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

Revised Curriculum

For

Diploma Programme in Electronics and Telecommunication Engineering

From July 2023

A.Y.2023-24

ST. Xavier's Technical Institute, Mahim, Mumbai 400 016
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 End-Semester-Examination (ESE) i.e Theory, Practical, Term work by securing minimum of 40% marks of the maximum marks i.e. :::--

   - For Theory (ESE) ::--- 28 out of 70 marks
   - For Theory (ESE) ::--- 32 out of 80 marks
   - For Practical (ESE) ::--- 20 out of 50 marks
   - For Term work ::--- 10 out of 25 marks
   - For Term work ::--- 20 out of 50 marks

2. Progressive Assessment (PA) for Theory includes – average of two PTs of 20 marks each. Progressive Assessment (PA) for Practical includes lab performance , micro projects, Assignment/Quiz/Presentations & attendance as per the course. The scheme and schedule for progressive assessment should be informed to the students and discussed with them at the start of the term.

3. 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 400 016
TEACHING AND EXAMINATION SCHEME

REVISED AND EFFECTIVE FROM JULY 2023

Program Name :::--- Electronics & Telecommunication Engineering

SEMESTER ::::---THREE

Duration ::::--- 16 weeks

ACADEMIC YEAR - 2023-24

SR.NO	COURSE TITLE	COURSE CODE	TEACHING SCHEME L	T	P	CREDITS	EXAMINATION SCHEME Exam Duration in Hrs	THEORY ESE Max Marks	ESE Min Marks	PA Max Marks	PA Min Marks	TOTAL Max Marks	TOTAL Min Marks	PRACTICAL ESE Max Marks	ESE Min Marks	PA Max Marks	PA Min Marks	TOTAL Max Marks	TOTAL Min Marks	GRAND TOTAL
1	Principles of Electronic Communication	ETPC301	3	0	2	4	3	70	28	30#	00	100	40	50	20	25	10	75	30	175
2	Digital Techniques	ETPC302	3	0	2	4	3	70	28	30#	00	100	40	50	20	25	10	75	30	175
3	Linear Integrated Circuit	ETPE303	3	0	2	4	3	70	28	30#	00	100	40	50	20	25	10	75	30	175
4	Python Programming	ETOE304	2	0	2	3	----	----	----	----	----	----	----	50*	20*	25	10	75	30	75
5	Circuit Simulation & Circuit Building	ETPC305	0	0	4	2	----	----	----	----	----	----	----	50	20	50	20	100	40	100
6	Software Simulation	ETPE306	0	0	2	1	----	----	----	----	----	----	----	----	----	50	20	50	20	50
7	Academic Skill	ETHS307	0	0	2	1	----	----	----	----	----	----	----	----	----	50	20	50	20	50
	TOTAL		11	0	16	19		210		90		300		250		250		500		800

Total No. of Credits = 19 **Total No. of Student Contact Hours = 27 Hrs.** **Total Marks 800**

Theory and Practical periods of 60 minutes each. **Medium of Instruction ::-- English**

Abbreviations						
TH	Theory	ESE	End Semester Exam	----	Not Applicable	
TU	Tutorial	PA	Progressive Assessment	*	Online Examination	

Program Title				**Diploma in Electronics & Telecommunication Engineering**							
Course Code	**ETPC 301**	Course Title		**Principles of Electronic Communication**					Semester	**3**	
Teaching Scheme					Examination Scheme						
Credits					Theory			Practical	Oral	Online	Term work	**Total**
Lecture	Tutorial	Practical	Total		ESE	PA	Total					
3	-----	2	4		70	30#	100	50	-----	-------	25	175
	1) Theorypaperduration3hrs. 2) Theory paper assessment is Internal and External. 3) The assessment of practical is Internal and External. 4) # Progressive Assessment out of 30 marks , 20 marks is average of2periodicaltests(PT)and10marksareformicroprojectassessment.											

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	(1stCOURSE IN SECOND YEAR) PREPAREDBY: VN, SG								
CO301	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2
CO301.1	3	2	1	2	2	1	2	2	1
CO301.2	3	3	2	3	2	1	2	2	1
CO301.3	2	3	3	2	3	1	2	3	1
CO301.4	3	3	3	3	2	1	2	2	1
CO301.5	2	3	2	3	3	1	2	3	1
CO TOTAL	16	17	13	15	15	6	12	12	5
CORRELATION LEVEL	3	3	2	3	3	1	2	2	1

TABLETODECIDECORRELATIONLEVELS

COSUMTOTAL	06	12	18
CORRELATIONLEVEL	1	2	3

COSUMTOTAL	0,1,2	3,4,5,6,7,8	9,10,11,12, 13,14	15,16,17,18
CORRELATIONLEVEL	0	1	2	3

Subject Expert
Mrs. Surbhi Gaoshinde
Mr. Vinay Nagalikar

	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	**CO301.1**
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	**FREQUENCYMODULATION & 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 3.5 Advantages & disadvantages of FM over AM	10	04	06	03	13	**CO301.2 301.3**

	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. Ground wave 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	**CO301.3**
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	**CO301.2 301.4**
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**

IMPLEMENTATIONSTRATEGY:

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

LISTOFLABORATORYEXPERIENCES

EXP. NO.	TITLE	COURSE OUTCOME	CHAPT. NO.
1	Amplitude Modulation Using DSB –TC and SC modulator	**CO301.1 301.2**	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.	**CO301.1 301.3**	5
12	Measurement of Attenuation of Horn Antenna.	**CO301.1 301.3**	5

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

IMPLEMENTATION STRATEGY

1. Practical 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 SPNO							
1303001							
1303002							
1303004							

* 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 ofPublication	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

LEARNINGWEBSITES /WEBREFERENCES:

- 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	**ETPC 302**	Course Title		**DIGITAL TECHNIQUES**					Semester	**3**	
Teaching Scheme					Examination Scheme						
Credits					Theory			Practical	Oral	Online	Term work	**Total**
Lecture	Tutorial	Practical	Total		ESE	PA	Total					
3	-----	2	4		70	30#	100	50	-----	-------	25	175
	1) Theory paper duration 3 hrs. 2) Theory paper assessment is Internal and External. 3) The assessment of practical is Internal and External. 4) # Progressive Assessment out of 30 marks , 20 marks is average of 2 periodical tests (PT) and 10 marks are for micro project assessment.											

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	**DIGITAL TECHNIQUES**
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	PSO 1	PSO 2
CO 302.1	3	3	3	2	2	1	2	2	2
CO 302.2	3	3	2	1	2	1	2	3	2
CO 302.3	3	3	3	2	1	2	2	3	2
CO 302.4	3	3	3	2	1	1	2	2	2
CO 302.5	3	3	3	2	1	1	2	3	2
CO 302.6	3	3	3	2	1	1	2	1	1
CO TOTAL	18	18	17	11	8	7	12	14	11
CORRELATION LEVEL	3	3	3	1	1	1	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 Experts
Dr. Janani Natarajan
Mr.R.V.Gheware

	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**

	Section -- 1						
Chapter No	**Topics**	**Periods**	**Marks**				**COs**
		Hrs.	**R**	**U**	**A**	**Total**	
3	**COMBINATIONAL CIRCUITS**						
	3.1Half 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 /purchasing components

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 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	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 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.	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

Program Title			**Diploma in Electronics & Telecommunication Engineering**								
Course Code	**ETPE 303**	Course Title	**LINEAR INTEGRATED CIRCUITS**						Semester	**3**	
Teaching Scheme					Examination Scheme						
Credits					Theory			Practical	Oral	Online	Term work	**Total**
Lecture	Tutorial	Practical	Total		ESE	PA	Total					
3	-----	2	4		70	30#	100	50	-----	-------	25	175
	1) Theory paper duration 3 hrs. 2) Theory paper assessment is Internal and External. 3) The assessment of practical is Internal and External. 4) # Progressive Assessment out of 30 marks , 20 marks is average of 2 periodical tests (PT) and 10 marks are for micro project assessment.											

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 basic electronics 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.**	

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	PSO 1	PSO 2
CO 303.1	3		1			2		1	2
CO 303.2	1		1	1	1	1	1	2	2
CO 303.3	2		1	1		1		2	1
CO 303.4	3	2	3	2	1	3	1	1	3
CO 303.5	3	1	3	2	1	2	2	3	2
CO TOTAL	12	3	9	6	3	9	4	9	9
CORRELATION LEVEL	2	1	2	1	1	2	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. Vinay Nagalikar

	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**

	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							
1303004							

* 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 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	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 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.	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/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

Program Title				**Diploma in Electronics & Telecommunication Engineering**							
Course Code	**ETOE 304**	Course Title		**PYTHON PROGRAMING**					Semester	**3**	
Teaching Scheme					Examination Scheme						
Credits					Theory			Practical	Oral	Online	Term work	**Total**
Lecture	Tutorial	Practical	Total		ESE	PA	Total					
2	-----	2	3		----	-----	------	50	-----	-------	25	75
	1) Theory paper duration 3 hrs. 2) Theory paper assessment is Internal and External. 3) The assessment of practical is Internal and External. 4) # Progressive Assessment out of 30 marks , 20 marks is average of 2 periodical tests (PT) and 10 marks are for micro project assessment.											

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

Semester	**3**	Subject	**PYTHON PROGRAMING**
CO 304		4^{TH} Course in Second Year	
CO 304.1		**Display message on screen using Python script**	
CO 304.2		**Develop Python program to demonstrate use of operators**	
CO 304.3		**Perform operations on data structures in Python**	
CO 304.4		**Develop functions for given problem**	
CO 304.5		**Design classes for given problem**	
CO 304.6		**Handle exceptions**	

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

SEM III	Python Programming								
CO 304	(4th Course in Second Year) PREPARED BY : RVG, AG								
CO 304	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2
CO 304.1	2	3	2	-	-	1	1	1	2
CO 304.2	2	3	2	1	1	1	1	2	3
CO 304.3	3	2	2	1	1	1	1	2	3
CO 304.4	3	2	2	1	1	1	1	1	2
CO 304.5	3	2	2	1	1	1	1	1	0
CO 304.6	2	2	3	1	1	1	1	1	0
CO TOTAL	15	14	13	5	5	6	6	8	10
CORRELATION LEVEL	3	2	2	1	1	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 Expert
Mr. R.V.Gheware

	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	04	---	-----	----	05	**CO 304.1**
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	06	---	-----	----	10	**CO 304.2**
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, deleting values in tuples, updating Tuples. 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	06	---	-----	----	10	**CO 304.3**

	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	06	---	----	----	10	**CO 304.4**
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	05	---	----	----	08	**CO 304.5**
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	05	---	----	----	07	**CO 304.6**

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	CHAPT. NO.
1	Install & Configure Python IDE	C 304.1	1
2	Write simple Python program to display message on Screen	C 304.1	1
3	Write simple Python program using Operators	C 304.2	2
4	Write simple Python program to display control / conditional statements	C 304.1 C304.2	2
5	Write simple Python program to display loop operation	C 304.1 C304.2	2
6	Write simple Python program to perform Tuples operation	C 304.3	3
7	Write simple Python program to perform Tuples operation	C 304.3	3
8	Write simple Python program to perform operation on Lists	C 304.3	3
9	Write simple Python program to perform Dictionaries	C 304.3	3
10	Write simple Python program to perform math built in Functions	C 304.4	4
11	Write simple Python program to perform string built in functions	C 304.4	4
12	Write simple Python program to perform module functions	C 304.4	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. 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							
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 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 PYTHON	04	----	-----	----	05
2	PYTHON FUNDAMENTAL OPERATORS CONTROL OPERATION	06	----	-----	----	10
3	DATA STRUCTUERS IN PYTHON	06	-----	-----	----	10
	Section II					
4	PYHTHON MODULES & PACKAGES	06	---	----	----	10
5	OOPS IN PYTHON	05	---	----	----	08
6	PYTHON I/O FUNCTIONS	05	---	----	----	07
	Total	**32**	---	----	----	**50**
	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.	Rao.K. Nageswara Shaikh Akbar	Python Programming	4th	2000	Scitech Publications(India) Pvt Ltd
2.	Lutz, Mark	Learning Python	5th	2002	O'Reilly Publication
3.	Beazley, David	Python Essential Referance	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
- http://spoken-tutorial.org/
- https://nptel.ac.in/courses/117106113/34

Program Title				**Diploma in Electronics & Telecommunication Engineering**							
Course Code	**ETPC 305**	Course Title		**CIRCUIT SIMULATION & CIRCUIT BUILDING -I**					Semester	**3**	
Teaching Scheme					Examination Scheme						
Credits					Theory			Practical	Oral	Online	Term work	**Total**
Lecture	Tutorial	Practical	Total		ESE	PA	Total					
---	-----	4	2		---	---	-----	50	-----	-------	50	100
	1) Theory paper duration 3 hrs. 2) Theory paper assessment is Internal and External. 3) The assessment of practical is Internal and External. 4) # Progressive Assessment out of 30 marks , 20 marks is average of 2 periodical tests (PT) and 10 marks are for micro project assessment.											

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 305		5th Course in Second Year	
CO 305.1		**Verify performance of the designed circuit through simulation using the "Ni MultiSim" circuit simulation software.**	
CO 305.2		**Develop soldering skills.**	
CO 305.3		**Compare the performance of the simulated circuit and physical circuit with components mounted on a printed circuit board.**	
CO 305.4		**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 305	(7thCourse in Second Year) PREPARED BY : AP, AG ,RS								
CO 305	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2
CO 305.1	3	2	2	3		1	2	3	3
CO 305.2	3		2	1				3	2
CO 305.3	3	3	3	3	2	2	1	3	2
CO 305.4	3	3	3	2	2	2	1	2	3
CO TOTAL	12	8	10	8	4	5	4	11	10
CORRELATION LEVEL	2	1	2	1	1	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. 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 and not covered in theory.

IMPLEMENTATION STRATEGY

1. Practical 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	**ETPC 306**	Course Title		**SOFTWARE SIMULATION**					Semester	**3**	
Teaching Scheme					Examination Scheme						
Credits					Theory			Practical	Oral	Online	Term work	**Total**
Lecture	Tutorial	Practical	Total		ESE	PA	Total					
---	-----	2	1		---	---	-----	----	-----	-------	50	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) # Progressive Assessment out of 30 marks , 20 marks is average of 2 periodical tests (PT) and 10 marks are for micro project assessment.											

RATIONALE:

This subject belongs to the Applied Technology category. The MATLAB simulation software is universally and widely accepted in all the branches of engineering and not just electronics. It can be used for simulation of circuit operation, waveform analysis, mathematical calculations, etc. The library functions available in this software are very flexible and useful for applying them to simulate real operating conditions and behavior of circuits. Practice on this subject / software will provide the student with a better understanding of all the subjects covered in the earlier semesters, as well as the subjects that will be studied in the fifth and sixth semesters. Knowledge of 'C' Programming will be useful in the use of this software.

COURSE OUTCOMES ::--

Semester	**3**	Subject	**SOFTWARE SIMULATION**
CO 306		6th Course in Second Year	
CO 306.1		Evaluate Arithmetic, Logarithmic, Exponential and Trigonometric expressions in MATLAB.	
CO 306.2		Formulate mathematical problems and implement in MATLAB.	
CO 306.3		Sketch simple plots using MATLAB.	
CO 306.4		Solve various matrix operations using MATLAB.	
CO 306.5		Implement modulated wave forms using Matlab	
CO 306.6		Compose, compile and debug programs in MATLAB.	

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

SEM III	SOFTWARE SIMULATION								
CO 306	(6th Course in Second Year) PREPARED BY : SD								
CO 306	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2
CO 306.1	3	2	1				1	3	3
CO 306.2	3	2	1		2	2	2	3	2
CO 306.3	3		2			2	2	3	2
CO 306.4	3	2		2		1	2	2	3
CO TOTAL	2	1		1	2	3		11	10
CORRELATION LEVEL	2	1	3	2	2	3	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

Mrs. Sanchita Datta

LIST OF LABORATORY EXPERIENCES

EXP. NO.	TITLE	COURSE CODE
1	Introduction to MATLAB. Calculations using MATLAB – Arithmetic, Exponential, Logarithmic, Trigonometric and calculations involving complex numbers.	C 306.1
2	Creating and working with arrays of numbers.	C 306.2
3	Creating and printing simple plots.	C 306.3
4	Creating, saving and executing a script file.	C 306.1
5	Creating and executing a function file – Converting temperature from Centigrade to Fahrenheit. Finding factorial of number Cross product of vectors.	C 306.6
6	Matrices and Vectors– Indexing a matrix, matrix manipulations – transpose, appending and deleting row or column, matrix operation.	C 306.4
7	Specialized 2-D plots.	C 306.3
8	Amplitude modulation.	C 306.5
9	Frequency modulation.	C 306.5
10	Generation of Continuous Time Signals.	C 306.6
11	Diode Characteristics	C 306.3
12	Pole Zero Plot	C 306.3

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. 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 5)	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							
1306001							
1306002							

* 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.

REFERNCES :::

Sr.No.	Author	Title	Edition	Year of Publication	Publisher & Address
1	Rudra Prathap	Getting Started with MATLAB-7.0	4th edition	2006	

LEARNING WEBSITES / WEB REFERENCES ::

- https://www.tutorialspoint.com/matlab
- https:// www.programiz.com/matlab-programming
- http://spoken-tutorial.org/ https://nptel.ac.in/courses/