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 2025-2026)

B.E. II – Semester [Chemistry Group] | **Stream: – Electrical Engineering Stream (EES)** | **Programme: Electrical and Electronics Engineering**

Sl. No	Course and Course Code		Course Title	TD/PSB	Teaching Hours/Week				Examination				Credits
					Theory Lecture	Tutorial	Practical/ Drawing	SAAE	Duration in hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P	S					
1	ASC	P25MAEE201	Calculus, Laplace Transform and Numerical Techniques	Mathematics	3	2	0		03	50	50	100	04
2	ASC	P25CHEE202	Applied Chemistry for Emerging Electronics and Futuristic Devices	Chemistry	3	0	0		03	50	50	100	03
3	ETC	P25ESC2035	Computer Aided Drawing for EEE stream	Mechanical	3	0	0		03	50	50	100	03
4	ESC	P25ESC2045	Essentials of Information Technology	Respective Engineering dept	3	0	0		03	50	50	100	03
5	PLC	P25PLC2051	Introduction to C Programming	Respective Engineering dept	3	0	0		03	50	50	100	03
6	PLC	P25PLCL2061	Introduction to C Programming Laboratory	Respective Engineering dept	0	0	2		02	50	50	100	01
7	ASC	P25CHEEL207	Applied Chemistry for Emerging Electronics and Futuristic Devices Laboratory	Chemistry	0	0	2		02	50	50	100	01
8	AEC	P25ENG208	Communicative English – II	Humanities	1	0	0		01	50	50	100	O1
9	AEC/SDC	P25IDT209	Interdisciplinary Project Based Learning	Any Dept	0	0	2		02	50	50	100	01
10	NCMC	P25ICO210	Indian Constitution	Humanities	1	0	0		01	100	--	100	PP
				TOTAL						550	450	**1000**	**20**

11	**AICTE Activity Points** (students have to earn **100** activity points between 01 to 08 semester)	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-hours Tutorial**(T)** 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
2-hours Practical / Drawing (**P**) per week=**1Credit**	01-Credit courses are to be designed for 12 hours of Teaching-Learning sessions

Integrated courses (IC), combining theory with practical components. The theory sessions conducted for 3 hours per week, while the practical sessions will be conducted for 2 hours per week.

- The theory component will be evaluated through both Continuous Internal Evaluation (CIE) and Semester End Examination (SEE).
- The practical component will be assessed only through CIE. However, questions related to the practical content will be included in the SEE question paper as part of the final examination.

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 Physics				
Code	**Title**	**L**	**T**	**P**	**Code**	**Title**	**L**	**T**	**P**
P25MACV101	Differential Calculus and Linear Algebra: CV Stream	3	2	0	P25PHCV102	Physics for Sustainable Structural System (CV stream)	3	0	0
P25MAME101	Differential Calculus and Linear Algebra: ME Stream	3	2	0	P25PHME102	Physics of Materials (Mech stream)	3	0	0
P25MAEE101	Differential Calculus and Linear Algebra: EEE Stream	3	2	0	P25PHEC102	Quantum Physics and Electronics Sensors (ECE stream)/	3	0	0
P25MACS101	Calculus and Linear Algebra: CSE Stream	3	2	0	P25PHEE102	Physics of Electrical & Electronics Materials (EEE)	3	0	0
					P25PHCS102	Quantum Physics and Applications (CSE stream)	3	0	0
Programme Specific Courses (PSC)					**Engineering Science Courses-I(ESC-I)**				
P25PSC1051	Engineering Mechanics	3	0	0	P25ESC1041	Introduction to Building Sciences	3	0	0
P25PSC1052	Elements of Mechanical Engineering	3	0	0	P25ESC1042	Introduction to Electrical Engineering	3	0	0
P25PSC1053	Elements of Electrical Engineering	3	0	0	P25ESC1043	Introduction to Electronics & Communication Engineering	3	0	0
P25PSC1054	Fundamentals of Electronics & Communication Engineering	3	0	0	P25ESC1044	Introduction to Mechanical Engineering	3	0	0
P25PSC1055	Programming in C	3	0	0	P25ESC1045	Essentials of Information Technology	3	0	0
P25PSC1056	Elements of Biotechnology and Biomimetics	3	0	0					
P25PSC1057	Principles of Soil Science and Agronomy	3	0	0					
Program-Specific Course Lab (PSCL)					**Emerging Technology Course (ETC)**				
P25PSCL1061	Mechanics and Materials Lab	0	0	2	P25ETC103	Introduction to AI and Applications	3	0	0
P25PSCL1062	Basic Electrical & Electronics Engineering Lab	0	0	2					
P25PSCL1063	Fundamentals of Electronics & Communication Engineering Lab	0	0	2		**Applied Physics Lab (ASC Lab)**			
P25PSCL1064	Elements of Mechanical Engineering Lab	0	0	2	P25PHCSL107	Applied Physics Laboratory (Quantum Physics and Applications)	0	0	2
P25PSCL1065	C Programming Lab	0	0	2					
P25PSCL1066	Soil Science and Agronomy Field Lab	0	0	2					
P25PSCL1067	Elements of Biotechnology Lab	0	0	2					

The Mathematics/Physics 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 Physics 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.

Programme Specific Courses (PSC): Programme Specific Courses (PSC) are a set of core courses tailored to the specific branch or discipline of engineering in which a student is enrolled (e.g., Mechanical Engineering, Computer Science, Civil Engineering, etc.). These courses are intended to provide students with in-depth knowledge and specialized skills essential for professional competence in their chosen field.
Students must select and complete the courses from this group that **correspond to their admitted program stream**.
Similarly, students are also required to choose and pass laboratory courses that are specific to their stream from the **Programme Specific Courses Laboratory (PSCL)** group.

Engineering Sciences Courses-I(ESC-I): Courses 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 disciplines. Students are required to select and complete the courses that do not belong to their admitted program stream. For example, a student admitted to the Civil Engineering program must choose a course such as Introduction to Mechanical Engineering or Introduction to Electrical Engineering, rather than Civil Engineering-related subjects. The course selected under Engineering Science Courses – II (ESC-II) must be different from the course chosen
under ESC-I and must also not belong to the student's admitted engineering stream.

II Semester

Course Title	Calculus, Laplace Transform and Numerical Techniques						
Course Code	P25MAEE201						
Category	COMMONTO EEE STREAMS						
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:

1	Apply the concepts of integral calculus and vector calculus to model and solve problems in engineering applications such as area, volume.
2	Apply appropriate numerical methods to find approximate solutions of algebraic, transcendental, and ordinary differential equations and to perform interpolation and numerical integration in engineering contexts.
3	Apply Laplace transform techniques for time domain, wave forms, periodic functions and solving differential equations.

Unit	Syllabus content	No. of hours
I	**Integral Calculus and its Applications:** Multiple Integrals: Evaluation of double and triple integrals, change of order of integration, changing to polar coordinates. Area and volume using double and triple integrals. Beta and Gamma functions: Definitions, properties, relation between Beta and Gamma functions. **Self-Study**: Volume by triple integration, Center of gravity.	8 hours
II	**Vector Calculus and its Applications:** Vector Differentiation: Scalar and vector fields, gradient of a scalar field, directional derivatives, divergence of a vector field, solenoidal vector, curl of a vector field, irrotational vector, physical interpretation of gradient, divergence and curl and scalar potential. Vector Integration: Line integrals, Statement of Green's and Stokes' theorem without verification problems. **Self-Study**: Volume integral and Gauss divergence theorem.	8 hours
III	**Numerical Methods-1:** Solution of algebraic and transcendental equations: Regula-Falsi method and Newton-Raphson method. Finite Differences and Interpolation: Forward and backward differences, Interpolation, Newton forward and backward interpolation formulae, Newton's divided difference interpolation formula and Lagrange's interpolation formula. Numerical Integration: Trapezoidal rule, Simpson's 1/3rd rule and Simpson's 3/8th rule. **Self-Study**: Boole's rule.	8 hours
IV	**Numerical Methods-2:** Numerical solution of ordinary differential equations of first order and first degree: Taylor's series method, Modified Euler's method, Runge-Kutta method of fourth order and Milne's predictor corrector method and Adam-Bashforth predictor-corrector method.	8 hours

	Self-Study :Runge-Kutta method of second order	
V	**Laplace Transform:** Laplace transforms (LT): Definition and Formulae of Laplace Transform, LT of elementary functions. Properties– linearity, scaling, shifting property, differentiation in the s domain, division by t. LT of periodic functions, square wave, saw-tooth wave, triangular wave, full and half wave rectifier, Heaviside Unit step function. Inverse Laplace Transforms: Definition, properties, evaluation using different methods, and applications to solve ordinary differential equations. **Self-Study:** Convolution theorem on Laplace Transform.	8 hours

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

CO1: Apply the concepts of integral calculus and vector calculus to model and solve problems in engineering applications such as area, volume.

CO2: Apply appropriate numerical methods to find approximate solutions of algebraic, transcendental, and ordinary differential equations and to perform interpolation and numerical integration in engineering contexts.

CO3: Apply Laplace transform techniques for time domain, wave forms, periodic functions and solving differential equations.

CO4: Demonstrate the applications of electrical engineering and allied engineering science using modern ICT tools

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

TEXTBOOKS:

1. B. S. Grewal, Higher Engineering Mathematics, 44th Edition 2018, Khanna Publishers, New Delhi.
2. E. Kreysizig, Advanced Engineering Mathematics, John Wiley and sons,10th Ed. (Reprint) 2016.
3. M. K. Jain, S.R.K. Iyengar and R.K. Jain, Numerical Methods for Scientific and Engineering Computation, New Age International Publishers, 8th Ed., 2022.

REFERENCEBOOKS:

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 Textbook 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.
5. Steven V. Chapra and Raymond P. Canale, Applied Numerical Methods with Matlab for Engineers and Scientists, McGraw-Hill, 3rd Ed., 2011.
6. Richard L. Burden, Douglas J. Faires and A. M. Burden, Numerical Analysis, 10th Ed.,2010, Cengage Publishers.
7. S.S. Sastry, "Introductory Methods of Numerical Analysis", PHI Learning Private Limited, 5th Ed., 2012

Web links and Video Lectures (e-Resources):

- http://academicearth.org/
- VTU e-Shikshana Program
- VTU EDUSAT Program
- https://nptel.ac.in/courses/111105160
- https://nptel.ac.in/courses/127106019
- https://ocw.mit.edu/courses/18-335j-introduction-to-numerical-methods-spring-2019/
- https://ocw.mit.edu/courses/18-330-introduction-to-numerical-analysis-spring-2012/pages/syllabus/

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2										
CO2	2	3										
CO3	3	2										
CO4	2	3										
Strength of correlation: Low-1, Medium-2, High-3												

PART-A		
Academic Year: 2025-2026	Semester: II	Scheme: P25
Course Title: Applied Chemistry for Emerging Electronics and Futuristic Devices		
Course Code: P25CHEE102	**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: Fundamental 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

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

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.

Course Name: Applied Chemistry for Emerging Electronics and Futuristic Devices
Course Code: P25CHEE202

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														

Academic Year: 2025-26	Semester: II	Scheme: P25
Course Title: Computer Aided Engineering Drawing for EE Stream		
Course Code: P25ESC2033	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 2D.

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

Electrical Drawing (For CIE Only): 2D drawing of switches, sockets, panels, junction boxes, antenna, electric circuits. Schematic diagrams of Automatic fire alarm, Call bell system, UPS system, Basic power system diagram. 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, Revised Edition	Pearson Education
4.	Electrical Engineering Drawing	Bhattacharya S. K	1998, 2nd Edition	New Age International Publishers

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://elion.co.in/understanding-electrical-drawings-a-beginners-guide/

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 schematic diagrams of Electrical Systems.	3	2	3	2	3								

Academic Year: 2025-26	**Semester:** II	**Scheme:** P25
Course Title: Essentials of Information Technology		
Course Code: P25ESC2045	**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 Hours	**Exam Hours:** 3 Hrs	
Credits:03		

Course Learning Objectives:

- Understand core concepts of computing, including data handling, operating systems, networking, software engineering, and web development.
- Apply technical and ethical principles to design secure, efficient, and responsible computing solutions.

Unit 1:	Hrs:8

Data Storage: Bits and Their Storage, Main Memory, Mass Storage, Representing Information as Bit Patterns, The Binary System, Storing Integers, Storing Fractions.
Data Manipulation: Computer Architecture, Machine Language, Program Execution, Arithmetic/Logic Instructions, Communicating with Other Devices.
Textbook 1: Chapter-1 (1.1-1.7), Chapter-2 (2.1-2.5)

Unit 2:	Hrs:8

Operating Systems: The History of Operating Systems, Operating System Architecture, Coordinating the Machine's Activities, Handling Competition Among Processes, Security.
Algorithms: The Concept of an Algorithm, Algorithm Representation, Algorithm Discovery.
Textbook 1: Chapter-3, Chapter-5 (5.1-5.3)

Unit 3:	Hrs:8

Networking and the Internet: Network Fundamentals, The Internet, The World Wide Web, Internet Protocols, Security.
Cybersecurity: Overview—What is Cybersecurity? Brief History of Cybersecurity Events, The Basic Information Security Model, Cyber Hygiene, Teams in Cybersecurity.
Ethical Issues in Information Technology: Overview, Ownership Rules, Ethics and Online Content.
Textbook 1: Chapter-4Textbook 2: Chapter-16, Chapter-17

Unit4:	Hrs:8

Software Engineering: The Software Engineering Discipline, The Software Life Cycle, Software Engineering Methodologies, Modularity, Tools of the Trade.
Database Systems: Database Fundamentals, The Relational Model.
Textbook 1: Chapter-7 (7.1-7.5), Chapter-9 (9.1-9.2)

Unit 5:	Hrs:8

Introduction to HTML and Website Development: What is HTML, Cascading Style Sheets (CSS), Website **Design and Storyboarding, Structure of a Website.**
Computer Graphics: The Scope of Computer Graphics, Overview of 3D Graphics, Modeling, Rendering.
Textbook 2: Chapter-12. Textbook 1: Chapter-10 (10.1-10.4)

Suggested Learning Resources:

Textbooks:

Sl. No.	Title	Author	Year & Edition	Publisher
1	Computer Science: An Overview,	J. Glenn Brookshear and Dennis Brylow,	2017, 12th Edition	Pearson Education Limited
2	Fundamentals of Information Technology	Roy, Shambhavi; Daniel, Clinton; and Agrawal, Manish		Digital Commons at The University of South Florida (2023)

Reference Books:

1.	Introduction to Information Technology	V. Rajaraman,	2018, 3rd Edition,	PHI Learning,
2.	Information Technology in Theory.	Pelin Aksoy,	First Edition,	Cengage.

Web links and Video Lectures (e-resources)

- Information Technology: https://onlinecourses.swayam2.ac.in/cec20_cs05/preview
- Computer Organization and Architecture: https://nptel.ac.in/courses/106103068
- Introduction To Internet: https://nptel.ac.in/courses/106105084

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. Flipped Classroom
2. Problem-Based Learning (PBL)
3. Case-Based Teaching
4. Simulation and Virtual Labs
5. 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	Illustrate different information representation and manipulation schemes.	3				2								1
CO2	Make use of Information Technology (IT) infrastructure for information exchange.					3				2				2
CO3	Apply basic software engineering concepts for	2		3		2								3

	Website and application development.													
CO4	Develop queries for quick insert, access and updating of structured information.					3								2
CO5	Identify role of cybersecurity and ethics issues in Information Technology (IT)						2	3						1

Academic Year: 2025-26	Semester: II	Scheme: P25
Course Title: **Introduction to C Programming**		
Course Code: **P25PLC2051**	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:

- Explain the basic structure, syntax, and primitive constructs of a C program, including data types, variables, and operators.
- Apply decision-making and looping constructs to develop programs that solve simple computational problems.
- To implement solutions for data manipulation and problem-solving in real-world contexts using Use arrays and string operations.
- Develop modular programs using user-defined functions and apply concepts of recursion and parameter passing.
- Demonstrate the use of structures and pointers to represent and manipulate complex data efficiently.
- 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**	**PO Addressed 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: II	Scheme: P25
Course Title: **Introduction to C Programming Laboratory**		
Course Code: **P25PLCL2061**	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:** II	**Scheme:** P25
Course Title: Applied Chemistry for Emerging Electronics and Futuristic Devices Laboratory		
Course Code: P25CHEEL207	**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:

- 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.

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 Laboratory
Course Code: P25CHEEL202

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 – II (Common to all branches)		
Course Code:	P25ENG208	**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: Listening Skills II	**2 Hours**
Levels of listening, Active listening, Techniques of listening. Activity: Listening for main ideas and listening for specific information	
Speaking Skills II	**6 Hours**
Language of discussion – Giving opinion, agreeing / disagreeing, asking questions, making suggestions. Sentence stress – content and structure words, Speaking situations, Intonations and Summarizing skills	
Module-2: Reading Skills II	**2 Hours**
Guessing meaning from the context, understanding graphical information, Summarizing. Activity: Book review	
Writing Skills II	**4 Hours**
Linkers and connectives, Sentence and paragraph transformation, Mind mapping techniques, Letter writing, Essay writing	
Module-3: Email Etiquette	**4 Hours**
Parts of an email, Writing an effective subject line, email language and tone. Activity: Email writing practice - Scenario based emails	
Group Presentations	**2 Hours**
Group presentations by the students.	
Module-4 Goal Setting	**2 Hours**
Defining goals, types of goals, Establishing SMART goals, Steps in setting goals, Goal setting activity	
Individual Presentations	**4 Hours**
Individual presentation by the students	
Module-5 Teamwork	**4 Hours**
Defining teams, Team vs. Group, Benefits and challenges of working in teams, Stages of team building, building effective teams, Case studies on teamwork	
Course Outcomes: On completion of this course, students will be able to, CO1: Develop skills in listening, speaking, reading, and writing for effective communication. CO2: Write effective emails, essays, and use proper email etiquette including subject lines, language, and tone. CO3: Define goals (individual and team), establish SMART goals, and work effectively in teams including stages of team building and benefits/challenges of teamwork. CO4: Develop skills for individual and group presentations	

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
6. The 7 habits of highly effective people by Stephen R Covey, Simon & Schuster – 2020.

7. You Are the Team: 6 Simple Ways Teammates Can Go from Good to Great by Michael G. Rogers.

CO – PO – PSO Matrix

CO	PO												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11		PSO1	PSO2	PSO3
CO1					1				3		1				
CO2					2				3						
CO3								3	1		2				
CO4					2			3	1						
CO5															

Academic Year: 2025-2026	**Semester:** II		**Scheme:** P25
Course Title: Interdisciplinary Project Based Learning			
Course Code: P25IDT209	**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:

- Basic understanding of design thinking principles
- Open-mindedness to diverse perspectives
- Effective communication, problem-solving skills and team collaboration

Course learning Objectives:

After learning this course, the student will be able to

- Design effective questionnaires and feedback forms for usability and experience evaluation.
- Create an Empathy Map to better understand the user's mindset, needs, and experiences.
- Understand the basics of early-stage business planning for social innovation projects.
- Present a fully functional Proof of Concept (PoC) to evaluators and stakeholders.

Course content

Week – 1 & 2: Introduction and first Semester Recap- Project-based learning & interdisciplinarity, User Testing Preparation & Execution - Interview Techniques and Questionnaire design, Field Visit.

Week – 3, 4 & 5: Analysis, Feedback & Prioritization- Feedback analysis, Customer Journey Mapping, Stakeholder Mapping and Empathy map.

Week – 6, 7 & 8: Iteration & Refinement- Feature improvement using SCAMPER technique, Iteration Sprint 1, Iteration Sprint 2

Week – 9, 10 &11: Presentation & Future Planning- Business Model Canvas, Pitch deck creation

Week - 12, 13 & 14: Final demo and social pitch - Prototype building, Hackathon and Demo Day

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

CO1: Analyze user feedback using empathy mapping to validate and refine problem–solution fit.

CO2: Develop the solution through iterative sprints based on validated user insights.

CO3: Develop a business plan and pitch deck articulating value proposition, feasibility, sustainability, and implementation strategy.

CO4: Demonstrate a Proof of Concept (PoC) and present a future roadmap by integrating technical, user, and business learnings during Demo Day.

Course Articulation Matrix

Course Outcomes	Program Outcomes												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2

CO1	Analyze user feedback using empathy mapping to validate and refine problem–solution fit.		3		3				2	2	2				
CO2	Develop the solution through iterative sprints based on validated user insights.			3	2	2				2			2		
CO3	Develop a business plan and pitch deck articulating value proposition, feasibility, sustainability, and implementation strategy.									2	3	3			
CO4	Demonstrate a Proof of Concept (PoC) and present a future roadmap by integrating technical, user, and business learnings during Demo Day.			3	2	2				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: Analyze 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.