. Understand the Core Principles of Cyber-Physical Systems. 2. Model and Analyze Dynamical Systems. 3. Design and Implement Real-Time Control Systems. 4. Apply Advanced Techniques for System Verification and Validation 5. Develop Solutions for CPS Security and Resilience.			
Course Outcomes: On completion of the course, students will be able to–			
	Course Outcomes	Bloom’s Level	
CO1	Understand the fundamental concepts and architecture of cyber-physical systems (CPS)	2- Understand	
CO2	Analyze and model dynamical systems within cyber-physical systems	4-Analyze	
CO3	Implement real-time communication and control strategies in cyber-physical systems	3-Apply	
CO4	Evaluate the impact of safety, security, and reliability in the design of cyber-physical systems	5-Evaluate	
CO5	Design and prototype a basic cyber-physical system for a specific application.	6-Create	
COURSE CONTENTS			
Unit I	Fundamentals of Real-Time Cyber-Physical Systems	(08hrs)	COs Mapped -CO1
Motivational Examples of Cyber-Physical Systems, Introduction to Compute Platforms for CPS, Hardware-Software Co-Design in CPS, Real-Time Sensing and Data Acquisition, Communication Protocols for Real-Time CPS, Real-Time Operating Systems (RTOS) for CPS, Task Scheduling in Real-Time Systems, Timing Analysis and Predictability			
Unit II	Dynamical System Modeling and Delay-Aware Control Design	(07hrs)	COs Mapped -CO2
Mathematical Modeling of Dynamical Systems, Stability Analysis of Dynamical Systems, Controller Design Techniques, Delay-Aware System Modeling, Delay-Aware Control Design, Platform Effects on System Stability and Performance, Integrated Design and Verification			
Unit III	Modeling and Analysis of Cyber-Physical Systems	(07hrs)	COs Mapped - CO3
Introduction to Hybrid Automata for CPS Modeling, Modeling Cyber-Physical Systems Using Hybrid Automata, Reachability Analysis in Hybrid Systems, Lyapunov Stability Theory in CPS, Barrier Functions for Safety Assurance, Tools and Software for Hybrid Automata and Reachability Analysis, Applications of Advanced Analysis Techniques in CPS.			

Unit IV	Controller Design for Cyber-Physical Systems	(07hrs)	COs Mapped - CO4
Introduction to Safe Controller Design, Quadratic Programming (QP) for Control, Constraint Handling in QP-Based Controllers, Barrier Functions for Safety Assurance, Neural Network (NN)-Based Controller Design, Safe Learning and Adaptation in NN Controllers, Integration of QP and NN-Based Controllers			
Unit V	State Estimation and Security in Cyber-Physical Systems	(07hrs)	COs Mapped – CO5
Introduction to State Estimation and Kalman Filters, Mathematical Foundations of Kalman Filters, Extended and Unscented Kalman Filters, Implementation of Kalman Filters in Real-Time Systems, Introduction to CPS Security and Threats, Attack Detection Using State Estimation Techniques, Mitigation Strategies and Resilience in CPS.			
Text Books			
1. Security and Trust in Online Social Networks by Barbara Carminati, Elena Ferrari, Springer International Publishing AG			
Reference Books			
1. Introduction to Embedded Systems: A Cyber-Physical Systems Approach, by E.A.Lee, Sanjit Seshia, MIT Press			
2. Principles of cyber-physical systems, rajeew alur, The MIT Press Cambridge, London.			
NPTEL Link			
https://onlinecourses.nptel.ac.in/noc24_cs27/preview			

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	3	-	-	2	-	-	-	-	-	-	-	-	-
CO3	3	3	2	-	2	-	-	-	-	-	-	-	-	3
CO4	3		3	-	-	3	-	-	-	-	-	-	-	-
CO5	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 (10 Marks) Assignment No. 2 - Unit 2 (10 Marks) Assignment No. 3 – Unit 3 (10 Marks) Assignment No. 4 - Unit 4 (10 Marks) Assignment No. 5 - Unit 5 (10 Marks)	10
2	Quiz (Using LMS): 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			
2302217A: MDM2: Lab Work in Foundations of Cyber Physical Systems			
Teaching Scheme:	Credit Scheme:	Examination Scheme:	
Practical : 02hrs/week	01	Practical: 25 Marks Term Work: 25 Marks	
Prerequisite Courses, if any: Introduction to Computer Science or Programming, Introduction to Embedded Systems			
Companion course, if any: Foundations of Cyber Physical Systems			
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	Develop and implement software for embedded systems	6-Create	6-Adaption
CO2	Analyze and optimize the performance of cyber-physical systems	4- Analyze	4-Mechanism
CO3	Integrate sensors, actuators, and communication modules in a cyber-physical system	4- Analyze	4-Mechanism
CO4	Demonstrate the application of safety and security principles in cyber-physical systems	3-Apply	3- Guided Response
CO5	Design and prototype a simple cyber-physical system for a real-world application	6-Create	6-Adaption

List of Laboratory Experiments / Assignments		
Sr. No.	Laboratory Experiments / Assignments	CO Mapped
1	CPS: Motivational Examples and Compute Platforms. Tool: MATLAB/Simulink	CO1
2	Real-time Sensing and Communication for CPS. Tool: ROS (Robot Operating System)	CO2, CO3
3	Real-time Task Scheduling for CPS. Tool: FreeRTOS	CO1,CO3
4	Dynamical System Modeling, Stability, Controller Design. Tool: Simulink Control Design	CO5
5	Delay-aware Design; Platform Effect on Stability/Performance. Tool: TrueTime	CO4
6	Hybrid Automata Based Modeling of CPS. Tool: HyTech	CO5
7	Reachability Analysis. Tool: SpaceEx	CO4
8	Lyapunov Stability, Barrier Functions. Tool: SOSTOOLS	CO2
9	Quadratic Program Based Safe Controller Design. Tool: Gurobi Optimizer	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.

[illegible]



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

S. Y. B. Tech. E&TC Pattern 2023 2302216B: MDM2: Machine Learning for Engineering and Science Applications		
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: Introduction to Programming, Probability and Statistics, Introduction to Data Science		
Companion course, if any:		
Course Objectives: 1. To develop a strong foundation in the core principles, theories, and methodologies of machine learning. 2. To acquire skills in preparing and transforming raw data into suitable formats for machine learning models. 3. To gain proficiency in building effective and efficient machine learning models using appropriate tools and technologies.		
Course Outcomes: On completion of the course, students will be able to–		
	Course Outcomes	Bloom's Level
CO1	Understand the fundamental concepts of Probability & machine learning.	2-Understand
CO2	Integrate and apply advanced machine learning techniques	3-Apply
CO3	Apply optimization techniques and algorithms to solve optimization problems in machine learning	3-Apply
CO4	Understanding of deep learning fundamentals	2-Understand
CO5	Understand and apply the architecture of Recurrent Neural Networks	3-Apply

COURSE CONTENTS			
Unit I	Introduction to Probability	(07hrs)	COs Mapped -CO1
Linear Algebra, Basic operation, Linear Combinations Span Linear Independence, Matrix Operations, Special Matrices, Matrix Decompositions, Introduction to Probability Theory Discrete and Continuous Random Variables, Conditional, Joint, Marginal Probabilities Sum Rule and Product Rule Bayes' Theorem, Independence Conditional Independence Chain Rule Of Probability, Expectation, Variance Co variance, Some Relations for Expectation and Covariance (Slightly Advanced), Machine Representation of Numbers, Overflow, Underflow, Condition Number, Derivatives, Gradient, Hessian, Jacobian, Taylor Series, Matrix Calculus (Slightly Advanced)			

Unit II	Introduction to Machine learning	(08hrs)	COs Mapped-CO2
Introduction to KNN, Binary decision trees, Binary regression trees, Bagging, Random Forest, Boosting, Gradient boosting, Unsupervised learning & Kmeans, Agglomerative clustering, Probability Distributions Gaussian, Bernoulli, Covariance Matrix of Gaussian Distribution, Central Limit Theorem, Naïve Bayes, MLE , PCA part 1, PCA part 2, Support Vector Machines, MLE, MAP and Bayesian Regression, Introduction to Generative model, Generative Adversarial Networks (GAN), Variational Auto-encoders (VAE), Applications: Cardiac MRI - Segmentation & Diagnosis, Applications: Cardiac MRI Analysis - Tensorflow code walkthrough, Application 1 description - Fin Heat Transfer, Application 1 solution, Application 2 description - Computational Fluid Dynamics, Application 2 solution, Application 3 description - Topology Optimization, Application 3 solution, Application 4 - Solution of PDE/ODE using Neural Networks			
Unit III	Introduction to Machine learning packages and neural networks	(08hrs)	COs Mapped-CO3
Optimization – Unconstrained Optimization, Introduction to Constrained Optimization, Introduction to Numerical Optimization Gradient Descent – 1, Gradient Descent – 2 Proof of Steepest Descent Numerical Gradient Calculation Stopping Criteria, Introduction to Packages, The Learning Paradigm, A Linear Regression Example, Linear Regression Least Squares Gradient Descent, Coding Linear Regression, Generalized Function for Linear Regression, Goodness of Fit, Bias-Variance Trade Off, Gradient Descent Algorithms, Feedforward Neural Network, Structure of an Artificial Neuron, Multinomial Classification - One Hot Vector, Multinomial Classification- Introduction, XOR Gate, NOR, AND, NAND Gates, OR Gate Via Classification, Logistic Regression			
Unit IV	Introduction to deep learning	(07hrs)	COs Mapped-CO4
Introduction to back prop, Biological neuron, Schematic of multinomial logistic regression, Multinomial Classification – Softmax, Code for Logistic Regression, Gradient of logistic regression, Differentiating the sigmoid, Binary Entropy cost function, Introduction to Deep Learning, Introduction to Convolution Neural Networks (CNN), Types of convolution, CNN Architecture Part 1 (LeNet and Alex Net), CNN Architecture Part 2 (VGG Net), CNN Architecture Part 3 (GoogleNet), CNN Architecture Part 4 (ResNet), CNN Architecture Part 5 (DenseNet), Train Network for Image Classification, Semantic Segmentation, Hyperparameter optimization, Transfer Learning, Segmentation of Brain Tumors from MRI using Deep Learning			
Unit V	Recurrent neural networks (RNNs) and architecture	(06hrs)	COs Mapped-CO5
Introduction to RNNs, Summary of RNNs, Deep RNNs and Bi- RNNs, Why LSTM Works, LSTM, RNN Architectures, Vanishing Gradients and TBPTT, Training RNNs - Loss and BPTT, Example - Sequence Classification, Batch Normalizing, Data Normalization, Learning Rate decay, Weight initialization, Activation Functions,			
Text Books			
1. Deep Learning, Goodfellow et al, MIT Press, 20172. 2. Pattern Recognition and Machine Learning, Christopher Bishop, Springer, 20093.			
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	2	-	-	-	-	-	-	-	-	-	3	-	-
CO2	3	3	3	2	3	-	-	-	-	-	-	3	-	3
CO3	3	3	3	2	3	-	-	-	-	-	-	3	-	3
CO4	3	3	-	-	-	-	-	-	-	-	-	3	-	3
CO5	3	3	3	2	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 (10 Marks) Assignment No. 2 - Unit 2 (10 Marks) Assignment No. 3 - Unit 3 (10 Marks) Assignment No. 4 - Unit 4 (10 Marks) Assignment No. 5 - Unit 5 (10 Marks)	10
2	Quiz Test (Using LMS): 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			
2302217B: MDM2: Lab Work in Machine Learning for Engineering and Science Applications			
Teaching Scheme:		Credit Scheme:	Examination Scheme:
Practical : 02hrs/week		01	Practical: 25 Marks Term Work: 25 Marks
Prerequisite Courses, if any: Introduction to Programming, Probability and Statistics, Data Structures and Algorithms, Introduction to Data Science			
Companion course, if any:			
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 python Tool for Machine Learning application. and Implement and analyze simple classification models using python tool	3- Apply	3-Precision
CO2	Develop and implement logistic regression models for classification tasks, and apply the back propagation algorithm to create and train a finite words classification system	3- Apply	3-Precision
CO3	Acquire the skills to construct and evaluate various Recurrent Neural Networks (RNNs) and implement Long Short-Term Memory (LSTM) networks	3- Apply	3-Precision

List of Laboratory Experiments / Assignments		
Sr. No.	Laboratory Experiments / Assignments	CO Mapped
1	(a)Write a python program to import and export data using Pandas library functions. (b)Write a Python program to demonstrate various Data Visualization Techniques. (c)Demonstrate various data pre-processing techniques for a given dataset.	CO1
2	Implement Naïve Bayes Classification in Python 1. Install Necessary Libraries 2. Import Libraries 3. Prepare the synthetic Dataset 4. Convert text data into numerical data using CountVectorizer, which creates a bag-of-words model. 5. Train the Naïve Bayes Model 6. Evaluate the Model	CO1
3	Build KNN Classification model for a given dataset. 1. Install and Import Necessary Libraries 2. Prepare the Dataset 3. Locate an open source Iris dataset data from the web (e.g. https://www.kaggle.com). Provide a clear description of the data and its source (i.e., URL of the web site). 4. Feature Scaling 5. Build and Train the KNN Model	CO1

Sr. No.	Laboratory Experiments / Assignments	CO Mapped
4	Implement Simple & Multiple linear Regression Model using python. 1. Import Necessary Libraries 2. Locate an open source data from the web (e.g. https://www.kaggle.com). Provide a clear description of the data and its source (i.e., URL of the web site). 3. Load data from a CSV file or a database 4. Split the Data 5. Train the Model 6. Make Predictions and Evaluate	CO2
5	Develop Logistic Regression Model for a given dataset using python. 1. Import Necessary Libraries 2. Load and Prepare the Dataset 3. Locate an open source Iris dataset data from the web (e.g. https://www.kaggle.com). Provide a clear description of the data and its source (i.e., URL of the web site). 4. Split the Data into Training and Testing Sets 5. Create and Train the Logistic Regression Model 6. Evaluate the Model 7. Visualize the Decision Boundary	CO2
6	Implement the finite words classification system using Back-propagation algorithm using python. 1. Import Necessary Libraries 2. Prepare the Dataset 3. Define the Neural Network Architecture 4. Train the Model 5. Evaluate the Model	CO2
7	(a) Build a Simple RNN using python (b) Build and Compare Deep RNNs and Bi-RNNs using python 1. Install Necessary Libraries 2. Import Libraries 3. Prepare the Dataset 4. Locate an open source simple synthetic dataset from the web (e.g. https://gretel.ai/). Provide a clear description of the data and its source (i.e., URL of the web site). 5. Build the Simple / a Deep / a Bi-RNN Model 6. Train the Model 7. Evaluate and Compare the Models	CO3
8	Implement LSTM and Explore Vanishing Gradients using python. 1. Install and Import Necessary Libraries 2. Prepare the synthetic Dataset 3. Locate an open source simple synthetic dataset from the web (e.g. https://gretel.ai/). Provide a clear description of the data and its source (i.e., URL of the web site). 4. Build and Train the LSTM Model 5. Evaluate the LSTM Model	CO3

Guidelines for Laboratory Conduction

Use of open source software is to be encouraged.

All the assignments should be implemented using python programming language

Guidelines for Student's Lab Journal

The laboratory assignments are to be submitted by students in the form of a journal. Journal consists of Certificate, table of contents, and handwritten write-up of each assignment (Title, problem statement, theory Concepts in brief, algorithm, test cases and conclusions). Program codes with sample outputs shall be submitted in soft form.

Guidelines for Term work Assessment

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

7. R1: Timely completion of experiment (10 Marks)

8. R2: Understanding of experiment (10 Marks)

9. 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.

[illegible]



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

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, 7 th edition 2. Projects: Planning, Analysis, Selection, Financing, Implementation, and Review, Dr Prasanna Chandra, McGraw Hill Education, 9 th edition			
Reference Books			
1. Project Management: A Systems Approach to Planning, Scheduling, and Controlling, Kerzner Harold, John Wiley & Sons, 8 th edition 2. The Practical Guide to Project Management, C. Petersen, Bookboon, 2 nd 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
(Autonomous from Academic Year 2022-23)

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 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, Intention and 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 need and 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 Resolution covering 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 in Human 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. Susan 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, Limits to Growth – Club of Rome’s report, Universe Books. 5. A Nagraj, 1998, Jeevan Vidya Ek Parichay, Divya Path Sansthan, Amarkantak. 6. P L Dhar, R R 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, Oxford University 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	-	-	-	-	-	-



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

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
(Autonomous from Academic Year 2022-23)

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		02	InSem Exam: 20Marks
Practical: 02 hrs/week		01	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 (Psychomot or 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		



K. K. Wagh Institute of Engineering Education and Research, Nashik
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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		02	InSem Exam: 20Marks
Practical: 02 hrs/week		01	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 Map ped
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, equipments 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	