



ST. XAVIER'S TECHNICAL INSTITUTE

To Nurture the Joy of Excellence in the World of High Technology

CURRICULUM FOR MATHEMATICS-II

Document Number: PBoS-2324-DEC-23201-00

REV. NO.	DATE	DESCRIPTION	PREPARED BY	CHECKED BY	APPROVED BY
00	11/12/2023	MATHEMATICS-II	SAD	VRR	SBG

EXECUTIVE SUMMARY

Mathematics–II is an applied mathematics course that builds upon the fundamental concepts learned in Mathematics–I. The course focuses on advanced mathematical techniques required for solving engineering and technical problems. It aims to strengthen students' analytical thinking, problem-solving ability, and understanding of mathematical applications in electronics and related engineering fields.

The syllabus of Mathematics–II includes major topics such as Differential Calculus, Integration, Differential Equations, Complex Numbers, and Laplace Transforms. Differential Calculus introduces the concepts of functions, limits, and derivatives. Students learn differentiation techniques, including derivatives of standard functions, composite functions, logarithmic differentiation, and second-order derivatives. These concepts help in determining slopes of curves, as well as finding maxima and minima of functions, which are important in engineering design and optimization.

Integration forms another major component of the course, where students learn basic integration techniques and their applications. These applications include finding the area under curves, area between two curves, and volumes generated by revolution. Differential Equations are introduced to model and solve real-world engineering problems involving changing quantities, particularly in electronics and signal analysis.

The course also covers Complex Numbers, enabling students to perform operations involving imaginary quantities and solve mathematical problems related to electrical and electronic systems. Additionally, Laplace Transforms are included to provide powerful tools for solving differential equations and analyzing dynamic systems used in engineering applications..

Overall, Mathematics–II plays a vital role in developing advanced mathematical skills required for engineering studies. It prepares students to apply mathematical methods effectively in analyzing electronic systems and supports learning in higher-level technical subjects throughout the diploma programme.

Curriculum Development Committee Members

Sr. No.	Faculty Members	Role of Faculty	Signatures
1	Mrs. Sanchita Datta	Subject Expert	
2			

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			SLH	NLH	CREDITS	THEORY				PRACTICAL				SLA		Total	
CL	TL	LL				FA	SA	Total		FA		SA					
								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::-- The student will be able to

Semester	2	Subject	Mathematics - II
CO 201		1 st Course In Semester Two	
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 Semester Two								
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	09	02	06	08	03	00
CORRELATION LEVEL	3	2	1	2	0	1	1	1	0

TABLE TO DECIDE CORRELATION LEVELS

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

	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.	08	03	03	---	06	
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.	17	---	10	05	15	CO 201.1
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						
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	15	03	06	05	14	CO 201.2
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						
2.7	Integration by parts						

	Section -- 2						
Chapter No	Topics	Periods	Marks				COs
		Hrs.	R	U	A	Total	
3	APPLICATIONS OF DEFINITE INTEGRATION						
3.1	Definite Integrations, Simple examples.	10	---	03	05	08	CO 201.3
3.2	Properties of Definite integral (without proof) and simple examples.						
3.2	Area under the curve, Area between two curves, Volume of revolution.						
4	DIFFERENTIAL EQUATIONS						
4.1	Definition of differential equation.	13	03	05	03	11	CO 201.4
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.						
5	COMPLEX NUMBERS						
5.1	Definition with different forms:	08	03	03	---	06	CO 201.5
5.1.1	Cartesian form						
5.1.2	Polar form						
5.1.3	Exponential form						
5.2	Algebra of complex Nos.						
6	LAPLACE TRANSFORMATION						
6.1	Definition, Laplace transform of elementary functions	09	---	05	05	10	CO 201.6
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.						

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.	CO 201.1
3.	Solve problems to find derivatives Implicit and Parametric functions.	CO 201.1
4.	Solve problems to find derivatives Logarithmic and Exponential functions.	CO 201.1
5.	Solve problems based on slope, tangent, and normal.	CO 201.1
6.	Solve problems based on Maxima, Minima of a function.	CO 201.1
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
	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.						

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	1 st	2005	Pune Vidyarthi Griha Prakashan
2.	Sameer Shah	Applied Mathematics	3 rd	2012	Tech-Max Publications
3.	H. K. Dass	Engineering Mathematics	1 st	2003	S. Chand & company Ltd., New Delhi
4.	Raval & Patel	Applied Mathematics	2 nd	2014	Nirali Publications
5.	S. G. Chitale & N. A. Joshi	A new approach to Mathematics and statistics (Sc.PaperII)	9 th	1998	Sheth Publisher s Pvt. Ltd., Mumbai

E 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>
- https://econtent.msbtte.edu.in/econtent/econtent_home.php



ST. XAVIER'S TECHNICAL INSTITUTE

To Nurture the Joy of Excellence in the World of High Technology

CURRICULUM FOR ELECTRONIC COMPONENTS & SENSORS

Document Number: PBoS-2324-DEC-23202-00

REV. NO.	DATE	DESCRIPTION	PREPARED BY	CHECKED BY	APPROVED BY
00	11/12/2023	ELECTRONIC COMPONENTS & SENSORS	JN & KHK	VRR	SBG

EXECUTIVE SUMMARY

The course **Electronic Components and Sensors** is designed to build a strong foundation in the principles, characteristics, and applications of fundamental electronic components and sensing devices. It enables students to understand and identify key elements such as resistors, capacitors, inductors, switches, and a wide range of sensors, along with their operational behaviour and specifications.

The curriculum integrates theoretical knowledge with practical laboratory experiences to develop skills in circuit design, testing, and troubleshooting. Emphasis is placed on sensor technologies—including electromechanical, inductive, capacitive, thermal, and magnetic sensors—and their real-world applications in domains like automotive systems, home appliances, aerospace, and environmental monitoring.

Through structured learning outcomes, progressive assessments, and hands-on experiments, the course prepares students to select appropriate components and sensors for specific engineering applications, thereby enhancing their analytical, practical, and problem-solving abilities essential for modern electronics engineering.

Curriculum Development Committee Members

Sr. No.	Faculty Members	Role of Faculty	Signatures
1	Dr. Janani Natarajan	Subject Expert	
2	Mr. K. H. Kamath	Subject Expert	

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			SLH	NLH	CREDITS	THEORY				PRACTICAL				SLA		Total	
CL	TL	LL				FA	SA	Total		FA		SA					
			Max	Min				Max	Min	Max	Min	Max	Min				
1	---	2	1	4	2	---	---	---	---	25	10	50	20	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 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 :--- The student will be able to

Semester	2	Subject	Electronic Components and Sensors
CO 202		2 nd Course In Semester Two	
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	2nd Course In Semester Two								
CO 202	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2
CO 202.1	3	-	2	1	-	-	2	2	0
CO 202.2	2	3	2	2	-	-	2	3	0
CO 202.3	3	-	2	1	-	-	2	3	0
CO 202.4	3	3	3	3	3	3	3	2	0
CO 202.5	3	3	3	3	3	3	3	2	0
CO TOTAL	14	9	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	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

	Section -- 1						
Chapter No	Topics	Periods	Marks				COs
		Hrs.	R	U	A	Total	
1	Resistors						
1.1	Working principle and Applications of Linear and non-linear type.	3	---	---	---	---	CO 202.1 CO 202.2
1.2	Resistor Characteristics Tolerance, Power rating, Accuracy, Temperature rating.						
1.3	Colour coding of resistor and Numericals based on colour coding.						
2	Capacitors						
2.1	Working principle and Applications of Fixed and variable capacitors.	3	---	---	---	---	CO 202.1 CO 202.2
2.2	Capacitor characteristics Capacitance, Capacitor number coding.						
3	Inductors						
3.1	Working principle and Applications of Fixed and variable Inductors	2	---	---	---	---	CO 202.1 CO 202.2
3.2	Inductor Characteristics self and mutual inductance, Co-efficient of coupling						

	Section -- 2						
Chapter No	Topics	Periods	Marks				COs
		Hrs.	R	U	A	Total	
4	Switches		-	-	-	-	
4.1	Switches - Working principle, types and Applications	2	---	---	---	---	CO 202.3
4.2	General specifications: 1. voltage rating 2. contact current rating, 3. contact resistance, 4. operating time 5. release time						
5	Sensors and Applications						
5.1	Electro mechanical Sensors: Introduction, Resistive Potentiometer, Strain Gauge, Resistance Strain Gauge, Semiconductor Strain Gauges.	6	---	---	---	---	CO 202.4 CO 202.5
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.						

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, 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	2 nd	1994	Wheeler Publishing L. B. Shastri marg, Allahabad

E REFERENCES :-

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- https://econtent.msbte.edu.in/econtent/econtent_home.php



ST. XAVIER'S TECHNICAL INSTITUTE

To Nurture the Joy of Excellence in the World of High Technology

CURRICULUM FOR ELECTRICAL DEVICES AND MACHINE

Document Number: PBoS-2324-DEC-23203-00

REV. NO.	DATE	DESCRIPTION	PREPARED BY	CHECKED BY	APPROVED BY
00	11/12/ 2023	ELECTRICAL DEVICES AND MACHINE	SRB	VRR	SBG

EXECUTIVE SUMMARY

Electrical devices and machines are essential components of modern engineering systems, responsible for converting, controlling, and utilizing electrical energy in various forms. Electrical devices refer to components such as switches, relays, circuit breakers, and measuring instruments that control, protect, and monitor electrical circuits. These devices ensure safe and efficient operation by regulating current flow, preventing overloads, and enabling automation.

Electrical machines, on the other hand, are energy conversion devices that transform electrical energy into mechanical energy or vice versa. The two primary categories are motors and generators:

- **Motors:** convert electrical energy into mechanical motion and are widely used in appliances, industrial machinery, and electric vehicles.
- **Generators:** convert mechanical energy into electrical energy and are fundamental to power generation systems.

Transformers are another key class of electrical machines that transfer electrical energy between circuits through electromagnetic induction. They are crucial for stepping voltage levels up or down in power transmission and distribution systems.

Different types of machines—such as DC machines, synchronous machines, and induction machines—are selected based on specific requirements like load conditions, control needs, and efficiency.

In summary, electrical devices and machines form the backbone of energy conversion and utilization, enabling the functioning of modern technological and industrial systems.

Curriculum Development Committee Members

Sr. No.	Faculty Members	Role of Faculty	Signatures
1	Mr. Sanjiv Borkar	Subject Expert	
2	Mr. Anil Gurav	Subject Expert	

Program Title			Diploma in Electronics & Telecommunication Engineering														
Course Code			Course Title			ELECTRICAL DEVICES & MACHINE								Course Type		Semester	
23203														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	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 :--- The student will be able to

Semester	2	Subject	Electrical Devices & Machine
CO 203		3 rd Course In Semester Two	
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	3rd Course In Semester Two								
CO 203	P01	P02	P03	P04	P05	P06	P07	PS0 1	PS0 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	2	0

TABLE TO DECIDE CORRELATION LEVELS

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

	Section -- 1						
Chapter No	Topics	Periods	Marks				COs
		Hrs.	R	U	A	Total	
1	DC GENERATOR						
1.1	Basic principle of generator.	10	03	03	05	11	CO 203.1
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 • Long shunt compound • Short shunt compound						
2	DC MOTOR WITH CONTROL						
2.1	General principle of Motor.	10	06	05	05	16	CO 203.2
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. • DC long compound • 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.						
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).	04	---	03	05	08	CO 203.3
3.4	Earthing (Importance).						
3.5	Factor affecting on earth Resistance.						

	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).	09	06	05	05	16	CO 203.4
4.2	Emf equation of transformer.						
4.3	Derivation ,explanation, simple problem.						
4.4	Types of Transformer.(Diagram, Characteristics, comparison). • Core type • Shell type						
4.5	Losses in Transformer. • Winding losses • Core losses						
4.6	Efficiency and voltage regulation.						
4.7	Auto transformer (working principle, advantages, disadvantages).						
4.8	Open and Close circuit test.						
5	SPECIAL TYPES OF MOTORS						
5.1	Synchronous Motor.	10	03	05	05	13	CO 203.5
5.1.1	Working principle with diagram.						
5.1.2	Characteristics features.						
5.1.3	Method of starting.						
5.1.4	Application.						
5.2	Universal Motor.						
5.2.1	Working principle with diagram.						
5.2.2	Applications.						
5.3	Stepper Motor (permanent magnet).						
5.3.1	Working principle with diagram.						
5.3.2	Applications.						
5.4	Induction Motor (Split phase, Capacitor start).						
5.4.1	Working principle with diagram.						
5.4.2	Applications.						
6	ELECTRIC STORAGE BATTERY						
6.1	Types and applications of secondary storage batteries.	05	03	03	---	06	CO 203.6
6.2	Principle of working of –Lead acid, Li- ion batteries (EV battery).						
6.3	Ampere-hour ratings, Ampere- hour efficiency.						
6.4	Advantages and disadvantages.						

LIST OF LABORATORY EXPERIENCES

EXP. NO.	TITLE	COURSE OUTCOME	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 (I_{sh}).	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 CO 203.2
3.	Make the chart to show the comparison in between Lap and Wave windings.	CO 203.1 CO 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	08
	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	McGrawHill, 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 and 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

E REFERENCES ::--

- Virtual lab & Multisim software
- www.electrical-technologies.com
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ST. XAVIER'S TECHNICAL INSTITUTE

To Nurture the Joy of Excellence in the World of High Technology

CURRICULUM FOR ELECTRONICS DEVICES & CIRCUITS

Document Number: PBoS-2324-DEC-23204-00

REV. NO.	DATE	DESCRIPTION	PREPARED BY	CHECKED BY	APPROVED BY
00	11/12/ 2023	ELECTRONICS DEVICES & CIRCUITS	AG	VRR	SBG

EXECUTIVE SUMMARY

The course Electronics Devices & Circuits is a core subject in the Diploma in Electronics & Telecommunication Engineering program, designed to build a strong foundation in semiconductor devices and their applications in electronic circuits. The course enables students to understand the behaviour, characteristics, and practical use of fundamental electronic components used in modern electronic systems.

The curriculum begins with an in-depth study of the Bipolar Junction Transistor (BJT), Various applications of transistors, power amplifiers. The curriculum is supported by extensive laboratory experiments, where students perform characteristic analysis, build amplifier and oscillator circuits, and test transistor applications. These practical sessions strengthen hands-on skills, circuit troubleshooting abilities, and experimental understanding. It serves as a foundation for advanced subjects in electronics, communication, and embedded systems, and prepares students for careers in electronics industry, maintenance, and system development.

Curriculum Development Committee Members

Sr. No.	Faculty Members	Role of Faculty	Signatures
1	Mr. Anil C. Gurav	Subject Expert	
2	Mr. RakeshKumar Saroj	Subject Expert	

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 ::-- The student will be able to

Semester	2	Subject	Electronics Devices & Circuits
CO 204		4 th Course In Semester Two	
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	4th Course In Semester Two								
	P01	P02	P03	P04	P05	P06	P07	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	2	0

TABLE TO DECIDE CORRELATION LEVELS

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

	Section -- 1						
Chapter No	Topics	Periods	Marks				COs
		Hrs.	R	U	A	Total	
1	BIPOLAR JUNCTION TRANSISTOR						
1.1	Introduction, types & symbols.	12	04	08	03	15	CO 204.1
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						
1.4.2	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.						
2	TRANSISTOR AS AMPLIFIER						
2.1	Biasing of Transistor:	07	03	06	03	12	CO 204.2 CO 204.3 CO 204.4
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.						
3	APPLICATIONS OF TRANSISTOR						
3.1	Transistor as switch	06	03	05	---	08	CO 204.1 CO 204.5
3.2	Transistor as voltage regulator						
3.3	Transistor as memory cell						
3.4	Transistor as waveform generator (square / pulse)						

	Section -- 2						
Chapter No	Topics	Periods	Marks				COs
		Hrs.	R	U	A	Total	
4	POWER AMPLIFIER USING BJT						
4.1	Introduction	08	03	06	03	12	CO 204.3 CO 204.4 CO 204.5
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						
5	OSCILLATORS USING BJT						
5.1	Introduction, Barkhausen criterion, Types of oscillators	08	04	06	02	12	CO 204.2 CO 204.5
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						
6	MOS-FIELD EFFECT TRANSISTORS						
6.1	Introduction of Voltage controlled Device family of FET	07	03	05	03	11	CO 204.6
6.2	MOSFET						
6.2.1	Types – Enhancement, Depletion Construction & Operation Characteristics and applications.						
6.3	Comparison						
6.3.1	BJT & FET						
6.3.2	FET & MOSFET						
6.3.3	JFET and MOSFET						

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 CO 204.2	1
3.	Perform , Test & Plot B.J.T. Common Emitter Configuration Output characteristics	CO 204.1 CO 204.2	1
4.	Perform , Test & Plot B.J.T. Common Base Configuration Input & Output characteristics	CO 204.1 CO 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 CO 204.2	1
6.	Build & Perform Transistor as switch	CO 204.1 CO 204.2 CO 204.5	3
7.	Build & Perform Single stage CE Amplifier	CO 204.1 CO 204.2 CO 204.5	2
8.	Build & Perform Transistor as voltage regulator	CO204.1 CO 204.2 CO 204.5	3
9.	Build & Perform Transistor as waveform generator (square / pulse)	CO 204.1 CO 204.2 CO 204.5	3
10.	Determine significance of Bandwidth, Gain by Frequency Response of Single Stage R-C Coupled Amplifier	CO 204.1 CO 204.2 CO 204.3	2
11.	Plot & determine the frequency of oscillations of Colpitts oscillator circuit	CO 204.1 CO 204.2 CO 204.5	5
12.	Plot & determine the frequency of oscillations of Hartley oscillator circuit	CO 204.1 CO204.2 CO 204.5	5
13.	Build & Perform R-C Phase Shift Oscillator & Plot & determine the frequency of oscillations	CO 204.1 CO 204.2 CO 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 CO 204.2 CO 204.3 CO 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 CO 204.2
2.	Build Transistor as switch.	CO 204.1 CO 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 CO 204.5
5.	Build circuit of DC regulated power supply.	CO 204.1 CO 204.5
6.	Build circuit of Bulgar Alarm using BJT.	CO 204.1 CO 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.	Bipolar junction Transistor	12	04	08	03	15
2.	Transistor as amplifier	07	03	06	03	12
3.	Applications of Transistor	06	03	05	---	08
	SECTION -2					
4.	Power amplifier 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	McGraw Hills Inc., New Delhi-2
6.	S. Salivahanan and N. Suresh Kumar	Electronic Devices and Circuits	4th	2017	McGraw Hills Inc., New Delhi-2
7.	Albert Malvino & David Bates	Electronic Principles	4th	2010	Tata McGraw Hill Publication

E REFERENCES ::-

- <https://electronicsforu.com/resources/electronic-devices-and-circuit-theory>
- <http://www.electronics-tutorials.ws>
- <http://www.electricaltechnology.org>
- https://econtent.msbte.edu.in/econtent/econtent_home.php



ST. XAVIER'S TECHNICAL INSTITUTE

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CURRICULUM FOR INTRODUCTION TO PROGRAMMING

Document Number: PBoS-2324-DEC-23205-00

REV. NO.	DATE	DESCRIPTION	PREPARED BY	CHECKED BY	APPROVED BY
00	11/12/2023	INTRODUCTION TO PROGRAMMING	RVG	VRR	SBG

EXECUTIVE SUMMARY

The course “**Introduction to Programming (Course Code: 23205)**” is a foundational subject offered in **Semester II** of the **Diploma in Electronics & Telecommunication Engineering** program. It is designed to introduce students to the fundamental concepts of programming using the **C language**, enabling them to build a strong base for advanced technical subjects. The course focuses on developing essential programming skills, including understanding **algorithms, flowcharts, data types, operators, and control structures**. Students are trained to write, compile, and debug programs while gaining practical exposure through structured laboratory exercises.

Curriculum Development Committee Members

Sr. No.	Faculty Members	Role of Faculty	Signatures
1	Mr. Rameshwar Gheware	Subject Expert	
2	Dr. Mahesh Munde	Subject Expert	

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 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 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 :- The student will be able to

Semester	2	Subject	Introduction To Programming
CO 205		5 th Course In Semester Two	
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		Apply Strings in Problem Solving	

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

SEM II	Introduction To Programming								
CO 205	5 th Course In Semester Two								
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	2

TABLE TO DECIDE CORRELATION LEVELS

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

	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,	01	---	---	---	---	CO 205.1
1.2	Low level language. (introduction)						
1.3	Middle level language (introduction)						
1.4	High level language.(introduction)						
2	BASICS OF C- PROGRAMMING						
2.1	Introduction to ‘C’; History of ‘C’.	03	---	---	---	---	CO 205.1 CO 205.2
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						
3	CONTROL & LOOPING STRUCTURE						
3.1	If	04	---	---	---	---	CO 205.3
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						

	Section -- 2						
Chapter No	Topics	Periods	Marks				COs
		Hrs.	R	U	A	Total	
4	ARRAYS						
4.1	Defining, Declaring & Initialization.	3	---	---	---	---	CO 205.4
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.						
5	FUNCTIONS & POINTER						
5.1	Definition: Function, Pointer	3	---	---	---	---	CO 205.5
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						
6	STRING						
6.1	Definition of string	2	---	---	---	---	CO 205.6
6.2	String Library functions						
6.3	User defined function equivalent to strlen, strcpy, strlwr,strupr						
6.4	Programs using strings						

LIST OF LABORATORY EXPERIENCES

EXP. NO.	TITLE	COURSE OUTCOME	CHAPTER NO
1.	Evaluation of Expressions in C	CO 205.1	1
2.	Simple Elementary Programs	CO 205.2	2
3.	Programs dealing with mathematical series	CO 205.3	3
4.	Programs dealing with one dimension arrays	CO 205.4	4
5.	Programs for two dimension arrays and sorting	CO 205.4	4
6.	Programs dealing with strings	CO 205.6	6
7.	Programs dealing with strings	CO 205.6	6
8.	Programs concerned with functions and pointers	CO.205.5	5
9.	Additional Program as given by teacher	CO 205.1, CO 205.2, CO 205.3, CO 205.4	1/2/3/4
10.	Additional Program as given by teacher	CO 205.1, CO 205.2, CO 205.3, CO 205.4	1/2/3/4
11.	Additional Program as given by teacher (strings)	CO 205.6	6
12.	Additional Program as given by teacher (strings)	CO 205.6	6
13.	Additional Program as given by teacher (functions & pointers)	CO 205.5	5
14.	Additional Program as given by teacher (functions & pointers)	CO 205.5	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'	7th	Latest Edn.	BPB Publication New Delhi
2.	Bryan Kernighan and Dennis Ritchie	The 'C' Programming Language	2nd	1995	Prentice Hall of India New Delhi
3.	Henry Mullishand Herbert Cooper	The Spirit Of 'C'	2nd	1996	Jaico Publication Mumbai
4.	E. Balaguruswamy	Ansi 'C'	4th	Latest Edn.	Tata McGraw Hill

E 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)
- https://econtent.msbtte.edu.in/econtent/econtent_home.php



ST. XAVIER'S TECHNICAL INSTITUTE

To Nurture the Joy of Excellence in the World of High Technology

CURRICULUM FOR ENGINEERING GRAPHICS

Document Number: PBoS-2324-DEC-23206-00

REV. NO.	DATE	DESCRIPTION	PREPARED BY	CHECKED BY	APPROVED BY
00	11/12/2023	ENGINEERING GRAPHICS	RRS	VR	SBG

EXECUTIVE SUMMARY

The course Engineering Graphics (23206) is a fundamental subject in the Diploma program in Electronics and Telecommunication Engineering that develops student's ability to visualize and communicate engineering concepts through graphical representation. Engineering graphics acts as a universal language of engineers and plays a vital role in the design, analysis, and documentation of engineering components and systems.

The curriculum focuses on building a strong foundation in basic drawing principles, including the use of drawing instruments, engineering scales, dimensioning practices, and standard drawing conventions. It introduces students to orthographic projections and isometric views, enabling them to interpret and represent three-dimensional objects accurately on two-dimensional drawing sheets. The course also emphasizes freehand sketching of basic engineering and electronic components to enhance visualization and drafting skills.

To meet modern engineering requirements, the course integrates Computer Aided Drafting (CAD) techniques, enabling students to create and modify engineering drawings using software tools. Through practical exercises, laboratory work, and problem-based learning activities, students develop spatial visualization ability, drafting accuracy, and technical communication skills.

The curriculum is designed in alignment with the guidelines of AICTE, MSBTE, and the principles of NEP 2020, promoting outcome-based education, skill development, and industry relevance for modern engineering practice.

Curriculum Development Committee Members

Sr. No.	Faculty Members	Role of Faculty	Signatures
1	Mr. Rakeshkumar Saroj	Subject Expert	
2	Mrs. Sanchita Datta	Subject Expert	

Program Title			Diploma in Electronics & Telecommunication Engineering														
Course Code			Course Title			ENGINEERING GRAPHICS								Course Type		Semester	
23206														SEC		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		
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 ::-- The student will be able to

Semester	2	Subject	Engineering Graphics
CO 206	6th Course In Semester Two		
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	6 th Course In Semester Two								
CO 206	PO1	PO2	PO3	PO4	PO5	PO6	PO7	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	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

	Section -- 1						
Chapter No	Topics	Periods	Marks				COs
		Hrs.	R	U	A	Total	
1	BASIC ELEMENTS OF DRAWING						
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.	---	---	---	---	---	CO 206.1
1.4	Dimensioning techniques as per SP-6:2003 – types and applications of chain, parallel and coordinate dimensioning. Geometrical and Tangency constructions. (Redraw the figure)						
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.	---	---	---	---	---	CO 206.2
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)						
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
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

Chapter No	Topics	Periods	Marks				COs
		Hrs.	R	U	A	Total	
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	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.	---	---	---	---	---	CO 206.5
5.2.1	File features: New file, Saving the file, Opening an existing drawing file, Creating templates, Quit.						
5.2.2	Setting up new drawing: Units, Limits, Grid, Snap.						
	Undoing and redoing action.						
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.	---	---	---	---	---	CO 206.6
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						

LIST OF LABORATORY EXPERIENCES

EXP NO	TITLE	COURSE OUTCOME MAPPING	Chapt. No.
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.	Bhatt, N. D	Engineering Drawing	---	2010	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



ST. XAVIER'S TECHNICAL INSTITUTE

To Nurture the Joy of Excellence in the World of High Technology

CURRICULUM FOR ELECTRONICS WORKSHOP

Document Number: PBoS-2324-DEC-23207-00

REV. NO.	DATE	DESCRIPTION	PREPARED BY	CHECKED BY	APPROVED BY
00	11/12/2023	ELECTRONICS WORKSHOP	SNJ	VR	SBG



EXECUTIVE SUMMARY

This Electronics Workshop proposal outlines a hands-on training program designed to teach foundational electronics, component identification, and circuit assembly using ICs and microcontrollers. It aims to bridge theoretical knowledge with practical skills, equipping students to troubleshoot, solder, and design functional electronic projects.

Workshop Objectives & Scope:

- **Skill Acquisition:** Teach identification, testing, and application of components (resistors, capacitors, diodes, transistors).
- **Practical Training:** Provide hands-on experience in soldering, PCB design, and circuit interconnection methods.
- **Project Development:** Enable participants to build functional projects, such as timer-based circuits, using IC 555 timers or microcontrollers.
- **Safety Standards:** Emphasize, demonstrate, and teach electrical safety measures to prevent electric shocks.

Key Deliverables

Hands-on familiarity with testing instruments and tools.

- Completion of mandatory exercises (e.g., soldering, circuit design).
- Aspiring professionals seeking hands-on PCB.

Curriculum Development Committee Members

Sr. No.	Faculty Members	Role of Faculty	Signatures
1	Mr. Shekhar Jirapure	Subject Expert	
2	Mr. Abhijit Patil	Subject Expert	

Program Title			Diploma in Electronics & Telecommunication Engineering														
Course Code			Course Title			ELECTRONICS WORKSHOP								Course Type		Semester	
23207														AEC		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) 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:

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 :---

Semester	2	Subject	Electronics Workshop
CO 207		7 th Course In Semester Two	
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	7 th Course In Semester Two								
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	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

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.						CO 207.1
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.						
2	INTRODUCTION OF THE COMPONENTS						
2.1	Passive Components. Color Code of Resistor, Capacitor & Inductor. Series Parallel combinations on bread board.						CO 207.2
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.						
3	INTRODUCTION OF CIRCUIT BOARD						
3.1	Types of circuit boards - Bread Board, General Purpose Board & Printed Circuit Board.						CO 207.3
3.2	Mounting and testing of small circuit on Bread Board.	---	---	---	---	---	
3.3	Mounting and testing of small circuit on General purpose board.						
4	SOLDERING AND DE SOLDERING OF COMPONENTS						
4.1	Types of Soldering Iron and they use.						CO 207.4
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.						
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: Passive Components. 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	Principles of Electronics	Latest edition	2014	S Chand Publication

E REFERENCES....--

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- www.eleccircuit.com
- www.youtube.com
- www.sprinboard.com
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