



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

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

From January 2024

A.Y.2024-25



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

PROGRAM EDUCATIONAL OBJECTIVES (PEO)

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 SPECIFIC OUTCOMES (PSOs)

PSO 1: Design, verify and validate electronic functional elements for a variety of applications, with skills to interpret and communicate results.

PSO 2: Exercise good programming practices employing low or high level languages on appropriate platforms.

PROGRAM OUTCOMES (POs)

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

Note for All the Semesters:

1. Every student has to pass in each head of Practical Formative Assessment [Term work] & Summative Assessment [End-Semester-Examination (ESE)] based on Laboratory learning & tutorial learning by securing minimum of 40% marks of the maximum marks i.e. ::--
 - **For Practical**
 - Formative Assessment -PR :--- 20 out of 50
 - Formative Assessment -PR ::--- 10 out of 25
 - Summative Assessment -PR ::--- 20 out of 50
2. Formative Assessment (FA-PR) for Practical includes lab performance, lab activity, attendance.
3. Every student has to pass in each head of **Self Learning Assessment [SLA]** by securing minimum of 40% marks of the maximum marks.
 - Self-Learning Assessment -SLA :--- 20 out of 50
 - Self-Learning Assessment -SLA ::--- 10 out of 25
4. **For Theory head** the assessment includes two components **i.e Formative Assessment (FA) & Summative Assessment [SA]**
5. **Formative Assessment (FA) for Theory** includes the average calculated of **two** periodical test i.e **PTs of 30 marks each.**
6. **Summative Assessment [SA] is the term end semester theory examination of 70 marks.**
7. **To pass in the theory head the students has to secure minimum 40% marks** of the maximum, **100 marks of Formative Assessment (FA) & Summative Assessment [SA] combined [i.e 30 marks for Formative Assessment (FA) + 70 marks for Summative Assessment [SA]]**
8. Self-Learning Assessment [SLA] includes Micro projects/Assignment/Quiz/Presentations & online workshops activity etc. as per the course. The scheme and schedule for Self-Learning Assessment should be informed to the students and discussed with them at the start of the term.
9. For developing self-directed learning skills from each course about 15-20% of the topics/sub-topics, which are relatively simpler or descriptive in nature are to be given to the students for self-study, proper learning of these topics should be assured by Assignment/Quiz/conducting classroom presentations of students by respective faculty.

					ST. XAVIER'S TECHNICAL INSTITUTE MAHIM, MUMBAI																		
					LEARNING AND ASSESMENT SCHEME																	[A.Y. ---- 2024—25]	
					Program Name ::-Electronics & Telecommunication Engineering													SEMESTER :- TWO					
													DURATION:: 16WEEK										
SR.NO.	COURSE TITLE	COURSE TYPE	COURSE CODE	IKS Hrs.	LEARNING SCHEME					Credits	Paper Duration (Hrs.)	ASSESMENT SCHEME											
					Actual Contacts Hrs. /week			Self Learning TERM work + Assignment	Notional Learning (NL) Hrs/week			THEORY				Based on LL & TL Practical				Based on Self Learning		TOTAL	
												FA-TH	SA-TH	TOTAL		FA-PR		SA-PR		MAX	MIN		
					CL	TL	LL					MAX	MAX	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN		
1	Mathematics --- II	AEC	23201	2	5	1	0	4	19	5	3	30	70	100	40	--	--	--	--	25	10	125	
2	Electronics Components & Sensors	DSC	23202	0	1	0	2	1	4	2	--	--	--	--	--	25	10	50	20	25	10	100	
3	Electrical Devices &Machine	DSC	23203	2	3	0	2	3	8	4	3	30	70	100	40	25	10	50	20	25	10	200	
4	Electronics Devices & Circuits	DSC	23204	0	3	0	2	1	6	3	3	30	70	100	40	25	10	50	20	25	10	200	
5	Introduction to Programming	SEC	23205	2	1	0	2	1	4	2	--	--	--	--	--	25	10	50	20	25	10	100	
6	Engineering Graphics	SEC	23206	0	0	0	2	2	4	2	--	--	--	--	--	25	10	--	--	--	--	25	
7	Electronics Workshop	AEC	23207	0	0	0	2	2	4	2	--	--	--	--	--	25	10	--	--	25	10	50	
	TOTAL			6	13	1	12	14	40	20		90	210	300		150		200		150		800	
Abbreviations :::-		CL - CLASSROOM LEARING , TL - TUTORIAL LEARING, LL - LABORATORY LEARING , FA - FOTRMATIVE ASSESSMENT, SA- SUMMATIVE ASSESSMENT, SL – SELF LEARNING, NL – NOTIONAL LEARNING																					
Total No. of Credits = 20		Total No. of Student Contact Hours = 26 Hrs.		Total Marks = 800																			
1) Theory FA-TH- represent average of Two class test of 30 marks conducted during the semester for the attainment of the Cos. 2) 25 marks Based on Self Learning are for Micro project, Assessments, Tutorial work, Workshops, Webinars to facilitate integration of Cos 3) If Candidate not securing minimum marks for passing in the FA part of Practical of any course of any semester, then the candidate shall be declared as Detained for that semester. 4) 1 credit is equivalent to 30 NL, Notional Learning hours for semester are (CL +LL+TL+SL)* 15 WEEKS , Self-learning hours shall not be reflected in the Time table																							
Course Category :: --- AEC :- Ability Enhancement Course, DSC :- Discipline Specific Course, DSE :-Discipline Specific Elective, VEC ::- Value Education Course SEC :- Skill Enhancement Course, INP :- Intern / Apparent/Project/Community, GE :- Generic Elective																							

Program Title			Diploma in Electronics & Telecommunication Engineering														
Course Code			Course Title			MATHEMATICS - II								Course Type		Semester	
23201														AEC		2	
Learning Scheme						Assessment Scheme											
Actual Contact Hrs./Week			SH	NH	CREDITS	THEORY				PRACTICAL				SLA		Total	
CL	TL	LL				FA		SA		Total		FA		SA			
			Max	Min		Max	Min	Max	Min	Max	Min	Max	Min				
5	1	----	4	10	5	30	70	100	40	----	----	----	----	25	10	125	
1) IKS of 2 hrs. 2) Theory paper duration 3 hrs. 3) Theory paper assessment is Internal and External. 4) The assessment of Practical is Internal and External. 5) Formative Assessment out of 30 marks is average of 2 periodical tests (PT). 6) The assessment of Self Learning is Internal.																	

RATIONALE:

This subject is classified under 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	10 th Course in First 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	(10 th Course in First Year) PREPARED BY : S.DATTA								
CO 201	P01	P02	P03	P04	P05	P06	P07	PSO 1	PSO 2
CO 201.1	3	2	1	2	1	1	2	0	0
CO 201.2	3	2	1	2		1	1	0	0
CO 201.3	3	2	1	2	1	1	1	0	0
CO 201.4	3	2	2	1		1	1	1	0
CO 201.5	3	1	1	1		1	2	1	0
CO 201.6	3	1	1	1		1	1	1	0
CO TOTAL	18	10	07	10	02	06	08	3	0
CORRELATION LEVEL	3	2	0	0	1	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

Subject Expert

Mrs.Sanchita Datta

	Section -- 1						
Chapter No	Topics	Periods	Marks				COs
		Hrs.	R	U	A	Total	
1	DIFFERENTIAL CALCULUS						
	1.1 FUNTIONS & 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 forum 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
		17	--	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	15	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.	10	--	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	13	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.	09	--	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) Practical 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 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

SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Chapter No	Topics	Periods Hrs.	Marks Distribution for Theory Paper setting			
			R	U	A	Total Marks
	Section -- 1					
1.	Differential calculus	25	03	13	05	21
2.	Integral Calculus	15	03	06	05	14
	Section -- 2					
3.	Applications of Definite Integration	10	--	03	05	08
4.	Differential Equations	13	03	05	03	11
5.	Complex Numbers	08	03	03	--	06
6.	Laplace Transformation	09	--	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.						

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 Publisher's 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			Course Title			ELECTRONIC COMPONENTS AND SENSORS								Course Type		Semester			
23202														DSC		2			
Learning Scheme						Assessment Scheme													
Actual Contact Hrs./Week			SL	NH	CREDITS	THEORY				PRACTICAL				SLA		Total			
CL	TL	LL				FA	SA	Total		FA		SA							
								Max	Min	Max	Min	Max	Min	Max	Min				
1	---	2	1	4	2	---	---	-----	----	25	10	50	20	25	10	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) Formative Assessment out of 30 marks is average of 2 periodical tests (PT). 5) The assessment of Self Learning is Internal.																			

RATIONALE:

This subject comes under the Core Technology group and will enable the students to comprehend the theory, concepts, characteristics and working principles of basic electronic 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 sensor devices , thus student should able to

Semester	2	Subject	ELECTRONIC COMPONENTS AND SENSORS
CO 202	11 th Course 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	(11th Course in First Year) PREPARED BY : JN & KHK								
CO 202	P01	P02	P03	P04	P05	P06	P07	PSO 1	PSO 2
CO 202.1	03		02	01			02	2	0
CO 202.2	02	03	02	02			02	3	0
CO 202.3	03		02	01			02	3	0
CO 202.4	03	03	03	03	03	03	03	2	0
CO 202.5	03	03	03	03	03	03	03	2	0
CO TOTAL	14	09	12	10	06	06	12	12	0
CORRELATION LEVEL	2	2	2	2	1	1	2	2	0

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

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

	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	-	-	-	-	
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	-	-	-	-	
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	-	-	-	-	
4	Switches		-	-	-	-	C 202.3
	4.1 Switches - Working principle, 4.2 Types and Applications 4.3 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		-	-	-	-	
	5.1 Electro mechanical Sensors: Introduction, Resistive Potentiometer, Strain Gauge, Resistance Strain Gauge, Semiconductor Strain Gauges . 5.2 Inductive Sensors: Sensitivity And Linearity of the Sensor –Types. 5.3 Capacitive Sensors: Electrostatic Transducer, Force/Stress Sensors Using Quartz Resonators, Ultrasonic Sensors. 5.4 Thermal Sensors: Introduction, Gas thermometric Sensors, Thermal Expansion Type Thermometric Sensors. 5.5 Magnetic sensors Magneto-resistive Sensors, Anisotropic Magneto resistive, Sensing, Semiconductor Magneto resistors. 5.6 Sensors –Applications: Introduction, On-board Automobile Sensors (Automotive Sensors), Home Appliance Sensors, Aerospace Sensors, Sensors for Manufacturing – Sensors for environmental Monitoring	6	-	-	-	---	C 202.4 C 202.5

LIST OF LABORATORY EXPERIENCES

EXP. NO.	TITLE	COURSE OUTCOME NO.	CHAPT.
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 202.4C 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, Sensors, components 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			Course Title			ELECTRICAL DEVICES & MACHINE								Course Type		Semester	
23203														DSC		2	
Learning Scheme						Assessment Scheme											
Actual Contact Hrs./Week			SLH	NLH	CREDITS	THEORY				PRACTICAL				SLA		Total	
CL	TL	LL				FA	SA	Total		FA		SA					
								Max	Min	Max	Min	Max	Min	Max	Min		
3	0	2	3	8	4	30	70	100	40	25	10	50	20	25	10	200	
1) IKS of 2hrs. 2) Theory paper duration 3 hrs. 3) Theory paper assessment is Internal and External. 4) The assessment of Practical is Internal and External. 5) Formative Assessment out of 30 marks is average of 2 periodical tests (PT). 6) The assessment of Self Learning is Internal.																	

RATIONALE:

This subject comes under the 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		12 th 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 DEVICES & MACHINE								
CO 203	(12th COURSE IN FIRST YEAR) PREPARED BY : SRB								
CO 203	P01	P02	P03	P04	P05	P06	P07	PSO 1	PSO 2
CO 203.1	3	1	1	2	1	1		2	0
CO 203.2	2	2	1	2	2	1	2	3	0
CO 203.3	3		1	1		1	1	2	0
CO 203.4	3	1	2	2	2	1	2	2	0
CO 203.5	3	1	1	1	1	1	3	3	0
CO 203.6	3		1	1		1	2	2	0
CO TOTAL	17	5	7	9	6	6	10	14	0
CORRELATION LEVEL	3	1	1	2	1	1	2	3	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

Subject Expert

Mr. Sanjiv Borkar

	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						
	4.1 Working principle with diagram (Step up, Step down, one to one ,Voltage transformation ratio) 4.2 Emf equation of transformer 4.3 Derivation ,explanation, simple problem Types of Transformer.(Diagram, Characteristics, comparison) 1. Core type 2. Shell type 4.5 Losses in Transformer. 1. Winding losses 2. Core losses 4.6 Efficiency and voltage regulation . 4.7 Auto transformer (working principle , advantages , disadvantages) 4.8 Open and Close circuit test	9	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.	05	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
10	To measure the percentage efficiency of the given transformer.	CO203.4	4

11	To measure the percentage voltage regulation of the given transformer.	CO203.4	4
12	To perform the Open circuit test on Transformer.	CO203.4	4
13	To perform the short circuit test on Transformer.	CO203.4	4
14	Identify fuses, switch fuses and fuse switch unit ,MCB , MCCB.	CO203.3	3
15	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
	SECTION - 1					
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
	SECTION - 2					
4.	TRANSFORMER	9	06	05	05	16
5.	SPECIAL TYPES OF MOTORS	10	03	05	05	13
6.	ELECTRIC STORAGE BATTERY	5	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			Course Title			ELECTRONICS DEVICES & CIRCUITS								Course Type		Semester	
23204														DSC		2	
Learning Scheme						Assessment Scheme											
ActualContact Hrs./Week			SLH	NLH	CREDITS	THEORY				PRACTICAL				SLA		Total	
CL	TL	LL				FA	SA	Total		FA		SA					
								Max	Min	Max	Min	Max	Min	Max	Min		
3	0	2	1	6	3	30	70	100	40	25	10	50	20	25	10	200	
1) IKS of 0 hrs. 2) Theory paper duration 3 hrs. 3) Theory paper assessment is Internal and External. 4) The assessment of Practical is Internal and External. 5) The Online Practical assessment is Internal. 6) Formative Assessment out of 30 marks is average of 2 periodical tests (PT). 7) The assessment of Self Learning is Internal.																	

RATIONALE:

This subject comes under the Core Technology group and will enable the students to comprehend the theory, concepts, characteristics and working principles of basic electronic 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	13 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	(13th COURSE IN FIRST YEAR) PREPARED BY : AG								
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2
CO 204.1	3							3	0
CO 204.2	3	1	2	2				3	0
CO 204.3	2	2	2	2	1	1		3	0
CO 204.4	2	2	2		2	1	1	2	0
CO 204.5	3	2	2	2	2	1	1	2	0
CO 204.6	3	1	2	1	1	1		1	0
CO TOTAL	16	08	10	07	06	04	02	14	0
CORRELATION LEVEL	3	1	2	1	1	1	1	3	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	12	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	07	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	08	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	08	04	06	02	12	CO 204.2 204.5

6	MOS-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	07	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	CO204.1 204.2	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	CO204.1,204.2,204.5	3
7	Build & Perform Single stage CE Amplifier	CO204.1,204.2,204.5	2
8	Build & Perform Transistor as voltage regulator	CO204.1,204.2,204.5	3
9	Build & Perform Transistor as waveform generator (square / pulse)	CO204.1,204.2,204.5	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 , BJT, FET 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	COURSE OUTCOME
1	Prepare a poster consisting different types of Transistors with their technical details.	CO 204.1 204.2
2	Build Transistor as switch	CO 204.1 204.5
3	Prepare model or chart of MOSFET with their symbols, specifications, applications	CO 204.6
4	Build circuit to switch on off LED using BJT switch	CO 204.1 204.5
5	Build circuit of DC regulated power supply	CO 204.1 204.5
6	Build circuit of Bulgar Alarm using BJT	CO 204.1 204.5

SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Chapter No	Topics	Periods Hrs.	Marks Distribution for Theory Paper setting			
			R	U	A	Total Marks
	SECTION -1					
1.	BIPOLARJUNCTION TRANSISTOR	12	04	08	03	15
2.	TRANSISTOR AS AMPLIFIER	07	03	06	03	12
3.	APPLICATIONSOF TRANSISTOR	06	03	05	---	08
	SECTION -2					
4.	POWERAMPLIFIER USING BJT	08	03	06	03	12
5.	OSCILLATORS USING BJT	08	04	06	02	12
6.	MOS-FIELD EFFECT TRANSISTORS	07	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	9th	2009	PHI publisher
2	G.K.Mital	Electronics Devices & Circuits	23rd	2006	Khanna Publication
3	DR. R.S.Sedha	APPLIED ELECTRONICS	Revised Edition	2015	S CHAND Publication
4	David Bell	Fundamentals of Electronic Devices	1st	1990	DB Taraporevala son & Co Pvt. Ltd. – Mumbai
5	Millman and Halkias	Electronics Devices and Circuits	4th	2015	McGrawHills Inc., New Delhi-2
6	S. Salivahanan and N. Suresh Kumar	Electronic Devices and Circuits	4th	2017	McGrawHills Inc., New Delhi-2
7	Albert Malvino & David Bates	Electronic Principles	4th	2010	Tata McGraw Hill Publication

LEARNING WEBSITES / WEB REFERENCES :

- <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			Course Title			INTRODUCTION TO PROGRAMMING								Course Type		Semester	
23205														SEC		2	
Learning Scheme						Assessment Scheme											
Actual Contact Hrs./Week			SLH	NLH	CREDITS	THEORY				PRACTICAL				SLA		Total	
CL	TL	LL				FA	SA	Total		FA		SA					
								Max	Min	Max	Min	Max	Min	Max	Min		
1	0	2	1	4	2	---	--	----	----	25	10	50	20	25	10	100	
1) IKS of 0 hrs. 2) Theory paper duration 3 hrs. 3) Theory paper assessment is Internal and External. 4) The assessment of Practical is Internal and External. 5) Formative Assessment out of 30 marks is average of 2 periodical tests (PT). 6) The assessment of Self Learning is Internal.																	

RATIONALE:

This subject is classified under Basic Technology courses and intends to teach students concepts of programming, rules and syntax of 'C' language, arithmetic and logical operations in 'C' language. Use of if, if-else, switch, Loops-while, for, break, continue statements and concepts of arrays, strings, functions and pointers in 'C' programming.

COURSE OUTCOMES ::-- Course theory content, practical skills, experience help student to understand basic programming concepts, thus student should be able to

Semester	2	Subject	INTRODUCTION TO PROGRAMMING
CO 205		14 th COURSE IN FIRST YEAR	
CO 205.1		Compare low level and high level programming language's.	
CO 205.2		Analyze 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	(14th COURSE IN FIRST YEAR) PREPARED BY : RVG,AG								
CO 205	P01	P02	P03	P04	P05	P06	P07	PSO 1	PSO 2
CO 205.1	3					1		1	3
CO 205.2	2	1	2	2		1		1	2
CO 205.3	3	2	2	2	1	1			2
CO 205.4	3	1	2			1			3
CO 205.5	3	1	2	2	1	1			2
CO 205.6	3	1	2			1		1	2
CO TOTAL	17	06	10	06	02	06	00	3	14
CORRELATION LEVEL	3	1	2	1	0	1	0	1	3

TABLE TO DECIDE CORRELATION LEVELS

CO SUM TOTAL	06	12	18
CORRELATION LEVEL	1	2	3

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

Subject Expert
Mr. R.V.Gheware,
Mr. Anil Gurav

	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	----	----	----	----	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	03	----	----	----	----	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	04	----	----	----	----	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.	3	----	---	----	----	CO 205.4
5	FUNCTIONS & POINTER						
	5.1 Definition: Function, Pointer 5.2 Advantages of function 5.3 Function prototypes 5.4 Passing arguments to a function by value and by reference 5.5 Meaning of recursion. 5.6 Concept of pointer 5.7 Programs using functions and pointers.	3	----	---	----	----	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	2	----	---	----	----	CO 205.4 205.5

LIST OF LABORATORY EXPERIENCES

EX P. NO	TITLE	COURSE OUTCOME	CHAPTER NO
1	Evaluation of Expressions in C	C205.1	1
2	Simple Elementary Programs	C205.2	2
3	Programs dealing with mathematical series	C205.3	3
4	Programs dealing with one dimension arrays	C205.4	4
5	Programs for two dimension arrays and sorting	C205.4	4
6	Programs dealing with strings	C205.4,205.5	6
7	Programs dealing with strings	C205.4,205.5	6
8	Programs concerned with functions and pointers	C205.4,205.5	5
9	Additional Program as given by teacher	C205.4,205.3	1/2/3/4
10	Additional Program as given by teacher	C205.4,205.3	1/2/3/4
11	Additional Program as given by teacher (strings)	C204.3	6
12	Additional Program as given by teacher (strings)	C205.4,205.5	6
13	Additional Program as given by teacher (functions & pointers)	C205.4,205.5	5
14	Additional Program as given by teacher (functions & pointers)	C205.5	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 programming tools, functions
- 6) Survey / study of latest programming languages

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.

- Survey / study of latest programming languages
- Prepare program make record of attendance & short list absentees

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
- <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			Course Title			ENGINEERING GRAPHICS								Course Type		Semester	
23206														SEC		2	
Learning Scheme						Assessment Scheme											
Actual Contact Hrs./Week			SLH	NLH	CREDITS	THEORY				PRACTICAL				SLA		Total	
CL	TL	LL				FA	SA	Total		FA		SA					
								Max	Min	Max	Min	Max	Min	Max	Min		
0	0	2	2	4	2	---	---	---	---	25	10	---	---	---	---	25	
1) IKS of 0 hrs. 2) Theory paper duration 3 hrs. 3) Theory paper assessment is Internal and External. 4) The assessment of Practical is Internal and External. 5) Formative Assessment out of 30 marks is average of 2 periodical tests (PT). 6) The assessment of Self Learning is Internal.																	

RATIONALE:

This subject comes under the Core Technology group and will enable the students to comprehend the theory, concepts, characteristics and working principles of basic electronic 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 practical skills, experience help student to understand basic terms, tools of drawing & design, thus student should be able to

Semester	2	Subject	ENGINEERING GRAPHICS
CO 206	15 th COURSE IN FIRST YEAR		
CO 206.1	Understand & Learn basic elements of drawing		
CO 206.2	Identify & draw Orthographic projections of 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	(15 th COURSE IN FIRST YEAR)PREPARED BY : RS								
CO 206	P01	P02	P03	P04	P05	P06	P07	PSO 1	PSO 2
CO 206.1	3							1	0
CO 206.2	3	1	2	2				2	0
CO 206.3	2	2	2	2	1	1		2	0
CO 206.4	2	2	2		2	1	1	2	0
CO 206.5	3	2	2	2	2	1	1	2	0
CO 206.6	3	1	2	1	1	1		2	0
CO TOTAL	16	08	10	07	06	04	02	11	0
CORRELATION LEVEL	3	1	2	1	1	1	0	2	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

Subject Expert

Mr. Rakeshkumar Saroj

	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), Small Circuit. 4.2 Free hand sketches of orthographic view (on squared graph paper) an isometric view (on Isometric grid aper)	-----	-----	---	---	----	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, status bar, 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						

	6.6 Draw basic entities like Line, Circle, Arc, Polygon, Ellipse, Rectangle, Multiline, Poly Line. 6.7 Method of Specifying points: Absolute coordinates, Relative Cartesian and Polar coordinates. 6.8 Modify and edit commands like trim, extend, delete, copy, offset, array, block, layers. 6.9 Dimensioning: Linear, Horizontal Vertical, Aligned, Rotated, Baseline, Continuous, Diameter, Radius, Angular Dimensions, Dim scale variable, Editing dimensions. 6.10 Text: Single line Text, Multiline text. Standard sizes of sheet. Selecting Various plotting parameters such as Paper size, paper units, drawing orientation, plot scale, plot offset, plot area, print preview.	----	----	---	---	---	CO 206.6
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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)	CO 206.1
2.	Write alphabets and numerical (Vertical only) (do this exercise in sketchbook)	CO 206.1
3.	Draw regular geometric constructions and redraw the given figure (do this exercise in sketch book)	CO 206.2
4.	Draw a problem on orthographic projections using first angle method of projection having plain surfaces and slanting.	CO 206.2
5.	Draw two problems on orthographic projections using first angle method of projection having cylindrical surfaces, ribs.	CO 206.2
6.	Draw two problems on Isometric view of simple objects having plain and slanting surface by using natural scale.	CO 206.3
7.	Draw some problems on Isometric projection of simple objects having cylindrical surface by using isometric scale.	CO 206.3

8.	Draw free hand sketches/ conventional representation of machine elements in sketch book of some electronic components	CO 206.4
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.	CO 206.5
10.	Draw basic 2D entities like: Rectangle, Rhombus, Polygon using AutoCAD (Print out should be a part of progressive assessment). Part I	CO 206.6
11.	Draw basic 2D entities like: Circles, Arcs, circular using AutoCAD(Printout should be a part of progressive assessment). Part II	CO 206.6
12.	Draw basic 2D entities like: Circular and rectangular array using AutoCAD (Printout should be a part of progressive assessment). Part III	CO 206.6

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)

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	2 nd	2010	Tata McGraw Hill Edu. New Delhi
4	Jolhe	Engineering Drawing	2 nd	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			Course Title			ELECTRONICS WORKSHOP								Course Type		Semester	
23207														DSC		2	
Learning Scheme						Assessment Scheme											
Actual Contact Hrs./Week			SLH	NLH	CREDITS	THEORY				PRACTICAL				SLA		Total	
CL	TL	LL				FA	SA	Total		FA		SA					
								Max	Min	Max	Min	Max	Min	Max	Min		
--	--	2	2	4	2	---	---	---	---	25	10	---	---	25	10	50	
1) Theory paper duration 3 hrs. 2) Theory paper assessment is Internal and External. 3) The assessment of Practical is Internal and External. 4) Formative Assessment out of 30 marks is average of 2 periodical tests (PT). 5) The assessment of Self Learning is Internal.																	

RATIONALE:

Electronic engineering diploma holder are expected to handle various mechanical electrical electronics tools in the workshop. The Diploma engineer has to supervise soldering of electron 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 the uses of tools & devices useful electronics workshop, thus student should able to

Semester	2	Subject	ELECTRONICS WORKSHOP
CO 207		16 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 mounting boards	
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 WORKSHOP								
CO 207	(16th COURSE IN FIRST YEAR)PREPARED BY : AP								
CO 207	P01	P02	P03	P04	P05	P06	P07	PSO 1	PSO 2
CO 207.1	1		2					2	0
CO 207.2				1			3	3	0
CO 207.3			1			2	2	3	0
CO 207.4		2					2	2	0
CO 207.5							2	1	0
CO 207.6	3			3				1	0
CO TOTAL	04	02	03	04	00	02	09	12	0
CORRELATION LEVEL	3	1	2	1	1	1	2	2	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

Subject Expert

Mr. Abhijit Patil

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 THECOMPONENTS						
	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, relays, switches 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 ofsmall circuit on Bread Board. Mounting and testing ofsmall circuit on General purpose board.	---	---	---	---	---	CO 207.3
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	-----	-----	---	---	-----	CO 207.4

Chapter No	Topics	Periods	Marks				COs
		Hrs.	R	U	A	Total	
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 color code 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.	Build a simple circuit on General Purpose Board and testing it.	C207.4
13.	Build a simple circuit on General Purpose Board and testing it.	C207.4
14.	Fault Finding in the circuit developed on the general-purpose board using various fault-finding techniques.	C207.5
15.	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 components with ratings and applications, Power supply ratings, applications etc)

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 components like BJT, Resistor, Relays, Capacitors with their technical details.
2	Build Transistor as touch switch
3	Prepare CRO cables, BNC connector cables
4	Build circuit to switch on off LED using BJT switch
5	Build circuit of DC regulated power supply using BJT & Diode
6	Build circuit of Intruder Alarm using BJT

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

E REFERENCE :-:-

- www.npteliitm.ac.in
- www.eleccircuit.com
- www.youtube.com
- www.sprinboard.com