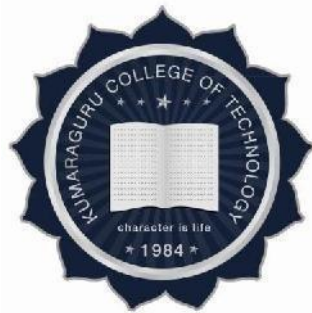# KUMARAGURU COLLEGE OF TECHNOLOGY
An autonomous Institution affiliated to Anna University, Chennai
COIMBATORE – 641049

B.E. - ELECTRONICS AND COMMUNICATION ENGINEERING

REGULATIONS 2024

CURRICULUM AND SYLLABUS

I to II Semesters

(For 2025 Batch students)

Department of Electronics and Communication Engineering

VISION

To be a centre of excellence in education and research by offering an internationally accredited curriculum, state-of-the-art infrastructure, and advanced laboratories that empower students to excel in globally competitive academic and industrial environments.

MISSION

The Department is committed to:

- Inspiring students to cultivate professional ethics, self-confidence, and leadership qualities.
- Enabling students to acquire knowledge and skills through innovative practices to address evolving global challenges and societal needs.
- Pursuing excellence in academics, core engineering domains, and research activities.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

The Programme Educational Objectives of Electronics and Communication Engineering Undergraduate Programme are:

PEO1: Graduates will be successful as Professionals, Researchers or Entrepreneurs in Electronics, Information and Communication Engineering disciplines.

PEO2: Graduates will continuously be updated with state-of the art technology through formal and informal education to provide sustainable solutions.

PEO3: Graduates will demonstrate ethical and social responsibilities as an individual and in a team of diverse cultures.

PROGRAMME OUTCOMES (POs)

PO1: Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.

PO2: Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4)

PO3: Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)

PO4: Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions. (WK8).

PO5: Create, select and apply appropriate techniques, resources and modern engineering and IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6)

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PO6: Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7).

PO7: Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)

PO8: Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.

PO9: Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences.

PO10: Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.

PO11: Recognize the need for and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change. (WK8)

PROGRAMME SPECIFIC OUTCOMES (PSOs)

Graduates of the Electronics and Communication Engineering Programme will have the ability to:

PSO1: Apply principles of signal processing and communication systems to design, develop, and optimize modern communication networks by addressing complex challenges using contemporary tools and technologies.

PSO2: Design, implement, and validate VLSI circuits and embedded systems by leveraging domain knowledge to develop efficient and innovative solutions for diverse engineering applications.

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KUMARAGURU COLLEGE OF TECHNOLOGY

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
REGULATION 2024
B.E. Electronics and Communication Engineering – Curriculum
(For 2025 Batch students)

Semester I

S. No	Course code	Course Title	Course Mode	Course Type	L	T	P	J	C
1	24HST101	Heritage of Tamils	Theory	HS	1	0	0	0	1
2	24MAI113	Linear Algebra and Multivariate Calculus	Embedded	BS	3	0	2	0	4
3	24CYI101	Electronic Materials Chemistry	Embedded	BS	3	0	2	0	4
4	24ECI103	C Programming: Logic and Applications	Embedded	ES	1	0	6	0	4
5	24ECT101	Network Theory	Theory	ES	3	1	0	0	4
6	24INP102	Innovation Practicum - 1	Practical	ES	0	0	2	0	1
7	24HSP111	Holistic Wellness - 1	Practical	HS	0	0	2	0	1
8	24INP101	Design Thinking	Practical	HS	0	0	2	0	1
9	24ADP001	Basics of AI	Practical	ES	0	0	2	0	1
10	24INO101	FCLF General Stack - 1	Practical	OE	0	0	2	0	1
								Total Credits	**22**
								Total Contact Hours/week	**30**

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S.No	Course code	Course Title	Course Mode	Course Type	L	T	P	J	C
		Semester II							
1	24HST102	Tamils and Technology	Theory	HS	1	0	0	0	1
2	24HST103	Effective Communication	Theory	HS	2	0	0	0	2
3	24MAI123	Computational Differential Equations	Embedded	BS	3	0	2	0	4
4	24PHI102	Applied Physics for Circuit Engineering	Embedded	BS	3	0	2	0	4
5	24MEI103	Computer Aided Engineering Graphics	Embedded	ES	2	0	2	0	3
6	24EEI107	Foundations of Electrical Machines and Drives	Embedded	ES	2	0	2	0	3
7	24ECI102	Electron Devices and Circuits	Embedded	PC	3	0	2	0	4
8	24INP103	Innovation Practicum - 2	Practical	ES	0	0	2	0	1
9	24HSP112	Holistic Wellness - 2	Practical	HS	0	0	2	0	1
10	24INO102	FCLF General Stack - 2	Practical	OE	0	0	2	0	1
							Total Credits		24
							Total Contact Hours/week		31

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SEMESTER I

24HST101	தமிழர் மரபு / HERITAGE OF TAMILS	L	T	P	J	C
		1	0	0	0	1
HS	(Common to all Departments)	SDG		4, 11, 16		

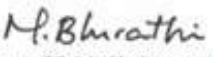| Pre-requisite courses	-	Data Book / Code book (If any)	-

Course Objectives:

The purpose of taking this course is to:

1	தமிழ் மொழி மற்றும் இலக்கியத்தின் அடிப்படை அம்சங்களை அறிமுகப்படுத்துதல், அதன் தொன்மைக்காலம் முதல் நவீனகாலம் வரையிலான வளர்ச்சியை விளக்கம் செய்யுதல். Introduce students to the foundational aspects of Tamil language and literature, tracing its evolution from ancient to modern times.
2	தமிழகத்தின் செழுமையான கலாச்சார பாரம்பரியத்தை அறிமுகப்படுத்துதல், பாறை ஓவியக் கலையிலிருந்து நவீன சிற்ப கலையின்படி அதன் கலை வெளிப்பாடுகளை ஆராய்தல். Familiarize students with the rich cultural heritage of Tamil Nadu, exploring its artistic expressions from rock art paintings to contemporary sculptures.
3	தமிழகத்தின் நாட்டுப்புறக் கலைகள் மற்றும் வீரவிளையாட்டுகளை அறிதல்-தினைக்கோட்பாடுகளை ஆராய்தல்- இந்திய தேசிய இயக்கத்தில் தமிழர்களின் பங்கினை அறிதல். To know the folk arts and heroic ames of Tamilnadu-explore the concept of thinai -to know the role of Tamils in Indian National movement.

Course Outcomes

After successful completion of this course, the students shall be able to	Revised Bloom's Taxonomy Levels (RBT)
CO1	தமிழ் மொழி மற்றும் இலக்கியத்தின் அடிப்படை அறிவை மேம்படுத்துதல். மொழி பண்பாட்டில் எவ்வாறு இணைந்துள்ளது என்பதை உணர்தல். Enhance the fundamental knowledge of Tamil language and literature	U
CO2	பழங்கால பாறை ஓவியங்கள், சிற்பம் என கலைகள் நவீன காலம்வரை எவ்வாறு பயணிக்கிறது என்பதை புரிந்துகொள்ளுதல். Understand the heritage, rock art paintings to modern art sculpture	U
CO3	நாட்டுப்புறக் கலைகள் தற்காப்புக் கலைகளாகவும், உடல் ஆரோக்கியத்தை மேம்படுத்தும் விதமாகவும் அமைவதை அறிந்து கலைகள் மீதான ஆர்வத்தை அதிகரிக்கச் செய்தல்- தமிழர்களின் அகத்திணை, புறத்திணை கோட்பாட்டினை புரிந்து கொள்ளுதல். இந்திய பண்பாட்டில் தமிழர்களின் பங்களிப்பை அறிதல். Acquire essential knowledge in the folk and martial arts-understanding the Agam and puram concept- to know the contribution of Tamils in Indian culture.	Ap

Course Outcomes (CO)	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)											Program Specific Outcomes (PSO)		
	1	2	3	4	5	6	7	8	9	10	11			
	Engineering Knowledge	Problem Analysis	Design/Development of Solutions	Conduct Investigations of Complex Problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project Management and Finance	Life-Long Learning	PSO-1	PSO-2	PSO-3
1							3	2	2		2			

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| 2 | | | | | | 3 | 3 | 2 | | 2 | | |
| 3 | | | | | | 3 | 2 | 2 | | 2 | | |

Course Content

மொழி மற்றும் இலக்கியம்

இந்திய மொழிக் குடும்பங்கள் - திராவிட மொழிகள் - தமிழ் ஒரு செம்மொழி - தமிழ் செவ்விலக்கியங்கள் - சங்க இலக்கியத்தின் சமய சார்பற்ற தன்மை - சங்க இலக்கியத்தில் பகிர்தல் அறம் - திருக்குறளில் மேலாண்மைக் கருத்துக்கள் - தமிழ்க் காப்பியங்கள், தமிழகத்தில் சமண பௌத்த சமயங்களின் தொடக்கம் -பக்தி இலக்கியம், ஆழ்வார்கள் மற்றும் நாயன்மார்கள் - சிற்றிலக்கியங்கள் - தமிழில் நவீன இலக்கியத்தின் வளர்ச்சி - தமிழ் இலக்கிய வளர்ச்சியில் பாரதியார் மற்றும் பாரதிதாசன் ஆகியோரின் பங்களிப்பு.

LANGUAGE AND LITERATURE
Language Families in India - Dravidian Languages – Tamil as a Classical Language - Classical Literature in Tamil – Secular Nature of Sangam Literature – Distributive Justice in Sangam Literature - Management Principles in Thirukural - Tamil Epics and Impact of Buddhism & Jainism in Tamil Land - Bakthi Literature Azhwars and Nayanmars - Forms of minor Poetry - Development of Modern literature in Tamil - Contribution of Bharathiyar and Bharathidhasan.

3 Hours

மரபு - பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை - சிற்பக்கலை

நடுகல் முதல் நவீன சிற்பங்கள் வரை - ஐம்பொன் சிலைகள்- பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப் பொருட்கள், பொம்மைகள் - தேர் செய்யும் கலை - சுடுமண் சிற்பங்கள் - நாட்டுப்புற தெய்வங்கள் - குமரிமுனையில் திருவள்ளுவர் சிலை - இசைக் கருவிகள் - மிருதங்கம், பறை, வீணை, யாழ், நாதஸ்வரம் - தமிழர்களின் சமூக பொருளாதார வாழ்வில் கோவில்களின் பங்கு.

HERITAGE – ROCK ART PAINTINGS TO MODERN ART SCULPTURES
Hero stone to modern sculpture - Bronze icons - Tribes and their handicrafts - Art of temple car making - - Massive Terracotta sculptures, Village deities, Thiruvalluvar Statue at Kanyakumari, Making of musical instruments - Mridhangam, Parai, Veenai, Yazh and Nadhaswaram - Role of Temples in Social and Economic Life of Tamils.

3 Hours

நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுகள்

தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான் கூத்து, ஓயிலாட்டம், தோல்பாவைக்கூத்து, சிலம்பாட்டம், வளரி, புலியாட்டம், தமிழர்களின் விளையாட்டுகள்.

FOLK AND MARTIAL ARTS
Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leather puppetry, Ciabatta, Valari, Tiger dance - Sports and Games of Tami

3 Hours

தமிழர்களின் திணைக்கோட்பாடுகள்

தமிழகத்தின் தாவரங்களும், விலங்குகளும் - தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புறக்கோட்பொடுகள் - தமிழர்கள் போற்றிய அறக்கோட்பாடு - சங்ககாலத்தில் தமிழகத்தில் எழுத்தறிவும், கல்வியும் - சங்ககால நகரங்களும் துறைமுகங்களும் - சங்ககாலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி - கடல்கடந்த நாடுகளில் தமிழர்களின் வெற்றி.

THINAI CONCEPTS OF TAMIL
Flora and Fauna of Tamils & Aham and Puram Concept from Tholkappiyam and Sangam Literature - Aram Concept of Tamils - Education and Literacy during Sangam Age - Ancient Cities and Ports of Sangam Age - Export and Import during Sangam Age - Overseas Conquest of Cholas.

3 Hours

இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு

இந்திய விடுதலைப் போரில் தமிழர்களின் பங்கு - இந்தியாவின் பிறப்பகுதிகளில் தமிழ்ப் பண்பாட்டின் தாக்கம் - சுயமரியாதை இயக்கம் - இந்திய மருத்துவத்தில், சித்த மருத்துவத்தின் பங்கு - கல்வெட்டுகள், கையெழுத்துப்படிகள் - தமிழ்ப் புத்தகங்களின் அச்சு வரலாறு. **CONTRIBUTIONS OF TAMIL TO INDIAN NATIONAL MOMENT AND INDIAN CULTURE** Contribution of Tamils to Indian Freedom Struggle - The Cultural Influence of Tamils over the other parts of India – Self-Respect Movement - Role of Siddha Medicine in Indigenous Systems of Medicine – Inscriptions & Manuscripts – Print History of Tamil Books.	3 Hours

Theory	Tutorial	Practical	Project	Total
Hours: 15	Hours: 0	Hours: 0	Hours: 0	Hours: 15

Learning Resources

Reference books:

1. தமிழக வரலாறு - மக்களும் பண்பாடும் - கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித்தமிழ் - முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை - ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi - 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Textbook and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Publishedby: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Bookand Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL)

Online Educational Resources:

1. https://www.youtube.com/watch?v=IKPwEmsmuZc&list=PLMMrJE4pHZmc0iJZIE6lBpFoPK_9Y325e
2. https://www.youtube.com/watch?v=j6_ddjn_gLc&list=PLMMrJE4pHZmc0iJZIE6lBpFoPK_9Y325e&index=2
3. https://docs.google.com/presentation/d/1pf0jbyuDTNdvlcKMnOfoPjbqha7JqdOc/edit#slide=id.p1
4. https://www.youtube.com/watch?v=IKPwEmsmuZc&list=PLMMrJE4pHZmc0iJZIE6lBpFoPK_9Y325e&index=1

Assessment (Theory course)

SA , Activity and Learning Task(s), Mini project, MCQ, End Semester Examination (ESE), Assignments, Quiz, Library Record

Course Curated by

Expert from Industry	Expert(s) from Higher Education Institutions	Internal Expert

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Signature of BOS Chairperson, ECE

Mr.Vijayan Ramanathan , Project manager, Toppan Merrill. Technologies, Coimbatore	Dr. Aninditha Sahoo, IIT, Madras Dr.P.R.Sujatha Priyadharshini, Anna University, Chennai Dr. E. Justin Ruben, CIT, Coimbatore	Suriya Prakash Department of Language	
Recommended by BoS on	16.08.2024		
Academic Council Approval	No: 27	**Date**	24.08.2024

M.Bharathi
Signature of BOS Chairperson, ECE

24MAI113	LINEAR ALGEBRA AND MULTIVARIATE CALCULUS (Common to EC, EE, EI)	L	T	P	J	C
		3	0	2	0	4
BS		SDG			7, 9	

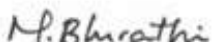| Pre-requisite courses	-	Data Book / Code book (If any)	-

Course Objectives:

The purpose of taking this course is to:

1	provide a solid foundation in linear algebra, focusing on eigenvalues, eigenvectors, matrix transformations, and quadratic forms for practical applications.
2	develop skills in multivariate calculus for solving optimization problems and computing derivatives, integrals, and volumes using double and triple integrals.
3	teach key concepts in vector calculus, including operations like gradient, divergence, curl, and the application of Green's, Gauss's, and Stokes' theorems.
4	introduce fundamental principles of complex analysis, covering analytic functions, Cauchy's theorems, and residue calculus for evaluating integrals through contour integration.
5	equip students with MATLAB proficiency to perform matrix operations, solve optimization problems, compute integrals and verify complex mathematical theorems.

Course Outcomes

After successful completion of this course, the students shall be able to		Revised Bloom's Taxonomy Levels (RBT)
CO1	apply the concepts of eigenvalues, eigenvectors, and the Cayley-Hamilton theorem to diagonalize matrices and perform orthogonal transformations of symmetric matrices using matrix operations and eigenvalue computations.	Ap
CO2	apply orthogonal transformations to reduce quadratic forms to their canonical forms and solve related matrix problems, leveraging to compute transformations and quadratic forms.	Ap
CO3	analyze and solve unconstrained and constrained optimization problems using the Lagrange multiplier method and determine the maxima and minima of functions with two or more variables relevant to engineering applications.	An
CO4	apply double and triple integrals in Cartesian coordinates by computing and using them to determine areas and volumes in engineering applications, including changing the order of integration.	Ap
CO5	apply vector calculus operations like gradient, divergence, curl, and directional derivatives to verify Green's theorem, Gauss's divergence theorem, and Stokes' theorem used for computational verification.	Ap
CO6	apply Cauchy-Riemann equations, Cauchy's integral theorem, and Cauchy's integral formula to solve complex analysis problems and evaluate integrals using the residue theorem for performing contour integration.	Ap

Course Outcomes (CO)	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)											Program Specific Outcomes (PSO)		
	1	2	3	4	5	6	7	8	9	10	11			
	Engineering Knowledge	Problem Analysis	Design/Development of Solutions	Conduct Investigations of Complex Problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project Management and Finance	Life-Long Learning	PSO-1	PSO-2	PSO-3
1	3	2			2									
2		3	2		2									

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3	2				2	1							
4	3			2	2								
5		2			2			2					
6					2								

Course Content:

MATRICES
Eigenvalues and Eigenvectors of a real matrix – Properties of eigenvalues and eigenvectors – Cayley Hamilton theorem (excluding proof) - Orthogonal matrices – Orthogonal transformation of a symmetric matrix to diagonal form – Reduction of quadratic form to canonical form by orthogonal transformation.

9 Hours

Practical Component
Introduction to MATLAB - Matrix Operations - Addition, Multiplication, Transpose, Inverse and eigenvalues and eigenvectors of higher order matrices.
Characteristic equation of a Matrix and Cayley-Hamilton Theorem.

6 Hours

FUNCTIONS OF SEVERAL VARIABLES
Total derivative – Taylor's series expansion – Maxima and minima of functions of two variables – Constrained maxima and minima: Lagrange's multiplier method with single constraints – Jacobians.

9 Hours

Practical Component
Determining Maxima and Minima of a function of one variable.
Determining Maxima and Minima of a function of two variables

6 Hours

MULTIPLE INTEGRALS
Double integration in Cartesian coordinates – Change of order of integration - Triple integration in Cartesian coordinates – Applications: Area as double integral and Volume as triple integral.

9 Hours

Practical Component
Double Integral and Area as double integral
Triple Integral and Volume as triple integral

6 Hours

VECTOR CALCULUS
Gradient, divergence and curl – Directional derivative – Irrotational and Solenoidal vector fields - Green's theorem in a plane, Gauss divergence theorem and Stoke's theorem (excluding proofs) – Verification of theorem and simple applications.

9 Hours

Practical Component
Evaluating gradient, divergence and curl.
Verifying Green's theorem in the plane

6 Hours

ANALYTIC FUNCTIONS
Functions of a complex variable – Analytic functions – Necessary and sufficient conditions in Cartesian coordinates, Cauchy- Riemann equations (excluding proofs).

4 Hours

Practical Component
Check analyticity using Cauchy-Riemann equations

3 Hours

COMPLEX INTEGRATION
Cauchy's integral theorem – Cauchy's integral formula –Singularities –Residues – Residue theorem –Application of residue theorem for evaluation of real integrals – Contour Integration (excluding poles on the real axis).

5 Hours

Practical Component
Perform contour integration around a circular contour

3 Hours

Theory Hours:	45	Tutorial Hours:	0	Practical Hours:	0	Project Hours:	30	Total Hours:	75

Learning Resources

Textbooks

1. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 45thEdition, 2020.
2. Ramana B.V., "Higher Engineering Mathematics", Tata McGraw Hill Co. Ltd., New Delhi, 11th Reprint, 2018.
3. Kreyszig E., "Advanced Engineering Mathematics" International students' version, 10th Edition, John Wiley and sons, 2023.

Reference books

1. Veerarajan T., "Engineering Mathematics (for First Year)", Tata McGraw Hill Pub. Co. Ltd., New Delhi, Revised Edition, 2008.
2. Kandasamy P., Thilagavathy K., and Gunavathy K., "Engineering Mathematics", S. Chand & Co., New Delhi, (Reprint) 2014.
3. Venkataraman M.K., "Engineering Mathematics", The National Publising Co., Chennai, 2003.
4. Jain R.K. and Iyengar S.R.K., "Advanced Engineering Mathematics", Narosa Publications, New Delhi, 3rd Edition, 2007.
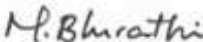
Online Resources (Web Links)

1. Linear Algebra by MIT Open Courseware (Free) https://ocw.mit.edu/courses/mathematics/18-06-linear-algebra-spring-2010/
2. Multivariable Calculus by MIT Open Courseware (Free) https://ocw.mit.edu/courses/mathematics/18-02sc-multivariable-calculus-fall-2010/
3. Khan Academy: Multivariable Calculus (Free) https://www.khanacademy.org/math/multivariable-calculus
4. Coursera: Introduction to MATLAB Programming by Vanderbilt University https://www.coursera.org/learn/matlab

Assessment (Embedded course)

SA, Activity and Learning Task(s), Mini project, MCQ, End Semester Examination (ESE)
Lab Workbook, Experimental Cycle tests, viva-voce

Course Curated by

Expert(s) from Industry	Expert(s) from Higher Education Institution	Internal Expert(s)
Mr. Ramesh V.S., STEPS Knowledge Services Private Limited, Coimbatore. Mr.Jayakumar Venkatesan, Valles Marineris International Private Limited- Chennai. Mr. Imran Khan, GE Transportation Company, Bangalore.	Dr.T.Govindan, Government College of Engineering, Srirangam, Trichy. Dr.C.Porkodi, PSG College of Technology, Coimbatore. Dr.P.Paramanathan, Amrita Vishwa Vidyapeetham, Coimbatore.	Dr. K.Maheswari Dr. J.Rajasingh Dr. K.Meena, Department of Mathematics
Recommended by BoS on	16.08.2024	
Academic Council Approval	No: 27	**Date** 24.08.2024

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Signature of BOS Chairperson, ECE

24CYI101	ELECTRONIC MATERIALS CHEMISTRY (Common to EC, EE, EI and MR)	L	T	P	J	C
		3	0	2	0	4
BS		SDG		7, 9, 12		

Pre-requisite courses	-	Data Book / Code book (If any)	-

Course Objectives:

The purpose of taking this course is to:

1	acquire knowledge of advanced electrochemical energy systems, organic materials, insulating, and high-resistivity materials in electronics to understand their role in modern electronic applications.
2	develop skills to synthesize, analyze, and characterize various electronic materials such as conducting polymers, nanomaterials, and green electronic materials through theoretical and practical approaches.
3	gain competency in evaluating the environmental impact of electronic materials and promote sustainable practices, including green chemistry principles, recycling, and e-waste management.
4	apply advanced concepts of electronic materials to solve real-world engineering problems in the field of energy storage, flexible electronics, and nanoelectronics.
5	enhance analytical and problem-solving abilities through hands-on laboratory experiments, bridging theoretical concepts with practical applications in the electronic materials domain.

Course Outcomes

After successful completion of this course, the students shall be able to		Revised Bloom's Taxonomy Levels (RBT)
CO1	apply electrochemical principles to solve challenges in advanced battery and hybrid energy systems.	Ap
CO2	analyse the properties and synthesis of conducting polymers to compare their applications in flexible electronics and OLEDs.	An
CO3	analyse the applications in electronic components by integrating the properties of insulating and high-resistivity materials.	An
CO4	apply the concepts of nanomaterials to demonstrate their significance in nanoelectronics and electronic sensing technologies.	Ap
CO5	analyse the environmental impact of electronic materials to prioritize the adoption of green chemistry and sustainable electronic practices.	An
CO6	evaluate and recommend innovative eco-friendly electronic materials and recycling strategies to address future environmental challenges.	E

Course Outcomes (CO)	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)											Program Specific Outcomes (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	PSO-1	PSO-2	PSO-3
	Engineering Knowledge	Problem Analysis	Design/Development of Solutions	Conduct Investigations of Complex Problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project Management and Finance	Life-Long Learning			
1	3	2												
2	2		2							2				
3	2	2		2										

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4			2		2								
5						3	2						
6		1	1				1				1		

Course Content

ADVANCED ELECTROCHEMICAL ENERGY SYSTEMS

Introduction to electrochemistry for energy systems - Advanced battery technologies (Li-ion batteries, Sodium-ion batteries, Al – air Battery, Zn - air batteries) - Comparison of battery technologies and its challenges.
Hybrid energy storage systems:
Super-capacitors: Electric double-layer capacitors (EDLCs) - Pseudo capacitors - Hybrid supercapacitors
Fuel cells: Principles and recent advancements of Proton exchange membrane fuel cells (PEMFCs) - Solid oxide fuel cells (SOFCs) - Microbial fuel cells - Regenerative fuel cells. **9 Hours**

Practical Component:
- Compare the Conductivity of different electrolytes in battery systems.
- Determination of electrical conductivity in electroplated metal coating on substrate.
- Determination of electrode potentials of the cell and construct feasible cell.
- Estimation of mixture of acids using strong base by Conductometric titrations.

12 Hours

ORGANIC MATERIALS FOR ELECTRONIC APPLICATIONS

Introduction to polymers - Classification - Functionality - Degree of Polymerization.
Polymerization: Addition polymerization and its Mechanism (Free Radical, Cationic, and Anionic) - Condensation polymerization – Copolymerization
Conducting materials: Small molecule conductors (Pentacenes and their derivatives) - Engineered Pentacenes and Reversible functionalization - Synthesis and doping of conducting polymers (Polyacetylene and Polythiophene) - Applications of conducting materials in devices (Organic light-emitting diodes (OLEDs), Organic photovoltaics, Flexible and printed electronics) **9 Hours**

Practical Component:
- Determination of molecular weight of polymer using Viscometric method.

3 Hours

INSULATING AND HIGH-RESISTIVITY MATERIALS IN ELECTRONICS

Insulating materials in electronics: Introduction (Importance and Key properties) - Classification (Solid, liquid, and gas insulators) - Properties (Dielectric properties and breakdown) - Preparation, properties, and uses of Solid inorganic (Mica and Porcelain) and organic insulators (Bakelite and Rubber) - Liquid insulators (Epoxy resin and Transformer oil) – Gas Insulator (Sulfur hexafluoride)
High Electrical resistivity materials: Factors influencing electrical resistivity - High resistivity materials (Composition, properties, and applications of Manganin and Molybdenum disilicide) - Nanocomposite insulators **9 Hours**

Practical Component:
- Determination of pH and Conductivity in different Transformer Oils

3 Hours

NANOMATERIALS AND NANOELECTRONICS

Introduction to nano chemistry - Distinction between molecules, nanoparticles, and bulk materials - Size-dependent properties of nanomaterials - Quantum confinement effects - Carbon nanotubes and graphene (Preparation by Chemical Vapor Deposition and Laser Ablation, Properties and Applications in electronics) - Nanowires (Preparation by Electrochemical Deposition and Electrospinning, Properties and Applications in electronics) – Nanoparticles, nanoclusters, and nanorods (Preparation by Sol-gel, Solvothermal, Properties and Applications in electronics) - Nanotubes and nanowires in sensing applications. **9 Hours**

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Practical Component: • Synthesis of Nanoparticle using Solvo-Thermal Method	**3 Hours**
GREEN CHEMISTRY AND SUSTAINABLE ELECTRONICS Introduction to sustainable electronics (Importance and Environmental challenges in the electronics industry) - Environmental impact (Conductors, semiconductors, and polymers), Toxicity and persistence of electronic materials - Green chemistry principles in electronics manufacturing (12 principles of green chemistry applied to electronics and Eco-friendly materials and processes) - Life cycle assessment of electronic products - Recycling and e-waste management strategies (Recovery, Challenges and innovations in electronics recycling) - Future trends in eco-friendly electronic materials.	**9 Hours**
Practical Component: • Determination of Copper from electronic waste by Complexometric method. • Estimation of copper ion by spectrophotometry. • Estimation of strength of sulphuric acid in spent Battery Electrolytes by pH metry	**9 Hours**

Theory		Tutorial		Practical		Project		Total	
Hours:	45	Hours:	0	Hours:	30	Hours:	0	Hours:	75

Learning Resources
References:
1. Singh, G. (2019). Advanced battery technology for energy storage applications (1st ed.). New Age International Publishers.
2. Beguin, F., & Frackowiak, E. (2013). Supercapacitors: Materials, systems, and applications (1st ed.). Wiley-VCH.
3. Kumar, V., & Kumar, A. (2015). Conducting polymers: Synthesis, properties, and applications (1st ed.). Narosa Publishing House.
4. Chandrasekhar, S. (2014). Organic electronics: Concepts and applications (1st ed.). Springer.
5. Sharma, R. K. (2022). Electrochemistry for energy systems (1st ed.). Narosa Publishing House.
6. Hironis, N. P., & Pal, M. (2004). Electrical insulating materials (1st ed.). S. Chand & Company Ltd.
7. Kulkarni, S. K. (2014). Nanotechnology: Principles and practices (3rd ed.). Capital Publishing Company.
8. Ahluwalia, V. K. (2009). Green chemistry: Environmentally benign reactions (1st ed.). Ane Books Pvt. Ltd.
9. Shina, S. G. (2008). Green electronics design and manufacturing (1st ed.). McGraw-Hill.
Online Resources (Weblinks)
1. https://www.coursera.org/learn/lithium-based-batteries
2. https://www.youtube.com/watch?v=Gbltx4IXLzQ&list=PLbMVogVj5nJT0slH3tuas5BIp1DG8ZpMj&index=2
3. https://www.coursera.org/learn/applied-sustainability-engineering
4. https://www.youtube.com/watch?v=nSAvyQajVzE

Assessment (Embedded course)
SA, Activity and Learning Task(s) (Concept Map, Think-Pair-Share, Jigsaw), MCQ, End Semester Examination (ESE), Lab Workbook, Model Exam, Viva-Voce.

Course Curated by		
Expert from Industry	**Expert from Higher Education Institution**	**Internal Expert(s)**
Dr. Muthuraja Perumal	Dr. Venkatakrishnan Professor,	Dr K Rathidevi, Dr. K Sampath,

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General Manager - Research & Development Rohith Industries, APIIC Industrial Park, Andhra Pradesh	School of Chemical Sciences Indian Institute of Technology (Mandi) Himachal Pradesh India	Dr S Jyothi, Dr R Ashokkumar, Department of Chemistry
Recommended by BoS on	16.08.2024	
Academic Council Approval	No.27	**Date**	24.08.2024

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24ECI103	C Programming: Logic and Applications	L	T	P	J	C
		1	0	6	0	4
ES		SDG			9	

Pre-requisite courses	Nil	Data Book / Codes / Standards (If any)	Nil

Course Objectives:	The purpose of taking this course is to:
1	Acquire knowledge of fundamental programming constructs in C, including data types, variables, control structures, input/output operations.
2	Develop the concept of loops, modular programming with functions and pointers.
3	Attain the capability to address real-world problems by utilizing arrays and strings.
4	Introduce concepts of structures and unions as tools for effective data representation.
5	Provide exposure to the development of C-based applications that integrate file operations.

Course Outcomes

After successful completion of this course, the students shall be able to	Revised Bloom's Taxonomy Levels (RBT)
CO 1	Understanding fundamental concepts of data types, variables, operators, and control flow in problem-solving	U
CO 2	Apply loops, functions and pointers in developing computational programs	Ap
CO 3	Apply arrays, strings, to solve computational problems using modular programming	Ap
CO 4	Analyse structures and unions to efficiently manage data in application programs	An
CO 5	Develop simple applications using file operations in C	Ap
CO 6	Develop and implement the logics of C programming and problem-solving techniques	E

Course Outcomes (CO)	Program Outcomes (PO) (Strong-3, Medium-2, Weak-1)											Program Specific Outcomes (PSO)	
	1 Engineering Knowledge	2 Problem Analysis	3 Design/Development of	4 Conduct Investigations of Complex Problems	5 Engineering Tool Usage	6 The Engineer and The World	7 Ethics	8 Individual and Collaborative Team work	9 Communication	10 Project Management and Finance	11 Life-Long Learning	PSO-1	PSO-2
CO 1	3	2			2						2	3	2
CO 2	3	3	2		2						2	3	3
CO 3	3	3	2		2						2	3	3
CO 4	3	2	3	2	2						2	3	3
CO 5	3	2	3	2	3						2	3	3
CO 6	3	3	3	3	3						3	3	3

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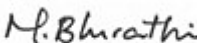| Course Content	
INTRODUCTION TO PROBLEM SOLVING AND C BASICS Introduction to C Language: structure of the C program, application of C Language (case studies) - data types - variables - operators and expressions - input and output operations - control flow using if and else statements.	**2 Hours**
Practical Component Drawing flowcharts, Writing pseudocode for algorithmic problem scenarios, Programs using arithmetic operators: simple calculator program, simple interest and compound interest, Programs using logical operators: checking of a leap year, Programs using relational operators: find the greatest/smallest of three numbers, Programs using assignment operators: swapping of two numbers with and without temporary variable, check vowel or consonant, Programs using increment/decrement operators: prefix and postfix increment and decrement, simple logic-based programs: prime number, palindrome, factorial, Fibonacci series, Armstrong number, Neon number.	**22 Hours**
LOOPS, FUNCTIONS AND POINTERS Looping and Control Statements: for, do, while, break, continue, switch statements - Pointer Fundamentals - Pointer Declaration -Pointer operations and arithmetic - C functions - Function Declaration vs Definition - Calling a function - Function prototypes - Parameter Passing Techniques in Function: Pass by value, Pass by pointer – Recursion.	**5 Hours**
Practical Component Programs on looping and control statements: LCM and HCF of two numbers, Print 'n' natural numbers, sum of 'n' natural numbers, Programs on switching: Simple Calculator, Print Day Name of the Week, Pointer operations and arithmetic, swapping values using pointers, Pattern printing using loops: Pyramid, triangle, pascal, floyd - Programs using functions factorial (recursive and non-recursive), fibonacci (recursive and non-recursive), sum of natural numbers, roots of quadratic equation.	**24 Hours**
ARRAYS AND STRING Defining an array - Processing an array - Pointers and one-dimensional arrays - Dynamic memory allocation in an array - Multidimensional Arrays - Passing arrays to functions -Definition and Initialization of Strings - Reading and Writing Strings - Processing Strings -Searching and Sorting of Strings.	**4 Hours**
Practical Component Programs on arrays: Find the smallest/largest number in array, print array values in ascending or descending order, merge, remove and copy array elements, Programs on Matrix operations: addition, subtraction, transpose, trace, determinants Programs on strings with strlen, strcpy, strcmp, strcpy, strrev - Programs on Dynamic memory allocation using malloc, calloc, and realloc.	**24 Hours**
USER DEFINED DATATYPES Structures and Unions: Defining a Structure - Processing a Structure - C Typedef – Unions.	**2 Hours**

Practical Component Programs using structures and pointers: print and access student details-Programs using unions: simple and compound interest-Case study implementation-Problem-solving application.	10 Hours
FILE HANDLING IN C Files - Opening and Closing a Data File - Reading and writing a data file - Processing a data file (Move, Create) - Concept of binary files - Accessing file data.	2 Hours
Practical Component Programs on file handling: create, open, read, write, move, close, Programs on binary file handling: read/write binary files, move file pointer to start/end.	10 Hours

Theory Hours:	15	Tutorial Hours:	0	Practical Hours:	90	Project Hours:	0	Total Hours:	90

Learning Resources
Textbooks

1. E. Balagurusamy, Programming in ANSI C, 9th Edition, McGraw-Hill Education, 2024.
2. Yashavant Kanetkar, Let Us C, 17th Edition, BPB Publications, 2023.

Reference books/ Web Links

1. Byron S Gottfried and Jitendar Kumar Chhabra, Programming with C, Tata McGraw Hill Publishing Company, 4th Edition, New Delhi, 2018.
2. R. G. Dromey, How to Solve It by Computer, Pearson Education, 1st Edition, New Delhi, 2008.
3. Pradip Dey and Manas Ghosh, Programming in C, 2nd Edition, Oxford University Press, 2011.
4. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, 2nd Edition, Pearson Education, 2015.
5. Ashok N. Kamthane, Programming in C, Pearson Education, 2011.
6. Reema Thareja, Programming in C, 2nd Edition, Oxford University Press, 2011.

Online Resources

1. https://www.geeksforgeeks.org/c-programming-language/
2. https://www.w3schools.com/c/
3. https://www.programiz.com/c-programming
4. https://www.coursera.org/learn/c-for-everyone
5. https://www.codingninjas.com/studio/library/c-programming

Assessment (Embedded course)
SA-1, SA-2, Activity and Learning Task(s), Mini project, End Semester Examination (ESE) Lab Workbook, Experimental Cycle tests, viva-voce

Course Curated by		
Expert(s) from Industry	**Expert(s) from Higher Education Institution**	**Internal Expert**
-	-	Dr. S. Vignesh Raja Ms. Ananya Bhattacharjee
Recommended by BoS on	30.04.2025	
Academic Council Approval	No: 28	**Date** 26.06.2025

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24ECT101	Network Theory	L	T	P	J	C
		3	1	0	0	4
ES		SDG		9		

Pre-requisite courses	NA	Data Book / Codes / Standards (If any)	NA

Course Objectives:	The purpose of taking this course is to:
1	Establish a comprehensive understanding of circuit laws and network theorems for solving complex DC circuits.
2	Develop the ability to analyse AC circuits using phasor representation and two-port network parameters to determine impedance, admittance, and other related parameters.
3	Provide knowledge of AC power analysis techniques for optimizing power transfer in complex circuits.
4	Examine the transient and steady-state behaviour of first-order and second-order circuits to predict their response to different inputs.
5	Equip students with the skills to design resonance and coupled circuits, focusing on mutual inductance calculations and energy transfer analysis in passive filters.

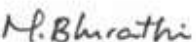| Course Outcomes:	After successful completion of this course, the students shall be able to	Bloom's Taxonomy Level (BTL)
CO 1	Apply circuit laws and network theorems to solve complex DC circuits, including Delta-Star and Star-Delta transformations.	Ap
CO 2	Analyze AC circuits using phasor representation and two-port network parameters to determine impedance, admittance, and related parameters.	An
CO 3	Evaluate AC power analysis techniques to optimize power transfer and perform power factor correction in complex circuits.	E
CO 4	Examine the transient and steady-state behaviour of first-order and second-order circuits to predict their response to various inputs.	An
CO 5	Design resonance and coupled circuits by calculating mutual inductance and analyzing energy transfer characteristics in passive filters.	C

Course Outcomes (CO)	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)											Program Specific Outcomes (PSO)	
	1	2	3	4	5	6	7	8	9	10	11		
	Engineering Knowledge	Problem Analysis	Design/Development of Solutions	Conduct Investigations of Complex Problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project Management and Finance	Life-Long Learning	PSO-1	PSO-2
1	2											1	
2	2	3		2								1	
3	1		2									1	
4	1		2								2	1	
5	1		2									2	

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Signature of BOS Chairperson, ECE

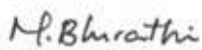| Course Content	
DC CIRCUITS ANALYSIS AND NETWORK THEOREMS Circuit Laws – Ohms Law, KVL and KCL, Delta-Star and Star-Delta transformation, Mesh and Nodal analysis – Superposition theorem – Thevenin's Theorem, Norton's Theorem, Maximum Power Transfer Theorem, Reciprocity Theorem.	**14 Hours**
AC CIRCUITS AND TWO PORT NETWORKS Sinusoids, Phasors, Phasor representation of R, L and C – Impedance and admittance – Mesh and Nodal analysis – Two Port Networks – Impedance Parameters, Admittance Parameters, Hybrid Parameters, Transmission Parameters, Relation between parameters.	**12 Hours**
AC POWER ANALYSIS Instantaneous and Average Power – Maximum Average power transfer – Effective or RMS Value – Apparent Power and Power Factor, Complex Power, Power Factor Correction.	**10 Hours**
FIRST ORDER AND SECOND ORDER CIRCUITS Source-free RC Circuit and Source-free RL Circuit – Unit step function – Step response of an RC Circuit and RL Circuit – Source-free series and parallel RLC circuits.	**12 Hours**
RESONANCE AND COUPLED CIRCUITS Series Resonance, Parallel Resonance, Passive filters – Magnetically Coupled Circuits – Mutual Inductance, Co-efficient of Coupling, Energy in a coupled circuit.	**12 Hours**

Theory Hours:	45	Tutorial Hours:	15	Practical Hours:	0	Project Hours:	0	Total Hours:	60

Learning Resources
Textbooks
1. Charles K. Alexander and Mathew N.O. Sadiku, Fundamentals of Electric Circuits, McGraw Hill Education, 7th Edition (2022). 2. David E. Johnson, Johny R. Johnson and John L. Hilburn, Electric Circuit Analysis, Prentice-Hall Int., 2nd Edition (1992).
Reference books
1. William H. Hayt, Jr., Jack E. Kemmerly and Steven M. Durbin, Engineering Circuit Analysis, McGraw Hill Education, 8th Edition (2013). 2. Joseph Edministor and Nahvi (Mohmood), Theory & Problems of Electric Circuits, McGraw Hill Education, 5th Edition (2011). 3. Murthy K.V.V. and Kamath M.S., Basic Circuit Analysis, Jaico Publishing House, Mumbai (1999). 4. Norman Balabanian, Electric Circuits, McGraw Hill Education, ISE Edition (1994). 5. DeCarlo R.A. and Lin P.M., Linear Circuit Analysis – Time, Domain, Phasor and Laplace Transform Approaches, Oxford University Press, 2nd Edition (2003).
Online Educational Resources
1.   https://onlinecourses.nptel.ac.in/noc22_ee07/preview

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Assessment (Theory course)
SA, Activity and Learning Task(s), Mini project, MCQ, End Semester Examination (ESE)

Course Curated By		
Expert(s) from Industry	**Expert(s) from Higher Education Institutions**	**Internal Expert(s)**
1. Mr. R. Sanjaykumar, Sasken Technologies Limited	1. Dr. D. Jude Hemanth, Karunya Institute of Technology and Sciences	Mr. R. Karthikeyan, ECE
Recommended by BoS on	**13.08.2024**	
Academic Council Approval	No: 27	24.08.2024

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24INP102	INNOVATION PRACTICUM – 1	L	T	P	J	C
	(Common to all Departments)	0	0	2	0	1
ES		SDG		9, 11, 12		

Pre-requisite courses	-	Data Book / Code book (If any)	-

Course Objectives:

The purpose of taking this course is to:

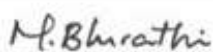| 1	analyse the effectiveness of systems thinking and problem-solving methodologies in applying data-driven insights for innovative solution design.
2	evaluate the impact of transdisciplinary collaboration on creating functional hardware prototypes through fabrication techniques.
3	understand the future trends and implications of technology in developing innovative products.

Course Outcomes:

After successful completion of this course, the students shall be able to	Revised Bloom's Taxonomy Levels (RBT)
CO1	recall the fundamental principles of custom hardware design.	R
CO2	understand the appropriate tools and their applications for solving hardware-related problems.	U
CO3	apply systems engineering concepts to real-world hardware design challenges.	Ap

Course Outcomes (CO)	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)											Program Specific Outcomes (PSO)		
	1	2	3	4	5	6	7	8	9	10	11			
	Engineering Knowledge	Problem Analysis	Design/Development of Solutions	Conduct Investigations of Complex Problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project Management and Finance	Life-Long Learning	PSO-1	PSO-2	PSO-3
1	2		1											
2	2				1									
3		2	2	1										

Course Content

Engineering Fundamentals and Innovation	
Why engineering? The concept of street fight engineering - Real-world design process and problem-solving methodology - Data-driven insights and concept generation - Case studies of successful engineering innovations.	3 Hours
Transdisciplinary Systems and Manu'Futuring	6 Hours
Transdisciplinary systems to accelerate innovation - Manu'Futuring: Technology in hardware manufacturing and manufacturing of hardware technologies - Future scopes with product case studies.	

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Building Custom Hardware How to build a basic custom hardware - Electronics fundamentals and components - Software for hardware control - Fabrication techniques.	**6 Hours**
System Thinking and Engineering Introduction to system thinking - Real world as a system - Concept of system engineering and its application – iLenSys.	**7 Hours**
Creativity Time and Tech Teardown Creativity exercise: Apply system thinking to a real-world problem - Tech teardown: Analyse a product or system to understand its engineering principles - Presentation: Present your creative project and tech teardown with an engaging title	**8 Hours**

Theory Hours:	0	**Tutorial Hours:**	0	**Practical Hours:**	30	**Project Hours:**	0	**Total Hours:**	30

Learning Resources

Textbooks:
1. Sanjoy Mahajan - Street Fighting Mathematics
2. Donald Knuth - The Art of Computer Programming
3. Think like a programmer: An introduction to creative problem solving
4. Thinking in Systems: A Primer

References:
1. Learning to code: How to think like a programmer
2. How to find innovative ideas: Ramesh Raskar's note
3. Case study: How Tesla changed the auto industry
4. Ultimate Guide: How to develop a new electronic hardware product

Online Resources (Weblinks)
1. https://www.ifixit.com/Teardown?srsltid=AfmBOorwzDG9RhJoL3L5tlZ_Dr4sVcey-vPC-pkKTj2E0mWJWtFYlikY
2. https://www.symmetryelectronics.com/technology-teardowns/

Assessment (Practical course)
Lab Workbook, Experimental Cycle tests, viva-voce

Course Curated by

Expert from Industry	Expert from Higher Education Institutions	Internal Expert
Dr. Mahesh Veezhinathan Director - Innovation Practicum Associate VP - Forge. Innovation	-	Dr. Samuel Ratna Kumar P S Assistant Professor – III Department Mechanical Engineering
Recommended by BoS on	17.08.2024	

Academic Council Approval	No: 27	**Date**	24.08.2024

24HSP111	HOLISTIC WELLNESS-1	L	T	P	J	C
	(Common to all Department)	0	0	2	0	1
HS		SDG			2, 3	

Pre-requisite courses	-	Data Book / Code book (If any)	-

Course Objectives:

The purpose of taking this course is to:

1	introduce first-year students to the foundational concepts of holistic wellness, emphasizing the integration of physical, mental, emotional, and Internal well-being.
2	create a balanced lifestyle that promotes overall health and happiness through practical activities.

Course Outcomes

After successful completion of this course, the students shall be able to	Revised Bloom's Taxonomy Levels (RBT)
CO 1	understand the basic principles of holistic wellness.	U
CO 2	apply strategies for maintaining physical health, including nutrition and exercise	Ap
CO 3	practice mindfulness techniques to enhance mental and emotional well-being.	Ap
CO 4	develop a personal wellness plan incorporating various aspects of holistic health.	C

Course Outcomes (CO)	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)											Program Specific Outcomes (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	PSO-1	PSO-2	PSO-3
	Engineering Knowledge	Problem Analysis	Design/Development of Solutions	Conduct Investigations of Complex Problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project Management and Finance	Life-Long Learning			
1						2		1						
2						2								
3						1					3			
4						2					3			

Course Content

INTRODUCTION TO HOLISTIC WELLNESS: • Overview of holistic wellness: physical, mental, emotional, and internal health. • The importance of balance in overall well-being. • Hands-on activity: Self-assessment of current wellness status.	**4 Hour**
PHYSICAL WELLNESS: • Importance of physical activity and exercise. • Understanding nutrition and its role in health. • Sleep hygiene and its impact on well-being. • Hands-on activity: Designing a personalized fitness and nutrition plan.	**14 Hours**
MENTAL AND EMOTIONAL WELLNESS: • Stress management techniques. • The role of Yoga, mindfulness and meditation in mental health. • Emotional intelligence and its impact on relationships.	**6 Hours**

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• Hands-on activity: Practicing Yoga, mindfulness and emotional regulation exercises.	
INTERNAL WELLNESS: • Exploring the concept of Internal wellness. • The role of purpose and meaning in life. • Introduction to meditation and reflective practices. • Hands-on activity: Developing a personal reflection, Yoga and meditation routine.	**4 Hours**
INTEGRATING WELLNESS PRACTICES: • Combining physical, mental, emotional, and Internal wellness practices into daily life. • Developing a balanced wellness plan. • Hands-on activity: Creating a comprehensive personal wellness plan.	**2 Hours**

Theory Hours:	0	Tutorial Hours:	0	Practical Hours:	30	Project Hours:	0	Total Hours:	30

Learning Resources
Textbooks:
1. Jayanna, Krishnamurthy., Science & Practice of Integrative Health & Wellbeing Lifestyle., White Falcon Publishing (2020).   **2.** Rosenberg, Marshall Bertram., Nonviolent Communication: A Language of Life., Puddle Dancer Press, Encinitas, CA (2015).
References:
1. B.K.S Iyengar., Yoga: The Path to Holistic Health., Dorling Kindersley Limited, City of Publication (2001)   2. Goleman Daniel., Emotional Intelligence., Bloomsbury India, India, (2021).   3. James Allen., As a Man Thinketh., Maple Press, Noida, (2010)   4. Swami Budhanandha., Will power and its development., Advaita Ashrama Mayavati, Pithoragarh, Himalayas from its Publication Department, Calcutta. (2001)   5. Kalderdon Adizes Ichak., What Matters in Life: Lessons I Learned from Opening My Heart ., WS Press, Newtown, PA (2023)
Online Resources (Weblinks)
1. Learning Suryanamskar   2. Yoga for well-being   3. Nutritional Educational contents   4. Introduction to Psychology   5. Guided Meditation   6. Simplified physical exercises instructions   7. Simplified Physical Exercises   8. Life skills and value education   9. James Allen Library

Assessment (Practical course)
Participation, Practical activities and assignments, personal wellness plan and reflection.

Course Curated by		
Expert(s) from Industry	**Expert(s) from Higher Education Institution**	**Internal Expert(s)**
		Dr. Ezhilarasi Principal- KCT
Recommended by BoS on	16.08.2024	

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Academic Council Approval	No: 27		Date	24.08.2024

24INP101	DESIGN THINKING (Common to all Department)	L	T	P	J	C
		0	0	2	0	1
ES		SDG		9		

Pre-requisite courses	-	Data Book / Code book (If any)	-

Course Objectives:

The purpose of taking this course is to:

1	introduces first-year engineering students to Design Thinking, focusing on practical, user-centered problem-solving techniques
2	empathize with users, generate ideas, and create models to test and refine their solutions
3	understand iteration, empathy, and critical reflection to cultivate a creative mindset

Course Outcomes

After successful completion of this course, the students shall be able to	Revised Bloom's Taxonomy Levels (RBT)
CO 1	apply problem-solving techniques and the Design Thinking process to engineering problems using simple models	Ap
CO 2	understand user needs through various empathy techniques and develop/refine models iteratively based on user insights.	U
CO 3	reflect critically on their learning journeys and the emotional demands of problem-solving. Collaborate effectively in teams to develop innovative solutions	Ap

Course Outcomes (CO)	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)											Program Specific Outcomes (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	PSO-1	PSO-2	PSO-3
	Engineering Knowledge	Problem Analysis	Design/Development of Solutions	Conduct Investigations of Complex Problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project Management and Finance	Life-Long Learning			
1	1		2			2		2			1			
2	1							2			1			
3	1		2			2		1			1			

Course Content

Introduction to Problem Solving and Ground Rules	
Introduction to problem-solving strategies without mentioning Design Thinking-Emphasize problem-solving attitudes, mindsets, and behaviours necessary for iterative problem solving (e.g., openness to failure, patience, empathy)-Set ground rules for the course, including incentives for creative risk-taking and penalties for non-participation or lack of reflection-Overview of the Design Thinking process and its importance.	6 Hours
Empathy and Problem Definition	

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Techniques for understanding user needs, including observation, interviews, **surveys** and **focus groups**-Importance of secondary research as a complement for the above-mentioned methods-Introduction to empathy cycles: involve students in two empathy cycles before and after problem definition-Finetuning problem definition based on user insights.	**6 Hours**
Ideation and Concept Modelling Brainstorming ideas and selecting feasible solution-Creating concept modelling to visualize ideas-Include an empathy cycle after students propose solutions, allowing them to revisit and reshape their solutions based on further insights from users.	**6 Hours**
Prototyping and Testing with Models Building basic prototypes using simple materials (e.g., cardboard, clay)- Introduction to different prototyping methods (e.g., **low-fidelity** vs **high-fidelity models**) for different contexts: product design, space design, policy, and digital/e-commerce solutions-Conduct an empathy cycle after the prototype is developed to gather user feedback and refine the prototype.	**6 Hours**
Iteration and Final Modelling Project Students refine their prototypes based on feedback from the empathy cycle-Finalize prototypes for presentation based on consistent feedback loops.	**6 Hours**
Presentation, Reflection, and Learning Summaries Students present their final projects and reflect on their learning journeys, including how their understanding of problem-solving and empathy evolved during the course-**Learning Summary Activity:** Each student presents their individual journey and learning outcomes from the empathy cycles and iterations-Peer review and group discussions.	**6 Hours**

Theory Hours:	0	Tutorial Hours:	0	Practical Hours:	30	Project Hours:	0	Total Hours:	30

Learning Resources

Textbooks:

1. Handbook of Design Thinking, Christian Muller – Roterberg, Kindly Direct Publishing
2. The Art of Innovation, Tom Kalley
3. E Balaguruswamy (2022), Developing Thinking Skills (The way to Success), Khanna Book Publishing Company

Online Resources (Weblinks)

1. Survey and focus group design guides
2. Guidance on Designing, Administering and Analyzing Focus Groups and Interviews
3. Empathy mapping tools
4. How to Make a Concept Model
5. Brainstorming Techniques: 15 Creative Activities
6. 10 Brainstorming Techniques for Developing New Ideas
7. Brainstorming templates
8. 5 Common Low-Fidelity Prototypes and Their Best Practices
9. UX Prototypes: Low Fidelity vs. High Fidelity
10. Low-fidelity vs. High-fidelity Design Prototypes (and when to use which)
Case study 1: Iterative Design and Prototype Testing of the NN/g Homepage
Case study 2: Using iterative design to optimise the user flow of a product
11. Reflective practice toolkit

Assessment

Formative: Assignments, Mini project

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Course Curated by		
Expert(s) from Industry	**Expert(s) from Higher Education Institutions**	**Internal Expert(s)**
		Dr. Padhmanand Sudhagar R Department of Bio-Tech Dr. Arul H Department of Physics
Recommended by BoS on	16.08.2024	
Academic Council Approval	No: 27	**Date** 24.08.2024

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24ADP001	BASICS OF ARTIFICIAL INTELLIGENCE (Common to all Departments except CS, IT, AD)	L	T	P	J	C
		0	0	2	0	1
ES		SDG		8, 9, 16		

Pre-requisite courses	-	Data Book / Code book (If any)	-

Course Objectives:

The purpose of taking this course is to:

1	introduce students to the fundamentals of Artificial Intelligence (AI) and Generative AI, and its key concepts
2	enable students to explore and experiment with common generative AI models and tools for generating text, images, audio, video, and code
3	equip students with the techniques and best practices for crafting effective prompts for AI models

Course Outcomes

After successful completion of this course, the students shall be able to	Revised Bloom's Taxonomy Levels (RBT)
CO 1	understand the fundamentals of AI and generative AI, including its potential impact, issues, limitations, and ethical concerns and its practical use cases in real-world scenarios.	U
CO 2	explore common generative AI models and tools for text, code, image, audio, and video generation.	E
CO 3	apply common prompt engineering techniques and approaches for writing effective prompts.	Ap

Course Outcomes (CO)	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)											Program Specific Outcomes (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	PSO-1	PSO-2	PSO-3
	Engineering Knowledge	Problem Analysis	Design/Development of Solutions	Conduct Investigations of Complex Problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project Management and Finance	Life-Long Learning			
1	2						2							
2	2		2											
3				2						2				

Course Content

Introduction to Artificial Intelligence (AI) **Practical Component** Introduction to Artificial Intelligence (AI) - Generative AI Overview and Use Cases - Impact and Examples of AI - Application Domains for AI - Generative AI Applications. AI Concepts, Terminology - Cognitive Computing (Perception, Learning, Reasoning) - Terminology and Related Concepts of AI- Machine Learning Techniques and Training - Deep Learning - Neural Networks - Natural Language Processing, Speech, Computer Vision - Self Driving Cars. AI: Issues, Concerns and Ethical Considerations - AI Ethics, Regulations, Governance, and ESG. The evolution and future of AI - The AI Ladder - The Journey for Adopting AI Successfully - Hotbeds of AI Innovation.	8 Hours
Generative AI: Introduction and Applications	

	6 Hours
Practical Component Introduction and Capabilities of Generative AI - Applications of Generative AI - Tools for Text Generation - Tools for Image Generation - Tools for Audio and Video Generation - Tools for Code Generation	
Generative AI: Prompt Engineering Basics **Practical Component** Introduction to Prompt and Prompt Engineering - Best Practices for Prompt Creation - Common Prompt Engineering Tools - Hands on Lab: Getting to Know Our AI Prompting - Experimenting with Prompts - Naive Prompting and Persona Pattern. Prompt Engineering Techniques and Approaches - Text-to-Text Prompt Techniques - Interview Pattern Approach - Chain-of-Thought Approach - Tree-of-Thought Approach - Future of Human-Crafted Prompts - Text-to-Image Prompt Techniques - Hands-on Lab: Effective Text Prompts for Image Generation.	**7 Hours**
Project and Wrap Up **Practical Component** Graded Quiz Final Project: Generating Text, Images, and Code.	**9 Hours**

Theory Hours: 0	Tutorial Hours: 0	Practical Hours: 30	Project Hours: 0	Total Hours: 30

Learning Resources

Textbooks:
1. George F. Luger "Artificial Intelligence: Structures and Strategies for Complex Problem Solving" (6th Edition), Pearson, 2021.
2. Anna Jordan, Robert S. Menzies, Kristine P. Schwab, "AI-Powered Creativity: Generative AI and the Future of Content Creation" Routledge, 2023.

References:
1. https://platform.openai.com/docs/overview
2. https://towardsdatascience.com/
3. https://gemini.google.com/

Online Resource (Weblinks)
1. Introduction to Artificial Intelligence (AI) | Coursera
2. Generative AI: Introduction and Applications | Coursera
3. Generative AI: Prompt Engineering Basics | Coursera

Assessment (Practical course)
MCQ, Mini project and viva-voce

Course Curated by

Expert(s) from Industry	Expert(s) from Higher Education Institution	Internal Expert(s)
-	-	Dr. S. Sangeetha, Associate Professor Department of AI&DS
Recommended by BoS on	16.08.2024	

Academic Council Approval	No: 27		**Date**	24.08.2024

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SEMESTER II

24HST102		தமிழரும் தொழில்நுட்பழும்/	L	T	P	J	C
			1	0	0	0	1
HS		TAMILS AND TECHNOLOGY	SDG		4, 8		
Pre-requisite courses		-	Data Book / Code book (If any)		-		

Course Objectives:

The purpose of taking this course is to:	
1	தமிழர்களின் நெசவு மற்றும் பானைத் தொழில்நுட்பத்தை அறிமுகப்படுத்துதல், சங்க கால கட்டிட தொழில்நுட்பத்தை விளக்குதல், கோயில்கள் மற்றும் சிற்பக்கலைகளை ஆராய்தல். introducing weaving and pottery technology of Tamils -Explaining the building technology of the Sangam Period-Explore temples and sculptures.
2	கப்பல், இரும்பு, நாணயங்கள், மணி உருவாக்கும் தொழிற்சாலைகள், ஆகியவற்றை விளக்கம் செய்தல், தமிழகத்தின் தொல்லியல் சான்றுகளின் பழமையை உணர்த்துதல். explain Ship, Iron, Coins, Beads Making Factories. Realizing the Antiquity of Archaeological Evidence of Tamil Nadu
3	வேளாண்மை மற்றும் அறிவியல் தமிழைப் பற்றி அறிதல், இணையத்தில் தமிழின் தேவையை உணர்த்துதல்,தமிழ் மென்பொருள்களை அறிமுகம் செய்தல். knowledge of Agricultural and Scientific Tamil, Realizing the need for Tamil on the Internet, Introducing Tamil software.

Course Outcomes:

After successful completion of this course, the students shall be able to		Revised Bloom's Taxonomy Levels (RBT)
CO 1	தமிழர்களின் நெசவு மற்றும் பானைத் தொழில்நுட்பத்தின் முக்கியத்துவத்தினை அறிந்து கொள்ளுதல். சங்ககால தமிழர் வளர்த்த அழகுக் கலைகளைத் தெரிந்து கொள்ளுதல். know the importance of weaving and pottery technology of Tamils-To know the Aesthetics arts developed by Sangam Tamils	U
CO 2	கப்பல் கட்டும் கலை, இரும்புத் தொழிற்சாலை, நாணயங்கள் அச்சடித்தல்,மணி உருவாக்கும் தொழிற்சாலைகள், சிலப்பதிகாரத்தில் உள்ள மணிகளின் வகையை அறிதல். knowledge of ship building, ironworks, coinage, minting, and beads making factories,Knowing the types of beads in Silapathikaram.	U
CO 3	வேளாண்மை மற்றும் நீர்ப்பாசன தொழில்நுட்பத்தை அறிந்து கொள்ளல். அறிவியல் தமிழ் மற்றும் கணினித் தமிழைப் புரிந்து கொள்ளுதல். know agriculture and irrigation technology. Understanding Scientific Tamil and Computer Tamil.	Ap

	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)											Program Specific Outcomes (PSO)
	1	2	3	4	5	6	7	8	9	10	11	

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Course Outcomes (CO)	Engineering Knowledge	Problem Analysis	Design/Development of Solutions	Conduct Investigations of Complex Problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project Management and Finance	Life-Long Learning	PSO-1	PSO-2	PSO-3
1	2		2				3	2	2		2			
2	2		2				3	2	2		2			
3	2		2				3	2	2		2			

Course Content

நெசவு மற்றும் பானைத் தொழில்நுட்பம்:	
சங்க காலத்தில் நெசவுத் தொழில் - பானைத் தொழில்நுட்பம் - கருப்பு சிவப்பு பாண்டங்கள் - பாண்டங்களில் கீறல் குறியீடுகள். Weaving Industry during Sangam Age - Ceramic technology - Black and Red Ware Potteries (BRW)-Graffiti on Potteries.	**3 Hours**

வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம்:	
சங்க காலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் ஊ சங்க காலத்தில் வீட்டுப் பொருட்களில் வடிவமைப்பு - சங்க காலத்தில் கட்டுமான பொருட்களும் நடுகல்லும் -சிலப்பதிகாரத்தில் மேடை அமைப்பு பற்றிய விவரங்கள் - மாமல்லபுரச் சிற்பங்களும், கோவில்களும் - சோழர் காலத்துப் பெருங்கோயில்கள் மற்றும் பிற வழிபாட்டுத் தலங்கள் - நாயக்கர் காலக் கோயில்கள் - மாதிரி கட்டமைப்புகள் பற்றி அறிதல், மதுரை மீனாட்சி அம்மன் ஆலயம் மற்றும் திருமலை நாயக்கர் மஹால் - செட்டிநாட்டு வீடுகள் - பிரிட்டிஷ் காலத்தில் சென்னையில் இந்தோ-சாரோசெனிக் கட்டிடக் கலை. Designing and Structural construction House & Designs in household materials during Sangam Age - Building materials and Hero stones of Sangam age Details of Stage Constructions in Silappathikaram - Sculptures and Temples of Mamallapuram - Great Temples of Cholas and other worship places - Temples of Nayaka Period - Type study (Madurai Meenakshi Temple)- Thirumalai Nayakar Mahal - Chetti Nadu Houses, Indo - Saracenic architecture at Madras during British Period.	**3 Hours**

உற்பத்தித் தொழில் நுட்பம்:	
கப்பல் கட்டும் கலை - உலோகவியல் - இரும்புத் தொழிற்சாலை - இரும்பை உருக்குதல், எஃகு - வரலாற்றுச் சான்றுகளாக செம்பு மற்றும் தங்க நாணயங்கள்-நாணயங்கள் அச்சடித்தல் - மணி உருவாக்கும் தொழிற்சாலைகள் -கல்மணிகள், கண்ணாடி மணிகள் - சுடுமண் மணிகள் - சங்கு மணிகள் - எலும்புத்துண்டுகள் - தொல்லியல் சான்றுகள் - சிலப்பதிகாரத்தில் மணிகளின் வகைகள். Art of Ship Building - Metallurgical studies - Iron industry - Iron smelting, steel-Copper and gold- Coins as source of history - Minting of Coins - Beads making-industries Stone beads -Glass beads - Terracotta beads -Shell beads/ bone beats - Archeological evidence - Gem stone types described in Silappathikaram.	**3 Hours**

வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில் நுட்பம்:	
அணை, ஏரி, குளங்கள், மதகு - சோழர்காலக் குமுழித் தூம்பின் முக்கியத்துவம்-கால்நடை பராமரிப்பு - கால்நடைகளுக்காக வடிவமைக்கப்பட்ட கிணறுகள்-வேளாண்மை மற்றும் வேளாண்மைச் சார்ந்த செயல்பாடுகள் - கடல்சார் அறிவு - மீன்வளம் - முத்து மற்றும் முத்துக்குளித்தல் - பெருங்கடல் குறித்த பண்டைய அறிவு - அறிவுசார் சமூகம். Dam, Tank, ponds, Sluice, Significance of Kumizhi Thoompu of Chola Period, Animal Husbandry - Wells designed for cattle use - Agriculture and Agro Processing Knowledge of Sea - Fisheries - Pearl - Conche diving - Ancient Knowledge of Ocean - Knowledge Specific Society.	**3 Hours**

அறிவியல் தமிழ் மற்றும் கணித்தமிழ்:	

M. Bharathi

Signature of BoS Chairperson, ECE

அறிவியல் தமிழின் வளர்ச்சி - கணித்தமிழ் வளர்ச்சி - தமிழ் நூல்களை மின்பதிப்பு செய்தல் - தமிழ் மென்பொருட்கள் உருவாக்கம் - தமிழ் இணையக் கல்விக்கழகம் - தமிழ் மின் நூலகம் - இணையத்தில் தமிழ் அகராதிகள்- சொற்குவைத் திட்டம். Development of Scientific Tamil - Tamil computing- Digitalization of Tamil Books- Development of Tamil Software - Tamil Virtual Academy - Tamil Digital Library - Online Tamil Dictionaries - Sorkuvai Project.	3 Hours

Theory		Tutorial		Practical		Project		Total	
Hours:	15	Hours:	0	Hours:	0	Hours:	0	Hours:	15

Reference books

1. தமிழக வரலாறு மக்களும் பண்பாடும் கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் - முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு).
4. பொருநை - ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு).
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL- (in print)
6. Social Life of the Tamils the Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tarnils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Textbook and Educational Services Corporation> Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Bookand Educational Services Corporation> Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R. Balakrishnan) (Published by: RMRL) - Reference Book.

Online Resources

1. https://www.youtube.com/watch?v=Gp1ratX2sOE&list=PLtyn2o7hocf40PtPibRqJTf_dQL3eOtLl
2. https://www.youtube.com/watch?v=jteRvnNiD6w

Assessment

SA-1, SA-2, Activity and Learning Task(s), MCQ, End Semester Examination (ESE)

Course Curated by		
Expert(s) from Industry	**Expert(s) from Higher Education Institution**	**Internal Expert(s)**
-	-	-
Recommended by BoS on	16.08.2024	
Academic Council Approval	No: 27	**Date** 24.08.2024

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24HST103	EFFECTIVE COMMUNICATION	L	T	P	J	C
		2	0	0	0	2
HS		SDG		4, 8		

Pre-requisite courses	-	Data Book / Code book (If any)	-

Course Objectives:

The purpose of taking this course is to	
1	enhance students' abilities to communicate ideas effectively, both orally and in writing, by developing skills in organizing thoughts clearly and logically and expressing them through well-structured paragraphs and concise summaries.
2	enable students to critically evaluate and synthesize information from multiple sources and utilize suitable writing techniques and formats to produce professional-quality content tailored to various contexts.
3	foster active listening, critical reading, and reflective thinking, empowering students to create engaging, relevant, and informative content by applying effective communication strategies across diverse platforms.

Course Outcomes

After successful completion of this course, the students shall be able to		Revised Bloom's Taxonomy Levels (RBT)
CO1	demonstrate proficiency in delivering ideas effectively, both in speaking and writing, with a deeper understanding of the content and the ability to convey complex ideas through well-structured paragraphs and summaries.	Ap
CO2	create and present original content by evaluating information from multiple sources and employing appropriate formats and writing strategies across various professional contexts.	C
CO3	produce engaging and informative content through active listening, reading, reflection, and effective communication skills.	E

Course Outcomes (CO)	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)											Program Specific Outcomes (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	PSO-1	PSO-2	PSO-3
	Engineering Knowledge	Problem Analysis	Design/Development of Solutions	Conduct Investigations of Complex Problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project Management and Finance	Life-Long Learning			
1							2	2	3		3			
2							2	2	3		3			
3							2	2	3		3			

Course Content

Text Analysis Composition of Coherent Paragraphs (Expository, Descriptive, Narrative, Evaluative) - Loud Reading (Reading Extracts will be given were students identify the main idea of paragraphs or sections and debrief)	6 Hours
Visual & Written Analysis Process writing (Drafting effective introduction, process and conclusion using	

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appropriate transition words and phrases) - Describing Visuals (Line graph, Bar Chart, Flow Chart, Pie Chart, Table, Tree diagram) - Note Making & Summarizing	**6 Hours**
Professional Correspondence Crafting Professional Emails - Writing Instruction for Manuals - Reading technical documents (Reading extracts will be given to construct sentences from the new words found in the document)	**6 Hours**
Research and Documentation Library Reading (Identify at least three sources and extract information, Summarize the main ideas and key findings from each source, compile them findings into a brief report that includes the main points, sources, and relevance to the topic)- Report Writing (Title Page, Abstract, Introduction, Methodology, Results, Discussion, Conclusion and recommendation)	**6 Hours**
Talk Analysis and Podcast Skills Listening to and analyzing TED talks – Preparing Podcast-PRISM (Professional Rhetoric Improvement and Speech Mastery) to share facts, opinions and experiences - Writing Reviews on products.	**6 Hours**

Theory Hours: 30	Tutorial Hours: 0	Practical Hours: 0	Project Hours: 0	Total Hours: 30

Learning Resources
References:

1. Swamy, V. R. Narayana. Strengthen Your Writing. Orient Longman, 2003.
2. Sasikumar, V., and P. V. Dhamija. Spoken English: A Self-Learning Guide to Conversation Practice. Tata McGraw Hill, New Delhi (1993).
3. Maison, Margaret M. Examine Your English. Orient Longman, 1999.
4. Rizwi, Ashraf. Effective Technical Communication. Tata McGraw Hill, 2005.
5. Pickett, Nell Ann, and Ann A. Laster. Technical English: Writing, Reading, and Speaking.
6. Harpercollins College Div, 1993.

Online Resources (Weblinks)

1. https://owl.purdue.edu/owl/general_writing/academic_writing/paragraphs_and_paragraphing/index.html
2. https://learnenglish.britishcouncil.org/skills/writing/upper-intermediate b2/describing-trends
3. https://hbr.org/2016/07/how-to-write-email-with-military-precision
4. https://owl.purdue.edu/owl/subject_specific_writing/professional_technical_writing/reports and_memos/index.html

Assessment (Theory course)
SA, Activity and Learning Task(s), Mini project, MCQ, End Semester Examination (ESE)

Course Curated by		
Expert from Industry	**Expert(s) from Higher Education Institution**	**Internal Expert(s)**
Mr.Vijayan Ramanathan , Project manager, Toppan Merrill. Technologies, Coimbatore	Dr. Aninditha Sahoo, IIT, Madras Dr.P.R.Sujatha Priyadharshini, Anna University, Chennai Dr. E. Justin Ruben, CIT, Coimbatore	Dr. Arokia Lawrence Vijay Dr. Sreejana Dr. Tissaa Department of English
Recommended by BoS on	16.08.2024	
Academic Council Approval	No:27	**Date** 24.08.2024

M. Bharathi
Signature of BoS Chairperson, ECE

24MAI123	COMPUTATIONAL DIFFERENTIAL EQUATIONS (Common to EC, EE, EI)	L	T	P	J	C
		3	0	2	0	4
BS		SDG			7, 9	

Pre-requisite courses	-	Data Book / Code book (If any)	-

Course Objectives:

The purpose of taking this course is to:

1	understand the fundamental concepts and methods for solving linear ordinary differential equations (ODEs) of second and higher order, and apply them to real-world engineering problems such as electric circuits.
2	develop proficiency in using Laplace Transform techniques to solve ODEs, particularly in scenarios involving constant coefficients, and apply these methods to practical engineering systems.
3	gain expertise in the application of various numerical methods, including Taylor's series, Euler, Improved Euler, and Runge-Kutta methods, to solve initial value problems for ODEs with a focus on accuracy and efficiency.
4	master the methods of solving partial differential equations (PDEs), including separation of variables and standard techniques for first-order and higher-order PDEs, and understand their application in modeling physical phenomena.
5	apply and evaluate finite difference and other numerical techniques for solving complex engineering problems involving PDEs, such as two-dimensional Laplace's and Poisson's equations, as well as one-dimensional heat and wave equations.

Course Outcomes

	After successful completion of this course, the students shall be able to	Revised Bloom's Taxonomy Levels (RBT)
CO 1	solve linear ordinary differential equations (ODEs) of second and higher order, including applications in electric circuits.	Ap
CO 2	apply Laplace Transform techniques to solve linear ODEs.	Ap
CO 3	apply numerical methods, including Taylor's series, Euler, Improved Euler, and Runge-Kutta methods, to solve initial value problems for ODEs.	Ap
CO 4	analyse and solve partial differential equations (PDEs) using separation of variables and standard methods for first-order PDEs and higher-order linear homogeneous PDEs.	An
CO 5	apply finite difference techniques to solve two-dimensional Laplace's and Poisson's equations and use numerical schemes to solve one-dimensional heat and wave equations.	Ap
CO 6	analyze and solve complex real-world engineering problems using a variety of analytical and numerical methods for ordinary and partial differential equations.	An

Course Outcomes (CO)	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)											Program Specific Outcomes (PSO)		
	1	2	3	4	5	6	7	8	9	10	11			
	Engineering Knowledge	Problem Analysis	Design/Development of Solutions	Conduct Investigations of Complex Problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project Management and Finance	Life-Long Learning	PSO-1	PSO-2	PSO-3

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1	3	2		2										
2	3			2										
3		2		2					2					
4		3	2											
5		2		3										
6	2	2		2					2					

Course Content

ORDINARY DIFFERENTIAL EQUATIONS
Linear equations of second and higher order with constant coefficients – Euler's and Legendre's linear equations – Method of variation of parameters – First order Simultaneous linear equations with constant coefficients – Applications: Electric Circuits. — **9 Hours**

Practical Component:
- Solving Second-Order Linear ODEs with Constant Coefficients
- Solving First-Order Simultaneous Linear Equations

— **7 Hours**

SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS USING LAPLACE TRANSFORMS:
Laplace Transform – Properties – Inverse Laplace transforms – Properties – Solution of linear ordinary differential equations with constant coefficients. — **9 Hours**

Practical Component:
- Using Laplace Transforms to Solve Linear ODEs

— **4 Hours**

NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS
Initial value problems - Single step methods: Taylor's series method – Truncation error – Euler and Improved Euler methods – Fourth order Runge–Kutta method – Multistep method: Milne's predictor - corrector method. — **9 Hours**

Practical Component:
- Numerical Solution Using Taylor's Series Method
- Numerical Solution Using Euler and Improved Euler Methods
- Numerical Solution Using Fourth Order Runge-Kutta Method

— **9 Hours**

PARTIAL DIFFERENTIAL EQUATIONS:
Solution of PDE by variable separable method - solution of standard types of first order partial differential equations (excluding reducible to standard types) - Lagrange's linear equation – Linear homogeneous partial differential equations of second and higher order with constant coefficients. — **9 Hours**

Practical Component:
- Solution of PDE by Variable Separable Method

— **4 Hours**

NUMERICAL SOLUTION OF PARTIAL DIFFERENTIAL EQUATIONS:
Finite difference techniques for the solution of two-dimensional Laplace's and Poisson's equations on rectangular domain–Solution of one-dimensional heat equation using Bender Schmidt and Crank Nicholson difference schemes –Solution of one-dimensional wave equation by explicit scheme. — **9 Hours**

Practical Component:
- Numerical Solution of Two-Dimensional Laplace's and Poisson's Equations
- Numerical Solution of Heat Equation Using Bender-Schmidt and Crank-Nicholson Methods.

— **6 Hours**

Theory	Tutorial	Practical	Project	Total
Hours: 45	Hours: 0	Hours: 30	Hours: 0	Hours: 75

Learning Resources		

Textbooks:

1. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 44th Edition, 2021.
2. Sastry S.S, "Introductory Methods of Numerical Analysis", PHI Learning Pvt. Ltd, 5th Edition, 2015.
3. Thomas, G.B., Weir, M.D., Hass, J., "Thomas' Calculus", Pearson Education, 15th Edition, 2023.

References:

1. Kreyzig E., "Advanced Engineering Mathematics", 10th Edition, John Wiley and sons, 2023.
2. Ramana B.V., "Higher Engineering Mathematics", Tata McGraw Hill Co. Ltd., New Delhi, 11th Reprint, 2018.
3. Zill, D.G., Wright, W.S., "Advanced Engineering Mathematics", Jones & Bartlett Learning, 7th Edition, 2020.
4. O'Neil, P.V., "Advanced Engineering Mathematics", Cengage Learning, 7th Edition, 2017.
5. "Numerical Methods for Engineers" by Steven C. Chapra and Raymond P. Canale,Mc Graw Hill, 8th Edition,2021.

Online Resources (Weblinks)

1. MIT OpenCourseWare: Differential Equations
   https://ocw.mit.edu/courses/mathematics/18-03-differential-equations-spring-2010
2. Khan Academy: Differential Equations
   https://www.khanacademy.org/math/differential-equations
3. Paul's Online Math Notes: Differential Equations
   http://tutorial.math.lamar.edu/Classes/DE/DE.aspx
4. Coursera: Introduction to Differential Equations
   https://www.coursera.org/learn/differential-equations
5. Wolfram MathWorld: Differential Equations
   https://mathworld.wolfram.com/topics/DifferentialEquations.html

Assessment

SA, Activity and Learning Task(s), MCQ, Open Book Assignment, Worksheet assignment, End Semester Examination (ESE), Lab Workbook, Experimental Cycle tests, viva-voce.

Course Curated by

Expert from Industry	Expert(s) from Higher Education Institution	Internal Expert(s)
Mr.Pradeep.C, Paerless Validation Software for Life Sciences Companies.	Dr. C. Porkodi, PSG College of Technology, Coimbatore. Dr. P. Paramanathan, Amrita Vishwa Vidyapeetham, Coimbatore.	Dr. K. Meena Dr. Vijeta Iyer Dr. R. Krishnamoorthy Department of Mathematics
Recommended by BoS on	16.08.2024	
Academic Council Approval	No: 27	**Date** 24.08.2024

Signature of BoS Chairperson, ECE

24PHI102	APPLIED PHYSICS FOR CIRCUIT ENGINEERING		L	T	P	J	C
			3	0	2	0	4
BS	(Common to EC, EE, EI an MR)		SDG			9	

Pre-requisite courses	Higher Secondary	Data Book / Code book (If any)	-

Course Objectives:

The purpose of taking this course is to:

1	discover the fundamental concepts of light-matter interactions, including emission, absorption, and Einstein's theory's presentation of stimulated emission's quantum mechanical foundations.
2	comprehend the principles of quantum mechanics, including wave-particle duality, the significance of the wave function, and quantum tunnelling.
3	examine various sources of green energy, including solar, wind, and ocean energy, and assess their efficiency and practical applications.
4	study the properties of semiconductors, magnetic materials, including carrier concentration, transport phenomena, and applications of the Hall effect in sensors.

Course Outcomes

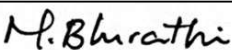| After successful completion of this course, the students shall be able to	Revised Bloom's Taxonomy Levels (RBT)
CO 1	apply the principles of applied optics to demonstrate the operation of laser systems and their applications.	Ap
CO 2	apply quantum mechanical concepts to solve problems related to wave-particle duality and quantum tunnelling.	Ap
CO 3	apply principles of green energy technologies to assess their efficiency and practical applications.	Ap
CO 4	0075nderstanding semiconductor physics concepts to analyze carrier transport phenomena and properties of semiconductor devices.	U
CO 5	apply knowledge of magnetic materials to evaluate their properties and uses in modern applications like spintronics.	Ap
CO 6	apply optics, quantum physics, green energy, and semiconductor physics methods to design practical solutions in experimental setups.	Ap

Course Outcomes (CO)	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)											Program Specific Outcomes (PSO)		
	1	2	3	4	5	6	7	8	9	10	11			
	Engineering Knowledge	Problem Analysis	Design/Development of Solutions	Conduct Investigations of Complex Problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project Management and Finance	Life-Long Learning	PSO-1	PSO-2	PSO-3
1	3	1												
2	3	1												
3	3	1												
4	3	1									2			
5	3	1												
6	3	1									2			

Course Content

APPLIED OPTICS	9 Hours

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Interaction of light and matter - Quantization of electromagnetic radiation – Absorption, Spontaneous emission and Stimulated emission - Einstein's theory of stimulated emission- Population inversion - Sources of excitation - Active medium -Laser beam output- Nd-YAG laser - CO_2 laser - Applications – Laser Imaging, Holography and Laser gyroscopes.	

Practical Component
1. Semiconductor laser:
    a. Determination of wavelength of laser
    b. Determination acceptance angle and numerical aperture of an optical fibre.
    c. Determination of particle size
2. Spectrometer – Determination of wavelength of mercury source using grating
	6 hours

QUANTUM PHYSICS Necessity of quantum mechanical picture - Planck's concept (hypothesis) - Wave-particle duality - de-Broglie waves - Physical significance of wave function - Schrodinger equation (Time independent and time-dependent) - Particle in a box- Eigen values and Eigen function- Superposition Principle - Quantum mechanical tunnelling through a barrier	**9 Hours**

Practical Component
    1. Compound pendulum – Determination of acceleration due to gravity
    2. Determination of Planck's constant–electroluminescence method.
	6 hours

GREEN ENERGY Introduction to Green energy – Solar energy: Energy conversion by photovoltaic principle – Solar cells – Efficiency measurements – Types (First, Second and Third Generation) - Wind energy: Basic components and principle of wind energy conversion systems – Ocean energy: Wave energy – Wave energy conversion devices. Futuristic Energy: Hydrogen – Methane Hydrates – Carbon capture and storage (CCS).	**9 Hours**

Practical Component
    1. Determination of efficiency of solar cell
    2. Melde's string – Determination of frequency of a tuning fork
	6 hours

SEMICONDUCTOR PHYSICS Semiconductors - Intrinsic and extrinsic semiconductors - Variation of carrier concentration with temperature and impurity concentration - Carrier transport in Semiconductors: Drift, mobility and diffusion – Hall Effect in Semiconductors – Applications of Hall Effect - Magnetic field sensor, current sensor, and position sensor - Ohmic contacts: concept and importance - Schottky diode – construction and working - energy band diagram, I-V characteristics.	**9 Hours**

Practical Component
  1. Determination of band gap of a semiconductor
  2. Determination of thermal conductivity of a bad conductor – Lee's Disc method
  3. Non-uniform bending – Determination of Young's modulus
	6 hours

MAGNETIC MATERIALS Introduction – Bohr magnetron - types of magnetic material – Hysteresis behaviour – Energy product - Hard and soft magnetic materials - Magnetic Anisotropy- Spintronics and Magnetic Semiconductors- Applications – GMR - MRAM (Magneto resistive Random Access Memory) - Nanomagnetic Materials - Magnetocaloric Materials – Magnetic Materials in Renewable Energy – Magnetic levitation.	**9 Hours**
Practical Component 1. Determination of magnetic susceptibility of a solid material – B-H curve apparatus	**6 hours**

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Theory Hours: 45	Tutorial Hours: 0	Practical Hours: 30	Project Hours: 0	Total Hours: 75

Learning Resources

Textbooks

1. Avadhanulu, M. N., Kshirsagar, P. G., & Arun Murthy, T. V. S., A Textbook of Engineering Physics, S. Chand Publications, New Delhi (2018).
2. Gaur, R. K., & Gupta, S. L., Engineering Physics, Dhanpat Rai Publishing Co Pvt Ltd, New Delhi (Year not provided).
3. Beiser, A., Mahajan, S., & Choudhury, S. R., Concepts of Modern Physics, McGraw Hill Education, New Delhi (2017).
4. Rajendran, V., Applied Physics, Tata McGraw Hill Publishing, New Delhi (2017).

Reference books

1. Lal, Brij, & Subrahmanyam, Properties of Matter, S. Chand & Co Ltd., New Delhi (2014).
2. Prakash, Satya, Quantum Mechanics, Pragati Prakashan Publishers (2015).
3. Thiagarajan, K., & Ghatak, Ajoy, Lasers: Fundamentals and Applications, Springer Science & Business Media (2010)
4. Hill, William Silfvast, Laser Fundamentals, Cambridge University Press, New York (2018).
5. Ultrasonics: Fundamentals, Technology, Applications, 2nd Edition, Marcel Dekker, New York (1988).
6. Sze, S. M., & Ng, K. K., Physics of Semiconductor Devices, Wiley (2020), ISBN: 978-1119090240.
7. Sellmyer, David J., & Skomski, Robert, Permanent Magnetic Materials and Devices,
8. Springer (2017), ISBN: 978-3319315828.

Online Resources (Weblinks)

1. National Institute of Standards and Technology (NIST) - Laser Fundamentals
2. Optics.org - Laser Applications
3. IEEE Xplore - Semiconductor Devices
4. Semiconductor Industry Association - Semiconductor Technology
5. Global Wind Energy Council (GWEC) - Wind Energy
6. Ocean Energy Europe
7. Magnetics - Magnetic Materials

Assessment (Embedded course)

SA, Mini project, Qualitative assignments (PrBL/Activity based), MCQ, End Semester Examination (ESE), Lab Workbook, Model exam and viva-voce

Course Curated by

Expert(s) from Industry	Expert(s) from Higher Education Institution	Internal Expert(s)
		Dr. R. Balamurugan Dr. K. Sugandhi Department of Physics

Recommended by BoS on	16.08.2024

Academic Council Approval	No: 27	Date	24.08.2024

M. Bharathi
Signature of BoS Chairperson, ECE

24MEI103	COMPUTER AIDED ENGINEERING GRAPHICS (Common to EE, EC, EI, BT)	L	T	P	J	C
		2	0	2	0	3
ES		SDG		9, 12		

Pre-requisite courses	-	Data Book / Code book (If any)	-

Course Objectives:

The purpose of taking this course is to:

1	understand the fundamental principles of engineering graphics and their significance.
2	develop proficiency in freehand sketching, usage of drawing instruments, and lettering.
3	gain competency in using computer graphics technologies for graphical communication, including isometric views and various coordinate systems (absolute, relative, polar)

Course Outcomes

After successful completion of this course, the students shall be able to	Revised Bloom's Taxonomy Levels (RBT)
CO1	apply the principles of engineering graphics to create accurate orthographic and isometric projections	Ap
CO2	design free-hand sketches of orthographic views from pictorial representations to improve spatial understanding and communication of engineering concepts	C
CO3	apply CAD software tools to create, edit, and annotate technical drawings and analyse them using ISO and ANSI standards	Ap
CO4	analyse the parametric and non-parametric CAD models, producing detailed two-dimensional documentation, including sectional views and annotations.	An
CO5	apply geometric and topological concepts to design 3D models for additive manufacturing.	Ap
CO6	apply the principles of engineering graphics to create accurate orthographic and isometric projections	Ap

Course Outcomes (CO)	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)											Program Specific Outcomes (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	PSO-1	PSO-2	PSO-3
	Engineering Knowledge	Problem Analysis	Design/Development of Solutions	Conduct Investigations of Complex Problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project Management and Finance	Life-Long Learning			
1	2	2		2							2			
2		1	2								1			
3	2	3	2	2							2			
4		1	1						2		1			
5				2	2			1			1			
6				2	2			1			1			

Course Content

Introduction to Engineering Drawing	6 Hours
Principles of Engineering Graphics and their significance, Freehand sketching, usage of Drawing instruments, lettering, Conic sections including the Rectangular Hyperbola (General method only); Cycloid, Epicycloid, Hypocycloid and Involute.	6 Hours
Orthographic and Isometric Projections	6 Hours

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Principles of Orthographic Projections-Conventions - Projections of Points and lines inclined to both planes; Projections of planes inclined Planes - Auxiliary Planes; Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions.	**6 Hours**
Overview of Computer Graphics Listing the computer technologies that impact on graphical communication, Isometric Views of lines, Planes, Simple and compound Solids, Coordinates system - Absolute Coordinates, Relative Coordinates, Polar Coordinates.	**6 Hours** **6 Hours**
Customization & CAD Drawing Setting up modules and drawing limits; ISO and ANSI standards for coordinate dimensioning and tolerancing; Orthographic constraints, Snap to objects manually and automatically; Isometric Projections and Solids.	**6 Hours** **6 Hours**
Annotations, layering & other functions Layers to create drawings, create, edit and use customized layers; orthographic projection techniques; Drawing sectional views of composite right regular geometric solids and projecting the true shape of the sectioned surface; Drawing annotation, Computer-aided design (CAD) software modeling of parts and assemblies. Part editing and two-dimensional documentation of models, Shape extractions (Freeform modelling). Planar projection theory includes sketching of perspective, isometric, Multiview, auxiliary, and section views. Spatial visualization exercises – Transformation, Rendering and Lighting. Geometry and topology of engineered components: Introduction to Additive manufacturing (AM); Exporting the 3D model.	**4 Hours** **8 Hours**

Theory	Tutorial	Practical	Project	Total
Hours: 30	Hours: 0	Hours: 30	Hours: 0	Hours: 60

Learning Resources

Textbooks

1. Dhawan, R. K. *A Textbook of Engineering Drawing*. S. Chand Publishing (2019).
2. Bhatt N.D., Panchal V.M. & Ingle P.R., Engineering Drawing, Charotar Publishing House (2014).
3. Shah, M.B. & Rana B.C. Engineering Drawing and Computer Graphics, Pearson Education (2008).

Reference books

1. Agrawal B. & Agrawal C. M. (2012), Engineering Graphics, TMH Publication
2. Narayana, K.L. & P Kannaiah (2008), Textbook on Engineering Drawing, Scitech Publishers.

Online Resources (Weblinks)

1. https://www.youtube.com/watch?v=8UKg928M4C0
2. https://www.youtube.com/watch?v=JvsJf1huMXQ
3. https://www.youtube.com/watch?v=8lHEizPf-wY

Assessment (Embedded course)

SA, Activity and Learning Task(s), Mini project, MCQ, End Semester Examination (ESE) Lab Workbook, Experimental Cycle tests, viva-voce

Course Curated by

Expert(s) from Industry	Expert(s) from Higher Education Institution	Internal Expert(s)
Mr. G. Vergin Vino Design Engineer TANCAM, Chennai	Dr. V. Prabhuraja Professor, Department of Mechanical Engineering PSG College of Technology, Coimbatore	Dr. Samuel Ratna Kumaar Assistant Professor – III Department of Mechanical Engineering

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Recommended by BoS on	17.08.2024		
Academic Council Approval	No: 27	**Date**	24.08.2024

Signature of BoS Chairperson, ECE

24EEI107	**FOUNDATIONS OF ELECTRICAL MACHINES AND DRIVES**	L	T	P	J	C
		2	0	2	0	3
ES		**SDG**			**7, 9**	

Pre-requisite courses	24ECT101	Data Book / Codes / Standards (If any)	-

Course Objectives:

	The purpose of taking this course is to:
1	Impart comprehensive knowledge on construction and working principles of electric motors and transformers
2	Foster the ability to recommend motor solutions based on application requirements
3	Establish foundation practical skills in Electric Motors, Transformers, and Power Electronic Converter Circuits

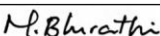| Course Outcomes	After successful completion of this course, the students shall be able to	Bloom's Taxonomy Level (BTL)
CO 1	Analyse the structure, principle of operation of Electrical machines.	An
CO 2	Illustrate the working of power semiconductor devices, AC-DC converters, DC-DC converters, and voltage source inverters.	Ap
CO 3	Apply power converters for the control of electrical motors.	Ap
CO 4	Apply electrical drive systems in basic electric vehicle applications.	Ap
CO 5	Demonstrate the performance of electrical machines and drives through laboratory experiments	An

Course Outcomes (CO)	Program Outcomes (PO) (Strong - 3, Medium - 2, Weak - 1)											Program Specific Outcomes (PSO)	
	1	2	3	4	5	6	7	8	9	10	11	PSO-1	PSO-2
	Engineering Knowledge	Problem Analysis	Design/Development of Solutions	Conduct Investigations of Complex Problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project Management and Finance	Life-Long Learning		
CO1	3	2											
CO2	3	2											1
CO3	3	2											1
CO4	3	2		2									2
CO5	2			2	1			3	2				2

Course Content	
ELECTRICAL MACHINES Construction and working principle of DC shunt generator and shunt motor-Construction and operation of single-phase core type transformer – Construction and operation of single - phase capacitor start and capacitor run induction motor - Construction and operation of three phase squirrel cage induction motor.	**10 Hours**
Practical Component: • Armature voltage control of DC shunt motor • Open circuit test on transformer • Load test on single phase induction motor	**9 Hours**
POWER SEMICONDUCTOR DEVICES AND CONVERTERS Structure, operation and VI Characteristics of SCR, Power MOSFET, IGBT - Single phase fully controlled AC-DC bridge converter (R load) - DC-DC buck-boost converter- Single-phase and Three-phase voltage source inverters (VSI).	**10 Hours**
Practical Component: • AC-DC fully controlled converter with R load • DC-DC Buck-Boost Converter • Single phase Sinusoidal PWM Inverter	**9 Hours**
ELECTRICAL DRIVES Introduction to Electric Drives - Advantages - Elements of an Electric Drive System- DC chopper fed DC shunt motor drive - Regenerative braking- VSI fed three phase induction motor drive- PMBLDC motor: Construction, Block diagram of drive, electric scooter application - PM Synchronous motor: Construction, block diagram of drive and electric car application- PM stepper motor: Construction, operation and application.	**10 Hours**
Practical Component: • Four quadrant chopper fed DC shunt motor control • V/f control of three phase induction motor • Speed control of PMBLDC motor • Analysis of electric bike	**12 Hours**

Theory Hours:	30	Tutorial Hours:	0	Practical Hours:	30	Project Hours:	0	Total Hours:	60

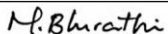| **Learning Resources** |
|---|
| **Textbooks** |
| 1. D.P. Kothari and I.J. Nagrath, "Electric Machines", McGraw Hill Education, 5th Edition, 2019.
2. Muhammad H. Rashid, "Power Electronics - circuits, devices and applications", Prentice Hall of India, 3rd Edition, 2017.
3. Gopal K. Dubey, "Fundamentals of Electrical Drives", Narosa Publishing House, New Delhi, 2nd Edition, 2015. |
| **Reference books/ Web Links** |
| 1. B.L. Theraja, "Fundamentals of Electrical Engineering and Electronics", S Chand and Company Limited, 2022. |

2. J.B. Gupta, "Theory and Performance of Electrical Machines", S.K.Kataria and Sons, New Delhi, 15th Edition, 2018.
3. S.K. Pillai, "A First Course on Electrical Drives", New Age International Publication, New Delhi, 4th Edition, 2023.
4. Janardhanan E.G, "Special Electrical Machines" PHI Learning, 1st Edition, 2014.

Online Resources

https://archive.nptel.ac.in/courses/108/105/108105155/
https://archive.nptel.ac.in/courses/108/102/108102146/

Assessment (Theory course)

SA-1, SA-2, Activity and Learning Task(s), Mini project, MCQ, End Semester Examination (ESE)

Course Curated by

Expert(s) from Industry	Expert(s) from Higher Education Institution	Internal Expert(s)
Mr. Sakthi Vishnu, Versa drives (P) Ltd.	Dr. G. Saravana Ilango, NIT, Trichy.	Dr. P. Thirumoorthi, EEE Dr. K. Malarvizhi, EEE
Recommended by BoS on	28.11.2025	
Academic Council Approval	No. 29	**Date**	24.12.2025

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Signature of BoS Chairperson, ECE

24ECI102	Electron Devices and Circuits (Common to ECE, EEE)	L	T	P	J	C
		3	0	2	0	4
PC		SDG			9	

Pre-requisite courses	NA	Data Book / Code book (If any)	NA

Course Objectives:

The purpose of taking this course is to:

1	Provide a solid foundation in the principles of semiconductor diodes and their applications.
2	Equip students with the comprehensive knowledge on structure, operation, biasing and configurations of BJT and MOSFET.
3	Develop analytical skills for applying small signal models of BJT and MOSFET amplifiers to determine gain and frequency response.
4	Equip students with the ability to evaluate the performance of multistage, differential, and tuned amplifiers and predict their gain and frequency response.
5	Foster an understanding of feedback, power amplifiers and oscillators and analyze their performance.

Course Outcomes

	After successful completion of this course, the students shall be able to	Revised Bloom's Taxonomy Levels (RBT)
CO 1	Apply the basics of semiconductor diodes to analyze the VI characteristics and operational behaviour.	Ap
CO 2	Analyze the structure, operation, and biasing techniques of BJT and MOSFET devices.	An
CO 3	Analyze the small signal models of BJT and MOSFET amplifiers to determine gain and frequency response.	An
CO 4	Examine the performance of multistage, differential, and tuned amplifiers to predict their gain and frequency response	An
CO 5	Distinguish between various feedback amplifiers and oscillator circuits and assess the efficiency of various power amplifier	An
CO 6	Demonstrate the characteristics of semiconductor devices and frequency response of amplifiers.	Ap

Course Outcomes (CO)	Program Outcomes (PO) (Strong-3, Medium-2, Weak-1)											Program Specific Outcomes (PSO)	
	1	2	3	4	5	6	7	8	9	10	11		
	Engineering Knowledge	Problem Analysis	Design/Development of Solutions	Conduct Investigations of Complex	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project Management and Finance	Life-Long Learning	PSO-1	PSO-2
1	2	1			1	1							
2	1	1	2		1	1							
3	1		2		1	1							
4	1		2		1	1							
5	1			1	1	1							
6	2				1	1							

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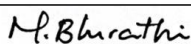| Course Content	
DIODES AND THEIR APPLICATIONS Structure, operation and VI Characteristics of PN junction diode, Zener diode - Diffusion and transition capacitances of PN junction diode - LEDs and Photo diodes - Applications of diodes: Clippers and Clampers - Half wave and Full wave rectifiers with filter - Zener voltage regulator.	**6 Hours**
Practical Component • Design of Clipper and Clamper circuit. • Half wave and full wave rectifiers with filter. • Design of Voltage regulator using Zener diode.	**9 Hours**
BJT AND MOSFET BJT - Structure, operation and VI characteristics - Load line, Quiescent point, CE, CB and CC configurations - Biasing: Fixed base bias, voltage divider bias, emitter bias - BJT as a switch. MOSFET - Structure, operation and VI characteristics - Enhancement and Depletion modes - Biasing of MOSFET: CS configuration - BJT vs MOSFET.	**10 Hours**
Practical Component • Characteristics of BJT under CE configuration. • Characteristics of MOSFET under CS configuration.	**6 Hours**
SMALL SIGNAL AMPLIFIERS USING BJT AND MOSFET BJT small signal model, Analysis of CE amplifier - Gain and frequency response - MOSFET small signal model: Analysis of CS Amplifier and Source follower, Gain and frequency response - High frequency analysis of BJT and MOSFET.	**10 Hours**
Practical Component • Frequency response of CE amplifier. • Frequency response of CS amplifier.	**6 Hours**
MULTISTAGE, DIFFERENTIAL AND TUNED AMPLIFIERS RC coupled amplifier, Differential amplifier - Common mode and Difference mode analysis, CMRR - Tuned amplifiers: Single tuned and double tuned - Gain and frequency response.	**9 Hours**
Practical Component • Analysis of RC coupled amplifier.	**3 Hours**
LARGE SIGNAL AMPLIFIERS AND OSCILLATORS Advantages of negative feedback - Voltage, Current, Series, Shunt feedback amplifiers - Power amplifiers: Class A, Class B and Class C amplifiers - Analysis of Class B push-pull power amplifier. Positive feedback - Conditions for oscillations, RC phase shift, Wien bridge Hartley, Colpitts and Crystal oscillators.	**10 Hours**
Practical Component • Analysis of Class B push-pull power amplifier. • Design of RC phase shift oscillator.	**6 Hours**

Theory Hours:	45	**Tutorial Hours:**	0	**Practical Hours:**	30	**Project Hours:**	0	**Total Hours:**	75

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Learning Resources

Textbooks

1. Jacob Millman, Christos C Halkias and Satyabrata Jit, Electron Devices and Circuits, Tata McGraw Hill, 4th Edition, 2015.
2. Adel S. Sedra and Kenneth C. Smith, Microelectronic Circuits-Theory and Applications, Oxford University Press, 7th Edition, 2017.

Reference books

1. Robert L. Boylestad and Louis Nashelsky, Electronic Devices and Circuit Theory, Pearson Education,11th Edition, 2015.
2. Thomas L. Floyd, Electronic Devices, Pearson Education, 9th Edition, 2012.
3. David A. Bell, Fundamentals of Electronic Devices and Circuits, Oxford University Press, 5th Edition, 2009.

Online Educational Resources

1. https://onlinecourses.nptel.ac.in/noc21_ee80/preview
2. https://onlinecourses.nptel.ac.in/noc20_ee89/preview

Assessment (Embedded course)

SA-1, SA-2, Activity and Learning Task(s), Mini project, MCQ, End Semester Examination (ESE), Lab Workbook, Experimental Cycle tests, viva-voce, etc.

Course Curated By

Expert(s) from Industry	Expert(s) from Higher Education Institutions	Internal Expert(s)
1. Ms. T. Jeevaranjani, Bosch Global Software Technologies	1. Dr. I. S. Akila, Coimbatore Institute of Technology 2. Dr. P. Palanisamy, NIT-Trichy	1. Dr. B. Gopinath, ECE 2. Ms. R. Dhivya Praba, ECE 3. Ms. A. Kalaiselvi, ECE 4. Mr. D. Allin Joe, ECE 5. Ms. T. Jaspar Vinitha Sundari, ECE 6. Dr. K. Paramasivam, EEE
Recommended by BoS on	13.08.2024	
Academic Council Approval	No: 27	24.08.2024

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24INP103	INNOVATION PRACTICUM – II	L	T	P	J	C
		0	0	2	0	1
ES	(Common to All branches)	SDG		9, 11, 12		

Pre-requisite courses	-	Data Book / Code book (If any)	-

Course Objectives:

The purpose of taking this course is to:

1	equip students with essential tools and techniques for leveraging open-source technologies to develop proof-of-concepts and prototypes
2	provide hands-on experience and participants will gain a comprehensive understanding of the entire product development process
3	final prototyping, empowering them to transform their ideas into tangible outcomes

Course Outcomes

After successful completion of this course, the students shall be able to	Revised Bloom's Taxonomy Levels (RBT)
CO 1	analyse the effectiveness of various electronic tools and techniques in product development processes	An
CO 2	develop and implement functional software prototypes using open-source tools	Ap
CO 3	design and fabricate 3D models using digital fabrication techniques	Ap

Course Outcomes (CO)	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)											Program Specific Outcomes (PSO)		
	1	2	3	4	5	6	7	8	9	10	11			
	Engineering Knowledge	Problem Analysis	Design/Development of Solutions	Conduct Investigations of Complex Problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project Management and Finance	Life–Long Learning	PSO-1	PSO-2	PSO-3
1	3	2	2	2	2									
2	2	2	2		2									
3	2	2	3	2	2									

Course Content

INTRODUCTION TO OPEN-SOURCE TOOLS AND TECHNIQUES Explore the concept of open-source, its underlying principles and its contrast with proprietary software, Discuss the advantages of using open-source tools, such as lower costs, increased innovation, educational value, and community support, walk through to the commonly used open-source tools for electronics design (KiCad, FreeCAD), software development (Python, Eclipse), and fabrication (Cura, LinuxCNC).	3 Hours
ELECTRONICS FUNDAMENTALS AND TOOLS Introduction to basic electronic components (resistors, capacitors, transistors, etc.), Understanding of electronic circuits and their functions, Hands-on practice with CircuitJS and Falstad, Simulating and analysing electronic circuits, Introduction to Arduino and Raspberry Pi, exploring their capabilities and applications, Designing PCBs using KiCad and EasyEDA, Understanding PCB fabrication processes	6 Hours
SOFTWARE PROTOTYPING AND TOOLS Benefits of rapid prototyping in product development, Iterative design and testing, Wireframing tools (Balsamiq, Figma), UI design tools (Sketch, Figma), Programming	6 Hours

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languages (Python, JavaScript), Testing frameworks (Selenium), No-code platforms (Bubble, Adalo, Wix, AppGyver), Building functional prototypes without extensive coding	
FABRICATION AND PROTOTYPING Overview of fabrication techniques (3D printing, laser cutting, CNC machining), Prototyping methods for physical products, using tools like Blender, TinkerCAD, or Fusion 360, Creating 3D models for physical prototypes, Hands-on experience with laser cutting and engraving, Understanding their applications and limitations	**7 Hours**
SIMULATION & DEMONSTRATION Integrated project demonstration, explaining the design process, technical choices, and outcomes, simulation showcase to demonstrate their understanding of various technical tools and prototyping techniques	**8 Hours**

Theory Hours:	0	Tutorial Hours:	0	Practical Hours:	30	Project Hours:	0	Total Hours:	30

Learning Resources
Textbooks:
1. Damir Godec, Joamin Gonzalez-Gutierrez, Axel Nordin, Eujin Pei, Julia Ureña Alcázar, A guide to additive manufacturing, Springer – 2022. https://doi.org/10.1007/978-3-031-05863-9 2. Introducing SolidWorks, Dassault Systems.
References:
1. Insight into Electronics 2. Microcontroller Programming with Arduino and Python 3. Fundamentals of 3D modelling
Online Resources (Weblinks)

1. Google Play store apps:
    a. https://play.google.com/store/apps/details?id=com.electronicslab
    b. https://play.google.com/store/apps/details?id=it.android.demi.elettronica
2. https://engservices-ece.sites.olt.ubc.ca/files/2020/01/SolidWorks-3D-Printing-Tutorial-R2.pdf

Assessment (Practical course)
Lab Workbook, Experimental Cycle tests, viva-voce

Course Curated by		
Expert from Industry	**Expert(s) from Higher Education Institution**	**Internal Expert**
Dr. Mahesh Veezhinathan Director - Innovation Practicum Associate VP - Forge. Innovation	-	Dr. Samuel Ratna Kumar P S Assistant Professor – III Department Mechanical Engineering
Recommended by BoS on	17.08.2024	
Academic Council Approval	No: 27	**Date** 24.08.2024

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Signature of BoS Chairperson, ECE

24HSP112	HOLISTIC WELLNESS-II	L	T	P	J	C
	(Common to all Department)	0	0	2	0	1
HS		SDG		3, 4		

Pre-requisite courses	Holistic Wellness-I	Data Book / Code book (If any)	-

Course Objectives:

The purpose of taking this course is to:

1	build on the foundation laid in Holistic Wellness -I and deepening into the practices and principles of holistic wellness.
2	explore advanced techniques in mental, emotional, and spiritual well-being, with an emphasis on creating sustainable wellness habits.

Course Outcomes

After successful completion of this course, the students shall be able to	Revised Bloom's Taxonomy Levels (RBT)
CO 1	apply advanced techniques in mindfulness, meditation, and stress management.	Ap
CO 2	understand the role of community and social connections in wellness.	U
CO 3	develop resilience and adaptability in maintaining wellness.	E
CO 4	refine and sustain a personalized holistic wellness plan.	E

Course Outcomes (CO)	Program Outcomes (PO) (Strong-3, Medium – 2, Weak-1)											Program Specific Outcomes (PSO)		
	1	2	3	4	5	6	7	8	9	10	11	PSO-1	PSO-2	PSO-3
	Engineering Knowledge	Problem Analysis	Design/Development of Solutions	Conduct Investigations of Complex Problems	Engineering Tool Usage	The Engineer and The World	Ethics	Individual and Collaborative Team work	Communication	Project Management and Finance	Life-Long Learning			
1						2		2						
2						2								
3						2					3			
4						2					3			

Course Content

ADVANCED MINDFULLNESS AND MEDITATION: • Deepening mindfulness practices for enhanced mental clarity. • Exploring different forms of meditation (e.g., guided, transcendental, movement-based). • Hands-on activity: Daily meditation practice and journaling reflections.	**6 Hours**
EMOTIONAL RESILIENCE AND MENTAL HEALTH: • Building emotional resilience through positive psychology practices. • Cognitive-behavioural strategies for managing stress and anxiety. • Hands-on activity: Developing and practicing a resilience toolkit.	**6 Hours**
SOCIAL AND ENVIRONMENTAL WELLNESS: • The impact of social connections and community on wellness. • Creating a supportive environment for personal growth. • Hands-on activity: Building a community wellness project or group activity.	**6 Hours**
INTERNAL GROWTH AND PURPOSE:	**6 Hours**

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• Exploring the deeper aspects of internal wellness and self-actualization. • Reflective practices for discovering life purpose and meaning. • Hands-on activity: Creating a vision board or personal mission statement.	
SUSTAINING WELLNESS PRACTICES: • Strategies for maintaining wellness habits over the long term. • Adapting wellness plans to life changes and challenges. • Hands-on activity: Revising and finalizing a long-term personal wellness plan.	**6 Hours**

Theory Hours: 0	Tutorial Hours: 0	Practical Hours: 30	Project Hours:	Total Hours: 30

Learning Resources

Textbooks:

1. Hanh, Thich Nhat. The Miracle of Mindfulness: An Introduction to the Practice of Meditation. Beacon Press, Boston (1975).
2. Tolle, Eckhart. The Power of Now: A Guide to Spiritual Enlightenment. New World Library, Novato (1997).
3. Patel, Kamlesh. Heartfulness Way: Heart-Based Meditations for Spiritual Transformation, Kamlesh Patel, 2018.

References:

1. Goleman Daniel., Emotional Intelligence., Bloomsbury India, India, (2021).
2. James Allen., As a Man Thinketh., Maple Press, Noida, (2010)
3. Swami Budhanandha., Will power and its development., Advaita Ashrama Mayavati, Pithoragarh, Himalayas from its Publication Department, Calcutta. (2001)
4. Rosenberg, Marshall Bertram., Nonviolent Communication: A Language of Life., Puddle Dancer Press, Encinitas, CA (2015).
5. Jayanna, Krishnamurthy., Science & Practice of Integrative Health & Wellbeing Lifestyle., White Falcon Publishing (2020).
6. Lipton, Bruce., The Biology of Belief 10th Anniversary Edition: Unleashing the Power of Consciousness, Matter & Miracles, Hay House, Carlsbad (2015).
7. Kalderdon Adizes Ichak., What Matters in Life: Lessons I Learned from Opening My Heart
8. ., WS Press, Newtown, PA(2023).
9. Murphy, Joseph., The Power of Your Subconscious Mind [Original Edition (Complete)], Prentice-Hall, Englewood Cliffs (1963).
10. Kamlesh D. Patel., Designing Destiny: The Heartfulness Way, Heartfulness Institute, Chennai (2021)

Online Resources (Weblinks)

- Introduction to Psychology
- Guided Meditation
- Life skills and value education
- James Allen Library

Assessment (Practical course)

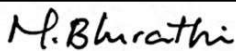Participation, Practical activities and assignments, personal wellness plan and reflection.

Course Curated by

Expert(s) from Industry	Expert(s) from Higher Education Institution	Internal Expert(s)
		Dr. Ezhilarasi Principal- KCT

M. Bharathi

Signature of BoS Chairperson, ECE

Recommended by BoS on				
Academic Council Approval	No: 27		**Date**	24.08.2024

M. Bharathi
Signature of BoS Chairperson, ECE