



**ST. Xavier's Technical Institute,
Mahim, Mumbai 400 016**

**Revised Curriculum
For
Diploma Programme
in Electronics and
Telecommunication
Engineering**

From July 2024

A.Y.2024-25



**ST. Xavier's Technical Institute, Mahim, Mumbai Diploma
Programme in Electronics and Telecommunication Engineering
Programme Structure**

Programme Educational Objectives (PEO)

(What the student will continue to do even after 3-5 years of working in the industry)

PEO1: To produce diploma holders who have the ability to demonstrate technical competence in the fields of Electronics and Telecommunication engineering and develop solutions to the problems.

PEO2: To produce diploma holders who would be able to take individual responsibility and to work as a part of a team towards the fulfillment of both individual and organizational goals.

PEO3: To prepare the students to engage in professional development through self-study, graduate and professional studies in engineering, management and research.

Program Outcomes (PO) given by NBA.

(What the student will be able to do at the entry point of industry soon after diploma programme)

PROGRAM OUTCOMES (POs)

1. **Basic and Discipline specific knowledge:** Apply knowledge of basic mathematics, science and engineering fundamentals and engineering specialization to solve the engineering problems.
2. **Problem analysis:** Identify and analyse well-defined engineering problems using codified standard methods.
3. **Design/ development of solutions:** Design solutions for well-defined technical problems and assist with the design of systems components or processes to meet specified needs.
4. **Engineering Tools, Experimentation and Testing:** Apply modern engineering tools and appropriate technique to conduct standard tests and measurements.
5. **Engineering practices for society, sustainability and environment:** Apply appropriate technology in context of society, sustainability, environment and ethical practices.
6. **Project Management:** Use engineering management principles individually, as a team member or a leader to manage projects and effectively communicate about well-defined engineering activities.
7. **Life-long learning:** Ability to analyse individual needs and engage in updating in the context of technological changes.

Note for All the Semesters:

1. Every student has to pass in each head of Practical Formative Assessment [Term work] & Summative Assessment [End-Semester-Examination (ESE)] based on Laboratory learning & tutorial learning by securing minimum of 40% marks of the maximum marks i.e. ::--
 - **For Practical**
 - Formative Assessment -PR :--- 20 out of 50
 - Formative Assessment -PR ::--- 10 out of 25
 - Summative Assessment -PR ::--- 20 out of 50
2. Formative Assessment (FA-PR) for Practical includes lab performance, lab activity, attendance.
3. Every student has to pass in each head of **Self Learning Assessment [SLA]** by securing minimum of 40% marks of the maximum marks.
 - Self-Learning Assessment -SLA :--- 20 out of 50
 - Self-Learning Assessment -SLA ::--- 10 out of 25
4. Formative Assessment (**FA**) for **Theory** includes – average of two PTs of 30 marks each.
5. Every student has to pass **Summative Assessment [SA / End-Semester-Examination (ESE)]** by securing minimum of 40% marks of the maximum marks
6. Self-Learning Assessment [SLA] includes Micro projects/Assignment/Quiz/Presentations & online workshops activity etc. as per the course. The scheme and schedule for Self- Learning Assessment should be informed to the students and discussed with them at the start of the term.
7. For developing self-directed learning skills from each course about 15-20% of the topics/sub-topics, which are relatively simpler or descriptive in nature are to be given to the students for self-study, proper learning of these topics should be assured by Assignment/Quiz/conducting classroom presentations of students by respective faculty.

Program Title					Diploma in Electronics & Telecommunication Engineering												
Course Code			Course Title		MICROCONTROLLERS								Course Type		Semester		
23401													DSC		4		
Learning Scheme						Assessment Scheme											
ActualContact Hrs./Week			SLH	NLH	CREDITS	THEORY				PRACTICAL				SLA		Total	
CL	TL	LL				FA	SA	Total		FA		SA					
								Max	Min	Max	Min	Max	Min	Max	Min		
3	-----	2	1	6	3	30	70	100	40	25	10	50	20	25	10	200	
1) Theory paper duration 3 hrs. 2) Theory paper assessment is Internal and External. 3) The assessment of Practical is Internal and External. 4) Formative Assessment (Theory)out of 30 marks is average of 2 periodical tests (PT). 5) The assessment of Self Learning (SLA) is Internal.																	

RATIONALE:

This subject which comes under the Applied Technology group will enable the students to comprehend the theory, concepts, working of microprocessors and microcontrollers, their programming and also their applications in electronic systems. The knowledge acquired by student will help them to design, test, troubleshoot and program microcontroller-based systems. Knowledge of microprocessors will provide a quicker grasping and understanding of the internal working and operation of microcontroller-based control systems in industry.

COURSE OUTCOMES :-

Course theory content, practical skills, experience help student to understand the uses of basic electronics, communication, terms & methods in system of Microcontroller, thus student should able to

Semester	4	Subject	MICROCONTROLLERS
		9th subject in Second Year	
C401.1	Analyze the architecture of 8051 Microcontrollers.		
C401.2	Develop assembly language program for microcontroller applications.		
C401.3	Illustrate the functions of SFRs in microcontroller applications.		
C401.4	Interface the special purpose peripherals 8255 and 0808 with 8051 microcontroller.		
C401.5	Demonstrate the designing of a microcontroller-based system.		
C401.6	Interface External devices with microcontroller		

Mapping of Course outcomes (COs) to Program outcomes (POs)

SEM III	MICROCONTROLLER							
CO 401	(9 th subject in Second Year) PREPARED BY : VN,RVG,AG							
CO 401	P01	P02	P03	P04	P05	P06	P07	
CO 401.1	2		2	2	2	2	2	
CO 401.2	2	1	3	2	1	2	2	
CO 401.3	2		3	2		2		
CO 401.4	2	2	3	3	1	2	1	
CO 401.5	2	2	3	3	1	2	1	
CO 401.6	2	2	3	3	1	2	1	
CO 401 TOTAL	12	07	17	15	06	12	07	
CORRELATION LEVEL	2	1	3	3	1	2	1	

TABLE TO DECIDE CORRELATION LEVELS

CO SUM TOTAL	06	12	18
CORRELATION LEVEL	1	2	3

CO SUM TOTAL	0, 1, 2	3, 4, 5, 6, 7, 8	9, 10, 11, 12, 13, 14	15, 16, 17, 18
CORRELATION LEVEL	0	1	2	3

Subject Experts
Mr. R. V. Gheware
Mr. Anil Gurav
Mr. Vinaykumar S. Nagalikar

	Section -- 1						
Chapter No	Topics	Periods	Marks				COs
		Hrs.	R	U	A	Total	
1	INTRODUCTION TO MICROCONTROLLER 8051						
	1.1 Simplified Block diagram of Microcontroller System, Buses & Their types: Address bus Data bus & Control Bus. 1.2 Comparison between Microprocessor & Microcontroller. 1.3 Specifications of MCS-51 Microcontrollers. Pin Diagram of 8051. 1.4 Internal block diagram of 8051, memory organization. 1.5 8051 machine cycle concept, significance of flags, ports.	08	4	3	8	15	C401.1
2	8051 INSTRUCTION SET						
	2.1 Detailed study of 8051 Instructions, instruction classification, Addressing modes. 2.2 8051 Programs for simple arithmetic and Logical problems. 2.3 Concept of Subroutine & Stack, Delay Subroutine	08	2	4	4	10	C401.2
3	TIMER & (UART) SERIAL PORT PROGRAMMING						
	3.1 TMOD, TCON, Programs on Delay and counters using timer. 3.2 SCON, SBUF, Programs for serial data communication.	08	2	4	4	10	C401.3
	Section -- 2						
Chapter No.	Topics	Periods	Marks				COs
		Hrs.	R	U	A	Total	
4	INTERRUPTS & INTERFACING WITH EXTERNAL MEMORY						
	4.1 Semiconductor Memory: RAM, EPROM 4.2 Study of Peripherals PPI 8255 interfacing with UC 8051. 4.3 Interfacing with external ROM and RAM 4.4 Interrupt structure, concept of interrupt priorities, IE & IP registers,	08	4	4	7	15	C401.4
5	APPLICATIONS OF 8051						
	5.1 ADC 0808-interfacing with 8051. 8051 Program to read data from ADC. 5.2 DAC 0800-interfacing with 8051. 8051 Program to read data from DAC. 5.3 Concept of KEYBOARD and LCD Display & its interfacing. 8051 program to display some numbers/characters on multiplexed display.	08	2	4	4	10	C401.5

6	INTERFACING WITH RELAYS AND MOTORS						
	6.1 Interfacing with Relay. 8051 program to control Relay. 6.2 DC motor Interfacing and PWM. 8051 program to control DC motor. 6.3 Stepper Motor interfacing & 8051 program to control stepper motor.	08	2	4	4	10	C401.6

IMPLEMENTATION STRATEGY:

- 1) Lecture plan
- 2) Use of PowerPoint presentations and Videos
- 3) References from the internet **(for teachers as well as students)**
- 4) Extensive use of examples
- 5) Group discussions and micro project
- 6) Assignments for writing skills, create awareness about selection /purchasing components

LIST OF LABORATORY EXPERIENCES

EXP. NO.	TITLE	COURSE OUTCOME	CHAPT. NO.
1	Demonstration of 8051 assembler, simulator	C401.1	1
2	8051 program to move a block of data to other memory locations and to compliment a block of data in successive memory locations	C401.2	1
3	8051 program to find largest and smallest of 8 bit numbers stored in successive memory locations	C401.2	2
4	8051 program to sort five 8 bit numbers in ascending as well as descending order	C401.3	2
5	8051 program to search given byte of block in external memory and to convert a 2 digit BCD number to Hex	C401.4	2
6	To add five bytes in successive memory locations of external memory and do the same for program memory AND program to transmit and receive five bytes serially	C401.3	3
7	Using assembly language/ embedded C Program to flash L.E.D. interfaced to port of 8051.using (a) delay subroutine (b) using one of the timers of 8051 microcontroller	C401.3	3
8	Using assembly language/ embedded C Program read data from an ADC interfaced to the 8051 microcontroller	C401.4	4
9	To interface a keyboard with 8051 and read data using assembly language/ embedded C Program	C401.4	5
10	Using assembly language/ embedded C Program interface seven segment LED display with 8051	C401.5	5
11	Using assembly language/ embedded C Program interface a stepper motor with 8051.	C401.6	6
12	Study of Hardware Interrupts	C401.4	6
13	To Interface LCD's	C401.6	6
14	To generate square and sawtooth waves using DAC 0832	C401.5	6
15	Interfacing 8051 with a DC Motor	C401.6	6

IMPLEMENTATION STRATEGY

1. Practical Plan
2. Self-learning tutorials, assignments, Microprojects
3. Minimum 10 to 12 practical

The table to measure the attainment levels for TERM WORK (on a rating scale of “out of 25”) of the defined expected course outcomes is as shown in the format given below:

(Note:.....the table should progress to the right for Lab Experience 7, 8, 9,and so on.....)

LAB EXPERIENCE		1	2	3	4	5	6
	COURSE OUTCOMES	C302.2 (out of 25)	C302.2 (out of 25)	C302.2 (out of 25)	C302.3 (out of 25)	C302.3 (out of 25)	C302.3 (out of 25)
STUDENT SPN							
1303001							
1303002							
1303003							

* The final % attainment level for TERM WORK of each course outcome may then be computed and the overall % attainment level for the course, for term work may then be calculated.

SUGGESTED MICRO PROJECT / ASSIGNMENT / ACTIVITIES FOR SPECIFIC LEARNING / SKILLS DEVELOPMENT (SELF LEARNING)

Micro project could be group based. A suggestive list is given here, similar micro projects could be added by concerned faculty. Each student will maintain dated work diary with details of individual contribution. Assessment is done by project guide based on their performance and presentation of submission.

SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Chapter No.	Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
	Section I					
1	Introduction to Microcontroller 8051	08	4	3	8	15
2	8051 Instruction set	08	2	4	4	10
3	TIMER & (UART)SERIAL PORT PROGRAMMING	08	2	4	4	10
	Section II					
4	Interrupts &Interfacing with external Memory.	08	4	4	7	15
5	Applications of 8051.	08	2	4	4	10
6	Interfacing with Relays and Motors.	08	2	4	4	10
	Total	48	16	23	31	70
	Legends :: R --- Remember , U --- Understand , A ---Application					

This specification table provide guide line to teacher to teach & assess student also a general guide line to frame theory paper & practical theory exam paper which student have to undertake. The actual distribution of marks at different taxonomy level in the question paper may vary from above table.

REFERENCES

Sr. No.	Author	Title	Edition	Year of Publication	Publisher & Address
1.	Intel	Intel data sheets			Intel USA
2.	Muhammad Ali Mazidi	The 8051 microcontroller	1st	2002	Pearson Education Delhi Branch
3.	Kenneth Ayala	The 8051 microcontroller	3rd	1998	Prentice Hall Int
4.	Douglas V. Hal	Microprocessors & Interfacing Programming & Hardware	3rd	1998	McGraw Hill International Edition

LEARNING WEBSITES / WEB REFERENCES :

- <https://datasheet4u.com/datasheet-pdf/Intel/8085/pdf.php?id=1462411>
- https://datasheet4u.com/share_search.php?sWord=8051 www.Youtube.com
- www.keil.com

Program Title					Diploma in Electronics & Telecommunication Engineering												
Course Code			Course Title		DIGITAL COMMUNICATION									Course Type		Semester	
23402														DSC		4	
Learning Scheme						Assessment Scheme											
Actual Contact Hrs./Week			SLH	NLH	CREDITS	THEORY				PRACTICAL				SLA		Total	
CL	TL	LL				FA	SA	Total		FA		SA					
								Max	Min	Max	Min	Max	Min	Max	Min		
3	-----	2	1	6	3	30	70	100	40	25	10	50	20	25	10	200	
	1) IKS of 2 hrs. 2) Theory paper duration 3 hrs. 3) Theory paper assessment is Internal and External. 4) The assessment of Practical is Internal and External. 5) Formative Assessment (Theory)out of 30 marks is average of 2 periodical tests (PT). 6) The assessment of Self Learning (SLA) is Internal.																

RATIONALE:

This subject comes under the Applied Technology category. Presently, majority of the telecommunication systems operate on the basis of digital principles. It demands that the student has a good working knowledge of fundamentals of pulse and data communication. The subject will help the student in understanding the concepts of various pulse modulation techniques and methods of generating and demodulating, in each of the pulse modulation systems and digital carrier modulation systems.

COURSE OUTCOMES :: --

Course theory content, practical skills, experience help student to understand basic terms, functions & uses of Digital Communication, thus student should be able to

Semester	IV	Subject	DIGITAL COMMUNICATION
		10 th Subject in Second Year	
C402.1	Calculate the performance parameters of Digital Communication System using the concepts of Information theory		
C402.2	Encode the analog information using analog pulse modulation techniques.		
C402.3	Convert analog signal into digital using different digital pulse modulation systems.		
C402.4	Categorize the various multiplexing techniques in modern digital communications.		
C402.5	Select appropriate digital modulation technique as per the system requirement		
C402.6	Recover the original information through suitable digital demodulation technique.		

Mapping of Course outcomes (COs) to Program outcomes (POs)

SEM IV	DIGITAL COMMUNICATION							
CO 402	(10 th Subject in Second Year)PREPARED BY : KHK, JN							
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	
C402.1	2	3	3		1	1	3	
C402.2	2	3	3			2	1	
C402.3	3	3	3			2	1	
C402.4	3	3	3	3	3	2	2	
C402.5	3	3	3			2	2	
C402.6	2	3	3	2	2	2	2	
Total	15	18	18	05	06	11	11	
CORRELATION LEVEL	3	3	3	1	1	2	2	

TABLE TO DECIDE CORRELATION LEVELS

CO SUM TOTAL	06	12	18
CORRELATION LEVEL	1	2	3

CO SUM TOTAL	0, 1, 2	3, 4, 5, 6, 7, 8	9, 10, 11, 12, 13, 14	15, 16, 17, 18
CORRELATION LEVEL	0	1	2	3

Subject Expert

Mr. K. H. Kamath

Dr. Janani Natarajan

	Section – 1						
Chapter No	Topics	Periods	Marks				COs
		Hrs.	R	U	A	Total	
1	INFORMATION THEORY						
	1.1 Introduction to digital communication. 1.2 Block diagram of basic digital communication system. 1.3 Definition and Expression for Measure of information, Amount of information, Average information (Entropy), Information rate, Channel capacity. 1.4 Hartley's laws related to channel capacity 1.5 Shannon & Hartley theorem. 1.6 Problems on above topics.	10	04	05	05	14	C402.1
2	PULSE COMMUNICATIONS						
	2.1 Pulse modulation – Definition, Types, Comparison with CW modulation 2.2 Analog Pulse modulation: PAM, PWM & PPM 2.2.1 Pulse Amplitude modulation (PAM) – Definition, Waveforms 2.2.2 Types - Single and Double Polarity type, Flat top and Natural PAM 2.2.3 Generation of PAM 2.2.4 Pulse Width modulation (PWM) - Definition, waveforms 2.2.5 Types-Symmetrical, Leading edge and Trailing edge PWM 2.2.6 Generation of PWM 2.2.7 Pulse Position Modulation (PPM) Definition, waveforms 2.2.8 Generation of PPM from PWM; Block diagram of PPM transmitter 2.2.9 Comparison of PAM, PWM & PPM. 2.3 Digital Pulse Modulation 2.3.1 Pulse Code Modulation (PCM) – Definition, Waveforms 2.3.2 Principles of PCM generation. 2.3.3 Block diagram of PCM transmitter 2.3.4 Companding 2.3.5 Block diagram of PCM receiver 2.3.6 Delta Modulation - working principle	14	06	10	05	21	C402.2 C402.3

	Section – 2						
Chapter No	Topics	Periods	Marks				COs
		Hrs.	R	U	A	Total	
3	CHANNEL MULTIPLEXING						
	3.1 Time Division Multiplexing (TDM) Definition, Block diagram of a typical PAM TDM system, Waveforms, 5channel and 10channel PCM TDM Transmitter. 3.2 Frequency Division Multiplexing (FDM) 3.2.1 Definition ,Group formation 3.2.2 Block diagram of 12 channel Basic group 3.2.3 Block diagram of Super group 3.2.4 Standard frequency allocations and bandwidth, Pilot carrier frequencies 3.2.5 General block diagram of FDM Transmitter & Receiver Comparison of TDM & FDM systems.	10	04	05	05	14	C402.4
4	BINARY MODULATION TECHNIQUES						
	4.1 Amplitude Shift Keying (ASK) : 4.1.1 Definition, description, waveforms. 4.1.2 ASK modulator 4.1.3 ASK receiver 4.1.4 Advantages, disadvantages and applications 4.2 Frequency Shift Keying (FSK) : 4.2.1 Definition, description, waveforms 4.2.2 FSK modulator using Timer IC 555 4.2.3 FSK receiver (PLL type) 4.2.4 Advantages, disadvantages and applications 4.3 Phase-Shift Keying (PSK): 4.3.1 Definition, description, waveforms of BPSK signal 4.3.2 BPSK transmitter - Circuit diagram using Ring modulator 4.3.3 BPSK receiver 4.3.4 QAM – definition, constellation diagram, types, QAM transmitter(16 QAM only)	14	06	10	05	21	C402.5 C402.6

IMPLEMENTATION STRATEGY:

- 1) Lecture Plan
- 2) Use of PowerPoint presentations and Videos
- 3) References from the internet **(for teachers as well as students)**
- 4) Extensive use of examples
- 5) Group discussions and micro project
- 6) Assignments for writing skills, create awareness about selection /purchasing components

LIST OF LABORATORY EXPERIENCES

EXP NO.	TITLE	COURSEOUTCOME MAPPING	Chapter No.
1	Pulse Amplitude Modulation using op-amp (ADTRON KIT)	C405.2	2
2	Pulse Amplitude Modulation using Transistor Circuit	C405.2	2
3	Pulse Width Modulation using op-amp(ADTRON KIT)	C405.2	2
4	Pulse Width Modulation using single op-amp	C405.2	2
5	Pulse Position Modulation using op-amp (ADTRON KIT)	C405.2	2
6	Pulse Position Modulation using single op-amp	C405.2	2
7	Frequency Shift Keyed Modulation	C405.5	4
8	Pulse Code Modulation	C405.3	3
9	Time Division Multiplexing	C405.4	3
10	Time Division De-Multiplexing	C405.4	3
11	Pulse Code Demodulation	C405.3	3
12	Frequency Shift Keyed Demodulation	C405.6	4
13	ASK Modulation/ Demodulation (Anshuman CM6 Kit)	C405.6	4
14	Frequency Division Multiplexing(Anshuman CM6 and P19 Kits)	C405.4	4
15	Quadrature Amplitude Modulation(Anshuman CM6 Kit)	C405.5	4

IMPLEMENTATION STRATEGY

1. Practical Plan
2. Self-learning tutorials, assignments, Microprojects
3. Minimum 10 to 12 practical

The table to measure the attainment levels for TERM WORK (on a rating scale of “out of 25”) of the defined expected course outcomes is as shown in the format given below:

(Note:.....the table should progress to the right for Lab Experience 7, 8, 9,and so on.....)

LAB EXPERIENCE		1	2	3	4	5	6
	COURSE OUTCOMES	C302.2 (out of 25)	C302.2 (out of 25)	C302.2 (out of 25)	C302.3 (out of 25)	C302.3 (out of 25)	C302.3 (out of 25)
STUDENT SPN							
1303001							
1303002							
1303003							

* The final % attainment level for TERM WORK of each course outcome may then be computed and the overall % attainment level for the course, for term work may then be calculated.

SUGGESTED MICRO PROJECT / ASSIGNMENT/ ACTIVITIES FOR SPECIFIC LEARNING / SKILLS DEVELOPMENT (SELF LEARNING)

1. Applications of PWM: Brightness control in smart lighting systems, Speed control of motors.
2. Delta modulation based voice encoder-Decoder
3. Demonstration of applications of PSK in wireless LANs, RFID and Bluetooth communication.
4. Build and test simple FSK MODEM.
5. Demonstrate a simple BPSK modulator-Demodulator

SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Chapter No.	Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
Section I						
1	INFORMATION THEORY	10	04	05	05	14
2	PULSE COMMUNICATIONS	14	06	10	05	21
Section II						
4	CHANNEL MULTIPLEXING	10	04	05	05	14
5	BINARYMODULATION TECHNIQUES	14	06	10	05	21
Total		48	20	30	20	70

REFERENCES

Sr. No.	Author	Title	Edition	Year of Publication	Publisher & Address
1.	George Kennedy	Electronic Communication Systems	4 th	1999	Tata McGraw-Hill New Delhi.
2.	Roddy Coolen	Electronic Communication	3 rd	2000	Prentice Hall of India, New Delhi
3.	Taub Schilling	Principles of communication Systems	3 rd	1986	McGraw-Hill International, New York
4.	Robert J. Schoenbeck	Electronic Communications - Modulation and Transmission	2 nd Edition	1999	Prentice Hall of India
5.	K. Sam Shanmugam	Digital and Analog Communication Systems	1 st	2012	Wiley India

LEARNING WEBSITES / WEB REFERENCES :

- <https://www.allsyllabus.com/aj/note/ECE/Digital%20Communication/unit5/index.php#.WRFIBdKGPIU>
- <https://www.slideshare.net/lineking/digital-communication-system>
- <http://www.managementstudyguide.com/digital-communication-system.htm>
- <http://www.uotechnology.edu.iq/depeee/lectures/4th/Electrical/Communication%20engineering%202/pa rt1.pdf>

Program Title					Diploma in Electronics & Telecommunication Engineering												
Course Code			Course Title		CIRCUITS & NETWORKS								Course Type		Semester		
23403													DSC		4		
Learning Scheme						Assessment Scheme											
Actual Contact Hrs./Week			HTS	NLH	CREDITS	THEORY				PRACTICAL				SLA		Total	
CL	TL	LL				FA	SA	Total		FA		SA					
								Max	Min	Max	Min	Max	Min	Max	Min		
3	-----	2	1	6	3	30	70	100	40	25	10	50	20	25	10	200	
	1) Theory paper duration 3 hrs. 2) Theory paper assessment is Internal and External. 3) The assessment of Practical is Internal and External. 4) Formative Assessment (Theory)out of 30 marks is average of 2 periodical tests (PT). 5) The assessment of Self Learning (SLA) is Internal.																

RATIONALE:

This subject comes under the Basic Technology group and intended to teach students the concepts and methods of analysis of different types of Electronic Circuits and Networks, network theorems and their applications in electrical and electronic circuits. The prerequisite for this subject is knowledge of basic electronics which is taught in the preceding semesters. It is important to note that a good knowledge of mathematics is necessary for a better understanding of this subject due to the depth of coverage, and hence the practice of the contents covered in the mathematics subjects of the first three semesters is also essential.

COURSE OUTCOMES: --

Course theory content, practical skills, experience help student to understand power electronics circuits, terms & network methods, thus student should able to

Semester	4	Subject	CIRCUITS & NETWORKS
CO403	11th Course in Second Year		
CO 403.1	Analyze the importance of circuits and networks and its applications in Electronics engineering		
CO 403.2	Sketch phasors diagram and calculate power factor, Quality factor in AC circuits.		
CO 403.3	Interpret the concept of time constant in DC circuit..		
CO 403.4	Understand the resonance condition in electrical circuits		
CO 403.5	Calculate different parameters of two port Networks.		
CO 403.6	Design different types of passive filters		

Mapping of Course outcomes (COs) to Program outcomes (POs)

SEM IV	CIRCUITS & NETWORKS							
CO 403	(11 th Course in Second Year) PREPARED BY : SG							
CO 403.1	P01	P02	P03	P04	P05	P06	P07	
CO 403.2	3	3	3	2	2	1	2	
CO 403.3	3	3	2	1	2	1	2	
CO 403.4	3	3	3	2	1	2	2	
CO 403.5	3	3	3	2	1	1	2	
CO 403.6	3	3	3	2	1	1	2	
CO TOTAL	15	15	14	09	07	06	10	
CORRELATION LEVEL	3	3	2	2	1	1	2	

TABLE TO DECIDE CORRELATION LEVELS

CO SUM TOTAL	06	12	18
CORRELATION LEVEL	1	2	3

CO SUM TOTAL	0, 1, 2	3, 4, 5, 6, 7, 8	9, 10, 11, 12, 13, 14	15, 16, 17, 18
CORRELATION LEVEL	0	1	2	3

Subject Experts

Mrs. Surbhi G.

	Section -- 1						
Chapter No	Topics	Periods	Marks				COs
		Hrs.	R	U	A	Total	
1	SINGLE PHASE AC CIRCUITS						
	1.1 Series A.C. circuits: R-L, R-C and R-L-C circuits Voltage and current equations, waveforms, reactance, impedance, phasor diagram, active(Real) power, Apparent power, Reactive power, power factor 1.2 Numerical practice on above topics	06	02	6	02	10	CO 403.1 403.2
2	TRANSIENT BEHAVIOR AND INITIAL CONDITIONS						
	2.1 Initial conditions in basic Passive elements 2.2 Transient response of series R-L circuit for D.C. Excitation 2.2.1 Transient response of Driven series R-L circuit 2.2.2 Transient response of source free or Undriven series R-L circuit 2.3 Transient response of series R-C circuit for D.C. Excitation 2.3.1 Transient response of Driven series R-C circuit 2.3.2 Transient response of source free or Undriven series R-C circuit 2.4 Numerical practice on above topics	10	03	06	03	12	CO 403.3
3	RESONANT CIRCUITS						
	3.1 Resonant Circuits-Definition 3.2 Q factor-Definition, Expression 3.3 Series Resonance- derivation of resonance frequency 3.4 Reactance curves, Q factor of series resonant circuit, voltage across L and C under resonance 3.5 Bandwidth and selectivity of series resonant circuit 3.6 Numerical practice on above topics	08	04	06	03	13	CO 403.4

	Section -- 2						
Chapter No.	Topics	Periods	Marks				COs
		Hrs.	R	U	A	Total	
4	TWO PORT NETWORKS						
	4.1 Symmetrical Networks : 4.1.1 Characteristic impedance 4.1.2 Propagation Constant 4.2 Asymmetrical Networks 4.2.1 Image impedences 4.2.2 Iterative impedences 4.2.3 Image transfer constant 4.3 T and Pi network-Characteristics impedance and propagation constant formulas (no derivation) 4.4 Voltage dividers-Definition 4.5 Attenuators- Definition, Design of T and Pi attenuator(only resistive) 4.6 Numerical practice on above topics	12	04	08	03	15	CO 403.5
5	PASSIVE FILTERS (LC filters)						
	Design of 6.1 Constant 'K' Filters – Low pass, High pass, Band pass & Band stop filter 6.2 M-derived filters- Low pass, High pass filter 6.3 Comparison between Prototype and m-derived filters 6.4 Block Diagram of Composite Filter.	12	04	08	08	20	CO 403.6

IMPLEMENTATION STRATEGY:

- 1) Lecture Plan
- 2) Use of PowerPoint presentations and Videos
- 3) References from the internet **(for teachers as well as students)**
- 4) Extensive use of examples
- 5) Group discussions and micro project
- 6) Assignments for writing skills, create awareness about selection /purchasing components

LIST OF LABORATORY EXPERIENCES

EXP. NO.	TITLE	COURSE OUTCOME	CHAPT. NO.
1	Variation of inductive reactance with frequency	C403.1	1
2	Variation of capacitive reactance with frequency	C403.1	1
3	Determine initial and final voltage across the inductor at $t=0^-$ and $t=0^+$	C403.3	2
4	Determine initial and final voltage across the capacitor at $t=0^-$ and $t=0^+$	C403.3	2
5	Determine Active, Reactive and Apparent power consumed in given R-L series circuit and draw phasor diagram	C403.2	1
6	Determine Active, Reactive and Apparent power consumed in given R-C series circuit and draw phasor diagram	C403.2	1
7	Determine Active Reactive and Apparent power consumed in given R-L-C series circuit and draw phasor diagram	C403.2	1
8	Create resonance in given R-L-C circuit by varying L and C or by using variable frequency supply.	C403.4	3
9	Design a constant k low pass filter	C403.6	5
10	Design a constant k high pass filter	C403.6	5

Fault finding practicals are demo experiments which is an extra skill imparted in the laboratory and not covered in theory.

IMPLEMENTATION STRATEGY

1. Practical Plan
2. Self-learning tutorials, assignments, Microprojects
3. Minimum 10 to 12 practical

The table to measure the attainment levels for TERM WORK (on a rating scale of "out of 25") of the defined expected course outcomes is as shown in the format given below:

(Note:.....the table should progress to the right for Lab Experience 7, 8, 9,and so on.....)

LAB EXPERIENCE		1	2	3	4	5	6
	COURSE OUTCOMES	C302.2 (out of 25)	C302.2 (out of 25)	C302.2 (out of 25)	C302.3 (out of 25)	C302.3 (out of 25)	C302.3 (out of 25)
STUDENT SPN							
1303001							
1303002							
1303003							

* The final % attainment level for TERM WORK of each course outcome may then be computed and the overall % attainment level for the course, for term work may then be calculated.

SUGGESTED MICRO PROJECT / ASSIGNMENT/ ACTIVITIES FOR SPECIFIC LEARNING / SKILLS DEVELOPMENT (SELF LEARNING)

Micro project could be group based. A suggestive list is given here, similar micro projects could be added by concerned faculty. Each student will maintain dated work diary with details of individual contribution. Assessment is done by project guide based on their performance and presentation of submission.

SR. NO.	TITLE
1	Single Phase A.C. series and parallel Circuits: Prepare series circuit using variable R, L and C combination on the bread board. Measure the response and draw vector diagram. Also calculate power factor for the circuit. Write report on the
2	Resonance in series Circuits: Prepare series RLC circuit using variable R, L and C combination on the bread board. Tune the circuit for resonance condition. Measure the responses and calculate band width and Q-factor for the circuit. Write report on the same.

SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Chapter No.	Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
	Section I					
1	SINGLE PHASE AC CIRCUITS	06	02	06	02	10
2	TRANSIENT BEHAVIOR AND INITIAL CONDITIONS	10	03	06	03	12
3	RESONANT CIRCUITS	08	04	06	03	13
	Section II					
4	TWO PORT NETWORKS	12	04	08	03	15
5	PASSIVE FILTERS	12	04	08	08	20
	Total	48	17	34	19	70
	Legends :: R ::- Remember , U ::- Understand , A ::-Application					
This specification table provide guide line to teacher to teach & assess student also a general guideline to frame theory paper & practical theory exam paper which student have to undertake. The actual distribution of marks at different taxonomy level in the question paper may vary from above table.						

REFERENCES

Sr. No.	Author	Title	Edition	Year of Publication	Publisher & Address
1.	Mittle V.N.	Basic electrical engineering	4th	2005	McGraw Hill, New Delhi.
2.	Sudhakar A	Circuit and networks	4th	2006	McGraw Hill, New Delhi
3.	Gupta B. R.	Fundamental of Electrical networks	2nd	2005	S.Chand & Company New Delhi

LEARNING WEBSITES / WEB REFERENCES :

- <https://www.griet.ac.in/nodes/BEEE.pdf>
- <https://sctevtodisha.nic.in/wp-content/plugins/LectureNote>
- <https://www.youtube.com/electirc circuits>

Program Title					Diploma in Electronics & Telecommunication Engineering												
Course Code		Course Title		POWER ELECTRONICS										Course Type		Semester	
23404														DSC		4	
Learning Scheme						Assessment Scheme											
Actual Contact Hrs./Week			SLH	NLH	CREDITS	THEORY				PRACTICAL				SLA		Total	
CL	TL	LL				FA	SA	Total		FA		SA					
								Max	Min	Max	Min	Max	Min	Max	Min		
3	-----	2	1	6	3	30	70	100	40	25	10	50	20	25	10	200	
1) Theory paper duration 3 hrs. 2) Theory paper assessment is Internal and External. 3) The assessment of Practical is Internal and External. 4) Formative Assessment (Theory) out of 30 marks is average of 2 periodical tests (PT). 5) The assessment of Self Learning is Internal.																	

RATIONALE:

This subject comes under the Core Technology group and will enable the students to comprehend the theory, concepts, characteristics and working principles of basic electronic communication techniques and their applications in communication circuits. Concepts such as modulation, side band transmission, radiation and propagation, reception and demodulation which are widely used in the field of analog communication are dealt with in this subject. Knowledge of basic electronic devices and circuits is a prerequisite for the learning of this subject..

COURSE OUTCOMES:: --

Course theory content, practical skills, experience help student to understand basics of power electronics terms & devices & their applications thus student should able to

Semester	IV	Subject	POWER ELECTRONICS
12 th Course in Second Year			
C404.1	Illustrate the turn on & turn off mechanism of SCR		
C404.2	Demonstrate the need, function and operation of Inverter		
C404.3	Select appropriate Chopper for DC control drives		
C404.4	Compare the principles of AC, DC & Microprocessor, MC based drive		
C404.5	Enumerate the operation of Power electronics applications		

Mapping of Course outcomes (COs) to Program outcomes (POs)

SEM IV	POWER ELECTRONICS							
CO 404	(12 th Course in Second Year) PREPARED BY : VR							
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	
C404.1	2	3	3		1	1	3	
C404.2	2	3	3			2	1	
C404.3	3	3	3			2	1	
C404.4	3	3	3	3	3	2	2	
C404.5	3	3	3			2	2	
Total	13	15	15	03	03	09	09	
CORRELATION LEVEL	3	3	3	1	1	2	2	

TABLE TO DECIDE CORRELATION LEVELS

CO SUM TOTAL	06	12	18
CORRELATION LEVEL	1	2	3

CO SUM TOTAL	0, 1, 2	3, 4, 5, 6, 7, 8	9, 10, 11, 12, 13, 14	15, 16, 17, 18
CORRELATION LEVEL	0	1	2	3

Subject Expert

Dr. Vijay R Rathod

	Section -- 1						
Chapter No	Topics	Periods	Marks				COs
		Hrs.	R	U	A	Total	
1	SCR TURN ON/OFF TECHNIQUES						
	1.1 Introduction 1.2 Basic construction, Principle, operation and characteristics of SCR 1.3 Turn on method of SCR 1.4 Dynamic Turn on switching characteristics 1.5 Turn off mechanism 1.6 Turn off methods (commutations) 1.7 Types of commutation Natural and Forced	08	03	04	02	09	CO 404.1
2	INVERTERS						
	2.1 Introduction 2.2 Working Principle of Inverters 2.3 SCR Inverters Classification a) Method of Commutation b) According to Connections 2.4 Series Inverter 2.5 Parallel Inverter 2.6 Bridge Inverters 2.6.1 Half bridge 2.6.2 Full bridge	09	04	05	04	13	CO 404.2
3	DC CHOPPERS						
	3.1 Introduction 3.2 Methods available for obtaining D.C. voltage from a Fixed DC Voltage. 3.3 Basic Chopper Classification (operation, Diagrams , No numerical) 3.3.1 Step Up 3.3.2 Step Down 3.3.3 Step Up- Down	09	03	06	04	13	CO 404.3

	Section -- 2						
Chapter No	Topics	Periods	Marks				COs
		Hrs.	R	U	A	Total	
4	SOLID STATE CONTROL OF D.C. & A.C. CONTROL DRIVES						
	4.1 Block schematic of DC Control Drive. 4.2 Block schematic of AC Control Drive. 4.3 Block schematic of microprocessor & microcontroller-based Control Drives 4.4 Advantages, Disadvantages and Applications of Motor drives	12	05	09	04	18	CO 404.4
5	POWER ELECTRONICS APPLICATIONS						
	5.1 LDR Application in a light activated turn off circuit 5.2 Illumination control using SCR 5.3 Applications of SCR and DIAC 5.3 Applications of SCR and TRIAC 5.3 UPS online and offline load	10	04	09	04	17	CO 404.5

IMPLEMENTATION STRATEGY:

- 1) Lecture Plan
- 2) Use of PowerPoint presentations and Videos
- 3) References from the internet **(for teachers as well as students)**
- 4) Extensive use of examples
- 5) Group discussions and micro project
- 6) Assignments for writing skills, create awareness about selection /purchasing components

LIST OF LABORATORY EXPERIENCES

Exp. No.	Title	CO Mapping
1.	SCR Characteristics	CO 404.1
2.	Turn on method of SCR (practical - 1)	CO 404.1
3.	Turn on method of SCR (practical - 2)	CO 404.1
4.	Commutation of SCR (part-1)	CO 404.1
5.	Commutation of SCR (part-2)	CO 404.1
6.	dv /dt limitation of SCR	CO 404.1
7.	SCR circuit breaker	CO 404.1
8.	Series Inverter	CO 404.2
9.	Parallel Inverter	CO 404.2
10.	Chopper circuits	CO 404.3
11.	SCR triggering by Micro controller (Micro controller based firing angle control)	CO 404.4

Fault finding practicals are demo experiments which is an extra skill imparted in the laboratory and not covered in theory.

IMPLEMENTATION STRATEGY

1. Practical Plan
2. Assignments
3. Microprojects
4. Minimum 10 to 12 practicals

The table to measure the attainment levels for TERM WORK (on a rating scale of “out of 25”) of the defined expected course outcomes is as shown in the format given below:

(Note:.....the table should progress to the right for Lab Experience 7, 8, 9,and so on.....)

* The final % attainment level for TERM WORK of each course outcome may then be computed and the overall % attainment level for the course, for term work may then be calculated.

LAB EXPERIENCE		1	2	3	4	5	6
	COURSE OUTCOMES	C (out of 25)	C (out of 25)	C (out of 25)	C (out of 25)	C (out of 25)	C (out of 25)
STUDENT SPNO							
1303001							
1303002							
1303003							

* The final % attainment level for TERM WORK of each course outcome may then be computed and the overall % attainment level for the course, for term work may then be calculated.

SUGGESTED MICRO PROJECT / ASSIGNMENT/ ACTIVITIES FOR SPECIFIC LEARNING / SKILLS DEVELOPMENT (SELF LEARNING)

Micro project could be group based. A suggestive list is given here, similar micro projects could be added by concerned faculty. Each student will maintain dated work diary with details of individual contribution. Assessment is done by project guide based on their performance and presentation of submission.

- RC time delay circuit employing Diac & SCR fan temperature control
- Fan Regulator using SCR & Triac
- SCR & Diac for Motor Control
- LDR for Traffic Controller
- UPS

SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Chapter no.	Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
Section I						
1	INTRODUCTION TO SCR	08	03	04	02	09
2	INVERTERS	09	04	05	04	13
3	CHOPPERS	09	03	06	04	13
Section II						
4	SOLID STATE CONTROL OF D.C.&A.C. CONTROL DRIVES	12	05	09	04	18
5	POWERELECTRONICS APPLICATIONS	10	04	09	04	17
Total		48	20	30	20	70

REFERENCES

S. No.	Author	Title	Edition	Year of Publication	Publisher & Address
1.	S K Bhattacharaya	Industrial Electronics& control		2000	Tata Mcgraw Hill
3.	P.C. Sen	Power Electronics	1st	1987	Tata Mcgraw Hill
4.	M. D Singh & K B Khanchandani	Power Electronics	1st	2007	Tata Mcgraw Hill
5	M.H .Rashid	Power Electronics	1st	2000	Tata Mcgraw Hill

E-REFERENCES

www.nptel.ac.in/courses/108101038

www.ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-334-power-electronics-spring-2007

www.nptelvideos.in/2012/11/power-electronics.html

www.coursera.org/learn/power-electronics

www.powerguru.org/power-electronics-videos/

Program Title					Diploma in Electronics & Telecommunication Engineering											
Course Code		Course Title			INTERNET OF THINGS – IOT [Program Elective]								Course Type		Semester	
23405													DSC		4	
Learning Scheme					Assessment Scheme											
ActualContact Hrs./Week			SLH	NLN	CREDITS	THEORY				PRACTICAL				SLA		Total
CL	TL	LL				FA	SA	Total		FA		SA				
								Max	Min	Max	Min	Max	Min	Max	Min	
1	-----	2	1	4	2	----	----	----	----	25	10	50	20	50	20	125
	1) The assessment of Practical is Internal and External. 2) The assessment of Self Learning is Internal.															

RATIONALE:

The Internet of Things is a new Eco-system of actual items that are, associated, connected and open through the web in all real time. This course will enable students to understand the basics building blocks of Internet of things and its related architecture and protocols. It will introduces them and aware them about areas where Internet of Things can be applied.

Students will learn about the hardware for Internet of Things. On completion of the course, student will be able to Understand the various concepts, terminologies and architecture of IoT systems. Use sensors and actuators for design of IoT. Apply various protocols for design of IoT systems Use various techniques of data storage and analytics in IoT . Understand various applications of IoT

COURSE OUTCOMES:: --

Course theory content, practical skills, experience help student to understand basics of electronic sensors & devices & their applications with advance technology of Internet thus student should able to

Semester	IV	Subject	INTERNET OF THINGS – IOT
		13 th Subject in Second Year	
C405.1		Understand the concepts of Internet of Things	
C405.2		Interpret the architecture of Internet of Things (IoT)	
C405.3		Identify roles of the processors, sensors and other devices in different IoT solutions	
C405.4		Learn different protocols used for IoT	
C405.5		To be familiar with data handling and analytics tools in IoT	
C405.6		Develop various applications to understand the role of IoT in various domains	

Mapping of Course outcomes (COs) to Program outcomes (POs)

SEM IV	INTERNET OF THINGS – IOT							
CO 405	(13 th Subject in Second Year) PREPARED BY : RVG, AG							
	P01	P02	P03	P04	P05	P06	P07	
C405.1	2	3	3		1	1	3	
C405.2	2	3	3			2	1	
C405.3	3	3	3			2	1	
C405.4	3	3	3	3	3	2	2	
C405.5	3	3	3			2	2	
C405.6	2	3	3	2	2	2	2	
Total	15	18	18	05	06	11	11	
CORRELATION LEVEL	3	3	3	1	1	2	2	

TABLE TO DECIDE CORRELATION LEVELS

CO SUM TOTAL	06	12	18
CORRELATION LEVEL	1	2	3

CO SUM TOTAL	0, 1, 2	3, 4, 5, 6, 7, 8	9, 10, 11, 12, 13, 14	15, 16, 17, 18
CORRELATION LEVEL	0	1	2	3

Subject Expert

Mr. R. V. Gheware
Mr. Anil Gurav

Chapter No.	Topics	Periods	Marks				Cos
		Hrs.	R	U	A	Total	
1.	IOT ARCHITECTURE						
	- The architecture of IOT – its functionality and implementation in different sectors. - An IOT Architecture elements such as sensors, actuators, protocols, cloud services, and layers.	3	-----	-----	-----	-----	C405.1 C405.2
2.	IOT PROCESSORS & PROGRAMMING BASICS						
	- Overview of processors such as Arduino UNO, Node MCU, ESP 8266 , - Board description, Pin configuration and architecture, Device and platform features - Concept of digital and analog ports - Programming Basics of Arduino data types, Variables and constants, Operators, Control Statements, Loops, Arrays, Pointer, String, functions, Pins Configured as INPUT, Pull-up Resistors, Pins Configured as OUTPUT, pinMode(), digitalWrite() analog Read() time delay() function	4	-----	-----	-----	-----	C405.2 C405.4
3	SENSORS & COMMUNICATION PROTOCOL						
	- Arduino with Humidity Sensor, Temperature Sensor, Water Detector / Sensor, PIR Sensor, Ultrasonic Sensor, Connecting Switch - Interfacing the keypad, Interfacing Servo motors to Arduino, Interfacing a RF Module. - Using serial input, Controlling LEDs with keys, toggle switch, interfacing a buzzer as an alarm unit, DC motor control - IoT Protocols: HTTP-REST, MQTT, LoRa, NB-IoT(features, communication, applications) - Communication Protocols: IEEE802.11: Wi-Fi (features, applications), configure Wi-Fi on NodeMCU, Wi-Fi libraries, code for connecting to Wi-Fi networks ,IEEE 802.15.4, ZigBee, Z Wave. - Introduction to IoT cloud platforms: AWS IoT, ThingSpeak, Google Cloud IoT, Microsoft Azure IoT. (features & uses)	5	-----	-----	-----	-----	C405.2 C405.3 C405.4 C405.5
4	IOT APPLICATIONS						
	- Smart Home Automation - IOT Applications for industry - Smart City - Smart Self Driving car, - IOT in Farming, Agricultural System - Smart Fitness & Trackers, - IOT Hospitality and Tourism, - Retail IOT Smart warehousing. Etc.	4	-----	-----	-----	-----	C405.2 C405.4 C405.5 C405.6

Suggested List of Components :-:-

- Arduino Uno, Node MCU, ESP 32, Raspberry Pi
- Sensors & Actuators - Bluetooth module(HC05), MQ135, Temperature DHT11, Humidity DHT 22, Pressure BMP280, Accelerometer MPU6050, Gyroscopes, PIR sensors, Heart rate sensor, Finger print sensor, Servo Motor MG90, PIR sensor, Ultrasonic sensor, Touch sensor
- Consumables : LED, button, connecting wires, LDR, LM35, battery, Breadboard LCD, 2-relay module etc.
- HC05 Bluetooth module

LIST OF LABORATORY EXPERIENCES

EX P. NO.	TITLE	COURSE OUTCOME MAPPING	CHAPTER No
1	Understanding Arduino UNO Board and Components	C405.1	1
2	Installing and work with Arduino IDE	C405.2	2
3	Blinking LED sketch with Arduino	C405.2	2
4	Simulation of 4-Way Traffic Light with Arduino	C405.2	2
5	Using Pulse Width Modulation	C405.2	2
6	Digital Read Serial Sketch Working with DHT/IR/Gas or Any other Sensor	C405.2 ,C405.6	3
7	Interfacing of IoT processor with Environmental sensors	C405.2 ,C405.6	4
8	Interfacing of IoT processor with Motion / Position Sensors	C405.2 ,C405.6	4
9	Spinning a DC Motor and Motor Speed Control Sketch	C405.2 ,C405.3	3
10	Interfacing of IoT processor with Biometric Sensors	C405.2 ,C405.6	4
11	Working with Adafruit Libraries in Arduino	C405.5	3
12	Understanding ESP 32 / Node MCU function & operation details	C405.2 ,C405.3	2
13	Controlling speed of Servo Motor .	C405.4, C405.5	3
14	Interfacing Arduino with Cloud (Thing speak API)	C405.3	3
15	Installing Linux in Raspberry pi	C405.2 C405.3	2
16	Installing Python in Raspberry pi, interfacing sensors to it.	C405.2 C405.3C405.6	2
17	Practical / Experiments suggested by subject teacher	C405.2 C405.3C405.6	
18	Practical /Experiments suggested by subject teacher	C405.2 C405.3C405.6	

IMPLEMENTATION STRATEGY

1. Practical Plan
2. Self-learning tutorials, assignments, Microprojects
3. Minimum 10 to 12 practical

The table to measure the attainment levels for TERM WORK (on a rating scale of “out of 25”) of the defined expected course outcomes is as shown in the format given below:

(Note:.....the table should progress to the right for Lab Experience 7, 8, 9,and so on.....)

LAB EXPERIENCE		1	2	3	4	5	6
	COURSE OUTCOMES	C302.2 (out of 25)	C302.2 (out of 25)	C302.2 (out of 25)	C302.3 (out of 25)	C302.3 (out of 25)	C302.3 (out of 25)
STUDENT SPN							
1303001							
1303002							
1303003							

* The final % attainment level for TERM WORK of each course outcome may then be computed and the overall % attainment level for the course, for term work may then be calculated.

SUGGESTED LIST OF Self Learning / MICROPROJECTS

Micro project could be group based. A suggestive list is given here, similar micro projects could be added by concerned faculty. Each student will maintain dated work diary with details of individual contribution. Assessment is done by project guide / subject teacher based on their performance and presentation of submission.

Above is just a suggestive list of microprojects / assignments; faculty must prepare their own bank of microprojects, assignments, and activities in a similar way. The faculty must allocate mix of tasks, considering the weaknesses and / strengths of the student in acquiring the desired skills.

- Design & develop IoT application for Smart Home
- Design & develop IoT application for Home Automation
- Design & develop IoT application for Agriculture
- Design & develop application for Industrial IoT
- Design & develop IoT application for Healthcare...etc

Assignments, workshop online workshops, microproject can be consider for Self-Learning activity any five activity to be perform by students for SLA

REFERENCES

Sr. No.	Author	Title	Edition	Year of Publication	Publisher
1.	Samuel Greengard	The Internet of Things	4th	1999	Tata McGraw-Hill New Delhi.
2.	Cuno Pfister	Getting started with Internet of Things	3rd	2000	Prentice Hall of India, New Delhi
3.	Peter Waher	Learning Internet of Things	3rd	1986	McGraw-Hill International, New York
4.	Rahul Dubey	An Introduction to Internet of Things	1st	2002	Cengage India Private Limited

LEARNING WEBSITES / WEB REFERENCES

- <http://www.spoken-tutorial.org>
- <http://swayam.gov.in>
- https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01329474210427699229893_shared/overview
- <https://nptel.ac.in/courses/108108147>
- <https://www.allsyllabus.com/notes/ECE/IOT>
- <https://www.slideshare.net/lineking/IOT>

Program Title					Diploma in Electronics & Telecommunication Engineering											
Course Code		Course Title		REPAIR AND MAINTENANCE OF CONSUMER ELECTRONIC APPLIANCES [Program Elective]								Course Type		Semester		
23409												DSC		4		
Learning Scheme					Assessment Scheme											
ActualContact Hrs./Week			SLH	NLH	CREDITS	THEORY				PRACTICAL				SLA		Total
CL	TL	LL				FA	SA	Total		FA		SA				
								Max	Min	Max	Min	Max	Min	Max	Min	
1	-----	2	1	4	2	----	----	----	----	25	10	50	20	50	20	125
	3) The assessment of Practical is Internal and External. 4) The assessment of Self Learning is Internal.															

RATIONALE:

To give knowledge and competencies in Installation, Servicing, Repair, Fault Diagnosis and Error Removal for home appliances.

COURSE OUTCOMES:: --

Course theory content, practical skills, experience help student to understand basics of electronic sensors & devices & their applications with advance technology of Internet thus student should able to

Semester	IV	Subject	REPAIR AND MAINTENANCE OF CONSUMER ELECTRONIC APPLIANCES
		17 th Subject in Second Year	
C409.1		Home appliance equipment operating Skills by accessing all features and applications of the equipment.	
C409.2		Equipment fault diagnostics, interpret test results to identify and localize faults and repairing skills through appropriate mechanisms and tools to rectify the faults.	
C409.3		Component handling skills with proper safety measures to assemble/dismantle the equipment and safe removal/replacement of components using right tools.	
C409.4		Identifying correct software version/modules and ascertain correct and complete porting/update of software for home appliances.	
C409.5		Troubleshooting Skills through proper approach towards identifying a defect, make use of standard troubleshooting steps and rectify the faults.	

Mapping of Course outcomes (COs) to Program outcomes (POs)

SEM IV	REPAIR AND MAINTENANCE OF CONSUMER ELECTRONIC APPLIANCES							
CO 409	(17th Subject in Second Year) PREPARED BY : JN							
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	
C409.1	2	3	3		1	1	3	
C409.2	2	3	3			2	1	
C409.3	3	3	3			2	1	
C409.4	3	3	3	3	3	2	2	
C409.5	3	3	3			2	2	
Total	13	15	15	03	03	09	09	
CORRELATION LEVEL	3	3	3	1	1	2	2	

TABLE TO DECIDE CORRELATION LEVELS

CO SUM TOTAL	06	12	18
CORRELATION LEVEL	1	2	3

CO SUM TOTAL	0, 1, 2	3, 4, 5, 6, 7, 8	9, 10, 11, 12, 13, 14	15, 16, 17, 18
CORRELATION LEVEL	0	1	2	3

Subject Expert

Dr. Janani Natarajan

Chapter No.	Topics	Periods	Marks				Cos
		Hrs.	R	U	A	Total	
1.	OVERVIEW OF HOME AUTOMATION CONCEPTS AND TECHNOLOGIES • Benefits and applications of home automation systems. Safety precautions when working with electronic systems. • Fundamentals of electricity and circuits. • Understanding voltage, current, and resistance. Reading and interpreting electrical diagrams and schematics	3	-----	-----	-----	-----	C409.1
2.	OVERVIEW OF COMMON HOME AUTOMATION COMPONENTS • Sensors, actuators, controllers • Understanding communication protocols (e.g., Wi-Fi, Bluetooth, Zigbee) • Identifying and troubleshooting common issues with components • Proper installation techniques for home automation systems • Connecting and configuring sensors, actuators, and controllers , Pairing devices and setting up communication protocols	4	-----	-----	-----	-----	C409.2 C409.4
3	DIAGNOSING COMMON ISSUES WITH HOME AUTOMATION SYSTEMS • Using multimeters and other testing equipment for troubleshooting • Identifying faulty components and wiring problems • Repairing or replacing faulty sensors, actuators, or controllers Soldering techniques for electronic connections - Firmware updates and reprogramming of devices	5	-----	-----	-----	-----	C409.2 C409.3
4	CONNECTING HOME AUTOMATION SYSTEMS TO SMART HOME PLATFORMS • Setting up automation routines and voice control. (E.G., AMAZON ALEXA, GOOGLE HOME) Troubleshooting integration issues and compatibility conflicts • Regular maintenance tasks for home automation systems • Cleaning and dusting components - Upgrading firmware and software to the latest versions • Understanding security risks and vulnerabilities in home automation systems	4	-----	-----	-----	-----	C409.5

LIST OF LABORATORY EXPERIENCES

EX P. NO.	TITLE	COURSE OUTCOME MAPPING
1	Install and configure various home automation components such as sensors, actuators, and controllers.	C409.2 C409.3 C409.4
2	Use multimeters and testing equipment to diagnose and troubleshoot problems.	C409.2 C409.3 C409.4 C409.5
3	Identify faulty components, faulty components or wiring issues in a home automation system.	C409.2 C409.3 C409.4 C409.5
4	Update firmware and software of home automation devices.	C409.2 C409.3 C409.4
5	Configure devices to connect to a central hub or smart home platform & test device integration and communication within the home automation network.	C409.2 C409.3 C409.4
6	Connect a home automation system to a smart home platform (e.g., Amazon Alexa, Google Home).	C409.5
7	Set up automation routines and voice control for various devices.	C409.2 C409.3 C409.4
8	Implement security measures, such as encryption protocols and user authentication.	C409.2 C409.3 C409.4
9	Analyse real-world scenarios and challenges in the installation, repair, and maintenance of home automation systems	C409.2 C409.3 C409.4
10	Implement security measures, such as encryption protocols and user authentication.	C409.2 C409.3 C409.4

IMPLEMENTATION STRATEGY

1. Practical Plan
2. Self-learning tutorials, assignments, Microprojects
3. Minimum 10 to 12 practical

The table to measure the attainment levels for TERM WORK (on a rating scale of “out of 25”) of the defined expected course outcomes is as shown in the format given below:

(Note:.....the table should progress to the right for Lab Experience 7, 8, 9,and so on.....)

LAB EXPERIENCE		1	2	3	4	5	6
	COURSE OUTCOMES	C302.2 (out of 25)	C302.2 (out of 25)	C302.2 (out of 25)	C302.3 (out of 25)	C302.3 (out of 25)	C302.3 (out of 25)
STUDENT SPN							
1303001							
1303002							
1303003							

* The final % attainment level for TERM WORK of each course outcome may then be computed and the overall % attainment level for the course, for term work may then be calculated.

SUGGESTED LIST OF Self Learning /MICROPROJECTS

Micro project could be group based. A suggestive list is given here, similar micro projects could be added by concerned faculty. Each student will maintain dated work diary with details of individual contribution. Assessment is done by project guide / subject teacher based on their performance and presentation of submission.

- Design & develop application for Smart Home
- Diagnosis Application for Home Automation
- Case study in application for Industry automation
- Visit Automation sites & prepare report

Assignments, workshop, online workshops can be consider as a Self-Learning activity any Three activities to be perform by students for SLA

REFERENCES

Sr. No.	Author	Title	Edition	Year of Publication	Publisher
1.	R Morrison	Practical Electronics - A Self-Teaching Guide: 178 (Wiley Self-Teaching Guides)	2 nd	1999	R Morrison John Wiley & Sons Inc
2.	Newton C Braga	Electronics for the Electrician	3 rd	2000	S.Chand (G/L) & Company Ltd

LEARNING WEBSITES / WEB REFERENCES: _

- <https://www.electronicrepairguide.com>
- <https://www.ambitautomation.in/courses/home-automation-training/>

Program Title					Diploma in Electronics & Telecommunication Engineering											
Course Code		Course Title		WEB DESIGNING [Open Elective & MOOC]								Course Type		Semester		
23406												DSC		4		
Learning Scheme					Assessment Scheme											
ActualContact Hrs./Week			SLH	NLH	CREDITS	THEORY				PRACTICAL				SLA		Total
CL	TL	LL				FA	SA	Total		FA		SA				
								Max	Min	Max	Min	Max	Min	Max	Min	
-----	-----	----	--	2	1	----	----	----	----	----	----	----	----	25	10	25
1) The assessment of Practical is Internal and External. 2) The assessment of Self Learning is Internal.																

COURSE OUTCOMES :: --

The aim of this course is to help the student to attain the following industry identified competency through various teaching learning experiences

Semester	IV	Subject	WEB DESIGNING Open Elective & MOOC
		14 th Subject in Second Year	
C406.1		Use LAMP Stack for web applications	
C406.2		Use Tomcat Server for Servlets and JSPs	
C406.3		Write simple applications with Technologies like HTML, Java script , PHP	
C406.4		Connect to Database and get results	
C406.5		To develop/build a functional website with full features.	

Mapping of Course outcomes (COs) to Program outcomes (POs)

SEM IV	WEB DESIGNING Open Elective & MOOC							
CO 406	14 th Subject in Second Year PREPARED BY: VR							
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	
C406.1	3	2	1		2			
C406.2	3	2	2	2	2	3	2	
C406.3	3	2	2	3	2	2	2	
C406.4	3	2	2	2	2	2	3	
C406.5	3	3	2	2	3	2	3	
Total	15	11	9	9	11	9	10	
CORRELATION LEVEL	3	2	2	2	2	2	2	

TABLE TO DECIDE CORRELATION LEVELS

CO SUM TOTAL	06	12	18
CORRELATION LEVEL	1	2	3

CO SUM TOTAL	0, 1, 2	3, 4, 5, 6, 7, 8	9, 10, 11, 12, 13, 14	15, 16, 17, 18
CORRELATION LEVEL	0	1	2	3

Subject Expert

Dr. V.R.Rathod

LIST OF LABORATORY EXPERIENCES

EXP. NO.	TITLE	COURSE OUTCOME MAPPING
1	Coding Server Client Programs	C406.1
2	Developing Web Application using HTML JavaScript	C406.2 C406.3
3	Developing Advanced Web Application Programs using CSS -1	C406.2 C406.3
4	Developing Advanced Web Application Programs using CSS -2	C406.2 C406.3
5	Practicing PHP : Basics	C406.3
6	Practicing PHP : Web Application Development – Example -1	C406.3
7	Practicing PHP : Web Application Development- Example - 2	C406.3
8	Practicing PHP: MySql - tiered Applications	C406.3
9	Case study - fully functional Web Service Application using all the technologies learned	C406.4 C406.5
10	Developing a fully functional Web Service Application using all the technologies learned -1	C406.5
11	Developing a fully functional Web Service Application using all the technologies learned -2	C406.5
12	Developing a fully functional Web Service Application using all the technologies learned -3	C406.5
13	Developing a fully functional Web Service Application using all the technologies learned -4	C406.5

IMPLEMENTATION STRATEGY

1. Practical plan
2. Minimum 10 to 12 practicals

The table to measure the attainment levels for TERM WORK (on a rating scale of “out of 25”) of the defined expected course outcomes is as shown in the format given below:

(Note:.....the table should progress to the right for Lab Experience 7, 8, 9,and so on.....)

*** The final % attainment level for TERM WORK of each course outcome may then be computed and the overall % attainment level for the course, for term work may then be calculated.**

LAB EXPERIENCE		1	2	3	4	5	6
STUDENT SPNO	COURSE OUTCOMES	CO	CO	CO	CO	CO	CO
		(out of 25)	(out of 25)	(out of 25)	(out of 25)	(out of 25)	(out of 25)
1303001							
1303002							
1303003							
1303004							
1303005							
1303006							

SUGGESTED ASSIGNMENT/ ACTIVITIES FOR SPECIFIC LEARNING / SKILLS DEVELOPMENT under MOOC

Micro project / Online course will be subjected by concerned faculty under MOOC activity . Each student will complete at least three different courses with the help of Spring Board / NPTL / Swayam portal ,which will be considered under mooc activity based on which FA -PR will be given to them.

REFERENCES

Sr. No.	Author	Title	Edition	Year of Publication	Publisher & Address
1.	Jeffrey C.Jackson	Web Technologies-- A Computer Science Perspective	2 nd	2000	Prentice Hall of India, New Delhi
2.	Deitel, Goldberg	Internet & World Wide Web How To Program	1 st	2001	Pearson Education
3.	Chris Bales	Web programming-- Building Internet Application	1 st	2003	Pearson Education

LEARNING WEBSITES / WEB REFERENCES

- <http://www.spoken-tutorial.org>
- <http://swayam.gov.in>
- <https://kanchiuniv.ac.in>

Program Title					Diploma in Electronics & Telecommunication Engineering												
Course Code			Course Title		RENEWABLE ENERGY TECHNOLOGIES [Open Elective & MOOC]								Course Type		Semester		
23410													DSC		4		
Learning Scheme						Assessment Scheme											
Actual Contact Hrs./Week			SLH	NLH	CREDITS	THEORY				PRACTICAL				SLA		Total	
CL	TL	LL				FA	SA	Total		FA		SA					
								Max	Min	Max	Min	Max	Min	Max	Min		
-----	-----	02	--	2	1	----	----	----	----	25	10	----	----	----	----	25	
3) The assessment of Practical is Internal and External. 4) The assessment of Self Learning is Internal.																	

RATIONALE:

This subject is classified under the Open elective group and intended to teach the students learn basics, concepts, principles of new technologies of other core branches & their importance, relevance with core knowledge.

COURSE OUTCOMES :: --

The aim of this course is to help the student to attain the following industry identified competency through various teaching learning experiences

Semester	IV	Subject	RENEWABLE ENERGY TECHNOLOGIES Open Elective & MOOC
		18 th Subject in Second Year	
	C410.1	Understand present and future energy scenario of the world.	
	C410.2	Understand various methods of solar energy harvesting.	
	C410.3	Identify various wind energy systems.	
	C410.4	Evaluate appropriate methods for Bio energy generations from various Bio wastes.	
	C410.5	Identify suitable energy sources for a location.	

Mapping of Course outcomes (COs) to Program outcomes (POs)

SEM IV	RENEWABLE ENERGY TECHNOLOGIES							
	Open Elective & MOOC							
CO 410	18 th Subject in Second Year PREPARED BY: VR							
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	
C410.1	3	2	1		2			
C410.2	3	2	2	2	2	3	2	
C410.3	3	2	2	3	2	2	2	
C410.4	3	2	2	2	2	2	3	
C410.5	3	3	2	2	3	2	3	
Total	15	11	9	9	11	9	10	
CORRELATION LEVEL	3	2	2	2	2	2	2	

TABLE TO DECIDE CORRELATION LEVELS

CO SUM TOTAL	06	12	18
CORRELATION LEVEL	1	2	3

CO SUM TOTAL	0, 1, 2	3, 4, 5, 6, 7, 8	9, 10, 11, 12, 13, 14	15, 16, 17, 18
CORRELATION LEVEL	0	1	2	3

Subject Expert

Dr. V.R.Rathod

Chapter No.	Topics	Periods	Marks				COs
		Hrs.	R	U	A	Total	
1.	OCEAN ENERGY TECHNOLOGIES						
	• Ocean energy map of India and its implications; Specification, Construction and working of the following • ocean energy technologies: • Tidal power technologies • Wave power technologies • Marine current technologies • Ocean Thermal Energy Conversion (OTEC) technologies	----	----	---	---	----	-----
2.	SOLAR PV AND CONCENTRATED SOLAR POWER PLANTS						
	• Solar Map of India: Global solar power radiation, Solar PV • Concentrated Solar Power (CSP) plants, construction and working of: Power Tower, Parabolic • Trough, Parabolic Dish, Fresnel Reflectors • Solar Photovoltaic (PV) power plant: components layout, construction, working. • Rooftop solar PV power system	----	----	---	---	----	-----
3.	LARGE WIND POWER PLANTS						
	• Wind Map of India: Wind power density in watts per square meter, Lift and drag principle; long path theory, Geared type wind power plants: components, layout and working, Direct drive type wind power plants: components, layout and working, Constant Speed Electric • Generators: Squirrel Cage Induction Generators (SCIG), Wound Rotor Induction Generator (WRIG), Variable Speed Electric • Generators: Doubly-fed induction generator (DFIG), wound rotor synchronous generator (WRSG), Permanent magnet synchronous generator (PMSG).	----	----	---	---	----	-----
4.	BIO-ENERGY						
	• Biomass direct combustion; Biomass gasifiers; Biogas plants; Digesters; Ethanol production; Bio diesel; Biomass Applications.	----	----	---	---	----	-----
5.	OTHER RENEWABLE ENERGY SOURCES						
	• Tidal energy; Wave Energy; Open and Closed OTEC Cycles; Small Hydro-Geothermal Energy; Hydrogen and Storage; Fuel Cell Systems; Hybrid Systems.	----	----	---	---	----	-----

SUGGESTED ASSIGNMENT/ ACTIVITIES FOR SPECIFIC LEARNING / SKILLS DEVELOPMENT under MOOC

Micro project / Online course will be subjected by concerned faculty under MOOC activity . Each student will complete at least three different courses with the help of Spring Board / NPTL / Swayam portal ,which will be considered under mooc activity based on which FA -PR will be given to them.

REFERENCES

Sr. No.	Author	Title	Edition	Year of Publication	Publisher& Address
1.	Rai. G.D	Non-Conventional Energy Sources	2 nd	2001	Khanna Publishers India, New Delhi
2.	GN Tiwari and MK Ghoshal,	Fundamental of Renewable Energy Sources	1 st	2007	Narosa, New Delhi
3.	NH Ravindranath, UK Rao, BNatarajan, P Monga	Renewable Energy and Environment-A Policy Analysis for India	1 st	2006	Tata McGraw Hill

LEARNING WEBSITES / WEB REFERENCES

- <http://www.spoken-tutorial.org>
- <http://swayam.gov.in>
- <https://kanchiuniv.ac.in>

Program Title					Diploma in Electronics & Telecommunication Engineering											
Course Code		Course Title		PYTHON PROGRAMMING FOR ML								Course Type		Semester		
23407												DSC		4		
Learning Scheme					Assessment Scheme											
ActualContact Hrs./Week			SLH	NLH	CREDITS	THEORY				PRACTICAL				SLA		Total
CL	TL	LL				FA	SA	Total		FA		SA				
								Max	Min	Max	Min	Max	Min	Max	Min	
1	-----	2	3	6	3	----	----	----	----	25	10	50	20	25	10	100
	5) The assessment of Practical is Internal and External. 6) The assessment of Self Learning is Internal.															

RATIONALE:

This subject is classified under the Applied Technology group and intended to teach the students basics, concepts, principles of Machine Learning. Machine Learning uses algorithms to imitate the way in which humans learn. It uses statistical methods to train models and make predictions without explicit programming them to do so. These algorithms make use of historical data to predict output values and these insights and predictions enable businesses to make smart decisions.

COURSE OUTCOMES :: --

Course theory content, practical skills, experience help student to understand basics of ML with advance uses of Python thus student should able to

Semester	IV	Subject	PYTHON PROGRAMMING FOR ML
		15 th Subject in Second Year	
C407.1		Handle Arrays , pandas data frame and files(csv,json)	
C407.2		Data Preprocessing i.e cleaning and handling missing values	
C407.3		Implementation of Linear Regression	
C407.4		Implementation of Logistic Regression	
C407.5		Implementation of K-Nearest Neighbors, SVM	
C407.6		Implementation of K mean Clustering	

Mapping of Course outcomes (COs) to Program outcomes (POs)

SEM IV	PYTHON PROGRAMMING FOR ML							
CO 407	15 th Subject in Second Year PREPARED BY: RVG							
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	
C407.1	2	3	3		1	1	3	
C407.2	2	3	3			2	1	
C407.3	3	3	3			2	1	
C407.4	3	3	3	3	3	2	2	
C407.5	3	3	3			2	2	
C407.6	2	3	3	2	2	2	2	
Total	15	18	18	05	06	11	11	
CORRELATION LEVEL	3	3	3	1	1	2	2	

TABLE TO DECIDE CORRELATION LEVELS

CO SUM TOTAL	06	12	18
CORRELATION LEVEL	1	2	3

CO SUM TOTAL	0, 1, 2	3, 4, 5, 6, 7, 8	9, 10, 11, 12, 13, 14	15, 16, 17, 18
CORRELATION LEVEL	0	1	2	3

Subject Expert

Mr. R.V.Gheware

Chapter No.	Topics	Periods	Marks				COs
		Hrs.	R	U	A	Total	
1.	DATA PRE-PROCESSING	5	-----	-----	-----	-----	
	- Data cleaning: handling missing values - Data scaling and normalization - Exploring data with Pandas and Matplotlib/Seaborn Pandas data frame and its methods i.e info, head, max, mean, median, corr, dropna. Reading CSV file. - Scatter plot, Label encoding, OneHot Encoder - Study of iris dataset						C407.1 C407.2
2.	MACHINE LEARNING	5	-----	-----	-----	-----	
	- Introduction, - Types of machine learning : Supervised and Unsupervised - Categories of Supervised machine learning: Regression and Classification						C407.1 C407.2
3.	ALGORITHMS OF MACHINE LEARNING	6	-----	-----	-----	-----	
	- Regression algorithms : Linear ,Polynomial - Classification algorithms : Logistic regression, Decision Tree - Unsupervised Learning : K Mean Clustering - Introduction to Deep Machine learning						C407.3 C407.4 C407.5 C407.6

LIST OF LABORATORY EXPERIENCES

EXP. NO.	TITLE	COURSE OUTCOME MAPPING
1	Python program to Handle pandas data frame and files (csv,json)	C407.2
2	Python program for data preprocessing i.e. data cleaning and handling missing values Part 1	C407.2
3	Python program for data preprocessing 1.LabelEncoding 2. One Hot Encoder	C407.2
4	Python program to implement Linear Regression using dataset 1 Python program to implement Linear Regression using dataset 2	C407.2
5	Python program to implement Logistic Regression (Binary Classification)	C407.2
6	Python program to implement Logistic Regression (Multiclass Classification)	C407.2
7	Python program to implement Decision Tree for Classification using suitable dataset.	C407.5

8	Python program to implement Random Forest Algorithm using suitable dataset.	C407.3
9	Implementation of K-Nearest Neighbors	C407.4
10	Implementation of support vector machine Algorithm	C407.4
11	Implementation of K mean clustering Algorithm	C407.3

IMPLEMENTATION STRATEGY

3. Practical plan

4. Minimum 10 to 12 practicals

The table to measure the attainment levels for TERM WORK (on a rating scale of “out of 25”) of the defined expected course outcomes is as shown in the format given below:

(Note:.....the table should progress to the right for Lab Experience 7, 8, 9,and so on.....)

* The final % attainment level for TERM WORK of each course outcome may then be computed and the overall % attainment level for the course, for term work may then be calculated.

LAB EXPERIENCE		1	2	3	4	5	6
	COURSE OUTCOMES	CO (out of 25)	CO (out of 25)	CO (out of 25)	CO (out of 25)	CO (out of 25)	CO (out of 25)
STUDENT SPNO							
1303001							
1303002							
1303003							

SUGGESTED MICRO PROJECT / ASSIGNMENT/ ACTIVITIES FOR SPECIFIC LEARNING / SKILLS DEVELOPMENT (SELF LEARNING)

Micro project could be group based. A micro projects could be added by concerned faculty. Each student will maintain dated work diary with details of individual contribution. Assessment is done by project guide / subject teacher based on their performance and presentation of submission. Assignments, workshop online workshops can be consider for Self Learning activity, any five activity perform by students considered for SLA

REFERENCES

Sr. No.	Author	Title	Edition	Year of Publication	Publisher & Address
1.	Sebastian Raschka	Machine Learning and Deep Learning with Python,	2 nd	2001	Prentice Hall of India, New Delhi

LEARNING WEBSITES / WEB REFERENCES :

- Python Machine Learning (w3schools.com)
- <https://www.geeksforgeeks.org/ml-introduction-data-machine-learning/>
- <https://www.youtube.com>
- <http://vlabs.iitb.ac.in/>
- <https://www.mathsisfun.com/>

Program Title					Diploma in Electronics & Telecommunication Engineering											
Course Code			Course Title		SOCIAL & LIFE SKILLS								Course Type		Semester	
23408													DSC		4	
Learning Scheme					Assessment Scheme											
Actual Contact Hrs./Week			SLH	NLH	CREDITS	THEORY				PRACTICAL				SLA		Total
CL	TL	LL				FA	SA	Total		FA		SA				
								Max	Min	Max	Min	Max	Min	Max	Min	
2	-----	-----	2	4	2	----	-----	-----	-----	-----	-----	-----	50	20	50	
	1) IKS 2 Hrs. 2) The assessment of Practical is Internal and External. 3) The assessment of Self Learning is Internal.															

RATIONALE:

Life skills can be defined as abilities that enable humans to deal effectively with the demands and challenges of life. Social skills are a subset of life skills that are needed for successful, healthy relationships to easily adapt when moving from one social situation to the next. They help regulate our emotions effectively and develop enduring, supportive relationships, we're happier and healthier. This is why developing life skills and eventually social skills is key not only to being successful in life, it's key for our health and well-being. Thus, Teaching of Social and life skills provide students with essentials of knowing, understanding attitudes, values, morals, social skills and better equip them to handle stress and build their self-efficacy, self-esteem and self-confidence.

COURSE OUTCOMES :--

Course theory content, practical skills, experience help student to understand basic human values social responsibility, thus student should be able to

Semester	4	Subject	Social & Life Skills
		16 th subject in Second Year	
C408.1	Unnat Maharashtra Abhiyan (UMA).		
C408.2	National Service Scheme (NSS)		
C408.3	To Develop Universal Human Values		
C408.4	Value Education (Unnati Foundation)		
C408.5	Financial Literacy		

Mapping of Course outcomes (COs) to Program outcomes (POs)

SEM IV	Social & Life Skills							
CO 408	(16th Course in Second Year) PREPARED BY : SBG							
CO 408	PO1	PO2	PO3	PO4	PO5	PO6	PO7	
CO 408.1	1		3		1	1	1	
CO 408.2	1	1	3	1		1	1	
CO 408.3	2	2	3	1		1	1	
CO 408.4	1	2	3	1	1		1	
CO 408.5	1	2	3	1	1			
CO 408 TOTAL	6	07	15	04	03	03	04	
CORRELATION LEVEL	1	2	3	1	1	1	1	

TABLE TO DECIDE CORRELATION LEVELS

CO SUM TOTAL	06	12	18
CORRELATION LEVEL	1	2	3

CO SUM TOTAL	0, 1, 2	3, 4, 5, 6, 7, 8	9, 10, 11, 12, 13, 14	15, 16, 17, 18
CORRELATION LEVEL	0	1	2	3

Subject Experts
Dr. Shivaji Ghungrad

	Section -- 1						
Chapter No	Topics	Periods	Marks				COs
		Hrs.	R	U	A	Total	
1	Activities Under Unnat Maharashtra Abhiyan (UMA)						
	• Introduction to Societal Needs and respective stakeholders : Regional societal issues that need engineering intervention • Multidisciplinary approach- linkages of academia, society and technology • Stakeholders' involvement • Introduction to Important secondary data sets available such as census, district economic surveys, cropping pattern, rainfall data, road network data etc • Problem Outline and stakeholders : Importance of activity and connection with Mapping of system components and stakeholders (engineering / societal) • Key attributes of measurement • Various instruments used for data collection - survey templates, simple measuring equipments • Format for measurement of identified attributes/ survey form and piloting of the same • Fieldwork : Measurement and quantifications of local systems such as agriculture produce, rainfall, Road network, production in local industries, Produce /service which move from A to B • Analysis and Report writing Report writing containing- 1 Introduction of the topic 2 Data collected in various formats such as table, pie chart, bar graph etc 3. Observations of field visits and data collected.	04	-----	-----	-----	-----	C408.1

2	National Service Scheme (NSS)						
	• Contacting Village/Area Leaders • Primary socio economic survey of few villages in the vicinity of the institute. • Selection of the village for adoption - conduct of activities • Comprehensive Socio Economic Survey of the Village/Area • Identification of Problem(s) • Dissemination of information about the latest developments in agriculture, watershed management, wastelands development, non- conventional energy, low-cost housing, sanitation, nutrition and personal hygiene, schemes for skill development, income generation, government schemes, legal aid, consumer protection and allied fields. • A liaison between government and other development agencies for the implementation of various development schemes in the selected village/slum	08	-----		-----		CO 408.2
3	To Develop Universal Human Values						
	• Love and Compassion • (Prem and Karuna): Introduction, Practicing Love and Compassion • Truth (Satya) : Introduction, Practicing Truth (Satya) • Non-Violence (Ahimsa) : Introduction, Practicing Non- Violence (Ahimsa) • Righteousness (Dharma) : Introduction, Practicing Righteousness (Dharma) • Peace (Shanti) : Introduction, Practicing Peace (Shanti) • Service (Seva) : Introduction, Practicing Service (Seva) • Renunciation (Sacrifice) Tyaga : Introduction, Practicing Renunciation (Sacrifice) Tyaga • Gender Equality and Sensitivity: Introduction, Practicing Gender Equality and Sensitivity.	04	-----		-----		CO 408.3

	Section -- 2						
Chapter No.	Topics	Periods	Marks				COs
		Hrs.	R	U	A	Total	
4	Value Education (Unnati Foundation)						
	• Punctuality, Icebreaker and Simple Greeting, Understanding & Managing Emotions, Introducing Self, The power of a Positive Attitude, Talking about one's Family, Talking about one's Family, Making a Positive Impression, Give word list for a Word based • Cleanliness , Hygiene and Orderliness , Likes and Dislikes, Developing Confidence in Self and Others, Strengths and Weaknesses, Listening Skills , Greeting gestures, Gender Equality and Sensitivity • Responsibility, OCSEM- Visual Comprehension and Word Based Learning, Goal Setting - Make it happen, Follow, Like & Share Unnati Social Media - Facebook / Instagram/ Twitter Introducing Others, Time Management, Talking about the daily routine, Money Management • Gratitude and Appreciation , Asking Simple Questions & Asking for the price , Stress Management, Student Referral process ,Comprehending & Paraphrasing Information, A Plate of Rice and Dignity of Labour, Topics for Public Speaking, Placement Process , OCSEM-E- Newspaper, Critical Thinking to overcome challenges • Determination and Persistence, Guiding and Giving Directions, Language Etiquette & Mannerism, . Unnati Philosophy , b. Unnati Branding - Follow, Like & Share Unnati Social Media - Facebook / Instagram/ Twitter, Simple instructions to follow procedures, Assertiveness, Give topics for Debate, Describing a person/Objects, Refusal Skills, Word List for Word based Learning Respect, Comparing , OCSEM - Public Speaking, Student referral process, Attending a phone call, Being a Good Team	08	-----	----- ----- -	-----	---	CO 408.4

	Player , Placement Process, At a Restaurant, Workplace ethics Team Spirit, Inviting someone, OCSEM - Picture Reading & Word, a. Unnati Philosophy & b. Unnati Branding - Follow, Like & Share Unnati Social Media - Facebook / Instagram/ Twitter, Apologizing, Apologizing, Dealing effectively with Criticism, Introduce Importance of Self Learning and upskilling Caring and Sharing , Handling Customer queries, Flexibility & Adaptability, Student referral process, Writing a Resume, OCSEM- Public Speaking, Placement Process, Meditation/ Affirmation & OCSEM-Debate, Introduce Certif- ID, how to create Certif-ID Project , Honesty, Email etiquette & Official Email communication, Alcohol & Substance use & abuse, Describing a known place , Leadership Skills, Describing an event, OSCEM-Picture Reading & Visual Comprehension Forgive and Forget, Facing and Interview, OSCEM-Public Speaking , Attending a telephonic/Video interview & Mock Interview , Affirmation , Pat-a-Back & Closure (Valediction , Unnati Branding, Student Testimonials), Meditation/ Affirmation & Sponsor connect (Speak to UNXT HO)						
5	FINANCIAL LITERACY						
	• Introduction - Life Goals and financial goals • Savings and Investments - Three pillars of investments, Popular asset classes, Government schemes, Mutual Funds, Securities markets (Shares and bonds), Gold, Real Estate, Do's and Don'ts of investments • Retirement planning • Cashless transactions • Income, expenditure and budgeting – Concepts and Importance • Inflation- Concept, effect on financial planning of an individual	08	-----	----- -	-----	---	CO 408.5

	- Loans – Types, Management of loans, - Tax benefits - Insurance – Types, Advantages, selection Dos and Don'ts in Financial planning and Transactions						
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LABORATORY LEARNING OUTCOME AND ALIGNED PRACTICAL / TUTORIAL EXPERIENCES :

NOT APPLICABLE.

SUGGESTED MICRO PROJECT / ASSIGNMENT/ ACTIVITIES FOR SPECIFIC LEARNING / SKILLS DEVELOPMENT (SELF LEARNING)

Suggestive list of activities during Regular as well as Special Camping (NSS Activities)

- Following list is only an illustrative list of the type of activities that can be undertaken. Under the programme it would be open to each NSS Unit to undertake one of these programmes or any other activity which may seem desirable to them according to local needs. The NSS Unit should aim at the integrated development of the area selected for its operation which could be a village or a slum. It has also to be ensured that at least a part of the programme does involve manual work.
- (a) Environment Enrichment and Conservation:
The activities under this sub-theme would inter-alia, include:
 - (i) plantation of trees, their preservation and upkeep Water conservation- Jaldindi, Essay competition, Drawing Competition.
 - (ii) Construction & maintenance of village streets, drains
 - (iii) Cleaning of village ponds and wells
 - (iv) Popularization and construction of Gobar Gas Plants, use of non-conventional energy;
 - (v) Disposal of garbage & composting
 - (b) Volunteering in Election activity
 - (c) Participating in awareness camp of Election activity
 - (d) Completing the online courses of UNISEF on YEW --- compulsory activity