



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

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

From July 2022

A.Y.2022-23



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 2022			Program Name ::--- Electronics & Telecommunication Engineering													SEMESTER ::--- ONE								
							Duration ::--- 16 weeks																	
ACADEMIC YEAR - 2022-23			TEACHING SCHEME				EXAMINATION SCHEME																	
SR.NO	COURSE TITLE	COURSE CODE	L	T	P	CREDITS	Exam Duration in Hrs	THEORY						PRACTICAL						GRAND TOTAL				
								ESE		PA		TOTAL		ESE		PA		TOTAL						
								Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks					
1	Mathematics-- I	ETBS101	5	1	0	6	3	70	28	30#	00	100	40	----	----	----	----	----	----	100				
2	Basic Electronics	ETPC102	3	0	2	4	3	70	28	30#	00	100	40	50	20	25	10	75	30	175				
3	Fundamental of Electrical Networks	ETES103	3	1	2	5	3	70	28	30#	00	100	40	50	20	25	10	75	30	175				
4	Introduction to IT	ETES104	0	0	4	2	----	----	----	----	----	----	----	50*	20*	25	10	75	30	75				
5	Environmental Science	ETAU105	0	0	2	1	----	----	----	----	----	----	----	----	----	25	10	25	10	25				
6	Communication Skills	ETHS106	2	0	2	3	----	----	----	----	----	----	----	----	----	50	20	50	20	50				
	TOTAL		13	2	12	21		210		90		300		150		150		300		600				
Professional Practices		ETHS107	2 Hour / Week				Non Credit & Non Exam																	
Sports and Yoga		ETHS108	1 Hour / Week				Non Credit & Non Exam																	
Total No. of Credits = 21												Total No. of Student Contact Hours = 30 Hrs.						Total Marks						600
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											
	PR	Practical	#		PA for theory subject																			

- (#)—Under the theory PA, out of 30 marks, 10 marks are for micro project assessment to facilitate integration of Cos & remaining 20 marks is the average of 2 tests to be taken during the semester for the attainment of the Cos.
- If Candidate not securing minimum marks for passing in the PA part of practical of any course of any semester, then the candidate shall be declared as **Detained** for that course.



ST. XAVIER'S TECHNICAL INSTITUTE, MAHIM, MUMBAI 400 016

TEACHING AND EXAMINATION SCHEME

REVISED AND EFFECTIVE
FROM JANUARY 2023

Program Name ::--- Electronics & Telecommunication Engineering

SEMESTER ::--- TWO

Duration ::--- 16 weeks

ACADEMIC YEAR - 2022-23

TEACHING SCHEME

EXAMINATION SCHEME

SR.NO	COURSE TITLE	COURSE CODE	L	T	P	CREDITS	Exam Duration in Hrs	THEORY						PRACTICAL						GRAND TOTAL				
								ESE		PA		TOTAL		ESE		PA		TOTAL						
								Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks							
1	Mathematics --- II	ETBS201	5	1	0	6	3	70	28	30#	00	100	40	----	----	----	----	----	----	100				
2	Electronics Components & Sensors	ETES202	1	0	2	2	----	----	----	----	----	----	----	50*	20*	25	10	75	30	75				
3	Electrical Devices & Machine	ETES203	4	0	2	5	3	70	28	30#	00	100	40	50	20	25	10	75	30	175				
4	Electronics Devices & Circuits	ETPC204	3	0	2	4	3	70	28	30#	00	100	40	50	20	25	10	75	30	175				
5	Introduction to Programming	ETPC205	1	0	2	2	----	----	----	----	----	----	----	50	20	25	10	75	30	75				
6	Engineering Graphics	ETES206	0	0	2	1	----	----	----	----	----	----	----	50	20	25	10	75	30	75				
7	Electronics Workshop	ETES207	0	0	2	1	----	----	----	----	----	----	----	----	----	25	10	25	10	25				
	TOTAL		13	2	12	21		210		90		300		250		150		400		700				
Academic Skill			ETHS208		1 Hour / Week			Non Credit & Non Exam																
Total No. of Credits = 21												Total No. of Student Contact Hours = 28 Hrs.						Total Marks						700
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											

- (#)—Under the theory PA, out of 30 marks, 10 marks are for micro project assessment to facilitate integration of Cos & remaining 20 marks is the average of 2 tests to be taken during the semester for the attainment of the Cos.
- If Candidate not securing minimum marks for passing in the PA part of practical of any course of any semester, then the candidate shall be declared as **Detained** for that course.



ST. XAVIER'S TECHNICAL INSTITUTE, MAHIM, MUMBAI 400 016
Diploma in Electronics and Telecommunication Engineering

Revised and Effective from July 2019			TEACHING AND EXAMINATION SCHEME										SEMESTER THREE					
Academic Year 2022-2023			Teaching Scheme				Examination Scheme											
Sr. No	Subject Title	Subject Code	TH	TU	PR	CRE DITS	PAP ER HRS	THEORY		PRACTIC AL		ONLINE		TERM WORK		TOTAL		
								Max	Min	Max	Min	Max	Min	Max	Min			
1	Applied Mathematics	ET-18311	3	1	xx	4	3	100	40	xx	xx	xx	xx	xx	xx	100		
2	Principles of Communication I*	ET-18312	4	xx	2	6	3	100	40	50	20	xx	xx	25	10	175		
3	Electronic Test Instruments	ET-18313	3	xx	2	5	3	100	40	50	20	xx	xx	25	10	175		
4	'C' Programming *	ET-18314	2	xx	4	6	xx	xx	xx	xx	xx	50	20	25	10	75		
5	Linear Integrated Circuits	ET-18315	4	xx	2	6	3	100	40	50	20	xx	xx	25	10	175		
6	Circuit Building I	ET-18319	xx	xx	4	4	xx	xx	xx	xx	xx	xx	xx	50	20	50		
7	Academic Skills	ET-18317	xx	xx	2	2	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx		
TOTAL			16	1	16	33		400		150		50		150		750		
*ET-18320 represents “Yoga” which is non-credit and non-exam in 3rd Semester of 2 hours per week																		
Total Number of Credits = 33, Total Number of Student Contact Hours = 35								Total Marks =										750
Abbreviations: 1)		TH	Theory	Note:		1) For progressive and continuous assessment two periodic tests of 20 marks each are for all the theory subjects. The average of these is added to the final theory examination marks, which is of 80 marks (except for online examinations). 2) All term work marks are Internal. 3) All practical exams/ oral are External and Internal.												
2)		TU	Tutorial															
3)		PR	Practical															
4)			No Theory Exam															
Prepared by Mr. Anil Gurav																		



ST. XAVIER'S TECHNICAL INSTITUTE, MAHIM, MUMBAI 400 016
Diploma in Electronics and Telecommunication Engineering

Revised in July 2019 and Effective from Dec 2019/ Jan 2020			TEACHING AND EXAMINATION SCHEME											SEMESTER FOUR		
Academic Year 2022-2023			Teaching Scheme				Examination Scheme									
Sr. No.	Subject Title	Subject Code	TH	TU	PR	CREDIT S	PAPER HRS	THEORY		PRACTICAL		ONLINE		TERM WORK		TOTAL
								Max	Min	Max	Min	Max	Min	Max	Min	
1	Entrepreneurship	ET-18411	3	xx	2	5	xx	xx	xx	xx	xx	50	20	50	20	100
2	Principles of Communication II	ET-18412	3	xx	2	5	3	100	40	50	20	xx	xx	25	10	175
3	Digital Electronics	ET-18413	3	xx	2	5	3	100	40	50	20	xx	xx	25	10	175
4	Circuits and Networks	ET-18415	3	xx	2	5	3	100	40	50	20	xx	xx	25	10	175
5	Software Simulation Techniques	ET-18416	xx	xx	2	2	xx	xx	xx	xx	xx	xx	xx	50	20	50
6	Circuit Building II	ET-18419	xx	xx	4	4	xx	xx	xx	xx	xx	xx	xx	50	20	50
7	Industrial Electronics	ET-18420	3	xx	2	5	3	100	40	50	20	xx	xx	25	10	175
8	Academic Skills	ET-18421	xx	xx	2	2	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx
TOTAL			15	0	18	33		400		200		50		250		900
ET-18423 represents Sports And Cultural which is non-credit and non-exam in 4th Semester of 2 hours/week																
Total Number of Credits = 33, Total Number of StudentContact Hours = 35								Total Marks =								900
Abbreviations: 1)			TH		Theory		Note:	1) For progressive and continuous assessment two periodic tests of 20 marks each are for all the theory subjects. The average of these is added to the final theory examination marks, which is of 80 marks (except for online examinations). 2) All term work marks are Internal. 3) All practical exams/ oral are External and Internal.								
			2) TU		Tutorial											
			3) PR		Practical											
			4)		No Theory Exam											
Prepared by Mr. Anil Gurav																



ST. XAVIER'S TECHNICAL INSTITUTE, MAHIM, MUMBAI 400 016

Diploma in Electronics and Telecommunication Engineering

Revised and Effective from July 2020			TEACHING AND EXAMINATION SCHEME								SEMESTER FIVE *						
Academic Year 2022-2023			Teaching Scheme				Examination Scheme										
Sr. No.	Subject Title	Subject Code	TH*	TU	PR	CRED ITS	PAPER HRS	THEORY		PRACTICAL		ORAL		TERM WORK		TOT AL	
								Max	Min	Max	Min	Max	Min	Max	Min		
1	Microprocessors and Microcontrollers	ET-18519	4	xx	2	6	3	100	40	50	20	xx	xx	25	10	175	
2	Signals and Systems	ET-18512	3	1	2	6	3	100	40	50	20	xx	xx	25	10	175	
3	Advanced Communication Systems	ET-18513	4	xx	2	6	3	100	40	50	20	xx	xx	25	10	175	
4	Project I	ET-18514	xx	xx	2	2	xx	xx	xx	xx	xx	xx	xx	50	20	50	
5	Basic Control Systems (E1)	ET-18520	4	xx	2	6	3	100	40	50	20	xx	xx	25	10	175	
6	Vocational Training	ET-18516	xx	xx	6	(4+2) =6	xx	xx	xx	50	20	xx	xx	50	20	100	
7	Circuit Simulation and PCB Design	ET-18517	xx	xx	2	2	xx	xx	xx	50	20	xx	xx	25	10	75	
8	PLC Systems and Applications (E1)	ET-18518	4	xx	2	6	3	100	40	50	20	xx	xx	25	10	175	
TOTAL			15	1	18	34		400		300				225		925	
Total Number of Credits, Student Contact Hours =						34	Total Marks =										925
Abbreviations: 1) 2) 3) 4) 5)		TH	Theory		Note:	1) For progressive and continuous assessment two periodic tests of 20 marks each are for all the theory subjects. The average of these is added to the final theory examination marks, which is of 80 marks (except for online examinations). 2) All term work marks are Internal. 3) All practical exams/ oral are External and Internal.											
		TU	Tutorial														
		PR	Practical														
			No Theory Exam														
		E1	Elective One														
Prepared by Mr. Anil Gurav																	



ST. XAVIER'S TECHNICAL INSTITUTE, MAHIM, MUMBAI 400 016

Diploma in Electronics and Telecommunication Engineering

Revised in July 2017 and Effective from Dec 2020 / Jan 2021			TEACHING AND EXAMINATION SCHEME								SEMESTER SIX *						
Academic Year 2022-2023			Teaching Scheme				Examination Scheme										
Sr. No.	Subject Title	Subject Code					TH*	TU	PR	CRE DITS	PAPER HRS	THEORY		PRACTICAL		ORAL	
									Max	Min	Max	Min	Max	Min	Max	Min	
1	Mobile Communication(E2)	ET-18611	4	xx	2	6	3	100	40	xx	xx	50	20	25	10	175	
2	Digital Signal Processing	ET-18612	3	1	2	6	3	100	40	50	20	xx	xx	25	10	175	
3	Data Commn. & Comp. Networking(E2)	ET-18613	4	xx	2	6	3	100	40	xx	xx	50	20	25	10	175	
4	Digital Communication	ET-18614	4	xx	2	6	3	100	40	50	20	xx	xx	25	10	175	
5	Mechatronics(E3)	ET-18619	4	xx	2	6	3	100	40	50	20	xx	xx	25	10	175	
6	Project II	ET-18616	xx	xx	4	4	xx	xx	xx	xx	xx	50	20	50	20	100	
7	Advanced Power Electronics (E3)	ET-18617	4	xx	2	6	3	100	40	50	20	xx	xx	25	10	175	
8	Scilab	ET-18618	xx	xx	2	2	xx	xx	xx	xx	xx	xx	xx	50	20	50	
9	Industrial Management and Quality Control (IMQC)	ET-18620	3	xx	xx	3	3	100	40	xx	xx	xx	xx	xx	xx	100	
10	Technical Writing	ET-18621	xx	xx	2	2	xx	xx	xx	xx	xx	xx	xx	50	20	50	
TOTAL			18	1	16	35		500		150		100		250		1000	
Total Number of Credits, Student Contact Hours = 35											Total Marks =						1000
Abbreviations: 1)			TH		Theory		Note:		1) For progressive and continuous assessment two periodic tests of 20 marks each are for all the theory subjects. The average of these is added to the final theory examination marks, which is of 80 marks (except for online examinations). 2) All term work marks are Internal. 3) All practical exams/ oral are External and Internal.								
			2) TU		Tutorial												
			3) PR		Practical												
			4)		No Theory Exam												
			5) E2, E3		Elective Two and Three												
Prepared by Mr. Anil Gurav																	



ST. XAVIER'S TECHNICAL INSTITUTE, MAHIM, MUMBAI 400 016
Diploma in Electronics & Telecommunication Engineering

REVISED AND EFFECTIVE FROM JULY 2022—SEMESTER 1,2 JULY 2018---- SEMESTER 3 --6		SUMMARY OF TEACHING / WEEK, CREDITS AND EXAMINATION SCHEME						SEMESTER ONE - SIX		
ACADEMIC YEAR 2022-23		TEACHING SCHEME				EXAMINATION SCHEME				
SR.NO	SUBJECT TITLE	TH	TU	PR	CREDITS	THEORY		PRACTICAL / ORAL		GRAND TOTAL
						ESE	PA	ESE	PA	
1	Semester -- 1	13	2	12	27	210	90	150	150	600
2	Semester -- 2	13	2	12	21	210	90	250	150	700
3	Semester -- 3	16	1	16	33	320	80	200	150	750
4	Semester -- 4	15	0	18	33	320	80	250	250	900
5	Semester -- 5	15	1	18	34	320	80	300	225	925
6	Semester -- 6	18	1	16	35	400	100	250	250	1000
Total		90	07	92	183	1780	520	1400	1175	4875



ST. XAVIER'S TECHNICAL INSTITUTE, MAHIM, MUMBAI 400 016

TEACHING AND EXAMINATION SCHEME

REVISED AND EFFECTIVE
FROM JANUARY 2023

Program Name ::--- Electronics & Telecommunication Engineering

SEMESTER ::--- TWO

Duration ::--- 16 weeks

ACADEMIC YEAR - 2022-23

TEACHING SCHEME

EXAMINATION SCHEME

SR.NO	COURSE TITLE	COURSE CODE	L	T	P	CREDITS	Exam Duration in Hrs	THEORY						PRACTICAL						GRAND TOTAL				
								ESE		PA		TOTAL		ESE		PA		TOTAL						
								Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks					
1	Mathematics --- II	ETBS201	5	1	0	6	3	70	28	30#	00	100	40	----	----	----	----	----	----	100				
2	Electronics Components & Sensors	ETES202	1	0	2	2	----	----	----	----	----	----	----	50*	20*	25	10	75	30	75				
3	Electrical Devices & Machine	ETES203	4	0	2	5	3	70	28	30#	00	100	40	50	20	25	10	75	30	175				
4	Electronics Devices & Circuits	ETPC204	3	0	2	4	3	70	28	30#	00	100	40	50	20	25	10	75	30	175				
5	Introduction to Programming	ETPC205	1	0	2	2	----	----	----	----	----	----	----	50	20	25	10	75	30	75				
6	Engineering Graphics	ETES206	0	0	2	1	----	----	----	----	----	----	----	50	20	25	10	75	30	75				
7	Electronics Workshop	ETES207	0	0	2	1	----	----	----	----	----	----	----	----	----	25	10	25	10	25				
	TOTAL		13	2	12	21		210		90		300		250		150		400		700				
Academic Skill			ETHS208		1 Hour / Week			Non Credit & Non Exam																
Total No. of Credits = 21												Total No. of Student Contact Hours = 28 Hrs.						Total Marks						700
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											

- (#)—Under the theory PA, out of 30 marks, 10 marks are for micro project assessment to facilitate integration of Cos & remaining 20 marks is the average of 2 tests to be taken during the semester for the attainment of the Cos.
- If Candidate not securing minimum marks for passing in the PA part of practical of any course of any semester, then the candidate shall be declared as **Detained** for that course.

Program Title				Diploma in Electronics & Telecommunication Engineering								
Course Code	ETBS 201		Course Title		Mathematics - II						Semester	2
Teaching Scheme					Examination Scheme							
Credits					Theory			Practical	Oral	Online	Term work	Total
Lecture	Tutorial	Practical	Total		ESE	PA	Total					
5	1	---	6		70	30#	100	----	-----	-----	---	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) The assessment of Online is Internal. 5) # -- 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 the Foundation Courses group and proceeds further to application levels of Mathematics to teach students the theory, concepts, principles of Applied Mathematics and the application, importance and use of mathematics in the analysis of concepts in electronics.

COURSE OUTCOMES:--

Course theory content, help student to understand Applied mathematics, thus student should able to

Semester	2	Subject	Mathematics - II
CO 201	1 st Course in Second Year		
CO 201.1	Evaluate slope of curve, maxima and minima of a function.		
CO 201.2	Solve the given problems on Integration using suitable methods.		
CO 201.3	Apply concept Integration to find area under a curve, area between two curves and volume of revolution.		
CO 201.4	Apply Differential Equations for solving problems in Electronics Engineering field.		
CO 201.5	Solve given problems based on Algebra of Complex Numbers.		
CO 201.6	Use Laplace Transforms to solve first order, first degree differential equations.		

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

SEM I	Mathematics - II						
CO 201	(1 st COURSE IN SECOND YEAR) PREPARED BY : S.DATTA						
CO 201	P01	P02	P03	P04	P05	P06	P07
CO 201.1	3	2	1	2	1	1	2
CO 201.2	3	2	1	2		1	1
CO 201.3	3	2	1	2	1	1	1
CO 201.4	3	2	2	1		1	1
CO 201.5	3	1	1	1		1	2
CO 201.6	3	1	1	1		1	1
CO 201TOTAL	18	10	07	10	02	06	08
CORRELATION LEVEL	3	2	0	0	1	1	0

TABLE TO DECIDE CORRELATION LEVELS

CO SUM TOTAL			
CORRELATION LEVEL	1	2	3

CO SUM TOTAL				
CORRELATION LEVEL	0	1	2	3

Mrs. Sanchita Datta

Subject Expert

Section -- 1							
Chapter No	Topics	Periods	Marks				COs
		Hrs.	R	U	A	Total	
1	DIFFERENTIAL CALCULUS						
	1.1 FUNCTIONS & LIMITS 1.1.1 Concept of Function and simple examples. 1.1.2 Concept of Limits without examples. 1.2 DERIVATIVES 1.2.1 Fundamental rules of differentiation (without proof) such as derivatives of sum, difference, scalar multiplication, product and quotient. 1.2.2 Differentiation of all types of standard functions. 1.2.3 Derivatives of Inverse, exponential and logarithmic functions. 1.2.4 Composite functions 1.2.5 Implicit functions 1.2.6 Parametric functions 1.2.7 Logarithmic differentiation 1.2.8 Second order derivatives without example 1.2.9 Slope of a curve, Maxima, Minima	08	03	03	--	06	CO 201.1
		16	--	10	05	15	
2	INTEGRAL CALCULUS						
	2.1 Rules of Integration and Integration of Standard functions. 2.2 Integration by substitution. 2.3 Standard integrals involving radicals and their square roots 2.4 Integration of the type $\frac{1}{ax^2+bx+c}$ 2.5 Integration of rational and irrational functions 2.6 Integration by partial fractions Integration by parts	16	03	06	05	14	CO 201.2
Section -- 2							
Chapter No	Topics	Periods	Marks				COs
		Hrs.	R	U	A	Total	
3	APPLICATIONS OF DEFINITE INTEGRATION						
	3.1 Definite Integrations, Simple examples 3.2 Properties of Definite integral (without proof) and simple examples. 3.3 Area under the curve, Area between two curves, Volume of revolution.	08	--	03	05	08	CO 201.3

Section -- 2							
Chapter No	Topics	Periods	Marks				COs
		Hrs.	R	U	A	Total	
4	DIFFERENTIAL EQUATIONS						
	4.1 Definition of differential equation 4.2 Order and degree of differential equation 4.3 Formation of differential equation for function containing single constant 4.4 Solution of First order First degree differential equations: (i) variable separable, (ii) linear 4.5 Applications of differential equations for solution of simple geometrical cases and simple electrical/electronic circuits-LC, RC,RLC	12	03	05	03	11	CO 201.4
5	COMPLEX NUMBERS						
	5.1 Definition with different forms: 5.1.1 Cartesian form 5.2.1 Polar form 5.3.1 Exponential form 5.2 Algebra of complex Nos.	08	03	03	--	06	CO 201.5
6	LAPLACE TRANSFORMATION						
	6.1 Definition, Laplace transform of elementary functions 6.2 Properties of Laplace Transforms – Linearity property, the first shifting property, second shifting property (without proof) 6.3 Inverse Laplace transform by partial fraction method, Linearity and First shifting Property 6.4 Application of Laplace Transform for solving differential equations of first order first degree.	12	--	05	05	10	CO 201.6

SUGGESTED LIST OF TUTORIALS

Sr.No.	Tutorials	COURSE OUTCOME
1.	Solve problems based on finding value of the function at different points	CO 201.1
2.	Solve Problems to find derivatives of Inverse functions and composite functions.	
3.	Solve problems to find derivatives Implicit and Parametric functions.	
4.	Solve problems to find derivatives Logarithmic and Exponential functions.	
5.	Solve problems based on slope, tangent, and normal.	
6.	Solve problems based on Maxima, Minima of a function.	
7.	Solve problems based on standard formula of Integration.	CO 201.2
8.	Solve problems based on methods of Integration, substitution, partial fraction	CO 201.2
9.	Solve problems based on Integration by parts	CO 201.2
10.	Solve practice problems based on properties of Definite Integration.	CO 201.3
11.	Solve problems based on finding area under curve, area between two curves and volume of revolution.	CO 201.3
12.	Solve problems order, degree and formation of differential equation.	CO 201.4
13.	Solve problems on first order, first degree Differential equations.	CO 201.4
14.	Solve problems based on Algebra of complex numbers.	CO 201.5
15.	Find Laplace Transform and Inverse Laplace Transform using related properties.	CO 201.6
16.	Make use of Laplace Transform to solve Differential Equations.	CO 201.6

IMPLEMENTATION STRATEGY:

- 1) Teaching plan
- 2) Minimum 10 -- 12 tutorial's taken with the coverage of all COs
- 3) Use of PowerPoint presentations and Videos
- 4) References from the internet **(for teachers as well as students)**
- 5) Extensive use of examples
- 6) Group discussions and micro project

The above strategy can be followed in the classroom teaching-learning process as well as extensively during the tutorial class by the teacher.

SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Chapter No	Topics	Periods Hrs.	Marks Distribution for Theory Paper setting			
			R	U	A	Total Marks
1.	Differential calculus	24	03	13	05	21
2.	Integral Calculus	16	03	06	05	14
3.	Applications of Definite Integration	08	--	03	05	08
4.	Differential Equations	12	03	05	03	11
5.	Complex Numbers	08	03	03	--	06
6.	Laplace Transformation	08	--	05	05	10
	Total	80	12	35	23	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.						

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.

EXP. NO.	TITLE	COURSE OUTCOME
1	Prepare charts /model using concept of radius of curvature to bending of railway track.	CO 201.1
2	Prepare charts displaying list of Integration formulae.	CO 201.2
3	Prepare charts displaying the volume of irregular shapes using concept of integration	CO 201.3
4	Prepare charts displaying area of irregular /regular shapes like circle, ellipse using concept of integration	CO 201.3
5	Prepare charts/models using the concept of Differential Equations for population growth	CO 201.4
6	Prepare models using the concept of Laplace Transform to solve linear differential equations.	CO 201.6

REFERENCES

Sr. No.	Author	Title	Edition	Year of Publication	Publisher & Address
1	S.P. Deshpande	Mathematics for Polytechnic students II	1st	2005	Pune Vidyarthi Griha Prakashan
2	Sameer Shah	Applied Mathematics	3rd	2012	Tech-Max Publications
3	H. K. Dass	Engineering Mathematics	1	2003	S. Chand & company Ltd., New Delhi
4	Raval & Patel	Applied Mathematics	2nd	2014	Nirali Publications
5	S.G. Chitale & N.A. Joshi	A new approach to Mathematics and statistics (Sc. Paper II)	9th	1998	Sheth Publishers Pvt. Ltd., Mumbai

LEARNING WEBSITES / WEB REFERENCES :

- [https://en.wikipedia.org/wiki/Function_\(mathematics\)](https://en.wikipedia.org/wiki/Function_(mathematics))
- <https://www.toppr.com/guides/maths/limits-and-derivatives/limits/>
- <https://www.cuemath.com/calculus/applications-of-derivatives/>
- <https://www.cuemath.com/numbers/complex-numbers/>
- <https://www.cuemath.com/calculus/integration/>
- <https://math24.net/average-value-function.html>
- Area Under a Curve – Mathematics A-Level Revision (revisionmaths.com)
- First order and first degree differential - Example Solved Problems with Answer, Solution, Formula | Differential Equations (brainkart.com)
- Differential Equations - Inverse Laplace Transforms (lamar.edu)
- <https://byjus.com/ncert-solutions-class-11-maths/chapter-13-limits-and-derivatives>

Program Title				Diploma in Electronics & Telecommunication Engineering								
Course Code	ETES 202		Course Title	ELECTRONIC COMPONENTS AND SENSORS							Semester	2
Teaching Scheme				Examination Scheme								
Credits				Theory			Practical	Oral	Online	Term work	Total	
Lecture	Tutorial	Practical	Total	ESE	PA	Total						
1	-----	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) The assessment of Online is Internal. 5) # 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 devices and their applications in electronic circuits. The knowledge of various devices acquired by the students will help them to design, test, troubleshoot basic electronic circuits. The course will help the diploma engineers to apply the basic concepts and principles to understand different technology based application.

COURSE OUTCOMES ::--

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

Semester	2	Subject	ELECTRONIC COMPONENTS AND SENSORS
CO 202		2 nd Subject in First Year	
CO 202.1		Identify different types of resistors, capacitors and inductors	
CO 202.2		Interpret the characteristics of resistors, capacitors and inductors	
CO 202.3		Identify different types of switches	
CO 202.4		Analyze the working principle and characteristics of sensors	
CO 202.5		Select the appropriate sensors with respect to their applications	

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

SEM II	ELECTRONIC COMPONENTS AND SENSORS						
CO 202	(COURSE IN FIRST YEAR) PREPARED BY : JN & KHK						
CO 202	P01	P02	P03	P04	P05	P06	P07
CO 202.1	03		02	01			02
CO 202.2	02	03	02	02			02
CO 202.3	03		02	01			02
CO 202.4	03	03	03	03	03	03	03
CO 202.5	03	03	03	03	03	03	03
CO 202 TOTAL	14	09	12	10	06	06	12
CORRELATION LEVEL	2	2	2	2	1	1	2

TABLE TO DECIDE CORRELATION LEVELS

CO SUM TOTAL	6	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

Mr. K.H.Kamath
Dr. Janani Natarajan
Subject Experts

Section -- 1							
Chapter No	Topics	Periods	Marks				COs
		Hrs.	R	U	A	Total	
1	Resistors						C 202.1 C 202.2
	1.1 Working principle and Applications of Linear and non-linear type. 1.2 Resistor Characteristics Tolerance, Power rating, Accuracy, Temperature rating. 1.3 Colour coding of resistor and Numericals based on colour coding.	3	-	-	-	7	
2	Capacitors						C 202.1 C 202.2
	2.1 Working principle and Applications of Fixed and variable capacitors 2.2 Capacitor characteristics Capacitance, Capacitor number coding	3	-	-	-	6	
3	Inductors						C 202.1 C 202.2
	3.1 Working principle and Applications of Fixed and variable Inductors 3.2 Inductor Characteristics self and mutual inductance, Co-efficient of coupling,	2	-	-	-	6	
4	Switches		-	-	-	6	C 202.3
	4.1 Switches - Working principle, types and Applications 4.2 General specifications: 1. voltage rating 2. contact current rating, 3. contact resistance, 4. operating time 5. release time	2					

Section -- 2							
Chapter No	Topics	Periods	Marks				COs
		Hrs.	R	U	A	Total	
5	Sensors and Applications		-	-	-	25	C 202.4 C 202.5
	5.1 Electro mechanical Sensors: Introduction, Resistive Potentiometer, Strain Gauge, Resistance Strain Gauge, Semiconductor Strain Gauges .	6				4	
	5.2 Inductive Sensors: Sensitivity And Linearity of the Sensor –Types.					4	
	5.3 Capacitive Sensors: Electrostatic Transducer, Force/Stress Sensors Using Quartz Resonators, Ultrasonic Sensors.					4	
	5.4 Thermal Sensors: Introduction, Gas thermometric Sensors, Thermal Expansion Type Thermometric Sensors.					4	
	5.5 Magnetic sensors Magneto-resistive Sensors, Anisotropic Magneto resistive Sensing, Semiconductor Magneto resistors.					5	
	5.6 Sensors –Applications: Introduction, On-board Automobile Sensors (Automotive Sensors), Home Appliance Sensors, Aerospace Sensors, Sensors for Manufacturing –Sensors for environmental Monitoring						

LIST OF LABORATORY EXPERIENCES

EXP. NO.	TITLE	COURSE OUTCOME	CHAPT. NO.
1	To identify different types of resistors, Capacitors and Inductors	C 202.1 C 202.2	1,2,3
2	Calculate the Resistance and Tolerance of the resistor	C 202.1 C 202.2	1
3	Calculate the capacitance of a ceramic capacitor using number code	C 202.1 C 202.2	2

4	Multi-turn Potentiometers and Trimmers	C 202.1 C 202.2	1
5	Temperature Sensor P.T.C. Type	C 202.4 C 202.5	5
6	Temperature Sensor N.T.C. Type	C 202.4 C 202.5	5
7	Temperature Sensor Thermocouple	C 202.4 C 202.5	5
8	Electronic Scale using Load Cell	C 202.4 C 202.5	5
9	LVDT sensor	C 202.4 C 202.5	5
10	Experiment on Toggle switch and push button switch	C 202.3	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

(Example : Market survey study of latest Diodes with ratings and applications, Power supply ratings, applications etc)

The above strategy can be followed in the classroom teaching-learning process as well as extensively during the tutorial class by the teacher.

REFERENCES

Sr. No.	Author	Title	Edition	Year of Publication	Publisher & Address
1.	Madhuri.A.Joshi	Electronic Components and Materials	2nd	1994	Wheeler Publishing, L.B.Shastri MArg, Allahabad

LEARNING WEBSITES / WEB REFERENCES :

- www.electricaltechnology.org
- online.courses.nptel.ac.in
- www.electronicsandyou.com

Program Title				Diploma in Electronics & Telecommunication Engineering								
Course Code	ETES 203	Course Title		Electrical Devices & Machine						Semester	2	
Teaching Scheme				Examination Scheme								
Credits				Theory			Practical	Oral	Online	Term work	Total	
Lecture	Tutorial	Practical	Total	ESE	PA	Total						
4	-----	2	5	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) The assessment of Online is Internal. 5) # 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 applied Technology group and will enable the students to comprehend the theory, concepts, characteristics , working principles and applications of electrical machines like Generator , different types of motors, Transformer along with starting ,switching and control circuits. The knowledge of various electrical machines, protective devices, batteries and their applications and real time use in industry acquired by the students will help them to operate ,design, test, troubleshoot of an electrical machines .

COURSE OUTCOMES :-

Course theory content, practical skills, experience help student to understand the students the theory, concepts, characteristics , working principles and applications of electrical machines, thus student should able to -

Semester	2	Subject	Electrical Devices & Machine
CO 203	3 rd Course in First Year		
CO 203.1	UNDERSTAND THE CONCEPT, CHARACTERISTICS, TYPES, APPLICATION OF DC GENERATOR.		
CO 203.2	ILLUSTRATE THE WORKING PRINCIPLE, TYPES, CHARACTERISTICS OF DC MOTOR.		
CO 203.3	APPLY THE DIFFERENT PROTECTIVE DEVICES TO PROTECT THE ELECTRICAL CIRCUITS.		
CO 203.4	DESCRIBE THE WORKING PRINCIPLE, TYPES, CHARACTERISTICS OF THE TRANSFORMER.		
CO 203.5	INTERPRET SPECIAL TYPES OF MOTOR WITH THEIR WORKING , TYPES AND APPLICATIONS.		
CO 203.6	ILLUSTRATE THE USE OF VARIOUS ELECTRIC BATTERIES .		

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

SEM II	ELECTRICAL ENGINEERING						
	(3 rd COURSE IN FIRST YEAR) PREPARED BY : SRB						
CO 203	P01	P02	P03	P04	P05	P06	P07
CO 203.1	3	1	1	2	1	1	
CO 203.2	2	2	1	2	2	1	2
CO 203.3	3		1	1		1	1
CO 203.4	3	1	2	2	2	1	2
CO 203.5	3	1	1	1	1	1	3
CO 203.6	3		1	1		1	2
CO TOTAL	17	5	7	9	6	6	10
CORRELATION LEVEL	3	1	1	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

Mr. Sanjiv Borkar**Subject Expert**

Section -- 1							
Chapter No	Topics	Periods	Marks				COs
		Hrs.	R	U	A	Total	
1	DC GENERATOR						
	1.1 Basic principle of generator. 1.2 Construction and working of different parts. 1.2.1 Armature system. 1.2.2 Field system. 1.3 Working principle DC generator. 1.4 Excitation method . 1.4.1 Separately excitation 1.4.2 Self excitation 1.5 EMF equation (Derivation and explanation , small problems) 1.6 Armature winding (Types , diagram ,characteristics , applications, comparison, pitches) 1.7 Types of DC generator (circuit diagrams and V-I equations, Small problems) 1.7.1 DC series generator 1.7.2 DC shunt generator 1.7.3 DC compound generator 1.7.3.1 Long shunt compound 1.7.3.2 Short shunt compound	10	03	03	05	11	CO 203.1
2	DC MOTOR WITH CONTROL						
	2.1 General principle of Motor . 2.1.1 Fleming's left hand rule 2.1.2 Back emf 2.2 Compare with generator. 2.3 Working principle with diagram. 2.4 Types of DC Motor with diagram and V-I equations. 2.4.1 DC series motor. 2.4.2 DC shunt motor. 2.4.3 DC compound motor. 2.4.3.1 DC long compound 2.4.3.2 DC short compound 2.5 Different equations of DC Motor. 2.5.1 Power equation 2.5.2 Torque equation 2.5.3 Speed equation 2.6 Efficiency and speed regulation . (statement and small problem) 2.7 Losses in DC Motor 2.7.1 Copper losses	10	06	05	05	16	CO 203.2

	2.7.2 Core losses 2.7.3 Brush losses 2.7.4 Mechanical losses 2.8 3- point starter 2.8.1 Use of 3- point starter. 2.8.2 Need of 3- point starter. 2.8.3 Working principle 3- point Starter with diagram. 2.9 Speed control methods 2.9.1 Armature control method. 2.9.2 Flux control method.						
3	PROTECTIVE DEVICES AND SWITCHGEAR						
	3.1 Electric fuse (working principle) 3.2 Switch fuse unit and fuse switch unit (Differences) 3.3 MCB,MCCB (specifications, similarity ,differences) 3.4 Earthing (Importance) 3.5 Factor affecting on earth Resistance.	4	-	3	5	8	CO 203.3
	Section -- 2						
Chapter No	Topics	Periods	Marks				COs
		Hrs.	R	U	A	Total	
4	TRANSFORMER						
	3.1 Working principle with diagram (Step up, Step down, one to one ,Voltage transformation ratio) 3.2 Emf equation of transformer (Derivation ,explanation, simple problem) 3.3 Types of Transformer.(Diagram, Characteristics, comparison) 3.3.1 Core type 3.3.2 Shell type 3.4 Losses in Transformer. 3.4.1 Winding losses 3.4.2 Core losses 3.5 Efficiency and voltage regulation . 3.6 Auto transformer (working principle , advantages , disadvantages) 3.7 Open and Close circuit test	10	06	05	05	16	CO 203.4

5	SPECIAL TYPES OF MOTORS						
	4.1 Synchronous Motor 4.1.1 working principle with diagram 4.1.2 Characteristics features 4.1.3 Method of starting 4.1.4 Application. 4.2 Universal Motor 4.2.1 working principle with diagram 4.2.2 Applications 4.3 Stepper Motor (permanent magnet) 4.3.1 working principle with diagram 4.3.2 Applications. 4.4 Induction Motor (Split phase, Capacitor start) 4.4.1 working principle with diagram 4.4.2 Applications	10	03	05	05	13	CO 203.5
6	ELECTRIC STORAGE BATTERY						
	5.1 Types and applications of secondary storage batteries. 5.2 Principle of working of – Lead acid, Li- ion batteries (EV battery) 5.4 Ampere-hour ratings, Ampere-hour efficiency 5.5 Advantages and disadvantages.	04	03	03	----	06	CO 203.6

LIST OF LABORATORY EXPERIENCES

EXP. NO.	TITLE	COURSE OUTCOM	CHAPT. NO.
1	Study the different parts of the DC machine.	CO203.1	1
2	Measurement of the winding resistances of DC machine by V-I method.	CO203.1	1
3	To study Magnetization Characteristics of DC Generator.	CO203.1	1
4	Speed Control of DC shunt motor by shunt field current (Ish).	CO203.2	2
5	To control the speed of DC shunt motor by the armature voltage.	CO203.2	2
6	To measure and plot the characteristics of DC shunt Motor.	CO203.2	2
7	To measure and plot the resistance of 3-point starter and speed of the DC shunt motor.	CO203.2	2
8	To measure voltage transformation ratio of the transformer.	CO203.4	4
9	Determine the voltage and current ratio and calculate input, output power of transformer.	CO203.4	4
9	To measure the percentage efficiency of the given transformer.	CO203.4	4

10	To measure the percentage voltage regulation of the given transformer.	CO203.4	4
11	To perform the Open circuit test on Transformer.	CO203.4	4
12	To perform the short circuit test on Transformer.	CO203.4	4
13	Identify fuses, switch fuses and fuse switch unit ,MCB , MCCB.	CO203.3	3
14	Connect fuses, switch fuses and fuse switch unit ,MCB , MCCB the circuit.	CO203.3	3

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

The above strategy can be followed in the classroom teaching-learning process as well as extensively during the tutorial class by the teacher.

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	COURSE OUTCOME
1	Draw the constructional diagram of the DC generator , Label all the parts of DC generator, write the function of each part.	CO 203.1
2	Design the chart of different types of DC generator ,It's circuit diagrams, definitions and V-I equations.	CO 203.1 203.2
3	Make the chart to show the comparison in between Lap and Wave windings.	CO 203.1 203.2
4	Generate an electricity with the help of dynamo by any natural resources.	CO 203.3
5	Design the chart for different types of DC motors with definition, circuit diagram and V-I equations.	CO 203.2
6	Draw the circuit diagram of 3-point starter , explain working principle of it.	CO 203.2
7	Make a chart of protecting devices for electrical circuit and write their specifications.	CO 203.3
8	Make the chart for different types of Transformer and their characteristics.	CO 203.4
9	Make the chart of different special motors , their diagrams and applications.	CO 203.5
10	Make a chart of different electrical batteries, paste their pictures and write it's efficiency.	CO 203.6

SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Chapter No	Topics	Periods Hrs.	Marks Distribution for Theory Paper setting			
			R	U	A	Total Marks
1.	DC GENERATOR	10	03	03	05	11
2.	DC MOTOR WITH CONTROL	10	06	05	05	16
3.	PROTECTIVE DEVICES AND SWITCHGEAR	4	-	03	05	8
4.	TRANSFORMER	10	06	05	05	16
5.	SPECIAL TYPES OF MOTORS	10	03	05	05	13
6.	ELECTRIC STORAGE BATTERY	04	03	03	---	06
	Total	48	21	24	25	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	B.L. Theraja	Electrical Technology vol-I	1st	2008	S. Chand & Co, Ramnagar, New Delhi.
2	B.L. Theraja	Electrical Technology vol-II	1st	2008	S. Chand & Co, Ramnagar, New Delhi.
3	Basic electrical engineering	V.N. Mittle and Arvind mittal	2nd	2005	McGraw Hill, New Delhi. ISBN: 9780070593572
4	Fundamental of electrical Engineering	S.B. Lal Saxena and Dasgupta	1st	2016	Cambridge University press, New Delhi. ISBN: 9781107464353
5	Basic electrical and Electronics engineering	V.Jegathesan , K Vinoth kumar	1st	2013	Wiley India Pvt Ltd , New Delhi ISBN: 9788126529513
6	Basic electrical engineering	V.K.Mehta	Revised edition	2012	S. Chand and company Ram nagar ,New Delhi

LEARNING WEBSITES / WEB REFERENCES :

- Virtual lab & Multisim software
- www.electrical-technologies.com
- www.onlinelibrary.wiley.com

Program Title				Diploma in Electronics & Telecommunication Engineering								
Course Code	ETPC 204		Course Title	Electronics Devices & Circuits						Semester	2	
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 devices and their applications in electronic circuits. The knowledge of various devices acquired by the students will help them to design, test, troubleshoot basic electronic circuits. The course will help the diploma engineers to apply the basic concepts and principles to understand different technology-based application.

COURSE OUTCOMES :-

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

Semester	2	Subject	Electronics Devices & Circuits
CO 204		4 th Course in First Year	
CO 204.1		Analyze the performance characteristics of BJT configurations	
CO 204.2		Understand the function of BJT using different biasing methods.	
CO 204.3		Express operations & uses, of BJT Amplifiers in various environment	
CO 204.4		Interpret the role of Amplifiers in communication circuits.	
CO 204.5		Develop & Design Transistorized applications circuits	
CO 204.6		Recognize & describe the construction, principle of operation and characteristics of MOSFETs and their use in engineering field.	

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

SEM II	Electronics Devices & Circuits						
CO 204	(4 th COURSE IN FIRST YEAR) PREPARED BY : AG						
CO 102	P01	P02	P03	P04	P05	P06	P07
CO 204.1	3						
CO 204.2	3	1	2	2			
CO 204.3	2	2	2	2	1	1	
CO 204.4	2	2	2		2	1	1
CO 204.5	3	2	2	2	2	1	1
CO 204.6	3	1	2	1	1	1	
CO 204 TOTAL	16	08	10	07	06	04	02
CORRELATION LEVEL	3	1	2	1	1	1	0

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

Mr. Anil Gurav

Subject Expert

Section -- 1							
Chapter No	Topics	Periods	Marks				COs
		Hrs.	R	U	A	Total	
1	BIPOLAR JUNCTION TRANSISTOR						C110.1
	1.1. Introduction, types & symbols. 1.2 Operating principle of NPN & PNP Transistor. 1.3 Transistor Currents & their relations. 1.4 Transistor configurations 1.4.1 CE configuration, CB configuration, CC configuration – Circuit Diagram & Details, I/P & O/P characteristics, Current Gain, Current relation, Leakage Current, Input & Output resistance, 1.5 Relation between α & β . 1.6 Comparison of configurations. 1.7 Simple problems based on parameters	10	04	08	03	15	CO 204.1
2	TRANSISTOR AS AMPLIFIER						
	2.1. BIASING OF TRANSISTOR 2.1.1 Need of Biasing, DC load line & Operating Point & Types 2.1.2 Voltage Divider Biasing. 2.2 Transistor as an amplifier, 2.2.1 Single stage C.E. amplifier Functions of each component of CE Amplifier circuit, Effect of coupling & emitter bypass Capacitors, frequency response 2.3 Multistage amplifier -Need, Types of Multistage amplifier RC coupled, Transformer coupled – operation, frequency response & bandwidth, merits, demerits	08	03	06	03	12	CO 204.2 204.3 204.4
3	APPLICATIONS OF TRANSISTOR						
	3.1 Transistor as switch 3.2 Transistor as voltage regulator 3.3 Transistor as memory cell 3.4 Transistor as waveform generator (square / pulse)	06	03	05	---	08	CO 204.1 204.5

Section -- 2							
Chapter No	Topics	Periods	Marks				COs
		Hrs.	R	U	A	Total	
4	POWER AMPLIFIER USING BJT						
	4.1 Introduction 4.1.1 Types of Amplifiers. 4.1.2 Comparison of Voltage & Power Amplifiers. 4.2 Classification of power amplifiers 4.2.1 Class A Power Amplifier Working Principle, characteristics, efficiency, merits & demerits 4.2.2 Class B Push-pull amplifier Cross over Distortion 4.2.3 Complimentary symmetry Class B Push-pull amplifier 4.2.4 Class C Amplifier 4.3 Performance Parameters of Amplifiers 4.4 Comparison of Power Amplifier Types	09	03	06	03	12	CO 204.3 204.4 204.5
5	OSCILLATORS USING BJT						
	5.1 Introduction, Barkhausen criterion, Types of oscillators 5.2 LC Oscillator - Hartley and Colpitts 5.2.1 Circuit diagram, Working, Advantages, disadvantages, applications, Expression for frequency of oscillation. 5.2.2 Numerical examples on above expressions 5.3 RC Oscillator – Phase shift type. 5.3.1 Circuit diagram, Working Advantages, Disadvantages, applications, 5.3.2 Expression for frequency of oscillation(no derivation) & Numerical examples	09	04	06	02	12	CO 204.2 204.5
6	FIELD EFFECT TRANSISTORS						
	6.1 Introduction of Voltage controlled Device / family of FET 6.2 MOSFET 6.2.1 Types – Enhancement, Depletion Construction & Operation Characteristics and applications. 6.3 Comparison 1.5.1 BJT & FET 1.5.2 FET & MOSFET 1.5.3 JFET and MOSFET	06	03	05	03	11	CO 204.6

LIST OF LABORATORY EXPERIENCES

EXP. NO.	TITLE	COURSE OUTCOME	CHAPT. NO.
1	Identify the terminal of BJT using various methods & understand their function	CO 204.1	1
2	Perform , Test & Plot B.J.T. Common Emitter Configuration Input characteristics	CO 204.1 204.2	1
3	Perform , Test & Plot B.J.T. Common Emitter Configuration Output characteristics	CO 204.1 204.2	1
4	Perform , Test & Plot B.J.T. Common Base Configuration Input & Output characteristics	CO 204.1 204.2	1
5	Perform & understand significance of DC Load Line & Q-point or Operating Point in B.J.T. Common Emitter Configuration	CO 204.1 204.2	1
6	Build & Perform Transistor as switch	CO 204.1 204.2,204.5	3
7	Build & Perform Single stage CE Amplifier	CO 204.1 204.2,204.3	2
8	Build & Perform Transistor as voltage regulator	CO 204.1 204.2,204.5	3
9	Build & Perform Transistor as waveform generator (square / pulse)	CO 204.1 204.2,204.5	3
10	Determine significance of Bandwidth, Gain by Frequency Response of Single Stage R-C Coupled Amplifier	CO 204.1 204.2,204.3	2
11	Plot & determine the frequency of oscillations of Colpitts oscillator circuit	CO 204.1 204.2,204.5	5
12	Plot & determine the frequency of oscillations of Hartley oscillator circuit	CO 204.1 204.2,204.5	5
13	Build & Perform R-C Phase Shift Oscillator & Plot & determine the frequency of oscillations	CO 204.1 204.2,204.5	5
14	Build & Perform M.O.S.F.E.T. Characteristics	CO 204.6	6
15	Class B Complimentary Symmetry Power Amplifier	CO 204.1, 204.2 204.3,204.4	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

(Example : Market survey study of latest Diodes with ratings and applications, Power supply ratings, applications etc)

The above strategy can be followed in the classroom teaching-learning process as well as extensively during the tutorial class by the teacher.

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	Prepare a poster consisting different types of Transistors with their technical details.
2	Build Transistor as switch
3	Prepare model or chart of MOSFET with their symbols, specifications, applications
4	Build circuit to switch on off LED using BJT switch
5	Build circuit of DC regulated power supply
6	Build circuit of Bulgar Alarm using BJT

SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Chapter No	Topics	Periods Hrs.	Marks Distribution for Theory Paper setting			
			R	U	A	Total Marks
1.	BIPOLAR JUNCTION TRANSISTOR	10	04	08	03	15
2.	TRANSISTOR AS AMPLIFIER	08	03	06	03	12
3.	APPLICATIONS OF TRANSISTOR	06	03	05	---	08
4.	POWER AMPLIFIER USING BJT	09	03	06	03	12
5.	OSCILLATORS USING BJT	09	04	06	02	12
6.	FIELD EFFECT TRANSISTORS	06	03	05	03	11
	Total	48	20	36	14	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	Robert Boylestad	Electronics Devices & Circuit Theory	9 th	2009	PHI publisher
2	G.K.Mital	Electronics Devices & Circuits	23 rd	2006	Khanna Publication
3	DR. R.S.Sedha	APPLIED ELECTRONICS	Revised Edition	2015	S CHAND Publication
4	David Bell	Fundamentals of Electronic Devices	1 st	1990	D B Taraporevala son & Co Pvt. Ltd. – Mumbai
5	Millman and Halkias	Electronics Devices and Circuits	4 th	2015	McGraw Hills Inc., New Delhi-2
6	S. Salivahanan and N. Suresh Kumar	Electronic Devices and Circuits	4 th	2017	McGraw Hills Inc., New Delhi-2
7	Albert Malvino & David Bates	Electronic Principles	4 th	2010	Tata McGraw Hill Publication

LEARNING WEBSITES / WEB REFERENCES :

- <https://www.electronics-tutorials.ws/>
- <https://electronicsforu.com/resources/electronic-devices-and-circuit-theory>
- <http://www.electronics-tutorials.ws>
- <http://www.electricaltechnology.org>

Program Title				Diploma in Electronics & Telecommunication Engineering							
Course Code	ETPC 205		Course Title	Introduction to Programming						Semester	2
Teaching Scheme				Examination Scheme							
Credits				Theory			Practical	Oral	Online	Term work	Total
Lecture	Tutorial	Practical	Total	ESE	PA	Total					
1	-----	2	2	----	-----	-----	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) The assessment of Online is Internal. 5) # 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 'C' language, arithmetic and logical operations in 'C' language. Use of if , if-else, switch, Loops-while, for ,break, continue statments and concepts of arrays, strings, functions and pointers in 'C' programming.

COURSE OUTCOMES ::--

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

Semester	2	Subject	Introduction to Programming
CO 205	5 th Course in First Year		
CO 205.1	Compare low level and high level programming language's.		
CO 205.2	Analyse data types, expressions in C.		
CO 205.3	Implement sequential, decision and iterative structures of programming language.		
CO 205.4	Compose, Compile and debug programs using array		
CO 205.5	Implement algorithms using functions & pointers.		
CO 205.6	Solve problems related to strings.		

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

SEM II	Introduction to Programming						
CO 205	(5 th COURSE IN FIRST YEAR) PREPARED BY : RVG,AG						
CO 205	P01	P02	P03	P04	P05	P06	P07
CO 205.1	3					1	
CO 205.2	2	1	2	2		1	
CO 205.3	3	2	2	2	1	1	
CO 205.4	3	1	2			1	
CO 205.5	3	1	2	2	1	1	
CO 205.6	3	1	2			1	
CO 205 TOTAL	17	06	10	06	02	06	00
CORRELATION LEVEL	3	1	2	1	0	1	0

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

Mr. R.V.Gheware, Anil Gurav

Subject Expert

Section -- 1							
Chapter No	Topics	Periods	Marks				COs
		Hrs.	R	U	A	Total	
1	CONCEPTS OF PROGRAMMING						
	1.1 Development of a Computer Program. Algorithm , Flowchart , 1.2 Low level language. (introduction) 1.3 Middle level language.(introduction) 1.4 High level language.(introduction)	01	----	----	----	05	CO 205.1
2	BASICS OF C- PROGRAMMING						
	2.1 Introduction to 'C'; History of 'C'. 2.2 Library types 2.3 Data types 2.4 Integer, Float, Character 2.5 Constants and Variables 2.6 keywords in c 2.7 Input, Output, scanf(), printf() 2.8 Operators 2.8.1 Precedence and Associativity of operators 2.8.2 Expressions and their evaluation. 2.9 Exercises related to: Converting from Fahrenheit to Celsius. Largest and smallest of 'n' numbers	04	----	----	----	10	CO 205.1 205.2
3	CONTROL & LOOPING STRUCTURE						
	3.1 IF 3.2 IF-ELSE 3.3 NESTED IF-ELSE 3.4 SWITCH 3.5 WHILE loop 3.6 DO-WHILE loop 3.7 FOR loop 3.8 Break Statement 3.9 Continue Statement 3.10 Programs based on above topics	4	----	----	----	10	CO 205.3

Section -- 2							
Chapter No	Topics	Periods	Marks				COs
		Hrs.	R	U	A	Total	
4	ARRAYS						
	4.1 Defining, Declaring& Initialization. 4.2 Accepting data into Arrays. 4.3 Processing data in a Array. 4.4 Sorting of an Array. 4.5 Programs concerned with manipulating data in Array.	6	----	---	----	10	CO 205.4
5	FUNCTIONS						
	6.1Defination: Function, Pointer 6.2 Advantages of function 6.3 Function prototypes 6.4 passing arguments to a function by value and by reference 6.5 meaning of recursion. 6.6 Concept of pointer 6.7 Programs using functions and pointers.	4	----	---	----	10	CO 205.5
6	STRING						
	6.1 Definition of string 6.2 String Library functions 6.3 User defined function equivalent to strlen,strcpy,strlwr,strupr 6.4 Programs using strings	3	----	---	----	05	CO 205.4 205.5

LIST OF LABORATORY EXPERIENCES

EXP. NO.	TITLE	COURSE OUTCOME
1	Evaluation of Expressions in C	C205.1
2	Simple Elementary Programs	C205.2
3	Programs dealing with mathematical series	C205.3
4	Programs dealing with one dimension arrays	C205.4
5	Programs for two dimension arrays and sorting	C205.4
6	Programs dealing with strings	C205.4,205.5
7	Programs dealing with strings	C205.4,205.5
8	Programs concerned with functions and pointers	C205.4,205.5
9	Additional Program as given by teacher	C205.4,205.3
10	Additional Program as given by teacher	C205.4,205.3
11	Additional Program as given by teacher (strings)	C204.3
12	Additional Program as given by teacher (strings)	C205.4,205.5

13	Additional Program as given by teacher (functions & pointers)	C205.4,205.5
14	Additional Program as given by teacher (functions & pointers)	C205.5

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

(Example : Market survey study of latest Diodes with ratings and applications, Power supply ratings, applications etc)

The above strategy can be followed in the classroom teaching-learning process as well as extensively during the tutorial class by the teacher.

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.

REFERENCES

Sr. No.	Author	Title	Edition	Year of Publication	Publisher & Address
1	Yashvant Kanetkar	Let us 'C'	7 th	Latest Edn.	BPB Publication New Delhi
2	Bryan Kernighan and Dennis Ritchie	The 'C' Programming Language	2 nd	1995	Prentice Hall of India New Delhi
3	Henry Mullish and Herbert Cooper	The Spirit Of 'C'	2 nd	1996	Jaico Publication Mumbai
4	E. Balaguruswamy	Ansi 'C'	4 th	Latest Edn.	Tata MacGraw Hill

LEARNING WEBSITES / WEB REFERENCES :

- [http://learn.onlinegdb.com/c for beginners](http://learn.onlinegdb.com/c%20for%20beginners)
- <https://www.tutorialspoint.com/cprogramming/index.htm>
- <https://www.programiz.com/c-programming>
- https://www.youtube.com/results?search_query=c+programming+tutorials
- <http://onlinegdb.com> (online compiler)

Program Title				Diploma in Electronics & Telecommunication Engineering							
Course Code	ETPC 206		Course Title	ENGINEERING GRAPHICS						Semester	2
Teaching Scheme				Examination Scheme							
Credits				Theory			Practical	Oral	Online	Term work	Total
Lecture	Tutorial	Practical	Total	ESE	PA	Total					
---	-----	2	1	---	---	---	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 comes under the Core Technology group and will enable the students to comprehend the theory, concepts, characteristics and working principles of basic electronic devices and their applications in electronic circuits. The knowledge of various devices acquired by the students will help them to design, test, troubleshoot basic electronic circuits. The course will help the diploma engineers to apply the basic concepts and principles to understand different technology-based application.

COURSE OUTCOMES :-

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

Semester	2	Subject	ENGINEERING GRAPHICS
CO 206		6 th Course in First Year	
CO 206.1		Understand & Learn basic elements of drawing	
CO 206.2		Identify & draw Orthographic projections off given object	
CO 206.3		Draw Isometric view of given component or orthographic projection	
CO 206.4		Draw free hand sketches of engineering components	
CO 206.5		Demonstrate the use of computer aided drafting approach to create engineering drawing	
CO 206.6		Enhance the drawing skills by basic methods & computer based tools	

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

SEM II	ENGINEERING GRAPHICS						
CO 206	(4 th COURSE IN FIRST YEAR) PREPARED BY : RS						
CO 206	P01	P02	P03	P04	P05	P06	P07
CO 206.1	3						
CO 206.2	3	1	2	2			
CO 206.3	2	2	2	2	1	1	
CO 206.4	2	2	2		2	1	1
CO 206.5	3	2	2	2	2	1	1
CO 206.6	3	1	2	1	1	1	
CO 206 TOTAL	16	08	10	07	06	04	02
CORRELATION LEVEL	3	1	2	1	1	1	0

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

Mr. Rakeshkumar Saroj

Subject Expert

Section -- 1

Section -- 1							
Chapter No	Topics	Periods	Marks				COs
		Hrs.	R	U	A	Total	
1	BASIC ELEMENTS OF DRAWING						C110.1
	1.1 Drawing Instruments and supporting materials: method to use them with applications. 1.2 Convention of lines and their applications. 1.3 Representative Fractions – reduced, enlarged and full-size scales; Engineering Scales such as plain and diagonal scale. 1.4 Dimensioning techniques as per SP-46:2003 – types and applications of chain, parallel and coordinate dimensioning. Geometrical and Tangency constructions. (Redraw the figure)	----	---	--	---	---	CO 206.1
2	ORTHOGRAPHIC PROJECTIONS						
	2.1. Introduction of projections- orthographic, perspective, isometric and oblique: concept and applications. (No question to be asked in examination). 2.2 Introduction to orthographic projection, First angle and Third angle method, their symbols. 2.3 Conversion of pictorial view into Orthographic Views – object containing plain surfaces, slanting surfaces, slots, ribs, cylindrical surfaces. (use First Angle Projection method only)	-----	-----	---	---	-----	CO 206.2
3	ISOMETRIC PROJECTIONS						
	3.1 Introduction to isometric projections. 3.2 Isometric scale and Natural scale. 3.3 Isometric view and isometric projection. 3.4 Illustrative problems related to objects containing lines, circles and arcs shape only. Conversion of orthographic views into isometric view/projection.	---	---	---	---	---	CO 206.3

Chapter No	Topics	Periods	Marks				COs
		Hrs.	R	U	A	Total	
4	FREE HAND SKETCHES OF ENGINEERING ELEMENTS						
	4.1 Free hand sketches of Electronic elements: Resistor, Capacitor, Integrated Circuit(IC), SmallCircuit. 4.2 Free hand sketches of orthographic view (on squared graph paper) and isometric view (on isometric grid paper)	-----	-----	---	---	-----	CO 206.4
5	COMPUTER AIDED DRAFTING INTERFACE						
	5.1 Computer Aided Drafting: concept. 5.1.1 Hardware and various CAD software available. 5.1.2 System requirements and Understanding the interface. 5.2.1 Components of AutoCAD software window: Title bar, standard tool bar, menu bar, object properties tool bar, draw tool bar, modify tool bar, cursor cross hair. Command window, statusbar, drawing area, UCS icon. 5.2.3 File features: New file, Saving the file, opening an existing drawing file, Creating templates, Quit. 5.2.4 Setting up new drawing: Units, Limits, Grid, Snap. Undoing and redoing action.	----	-----	---	---	---	CO 206.5
6	COMPUTER AIDED DRAFTING						
	6.1 Draw basic entities like Line, Circle, Arc, Polygon, Ellipse, Rectangle, Multiline, Poly Line. 6.2 Method of Specifying points: Absolute coordinates, Relative Cartesian and Polar coordinates. 6.3 Modify and edit commands like trim, extend, delete, copy, offset, array, block, layers. 6.4 Dimensioning: Linear, Horizontal Vertical, Aligned, Rotated, Baseline, Continuous, Diameter, Radius, Angular Dimensions, Dim scale variable, Editing dimensions. 6.5 Text: Single line Text, Multiline text. Standard sizes of sheet. Selecting Various plotting	----	-----	---	---	---	CO 206.6

	parameters such as Paper size, paper units, drawing orientation, plot scale, plot offset, plot area, print preview.						
--	---	--	--	--	--	--	--

LIST OF LABORATORY EXPERIENCES

EXP. NO	TITLE	COURSE OUTCOME MAPPING
1.	Draw horizontal, Vertical, 30-degree, 45-degree, 60 and 75-degrees lines, different types of lines, dimensioning styles using Tee and Set squares/ drafter. (do this exercise in sketch book)	
2.	Write alphabets and numerical (Vertical only) (do this exercise in sketchbook)	
3.	Draw regular geometric constructions and redraw the given figure (do this exercise in sketch book)	
4.	Draw a problem on orthographic projections using first angle method of projection having plain surfaces and slanting.	
5.	Draw two problems on orthographic projections using first angle method of projection having cylindrical surfaces, ribs.	
6.	Draw two problems on Isometric view of simple objects having plain and slanting surface by using natural scale.	
7.	Draw some problems on Isometric projection of simple objects having cylindrical surface by using isometric scale.	
8.	Draw free hand sketches/ conventional representation of machine elements in sketch book of some electronic components	
9.	Problem based Learning: Given the orthographic views of at least three objects with few missing lines, the student will try to imagine the corresponding objects, complete the views and draw these views in sketchbook.	
10.	Draw basic 2D entities like: Rectangle, Rhombus, Polygon using AutoCAD (Print out should be a part of progressive assessment). Part I	
11.	Draw basic 2D entities like: Circles, Arcs, circular using AutoCAD (Print out should be a part of progressive assessment). Part II	
12.	Draw basic 2D entities like: Circular and rectangular array using AutoCAD (Print out should be a part of progressive assessment). Part III	

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

(Example : Market survey study of latest Diodes with ratings and applications, Power supply ratings, applications etc)

The above strategy can be followed in the classroom teaching-learning process as well as extensively during the tutorial class by the teacher.

REFERENCES

Sr. No.	Author	Title	Edition	Year of Publication	Publisher & Address
1	Bureau of Indian Standards	Engineering Drawing Practice for Schools and Colleges	3 rd	October 1998	Bureau of Indian Standards, Government of India
2	<u>Bhatt, N. D</u>	<u>Engineering Drawing.</u>	---	<u>2010</u>	Charotar Publishing House, Anand, Gujrat
3	Jain & Gautam	Engineering Graphics & Design	2nd	2010	Tata McGraw Hill Edu. New Delhi
4	Jolhe	Engineering Drawing	2nd	2010	Tata McGraw Hill Edu. New Delhi
5	Jeyapoovan	Essentials of Engineering Drawing and Graphics using AutoCAD	----	2011	Vikas Publishing House Pvt. Ltd, Noida

Program Title				Diploma in Electronics & Telecommunication Engineering							
Course Code	ETPC 207		Course Title	ELECTRONICS WORKSHOP						Semester	2
Teaching Scheme				Examination Scheme							
Credits				Theory			Practical	Oral	Online	Term work	Total
Lecture	Tutorial	Practical	Total	ESE	PA	Total					
---	-----	2	1	---	---	---	----	-----	-----	25	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) # Progressive Assessment out of 30 marks , 20 marks is average of 2 periodical tests (PT) and 10 marks are for micro project assessment.											

RATIONALE:

Electronic engineering diploma holder are expected to handle various mechanical electrical and electronics tools in the workshop. The Diploma engineer has to supervise soldering of electronic components and circuits in workshop. This course will develop skills in handling tools, equipment used in the electronic workshop and perform soldering of components primarily.

COURSE OUTCOMES :---

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

Semester	2	Subject	ELECTRONICS WORKSHOP
CO 207		7 th Course in First Year	
C207.1		Illustrate the use of common hand tools used in electronic workshop.	
C207.2		Illustrate different types of components used in electronics.	
C207.3		Differentiate the different types of components mounting boards.	
C207.4		Compare soldering and desoldering practice of electronic components on various mountingboards	
C207.5		Illustrate different ways of troubleshooting the component mounting board.	
C207.6		Illustrate the new technology of components used in modern world.	

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

SEM II	Electronics Devices & Circuits						
CO 207	(7 th COURSE IN FIRST YEAR) PREPARED BY : SD						
CO 207	P01	P02	P03	P04	P05	P06	P07
CO 207.1	1		2				
CO 207.2				1			3
CO 207.3			1			2	
CO 207.4		2					
CO 207.5							2
CO 207.6	3			3			
CO 207 TOTAL	04	02	03	04	00	02	05
CORRELATION LEVEL	3	1	2	1	1	1	0

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

Mr. Stevenson Dsouza

Subject Expert

Chapter No	Topics	Periods	Marks				COs
		Hrs.	R	U	A	Total	
1	INTRODUCTION OF HAND-TOOLS USED FOR ELECTRONICS WORKSHOP						
	1.1 Files, Drill machines and Drill Bits, Hacksaw Blade. 1.2 Digital Multimeter 1.3 Soldering Iron, DE soldering Pump Long nose plier, Wire Striper, Wire Cutter, Bread-board, Line Tester and Screwdriver Set.	----	---	--	---	---	CO 207.1
2	INTRODUCTION OF THE COMPONENTS						
	2.1 Passive Components. Color Code of Resistor, Capacitor & Inductor. Series Parallel combinations on bread board. 2.2 Active Components. 2.2.1 Terminal identification of active components 2.2.2 Testing of Diodes, LED's and Transistor using Multimeter. 2.3 Types of Transformers. 2.3.1 Identifying Primary and Secondary winding of transformer using multimeter. 2.4 Testing of BJT and FET using Multimeter	-----	-----	---	---	-----	CO 207.2
3	INTRODUCTION OF CIRCUIT BOARD						
	3.1 Types of circuit boards - Bread Board, General Purpose Board & Printed Circuit Board. 3.2 Mounting and testing of small circuit on Bread Board. Mounting and testing of small circuit on General purpose board.	---	---	---	---	---	CO 207.3

Chapter No	Topics	Periods	Marks				COs
		Hrs.	R	U	A	Total	
4	SOLDERING AND DE SOLDERING OF COMPONENTS						
	4.1 Types of Soldering Iron and they use. 4.2 Soldering Techniques 4.2.1 Soldering of passive components with and without lead bending (C-bending & V- bending) 4.2.2 Soldering of active components. 4.2.3 Soldering of BJT & FET with lead bending (Side bending & front or back foot bending) 4.3 De soldering of components using wig & pump.	-----	-----	---	---	-----	CO 207.4
5	FAULT FINDING IN CIRCUIT BOARD						
	5.1 Different types of test used to find a fault. Visual Test, Cold Test & Hot Test.	----	-----	---	---	---	CO 207.5
6	SURFACE MOUNTED DEVICES.						
	6.1 Identifying the Active and Passive Surface Mounted Devices (SMD). Identifying the pin configuration of an SMD component.	----	-----	---	---	---	CO 207.6

LIST OF LABORATORY EXPERIENCE

EXP. NO	TITLE	COURSE OUTCOME MAPPING
1.	Introduction of the Tool Kit.	C207.1
2.	Identify various: a. Passive Components. b. Active Components.	C207.2
3.	Determine the value of given Resistor, Capacitor & Inductor using colorcode and Multimeter.	C207.2
4.	Identify the pins of Diode, LED & Transistor using datasheet and testing them using multimeter.	C207.2
5.	Identifying Primary winding & Secondary winding of a step-down transformer using Multimeter.	C207.2
6.	Connect Resistor & Capacitor in Series & Parallel combination on breadboard & measure its value using Multimeter.	C207.2

7.	Use of Breadboard, General Purpose Board & Printed Circuit Board.	C207.3
8.	Mounting of components on GPB with and without bending of leads.	C207.4
9.	Soldering technique used to solder components on GPB.	C207.4
10	Desoldering technique of components from GPB & PCB.	C207.4
11	Build a simple circuit on General Purpose Board and testing it.	C207.4
12	Fault Finding in the circuit developed on the general-purpose board using various fault-finding techniques.	C207.5
13	Identifying the Surface Mounted Components (SMD) pin configuration.	C207.6

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
(Example : Market survey study of latest Diodes with ratings and applications, Power supply ratings, applications etc)

The above strategy can be followed in the classroom teaching-learning process as well as extensively during the tutorial class by the teacher.

REFERENCES

Sr. No.	Author	Title	Edition	Year of Publication	Publisher & Address
1	RAGHUWANSHI	A Course in Workshop Technology	Latest edition	2011	Dhanpat Rai publication
2	JONES THOMAS	Electronic Components Handbook	Latest edition	2010	Reston publication
3	V.K.MEHATA	Principal of Electronics	Latest edition	2014	S Chand Publication

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