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.

ST. XAVIER'S TECHNICAL INSTITUTE MAHIM, MUMBAI

LEARNING AND ASSESMENT SCHEME [A.Y. ---- 2024—25]

Program Name ::-- Electronics & Telecommunication Engineering

SEMESTER ::-- THIRD

DURATION:: 16 WEEK

SR.NO.	COURSE TITLE	COURSE TYPE	COURSE CODE	IKS Hrs.	LEARNING SCHEME					Credits	ASSESMENT SCHEME											
					Actual Contacts Hrs. /week			Self Learning TERM work + Assignment	Notional Learning (NL) Hrs/week		Paper Duration (Hrs.)	THEORY				Based on LL & TL Practical				Based on Self Learning		TOTAL
												FA-TH	SA-TH	TOTAL		FA-PR		SA-PR				
					CL	TL	LL					MAX	MAX	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	
1	Principles of Electronic Communication	DSC	23301	2	3	-	2	1	6	3	3	30	70	100	40	25	10	50	20	25	10	200
2	Digital Electronics	DSC	23302	0	3	-	2	1	6	3	3	30	70	100	40	25	10	50	20	25	10	200
3	Linear Integrated Circuit	DSC	23303	0	3	-	2	1	6	3	3	30	70	100	40	25	10	50	20	25	10	200
4	Industrial Electronics	DSC	23304	0	3	-	2	1	6	3	3	30	70	100	40	25	10	-	-	25	10	150
5	Electronics Measurement & Instrumentation	AEC	23305	1	3	-	2	1	6	3	3	30	70	100	40	25	10	-	-	25	10	150
6	Python Programming	AEC	23306	0	-	-	2	-	2	1	-	-	-	-	-	25	10	-	-	-	-	25
7	Circuit Simulation & Circuit Building	SEC	23307	0	-	-	2	4	6	3	-	-	-	-	-	25	10	-	-	25	10	50
8	Essence of Indian Constitution	VEC	23308	2	1	-	-	1	2	1	-	-	-	-	-	-	-	-	-	25	10	25
	TOTAL			05	16	-	14	10	40	20		150	350	500		175		150		175		1000

Abbreviations :::- CL - CLASSROOM LEARING , TL - TUTORIAL LEARING, LL - LABORATORY LEARING , FA - FOTRMATIVE ASSESSSMENT, SA- SUMMATIVE ASSESSSMENT,SL – SELF LEARNING, NL – NOTIONAL LEARNING

Total No. of Credits = 20 Total No. of Student Contact Hours = 30 Hrs. Total Marks = 1000

1) Theory FA-TH- represent average of Two class test of 30 marks conducted during the semester for the attainment of the Cos.
2) 25 marks Based on Self Learning are for Micro project ,Assessments, Tutorial work, Workshops, Webinars, Online workshop etc. to facilitate integration of Cos
3) If Candidate not securing minimum marks for passing in the FA part of Practical of any course of any semester, then the candidate shall be declared as **Detained** for **that semester.**
4) 1 credit is equivalent to 30 NL, Notional Learning hours for semester are(CL+LL+TL+SL) * 15 WEEKS , Self learning hours shall not be reflected in the Time table
5) Course Category :::--- AEC ::- Ability Enhancement Course, DSC ::- Discipline Specific Course, DSE ::-Discipline Specific Elective, VEC ::-- Value Education Course
SEC ::- Skill Enhancement Course, INP ::- Intern / Apparent/Project/Community, GE ::- Generic Elective

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Program Title	Diploma in Electronics & Telecommunication Engineering															
Course Code	Course Title	PRINCIPLES OF ELECTRONIC COMMUNICATION												Course Type	Semester	
23301														DSC	3	
Learning Scheme						Assessment Scheme										
Actual Contact Hrs./Week			SLH	NLH	CREDITS	THEORY				PRACTICAL				SLA		Total
								Total		FA		SA				
CL	TL	LL				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) The Online Practical assessment is Internal.
6) Formative Assessment out of 30 marks is average of 2 periodical tests (PT).
7) The assessment of Self Learning is Internal.

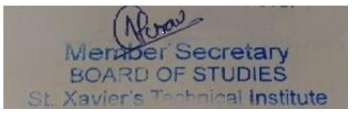
RATIONALE:

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 basic electronics communication terms &devices methods, thus student should able to

Semester 3	Subject	Principles of Electronic Communication
CO301	1st Course in Second Year	
CO301.1	Understand the need & fundamentals of Various Modulation and Demodulation techniques	
CO301.2	Analyze the operation of AM & FM transmitter and receiver	
CO301.3	Express the role of different types of Wave Propagation in communication circuits.	
CO301.4	Recognize & Describe the construction, principle of operation of various types of Antennas and their uses in communication.	
CO301.5	Identify & Describe the fundamentals of different types of Pulse communication	



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

SEM III	Principles of Electronic Communication						
CO301	(1st COURSE IN SECOND YEAR) PREPAREDBY: VN, SG						
CO301	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO301.1	3	2	1	2	2	1	2
CO301.2	3	3	2	3	2	1	2
CO301.3	2	3	3	2	3	1	2
CO301.4	3	3	3	3	2	1	2
CO301.5	2	3	2	3	3	1	2
CO TOTAL	16	17	13	15	15	6	12
CORRELATION LEVEL	3	3	2	3	3	1	2

TABLETODECIDECORRELATIONLEVELS

COSUMTOTAL	06	12	18
CORRELATIONLEVEL	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
CORELATION LEVEL	0	1	2	3

Subject Expert
Mrs. Surbhi Gaoshinde
Mr. Vinay Nagalikar

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	Section--1						
Chapter No	**Topics**	**Periods**	**Marks**				**COs**
		Hrs.	**R**	**U**	**A**	**Total**	
1	**MODULATION**						
	1.1 Block Diagram of Basic Communication system 1.2 Definition, need for modulation. 1.3 Types of modulation - AM, FM &PM. 1.4 Types of transmission modes –Simplex, half duplex and full duplex (only definition)	04	03	06	---	09	**CO 301.1**
2	**AMPLITUDE MODULATION & DEMODULATION**						
	2.1 Mathematical representation of Amplitude modulated wave, Modulation Index, Band width requirement, Representation of AM signal in Time and Frequency domain. 2.2 AM transmission Power, current calculations. Numerical on above topics. 2.3 Types of AM(DSB, SSB), Generation of AM. 2.4 Demodulation of AM signal: Diode detector and practical diode detector 2.5 Automatic gain control and its types 2.6 Super heterodyne receiver block diagram .Specifications of radio receivers: Sensitivity, Selectivity, Fidelity	10	04	06	03	13	**CO 301.2 301.3**
3	**FREQUENCY MODULATION & DEMODULATION**						
	3.1 Frequency Modulation: representation of FM signal in time domain and frequency domain , frequency deviation ratio, modulation index(δ), mathematical representation of FM, bandwidth requirement, types of frequency modulation (NB and WBFM) 3.2 Generation of FM using direct (varactor diode and reactance modulator) and indirect method (Armstrong method) 3.3 Block diagram of FM receiver and its working with waveforms 3.4 FM detector circuits: Ratio detector and PLL as FM demodulator Advantages & disadvantages of FM over AM	10	04	06	03	13	**CO 301.2 301.3**

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	Section--2						
Chapter No	**Topics**	**Periods**	**Marks**				**COs**
		Hrs.	**R**	**U**	**A**	**Total**	
4	**WAVE PROPAGATION**						
	4.1 Fundamentals of electromagnetic wave 4.1.1 Electromagnetic Spectrum & Band Designation. 4.1.2. Reflection, refraction, diffraction & polarization 4.1.3. Rectangular waveguide modes- TE,TM modes, field patterns. 4.1.4 Propagation of waves through Rectangular waveguide. Groundwave propagation Sky wave propagation Ionosphere 4.2 Concept of actual height and virtual height 4.3 Definition:- critical frequency, max-usable frequency, skip distance, fading, Space wave propagation Duct propagation , Tropospheric scatter	10	04	07	04	15	**CO 301.3**
5	**ANTENNA**						
	5.1 Radiation Mechanism 5.2 Types of Antennas Resonant and non-resonant antenna Grounded and ungrounded antenna 5.3 Definitions: - Isotropic antenna, Directive gain, Power gain, Antenna resistance, Antenna Efficiency, Beam-width, Bandwidth, Effective radiated power. 5.4 Antennas:-Construction, Working principles and Radiation pattern i. Monopole antenna. ii. Dipole Antenna-Half wave dipole. iii. Dish antenna. iv Yagi-uda antenna v Pyramidal Horn antenna. vi Helical antenna. vii. Micro-strip patch antenna.	10	04	06	02	12	**CO 301.2 301.4**
6	**PULSE ANALOG MODULATION**						
	6.1 Ideal sampling, Sampling theorem, aliasing, interpolation, 6.2 Natural and flat top sampling in time and frequency domains	04	04	04	---	08	**CO301.2 301.5**

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IMPLEMENTATIONSTRATEGY:

a. Use of Power Point presentations and Videos
b. References from the internet **(for teachers as well as students)**
c. Extensive use of examples
d. Group discussions and microproject
e. Assignments for writing skills, create awareness about selection /purchasing components

f. LIST OF LABORATORY EXPERIENCES

EXP. NO.	TITLE	COURSE OUTCOME	CHAPT. NO.
1	Amplitude Modulation Using DSB –TC and SC modulator	**CO 301.1 301.2**	1
2	FM Modulator	**CO 301.1 301.2**	1
3	Voltage Analysis of Single Band AM Radio Receiver	**CO 301.1 301.2**	1
4	Voltage Analysis of FM Radio Receiver	**CO 301.1 301.2**	1
5	DSB – TC Demodulator	**CO 301.1 301.2**	1
6	DSB - SC Demodulator	**CO 301.1 301.2**	3
7	SSB - SC Demodulator	**CO 301.1 301.2**	2
8	Measure and plot Selectivity of AM Receiver	**CO 301.1 301.2**	3
9	Measure and plot Sensitivity of AM Receiver	**CO 301.1 301.2**	3
10	Measure and plot Fidelity of AM Receiver	**CO 301.1 301.2**	2
11	Measurement of Bandwidth of Horn Antenna.	**CO 301.1 301.3**	5
12	Measurement of Attenuation of Horn Antenna.	**CO 301.1 301.3**	5

Fault finding practical's are demo experiments which is an extra skill imparted in the laboratory andnot covered in theory.

IMPLEMENTATION STRATEGY

1. Teaching plan
2. Minimum 10practicals

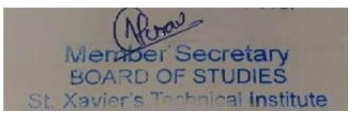
The table to measure the attainment levels for TERM WORK (on a rating scale of "out of 25') of the defined expected course outcomes is as shown in the format given below:
(Note:……the table should progress to the right for Lab Experience 7, 8, 9, ….and so on……)

LAB EXPERIENCE		1	2	3	4	5	6
	COURSE OUTCOMES	C202.2 (out of 25)	C202.2 (out of 25)	C202.2 (out of 25)	C202.3 (out of 25)	C202.3 (out of 25)	C202.3 (out of 25)
STUDENT SPN							
2303001							

* 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 MICROPROJECTS :::

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



submission.

SR. NO.	TITLE
1	Prepare a poster to show different types of radio communications
2	Build a circuit for Amplitude modulation using IC MC 1496 / 8038
3	Prepare model or chart of types of radio communications
4	Build a circuit for Frequency modulation using IC 8038 / BF 549
5	Build circuit of tunning IFT at 455khz
6	Design a given Antenna

SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

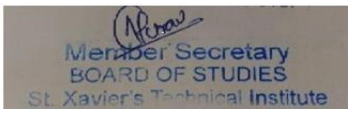
Chapter No.	Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
Section I						
1	**MODULATION**	04	03	06	---	09
2	**AMPLITUDE MODULATION & DEMODULATION**	10	04	06	03	13
3	**FREQUENCYMODULATION & DEMODULATION**	10	04	06	03	13
Section II						
4	**WAVE PROPAGATION**	10	04	07	04	15
5	**ANTENNA**	10	04	06	02	12
6	**PULSE ANALOG MODULATION**	04	04	04	---	08
Total		**48**	**23**	**35**	**12**	**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.	Wayne Tomasi	Elec. Comm. Systems	2nd	1989	Pearson Education
2.	George Kenedy	Electronic communication systems	2nd	1993	McGraw-Hill
4.	Dennis Roddy & John Coolen	Electronic Communication	2nd	1988	Prentice Hall of India Pvt. Ltd
3.	Gary M. Miller	Modern Electronic Communication	3rd	1994	Prentice Hall of India Pvt. Ltd

LEARNING WEBSITES /WEB REFERENCES:

- https://en.wikipedia.org/wiki/Modulation
- https://en.wikipedia.org/wiki/Amplitude_modulation
- https://en.wikipedia.org/wiki/Frequency_modulation
- https://en.wikipedia.org/wiki/Radio_receiver



Program Title	Diploma in Electronics & Telecommunication Engineering															
Course Code	Course Title	DIGITAL ELECTRONICS												Course Type	Semester	
23302														DSC	3	
Learning Scheme						Assessment Scheme										
Actual Contact Hrs./Week			SLH	NIH	CREDITS	THEORY				PRACTICAL				SLA		Total
								Total		FA		SA				
CL	TL	LL				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) The Online Practical assessment is Internal.
5) Formative Assessment out of 30 marks is average of 2 periodical tests (PT).
6) The assessment of Self Learning is Internal.

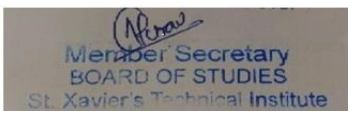
RATIONALE:

This subject comes under the Core Technology group and will enable the students to comprehend the theory, concepts, characteristics and working principles of digital electronics componenets, techniques and their applications in electronics & communication circuits. Concepts such as gates, flipflops, counters which are widely used in the field of digital electronics & communication area are dealt with in this subject. Knowledge of basic electronics, 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 digital electronics terms & devices, thus student should able to

Semester	3	Subject	Digital Electronics
CO 302		2nd Course in Second Year	
CO 302.1		Use Boolean laws and Karnaugh Map to simplify complex logical expressions	
CO 302.2		Compare different number systems and illustrate different code converters.	
CO 302.3		Illustrate different types of arithmetic circuits.	
CO 302.4		Illustrate different types of flip-flops.	
CO 302.5		Design counters and shift registers.	
CO 302.6		Design and test data converters, semiconductor memories.	



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

SEM III	Digital Electronics						
CO 302	(2nd Course in Second Year) PREPARED BY : JN, RVG						
CO 302	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO 302.1	3	3	3	2	2	1	2
CO 302.2	3	3	2	1	2	1	2
CO 302.3	3	3	3	2	1	2	2
CO 302.4	3	3	3	2	1	1	2
CO 302.5	3	3	3	2	1	1	2
CO 302.6	3	3	3	2	1	1	2
CO TOTAL	18	18	17	11	8	7	12
CORRELATION LEVEL	3	3	3	1	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
Dr. Janani Natarajan
Mr.R.V.Gheware

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	Section -- 1						
Chapter No	**Topics**	**Periods**	**Marks**				**COs**
		Hrs.	**R**	**U**	**A**	**Total**	
1	**LOGIC GATES AND LOGIC FAMILIES**						
	1.1 AND, OR, NOT NAND, NOR, EX-OR and EXNOR gates Logical expression and truth-tables. 1.2 Digital logic Families: Bipolar, Unipolar , TTL - different types, TTL NAND Gate and Inverter Parameters VIH, VIL, VOH, VOL IIH, IIL, IOH, IOL, Propagation Delay Time, Power Dissipation ,Noise margin, Noise Immunity 1.3 Boolean Algebra: 1.3.1 AND Laws, OR Laws, Commutative law, Associative Law, Distributive law, Absorption law. 1.3.2 De-Morgan's Theorems 1.3.3 Simple examples of Boolean Algebra 1.3.4 Sum of the Product and Product of the Sum forms of Boolean Expressions 1.3.5 Writing Truth table from Logical Expression and to write Logical Expression from the Truth Table 1.3.6 Drawing Logical circuit diagram from Logical Expression. 1.4 Karnaugh Map, Drawing K-map for a given function, truth table .	06	03	04	02	09	**CO 302.1**
2	**NUMBER SYSTEMS AND CODES**						
	2.1 Decimal, Binary, Octal, Hexadecimal system 2.1.1 Conversion of a number from one number system to the other system 2.2 Binary Codes 2.2.1 Weighted codes 8421 2.2.2 Error Detecting code- Even/odd parity code 2.3 Code converters 2.3.1 Gray to Binary 2.3.2 Binary to Gray 2.3.3 BCD to Decimal 2.3.4 Decimal to BCD 2.3.5 BCD to seven segment decoder	09	04	06	03	13	**CO 302.2 302.3**

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	Section -- 1						
Chapter No	**Topics**	**Periods**	**Marks**				**COs**
		Hrs.	**R**	**U**	**A**	**Total**	
3	**COMBINATIONAL CIRCUITS**						
	3.1 Half Adder using logical gates -Logical circuit diagram, Expressions of outputs and working . 3.2 Full Adder- using logical gates, using Half Adders, Logical circuit diagram, Expressions of outputs and working. 3.3 Half subtractor using logical gates, Logical Circuit diagram, Expressions of outputs and working 3.4 Full subtractor using logical gates, Logical circuit diagram, Expressions of outputs and working. 3.5 Addition, Subtraction of binary numbers – 1's & 2's complement 4 Bit Binary Parallel Adder, 4 Bit Binary Parallel Adder/Subtractor 3.6 Multiplexer – 2:1, 4:1, 8:1. Demultiplexer – 1:2, 1:4, 1:8.	09	03	06	04	13	**CO 302.2** **302.3**
	Section -- 2						
Chapter No.	**Topics**	**Periods**	**Marks**				**COs**
		Hrs.	**R**	**U**	**A**	**Total**	
4	**SEQUENTIAL LOGIC CIRCUITS**						
	4.1 R-S Flip-flop using NAND gates, NOR gates, Truth-table, Race-round condition 4.2 Clocked RS Flip-flop- Level triggering ,Edge triggering (using NAND gates). 4.3 Clocked D Flip-flop using NAND gates, Preset and Clear inputs. 4.4 JK FF using R-S FF its truth table 4.5 Master and slave JKFF, Advantage-over simple JKFF, Preset & clear inputs 4.6 Shift Registers: Logic diagram of 4- bit Shift registers – SISO,PISO, SIPO,PIPO, 4 Bit Universal Shift register. 4.7 Counters 4.7.1 Asynchronous (ripple) binary counter 4.7.2 Synchronous (parallel) binary counter 4.7.3 Design of the above using flip-flops and comparison. 4.7.4 Comparison between Asynchronous and Synchronous counters 4.7.5 Up/Down ripple counter	18	05	12	05	22	**CO 302.3**

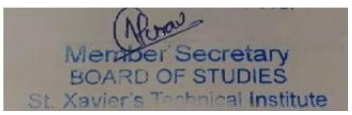
	Section -- 2						
Chapter No	**Topics**	**Periods**	**Marks**				**COs**
		Hrs.	**R**	**U**	**A**	**Total**	
	4.7.6 Decade counter using RESET input 4.7.7 Ring counter 4.7.8 Mod counters design						
5	**DATA CONVERTERS AND SEMICONDUCTOR MEMORIES**						
	5.1 DAC: Types, weighted resistor circuit and R-2R ladder circuit, DAC IC 0808 specifications 5.2 ADC: Block Diagram, types, and working of Dual slope ADC, SAR ADC, ADC IC 0808/0809, specification. 5.3 Memory: RAM and ROM basic building blocks, read and write operation , types of semiconductor memories.	06	04	06	03	13	**CO 302. 2 302.4**

IMPLEMENTATION STRATEGY:

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

LIST OF LABORATORY EXPERIENCES

EXP. NO.	TITLE	COURSE OUTCOME	CHAPT. NO.
1	NAND Gate as an Universal Gate	C 302.1	1
2	Half Adder and Full Adder	C 302.3	3
3	Four Bit Binary Parallel Adder	C 302.3	3
4	RS Flip-flop	C 302.4	4
5	D Flip-flop	C 302.4	4
6	JK Flip-flop	C 302.4	4
7	BCD to Decimal Decoder	C 302.2	2
8	Four Bit Binary Controlled Inverter	C 302.3	3
9	Decade / BCD Counter using IC 7490	C 302.5	5
10	Operation and Characteristics of a Shift Register	C 302.5	5
11	Left Shift and Right Shift operation with Shift Register	C 302.5	5
12	Arithmetic Operations with Shift Register	C 302.5	5
13	Ripple Counter	C 302.5	5
14	Reverse Counter	C 302.5	5
15	Programmable Counter	C 302.5	5



16	Modulo 9 Counter	C 302.5	5
17	BCD to 7 Segment Decoder / Driver for LED Display	C 302.2	2
18	Constructing a Clock Oscillator	C 302.6	6

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

IMPLEMENTATION STRATEGY

1. Teaching plan
2. Minimum 10 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……)

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 SPNO							
1303001							
1303002							
1303004							

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

SUGGESTED LIST OF MICROPROJECTS

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

SR. NO.	TITLE
1	Build a Digital IC tester circuit. Build a circuit to test 7 segment displays.
2	Build a circuit to implement debounce switch.
3	Build a 4bit parity generator and parity checker circuit.
4	Build a circuit to implement 4 bit adder.
5	Build a circuit for LED flasher.
6	Build a circuit for LED BAR display
7	Design and analyze digital arithmetic circuit

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	**LOGIC GATES AND LOGIC FAMILIES**	06	03	04	02	09
2	**NUMBER SYSTEM**	09	04	06	03	13
3	**COMBINATIONAL LOGIC CIRCUITS**	09	03	06	04	13
	Section II					
4	**SEQUENTIAL LOGIC CIRCUIT**	18	05	12	05	22
5	**DATA CONVERTERS AND SEMICONDUCTOR MEMORIES**	06	04	06	03	13
	Total	**48**	**19**	**34**	**17**	**70**
	Legends :: R ::-- Remember , U ::-- Understand , A ::--Application					

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

REFERENCES

Sr. No.	Author	Title	Edition	Year of Publication	Publisher & Address
1.	R.P.Jain	Modern Digital Electronics	4th	1986	TMH
2.	Malvino & Leach	Digital Principles & Applications	4th	1986	TMH
3.	William Gothman	Digital Electronics	2nd	1998	Prentice Hall of India
4.	Salivahanan S. Arivazhagan S.	Digital Circuits and Design Digital Electronics	4th	2013, ISBN: 9789325960411	Vikas Publishing House, New Delli
5.	Digital Electronics	Puri, V.K.	2nd	2016, ISBN: 97800746331751	McGraw Hill, New Delhi.

LEARNING WEBSITES / WEB REFERENCES :

- https://www.tutorialspoint.com/digital_circuits/index.htm
- https://tutorialsinhand.com/tutorials/digital-electronics-tutorial/
- https://www.youtube.com
- http://vlabs.iitb.ac.in/vlabs-dev/labs/digital-electronics/
- https://www.mathsisfun.com/binary-digits.html

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Program Title	Diploma in Electronics & Telecommunication Engineering															
Course Code	Course Title	LINEAR INTEGRATED CIRCUITS												Course Type	Semester	
23303														DSC	3	
Learning Scheme						Assessment Scheme										
Actual Contact Hrs./Week			SLH	NLH	CREDITS	THEORY				PRACTICAL				SLA		Total
								Total		FA		SA				
CL	TL	LL				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) The Online Practical assessment is Internal.
5) Formative Assessment out of 30 marks is average of 2 periodical tests (PT).
6) 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 circuits. Linear Integrated Circuits hold an important unique place in the field of electronics. This subject is classified under Basic Technology group with a focus on imparting concepts, principles and applications of Linear/Analog integrated circuits in the field of Electronics. The prerequisite for this subject is knowledge of basic electronic devices and circuits.

COURSE OUTCOMES ::--

Course theory content, practical skills, experience help student to understand Linear Integrated Circuits terms & devices, Circuits, thus student should able to

Semester	3	Subject	Linear Integrated Circuits
CO 303		3rd Course in Second Year	
CO 303.1		Analyze working of Op –Amp in Mathematical operations	
CO 303.2		Analyze working of Op –Amp in linear and non-linear applications	
CO 303.3		Demonstrate working principle of PLL and Develop electronics circuits using PLL	
CO 303.4		Apply the knowledge of Voltage regulators in designing power supply	
CO 303.5		Illustrate electronics circuits using timer IC555.	

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

SEM III	Linear Integrated Circuits						
CO 303	3rd Course in Second Year PREPARED BY : VN						
CO 303	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO 303.1	3		1			2	
CO 303.2	1		1	1	1	1	1
CO 303.3	2		1	1		1	
CO 303.4	3	2	3	2	1	3	1
CO 303.5	3	1	3	2	1	2	2
CO TOTAL	12	3	9	6	3	9	4
CORRELATION LEVEL	2	1	2	1	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 Expert

Mr. Vinay Nagalikar

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	Section -- 1						
Chapter No	**Topics**	**Periods**	**Marks**				**COs**
		Hrs.	**R**	**U**	**A**	**Total**	
1	**OP - AMPS**						
	1.1 Block diagram study of an op-amp. Parameters of op amp:- 741- Ideal parameters, definitions- Input offset voltage, Input offset current, Input Bias current, CMRR,PSRR, Slew Rate, Output voltage swing, Gain- Bandwidth product. 1.2 Op amp as a linear amplifier: - open & closed loop configurations, Virtual Ground Concept, Offset null adjustment, Transfer Characteristic. 1.3. Inverting , Non-inverting & differential configurations - Expressions of voltage Gain, Input resistance, output resistance &bandwidth for each. 1.4 Applications of inverting & non-inverting amplifiers as summing, scaling and averaging amplifier. (i) Log and Antilog amplifier. (ii) Integrator and differentiator. Voltage Follower, Instrumentation Amplifier using 3 op amps - having fixed gain and variable gain..	14	04	10	03	17	**CO 303.1**
2	**TYPICAL OPAMP CIRCUITS**						
	2.1 OPAMP Sine Wave (L.F.) Oscillators: Operating principle, Circuit, operation and applications of Wien Bridge and Phase Shift Oscillator 2.2 OPAMP Active Filters: (Simple Treatment) Low-Pass and High-Pass type First Order and Second Order Butterworth active filters. Comparison with passive filters. Advantages of employing the OPAMP in Active Filters. 2.3 Inverting and Non-Inverting Comparator, Zero crossing detector, Peak detector, Schmitt trigger V-I converter and I-V Converter, Sample and Hold circuit	10	04	10	04	18	**CO 303.2 303.1**

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	Section -- 2						
Chapter No	**Topics**	**Periods**	**Marks**				**COs**
		Hrs.	**R**	**U**	**A**	**Total**	
3	**PHASE LOCKED LOOP (PLL)**						
	3.1 Block diagram of VCO IC LM-566. 3.2 Working principle, functional block diagram and operation of PLL system. The PLL parameters - Lock-range, capture range, the transfer characteristics. 3.3 Block diagram study of PLL I.C. type 565. 3.4 Applications of PLL - F.M. Demodulator, Frequency Multiplier.	06	03	04	03	10	**CO 303.3**
4	**LINEAR AND SWITCHING VOLTAGE REGULATORS**						
	4.1 Concepts of Voltage Regulation: Line, Load, Temperature stability, Ripple rejection. 4.2 The 3-Pin voltage Regulators: Structure and Operation, Advantage and limitations. The 78xx and 79xx I.C.s and their power supply circuits, the LM-317 I.C. Regulator and its power supply circuit. 4.3 Block diagram of switching voltage regulator. 4.4 Block diagram of an SMPS power Supply System, employing Controller I.C. type SG-3524.	09	04	06	03	13	**CO 303.4**
5	**TIMER I.C. TYPE NE-555**						
	5.1 Functional block diagram study and operation. 5.2 Operation in Monostable Mode. 5.3 Operation in Astable Mode. 5.4 Application as square wave generator.	09	03	06	03	12	**CO 303. 2 303.4**

IMPLEMENTATION STRATEGY:

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

LIST OF LABORATORY EXPERIENCES

EXP. NO.	TITLE	COURSE OUTCOME	CHAPT. NO.
1	Inverting Amplifier	C205.1	
2	Non Inverting Amplifier	C205.1	
3	Differential Amplifier	C205.1	
4	Integrator	C205.1	
5	Differentiator	C205.1	
6	Low Pass Filter	C205.2	
7	High Pass Filter	C205.2	
8	Monostable Multivibrator (Using IC-555)	C205.5	
9	Astable MultiVibrator (Using IC- 741)	C205.1	
10	Astable MultiVibrator (Using IC-555)	C205.5	
11	7805 and 7905 Voltage regulator	C205.4	
12	317 Voltage regulator	C205.4	
13	Wien Bridge Oscillator	C205.2	
14	Schmitt Trigger	C205.2	
15	PLL 565 Parameters	C205.3	

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

IMPLEMENTATION STRATEGY

1. Teaching plan
2. Minimum 10 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……)

LAB EXPERIENCE		1	2	3	4	5	6
	COURSE OUTCOMES	C202.2 (out of 25)	C202.2 (out of 25)	C202.2 (out of 25)	C202.3 (out of 25)	C202.3 (out of 25)	C202.3 (out of 25)
STUDENT SPNO							
1303001							
1303002							

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

SUGGESTED LIST OF MICROPROJECTS

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

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SR. NO.	TITLE
1	Build a Wave generator
2	Build a Regulated power supply.
3	Build a Square wave circuit.
4	Build a circuit to implement 4 bit adder.
5	Build a circuit for LED flasher.

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	**OP - AMPS**	14	04	10	03	17
2	**TYPICAL OPAMP CIRCUITS**	10	04	10	04	18
	Section II					
3	**PHASE LOCKED LOOP (PLL)**	06	03	04	03	10
4	**LINEAR AND SWITCHING VOLTAGE REGULATORS**	09	04	06	03	13
5	**TIMER I.C. TYPE NE-555**	09	03	06	03	12
	Total	**48**	**18**	**36**	**16**	**70**
	Legends :: R ::-- Remember , U ::-- Understand , A ::--Application					
This specification table provide guide line to teacher to teach &assess student also a generalguideline to frame theory paper & practical theory exam paper which student have to undertake. The actual distribution of marks at different taxonomy level in thequestion papermay vary from above table.						

REFERENCES

Sr. No.	Author	Title	Edition	Year of Publication	Publisher & Address
1.	R. Gaikwad.	Operational Amplifiers	4th	1983	Prentice Hall
2.	J. Michael Jacob	Applications and Design with Analog Integrated Circuits	2nd	1993	Prentice Hall
3.	K.R. Botkar	Integrated Circuits	3rd	1994	Khanna Publishers,

LEARNING WEBSITES / WEB REFERENCES :

- https://www.tutorialspoint.com/analog_circuits/index.htm
- https://tutorialsinhand.com/tutorials/analog-electronics-tutorial/
- https://www.youtube.com
- http://vlabs.iitb.ac.in/vlabs-dev/labs

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Program Title	Diploma in Electronics & Telecommunication Engineering															
Course Code	Course Title	INDUSTRIAL ELECTRONICS												Course Type	Semester	
23304														DSC	3	
Learning Scheme						Assessment Scheme										
Actual Contact Hrs./Week			SLH	NIH	CREDITS	THEORY				PRACTICAL				SLA		Total
								Total		FA		SA				
CL	TL	LL				FA	SA	Max	Min	Max	Min	Max	Min	Max	Min	
3	—-	2	1	6	3	30	70	100	40	25	10	—	—	25	10	150

1) Theory paper duration 3 hrs.
2) Theory paper assessment is Internal and External.
3) The assessment of Practical is Internal and External.
4) The Online Practical assessment is Internal.
5) Formative Assessment out of 30 marks is average of 2 periodical tests (PT).
6) The assessment of Self Learning is Internal.

RATIONALE:

This subject twhich comes under the Applied Technology group enables the students to comprehend the theory, construction, concepts and working principles of various basic power electronic devices and circuits and their applications in industry. The knowledge acquired by student will help them to design, test, troubleshoot and repair power electronic circuits and systems that are widely used in heavy industries, switching and control systems, induction heating, resistance welding and so on.

COURSE OUTCOMES: --

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

Semester	3	Subject	Industrial Electronics
		4th Course in Second Year	
CO 304.1		Categories the working principle of static power switching Devices for power driven applications.	
CO 304.2		Distinguish and use various devices and turn on methods for SCR and Thyristor family	
CO 304.3		Compare the concept and design of single phase and three phase-controlled rectifiers	
CO 304.4		Illustrate the concept of Resistance and its applications	
CO 304.5		Justify the concept of High frequency heating. and its applications	
CO 304.6		Propose the concept of Ultra sonics in various Biomedical and non - destructive testing and basic applications	

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

SEM III	INDUSTRIAL ELECTRONICS						
CO	(4th Course in Second Year) PREPARED BY : Dr. V. R. Rathod Mr. S. N. Jirapure, Mr. A.A.Patil						
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO304.1	1	2	3	2	2	3	2
CO 304.2	1	2	3	2	2	1	2
CO 304.3	3	2	2	3	1	2	2
CO 304.4	3	1	2	2	2	1	2
CO 304.5	1	2	2	2	2	1	2
CO TOTAL	09	09	12	11	09	08	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

Dr. V. R. Rathod
Mr. S. N. Jirapure
Mr. A. A. Patil

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	Section -- 1						
Chapter No	**Topics**	**Periods**	**Marks**				**COs**
		Hrs.	**R**	**U**	**A**	**Total**	
1	**STATIC POWER SWITCHING DEVICES**						
	Static Power Switching Devices 1.1Thyristor Family Devices – (SCR,TRIAC and DIAC and Power MOSFET) 1.1.1Construction of SCR,TRIAC and DIAC 1.1.2 Detailed operation of SCR, TRIAC and DIAC 1.1.3 I-V Characteristics of SCR, TRIAC and DIAC 1.1.4 Specifications and ratings of SCR, TRIAC and DIAC. 1.2 Applications on SCR, TRIAC, DIAC and Power MOSFET	10	04	04	04	12	**CO 304.1**
2	**GATE TRIGGERING CIRCUITS OF SCR**						
	2.1 Various Gate Triggering Methods – D.C, A.C & Pulse triggering. 2.2 RC triggering circuits. 2.3 UJT Construction, Characteristics and Application as Relaxation Oscillator. 2.4 PUT Construction, Characteristics and Application as Relaxation Oscillator.	08	04	04	04	12	**CO 304.2**
3	**PHASE CONTROLLED CONVERTERS**						
	3.1 Concept of Controlled Conversion of a.c to d.c 3.2 Various types of control techniques 3.3 Rectifier Circuits Using SCR 3.3.1 Single Phase Half Wave, Full Wave & Bridge Controlled Rectifier – with Resistive Load. 3.3.2 Expressions (no derivations) for Output d.c voltage, d.c power, output a.c voltage, input a.c power	08	04	03	04	11	**CO 304.3**

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	Section -- 2						
Chapter No.	Topics	Periods	Marks				COs
		Hrs.	R	U	A	Total	
4	**RESISTANCE WELDING**						
	4.1 Working Principle of Resistance Welding process. 4.2 Electronic Circuits used in Resistance Welding – Line Contractor &Sequential Timer. 4.3 Energy Storage Welding Process	08	04	06	04	14	**CO 304.4**
5	**HIGH FREQUENCY HEATING**						
	5.1 Need & Advantages 5.2 Induction Heating 5.2.1 Operating Principle 5.2.2 Applications – Industrial Heating, Heat Treatment 5.3 Dielectric Heating 5.3.1 Operating Principle Applications- Industrial, Medical.	08	04	08	04	14	**CO 304.5**
6	**ULTRASONICS**						
	6.1 Introduction- Ultrasonic generation Properties and Applications	06	02	01	04	07	**CO 304.6**

IMPLEMENTATION STRATEGY: Use of PowerPoint presentations and Videos

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

LIST OF LABORATORY EXPERIENCES

EXP. NO.	TITLE	COURSE OUTCOME	CHAPT. NO.
1	V-I Characteristics of SCR	**CO406.1**	1
2	V-I Characteristics of TRIAC	**CO406.1**	1
3	V-I Characteristics of DIAC	**CO406.1**	1
4	V-I Characteristics of UJT	**CO406.1**	1
5	UJT Relation Oscillator	**CO406.2**	2
6	TRIAC DIAC Light Dimmer Circuit	**CO406.2**	2
7	Single Phase Half Wave Control Rectifier	**CO406.2**	3
8	H- Bridge Using Power MOSFET	**CO406.1**	1
9	Application of Induction Heating	**CO406.5**	5
10	Ultrasonics Generation	**CO406.6**	6

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

IMPLEMENTATION STRATEGY

1. Teaching plan
2. Minimum 10 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:

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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							
2303001							
2303002							

*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 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 diarywith details of individual contribution. Assessment is done by project guide based on their performance and presentation of submission.

SR. NO.	TITLE
1	Applications based on SCR, TRIAC, DIAC and UJT
2	Applications based on TRIAC and DIAC for Fan Control
3	Applications based on Power MOSFET for Motor Speed Control

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	STATIC POWER SWITCHING DEVICES	10	04	04	04	12
2	GATE TRIGGERING CIRCUITS OF SCR	08	04	04	04	12
3	PHASE CONTROLLED CONVERTERS	08	04	03	04	11
	Section II					
4	RESISTANCE WELDING	09	04	08	08	14
5	HIGH FREQUENCY HEATING	09	04	08	08	14
6	ULTRASONICS	04	04	08	08	07
	Total	48	24	42	36	70
	Legends :: R ::-- Remember , U ::-- Understand , A ::--Application					

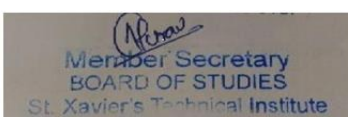
This specification table provide guide line to teacher to teach &assess student also a general guideline to frame theory paper & practical theory exam paper which student have to undertake. The actual distribution of marks at different taxonomy level in the question paper may vary from above table.

REFERENCES

Sr. No.	Author	Title	Edition	Year of Publication	Publisher & Address
1.	M. D.Singh	Powe Electronics	2nd	2006	McGraw Hill, New Delhi
2.	P.C. Sen.	Power Electronics	1st	1987	McGraw Hill, New Delhi
3.	Williams	Power Electronics & Applications	1st	1987	Macmillan Education

LEARNING WEBSITES / WEB REFERENCES :

- NPTEL :: Electrical Engineering - NOC:Fundamental of Power Electronics
  https://sctevtodisha.nic.in/ content/plugins/Lecture Note
  Fundamental of Power Electronics - Course (nptel.ac.in)



Program Title	Diploma in Electronics & Telecommunication Engineering																	
Course Code	Course Title	ELECTRONICS MEASUREMENTS & INSTRUMENTATION													Course Type	Semester		
23305															DSC	3		
Learning Scheme						Assessment Scheme												
Actual Contact Hrs./Week			SLH	NLH	CREDITS	THEORY				PRACTICAL				SLA		Total		
								Total		FA		SA						
CL	TL	LL				FA	SA	Max	Min	Max	Min	Max	Min	Max	Min			
3	—-	2	1	6	3	30	70	100	40	25	10	---	----	25	10	150		

1) IKS of 1 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) The Online Practical assessment is Internal.
6) Formative Assessment out of 30 marks is average of 2 periodical tests (PT).
7) The assessment of Self Learning is Internal.

RATIONALE:

The 'Electronic Test Instruments' plays an important role in the field of Electronics. This is being treated as a 'Compulsory course' and intended to teach students the Principles of working, Block diagrams and Front panel controls of various Electronic Test Equipment and their applications in this field. The prerequisite for this subject is the basic knowledge of courses viz "Basic Electronics", and "Electronic Circuits".

COURSE OUTCOMES: --

Course theory content, practical skills, experience help student to understand basic terms & methods, thus student should able to

Semester	3	Subject	Electronics Measuring & Instrument
CO305		5th Course in Second Year	
CO 305.1		Interpret the characteristics of measuring instrument.	
CO 305.2		Explain with sketches the construction and working principle of basic measuring Instrument .	
CO 305.3		Describe with sketches the procedure to convert the basic measuring instrument into Voltage, Current and Resistance measurement.	
CO 305.4		Illustrates the Principle and Operation of C.R.O.s.	
CO 305.5		Illustrates the Principle & Operation of Primarily Instruments used for the Measurements.	
CO 305.6		Measurement of capacitance and inductance using bridge.	

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

SEM IV	Electronics Measurements & Instrumentation						
CO	(5th Course in Second Year) PREPARED BY : Mr. S. N. Jirapue Mr. Abhijit Ajitkumar Patil						
CO 305.1	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO 305.2	3	3	3	2	2	1	2
CO 305.3	3	3	2	1	2	1	2
CO 305.4	3	3	3	2	1	2	2
CO 305.5	3	3	3	2	1	1	2
CO 305.6	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

Mr S. N. Jirapure

Mr Abhijit Ajitkumar Patil

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	Section – 1						
Chapter No	**Topics**	**Periods**	**Marks**				**COs**
		Hrs.	**R**	**U**	**A**	**Total**	
1	**FUNDAMENTAL's OF ELECTRONICS MEASUREMENTS**						
	1.1 Measurement: Concept, Units of measurement of fundamental quantities, standard and their classification, Static and dynamic characteristics, types of errors. 1.2 Classification of instruments: (i) Absolute and secondary instruments. (ii) Analog and digital instruments. (iii) Mechanical, electrical and electronic instruments. 1.3 Calibration: need and procedure.	06	01	06	01	08	**CO 305.1**
2	**CLASSIFICATION OF INSTRUMENTS**						
	2.1 Permanent Magnet Moving Coil (PMMC) type: 2.1.1 Dynamic Meter Movement – Construction, 2.1.2 Operation , 2.1.3 Advantages and Disadvantages, and 2.1.4 Applications. **2.2 Taut Band type :** 2.2.1 Construction, 2.2.2 Operation, 2.2.3 Advantages and Disadvantages, and 2.2.4 Applications. **2.3 Moving Iron type :** 2.3.1 Classification as Attraction type & Repulsion type, 2.3.2 Construction, 2.3.3 Operation, 2.3.4 Advantages & Disadvantages, 2.3.5 Applications, and 2.3.6 Comparison.	10	04	06	04	14	**CO 305.2**
3	**BASIC ELECTRONIC MEASURING INSTRUMENTS:**						
	3.1 AMMETER: 3.1.1 Basic D.C. Ammeter using a PMMC meter, 3.1.2 Construction, 3.1.3 Operation, 3.1.4 Specifications, and 3.1.5 Applications. **3.2 VOLTMETER:** 3.2.1 Basic D.C. Voltmeter using a PMMC meter, 3.2.2 Construction,	08	03	06	04	13	**CO 305.3**

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	3.1.3 Operation, 3.1.4 Specifications, and 3.1.5 Applications. **3.3 OHMMETER:** 3.3.1 Basic D.C. Ohmmeter using PMMC meter. 3.3.2 Construction, 3.3.3 Operation, 3.3.4 Specifications, and 3.3.5 Applications. **3.4 DIGITAL MULTIMETER (D.M.M.):** 3.5.1 Block diagram and its description, 3.5.2 Specifications, and 3.5.3 Front Panel Control diagram. **3.5** Comparison between Analog Multimeter and D.M.M.						
	Section – 2						
Chapter No.	**Topics**	**Periods**	**Marks**				**COs**
		Hrs.	**R**	**U**	**A**	**Total**	
4	**CATHODE RAY OSCILLOSCOPE (C.R.O.):**						
	4.1 Single Beam type C.R.O. : 4.1.1 Block Diagram, 4.1.2 Functions of each block, 4.1.3 Front Panel Control diagram, and 4.1.4 Applications. **4.2 Duel Beam C.R.O. :** 4.2.1 Block Diagram, 4.2.2 Functions of each block, 4.2.3 Front Panel Control diagram, and 4.2.4 Applications. **4.3** Comparison between Single & Duel Beam C.R.O.s. **4.4** Electronic Switch.	12	04	08	03	15	**CO 305.4**
5	**WAVE FORM GENREATORS AND MEASURING INSTRUMENTS**						
	4.1 Block diagram, with functions of each block, Front panel controls and Applications of the following Instruments: 4.1.1 Function Generator, and 4.1.2 Stroboscope. **4.2 Basic Concepts viz Construction, Operation, Advantages, Disadvantages and Applications of the Following:** 4.2.1 Maxwell's Bridge, 4.2.2 Hay's Bridge,	12	04	08	08	20	**CO 305.5 305.6**

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IMPLEMENTATION STRATEGY:

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

LIST OF LABORATORY EXPERIENCES

EXP. NO.	TITLE	COURSE OUTCOME	CHAPT. NO.
1	Study of Mechanical Instrument	C 305.2	2
2	Study of Electrical Instrument	C 305.2	2
3	Study of Electronics Instrument	C 305.2	2
4	Study PMMC Meter	C 305.2	2
5	Measurement of Voltage and Current Using PMMC	C 305.3	3
5	Study of D.M.M.- Internal Feature's Demonstration.	C 305.3	3
6	Measurement of Voltage and Current Using DMM	C 305.3	3
7	C.R.O.- Front Panel Control's	C 305.4	4
8	C.R.O Measurements of different Parameters such as Average Voltage, Peak Voltage, etc.	C 305.4	4
9	Maxwell's Bridge	C305.6	5
10	Hay's Bridge	C305.6	5

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

IMPLEMENTATION STRATEGY

1. Teaching plan
2. Minimum 10 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:

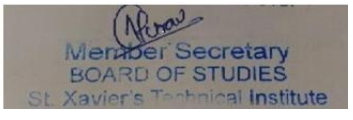
(Note:……the table should progress to the right for Lab Experience 7, 8, 9, ….and so on……)

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							
2303001							
2303002							

* 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 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 based on their performance and presentation of submission.

SR. NO.	TITLE
1	Designing and implementation of Maxwell's Bridge
2	Designing and implementation of Hay's Bridge
3	Designing and implementation of FET type Voltmeter

SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

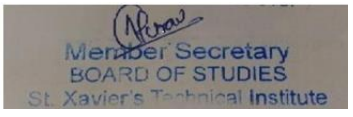
Chapter No.	Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
	Section I					
1	FUNDAMENTAL's OF ELECTRONICS MEASUREMENTS	06	01	06	01	08
2	CLASSIFICATION OF INSTRUMENTS:	10	04	06	04	14
3	BASIC ELECTRONIC MEASURING INSTRUMENTS:	08	03	06	04	13
	Section II					
4	CATHODE RAY OSCILLOSCOPE-CRO	12	04	08	03	15
5	WAVE FORM GENREATORS AND MEASURING INSTRUMENTS	12	04	08	08	20
	Total	48	19	33	18	70
	Legends :: R ::-- Remember , U ::-- Understand , A ::--Application					
	This specification table provide guide line to teacher to teach &assess student also a generalguideline 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 papermay vary from above table.					

REFERENCES

Sr. No.	Author	Title	Edition	Year of Publication	Publisher & Address
1.	H.S. Kalsi	Electronic Instrumentation	2nd	2007	Tata Mc Graw Hill Pub. Co.Ltd, New Delhi.
2.	A.K. Sawhney	A Course in Electrical & Electronics Measurements & Instrumentation	13th	1996	Dhanpat Rai & Sons, Delhi.
3.	William D. Cooper and Albert D. Helfrick	Modern Electronic Instrumentation and Measurement Techniques	3rd	1992	Prentice Hall India, Delhi.

LEARNING WEBSITES / WEB REFERENCES :

- Lecture 01: PMMC Instrument (youtube.com)
- https://www.youtube.com/watch?v=yMgmvmf-EEM



Program Title	Diploma in Electronics & Telecommunication Engineering																
Course Code	Course Title													Course Type	Semester		
23306	PYTHON PROGRAMMING													DSC	3		
Learning Scheme						Assessment Scheme											
Actual Contact Hrs./Week			SLH	NLH	CREDITS	THEORY				PRACTICAL				SLA		Total	
								Total		FA		SA					
CL	TL	LL				FA	SA	Max	Min	Max	Min	Max	Min	Max	Min		
—-	—-	2	—	2	1	—	—	—	—	25	10	—	—	—	—	25	

1) Theory paper duration 3 hrs.
2) Theory paper assessment is Internal and External.
3) The assessment of Practical is Internal and External.
4) The Online Practical assessment is Internal.
5) Formative Assessment out of 30 marks is average of 2 periodical tests (PT).
6) The assessment of Self Learning is Internal.

RATIONALE:

This subject is classified under Basic Technology courses and intends to teach students concepts of programming, rules and syntax of 'Python' language, arithmetic and logical operations, use of lists, Tuples, Dictionaries, functions, Classes and files in 'Python' programming.

Python is powerful programming language . It has efficient high level data structures and simple but effective approach object oriented programming. Python code is simple, short, readable, intuitive And powerful thus it is effective for introducing computing and problem solving to beginners. Its elegant syntax and dynamic typing together with its interpreted nature makes it ideal language for scripting and rapid application development in many areas.

COURSE OUTCOMES ::--

Course theory content, practical skills, experience help student to understand programming terms & methods, thus student should able to

Semester	3	Subject	PYTHON PROGRAMING
CO 306		6TH Course in Second Year	
CO 306.1		**Display message on screen using Python script**	
CO 306.2		**Develop Python program to demonstrate use of operators**	
CO 306.3		**Perform operations on data structures in Python**	
CO 306.4		**Develop functions for given problem**	
CO 306.5		**Design classes for given problem**	
CO 306.6		**Handle exceptions**	

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

SEM III	Python Programming						
CO 306	(6th Course in Second Year) PREPARED BY : RVG, AG						
CO 306	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO 306.1	2	3	2	-	-	1	1
CO 306.2	2	3	2	1		1	1
CO 306.3	3	2	2	1		1	1
CO 306.4	3	2	2	1		1	1
CO 306.5	3	2	2	1		1	1
CO 306.6	2	2	3	1		1	1
CO TOTAL	15	14	13	5		6	6
CORRELATION LEVEL	3	2	2	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 Expert
Mr. R.V.Gheware

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	Section -- 1						
Chapter No	**Topics**	**Periods**	**Marks**				**COs**
		Hrs.	**R**	**U**	**A**	**Total**	
1	**INTRODUCTION TO PYTHON**						
	1.1 Features of Python- Interactive, Object oriented, Interpreted. platform independent 1.2 Python building blocks- Identifiers, Keywords,Indention, Variables, Comments 1.3 Python environment setup – Installation 1.4 Running Simple Python scripts to display welcome message 1.5 Python Data Types: Numbers, String, Tuples, Lists, Dictionary. Declaration and use of datatypes	---	---	-----	----	---	**CO 306.1**
2	**PYTHON FUNDAMENTAL OPERATORS CONTROL OPERATION**						
	2.1 Basic Operators: Arithmetic, Assignment, Logical, Bitwise, Identity operators. Operator Precedence 2.2 Control Flow: Conditional Statements if, if … else ,nested if 2.3 Looping in Python While loop , for loop, nested loops 2.4 Loop manipulation using continue, pass, break	---	---	-----	----	---	**CO 306.2**
3	**DATA STRUCTUERS IN PYTHON**						
	3.1 Lists : Defining lists, accessing values in list, deleting values in list, updating lists. Basic list operations, Built in List functions 3.2 Tuples : Defining tuples, accessing values in tuple. Basic Tuple operations, Built in Tuples functions 3.3 Sets : Accessing values in Set, deleting values in Set, updating Sets. Basic Set operations, Built in Set functions 3.4 Dictionaries : Accessing values in Dictionary , deleting values in Dictionary, updating Dictionary. Basic Dictionary operations, Built in Dictionaries functions	---	---	-----	----	---	**CO 306.3**

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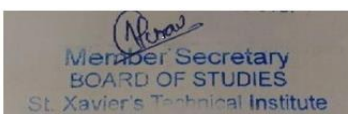
	Section -- 2						
Chapter No	**Topics**	**Periods**	**Marks**				**COs**
		Hrs.	**R**	**U**	**A**	**Total**	
4	**PYHTHON MODULES & PACKAGES**						
	4.1 Use of Python built in functions Math, type conversion functions. 4.2 User Defined Functions: Function Definition, Function calling , Function arguments and parameter passing , return statement. Scope of variable : Global and Local variable 4.3 Modules : Importing modules, importing objects from modules 4.4 Python Packages : Using standard packages e.g. math, SciPy, NumPy, matplotlib, pandas	---	---	----	----	---	**CO 306.4**
5	**OOPS IN PYTHON**						
	5.1 Creating Classes and Objects 5.2 Method Overloading and Overriding 5.3 Data Hiding 5.4 Data abstraction 5.5 Inheritance and composition classes	---	---	----	----	---	**CO 306.5**
6	**PYTHON I/O FUNCTIONS**						
	6.1 I/O Operations : Reading keyboard input, Printing to screen 6.2 File Handling : Opening file in different modes, accessing file content using standard library functions, Reading and writing flies, closing file 6.3 Exception Handling	---	---	----	----	---	**CO 306.6**

IMPLEMENTATION STRATEGY:

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

LIST OF LABORATORY EXPERIENCES

EXP. NO.	TITLE	COURSE OUTCOME	NO.
1	Install & Configure Python IDEand Python program to display message on Screen	C 304.1	
2	Write simple Python program using Operators	C 304.2	



3	Write simple Python program using control / conditional statements	C 304.1 C304.2	
4	Write simple Python program using loops and Turtle	C 304.1 ,.2	
5	Write simple Python program to perform List operation	C 304.3	
6	Write simple Python program to perform Tuples operation	C 304.3	
7	Python program to perform operation on Dictionaries	C 304.3	
8	Simple Python program to display waveforms using MatPlotLib	C 304.3	
9	Writing User Defined Functions	C 304.4	
10	Simple Python program to build GUI application	C 304.4	
11	Simple Python program to process Excel file using pandas dataframe	C 304.4	
12	Simple Python program having class and objects (OOPs)	C 304.4	

Fault finding practicals are demo experiments which is an extra skill imparted in the laboratory andnot covered in theory.

IMPLEMENTATION STRATEGY

1. Teaching plan
2. Minimum 10 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……)

LAB EXPERIENCE		1	2	3	4	5	6
	COURSE OUTCOMES	C202.2 (out of 25)	C202.2 (out of 25)	C202.2 (out of 25)	C202.3 (out of 25)	C202.3 (out of 25)	C202.3 (out of 25)
STUDENT SPNO							
1303001							
1303002							

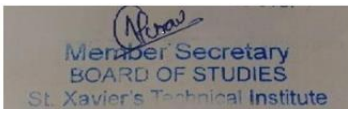
* The final % attainment level for TERM WORK of each course outcome may then becomputed and the overall % attainment level for the course, for term work may then be calculated.

REFERENCES ::

Sr. No.	Author	Title	Edition	Year of Publication	Publisher & Address
1.	Rao.K. Nageswara Shaikh Akbar	Python Programming	4th	2000	Scitech Publications(India) Pvt
2.	Lutz, Mark	Learning Python	5th	2002	O'Reilly Publication
3.	Beazley, David	Python Essential	4th	1998	Addison-Wesley Professional
4.	Paul, Barry	Head First Python	2nd	2013	O'Reilly Publication

LEARNING WEBSITES / WEB REFERENCES ::

- https://www.tutorialspoint.com/python/index.htm
- https://www.programiz.com/python-programming
- https://www.youtube.com https://nptel.ac.in/courses/117106113/34



Program Title	Diploma in Electronics & Telecommunication Engineering															
Course Code	Course Title	CIRCUIT SIMULATION & CIRCUIT BUILDING												Course Type	Semester	
23307														DSC	3	
Learning Scheme						Assessment Scheme										
Actual Contact Hrs./Week			SLH	NIH	CREDITS	THEORY				PRACTICAL				SLA		Total
								Total		FA		SA				
CL	TL	LL				FA	SA	Max	Min	Max	Min	Max	Min	Max	Min	
—	—-	2	4	6	3	—	—	—	—	25	10	—	—	25	10	50

1) Theory paper duration 3 hrs.
2) Theory paper assessment is Internal and External.
3) The assessment of Practical is Internal and External.
4) The Online Practical assessment is Internal.
5) Formative Assessment out of 30 marks is average of 2 periodical tests (PT).
6) The assessment of Self Learning is Internal.

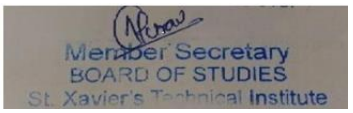
RATIONALE:

The objective of this subject is to involve students in actual practical work of designing, constructing, designing and building circuits pertaining to linear integrated electronics on printed circuit boards. After completing the PCB layout design using relevant software, these circuits have to built and tested for their performance, response and characteristics. This will enable the students to gain confidence with experience and the practical joy of building simple application based circuits with their implementation, so as to bring about a clear understanding of the working of these linear integrated circuits.

The details of activities and guidance concerned with the circuits to be constructed and tested by the students will be provided by the concerned teacher. The activities are designed in such a manner so as to provide maximum hands-on experiences and impart practical training and skills in circuit building and testing.

COURSE OUTCOMES ::--Course content help student to experience practical skills about soldering technique understand Basic electronics , Linear Integrated Circuits Digital Circuits

Semester 3	Subject	CIRCUIT SIMULATION & CIRCUIT BUILDING
CO 307	7th Course in Second Year	
CO 307.1	Verify performance of the designed circuit through simulation using the "Ni MultiSim" circuit simulation software.	
CO 307.2	Develop soldering skills.	
CO 307.3	Compare the performance of the simulated circuit and physical circuit with components mounted on a printed circuit board.	
CO 307.4	Design, Simulate, Construct & Test the various application circuits like Regulated power supply using diode & Ic, OpAmp applications circuits, Digital Circuits	



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

SEM III	CIRCUIT SIMULATION & CIRCUIT BUILDING						
CO 307	(7thCourse in Second Year) PREPARED BY : SD', AG,RS						
CO 307	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO 307.1	3	2	2	3		1	2
CO 307.2	3		2	1			
CO 307.3	3	3	3	3	2	2	1
CO 307.4	3	3	3	2	2	2	1
CO TOTAL	12	8	10	8	4	5	4
CORRELATION LEVEL	2	1	2	1	1	1	1

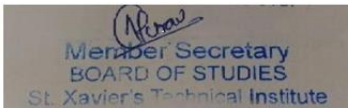
TABLE TO DECIDE CORRELATION LEVELS

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 Expert

Mr. Stevenson D'souza
Mr. Anil Gurav
Mr. Rakeshkumar Saroj



LIST OF LABORATORY EXPERIENCES

EXP. NO.	TITLE	COURSE CODE
1.	Introduction and Need of CSPCB	-
2.	Introduction to Multisim Software.	C305.1
3.	Simulating the Schematic Diagram in Multisim Software , build and test Regulated Power supply – 5V, +/-12V, +/- 15V	C305.2
4	Simulate , Build & Test Integrator Using IC- 741	C305.1
5	Simulate , Build & Test Differentiator Using IC- 741	C305.1
6	Simulate, Build & Test Low Pass Filter Using IC- 741	C305.2
7	Simulate , Build & Test High Pass Filter Using IC- 741	C305.2
8	Simulate , Build & Test Monostable Multivibrator (Using IC-555)	C305.5
9	Simulate , Build & Test Astable MultiVibrator (Using IC- 741)	C305.1
10	Simulate , Build & Test Astable MultiVibrator (Using IC-555)	C305.5
11	Simulate , Build & Test Gates truth table verifier	C305.4
12	Simulate , Build & Test Counter using flipflops	C305.4
13	Simulate , Build & Test LED sequence player	C305.4

Fault finding practicals are demo experiments which is an extra skill imparted in the laboratory andnot covered in theory.

IMPLEMENTATION STRATEGY

1. Teaching plan
2. Minimum 10 practicals

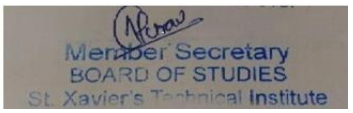
The table to measure the attainment levels for TERM WORK (on a rating scale of "out of 25') of the defined expected course outcomes is as shown in the format given below:
(Note:……the table should progress to the right for Lab Experience 7, 8, 9, ….and so on……)

LAB EXPERIENCE		1	2	3	4	5	6
	COURSE OUTCOMES	C202.2 (out of 25)	C202.2 (out of 25)	C202.2 (out of 25)	C202.3 (out of 25)	C202.3 (out of 25)	C202.3 (out of 25)
STUDENT SPNO							
1305001							
1305002							
1305004							

* 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.

LEARNING WEBSITES / WEB REFERENCES :

- https://www.tutorialspoint.com/digital_circuits/index.htm
- http://vlabs.iitb.ac.in/vlabs-dev/labs/
- https://www.mathsisfun.com/binary-digits.html



Program Title	Diploma in Electronics & Telecommunication Engineering																
Course Code	Course Title	ESSENCE OF INDIAN CONSTITUTION												Course Type	Semester		
23308														VEC	3		
Learning Scheme						Assessment Scheme											
Actual Contact Hrs./Week			SLH	NLH	CREDITS	THEORY				PRACTICAL				SLA		Total	
								Total		FA		SA					
CL	TL	LL				FA	SA	Max	Min	Max	Min	Max	Min	Max	Min		
1	—-	—-	1	2	1	—	—	—	—	—	—	—	—	25	10	25	

1) IKS 2Hrs.
2) Theory paper duration 3 hrs.
3) Theory paper assessment is Internal and External.
4) The assessment of Practical is Internal and External.
5) The Online Practical assessment is Internal.
6) Formative Assessment out of 30 marks is average of 2 periodical tests (PT).
7) The assessment of Self Learning is Internal.

RATIONALE:

Fundamental knowledge of the Indian Constitution equips production engineering professionals with essential legal, ethical, and governance insights. Understanding these fundamental of Indian constitution provides diploma engineering students with a holistic view of the constitutional values that underpin India's governance and societal framework. It encourages them to contribute responsibly to the nation's technological advancement while upholding principles of justice, liberty, equality, and fraternity.

COURSE OUTCOMES ::-- Course content help student to understand society expected role & responsibility abide by the Constitution in their personal and professional life.

Semester	3	Subject	ESSENCE OF INDIAN CONSTITUTION
CO 308		8th Course in Second Year	
CO 308.1		List salient features and characteristics of the constitution of India	
CO 308.2		Follow fundamental rights and duties as responsible citizen and engineer of the country.	
CO 308.3		Analyze major constitutional amendments in the constitution.	
CO 308.4		Follow procedure to cast vote using voter-id.	

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

SEM III	ESSENCE OF INDIAN CONSTITUTION						
CO 308	(8thCourse in Second Year) PREPARED BY : SBG						
CO 308	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO 308.1	1	-	-	-	2	-	-
CO 308.2	1	-	-	-	2	-	-
CO 308.3	1	2	-	-	2	-	1
CO 308.4	-	-	-	1	-	-	-
CO TOTAL	4	2	-	1	6	-	1
CORRELATION LEVEL	2	1	2	1	1	1	5

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. Shivaji Ghungrad

Member Secretary
BOARD OF STUDIES
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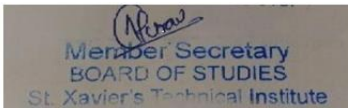
	Section -- 1						
Chapter No	**Topics**	**Periods**	**Marks**				**COs**
		Hrs.	**R**	**U**	**A**	**Total**	
1	**CONSTITUTION AND PREAMBLE**						
	1.1 Meaning of the constitution of India. 1.2 Historical perspectives of the Constitution of India. 1.3 Salient features and characteristics of the Constitution of India. 1.4 Preamble of the Constitution of India.	04	---	-----	----	05	**CO 306.1**
2	**FUNDAMENTAL RIGHTS AND DIRECTIVE PRINCIPLES**						
	2.1 Fundamental Rights Under Part-Iii 2.2 Fundamental Duties And Their Significance Under Part-IV-A. 2.3 Relevance Of Directive Principles Of State Policy Under Part-IV A	06	---	----	----	10	**CO 306.2**
3	**GOVERNANCE AND AMENDMENTS**						
	3.1 Amendment procedure of the Constitution and their types - simple and special procedures. 3.2 The Principle of Federalism and its contemporary significance along with special committees that were setup. 3.3 Major Constitutional Amendment procedure - 1st, 7th, 42nd 44th, 73rd & 74th, 76th, 86th, 52nd & 91st, 102nd	06	--	-----	----	10	**CO 306.3**
4	**ELECTORAL LITERACY AND VOTER'S EDUCATION**						
	4.1 Electoral rights , Electoral process of registration, Ethical electoral participation 4.2 Motivation and facilitation for electoral participation 4.3 Voter's guide 4..4 Prospective empowered voter 4.5 Voting procedure 4.6 Voter awareness 4.7 Voter online registration https://www.ceodelhi.gov.in/ELCdetails.asp						

SUGGESTED MICRO PROJECT

Assignments are to be provided by the course teacher in line with the targeted COs.
A1. Outline the procedure to submit application for Voter-id
A1. Prepare an essay on Constitution of India.
A3. Prepare a comparative chart of unique features of Indian Constitution of India and Constitution of USA A4.



Self-learning topics:

1) Parts of the constitution and a brief discussion of each part.
2) Right to education and girl enrollment in schools.
3) GER of Girls and Boys.
4) Right to equality.
5) Social Democracy.
6) Women Representation in Parliament and State Assemblies.

Micro project

1. Organize a workshop-cum discussions for spreading awareness regarding Fundamental Rights of the citizen of the country.
2. Prepare elaborations where directive principle of State policy has prevailed over Fundamental rights with relevant Supreme Court Judgments.
3. Organize a debate on 42nd, 97th and 103rd Constitutional Amendment Acts of Constitution of India.

Seminar

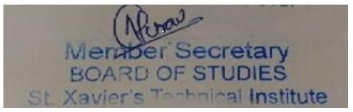
1. Differences in the ideals of Social democracy and Political democracy.
2. Democracy and Women's Political Participation in India.
3. Adoption of Article 365 in India.
4. Situations where directive principles prevail over fundamental rights.

Group discussions on current print articles.

- Art 356 and its working in Post-Independent India.
- Women's Resrvation in Panchayat leading to Pati Panchayats - Problems and Solutions.
- Adoption of Article 365 in India.
- Need of Amendments in the constitution.
- Is India moving towards a Unitary State Model?

Note :

1. Above is just a suggestive list of micro projects and assignments; faculty must prepare their own bank of micro projects, assignments, and activities in a similar way.
2. The faculty must allocate judicial mix of tasks, considering the weaknesses and / strengths of the student in acquiring the desired skills.
3. If a micro project is assigned, it is expected to be completed as a group activity. SLA marks shall be awarded as per the continuous assessment record.
4. If the course does not have associated SLA component, above suggestive listings is applicable to Tutorials and maybe considered for FA-PR evaluations.



REFERENCES ::

Sr. No.	Author	Title	Edition	Year of Publication	Publisher & Address
1.	P.M. Bakshi	The Constitution of India	4th	——	Universal Law Publishing, New Delhi 15th edition, 2018, ISBN: 9386515105
2.	D.D. Basu	Introduction to Indian Constitution	5th	——-	Lexis Nexis Publisher, New Delhi, 2015, ISBN:935143446X
3.	B. K. Sharma	Introduction to Constitution of India	4th	——-	PHI, New Delhi, 6thedition, 2011, ISBN:8120344197
4.	B.L. Fadia	The Constitution of India	2nd	——-	Sahitya Bhawan,Agra, 2017, ISBN:8193413768

LEARNING WEBSITES / WEB REFERENCES :

- http://www.legislative.gov.in/constitution-of-india
- https://en.wikipedia.org/wiki/Constitution_of_India
- https://www.india.gov.in/my-government/constitution-india
- https://www.toppr.com/guides/civics/the-indian-constitution/ the-constitution-of-india/
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- https://constitutionnet.org/vl/item/basic-structure-indian-c onstitution

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