P. E. S. COLLEGE OF ENGINEERING, MANDYA

Scheme of Teaching and Examinations - 2025

Outcome-Based Education (OBE) and Choice Based Credit System (CBCS)

(Effective from the academic year 2025-26)

B.E. I – Semester [Chemistry Group] Stream: –E and C Engineering Stream (ECES) Programme: Electronics and communication Engineering

Sl. No	Course and Course Code		Course Title	TD/PSB	Teaching Hours/Week				Examination				Credits
					Theory Lecture	Tutorial	Practical/ Drawing	SAAE	SEE Duration in hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P	S					
1	ASC	P25MAEE101	Differential Calculus and Linear Algebra	Maths	3	2	0		03	50	50	100	04
2	ASC	P25CHEE102	Applied Chemistry for Emerging Electronics and Futuristic Devices	CHE	3	0	0		03	50	50	100	03
3	ESC	P25ESC1033	Computer-Aided Engineering Drawing for ECE Stream	ME dept	2	0	2		03	50	50	100	03
4	ESC	P25ESC1042	Introduction to Electrical Engineering	Respective Engg dept	3	0	0		03	50	50	100	03
5	PLC	P25PLC1051	Introduction to C Programming	Respective Engg dept	3	0	0		03	50	50	100	03
6	PLC	P25PLCL1061	Introduction to C Programming Laboratory	Respective Engg dept	0	0	2		03	50	50	100	01
7	ASC	P25CHEEL107	Applied Chemistry lab for Emerging Electronics and Futuristic Devices Laboratory	CHE	0	0	2		03	50	50	100	01
8	AEC	P25ENG108	Communicative English-I	Humanities	0	2	0		02	50	50	100	01
9	AEC/ SDC	P25IDT109	Innovation and Design Thinking Laboratory	Any Dept	0	0	2		02	50	50	100	01
10	NCMC	P25ICO110	Indian Constitution	Humanities	1	0	0		01	100	--	100	PP
	TOTAL									**550**	**450**	**1000**	**20**
10	**AICTE Activity Points** (students have to earn **100** activity points between 01 to 08 semesters)				Compulsory requirement for the award of a degree								

S- (SAAE) Students Academic Activity Engagement Hours, **ASC**-Applied Science Course, **ESC**- Engineering Science Courses, **IC** – Integrated Course (Practical Course Integrated with Theory Course), **PLC(IC)**- Programming Language Course (Integrated Course), **AEC**- Ability Enhancement Course, **AEC/SDC**- Ability Enhancement Course/Skill Development course, **ETC**- Emerging Technology Course, **TD/PSB**- Teaching Department / Paper Setting Board, **HSMC**- Humanity, Social Science and management Course, **CIE** –Continuous Internal Evaluation, **SEE**- Semester End Examination, **NCMC:** Non Credit Mandatory Course, **PP** : (Pass/Pass) is assigned to a non-credit course. "PP" represents pass in course provided students have successfully completed the CIE requirements. Otherwise, "NP-not pass shall be awarded. "PP" is essential for the award of the degree

Credit Definition: 1-hour Lecture **(L)** per week=**1Credit** 2-hoursTutorial**(T)** per week=**1Credit** 2-hours Practical / Drawing **(P)** per week=**1Credit**	04-Credits courses are to be designed for 50 hours of Teaching-Learning Session 04-Credits (IC) are to be designed for 40 hours' theory and 10-12 hours of practical sessions 03-Credits courses are to be designed for 40 hours of Teaching-Learning Session 02- Credits courses are to be designed for 25 hours of Teaching-Learning Session 01-Credit courses are to be designed for 12 hours of Teaching-Learning sessions

The **Student Induction Programme** (SIP), initiated by the All India Council for Technical Education (AICTE), is designed to help newly admitted students in technical institutions transition smoothly into the higher education environment. It aims to familiarize students with the institutional culture, foster connections with peers and faculty, and provide a foundation for holistic learning. The first year of Engineering programmes is composed of I semester and II semester and Summer Semester. SIP activities shall be scheduled in the afternoon sessions during the first week of class commencement of I and II semesters only. Activities under SIP may include Physical Activities, Creative Arts, Universal Human Values, Literary Events, Proficiency Modules, Lectures by Eminent Personalities, Local Area Visits, Department/Branch Familiarization, and Innovation-related sessions. The specific programmes to be conducted will be notified separately by the University, with the academic calendar or separately.

AICTE Activity Points Requirement for BE/B.Tech. Programmes

As per AICTE guidelines (refer Chapter 6 – *AICTE Activity Point Program, Model Internship Guidelines*), in addition to academic requirements, students must earn a specified number of **Activity Points** to be earned is to be eligible for the award of their degree.

- **Regular students** admitted to a 4-year degree program must earn **100 Activity Points**.
- **Lateral entry students** (joining from the second year) must earn **75 Activity Points**.
- **Students transferred** from other universities directly into the fifth semester must earn **50 Activity Points** from the date of entry into VTU.

These Activity Points are **non-credit** and will not be considered for **the SGPA/CGPA** or be used for **vertical progression**. However, they are mandatory for the **award of the degree**, and the points earned will be reflected on the **eighth semester Grade Card**.

The hours spent for earning the activity points shall not be counted for regular attendance requirements. Students can accumulate these points at any time during their program, including on weekends, holidays, and vacations starting from the year of admission, provided they meet the minimum hours of engagement prescribed for each activity.

If a student fails to earn the required Activity Points, the eighth-semester Grade Card will be withheld until the requirement is fulfilled. Consequently, the degree will be awarded only after the Grade Card has been released.

Applied Mathematics-I					Applied Chemistry				
Code	**Title**	**L**	**T**	**P**	**Code**	**Title**	**L**	**T**	**P**
P25MACV101	Differential Calculus and Linear Algebra: CV Stream	3	2	0	P25CHCV102	Applied Chemistry for Sustainable Built Environment (CV)	3	0	0
P25MAME101	Differential Calculus and Linear Algebra: ME Stream	3	2	0	P25CHME102	Applied Chemistry for Metal Protection and Sustainable Energy (ME)	3	0	0
P25MAEE101	Differential Calculus and Linear Algebra: EEE Stream	3	2	0	P25CHEE102	Applied Chemistry for Emerging Electronics and Futuristic Devices (EEE, ECE)	3	0	0
P25MACS101	Calculus and Linear Algebra: CSE Stream	3	2	0	P25CHCS102	Applied Chemistry for Smart Systems (CSE)	3	0	0
(ESC-I) Engineering Science Courses-I					**(PLC) Programming Language Courses and Laboratory**				
Code	**Title**	**L**	**T**	**P**	**Code**	**Title**	**L**	**T**	**P**
P25ESC1041	Introduction to Building Sciences	3	0	0	P25PLC1051	Introduction to C Programming (For none IT programmes)	3	0	0
P25ESC1042	Introduction to Electrical Engineering	3	0	0	P25PLC1052	Python Programming (for CSE and allied programmes)	3	0	0
P25ESC1043	Introduction to Electronics & Communication	3	0	0	P25PLCL1061	Introduction to C Programming Laboratory (For none IT programmes)	0	0	2
					P25PLCL1062	Python Programming Laboratory (For CSE and allied programmes)	0	0	2
P25ESC1044	Introduction to Mechanical Engineering	3	0	0	**Computer Aided Engineering Drawing**				
P25ESC1045	Essentials of Information Technology	3	0	0	P25ESC1031	Computer Aided Drawing for CV Stream	2	0	2
					P25ESC1032	Computer Aided Drawing for ME stream Engineering	2	0	2
	Applied Chemistry Lab (ASC Lab)				P25ESC1033	Computer Aided Drawing for EEE stream	2	0	2
P25CHCVL107	Applied Chemistry Laboratory (Applied Chemistry for Sustainable Built Environment)	0	0	2	P25ESC1034	Computer Aided Drawing for CSE stream	2	0	2

The Mathematics/Chemistry courses shall be taught by a single faculty member per session, with no sharing of the course (subject) modules. The **tutorial sessions** for the **mathematics course** shall be conducted in the Laboratory environment using **MATLAB software** to enhance computational understanding and application skills.

Students admitted to a specific engineering stream are required to select and successfully complete **Applied Mathematics-I** and **Applied Chemistry courses** that are aligned with their program stream. These courses are intended to reinforce the academic foundations and develop the professional competencies relevant to their chosen engineering discipline.

Engineering Sciences Courses-I (ESC-I): These courses are designed to broaden the technical knowledge of students beyond their core area of study. These courses enable students to gain a foundational understanding of engineering principles from other stream courses. Students are required to select and complete two courses that are not belong to their admitted program stream. For example, a student admitted to the any programme of the Civil Engineering stream should not select Introduction to Building Sciences but any other two. One course shall select under ESC-I and another course under ESC-II. The two courses must be different from the other.

For the course **Interdisciplinary Project,** it is mandatory to form a team comprising students from multiple engineering disciplines. For example, a project team may include students from Mechanical Engineering, Electronics and Communication Engineering (ECE), and Computer Science and Engineering (CSE), working collaboratively to design and implement the project.

Computer-Aided Engineering Drawing: The courses under this category are stream-specific. Students must select and complete the course that corresponds to their admitted engineering stream**.**

I Semester

Course Title	**Differential Calculus & Linear Algebra**						
Course Code	**P25MAEE101**						
Category	**COMMON TO EEE STREAM**						
Scheme and Credits	Theory/Practical/Integrated					Total teaching hours	Credits
	L	T	P	SS	Total		
	3	2	0	-	04	(40 Hours Theory + 20 hours tutorial)	04
CIE Marks:50	**SEE Marks: 50**		**Total Max. marks=100**		**Duration of SEE: 03 Hours**		

Course Learning Objectives: By the end of the course, students will be able to:

- **Apply** concepts of differential and multivariable calculus—including series expansions, indeterminate forms, partial derivatives, Jacobians, and extrema—to analyze and solve mathematical problems.
- Formulate and **solve** ordinary differential equations of first and higher order using standard analytical methods, and interpret their applications in engineering systems.
- **Apply** linear algebra techniques such as matrix transformations, system consistency tests, numerical methods, and eigen-analysis to solve linear systems and related engineering problems.

Unit	Syllabus content	Hours
I	**Differential Calculus:** Polar curves, angle between the radius vector and the tangent, angle between the polar curves, pedal equations. Curvature and radius of curvature in cartesian, polar, parametric and pedal forms. **Self - study:** Center and circle of curvature, evolutes and involutes.	08
II	**Power Series Expansions, Indeterminate Forms and Multivariable Calculus:** Statement and problems on Taylor's and Maclaurin's series expansion for one Variable. Indeterminate forms- L'Hospital's rule. Partial Differentiation: Partial differentiation, total derivative- differentiation of composite functions. Jacobian. Maxima and minima for a function of two variables. **Self - study:** Euler's theorem and problems. Method of Lagrange's undetermined multipliers with single constraint.	08
III	**Ordinary Differential Equations (ODE) of First Order and First Degree and Nonlinear ODE:** Exact and reducible to exact differential equations- Integrating factors on $\frac{1}{N}\left(\frac{\partial M}{\partial y}-\frac{\partial N}{\partial x}\right)$ and $-\frac{1}{m}\left(\frac{\partial N}{\partial x}-\frac{\partial M}{\partial y}\right)$ only. Linear and Bernoulli's differential equations. Orthogonal trajectories, L-R and C-R circuits. Non-linear differential equations: Introduction to general and singular solutions, solvable for p only, Clairaut's equations, reducible to Clairaut's equations. **Self - study:** Newton Law of Cooling.	08
IV	**Ordinary Differential Equations of Higher Order**: Higher-order linear ODEs with constant coefficients, homogeneous and non-homogeneous equations$-e^{ax}, sin(ax+b), cos(ax+b), x^n$ only. Method of variation of parameters, Cauchy's and Legendre's homogeneous differential equations. L-C-R circuits. **Self-Study**: Orthogonal Trajectory.	08

V	**Linear Algebra**: Elementary transformation on a matrix, Echelon form, rank of a matrix, consistency of system of linear equations. Gauss elimination, Gauss – Seidel method to solve system of linear equations. Eigen values and eigen vectors of a matrix, Rayleigh power method to determine the dominant eigen value of a matrix. **Self-Study**: Gauss-Jordan method.	08

COURSE OUTCOMES: On completion of the course, student should be able to:

CO1: Apply foundational concepts of calculus and differential equations to analyze geometric properties of curves, solve first and higher-order ordinary differential equations, and model physical phenomena in science and engineering.

CO2: Apply the principles of linear algebra to solve systems of linear equations, determine eigenvalues and eigenvectors, and analyze real-world problems such as traffic flow.

CO3: Demonstrate the applications of electrical engineering and allied engineering science using modern ICT tools.

TEACHING – LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos.

Text books:

1. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44th Ed., 2021.
2. E. Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons,10th Ed., 2018.
3. Gilbert Strang, Linear Algebra and its Applications, Cengage Publications, 4th Ed., 2022.

Reference books:

1. B. V. Ramana, Higher Engineering Mathematics, McGraw-Hill Education, 11th Ed., 2017
2. Srimanta Pal & Subodh C.Bhunia, Engineering Mathematics, Oxford University Press, 3rd Ed., 2016.
3. N. P. Bali and Manish Goyal, A Text book of Engineering Mathematics, Laxmi Publications, 10th Ed., 2022.
4. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand Publication,3rd Ed., 2014.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2										
CO2	2	3										
CO3	3	2										
Strength of correlation: Low-1, Medium-2, High-3												

Academic Year: 2025-2026	Semester : I/II	Scheme: P25
Course Title: Applied Chemistry for Emerging Electronics and Futuristic Devices		
Course Code: P25CHEE102/202	**CIE Marks:** 50	**CIE Weightage:** 50
Teaching hours/week (L:T:P) 3:0:0	SEE Marks: 50	**SEE Weightage**:50
Teaching hours of Pedagogy: 40	**Exam Hours:** 03	
Credits: 03		

Prerequisite:

- A foundation in **materials science**, **physical and inorganic chemistry**, **electrochemistry**, **solid-state chemistry**, and **environmental science.**
- **A basic understanding of nanotechnology, corrosion mechanisms and sensor technology**

Course learning Objectives:

- To bring adaptability to the concepts of chemistry and to acquire the required skills to become a perfect engineer.
- To enable students to acquire knowledge on principles of chemistry for engineering applications.
- To develop an intuitive understanding of chemistry by emphasizing the related branches of engineering.
- To provide students with a solid foundation in analytical reasoning required to solve societal problems.
- To acquire the skills pertaining to analytical techniques and to apply them for Engineering field.

UNIT 1: Materials for Energy Devices	Hrs: 08

Semiconductors: Introduction, n-type and p-type semiconductor materials, difference between organic and inorganic semiconductors, organic photovoltaics - working principle and applications of; Poly (3-hexylthiophene) (P3HT) as a donor and Phenyl-C61-butyric acid methyl ester (PCBM) as an acceptor.

Energy Storage Devices: Introduction, classification of batteries-primary, secondary and reserve battery, characteristics - capacity, power density, cell balancing & cycle life. Construction and working of lithium-ion battery and its advantages in EV applications. Construction and working of ultra-small asymmetric super capacitor and its applications in IoT/wearable devices.

Energy Conversion Devices: Introduction, construction, working principal, advantages and limitations of solar photovoltaic cell (PV cell). Working principle and applications of Micro-electromechanical systems (MEMS)-based energy harvesters.

Self-Study Content: Batteries classification and their chemistry. Difference between capacitor and battery. Efficiency comparison of PV and OPV. Recycling of PCB and battery component

Textbook Map: 1. Semiconductor chemistry by Roy Mcweeny.
2.Energy storage and conversion devices; Supercapacitors, batteries and hydroelectric Cells Editor: Anurag Gaur, 2021, CRC Press.

Teaching Learning Process: chalk and talk method, Use of online platforms for assignments

UNIT 2: Nano and Quantum Dot Materials	Hrs: 08

Nanomaterials: Introduction, size dependent properties of nanomaterials - surface area, catalytic, optical properties and electrical conductivity. Synthesis of TiO_2 nanoparticles by sol-gel method and its uses in sensor applications.

Quantum Dot Materials: Introduction, types, optical and electronic properties of quantum dots

(QDs).

Inorganic Quantum Dot Materials (IQDMs): Introduction, synthesis and properties of silicon based QDs by solution phase method and Cd-Se Quantum Dots by hot injection method and applications in optoelectronic devices

Organic Quantum Dot Materials (OQDMs): Introduction, synthesis and properties of chitosan-carbon quantum dots hydrogel and its applications in next-generation **flexible and wearable electronics**. Synthesis and properties of Graphene Quantum Dots using citric acid method and its applications in emerging electronics.

Self-Study Content: Cd based QD (Toxicity and Stability). Comparison of graphene QDs, carbon QDs and inorganic QDs. TiO_2 nanoparticles for gas sensor applications

Textbook:

1. Introduction to Nano materials and Nanoscience by Chattopadhyay K K and A N Banerjee.
2. Quantum dots: Fundamentals,applications and frontiers by Bruce A Joyce and Paul Dawson.

Teaching Learning Process: chalk and talk method, Use of ICT–Online videos, online courses

UNIT 3: Functional Polymers and Hybrid Composites in Flexible Electronics	Hrs:08

Stretchable and Wearable Microelectronics: Introduction, basic principle and working of lithography for micro-patterned copper deposition. Synthesis, properties and applications of PDMS (Polydimethylsiloxane) and its uses in e-skin (electronic skin) and RFID applications.

Polymers: Introduction, synthesis, conduction mechanism of polyaniline and its electronic devices applications. Number average and weight average molecular weight of the polymer numerical. Synthesis and properties of Polyvinylidene Fluoride (PVDF) and its applications in E-nose devices.

Polymer Composites: Introduction, synthesis and properties of epoxy resin-magnetite (Fe_3O_4) composite for sensors applications. Synthesis and properties of Kevlar Fiber Reinforced Polymer (KFRP) for smart electronic devices applications.

Self-Study Content: Lithography, polymer synthesis(PANI,PDMS,PVDF), composite synthesis. PDMS in e-skin, PVDF in e-nose, epoxy- Fe_3O_4 sensors, kevlar composites.

Textbook Map: Stretchable electronics by takao someya (springer,2013)
Introduction rto polymers by R J young and P A lovell(3rd Edition)

Teaching Learning Process: chalk and talk method, Use of ICT–Online videos, online course

UNIT 4: Electrode System and Electrochemical Sensors	Hrs: 08

Electrode System: Introduction, types of electrodes, overview of Nernst equation, reference electrode-construction, working and applications of calomel electrode. Ion selective electrode-definition, construction, working of glass electrode, determination of pH using glass electrode. Construction and working of concentration cell and numerical.

Sensing Methods: Introduction, principle and instrumentation of colorimetric sensors; its application in the estimation of copper in PCBs. Principle and instrumentation of potentiometric sensors; applications in the estimation of iron in steel, conductometric sensors; its application in the estimation of acid mixture in the sample.

Self-Study Content: Electrode classification. Applications of potentiometry in pharmaceutical quality control for drug assays. Principle, instrumentation and applications of pH sensor.

Text book : Electrochemistry by Carl H Hamann, Andrew Hamnett and Wolf Vielstich.
Principles of instrumental analysis by Skoog, Holler and Crouch.

Teaching Learning Process: chalk and talk method, Use of ICT–Online videos, online courses

UNIT 5: Corrosion Science and E-waste Management | Hrs:08

Corrosion Chemistry: Introduction, electrochemical theory of corrosion, types of corrosion, differential metal corrosion in electronic circuits and differential aeration corrosion- waterline and pitting corrosion. Corrosion control- galvanization, anodization, cathodic protection and impressed current method. Corrosion penetration rate (CPR) - definition, importance and weight loss method-numerical problems.

Metal Finishing: Introduction, technological importance of metal finishing, difference between electroplating & electroless plating, electroplating of chromium for hard and decorative coatings, electroless plating of copper on PCBs.

E-waste: Introduction, sources of e-waste, need of e-waste management & effects of e-waste on environment and human health. Extraction of gold from e-waste from bioleaching method

Self-Study Content: Electroplating of Gold and Electro-less plating of Nickel. Role of stake holders in E-waste management.

Textbook Map: 1. Engineering chemistry by Jain and Jain.
2. Engineering chemistry by Dr. R. V. Gadag and Dr. A. Nithyananda Shetty.

Teaching Learning Process: chalk and talk method, Experiments in laboratories shall be executed in blended mode

Course Outcomes: At the end of the course students should be able to :

CO1: Explain the fundamental concepts of semiconductor materials, energy storage and conversion devices.

CO2: Apply the synthesis techniques of nanomaterials and quantum dot materials to develop functional nanostructures and demonstrate their application in various electronic devices.

CO3: Critically analyze and assess the synthesis, properties and applications of polymers composites and micro fabrication techniques in stretcheable, wearable and smart electronic devices.

CO4: Analyze various electrode systems and sensing methods by understanding their principle to evaluate electrochemical measurements.

CO5: Apply appropriate methods for corrosion prevention and e-waste management in engineering practices.

Suggested Learning Resources:

Textbooks:

Sl.no	Title	Author	Year & Edition	Publisher
1	A Text book of Engineering Chemistry	S S Dara	15th Edition, 2020.	S Chand & Company Ltd
2	"Chemistry for Engineering Students"	B. S. Jai Prakash, R. Venugopal, Sivakumaraiah & Pushpa Iyengar.	10th Edition, 2020	Subash Publications
3	Text Book of Polymer Science	F. W. Billmeyer	15th Edition, 2020	John Wiley & Sons

Reference Books:

1.	A Text Book of Engineering Chemistry	R. V. Gadag and Nityananda Shetty	2nd Edition, 2016.	I. K. International Publishing House
2	Nanotechnology A Chemical Approach to Nanomaterials	G.A. Ozin & A.C. Arsenault	2005.	RSC Publishing
3	Engineering Chemistry	PC Jain & Monica Jain	2015-16th Edition.	Dhanpat Rai Publication.0

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CO3: Critically analyze and assess the synthesis, properties and applications of polymers composites and micro fabrication techniques in stretcheable, wearable and smart electronic devices.
CO4: Analyze various electrode systems and sensing methods by understanding their principle to evaluate electrochemical measurements.
CO5: Apply appropriate methods for corrosion prevention and e-waste management in engineering practices.

Web links and Video Lectures (e-resources)
1. https://youtu.be/HT21wrGl6oM
2. https://youtu.be/aG2F-fd2drM
3. https://youtu.be/ivWXuOd5SrI
4. https://www.youtube.com/watch?v=BGdCj3-PEoE
5. https://www.youtube.com/watch?v=xvtOPHsukzE
6. https://www.youtube.com/watch?v=VxMM4g2Sk8U
7. https://www.youtube.com/watch?v=0bjRNq1PKak
8. https://youtu.be/XIjDw5Sw9c4
9. https://youtu.be/lB2zbQvnwXw
10. https://youtu.be/FNohb7ZKxMI
11. https://www.youtube.com/watch?v=Y-nZbZzBOPg
12. https://en.wikipedia.org/wiki/Graphene_quantum_dot
13. https://youtu.be/NCOwWEMEQN8
14. https://youtu.be/u_2YRTmOTWQ
15. https://youtu.be/ygtbo5KDXeI
16. https://youtu.be/whyIdJab1kM
17. https://youtu.be/3TYH-8pPDV4
18. https://youtu.be/xS60SGWSw4s
19. https://youtu.be/zJTQLce-WC8
20. https://www.youtube.com/watch?v=dmZtRntO1QI
21. https://www.youtube.com/watch?v=Kbta_BXZ4Vs&t=73s

Course Name: Applied Chemistry for Emerging Electronics and Futuristic Devices
Course Code: P25CHEE102

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO-1	1	1		2					1					
CO-2	3	2		1					2					
CO-3	3	3		2					2					
CO-4	3	3		3					3					
CO-5	3	2		1					1					
3 – HIGH, 2 – MEDIUM, 1 - LOW														

Active Based Learning (Suggested Activity in Class)/ Practical Based Learning(Example)
The following are sample strategies that educators may adopt to enhance the effectiveness of the teaching- learning process and facilitate the achievement of course outcomes. **1. Project-Based Learning (PBL):** Students gain knowledge by working on complex, real-world projects over time. **2. Example:** Building prototypes, developing community solutions, research presentations. **Flipped Classroom:** Students learn theoretical content at home (videos, readings) and engage in problem-solving or discussions in class.

Academic Year: 2025-26	**Semester:** I	**Scheme:** P25
Course Title: Computer Aided Engineering Drawing for ECE Stream		
Course Code: P25ESC1033	**CIE Marks:**50	CIE Weightage:50%
Teaching hours/week (L: T: P): 2:0:2	**SEE Marks:**50	SEE Weightage:50%
Teaching hours of Pedagogy:40 Hours	**Exam Hours:** 3 Hrs	
Credits:03		

Course Learning Objectives:

- To understand the fundamentals and significance of engineering drawing and BIS conventions.
- To learn the use of computer-aided drafting tools for creating 2D and 3D drawings.
- To develop skills in orthographic projection, sectional views, and development of solids.
- To acquire the ability to visualize and model simple engineering components in 3D.

Unit 1:	**Hrs: 8**

Introduction: Significance of Engineering drawing, BIS Conventions of Engineering Drawing, Free hand sketching of engineering drawing, Scales. Introduction to Computer Aided Drafting software, Co-ordinate system and reference planes HP, VP, RPP & LPP of 2D/3D environment. Selection of drawing sheet size and scale. Commands and creation of Lines, coordinate points, axes, polylines, square, rectangle, polygons, splines, circles, ellipse, text, move, copy, off-set, mirror, rotate, trim, extend, break, chamfer, fillet and curves.

Orthographic Projections of Points, Lines and Planes: Introduction to Orthographic projections, Orthographic projections of points in 1st and 3rd quadrants. Orthographic projections of lines (Placed in First quadrant only as per BIS) Orthographic projections of planes: triangular, square, rectangular, pentagonal, hexagonal and circular lamina (Placed in First quadrant only using change of position method).

Unit 2:	**Hrs: 8**

Orthographic Projection of Solids: Orthographic projection of right regular solids (Resting on HP only and inclined to both the planes); Prisms, Pyramids, Cylinders & Cones.

Unit 3:	**Hrs: 8**

Section of Solids: Introduction, Section planes, Sectional views: apparent shapes and true shapes, Sections of right regular prisms, pyramids, cylinders and cones resting with their base on HP. (Concepts only and No Problems for practice).

Development of Lateral Surfaces of Solids: Development of lateral surfaces of right regular Prisms, Pyramids, Cylinders & Cones and their frustums and truncations. Problems on applications of development of lateral surfaces like funnels and trays.

Unit4:	**Hrs: 8**

Isometric Views: Introduction to Isometric views, Isometric projections, Isometric scale. Isometric view of hexahedron (cube), right regular prisms, pyramids, cylinders, cones and spheres, Isometric view of combination of two simple solids, step block. Conversion of simple isometric drawings into orthographic views: Problems on conversion of Isometric view of simple objects / engineering components into orthographic views.

Unit 5:	**Hrs:8**

Electronic Components Visualization (For CIE Only):3D Modelling: Optical fibre cable with core and cladding, photonic crystal fibers, Antenna: Single element patch antenna, antenna array. Sheet Metal & Surface Design: PCB Enclosures: Creation of different geometry with slots as per Standards: NMEA-0183, applying material properties for heat sink and water/dust proofing and rendering for realistic visualization. Concept of Industrial drawing.

Suggested Learning Resources:

Textbooks:

Sl. No.	Title	Author	Year & Edition	Publisher
1	A Textbook of Computer Aided Engineering Drawing	K. R. Gopalakrishna, & Sudhir Gopalakrishna	2017, 39th Edition,	Subash Stores, Bangalore.
2	Engineering Drawing: Plane and Solid Geometry	Bhatt, N. D.	2023, 53rd Edition	Charotar Publishing House Pvt. Limited.

Reference Books:

1.	Engineering Visualisation	S. N. Lal and T. Madhusudhan	2022, 1st Edition	Engage Learning India Pvt. Ltd.
2.	Computer Aided Engineering Drawing	P.J. Shah	2021	S. Chand Publishing
3.	Engineering Drawing	M. B. Shah & B.C. Rana	2009, Revis-ed Edition	Pearson Education
4.	Electronics Drafting,	John Frostad	2010, 4th Edition	Goodheart-Willcox Pub

Web links and Video Lectures (e-resources)

- https://nptel.ac.in/courses/112104172
- https://nptel.ac.in/courses/112102304
- https://nptel.ac.in/courses/112105294
- https://www.coursera.org/courses?query=3d%20modeling&utm
- https://fiberopticx.com/optical-fiber-cable-structure/
- https://www.newport.com.cn/t/photonic-crystal-fibers

Teaching-Learning Process (Innovative Delivery Methods)

The following are sample strategies that educators may adopt to enhance the effectiveness of the teaching learning process and facilitate the achievement of course outcomes.

- Flipped Classroom
- Case-Based Teaching
- Simulation and Virtual Labs
- Partial Delivery of course by Industry expert/ industrial visits
- ICT-Enabled Teaching

Course Articulation Matrix

Course Outcomes		Program Outcomes											PSO	
		1	2	3	4	5	6	7	8	9	10	11	1	2
CO1	Generate orthographic projections of points, lines, planes, and solids manually and with computer aided tools.	3	2	2	1	2								
CO2	Develop the lateral surfaces of solids for real-world applications.	3	2	2		1								
CO3	Draw isometric views and convert isometric drawings to orthographic views.	3	2	2		2								
CO4	Create basic 3D models of electronic components and parts	3	2	3	2	3								

Academic Year: 2025-26	**Semester: I**	**Scheme: P25**
Course Title: **Introduction to Electrical Engineering**		
Course Code: **P25ESC1042/2042**	CIE Marks:**50**	CIE Weightage:**50%**
Teaching hours/week (L:T:P): **3:0:0**	SEE Marks:**50**	SEE Weightage:**50%**
Teaching hours of Pedagogy:**40**	Exam Hours: **3 Hrs**	
Credits:**3**		

Course learning Objectives:

- Explain the generation of power and the laws used in DC circuits.
- Analyze single-phase and three-phase circuits.
- Describe the construction, operation and applications of DC machines.
- Describe the construction, operation and applications of transformers and induction motors.
- Explain electricity billing and safety measures

Unit 1	**8 Hours**

Power Generation: Conventional and nonconventional energy sources. Single-line diagram of power supply system showing power station, transmission system and distribution system. Definition of power grid.

DC circuits: Ohm's law and Kirchhoff's laws, analysis of series, parallel and series-parallel circuits. Power and energy. Problems.

Unit 2	**8 Hours**

Single-Phase Circuits: Generation of single-phase system. Equation of AC voltage and current, average value, RMS value, form factor, peak factor and their relation [No derivations]. Voltage and current relationships in R, L and C circuits, concept of power, reactive power, apparent power and power factor, analysis of R-L, R-C and R-L-C series circuits, parallel circuits, illustrative examples.

Three-Phase Circuits: Generation of three-phase systems, star and delta (mesh) connections, relation between phase and line values of voltages and of currents of star and delta connections. Definition of balanced and unbalanced source and load. Power, reactive power and power factor. Problems with balanced loads.

Unit 3	**8 Hours**

DC Generator: Principle of operation, constructional details, induced emf expression, types of generators. Relation between induced emf and terminal voltage. Simple problems.

DC Motor: Principle of operation, back emf and its significance. Torque equation, types of motors, characteristics and speed control of DC shunt motor. Applications of DC motors. Simple problems.

Unit 4	**8 Hours**

Transformers: Introduction to transformers, necessity of transformer, principles of operation, constructional features of single-phase transformers. EMF equation, losses, variation of losses with respect to load. Calculation of efficiency at different loads.

Three-phase induction Motors: Definition of rotating magnetic field (without derivation), Principle of operation. Constructional features of squirrel cage type and wound rotor type induction motor. Slip and its significance, problems. Applications.

Unit 5	**8 Hours**

Domestic Wiring: Two-way and three-way control of loads.

Electricity Bill: Definition of "unit" used for consumption of electrical energy, power rating of

common household appliances. Two-part electricity tariff.

Equipment Safety measures: Working principle of fuse and miniature circuit breaker (MCB), merits and demerits.

Personal safety measures: Electric shock, safety precautions to avoid shock. Earthing and types: Plate earthing and pipe earthing.

Suggested Learning Resources:

Textbooks:

1	B.L. Theraja	A textbook of Electrical Technology	S Chand and Company	Volume-1 Reprint Edition 2014
2	V. K. Mehta, Rohit Mehta	Principles of Electrical Engineering & Electronics	S. Chand and Company Publications,	2nd edition, 2015

Reference Books:

1.	D. P. Kothari and I. J. Nagrath	Basic Electrical Engineering	McGraw Hill	4th edition, 2019
2	Rajendra Prasad	Fundamentals of Electrical Engineering	PHI	3rd edition, 2014
3	E. Hughes	Electrical Technology	Pearson	12th Edition, 2016
4	K. Vijayarekha	Basic Electrical and Electronics Engineering	Cengage	Reprint 2023
5	Harish C Rai	Handbook of Electrical Engineering formulae	CBS Publications	2018

Course Outcomes: At the end of the course students should be able to;

CO1: Analyse the single-line power supply system and compare conventional and non-conventional energy sources based on generation and distribution.

CO2: Apply AC circuit concepts to determine current, voltage, and power in single-phase and three-phase systems under different load conditions.

CO3: Analyze the working principles and performance characteristics of DC generators and motors for various applications.

CO4: Apply the principles of operation of transformers and three-phase induction motors to evaluate their performance and applications.

CO5: Analyze domestic electrical wiring systems and safety measures to ensure safe and efficient utilization of electrical energy.

COURSE ARTICULATION MARTIX[CAM]													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P011	PSO1	PSO2
CO1	3	2					1						
CO2	3	3											
CO3	3	3											
CO4	3	3											
CO5	2	3				1	1	1					
EXPECTED ATTAINMENT TARGET OF EACH PO'S													
%													

1. Level 3 is placed on the "apply or analyze or understand or design" level, which corresponds to 50% of the total distribution. 2. Level 2 is placed on the "apply or analyze or understand or design" level, which corresponds to 33% of the total distribution. 3. Level 1 is placed on the "apply or analyze or understand or design" level, which corresponds to 17% of the total distribution.
Web links and Video Lectures (e-resources)
www.nptel.ac.in (1) Principle of Electrical Sciences, Prof Sanjay Agrawal, Indira Gandhi National Open University. (2) Electricity and Electrical Wiring, Dr. Antara Mahanta Barua, Krishna Kanta Handiqui State Open University, Guwahati.
Teaching-Learning Process (Innovative Delivery Methods):
The following are sample strategies that educators may adopt to enhance the effectiveness of the teaching- learning process and facilitate the achievement of course outcomes. 1. Technology Integration, 2. Collaborative Learning, 3. Flipped Classroom, 4. Visual Based Learning

Academic Year: 2025-26	**Semester: I**	**Scheme: P25**
Course Title: **Introduction to C Programming**		
Course Code: **P25PLC1051**	CIE Marks:**50**	CIE Weightage:**50%**
Teaching hours/week (L:T:P): **3:0:0**	SEE Marks:**50**	SEE Weightage:**50%**
Teaching hours of Pedagogy:**40**	Exam Hours: **3 Hrs**	
Credits:**3**		

Course learning Objectives:

At the end of the course, the student will be able to:

1. Explain the basic structure, syntax, and primitive constructs of a C program, including data types, variables, and operators.
2. Apply decision-making and looping constructs to develop programs that solve simple computational problems.
3. To implement solutions for data manipulation and problem-solving in real-world contexts using Use arrays and string operations.
4. Develop modular programs using user-defined functions and apply concepts of recursion and parameter passing.
5. Demonstrate the use of structures and pointers to represent and manipulate complex data efficiently.
6. Integrate various C programming constructs to design, implement, and debug complete programs for practical applications.

Unit 1	**8 Hours**

Flowchart and Algorithms: Art of Programming through Algorithms & Flowcharts.
Overview of C: History of C, Importance of C, Basic Structure of C Programs, Programming Style, Compiling and Executing a 'C' Program.
Constants, Variables and Data Types: Character Set, C Tokens, Keywords and Identifiers, Constants, Variables, Data Types, Declaration of Variables, Assigning Values to Variables, Defining Symbolic Constants, Declaring a Variables as Constants and Volatile, Input/Output Statements in C.

Textbook Map: Chapter 1. 6, 2.1, 2.2, 2.8, 2.9, 2.10, Chapter 3.2 to 3.14, Chapter 5.1 to 5.5

Unit 2	**8 Hours**

Operators: Introduction to Operators, Arithmetic Operators, Relational Operators, Logical Operators, Assignment Operators, Increment and Decrement Operators, Conditional Operators, Precedence of Arithmetic Operators.
Decision Making, Branching, Looping: Introduction, Decision Making with IF Statement, Simple IF Statement, The IF..ELSE Statement, Nesting of IF..ELSE Statements, The ELSE IF Ladder, The Switch Statement, The ?: Operator, The GOTO Statement, WHILE, DO, FOR, Jumps in LOOPS.

Textbook Map: Chapter 4.1 to 4.7, 4.12, Chapter 6.1 to 6.9, Chapter 7.1 to 7.5

Unit 3	**8 Hours**

Arrays and Strings: Introduction, Declaration and Initialization of One-dimensional and Two-Dimensional Arrays, Declaring and Initializing String Variables, Example programs using arrays, Reading Strings from Terminal, Writing Strings to Screen, Arithmetic Operations on Characters, Comparison of Two Strings, String-handling Functions.

Textbook Map: Chapter 8.1 to 8.6, Chapter 9.2 to 9.5, 9.7, 9.8

Unit 4	**8 Hours**

User-defined Functions: Introduction, Need for User-defined Functions, A Multi-functional Program, Elements of User-defined Functions, Definition of Function, Return Values and their Types, Function Calls, Function Declaration, No Arguments and no Return Values, Arguments but no Return Values, Nesting of Functions.				
Textbook Map: Chapter 10.1 to 10.8, 10.10 to 10.14				
Unit 5				**8 Hours**
Structures and Pointers: Introduction, defining a Structure, Declaring and Accessing Structure Variables and Members, Structure Initialization, Copying and Comparing Structure Variables, Array of Structures, Arrays within Structures. **Pointers:** Introduction, Understanding Pointers, Accessing the Address of Variable, declaring pointer variables, initialization of pointers, accessing variables through its pointer.				
Textbook Map: Textbook 1: Chapter 7				
Textbooks: Chapter 11.1 to 11.6, 11.8, 11.19, Chapter 12.1 to 12.6				
Suggested Learning Resources:				
1	Programming in ANSI C	9e, E Balaguruswamy		Tata McGraw Hill Education
Reference Books:				
1.	PROGRAMMING IN C	Reema Thareja, Oxford University	3rd Edition	2023
2	The 'C' Programming Language	Brian W. Kernighan and Dennis M. Ritchie	2nd Edition	Prentice Hall of India, 2015
Web links and Video Lectures (e-Resources): 1. elearning.vtu.ac.in/econtent/courses/video/BS/15PCD23.html 2. https://nptel.ac.in/courses/106/105/106105171/ MOOC				
Courses can be adopted for more clarity in understanding the topics and verities of problem-solving methods. • https://www.tutorialspoint.com/what-is-an-algorithm-and-flowchart-in-c-language • https://www.tutorialspoint.com/cprogramming/c_data_types.htm • https://www.tutorialspoint.com/cprogramming/c_operators.htm • https://www.ccbp.in/blog/articles/decision-making-statements-in-c • https://www.tutorialspoint.com/cprogramming/c_arrays.htm • https://www.geeksforgeeks.org/variables-in-c/ • https://www.w3schools.com/c/c_arrays.php • https://www.programiz.com/c-programming/c-strings • https://www.programiz.com/c-programming/c-pointers • https://www.scaler.com/topics/c/structures-c/				

Course Outcomes: On completion of this course, students are able to:

COs	**Course Outcomes** with ***Action verbs*** for the Course topics	**Bloom's Taxonomy Level**	**Program Outcome Addressed (PO#) with BTL**
CO1	Apply the fundamental programming principles to construct efficient solutions by integrating C language features such as data types, control structures, arrays, functions, structures, and pointers.	L2, L3	PO1

CO2	*Analyze and Develop* algorithms/logical constructs to solve problems through systematic and efficient programming approaches.	L4	PO2, PO3
CO3	*Construct* C programs by integrating multiple programming components and techniques.	L4, L6	PO3
CO4	Design and implement modular programs by integrating user-defined functions, structures, and pointers to develop efficient solutions for complex computational problems.	L4, L6	PO3, PO4
CO5	Design and develop optimized efficient programs using C programming practices and modern tools, ensuring robustness, scalability, and maintainability for the given problem.	L6	PO4, PO5

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
#1	3											3	
#2		3	2										3
#3			2										
#4			2	2									
#5				2	2								

Academic Year: 2025-26	Semester: I	Scheme: P25
Course Title: **Introduction to C Programming Laboratory**		
Course Code: **P25PLCL1061**	CIE Marks:**50**	CIE Weightage:**50%**
Teaching hours/week (L: T:P): **0:0:2**	SEE Marks:**50**	SEE Weightage:**50%**
Teaching hours of Pedagogy: **24**	Exam Hours: **3**	
Credits:**1**		

PRACTICAL COMPONENT	
1.	Develop a program to calculate the temperature converter from degree to Fahrenheit.
2.	Develop a program to find the roots of quadratic equations.
3.	Develop a program to find whether a given number is prime or not.
4.	Develop a program to find key elements in an array using linear search.
5.	Given age and gender of a person, develop a program to categorize senior citizen (male & female).
6.	Generate Floyd's triangle for given rows.
7.	Develop a program to find the transpose of a matrix.
8.	Develop a program to concatenate two strings, find length of a string and copy one string to other using string operations.
9.	Develop a modular program to find GCD and LCM of given numbers.
10.	Develop a program to declare the structure of employees and display the employee records with higher salary among two employees.
11.	Develop a program to add two numbers using the pointers to the variables.
12.	Develop a program to find the sum of digits of a given number.
13.	Develop a program to perform Matrix Multiplication.
14.	Develop a program to create an array of structures to store book details and check whether a specific book, as requested by the user, is available or not.

Course Outcome

Course Outcomes: On completion of this course, students are able to:

COs	Course Outcomes with *Action verbs* for the Course topics	Bloom's Taxonomy Level	Program Outcome Addressed (PO #) with BTL
CO1	Apply fundamentals of C programming constructs to implement and solve basic computational problems.	L3	PO1, PO2
CO2	Develop C programs to transform data structures such as arrays, strings and matrices to solve the given problems.	L5	PO2, PO3, PO4
CO3	Create efficient modular programs by employing advanced C programming concepts.	L4, L6	PO2, PO3, PO4
CO4	Design, implement and test programs that solve real-world problems utilizing modern tools for efficient coding and debugging.	L4, L6	PO3, PO4, PO5, PO11

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
#1	3	3										3	3
#2		2	2	1									2
#3		2	2	1									2
#4			2	1	1						2		

Academic Year: 2025-2026	**Semester:** I/II	**Scheme:** P25
Course Title: Applied Chemistry for Emerging Electronics and Futuristic Devices Laboratory		
Course Code: P25CHEEL107	**CIE Marks:** 50	**CIE Weightage:** 50
Teaching hours/week (L:T:P) 0:0:2	**SEE Marks:** 50	**SEE Weightage**:50
Teaching hours of Pedagogy: 20	**Exam Hours:** 02	
Credits: 01		

Prerequisite:
Know basic chemistry concepts, handle chemicals and instruments safely, measure and record accurately.

Course learning Objectives:

CLO1: To bring adaptability to the concepts of chemistry and to acquire the required skills to become a perfect engineer.
CLO2: To enable students to acquire knowledge on principles of chemistry for engineering applications.
CLO3: To develop an intuitive understanding of chemistry by emphasizing the related branches of engineering.
CLO4: To provide students with a solid foundation in analytical reasoning required to solve societal problems.
CLO5: To acquire the skills pertaining to analytical techniques and to apply them for Engineering field.

FIXED SET OF EXPERIMENTS

1. Estimation of total hardness of water by EDTA method.
2. Determination of chemical oxygen demand (COD) of industrial effluent sample.
3. Estimation of iron in TMT bar by diphenyl amine indicator method.
4. Determination of alkalinity of given boiler water sample.
5. Green synthesis of copper nanoparticles for conductive ink applications.
6. Estimation of acid mixture by conductometric sensor (Conductometry)
7. Estimation of iron in rust sample by Potentiometric sensor (Potentiometry)
8. Determination of pKa of vinegar using pH sensor (Glass electrode)
9. Estimation of copper present in e-waste by optical sensor (Colorimetry).
10. Smartphone-Based colorimetric estimation of total phenolic content in coffee products.
11. Data analysis of pka of a week acid and its interpretation using origin software.
12. Chemical structure drawing using software: Chem Draw/ Chem Sketch.

Course Outcomes: At the end of the course students should be able to :

CO1: Apply titrimetric and redox-based analytical techniques for the analysis of the constituents.
CO2: Analyze the experimental data using a suitable sensor to interpret the results obtained.

Course Name: Applied Chemistry for Emerging Electronics and Futuristic Devices
Course Code: P25CHEEL102

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO-1					2									
CO-2					3									

3 – HIGH, 2 – MEDIUM, 1 - LOW

Course Title:	Communicative English – I (Common to all branches)		
Course Code:	P25ENG108	CIE Marks	50
	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P:S)	0:2:0:2	Exam Hours	02 Theory
Total Hours of Pedagogy	30 hours	Credits	01

Module-1: Introduction to Communication Skills	6 Hours
Introduction to communication, Meaning and process, Channels of communication, Elements of communication, Barriers to effective communication. Activities - Making introductions, sharing personal information, Describing feelings and opinions.	
Module-2: Listening Skills I	**4 Hours**
Hearing vs. Listening, Types of listening, Determinants of good listening, Active listening process, Barriers to listening, Activities - Listening for pronunciation practice, listening for personal communication, Listening for communication - language functions	
Module-3: Speaking Skills I	**6 Hours**
Basics of speaking, Elements and Functions of speaking, structuring your speech, Focusing on fluency, Homographs and Signpost words. Activities – Free Speech and Pick and Speak	
Module-4: Reading Skills I	**4 Hours**
Developing reading as a habit, building confidence in reading, improving reading skills, Techniques of reading - skimming and scanning. Activities - understanding students' attitudes towards reading, countering common errors in reading, developing efficiency in reading.	
Writing Skills I	**4 Hours**
Improving writing skills, Spellings and punctuation, Letter and Paragraph writing. Activity – Writing your personal story	
Module-5: Body Language and Presentation Skills	**6 Hours**
Elements of body language, Types, Adapting positive body language, Cultural differences in body language. 4 Ps in presentations, Overcoming the fear of public speaking, Effective use of verbal and nonverbal presentation techniques. Activity – Group presentations	
Course Outcomes: On completion of this course, students will be able to, CO1: Understanding elements of communication, barriers to effective communication, and channels of communication. CO2: Learning determinants of good listening, active listening processes, and types of listening. CO3: Mastering basics of speaking, structuring speeches, focusing on fluency, and overcoming fear of public speaking. CO4: Developing efficiency in writing, understanding common errors, and practicing letter and paragraph writing	

Textbooks and Reference Books:

1. Communication Skills by Sanjay Kumar and Pushpa Lata, Oxford University Press - 2015.
2. Everyday Dialogues in English by Robert J. Dixson, Prentice-Hall of India Ltd., 2006.
3. Developing Communication Skills by Krishna Mohan& Meera Banerjee (Macmillan)
4. The Oxford Guide to Writing and Speaking, John Seely, Oxford.
5. English Language Communication Skills - Lab Manual cum Workbook by Rajesh Kumar Singh, Cengage learning India Pvt Limited – 2018

CO – PO – PSO Matrix

CO	PO												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11		PSO1	PSO2	PSO3
CO1								1	3		2				
CO2									3		1				
CO3								1	3		2				
CO4					1				3		2				
CO															

Academic Year: 2025-2026	**Semester:** I	**Scheme:** P25
Course Title: Innovation & Design Thinking Laboratory		
Course Code: P25IDT109	**CIE Marks:** 50	**CIE Weightage:** 50
Teaching hours/week (L:T:P) 0:0:2	**SEE Marks:** 50	**SEE Weightage**:50
Teaching hours of Pedagogy: -	**Exam Hours:** 02	
Credits: 01		

Prerequisite:

- Empathy, creativity, experimentation, and iteration
- Ability to identify and tackle complex problems
- Hands-on experience with prototyping and user testing

Course learning Objectives:

CLO1: Understand a community-based challenge and perform research to analyze the problem.
CLO2: Generate and evaluate solution ideas based on the problem analysis and select a feasible concept for prototyping.
CLO3: Learn and apply appropriate rapid prototyping tools and techniques (e.g., Arduino, 3D printing, Figma, Onshape, etc.) to build a Proof of Concept (PoC).
CLO4: Demonstrate their prototype solution through a structured presentation or demo, explaining the design decisions, functionality, and potential impact.

Course content

Week -1&2
Introduction to Social Entrepreneurship, Innovation and Design Thinking Group discussion on What is Innovation vs Invention. Why Design Thinking is important. Brief about 5 stages: Empathize – Define – Ideate – Prototype – Test.

Week -3,4&5
Problem Immersion & 5W1H Mind Mapping, Root Cause (Fishbone) & User Journey Mapping Ideation (Design Sprint principles & SCAMPER).

Week -6,7 &8
Low-Fidelity Wireframing & Information Architecture (IT), High-Fidelity Prototyping (IT), CAD Design - Part 1 (2D Sketching) (Circuit branches, Mech, Civil), CAD Design - Part 2 (3D Part modelling & Assembly) (Circuit branches)

Week-9 10 &11
UI Design using Figma (IT), Backend Setup (Supabase) & Database Design (IT), Frontend Development - Flutter flow (IT), Basic Electronics and Simulation (Circuit branches), Arduino Basics (Circuit branches), Arduino Sensor integration (Circuit branches), Digital fabrication using Laser cutting and 3D printing (Mech/civil), woodworking (Mech/Civil)

Week- 12,13&14: Prototype building Hackathon and Demo Day

Course Outcomes: At the end of the course students should be able to:

CO1: Apply innovation strategies to real-world challenges
CO2: Analyze market trends and user needs to identify opportunities for innovation
CO3: Develop problem statements and ideate multiple creative solutions.
CO4: Build Prototypes to demonstrate design concepts.

Course Articulation Matrix														
Course Outcomes	Program Outcomes												PSO	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1		3	3			2	2		2			1		
CO2		3	2			2	1		2			2		
CO3	2	3	3						2	2		1		
CO4	2	3		2	3				2	2				

Indian Constitution			
Course Code	**P25ICO110**	CIE Marks	100
Teaching Hours/Week (L: T:P: S)	1:0:0	SEE Marks	---
Total Hours of Pedagogy	01Hours/Week	Total Marks	100
Credits	00	Exam Hours	-

Course objectives: This course will enable the students

1. To know about the basic structure of the Indian Constitution.
2. To know the Fundamental Rights (FRs), DPSP's, and Fundamental Duties (FD's) of our constitution.
3. To know about our Union Government, political structure & codes, and procedures.
4. To know the State Executive & Elections system of India.
5. To learn the Amendments and Emergency Provisions, other important provisions given by the constitution.

Module - 1

Introduction to Indian Constitution: The Necessity of the Constitution, The Societies before and after the Constitution adoption. Introduction to the Indian constitution, The Making of the Constitution, The Role of the Constituent Assembly. The Preamble of Indian Constitution & Key concepts of the Preamble. Salient features of India Constitution.

Module - 2

FR's, FD's and DPSP's: Fundamental Rights and its Restriction and limitations in different Complex Situations. Directive Principles of State Policy (DPSP) and its present relevance in our society with examples. Fundamental Duties and its Scope and significance in Nation building.

Module - 3

Union Executive: Parliamentary System, Union Executive - President, Prime Minister, Union Cabinet, Parliament - LS and RS, Parliamentary Committees, Important Parliamentary Terminologies. Supreme Court of India, Judicial Reviews and Judicial Activism.

Module - 4

State Executive & Elections, Amendments and Emergency Provisions: State Executive, Election Commission, Elections & Electoral Process. Amendment to Constitution (How and Why) and Important Constitutional Amendments till today. Emergency Provisions.

Module-5

Professional Ethics: Ethics & Values. Types of Ethics. Scope & Aims of Professional & Engineering Ethics. Positive and Negative Faces of Engineering Ethics. Clash of Ethics, Conflicts of Interest. The impediments to Responsibility. Trust & Reliability in Engineering, IPRs (Intellectual Property Rights), Risks, Safety and liability in Engineering.

Teaching-Learning Process

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching -Learning more effective: Teachers shall adopt suitable pedagogy for effective teaching - learning process. The pedagogy shall involve the combination of different methodologies which suit modern technological tools.

(i) Direct instructional method (Low/Old Technology), (ii) Flipped classrooms (High/advanced Technological tools), (iii) Blended learning (Combination of both), (iv) Enquiry and evaluation-based learning, (v) Personalized learning, (vi) Problems based learning through discussion. Apart from conventional lecture methods, various types of innovative teaching techniques through videos, animation films may be adapted so that the delivered lesson can progress the students in theoretical applied and practical skills.
Course outcome (Course Skill Set): At the end of the course the student will be able to :
CO1: Analyse the basic structure of Indian Constitution.
CO2: Remember their Fundamental Rights, DPSP's and Fundamental Duties (FD's) of our constitution.
CO3: know about our Union Government, political structure & codes, procedures.
CO4: Understand our State Executive & Elections system of India.
CO5: Remember the Amendments and Emergency Provisions, other important provisions given by the constitution.