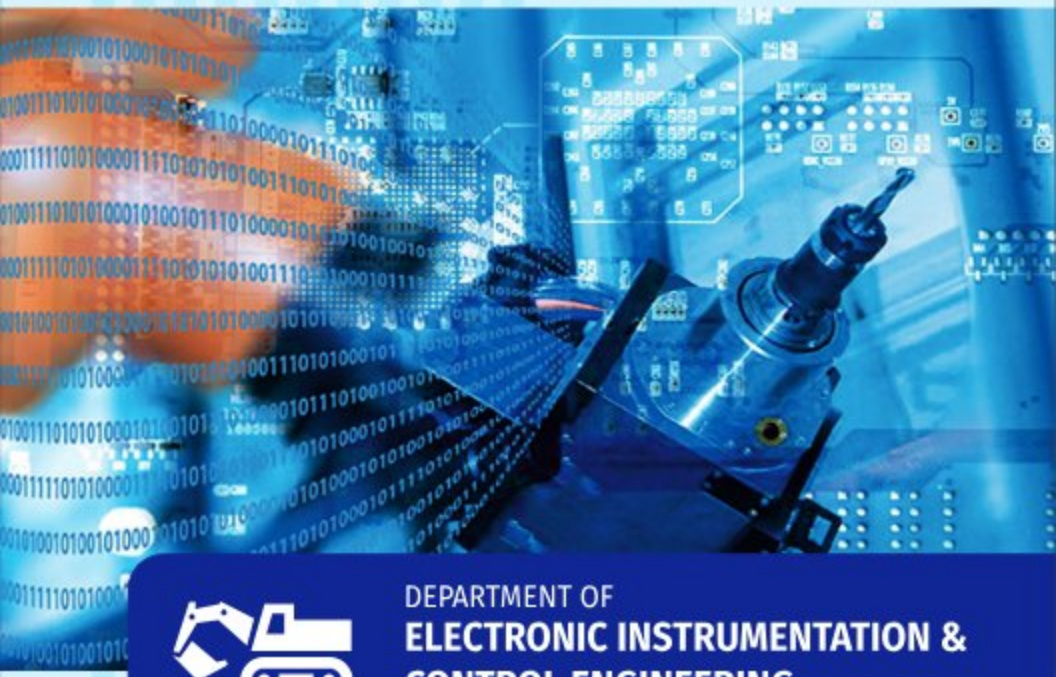
Sri
SAI RAM
ENGINEERING COLLEGE
An Autonomous Institution
West Tambaram, Chennai - 44
www.sairam.edu.in

Approved by AICTE, New Delhi
Affiliated to Anna University



DEPARTMENT OF
ELECTRONIC INSTRUMENTATION & CONTROL ENGINEERING

REGULATIONS
2024

Academic Year 2024-25 onwards

AUTONOMOUS
CURRICULUM AND
SYLLABUS
I - II
SEMESTERS

SRI SAIRAM ENGINEERING COLLEGE

VISION

To emerge as a "Centre of excellence " offering Technical Education and Research opportunities of very high standards to students, develop the total personality of the individual and instil high levels of discipline and strive to set global standards, making our students technologically superior and ethically stronger, who in turn shall contribute to the advancement of society and humankind.

MISSION

We dedicate and commit ourselves to achieve, sustain and foster unmatched excellence in Technical Education. To this end, we will pursue continuous development of infra-structure and enhance state-of-the-art equipment to provide our students a technologically up-to date and intellectually inspiring environment of learning, research, creativity, innovation and professional activity and inculcate in them ethical and moral values.

Educational Organization Management System (EOMS) Policy

We at Sri Sai Ram Engineering College are committed to empower our students not only to excel academically but also imbibe essential values, enabling them to become exemplary global citizens. We build a better nation by fostering excellence and innovative practices in Engineering, Technology and Management Education. We are dedicated to consistently enhancing our systems, infrastructure and services to meet the needs and expectations of all our stakeholders for sustainable growth

DEPARTMENT OF ELECTRONICS, INSTRUMENTATION & CONTROL ENGINEERING

VISION

To Pioneer in Providing Technical Education and to develop competent Engineers who are technically proficient in the field of Electronics, Instrumentation and Control Engineering, ethically stronger contributing to the growth of Society and Nation.

MISSION

M1 - To Provide excellence in the field of Electronics Instrumentation and Control Engineering by enhancing the students Knowledge in both theoretical and applied foundations.

M2 - To Adapt ICT enabled tools in teaching and enhance lifelong learning through Professional society activities and online learning Platforms

M3 - To Improve the infrastructure and provide conducive environment for learning and research following ethical and moral values

M4 - To Enhance Problem Solving capabilities through Design Project, Industrial Project, Internship and In- house Projects through Sairam Techno Incubation to foster the needs of the society.

CHAIRMAN
Board of Studies
Electronic Instrumentation
and
Control Engineering

AUTONOMOUS CURRICULA AND SYLLABI
Regulations 2024

SEMESTER I

S. NO	COURSE CODE	COURSE TITLE	WEEK HOURS L	T	P	TOTAL CONTACT HOURS	CREDITS
		THEORY					
1	24BSMA101	Matrices and Calculus	3	1	0	4	4
2	24HSEN101	Communicative English	3	0	0	3	3
3	24BSPH101	Engineering Physics	3	0	0	3	3
4	24BSCY101	Engineering Chemistry	3	0	0	3	3
5	24ESCS101	Problem Solving and Programming in C	3	0	0	3	3
6	24ESGE101	Engineering Graphics	1	2	0	3	3
7	24HSTA101	Heritage of Tamils	1	0	0	1	1
		PRACTICALS					
1	24BSPL101	Physics and Chemistry Laboratory	0	0	4	4	2
2	24ESPL101	Programming in C Laboratory	0	0	2	2	1
		VALUE ADDITIONS - I					
1	24ENTP101	Functional Life Skills	1	0	1	2	1
2	24ESID101	Idea Engineering Lab - I	0	0	2	2	1
		ONLINE SUPPLEMENTARY					
		Recommended by BoS					
					Total	30	25

SEMESTER II

S. NO	COURSE CODE	COURSE TITLE	WEEK HOURS L	T	P	TOTAL CONTACT HOURS	CREDITS
		THEORY					
1	24BSMA202	Differential Equations, Complex Variables and Transforms	3	1	0	4	4
2	24HSEN201	Professional English	2	0	0	2	2
3	24BSPH206	Physics for Instrumentation Engineering	3	0	0	3	3
4	24BSCY201	Chemistry for Environment and Sustainability	3	0	0	3	3
5	24EEPC201	Circuit Theory	3	0	0	3	3
6	24HSTA201	Tamils and Technology	1	0	0	1	1
7	24HSNC201	NCC Course Level 1*	2	0	0	2	0
		PRACTICALS					
3	24ESGE102	Engineering Practices Laboratory	0	0	4	4	2
		VALUE ADDITIONS - II					
1	24ENTP201	Digital Dynamics	1	0	1	2	0
2	24ESID201	Idea Engineering Lab - II	0	0	2	2	1
		ONLINE SUPPLEMENTARY					
1	24ESMC201	MS Office (Mandatory - NC)	0	0	0	0	0
		*only for NCC cadets			Total	24	19

Approved by
Academic Council Meeting
No. 8 Dated: 3/9/2024

CHAIRMAN
Board of Studies
Electronic Instrumentation and Control Engineering

AUTONOMOUS CURRICULA AND SYLLABI
Regulations 2024

SEMESTER III

S. NO	COURSE CODE	COURSE TITLE	WEEK HOURS L	T	P	TOTAL CONTACT HOURS	CREDITS
		THEORY					
1	24BSMA302	Linear Algebra and Partial Differential Equations	3	1	0	4	4
2	24IXPC301	Sensors Transducers and Actuators	3	0	0	3	3
3	24IXPC302	Electrical and Electronic Measurements	3	0	0	3	3
4	24ESIT301	Data Structures	3	0	0	3	3
5	24IXPC304	Analog Electronics and Linear Integrated Circuits	3	0	0	3	3
6	24HSMC301	Universal Human Values - II Understanding Harmony	3	0	0	3	3
7	24HSNC301	NCC course Level 2*	3	0	0	3	0
		PRACTICALS					
1	24IXPL301	Electron Devices and Linear Circuits Laboratory	0	0	4	4	2
		VALUE ADDITIONS - III					
1	24IXID301	Innovative Design Lab-I	0	0	2	2	1
2	24IXTP301	Aptitude Skills - I	0	0	2	2	1
		ONLINE SUPPLEMENTARY					
1	24ESMC301	Joy of Computing using Python (Mandatory - NC)	2	0	0	2	0
				Total		32	23

SEMESTER IV

S. NO	COURSE CODE	COURSE TITLE	WEEK HOURS L	T	P	TOTAL CONTACT HOURS	CREDITS
		THEORY					
1	24BSMA403	Statistics and Numerical Methods	3	1	0	4	4
2	24IXPC401	Industrial Measurements and Instrumentation	3	0	0	3	3
3	24EIPC403	Principles of Communication Engineering	3	0	0	3	3
4	24EIPC404	Control Systems	3	1	0	4	3
5	24EIPC401	Electrical Machines and Drives	3	0	0	3	3
6	24MGOExxx	Open Elective - I- Logistics	3	0	0	3	3
7	24HSNC401	NCC Course Level 3*	3	0	0	3	0
		PRACTICALS					
1	24IXPT402	Digital System Design Laboratory with Theory	1	0	4	5	3
2	24IXPL401	Sensors and Instrumentation Laboratory	0	0	4	4	2
		VALUE ADDITIONS - IV					
1	24IXID401	Innovative Design Laboratory - II	0	0	2	2	1
2	24IXTP401	Aptitude Skills - II	0	0	2	2	0
		ONLINE SUPPLEMENTARY					
1	24ESMC401	Data Analytics with Python	2	0	0	2	–
				Total		35	25

*only for NCC cadets

Fundamentals of Supply Chain and Logistics Management

Approved by
Academic Council Meeting
No. 8 Dated: 3/9/2024

CHAIRMAN
Board of Studies
Electronic Instrumentation and Control Engineering

AUTONOMOUS CURRICULA AND SYLLABI
Regulations 2024

SEMESTER V

S. NO	COURSE CODE	COURSE TITLE	WEEK HOURS L	T	P	TOTAL CONTACT HOURS	CREDITS
		THEORY					
1	24EIPC501	Process Dynamics and Control	3	0	0	3	3
2	24IXEL5xx	Professional Elective-I	3	0	0	3	3
3	24IXEL5yy	Professional Elective-II	3	0	0	3	3
4	24xxOE5xx	Open Elective-II#	3	0	0	3	3
5	24HSMG501	Principles of Engineering Management	3	0	0	3	3
6	24MGMC501	Constitution of India	2	0	0	2	0
		PRACTICALS					
1	24EIPL501	Process Control and Simulation Laboratory	0	0	4	4	2
2	24EIPT402	Microprocessor and Microcontroller Laboratory with Theory	1	0	4	5	3
		VALUE ADDITIONS - V					
1	24IXTP501	Skill Enhancement	0	0	2	2	1
2	24IXID501	Prototype Development Lab-I	0	0	2	2	1
		ONLINE SUPPLEMENTARY					
		As Recommended by BOS		Total		30	22

SEMESTER VI

S. NO	COURSE CODE	COURSE TITLE	WEEK HOURS L	T	P	TOTAL CONTACT HOURS	CREDITS
		THEORY					
1	24IXPC601	Industrial Data Networks	3	0	0	3	3
2	24IXPC602	Embedded Systems	3	0	0	3	3
3	24IXEL6xx	Professional Elective –III	3	0	0	3	3
4	24IXEL6yy	Professional Elective –IV	3	0	0	3	3
5	24IXEL6zz	Professional Elective- V	3	0	0	3	3
6	24xxOE9xx	Open Elective -III#	3	0	0	3	3
		PRACTICALS					
1	24IXPL601	Embedded Systems Laboratory	0	0	4	4	2
		VALUE ADDITIONS - VI					
1	24IXTP601	Technical Skill	0	0	2	2	0
2	24IXID601	Prototype Development Lab - II	0	0	2	2	1
		ONLINE SUPPLEMENTARY					
		Recommended by BOS		Total		26	21

Approved by
Academic Council Meeting
No. 8 Dated: 23/09/2024

CHAIRMAN
Board of Studies
Electronic Instrumentation and Control Engineering

AUTONOMOUS CURRICULA AND SYLLABI
Regulations 2024

SEMESTER VII

S. NO	COURSE CODE	COURSE TITLE	WEEK HOURS L	T	P	TOTAL CONTACT HOURS	CREDITS
THEORY							
1	24IXPC701	Logic and Distributed Control Systems	3	0	0	3	3
2	24IXPC702	OT Security for Process Industries	3	0	0	3	3
3	24IXEL7xx	Professional Elective –VI	3	0	0	3	3
5	24XXOE9xx	Open Elective - IV#	3	0	0	3	3
6	24MGEL703	Creative Innovation and Entrepreneurship	2	0	0	2	2
PRACTICALS							
1	24IXPL701	Industrial Automation Laboratory	0	0	4	4	2
2	20IXPJ701	Project Phase-I	0	0	8	8	4
VALUE ADDITIONS - VII							
1	24IXTP701	Company Specific Skills	0	0	2	2	1
ONLINE SUPPLEMENTARY							
		Recommended by BOS					
					Total	28	21

SEMESTER VIII

S. NO	COURSE CODE	COURSE TITLE	WEEK HOURS L	T	P	CONTACT PERIODS	CREDITS
THEORY							
1	24IXEL8xx	Professional Elective - VII	3	0	0	3	3
PRACTICALS							
1	24IXPJ801	Project Work - Phase II	0	0	12	12	6
VALUE ADDITIONS - VIII							
1	24IXIN801	Internship	0	0	9	9	3
					Total	24	12

Approved by
Academic Council Meeting
No. 8 Dated: 03/09/2024

CHAIRMAN
Board of Studies
Electronic Instrumentation and Control Engineering

SEMESTER - I

24BSMA101 - SDG NO. 4	MATRICES AND CALCULUS	L	T	P	CP	C
		3	1	0	4	4

OBJECTIVES:

- To develop a strong foundation in matrix algebra and its applications.
- To introduce the concepts of limits, continuity, differentiation, and optimization for functions of several variables.
- To familiarize students with the principles of vector calculus relevant to engineering problems.
- To provide an understanding of double and triple integrals along with their practical applications.
- To impart knowledge of Fourier series and its significance in engineering analysis.

MODULE I MATRICES 12

Eigenvalues and eigenvectors of a real matrix – Properties of eigenvalues and eigenvectors – Cayley-Hamilton theorem (excluding proof) – Symmetric and orthogonal matrices - Reduce the quadratic to canonical form using orthogonal transformation - Nature of quadratic forms.

MODULE II FUNCTIONS OF SEVERAL VARIABLES 12

Limits, Continuity - Definitions - Partial derivatives - Taylor's series - Jacobians, Maxima and Minima - Method of Lagrange multipliers.

MODULE III VECTOR DIFFERENTIATION 4

Scalar and vector valued functions - Gradient and directional derivatives – Tangent plane - Divergence and curl - Irrotational and solenoidal vector fields - Scalar and vector potentials - Vector identities (without proof).

MODULE IV VECTOR INTEGRATION 8

Line integral over a plane curve - Surface integral - Area of a curved surface - Volume integral - Greens, Gauss divergence and Stoke's theorems - Verification and application in evaluating line, surface and volume integrals. (Cube and Cuboids).

MODULE V MULTIPLE INTEGRALS 12

Double integrals – Change of order of integration – Double integrals in polar coordinates – Area enclosed by plane curves – Change of variables from cartesian to polar coordinates - Triple integrals – Volume of solids (Spherical and Cylindrical polar coordinates).

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/05/2024

Chairman
Board of Studies
Department of Hum...

MODULE VI FOURIER SERIES **12**

Fourier series – Convergence of Fourier series - Half range sine and cosine series – Parseval's theorem.

TOTAL: 60 PERIODS

TEXT BOOKS:

1. Advanced Engineering Mathematics, Erwin Kreyszig, 9th Edition, John Wiley & Sons, 2006.
2. Calculus and Analytic geometry, G.B. Thomas and R.L. Finney, 9th Edition, Pearson, Reprint, 2002.

REFERENCES:

1. Higher Engineering Mathematics, B. V. Ramana, 11th reprint, Tata McGraw-Hill, New Delhi, 2010.
2. Engineering Mathematics for first year, T. Veerarajan, Tata McGraw-Hill, New Delhi, 2008.
3. A text-book of Engineering Mathematics, N.P. Bali and Manish Goyal, 9th Edition, Laxmi Publications, Reprint, 2008.
4. Higher Engineering Mathematics, B. S. Grewal, 40th Edition, Khanna Publishers, New Delhi, 2007.

WEB REFERENCES:

1. https://testbook.com/maths/cayley-hamilton-theorem
2. https://www.iitg.ac.in/rafik/Tutorials/MA-102/2013/lect-10.pdf
3. https://ms.unimelb.edu.au/__data/assets/pdf_file/0007/2516596/functions_sev_var.pdf
4. https://www.mecmath.net/VectorCalculus.pdf
5. https://egyankosh.ac.in/bitstream/123456789/64855/1/Unit4.pdf
6. https://williamsgj.people.charleston.edu/Fourier%20Series.pdf

ONLINE RESOURCES:

1. https://www.youtube.com/watch?v=oJDlt_Xv-mM
2. https://www.youtube.com/watch?v=8h3yY0im5XU
3. https://www.youtube.com/watch?v=LGxE_yZYigI
4. https://www.youtube.com/watch?v=ma1QmE1SH3I
5. https://www.youtube.com/watch?v=QPw4GYz5Unc
6. https://www.youtube.com/watch?v=1mMYaPkXcNI

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/05/2024

S. Narasimhan
Chairman
Board of Studies
Department of Humanities & Sciences

COURSE OUTCOMES:

Upon completion of the course, the student should be able to:

1. Diagonalize the matrix using orthogonal transformation and apply Cayley Hamilton Theorem to find the inverse and integral powers of a square matrix. (K3)
2. Evaluate the limit, examine the continuity and use derivatives to find extreme values for functions of several variables. (K3)
3. Compute the derivatives of scalar and vector point functions. (K3)
4. Use the vector point function to establish the relation between line, surface and volume integrals. (K3)
5. Apply double and triple integrals to find the area and the volume of a region. (K3)
6. Compute Fourier series expansion of a function. (K3)

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	-	-	-	-	-	-	-	-	-	-
CO2	3	-	-	-	-	-	-	-	-	-	-
CO3	3	-	-	-	-	-	-	-	-	-	-
CO4	3	-	-	-	-	-	-	-	-	-	-
CO5	3	-	-	-	-	-	-	-	-	-	-
CO6	3	-	-	-	-	-	-	-	-	-	-

SEMESTER - I

24HSEN101 - SDG NO. 4	COMMUNICATIVE ENGLISH	L	T	P	CP	C
		3	0	0	3	3

OBJECTIVES:

- Develop the basic LSRW skills
- Acquire enhanced knowledge of English grammar
- Improve modern and technical vocabulary
- Enhance the communicative and cognitive skills
- Interpret the texts and write reviews critically

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/05/2024

Chairman
Board of Studies
Department of Humanities & Sciences

MODULE - I COMMUNICATION PROCESS 8

Listening – informal conversations - Speaking – basics in speaking – speaking on given topics & situations – recording speeches and strategies to improve - Reading comprehension – skimming/ scanning/ predicting – question & answers – objective and descriptive answers - Writing – paragraph writing, personal notes - Language Development – parts of speech, prefix, suffix, word formation

MODULE - II LANGUAGE BARRIERS, LEVELS AND CHANNELS 8

Listening –interviews - Speaking – describing a simple process – asking and answering questions - Reading – critical reading – finding key information in a given text – ideation, mind mapping - Writing - dialogue,, instructions – Language Development – regular, irregular verbs, tenses, framing questions,

MODULE - III NARRATION AND SUMMATION 8

Listening - long texts - TED talks - extensive speech on current affairs - Speaking – role plays – asking about routine actions and expressing opinions - Reading- longer texts & making a critical analysis of the given text - Writing – essay (comparative / analytical), jumbled sentences, recommendations - Language Development – writing single sentence definitions, sequence words

MODULE - IV WRITING MECHANICS 7

Listening -debates and discussions – practicing multiple tasks –Speaking - self introduction about friends/ places/ hobbies - Reading -Making inference from the reading passage – Predicting the content of the reading passage - Writing – informal letters, e-mails - accuracy, coherence, brevity – Language Development- single word substitutes, compound words- conditionals

MODULE - V INTERPRETATION SKILLS 7

Listening- popular speeches and presentations - Speaking - impromptu speeches -Reading - articles – magazines - Writing – review writing, channel conversion – bar diagram/ table, poster/ picture interpretation - Language Development – modal verbs, collocations, 21st century vocabulary

MODULE - VI COGENT EXPOSITIONS 7

Listening - Motivational speeches - Speaking - Debates and discussion - Reading - analytical reading - newspapers - Writing - process description - Language Development - voices, sentences expressing purpose, synonyms & antonyms

TOTAL: 45 PERIODS

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 21/05/2019

Chairman
Board of Studies
Department of Humanities & Sciences

TEXT BOOKS:

1. Board of Editors. Using English: A Coursebook for Undergraduate Engineers and Technologists. Orient Blackswan Limited, Hyderabad: 2015.
2. A Course in Technical English, D. Praveen Sam and K.N. Shoba, Cambridge University Press, 2020

REFERENCES:

1. Anderson, Paul V. Technical Communication: A Reader – Centered Approach. Cengage, New Delhi, 2008.
2. Smith-Worthington, Darlene & Sue Jefferson. Technical Writing for Success. Cengage, Mason, USA, 2007.
3. Grussendorf, Marion, English for Presentations, Oxford University Press, Oxford, 2007.
4. Chauhan, Gajendra Singh and et.al.Technical Communication (Latest Revised Edition). Cengage Learning India Pvt. Limited, 2018.

WEB REFERENCES:

1. https://onlinecourses.nptel.ac.in/noc19_hs31/preview
2. https://www.myenglishpages.com/speaking/#google_vignette

ONLINE RESOURCES:

1. https://wwPearson.com/english/catalogue/business-english/technical-english.html
2. https://ww.cambridgeenglish.org/learning-english/free-resources/

OUTCOMES:

Upon completion of the course, the student will be able to:

1. Improve understanding and application of listening, speaking, reading, and writing skills (K2)
2. Demonstrate the ability to write personal notes, clear and coherent paragraphs (K2)
3. Apply analytical skills to write essays, rearrange jumbled sentences, and formulate recommendations (K3)
4. Apply skills to develop email etiquette and construct professional emails and informal letters (K3)
5. Analyze and interpret data to write comprehensive and effective reviews (K3)
6. Enhance vocabulary, improve grammatical accuracy, and confidently engage in debates (K2)

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/05/2024

S. Ramakrishnan
Chairman
Board of Studies
Department of Humanities & Sciences

CO-PO, PSO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	3	-	2	-	-
CO2	-	-	-	-	-	-	-	-	3	-	2	-	-
CO3	-	-	-	-	-	-	-	-	3	-	2	-	-
CO4	-	-	-	-	-	-	-	-	3	-	2	-	-
CO5	-	-	-	-	-	-	-	-	3	-	2	-	-
CO6	-	-	-	-	-	-	-	-	3	-	2	-	-

SEMESTER - I

24BSPH101 - SDG NO. 4,7,9,11	ENGINEERING PHYSICS	L	T	P	CP	C
		3	0	0	3	3

OBJECTIVES:

- To understand the basic concepts of mechanics and its use in engineering applications.
- To understand the concept of waves and lasers and its applications.
- To illustrate the various laws of electromagnetic waves and its applications.
- To apply the concepts of quantum mechanics to engineering studies.
- To understand the basics of crystal for engineering applications.
- To identify the basic principles involved in thermal physics and its applications.

MODULE - I PROPERTIES OF MATTER 8

Elasticity – Hooke's law- Poisson's ratio - Stress - strain diagram and its uses - Twisting couple - shaft - Torsion pendulum: theory and experiment - bending of beams - bending moment - cantilever: theory and experiment - uniform and non-uniform bending: theory and experiment - I-shaped girders.

MODULE - II MECHANICAL WAVES AND LASERS 7

Waves on a string – standing waves – traveling waves – Energy transfer of a wave – Reflection and refraction of light waves – interference –Theory of air wedge and experiment - Theory of laser – characteristics – Spontaneous and stimulated emission – Einstein's coefficients – population inversion – Nd-YAG laser, CO2 laser – Basic applications of lasers in industry.

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/05/2024

S-Ramakrishnan
Chairman
Board of Studies
Department of Humanities & Sciences

MODULE - III ELECTROMAGNETIC WAVES 8

The Maxwell's equations – wave equation; Plane electromagnetic waves in vacuum, Conditions on the wave field – properties of electromagnetic waves: speed, amplitude, phase, orientation and waves in matter – polarization – Producing electromagnetic waves – Energy and momentum in EM - Reflection and transmission of electromagnetic waves from a non-conducting medium vacuum interface for normal incidence.

MODULE - IV BASIC AND APPLIED QUANTUM MECHANICS 7

Black body radiation – Planck's derivation – Electrons and matter waves –The Schrodinger equation (Time dependent and time independent forms) – significance of wave function – Normalization –Free particle – particle in a infinite potential well: 1D, 2D and 3D Boxes; - Barrier penetration and quantum tunneling (qualitative) – Scanning Tunneling Microscope.

MODULE - V CRYSTAL PHYSICS 8

Single crystalline, Polycrystalline and Amorphous materials - single crystals: unit cell, crystal systems, Bravais lattices, directions and planes in a crystal - Miller indices - Interplanar distance - X-Ray diffraction - Calculation of number of atoms per unit cell - Atomic radius - Coordination number – packing. factor for SC, BCC, FCC and HCP structures - Polymorphism and allotropy. Crystal Growth: Chochralski technique - Molecular beam epitaxy.

MODULE - VI THERMAL PHYSICS 7

Transfer of heat energy - Conduction, Convection and Radiation - Thermal conductivity, Forbe's method and Lee's disc method - Conduction through compound media - series and parallel methods - Heat exchangers - Refrigerators and Solar water heaters.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. D.K. Bhattacharya & T.Poonam, "Engineering Physics". Oxford University Press, 2015.
2. R.K. Gaur & S.L. Gupta, "Engineering Physics". Dhanpat Rai Publishers, 2012.
3. B.K. Pandey & S.Chaturvedi, "Engineering Physics", Cengage Learning India, 2017.
4. V. Rajendran, "Engineering Physics", Mc Graw Hill Publications Ltd. New Delhi, 2014.
5. M.N. Avadhanulu And P.G. Kshirsagar, "A textbook of Engineering Physics", S. Chand & Co Ltd. 2016.

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/05/2019

S. Narasimhan
Chairman
Board of Studies
Department of Humanities & Sciences

REFERENCES:

1. D. Halliday, Resnick & J. Walker, "Principles of Physics", Wiley, 2015.
2. R.A. Serway, & J.W. Jewett, "Physics for Scientists and Engineers", Cengage Learning, 2010.
3. N.K. Verma," Physics for Engineers", PHI Learning Private Limited, 2014.
4. P.A. Tipler & G. Mosca "Physics for Scientists and Engineers", W.H.Freeman, 2020.
5. Brijlal and Subramanyam, "Properties of Matter", S. Chand Publishing, 2018.
6. Shatendra Sharma & Jyotsna Sharma, "Engineering Physics", Pearson, 2018.
7. Arthur Beiser. "Concepts of Modern Physics", McGraw-Hill, 6th Edition. 2003.
8. Charles Kittel, "Introduction to Solid State Physics". John Wiely & Sons. 8th Edition, 2005.

OUTCOMES:

Upon completion of the course, the student will be able to:

1. Apply the concepts of stress, torsion, and bending to study the mechanical behavior of structural elements using theoretical and experimental methods. (K3)
2. Analyze wave phenomena and interference to study energy transfer, and evaluate laser principles with their industrial applications. (K4)
3. Examine Maxwell's equations and electromagnetic wave theory to analyze wave propagation, polarization and reflection-transmission phenomena in different media (K4)
4. Utilize the principles of quantum mechanics to explain black body radiation, matter waves, particle confinement in potential wells and tunneling phenomena. (K3)
5. Examine and compare the characteristics of various crystal structures, polymorphic forms, and crystal growth techniques. (K4)
6. Apply the principles of heat transfer to determine the thermal conductivity and explain the role of heat exchangers in refrigerators and solar water heaters. (K3)

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/05/2024

Chairman
Board of Studies
Department of Humanities & Sciences

CO-PO, PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-
CO3	-	3	-	-	-	-	-	-	-	-	-
CO4	3	-	-	-	-	-	-	-	-	-	-
CO5	-	3	-	-	-	-	-	-	-	-	-
CO6	3	-	-	-	-	-	-	-	-	-	-

SEMESTER - I

24BSCY101 - SDG NO. 4,7,8,9,11,12,17	ENGINEERING CHEMISTRY	L	T	P	CP	C
		3	0	0	3	3

OBJECTIVES:

- To enumerate the importance, synthesis, and applications of polymers.
- To impart basic knowledge of chemistry and the principles involved in electrochemistry, energy storage devices, and their commercial applications.
- To familiarize the fundamental laws and concepts of important photophysical and photochemical processes, as well as spectroscopy.
- To explore the fundamental concepts, laws, and principles of thermodynamics, and apply its derivations to optimize and innovate engineering processes across various disciplines.
- To comprehend the chemistry of fuels and combustion, and their applications across various engineering and industrial processes.
- To gain an understanding of the emergence and challenges of nanomaterials and nanotechnology across various scientific and technological disciplines.

MODULE - I POLYMER CHEMISTRY 8

Polymers: Definition, Degree of polymerization, Functionality of monomer, Classification of polymer with examples, Types of polymerization, Mechanism of addition polymerization (Free radical mechanism).

Plastics: Definition and Characteristics - Thermoplastics & Thermosets. Preparation, properties and engineering applications of plastics -PVC, Teflon, Kevlar and Bakelite.

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/Oct/2024

S. Ramakrishnan
Chairman
Board of Studies
Department of Humanities & Sciences

Fibers: Characteristics fibers - Preparation, properties and applications of Nylon and Dacron. Biodegradable polymers & Conducting Polymers: Characteristics, Classification and their applications.

MODULE - II ELECTROCHEMISTRY AND BATTERY TECHNOLOGY 7

Electrochemistry: Types of Cells (Electrochemical and Electrolytic cell) – Redox reaction – Single and Standard electrode potential, Reference electrodes - SHE, Calomel electrode, Measurement of Single Electrode Potential, Nerns't equation (Derivation & Problems), Electrochemical series and its significance.

Batteries: Evolution of batteries – Primary and Secondary battery (Lead acid battery), Next Generation Battery Technology (NGBT) - Solid-state batteries (Lithium-ion), Sodium-ion batteries.

MODULE - III PHOTOCHEMISTRY & SPECTROSCOPY 7

Photochemistry: Laws of photochemistry - Grotthuss–Draper law, Stark-Einstein law and Lambert-Beer Law. Quantum efficiency – determination-Photo processes - Jablonski diagram (Internal Conversion, Intersystem crossing, Fluorescence, Phosphorescence), Chemiluminescence and Photo-sensitization.

Spectroscopy: Electromagnetic spectrum - Absorption of radiation – Electronic, Vibrational and Rotational transitions. UV-visible and IR spectroscopy – principles, instrumentation (Block diagram only).

MODULE - IV CHEMICAL THERMODYNAMICS 8

Terminology of Thermodynamics - Laws of Thermodynamics – I law – Significance – Mathematical formulation and its applications. II law – Need for the II law. Second law: Entropy - entropy change for an ideal gas, reversible and irreversible processes, entropy of phase transitions; Clausius inequality. Helmholtz and Gibbs free energy functions, Criteria of spontaneity, Maxwell relations, Gibbs-Helmholtz equation, Van't Hoff Isotherm and Isochore.

MODULE - V FUELS 8

Fuels: Introduction –Classification of fuels – Coal – Analysis of coal (proximate and ultimate). Carbonization – manufacture of metallurgical coke (Otto Hoffmann method) – Petroleum – manufacture of synthetic petrol (Bergius process). Knocking – Octane number and Cetane number – Gaseous fuels – Compressed natural gas (CNG), Liquefied petroleum gas (LPG). Biofuels – Gobar gas and Biodiesel.

Combustion of fuels: Introduction – Calorific value – Higher and Lower Calorific values- Theoretical calculation of Calorific value(Dulong formula) – Flue gas analysis (ORSAT Method).

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/05/2024

S. Narasaiah 31/05/2024
Chairman
Board of Studies
Department of Humanities & Sciences

MODULE - VI NANOCHEMISTRY **7**

Introduction - Types of nanomaterials - Emergence and challenges in nanotechnology- Synthesis routes for nanomaterials: Bottom-up and top-down approaches - Sol-gel, precipitation, Thermolysis, Laser ablation, Chemical Vapour Deposition (CVD), Electro deposition - Properties of nanomaterials- Mechanical properties, Chemical, Optical, Electrical and Magnetic properties-applications of nanomaterials (Gold nanoparticles as an example). Quantum Dots - concept, properties and applications.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. S. S. Dara and S. S. Umare, "A Textbook of Engineering Chemistry", S. Chand & Company LTD, New Delhi, 2015.
2. P. C. Jain and Monika Jain, "Engineering Chemistry" Dhanpat Rai Publishing Company (P) LTD, New Delhi, 2015.
3. S. Vairam, P. Kalyani and Suba Ramesh, "Engineering Chemistry", Wiley India PVT, LTD, New Delhi, 2013.
4. Ravikrishnan A, 'Engineering Chemistry', Sri Krishna Hitech Publishing Company Pvt. Ltd, New Edition 2024.

REFERENCES:

1. Friedrich Emich, "Engineering Chemistry", Scientific International PVT, LTD, New Delhi,2014.
2. Prasanta Rath, "Engineering Chemistry", Cengage Learning India PVT, LTD, Delhi, 2015.
3. Shikha Agarwal, "Engineering Chemistry-Fundamentals and Applications", Cambridge University Press, Delhi, 2015.
4. Chemistry of Nanomaterials Vol.1 S.S.R Kumar Challa (Ed).
5. Advanced chemistry by Phillip Matthews Vol.1 and Vol.2.
6. Chemistry in Engineering and Technology Vol. 1 & 2, J.C. Kuriacose and J. Rajaram.
7. Applied chemistry - A textbook for Engineers and Technologists by H.D. Gesser.

OUTCOMES:

Upon completion of the course, the student will be able to:

1. Explain the importance of polymers in science and technology, describe their roles in different applications and discuss their impacts on modern advancements. (K3)
2. Recognize the basic principles of electrochemistry and describe their application in battery technologies. (K3)

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/05/2024

S. Ramakrishnan
Chairman
Board of Studies
Department of Humanities & Sciences

3. Apply the concepts of key photophysical and photochemical processes, as well as spectroscopy, to develop and optimize various applications. (K3)
4. Describe the principles of the second law of thermodynamics and its derivations to analyze engineering applications across all disciplines. (K3)
5. Categorize the chemistry of fuels and combustion and their applications at various levels. (K3)
6. Demonstrate the knowledge of nanomaterials, including their properties, behavior, interactions and applications across various disciplines of science and technology. (K3)

CO-PO, MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	2	3	-	-	2	-	-	-	-	-
CO2	3	3	3	-	-	2	-	-	-	-	-
CO3	3	2	3	-	2	-	-	-	-	-	-
CO4	3	2	3	-	-	1	-	-	-	-	-
CO5	3	2	2	-	-	-	-	-	-	-	-
CO6	2	1	2	-	-	-	-	-	-	-	-

SEMESTER - I

24ESCS101 106105171 SDG NO. 4 & 9	PROBLEM SOLVING AND PROGRAMMING IN C	L	T	P	CP	C
		3	0	0	3	3

OBJECTIVES:

- Interpret Mathematical problems using algorithms, flowchart and pseudocode.
- To understand the programming language.
- To develop C Programs using basic Programming Constructs, Loops, Arrays and Strings.
- To develop applications in C using Functions, Pointers and Structures.
- To perform I/O operations and File Handling in C.

MODULE-I INTRODUCTION TO PROGRAMMING AND ALGORITHMS FOR PROBLEM SOLVING 7

Introduction to Problem Solving through programs- Algorithm-Flowchart-Pseudocode-Memory, Variables, Values, Instructions, Programs-

Recommended by
Board of Studies of H&S dept.
Meeting No. 10 Dated: 31/05/2024

Chairman
Board of Studies
Department of Humanities & Sciences

compilation process-Syntax and Semantic Errors- The language of C : Phases of developing a running computer program in C - Character set – Constants – Keywords – Primitive data types –Declaration, Type Conversion.

MODULE - II BASICS OF C PROGRAMMING 7

Sequential- Arithmetic Operators, Relational Operators, Logical Operators, Increment Decrement Operators, Bitwise Operators, Assignment Operators and Expressions, Precedence and Order of Evaluation, selective – If, Else-If, Switch- repetitive structures-for, while, do while, Nested loops, go to, break, continue –Finding maximum of 3 numbers, Unit converters, Interest calculators, multiplication tables, GCD and LCM, Prime number generation.

MODULE - III ARRAYS AND STRINGS 8

Introduction to Arrays: Declaration, Initialization – One Dimensional Array – Example Program: Computing Mean, Median and Mode - Two Dimensional Arrays – Example Program: Matrix Operations (Addition, Scaling, Determinant and Transpose) - String Operations: Length, Compare, Concatenate - Copy – Selection Sort - Linear and Binary Search.

MODULE - IV FUNCTIONS AND POINTERS 9

Introduction to Functions: Function Prototype, Function Definition, Function Call, Built-in Functions (String Functions, Math Functions) – Recursion – Example Program: Computation of Sine Series - Scientific Calculator using Built-in Functions - Binary Search using Recursive Functions - Factorial and Fibonacci Generation - Towers of Hanoi problem - – Pointers – Pointer Operators – Pointer Arithmetic – Arrays and Pointers –Array of Pointers – Example Program: Sorting of Names – Parameter Passing: Pass by Value - Pass by Reference – Example Program: Swapping of Two Numbers using Pass by Reference.

MODULE - V STRUCTURES 7

Structure - Nested Structures – Pointer and Structures – Array of Structures – Example Program using Structures and Pointers – Self Referential Structures – Dynamic Memory Allocation - Singly Linked List – Typedef.

MODULE - VI FILE PROCESSING 7

Files – Types of File Processing: Sequential Access, Random Access – Sequential Access File - Example Program: Finding Average of Numbers stored in Sequential Access File - Random Access File - Example Program: Transaction Processing Using Random Access Files – Command Line Arguments.

TOTAL: 45 PERIODS

Recommended by
Board of Studies of CSE dept.
Meeting No. 7 Dated: 30.5.2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
Sri Sairam Engineering College

TEXT BOOKS:

1. R.G. Dromey, "How to solve it by Computers", Reprint, PHI Publishers, 2011.
2. Reema Thareja, "Programming in C", Oxford University Press, Second Edition, 2018.
3. Kernighan, B.W and Ritchie D.M, "The C Programming language", Second Edition, Pearson Education, 2015.

REFERENCES:

1. Yashwant Kanetkar, "Let us C", 18th Edition, BPB Publications, 2021.
2. Byron Gottfried, "Programming with C", Fourth Edition, Tata McGraw Hill Education, 2018.
3. Paul Deitel and Harvey Deitel, "C How to Program", Seventh edition, Pearson Publication, 2015.
4. Jeri R. Hanly & Elliot B.Koffman, "Problem Solving and Program Design in C", Pearson Education, 2013.
5. Pradip Dey, Manas Ghosh, "Fundamentals of Computing and Programming in C", First Edition, Oxford University Press, 2009.
6. Anita Goel and Ajay Mittal, "Computer Fundamentals and Programming in C", Dorling Kindersley (India) Pvt. Ltd., Pearson Education in South Asia, 2011.
7. Hanly J R & Koffman E.B, "Problem Solving and Programme design in C", Pearson Education, 2009.

WEB REFERENCES:

1. https://www.learn-c.org/
2. https://codeforwin.org/
3. https://www.cprogramming.com

ONLINE RESOURCES:

1. https://www.linuxtopia.org/online_books/programing_books/gnu_c_programming_tutorial
2. https://nptel.ac.in/courses/106105171
3. https://swayam.gov.in/nd1_noc19_cs42/preview

OUTCOMES:

Upon completion of the course, the student will be able to:

1. Solve basic problems using algorithms, flowcharts, and pseudo code.(K3)
2. Analyze the various programming constructs for basic computational problems.(K4)
3. Implement simple C programs using arrays and strings. (K3)

Recommended by
Board of Studies of CSE dept.
Meeting No. 7 Dated: 30.5.2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
Sri Sairam Engineering College

4. Use functions, recursion, and pointers to perform calculations, searching, and sorting.(K3)
5. Apply structures and dynamic memory allocation in handling complex programming tasks.(K3)
6. Organize sequential and random file processing techniques to provide solutions for real-world computational problems.(K4)

CO-PO, PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	2	2
CO2	-	3	-	-	-	-	-	-	-	-	-	2	2
CO3	3	-	-	-	-	-	-	-	-	-	-	1	2
CO4	-	3	-	-	-	-	-	-	-	-	-	2	2
CO5	-	3	-	-	-	-	-	-	-	-	-	2	3
CO6	-	-	3	-	-	-	-	-	-	-	-	3	3

SEMESTER - I

24ESGE101 - SDG NO. 4,6,7,9,12, 14 & 15	ENGINEERING GRAPHICS	L	T	P	CP	C
		1	2	0	3	3

OBJECTIVES:

- To develop in students, graphic skills for communication of concepts, ideas and design of engineering products.
- To visualize the job in three dimensions.
- To have a clear conception and appreciation of the shape, size, proportion and design.
- To expose the student community to existing national standards related to technical drawings.

Recommended by
Board of Studies of Mech dept.
Meeting No. 9 Dated: 21.3.25

CHAIRMAN
Board of Studies
Mechanical Engineering

MODULE - I PLANE CURVES **6+4**

Basic Geometrical constructions, Curves used in engineering practices: Conics – Construction of ellipse, parabola and hyperbola by eccentricity method – Construction of cycloid on Horizontal Surfaces – Drawing of tangents and normal to the above curves.

MODULE - II PROJECTION OF POINTS, LINES AND PLANES **6+4**

Projection of Points (Concept only). Projection (Elevation and Plan) of straight lines, inclined to both reference planes by rotating line method. Projection of plane surfaces, inclined to one of the reference planes by rotating object method.

MODULE - III PROJECTION OF SOLIDS **6+4**

Projection of regular solids (Prisms, Pyramids, Cylinder and cone) in first quadrant, by rotating object method when the axis is inclined to one of the reference planes.

MODULE - IV ORTHOGRAPHIC PROJECTION **6+4**

Orthographic Projection - Principles of orthographic projections, Orthographic projection of objects from pictorial view.

MODULE - V SECTION AND DEVELOPMENT OF LATERAL SURFACE **6+4**

Projection of sectioned solids (Prisms, Pyramids, Cylinder and cone) and true shape of the sections, when the axis of the solid is perpendicular to HP alone and cutting plane inclined to HP only. Development of lateral surfaces of sectioned regular vertical solids (Prisms, Pyramids, Cylinder and Cone) with cutting plane inclined to HP only.

MODULE - VI ISOMETRIC PROJECTIONS **6+4**

Isometric projection – Principle, isometric scale, Isometric views and Isometric projections of truncated solids - Prisms, Pyramids, Cylinder and Cone in simple vertical positions only.

TOTAL: 60 PERIODS

TEXT BOOKS:

1. Venugopal K. and Prabhu Raja V., "Engineering Graphics", New Age International (P) Limited, 2011.
2. T. Jeyapoovan, "Engineering Graphics using AUTOCAD", Vikas Publishing House Pvt Ltd, 7th Edition.

Recommended by
Board of Studies of Mech dept.
Meeting No. 9 Dated: 21.3.25

CHAIRMAN
Board of Studies
Mechanical Engineering

REFERENCES:

1. N S Parthasarathy and Vela Murali, "Engineering Graphics", Oxford University, Press, New Delhi, 2015.
2. Bhatt N.D. and Panchal V.M., "Engineering Drawing", Charotar Publishing House, 50th Edition, 2010.
3. Natrajan K.V., "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2009.

WEB REFERENCES:

1. https://archive.nptel.ac.in/courses/112/102/112102304/

ONLINE RESOURCES:

1. https://nptel.ac.in/courses/105/104/105104148/
2. https://nptel.ac.in/courses/112/103/112103019/

OUTCOMES:

Upon completion of the course, the student will be able to:

1. Perform free hand drawing of conical sections and cycloids. (K3)
2. Sketch the orthographic projection of lines and plane surfaces of rectangle, square, pentagon and Hexagon. (K3)
3. Draw the orthographic projection of regular solids like prism, pyramids, cylinder and cone using change of position method. (K3)
4. Draw plan, elevation and side views for the 3dimensional isometric drawing by using the concepts of orthographic projection. (K3)
5. Draw the section and development of lateral surfaces for the regular solids like Prism, Pyramid, Cylinder and Cone for the axis perpendicular to HP. (K3)
6. Draw the isometric view, projection for regular and truncated solids like Prism, Pyramid, Cylinder and Cone. (K3)

CO-PO, PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	2	-	-	-	3
CO2	3	-	-	-	-	-	-	-	2	-	-	-	3
CO3	3	-	-	-	-	-	-	-	2	-	-	-	3
CO4	3	-	-	-	-	-	-	-	3	-	-	-	3
CO5	3	-	-	-	-	-	-	-	2	-	-	-	3
CO6	3	-	-	-	-	-	-	-	3	-	-	-	3

Recommended by
Board of Studies of Mech dept.
Meeting No. 9 Dated: 21.3.25

CHAIRMAN
Board of Studies
Mechanical Engineering

SEMESTER - I

24HSTA101 - SDG NO. 4	HERITAGE OF TAMILS	L	T	P	CP	C
		1	0	0	1	1

OBJECTIVES:

- Develop interest for classical language and literature to promote Tamil heritage
- Understand the ancient Tamil sculptures, folk and martial arts and contribution of Tamil to the freedom of India

UNIT - I LANGUAGE AND LITERATURE 3

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.

UNIT - II HERITAGE - ROCK ART PAINTINGS TO MODERN ART – SCULPTURE 3

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.

UNIT - III FOLK AND MARTIAL ARTS 3

Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leather puppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils.

UNIT - IV THINAI CONCEPT OF TAMILS 3

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.

UNIT - V CONTRIBUTION OF TAMILS TO INDIAN NATIONAL MOVEMENT AND INDIAN CULTURE 3

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.

TOTAL : 15 PERIODS

TEXT-CUM-REFERENCE BOOKS

1. தமிழக வரலாறு - மக்களும் பண்பாடும் - கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/05/2024

S. Ramakrishnan
Chairman
Board of Studies
Department of Humanities & Sciences

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 Tamils 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 Text Book 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 Book and Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

தமிழர் மரபு

அலகு - I மொழி மற்றும் இலக்கியம்: **3**

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

அலகு - II மரபு - பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை - சிற்பக் கலை: **3**

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

அலகு - III நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுகள்: **3**

தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான் கூத்து, ஒயிலாட்டம், தோல்பாவைக் கூத்து, சிலம்பாட்டம், வளரி, புலியாட்டம், தமிழர்களின்

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/05/2024

S. Ramakrishnan
Chairman
Board of Studies
Department of Humanities & Sciences

விளையாட்டுகள்.

அலகு - IV தமிழர்களின் திறைக் கோட்பாடுகள்: 3

தமிழகத்தின் தாவரங்களும், விலங்குகளும் - தொல்கொப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புறக் கோட்பாடுகள் - தமிழர்கள் போற்றிய அறக்கோட்பாடு - சங்ககாலத்தில் தமிழகத்தில் எழுத்தறிவும், கல்வியும் - சங்ககால நகரங்களும் துறை முகங்களும் - சங்ககாலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி - கடல்கடந்த நாடுகளில் சோழர்களின் வெற்றி.

அலகு - V இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு: 3

இந்திய விடுதலைப்போரில் தமிழர்களின் பங்கு - இந்தியாவின் பிறப்பகுதிகளில் தமிழ்ப் பண்பாட்டின் தாக்கம் - சுயமரியாதை இயக்கம் - இந்திய மருத்துவத்தில், சித்த மருத்துவத்தின் பங்கு - கல்வெட்டுகள், கையெழுத்துப்படிகள் - தமிழ்ப் புத்தகங்களின் அச்சு வரலாறு.

TOTAL : 15 PERIODS

TEXT-CUM-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 Tamils 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 Text Book 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 Book and Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 21/05/2024

S. Ramakrishnan
Chairman
Board of Studies
Department of Humanities & Sciences

OUTCOMES:

Upon completion of the course, the learners will be able to:

1. Understand Tamil as a classical language & Literature (K2)
2. Explore about Tamil Heritage & Sculptures,Role of temples (K2)
3. Appreciate Sports and games of Tamils (K2)
4. Perceive Thinai concept of Tamils (K2)
5. Comprehend Education and literacy during Sangam Age (K2)
6. Understand the Contribution of Tamils to National Movement & Indian Culture (K2)

CO- PO, PSO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	-	-	-	-	-	3	-	-	-	-	3	-	-
CO2	-	-	-	-	-	3	-	-	-	-	3	-	-
CO3	-	-	-	-	-	3	-	-	-	-	3	-	-
CO4	-	-	-	-	-	3	-	-	-	-	3	-	-
CO5	-	-	-	-	-	3	-	-	-	-	3	-	-
CO6	-	-	-	-	-	3	-	-	-	-	3	-	-

SEMESTER - I

24BSPL101 - SDG NO. 6,11,12,17	PHYSICS AND CHEMISTRY LABORATORY	L	T	P	CP	C
		0	0	4	4	2

PHYSICS LABORATORY (Any Five Experiments to be conducted)

OBJECTIVES:

- Demonstrate the wave nature of light using diffraction and interference properties.
- Study the thermal conductivity of a bad conductor.
- Verify experimentally the elastic properties of materials.

Sl.No.	Name of the Experiment
1	(a) Determination of wavelength of Laser (b) Determination of numerical aperture and acceptance angle in an optical fiber. (c) Determination of particle size using laser source.
2	Determination of thermal conductivity of a bad conductor – Lee's Disc method.
3	Determination of Young's modulus by non-uniform bending method.

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/05/2024

S. Namasivayam
Chairman
Board of Studies
Department of Humanities & Sciences

4	Determination of the period of oscillation of a given torsional pendulum for a fixed length and find the rigidity modulus of the wire.
5	Find out the thickness of the given wire by air wedge method.
6	Calculation of lattice cell parameter – X-ray diffraction method.
7	Determination of Planck's constant.
8	Determination of wavelength of mercury spectrum – spectrometer grating.
9	Determination of velocity of sound and compressibility of liquid – Ultrasonic Interferometer.
10	Determination of band gap of a semiconductor.
11	Determination of Hall coefficient by Hall Effect experiment.
12	Determination of solar cell characteristics.

CHEMISTRY LABORATORY (Any Five Experiments to be conducted)

OBJECTIVES:

- To acquaint students with practical knowledge of the basic concepts of chemistry that they will encounter during their studies and in the industry and engineering fields.
- To acquaint students with the determination of the molecular weight of a polymer by viscometry.
- To develop and understand the basic concepts of acidic and basic nature using pH.

Sl.No.	Name of the Experiment
1	Conductometric titration of strong acid vs strong base.
2	Determination of chloride content of water sample by Argentometric method.
3	Determination of strength of acids in a mixture of acids using conductivity meter.
4	Determination of total, temporary & permanent hardness of water by EDTA method.
5	Estimation of iron content of the given solution using potentiometer.
6	Determination of DO content of water sample by Winkler's method.
7	Determination of strength of given hydrochloric acid using pH meter.
8	Estimation of iron content of the water sample using spectrophotometer (1,10- Phenanthroline / thiocyanate method).

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/05/2019

S. Ramakrishnan
Chairman
Board of Studies
Department of Humanities & Sciences

9	Estimation of Sodium and Potassium in the given sample of water using Flame Photometer.
10	Determination of molecular weights of polymer samples using Ostwald's Viscometer.
11	Synthesis of nano-CdS by precipitation. (Demonstration only)
12	Corrosion experiment-weight loss method.

TOTAL: 60 PERIODS

TEXT BOOKS:

1. Engineering Physics Lab, Dr. G. SenthilKumar, VRB publishers. (2019)
2. Engineering Physics Practical, Dr. P. Mani, Dhanam Publications. (2020)

TEXTBOOK:

1. Vogel's Textbook of Quantitative Chemical Analysis (8th edition, 2014).
2. Practical Physical chemistry by B. Viswanathan, P. S. Raghavan (Vivabooks), 2009.
3. Foundation of Experimental Chemistry by Jubaraj B. Baruah, ParikshitGogoi, 2010.

OUTCOMES:

Upon completion of the course, the student will be able to:

1. Apply the principles of elasticity and thermal physics to evaluate the various modulus of elasticity and conductivity of a bad conductor. (K3)
2. Explicate the properties of semiconductors by evaluating the band gap, I-V characteristics of solar cells and Hall effect of the materials. (K3)
3. Describe multiple measurement techniques, including volumetric titrations, conductivity, pH, redox potential and optical density measurements, used to estimate the amount of substance present in a solution. (K3)
4. Apply spectroscopic techniques, viscometry, synthesize nanoparticles, analyze the corrosion behavior of materials in different environments. (K3)

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	3	-	-	2	-	-	-	-	-	2
CO2	3	3	-	-	2	-	-	-	-	-	2
CO3	3	3	-	-	2	-	-	-	-	-	2
Co4	3	3	-	-	2	-	-	-	-	-	2

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/05/2024

S. Ramakrishnan
Chairman
Board of Studies
Department of Humanities & Sciences

SEMESTER - I

24ESPL101 - SDG NO. 4 & 9	PROGRAMMING IN CLABORATORY	L	T	P	CP	C
		0	0	2	2	1

OBJECTIVES:

- To develop programs in C using basic Programming Constructs.
- To develop applications in C using Arrays and Strings.
- To design and implement applications in C using Functions, Structures.
- To develop applications in C using Files.

LIST OF EXPERIMENTS

1. 1. Write a program using I/O statements and expressions.
2. Write programs using decision-making constructs.
3. Write a program to find whether the given year is a leap year or not? (Hint: not every century is a leap. For example 1700, 1800 and 1900 is not a leap year).
4. Write a program to perform the Calculator operations, namely, addition, subtraction, multiplication, division and square of a number.
5. Write a program to check whether a given number is an Armstrong number or not.
6. Write a program to check whether a given number is odd or even.
7. Write a program to find the factorial of a given number.
8. Write a program to find out the average of 4 integers.
9. Write a program to print half pyramid of *.
10. Write a program to display array elements using two dimensional arrays.
11. Write a program to perform swapping using a function.
12. Write a program to display all prime numbers between two intervals using functions.
13. Write a program to solve towers of Hanoi using recursion.
14. Write a program to get the largest element of an array using the function.
15. Write a program to concatenate two strings.
16. Write a program to find the length of String.
17. Write a program to find the frequency of a character in a string.
18. Write a program to store Student Information in Structure and Display it.

Recommended by
Board of Studies of CSE dept.
Meeting No. 7 Dated: 30.5.2024

CHAIRMAN
Board of Studies
Department of Computer Science and Engineering
Sri Sairam Engineering College

19. The annual examination is conducted for 10 students for five subjects. Write a program to read the data and determine the following:

(a) Total marks obtained by each student.

(b) The highest marks in each subject and the marks of the student who secured it.

(c) The student who obtained the highest total marks.

20. Write a program to demonstrate file operations (e.g. count the number of characters, words and lines in a file, replace a specific word with the given word in the same file).

TOTAL: 45 PERIODS

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

1. Stand alone desktops with C compiler 30 Nos. (Or)
   Server with C compiler supporting 30 terminals or more.

OUTCOMES:

Upon completion of the course, the student will be able to:

1. Apply basic constructs,arrays,strings,functions and recursion for executing C programming applications.(K3)
2. Analyze C programs involving pointers and structures.(K4)
3. Evaluate applications using sequential and random access files.(K5)

CO-PO, PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	-	-	-	-	2	-	-	-	-	-	-	1	1
CO2	-	-	3	-	-	-	-	-	-	-	-	1	2
Co3	-	-	3	-	-	-	-	-	-	-	-	2	2

SEMESTER - I

24ENTP101 - SDG NO.4	FUNCTIONAL LIFE SKILLS	L	T	P	CP	C
		1	0	1	2	1

OBJECTIVES:

- Resolve common communication problems
- Observe the effectiveness of nonverbal messages
- Communicate precisely through the digital media
- Understand the importance of empathetic listening
- Explore reading and speaking processes

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/05/2024

C. Ramakrishnan
Chairman
Board of Studies
Department of Humanities & Sciences

MODULE - I LISTENING 5

Techniques of effective listening
Listening and comprehending
Probing questions
Barriers to listening
Reflection from listening

MODULE - II SPEECH MECHANICS 5

Pronunciation
Enunciation
Vocabulary
Fluency
Common errors

MODULE - III READING SKILLS 5

Techniques of effective reading
Kinds of reading
Gathering ideas and information from the text
Evaluating the ideas and information
Interpreting the text from multiple angles

MODULE - IV WRITING ASPECTS 5

Writing process
Effective writing strategies
Different modes of writing
Optimizing the use of resources
Editing

MODULE - V PRESENTATION SKILLS 5

Types of presentations
Nonverbal communication
Understanding the purpose and the audience
Beginning and closure of presentations
Presentation tools and strategies

MODULE - VI ARTICULATION ASPECTS 5

Perform exercises
Slow speeches
Long speeches

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/05/2014

S. Ramasubramanian
Chairman
Board of Studies
Department of Humanities & Sciences

Monologues, Dialogues and Conversation
Feedback necessity

TOTAL : 30 PERIODS

REFERENCES:

1. Sen, Madhuchanda.2010, An Introduction to Critical Thinking, Delhi, Pearson.
2. Effective Communication Skills Strategies for Success. Edited by Nitin Bhatnager and Mamta Bhatnager. 2023, Pearson
3. Technical Communication: Principles and Practice, Meenakshi Raman and Sangeeta Sharma. Oxford University Press, 2015

WEB REFERENCES:

1. https://swayam.gov.in/nd1_noc19_hs31/preview
2. https://www.myenglishpages.com/speaking/#google_vignette

OUTCOMES:

Upon completion of the course, the student will be able to:

1. Employ reading, writing, and listening skills to communicate clearly in academic and professional contexts.
2. Demonstrate confident oral communication and presentation skills using appropriate tools and techniques.
3. Interpret ethical, inclusive, and culturally aware communication in team and societal settings

CO-PO, PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	3	-	2	-	-
CO2	-	-	-	-	-	-	-	-	3	-	2	-	-
CO3	-	-	-	-	-	-	-	3	2	-	2	-	-

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/05/2024

S. Namasivayam
Chairman
Board of Studies
Department of Humanities & Sciences

SEMESTER - I

24ESID101 - SDG NO. 1-17	IDEA ENGINEERING LAB - I	L	T	P	CP	C
		0	0	2	2	1

OBJECTIVES:

- To understand the significance of Millennium Development Goals (MDGs) and Sustainable Development Goals (SDGs) of the United Nations
- To familiarize with SDG targets and indicators
- To identify the Constitutional implementation pertaining to SDGs in Panchayat Raj
- To acquire knowledge of the State and the Central government welfare schemes
- To recognize the role of educational Institutions in community development
- To develop critical thinking skills to address complex societal challenges through an immersion program

MODULE - 1 United Nations Sustainability and the Sustainable Development Agenda 3

- Introduction to Sustainability
- Indian Rural Environment: Necessity and Sustainability
- Millennium Development Goals (MDGs)
- United Nations Sustainable Development Goals (SDGs) & the Agenda
- Overview of the Sustainable Development Goals (SDGs)

MODULE - 2 Universal SDG Targets 4

- SDG Framework
- Key Components
- Pillars of the SDGs
- Targets of the Goals
- Indicators of the Targets

MODULE-3 SDG and Indian Gram Panchayat 3

- Gram Panchayat
- Salient Features of Constitutional Amendments
- Transition from SDGs to LSDGs (Localizing Sustainable Development Goals)

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/05/2024

S. Ramakrishnan
Chairman
Board of Studies
Department of Humanities & Sciences

MODULE-4 Government Schemes 4

- Introduction to State and Central Government Schemes
- Overview of Government Schemes
- Localization and Implementation at the Regional Level
- Impact on Local Communities

MODULE-5 Community Engagement 4

- Key Recommendations of the National Education Policy
- Guidelines for Fostering Social Responsibility
- Awareness
- Participation
- Collaboration

MODULE-6 Idea Generation 12

- Immersion Program
- Focus Areas
- Channelizing Ideas
- Forming Working Teams for SDGs (Sustainable Development Goals)

TOTAL: 30 PERIODS

REFERENCES:

1. Joy Elamon and Ms. Mariamma Sanu George,"The Handbook on Sustainable Development Goals and Gram Panchayats" , State Institute for Rural Development (SIRD).
2. Dr.C.R.Rene Robin, Dr.PA.Shanthi , Dr.B.Thanuja & Dr.V.Yuvaraj ,"Sairam SDG Idea Engineering Lab I", Sri Sairam Engineering College.

WEB REFERENCES

1. UN Sustainable Development Goals
2. https://srmuniv.digimat.in/nptel/courses/video/109106200/L30.html
3. https://avcce.digimat.in/nptel/courses/video/109106200/L26.html

OUTCOMES:

Upon completion of the course, the student will be able to:

1. Analyse and apply the concepts of sustainability,Rural environment,Gram panchayat and various government schemes to design innovative practical solutions that address real life rural challenges. (K2)
2. Compare MDG's,SDG's and LSDG's to analyse village topology and identify specific development targets to propose innovative rural solutions. (K4)

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/05/2024

S. Ramakrishnan
Chairman
Board of Studies
Department of Humanities & Sciences

3. Analyse the attainment levels of SDG's and write a reflective report on local community.(K4)
4. Formulate problem statement based on local community needs and propose innovative ideas for community development. (K4)
5. Perform an individual presentation of field observation by mapping them with relevant SDG's and justify their significance for rural development. (K4)

CO-PO, PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-
CO3	-	1	-	-	-	2	-	-	1	-	2
CO4	-	2	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	1	-	3	2	3	1

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/05/2024

Chairman
Board of Studies
Department of Humanities & Sciences

SEMESTER - II

24BSMA202 - SDG NO. 4	DIFFERENTIAL EQUATIONS, COMPLEX VARIABLES AND TRANSFORMS	L	T	P	CP	C
		3	1	0	4	5

OBJECTIVES:

- The objective of this course is to familiarize the prospective engineers with techniques in Ordinary differential equations, Complex variables, Z - Transforms, Fourier Transforms and Laplace transforms. It aims to equip the students to deal with advanced levels of mathematics and applications that would be essential for their disciplines.

MODULE - I ORDINARY DIFFERENTIAL EQUATIONS 12

Second and Higher order linear differential equations with constant coefficients - Method of variation of Parameters -Homogeneous equation of Euler's and Legendre's type - System of simultaneous first order linear differential equations with constant coefficients.

MODULE- II COMPLEX VARIABLES 9

Analytic functions – Necessary and sufficient conditions for analyticity in cartesian and polar coordinates (without proof)- Properties- Harmonic Conjugate-Construction of analytic functions-Conformal mapping -Bilinear transformation (w=1/z).

MODULE - III COMPLEX INTEGRATION 9

Cauchy- Goursat theorem (without proof) - Cauchy Integral formula (without proof) - Zeroes of Analytic functions - Singularities - Laurent's Series - Residues – Cauchy Residue theorem (without proof).

MODULE - IV LAPLACE TRANSFORMS 12

Existence conditions – Transforms of elementary functions – Transform of Unit step function and Unit impulse function – Basic properties – Shifting theorems – Transforms of derivatives – Transform of Periodic functions - Inverse Laplace Transforms - Initial and Final value theorems – Convolution theorem (excluding proof) –- Application of solution of linear second order ordinary differential equations with constant coefficients.

MODULE - V FOURIER TRANSFORMS 9

Statement of Fourier integral theorem – Fourier transform pair – Fourier sine and cosine transforms – Properties – Convolution theorem – Parseval's identity.

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/oct/2024

S. Namasivayam
Chairman
Board of Studies
Department of Humanities & Sciences

MODULE - VI Z-TRANSFORMS 9

Elementary properties – Inverse Z-transform (using partial fraction and residues) – Initial and final value theorems - Convolution theorem - Formation of difference equations – Solution of difference equations using Z - transform.

TOTAL: 60 PERIODS

TEXT BOOKS:

1. Advanced Engineering Mathematics, Erwin Kreyszig, 9th Edition, John Wiley & Sons, 2006.
2. Advanced Modern Engineering Mathematics, Glyn James, 3rd Edition, Pearson Education, 2010.

REFERENCES:

1. Higher Engineering Mathematics, Dass, H.K., and Er. Rajnish Verma, reprint, S. Chand Private Ltd., 2011.
2. Higher Engineering Mathematics, B.S. Grewal, 44th Edition, Khanna Publishers, 2023.
3. Advanced Engineering Mathematics, Peter V. O'Neil, 7th Edition, Cengage learning, 2012.
4. An Introduction to Ordinary Differential Equations, E. A. Coddington, 1st edition, Prentice Hall, 1961.
5. Higher Engineering Mathematics, Ramana. B.V., 11th reprint, Tata McGraw-Hill, New Delhi, 2010.
6. A Textbook of Engineering Mathematics, N. P. Bali and Manish Goyal, reprint, Laxmi Publications, Reprint 2008.

WEB COURSES:

1. http://archive.nptel.ac.in/courses/111/106/111106100/
2. https://nptel.ac.in/courses/111105134/ (Week-3 Complex Differentiation)
3. https://nptel.ac.in/courses/111105134 (Week 4 Complex Integration)
4. https://archive.nptel.ac.in/courses/111/106/111106111/
5. http://www.nptelvideos.com/course.php?id=90

ONLINE RESOURCES:

1. https://ocw.mit.edu/resources/res-6-007-signals-and-systems-spring-2011/video-lectures/lecture-1-introduction/
2. https://ocw.mit.edu/courses/18-04-complex-variables-with-applications-spring-2018/

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/05/2024

S. Ramakrishnan
Chairman
Board of Studies
Department of Humanities & Sciences

COURSE OUTCOMES:

Upon completion of the course, the student should be able to:

1. Solve ordinary differential equations of second and higher order with constant coefficients, variable coefficients and simultaneous linear differential equations. (CO1) (K3)
2. Construct an analytic function and apply the properties of analytic functions to check for harmonic and orthogonal functions and find the images of circle and straight lines under the standard transformations. (CO2) (K3)
3. Use Cauchy's integral theorem, formula and Cauchy's Residue theorem to evaluate complex and real integrals, find the Taylor's and Laurent's series expansion. (CO3) (K3)
4. Apply Laplace and inverse Laplace Transforms to solve the linear ordinary differential equations with constant coefficients (CO4) (K3)
5. Find Fourier transforms and Fourier sine and cosine transforms of simple functions. (CO5) (K3)
6. Solve difference equations using Z-transforms. (CO6) (K3)

CO-PO, MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	3	2
CO2	3	-	-	-	-	-	-	-	-	-	-	3	2
CO3	3	-	-	-	-	-	-	-	-	-	-	3	2
CO4	3	-	-	-	-	-	-	-	-	-	-	3	3
CO5	3	-	-	-	-	-	-	-	-	-	-	3	3
CO6	3	-	-	-	-	-	-	-	-	-	-	3	3

SEMESTER - II

24HSEN201 - SDG NO.4	PROFESSIONAL ENGLISH	L	T	P	CP	C
		2	0	0	2	2

OBJECTIVES:

- Acquire techniques for comprehending and critically analyzing passages
- Improve the communicative competence
- Enhance learners' ability to read and write complex texts, summaries, definitions and reports
- Write effective formal letters and reports

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/05/2024

S. Narasimhaiah
Chairman
Board of Studies
Department of Humanities & Sciences

- Develop skills for preparing effective job application

MODULE - I EFFECTIVE COMMUNICATION 6

Listening – Listening to conversations – Speaking – making conversations in real life occurrences – Reading - short stories, happenings - Writing – autobiographical writing, preparation of checklist – communication and types of communication – Language Development – subject - verb agreement, commonly confused words – spellings

MODULE - II BASICS OF TECHNICAL WRITING 5

Listening – listening to advertisements and products – Speaking - creating greetings/wishes/excuses and thanks – Reading – articles/novels - Writing - summary of articles, writing modes, formats, compositions - Language Development - reported speech, numerical adjectives

MODULE - III REPORT WRITING 4

Listening – listening to podcasts – Speaking - practicing telephonic conversations – observing and responding. Reading – regular columns of newspapers/magazines - Writing – reports – feasibility, accident, preparation of agenda and minutes – Language Development - cause & effect expressions, discourse markers

MODULE - IV DIVERSE WRITING SKILLS 5

Listening – documentaries, anecdotes and short stories - Speaking – expressing opinions using verbal and non-verbal communication – Reading biographies/autobiographies, travelog, – Writing – formal letters – inviting guests – acceptance/declining letters - Language Development- degrees of comparison – embedded sentences - acronyms and abbreviations

MODULE - V CAREER COMPETENCIES 6

Listening – expert talks – recommending suggestions & solutions – Speaking – Debate- participating in a group discussion – learning GD strategies – Reading – innovations, ideations - Writing – Job application, resume, – proposals – Language Development – verbal analogies – phrasal verbs

MODULE - VI LEXICAL ENHANCEMENT 4

Listening - technical and general talks - Speaking - oral presentation with visual aids - Reading - successful stories/autobiographies - Writing - writing blogs - Language Development - common errors in English, idiomatic expressions

TOTAL: 30 PERIODS

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/05/2019

S. Ramakrishnan
Chairman
Board of Studies
Department of Humanities & Sciences

TEXT BOOKS:

1. Board of editors. Fluency in English: A Course book for Engineering and Technology. Orient Blackswan, Hyderabad 2016.
2. Raman, Meenakshi, Sharma. Sangeeta (2019). Professional English. Oxford University Press.

REFERENCES:

1. Bailey, Stephen. Academic Writing: A Practical Guide for Students. Routledge, New York,2011.
2. Raman, Meenakshi, Sharma, Sangeeta. Technical Communication. Principles and Practice. Oxford University Press, New Delhi, 2014.
3. Muralikrishnan & Mishra Sunitha, Communication skills for Engineers 2nd ed. Pearson, Tamil Nadu, India 2011. P. Kiranmai and Rajeevan, Geetha. Basic Communication Skills, Foundation Books, New Delhi, 2013.
4. Vesilind Aarne P., Public Speaking and Writing Skills for Engineering Students (2nd Ed), Lakeshore press, 2007
5. Richards, Jack C. Interchange Students' Book – 2. Cambridge University Press, New Delhi, 2015.

WEB REFERENCES:

1. https://swayam.gov.in/nd1_noc20_hs21/preview
2. https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/109106122/lec1.pdf
3. https://takelessons.com/en-in/search?service=English&sort=1&utm_

ONLINE RESOURCES:

1. https://www.coursera.org/specializations/improve-english?
2. https://www.fluentu.com/blog/educator-english/business-english-conversation-topics/

OUTCOMES:

Upon completion of the course, the student will be able to:

1. Demonstrate an understanding of various types of communication and prepare effective checklists.(K2)
2. Summarize articles/ write ups (K2)
3. Construct feasibility reports, accident reports, survey reports and meeting minutes (K3)
4. Apply skills to compose official letters with emphasis and clarity (K3)
5. Compose job applications and technical proposals (K3)

Recommended by
Board of Studies of HAS dept.
Meeting No. 6 Dated: 31/05/2021

S. Narasimhaiah
Chairman
Board of Studies
Department of Humanities & Sciences

6. Demonstrate the ability to express opinions in both oral and written forms of communication (K2)

CO-PO, PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	3	-	3	-	-
CO2	-	-	-	-	-	-	-	-	3	-	3	-	-
CO3	-	-	-	-	-	-	-	-	3	-	3	-	-
CO4	-	-	-	-	-	-	-	-	3	-	3	-	-
CO5	-	-	-	-	-	-	-	1	3	-	3	-	-
CO6	-	-	-	-	-	-	-	1	3	-	3	-	-

SEMESTER - II

24BSPH206 - SDG NO. 4, 7, 9	PHYSICS FOR INSTRUMENTATION ENGINEERING	L	T	P	CP	C
		3	0	0	3	3

OBJECTIVES:

- To understand the essential principles of physics of conducting materials.
- To educate the basic principles of semiconductor device and electron transport properties.
- To become proficient in magnetic materials.
- To acquaint the basics of optical materials and their applications
- To acquire the fundamentals of dielectric materials
- To understand the basics of nanoelectronic devices and quantum computing.

MODULE-I ELECTRICAL PROPERTIES OF CONDUCTING MATERIALS 8

Classical free electron theory – Expression for electrical conductivity – Thermal conductivity, expression – Quantum free electron theory:– Fermi-Dirac statistics –Variation of Fermi energy with temperature-Density of energy states-Carrier concentration– Electron in periodic potential – Energy bands in solids – Electron effective mass – Concept of hole.

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/05/2024

S. Narasakshmaiah
Chairman
Board of Studies
Department of Humanities & Sciences

MODULE - II SEMICONDUCTORS AND TRANSPORT PHYSICS 7

Intrinsic Semiconductors – Energy band diagram – direct and indirect band gap semiconductors – Carrier concentration in intrinsic semiconductors – extrinsic semiconductors – Carrier concentration in N-type & P-type semiconductors – Variation of carrier concentration with temperature – Carrier transport in Semiconductors: Drift, mobility and diffusion – Hall effect and devices – Ohmic contacts – Schottky diode (qualitative).

MODULE - III MAGNETIC PROPERTIES OF MATERIALS 8

Magnetic materials: Elementary Ideas of classification of magnetic materials (Dia, Para, Ferro & Ferri) – Domain Theory of Hysteresis– Qualitative ideas of Anti ferromagnetic Ordering – Structure and Properties of Ferrites – Properties of Soft & Hard Magnetic Materials – applications – Magnetic principle in computer data storage - Magnetic hard disc - GMR sensor.

MODULE - IV OPTICAL PROPERTIES OF MATERIALS 7

Classification of optical materials – Optical processes in semiconductors: optical absorption and emission, charge injection and recombination, optical absorption, loss and gain. Optical processes in quantum wells – Optoelectronic devices: light detectors and solar cells – light emitting diode – laser diode –Modulators (Optical Modulator) and switching devices (Coupler) (qualitative) – plasmonics. Organic LED - Optical data storage techniques and devices.

MODULE - V DIELECTRIC PROPERTIES OF MATERIALS 7

Dielectric Polarization and Mechanism (qualitative) - Internal or local Field Clausius Mossotti relation – Dielectric loss Temperature and frequency dependence of dielectric constant – Dielectric breakdown – Measurement of Dielectric constant and loss using Schering bridge – Elementary ideas of Piezoelectric, Ferroelectrics and Pyroelectric materials and its Applications.

MODULE - VI NANODEVICES AND QUANTUM COMPUTING 8

Introduction to nanomaterials – quantum confinement – quantum structures: quantum wells, wires and dots - band gap of nanomaterials. Tunneling – Single electron phenomena: Coulomb blockade – single electron transistor– Quantum system for information processing- Quantum states- classical bits- Quantum bits or qubits-CNOT gate –multiple qubits - Bloch sphere - Quantum sphere- Quantum gate –advantage of quantum computing over classical computing.

TOTAL = 45 PERIODS

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/05/2019

S. Narasaraju
Chairman
Board of Studies
Department of Humanities & Sciences

TEXT BOOKS:

1. S.O.Pillai "Solid State Physics", New Age International Publishers, 5th Edition, New Delhi,2018.
2. S.O.Kasap, "Principles of Electronic Materials and Devices", McGraw-Hill Education, 2017.
3. P.K.Palanisamy, "Physics for Electronics Engineering", Scitech Publication, 2018.
4. S. Salivahanan, A. Rajalakshmi, S. Karthie, N.P.Rajesh, "Physics for Electronics Engineering and Information", McGraw Hill Education, 2018.
5. G.W.Hanson, "Fundamentals of Nanoelectronics", Pearson Education, 2011.

REFERENCES:

1. C.Kittel, "Introduction to Solid State Physics", Wiley, 2018.
2. B. Rogers, J. Adams & S.Pennathur, "Nanotechnology: Understanding Small Systems", CRC Press, third edition, 2017.
3. N.K.Verma, "Physics for Engineers", PHI Learning Private Limited, 2017.
4. H.C.Marcel Van de Voorde, Robert Puers, LivioBaldi, Abstiaan Evan Nooten, "Nanoelectronics: Materials, devices and application", Wiley VCH, 2017.
5. MoriakiWakaki, "Optical materials and Applications" CRC Press, 2018.
6. Umesh K Mishra &Jasprit Singh, "Semiconductor Device Physics and Design", Springer, 2014.
7. W.D.Callister., "Materials Science and Engineering: An introduction", John Wiley & Sons Inc., New York, 6th Edition, 2002.
8. V. Raghavan. "Materials Science and Engineering – A first course", Prentice Hall, New Delhi.

OUTCOMES:

Upon completion of the course, the student will be able to:

1. Explore the basic concepts of free electron theory of solids and apply it to determine the conducting properties, carrier concentration and effective mass of an electron in conductors (K3)
2. Illustrate the various types of semiconductors based on band gap energy and doping, expression for carrier concentration and their variations with temperature (K3)
3. Have an insight into the different types of magnetic materials and magnetic data storage device (K2)
4. Recognize, choose and apply knowledge to develop materials for sensor applications(K3).

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/05/2019

S. Ramakrishnan
Chairman
Board of Studies
Department of Humanities & Sciences

5. Recall the basic knowledge of different types of polarization mechanisms, measurement of dielectric loss, elementary ideas of piezo, pyro, ferroelectric materials and their applications. (K3)
6. Acquire knowledge on quantum structures and apply it for illustrating nanodevices and explore the basics of quantum computing and their applications (K3)

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	3	-	-	-	-	-	-	-	-	-
CO2	3	3	3	-	-	-	-	-	-	-	-
CO3	3	2	2	-	-	-	-	-	-	-	-
CO4	3	3	2	-	-	-	-	-	-	-	-
CO5	3	3	2	-	-	-	-	-	-	-	-
CO6	3	3	2	-	-	-	-	-	-	-	-

SEMESTER - II

24BSCY201 - SDG NO.4	CHEMISTRY FOR ENVIRONMENT AND SUSTAINABILITY	L	T	P	CP	C
		3	0	0	3	3

OBJECTIVES:

- To gain a comprehensive understanding of environmental science, the intricate relationships within ecosystems, and the crucial role of biodiversity conservation..
- To introduce the structure and components of the atmosphere, and provide an overview of the photochemical reactions involved.
- To foster a sound understanding of water quality parameters and water treatment techniques.
- To explore the various components of soil and understand the steps involved in Solid Waste Management (SWM).
- To advocate the benefits of renewable energy and promote awareness of sustainable energy practices..
- To implement the principles of Green Chemistry in alignment with the Sustainable Development Goals (SDGs).

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/05/2024

S. Narasimhan
Chairman
Board of Studies
Department of Humanities & Sciences

MODULE - I INTRODUCTION TO ENVIRONMENTAL SCIENCE 8

Environment: Definition, concept of environment and its components - scope and importance of environment – need for public awareness.

Ecosystem: Structure and functions: Structures - Biotic and Abiotic components. Functions - Energy flow in ecosystems, food chains and food webs. Biogeochemical cycles(C,N&P), Ecological succession.

Biodiversity and its conservation: Definition, types, importance of biodiversity, values and threats to biodiversity. Endangered and endemic species - concept and basis of identification of 'Hotspots'; hotspots in India. Strategies for biodiversity conservation: in situ, ex situ and in vitro conservation.

MODULE - II ATMOSPHERIC CHEMISTRY 7

Atmospheric Chemistry - Composition and structure of atmosphere. Climate change - greenhouse effect - role of greenhouse gases (CO_2, CH_4, N_2O, CFCs) on global warming. Chemical and photochemical reactions in the atmosphere - Formation of smog, PAN, acid rain (causes, effect and control measures). Oxygen and ozone chemistry - Ozone layer depletion (causes, effect and control measures).

MODULE - III WATER CHEMISTRY 8

Importance and scope of water chemistry - Sources and impurities in water - Water Quality Parameters - Specifications as per WHO/BIS standards. Hardness of water, types, numerical problems on hardness of water. Softening of water - Internal treatment (Lime-soda, Phosphate, Calgon, Sodium Aluminate and Colloidal conditioning). External treatments: Ion exchange and Zeolite processes. Municipal water treatment: primary treatment and disinfection (UV, Ozonation, break-point chlorination). Desalination of brackish water by Reverse osmosis. Sustainable water management practices (water recycling and rainwater harvesting)

MODULE - IV SOIL CHEMISTRY AND SOLID WASTE MANAGEMENT 7

Soil Chemistry: Chemical composition of soil, Acid-Base and Ion-Exchange Reactions in Soil, Soil acidity and salinity. Importance of NPK in Soil Fertility. Modern agriculture - Impacts of both excessive and insufficient fertilizer use, alongside the effects of pesticides on soil chemistry and the environment. Sustainable agriculture - Approaches to improve soil salinity (leaching, soil amendments, crop rotation), Design and use of green pesticides for sustainable farming.

Solid Waste Management System: Sources and types of solid waste, Elements of solid waste management, Methods of residential and commercial

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/05/2019

S. Narayanan Raj.
Chairman
Board of Studies
Department of Humanities & Sciences

waste collection, Treatment / processing - Incineration, Composting, Landfill - Dumpsite rehabilitation.

MODULE - V ENERGY AND ENVIRONMENT **8**

Energy sources – Renewable and non-renewable energy sources. Principle and generation of solar energy (solar collectors, photo-voltaic modules, solar ponds), wind energy, geothermal energy; tidal energy, OTEC energy from biomass, biofuels, Nuclear energy - fission and fusion, Nuclear fuels, Nuclear reactor – principles and types. Need for energy efficiency, Energy conservation and sustainability - action strategies for sustainable energy management from a future perspective.

MODULE - VI GREEN CHEMISTRY AND SUSTAINABILITY **7**

Green Chemistry: Introduction to green chemistry, Principles of Green Chemistry (12-principles), the concept of atom economy and chemical synthesis, Important techniques used in green chemistry. Application of green chemistry, viz. replacement of ozone depleting substances including CFCs, manufacture of biodegradable polymers, use of H2O2 as benign bleaching agents in the paper industry.

Sustainable Development: Definition and concepts of sustainable development, Need for sustainable development; Sustainable development goals – 17 SDG goals.

Sustainable practices: Zero waste and R concept, Circular economy, ISO 14000 Series, Material Life cycle assessment and Environmental Impact Assessment.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Benny Joseph, 'Environmental Science and Engineering', Tata McGraw-Hill, New Delhi, 2006.
2. Gilbert M.Masters, 'Introduction to Environmental Engineering and Science', 2nd edition, Pearson Education, 2004.
3. Ravikrishnan A, 'Environmental Science and Engineering', Sri Krishna Hitech Publishing Company Pvt. Ltd, Revised Edition 2020.
4. Vogel's Textbook of Quantitative Chemical Analysis (8th edition,2014).

REFERENCES:

1. Dharmendra S. Sengar, 'Environmental law', Prentice hall of India PVT LTD, New Delhi, 2007.
2. Erach Bharucha, "Textbook of Environmental Studies", Universities Press(I) PVT, LTD, Hyderabad, 2015.

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/05/2024

C. Ramakrishnan
Chairman
Board of Studies
Department of Humanities & Sciences

3. G. Tyler Miller and Scott E. Spoolman, "Environmental Science", Cengage Learning India PVT, LTD, Delhi, 2014.
4. Chemistry for Environmental Engineering, Clair N. Sawyer, Perry L. Mc Carty, Gene F. Parkin, 4th Edition, McGraw-Hill.

OUTCOMES:

Upon completion of the course, the student will be able to:

1. Develop a foundational understanding of environmental science, the interactions within ecosystems, the significance of biodiversity, and the importance of conservation strategies for maintaining ecological balance. (K3)
2. Identify the primary components of the atmosphere, explain the causes of atmospheric pollution, and propose basic strategies to promote a sustainable and clean atmosphere. (K3)
3. Demonstrate complex water quality parameters, and develop innovative methods for producing cost-effective soft water suitable for both industrial use and potable consumption. (K3)
4. Describe the composition and functions of soil components, analyze the sources and characteristics of solid wastes, and evaluate the methods and strategies employed in solid waste management (SWM). (K3)
5. Explain renewable and non-renewable resources, describe various methods for harnessing energy from different sources and explain their applications in various contexts. (K3)
6. Illustrate a comprehensive understanding of green chemistry principles and their alignment with sustainable development goals, preparing them to contribute to environmentally friendly and sustainable practices in their future careers. (K3)

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	2	2	1	-	-	-	-	-	-	-	-
CO2	3	2	2	-	-	-	-	-	-	-	-
CO3	3	2	1	-	-	-	-	-	-	-	-
CO4	2	2	1	-	-	-	-	-	-	-	-
CO5	3	2	2	-	-	-	-	-	-	-	-
CO6	3	3	-	2	1	-	-	-	-	-	-

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/05/2024

Chairman
Board of Studies
Department of Humanities & Sciences

SEMESTER - II

24EEPC201 108105159 SDG NO. 4, 9	CIRCUIT THEORY	L	T	P	CP	C
		2	1	0	3	3

OBJECTIVES:

- To utilize the concepts of basic laws for solving DC circuits.
- To apply the fundamentals of AC circuits to solve mesh current and node voltage method.
- To apply Network theorems to simplify for both DC and AC circuits
- To solve the Transient response of circuits for RL, RC and RLC circuits with DC and AC input.
- To develop the Frequency response for resonance circuits, single tuned circuits.
- To develop the performance parameters of three phase systems and power measurement.

MODULE - I BASIC DC CIRCUITS ANALYSIS 7

Resistive elements - Ohm's law Resistors in series and parallel circuits – Kirchoff's law- Network reduction-Voltage and current division, source transformation – Star Delta conversion - Mesh current and node voltage methods for DC circuits.

MODULE - II FUNDAMENTALS OF AC CIRCUITS ANALYSIS 7

AC Fundamentals- Average and RMS value - Phasor diagram – Power, Power factor and energy – Mesh current and node voltage methods for AC circuits.

MODULE - III NETWORK THEOREMS FOR DC AND AC CIRCUITS 7

Superposition theorem - Thevenin's and Norton's theorems – Maximum power transfer theorem.

MODULE - IV TRANSIENT RESPONSE ANALYSIS 8

R, L and C elements -Transient response of RL, RC and RLC Circuits using Laplace transform for DC input and AC sinusoidal input.

MODULE - V RESONANCE AND COUPLED CIRCUITS 8

Series and parallel resonance–Frequency response – Quality factor and bandwidth - Self and mutual inductance – Coefficient of coupling – Tuned circuits – Single tuned circuits.

Recommended by
Board of Studies of EEE dept.
Meeting No. 6 Dated: 30-5-2024

CHAIRMAN
Board of Studies
Electrical and Electronics Engineering

MODULE - VI THREE PHASE CIRCUITS 8

Three phase 3-wire and 4-wire circuits - Star and delta connection for balanced and un balanced loads– Phasor diagram of voltages and currents – Power and power factor measurement in three phase circuits.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Sudhakar A and Shyam Mohan SP, "Circuits and Network Analysis and Synthesis", McGraw Hill, Fifth Edition, 2015.
2. Charles K.Alexander, Mathew N.O.Sadiku, "Fundamentals of Electric Circuits", Sixth Edition, McGraw Hill, 2022.
3. Joseph A.Edminister, Mahmood Nahri, "Electric circuits", (Schaum's outline series), Mc Graw- Hill, New Delhi, Fifth edition, 2010.

REFERENCES:

1. Chakrabarti A, "Circuits Theory Analysis and Synthesis", Dhanpath Rai & Sons, New Delhi, Seventh edition, 2023.
2. A Nagoor kani, "Circuit Analysis," McGraw Hill, First edition, 2018
3. William H. Hayt, Jack Kemmerly, Steven M. Durbin, "Engineering Circuits Analysis", McGraw Hill, ninth edition, 2020.
4. Mahadevan K ,Chitra C., "Electric Circuits Analysis," Prentice-Hall of India Pvt Ltd., New Delhi, Second edition, 2018.
5. Richard C. Dorf and James A.Svoboda, "Introduction to Electric Circuits", 7th Edition, John Wiley & Sons, Inc., 9th edition, 2015.

WEB RESOURCES:

1. https://www.edx.org/learn/circuits/massachusetts-institute-of-technology-circuits-and- electronics-1-basic-circuit-analysis
2. https://www.circuit-magic.com/
3. https://www.khanacademy.org/science/electrical-engineering/ee-circuit-analysis-topic

ONLINE RESOURCES:

1. https://archive.nptel.ac.in/courses/108/102/108102097/
2. https://archive.nptel.ac.in/courses/108/105/108105159/
3. https://onlinecourses.nptel.ac.in/noc22_ee90/preview

CHAIRMAN
Board of Studies
Electrical and Electronics Engineering

Recommended by
Board of Studies of EEE dept.
Meeting No. 6 Dated: 30.5.2024

OUTCOMES:

Upon completion of the course, the student will be able to:

1. Apply Ohm's law, Kirchhoff's laws, star-delta conversion, mesh current and node voltage methods in DC circuits. (K3)
2. Apply basic AC fundamentals and mesh and nodal techniques in AC circuits. (K3)
3. Make use of Superposition, Thevenin's, Norton's and Maximum power transfer theorems for network reduction of DC and AC circuits. (K3)
4. Solve the transient response of RL, RC, RLC circuits using Laplace transforms for DC and AC inputs. (K3)
5. Develop the frequency response of series and parallel resonance circuits and single tuned circuits. (K3)
6. Develop the performance parameters of three phase three wire and four wire circuits for various conditions. (K3)

CO – PO, PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	2	-	-	-	-	-	-	-	-	2	2
CO2	3	3	2	-	-	-	-	-	-	-	-	2	2
CO3	3	3	2	-	-	-	-	-	-	-	-	2	2
CO4	3	3	2	-	-	-	-	-	-	-	-	2	2
CO5	3	3	2	-	-	-	-	-	-	-	-	2	2
CO6	3	3	2	-	-	-	-	-	-	-	-	2	2

SEMESTER - II

24HSTA201 - SDG NO. 4	TAMILS AND TECHNOLOGY	L	T	P	CP	C
		1	0	0	1	1

OBJECTIVES:

- Understand the techniques that help for a better livelihood
- Identify the methods used for scientific Tamil computing

UNIT - I WEAVING AND CERAMIC TECHNOLOGY 3

Weaving Industry during Sangam Age – Ceramic technology – Black and Red Ware Potteries (BRW) – Graffiti on Potteries.

UNIT - II DESIGN AND CONSTRUCTION TECHNOLOGY 3

Designing and Structural construction House & Designs in household materials during Sangam Age - Building materials and Hero stones of Sangam age – Details of Stage

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/05/2024

S. Narasimhan
Chairman
Board of Studies
Department of Humanities & Sciences

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.

UNIT - III MANUFACTURING TECHNOLOGY 3

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 evidences - Gem stone types described in Silappathikaram.

UNIT - IV AGRICULTURE AND IRRIGATION TECHNOLOGY 3

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.

UNIT - V SCIENTIFIC TAMIL & TAMIL COMPUTING 3

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.

TOTAL : 15 PERIODS

TEXT-CUM-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 Tamils 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 Text Book 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 Book and Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 21/05/2019

S. Ramakrishnan
Chairman
Board of Studies
Department of Humanities & Sciences

தமிழர் மரபு

அலகு - I நெசவு மற்றும் பானைத் தொழில்நுட்பம்: 3

சங்க காலத்தில் நெசவுத் தொழில் - பானைத் தொழில்நுட்பம் - கருப்பு சிவப்பு பாண்டங்கள் - பாண்டங்களில் கீறல் குறியீடுகள்.

அலகு - II வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம்: 3

சங்க காலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் & சங்க கொலத்தில் 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 கொலத்தில் சென்னையில் இந்தோ-சாரோசெனிக் கட்டிடக் கலை.

அலகு - III உற்பத்தித் தொழில் நுட்பம்: 3

கப்பல் கட்டும் கலை -உலோகவியல் - இரும்புத் தொழிற்சாலை - இரும்பை உருக்குதல், எஃகு - வரலாற்றுச் சான்றுகளாக செம்பு மற்றும் தங்க நாணயங்கள் - நாணயங்கள் அச்சடித்தல் - மணி உருவாக்கும் தொழிற்சாலைகள் - கல்மணிகள், கண்ணொடி மணிகள் - சுடுமண் மணிகள் - சங்கு மணிகள் - எலும்புத்துண்டுகள் - தொல்லியல் சான்றுகள் - சிலப்பதிகாரத்தில் மணிகளின் வகைகள்.

அலகு - IV வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில் நுட்பம்: 3

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.

அலகு - V அறிவியல் தமிழ் மற்றும் கணித்தமிழ்: 3

அறிவியல் தமிழின் வளர்ச்சி - கணித்தமிழ் வளர்ச்சி - தமிழ் நூல்களை மின்பதிப்பு செய்தல் - தமிழ் மென்பொருட்கள் உருவாக்கம் - தமிழ் இணையக் கல்விக்கழகம் - தமிழ் மின் நூ லகம் - இணையத்தில் தமிழ் அகராதிகள் - சொற்குவைத் திட்டம்.

TOTAL : 15 PERIODS

TEXT-CUM-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).

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/08/2019

S. Narasimhan
Chairman
Board of Studies
Department of Humanities & Sciences

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 Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book 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 Book and Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

OUTCOMES:

Upon completion of the course, the learners will be able to:

1. Understand Weaving and Ceramic Technology during Sangam Age (K2)
2. Explore about Design & Construction of House and Temples during Sangam Age (K2)
3. Appreciate Manufacturing Technology of Tamils (K2)
4. Perceive Agriculture and Agro-processing during Sangam Age (K2)
5. Comprehend Ancient Knowledge of Ocean & Fisheries(K2)
6. Understand the Scientific Tamil & Tamil Computing (K2)

CO- PO, PSO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	-	-	-	-	3	-	-	-	-	3	-	-
CO2	3	-	-	-	-	3	-	-	-	-	3	-	-
CO3	3	-	-	-	-	3	-	-	-	-	3	-	-
CO4	3	-	-	-	-	3	-	-	-	-	3	-	-
CO5	3	-	-	-	-	3	-	-	-	-	3	-	-
CO6	3	-	-	-	-	3	-	-	-	-	3	-	-

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/05/2024

S. Ramakrishnan
Chairman
Board of Studies
Department of Humanities & Sciences

SEMESTER - II

24HSNC201 - SDG NO. 4	NCC COURSE LEVEL 1	L	T	P	CP	C
		2	0	0	2	0

ARMY WING

NCC GENERAL		**6**
NCC 1	Aims, Objectives & Organization of NCC	1
NCC 2	Incentives	2
NCC 3	Duties of NCC Cadet	1
NCC 4	NCC Camps: Types & Conduct	2
NATIONAL INTEGRATION AND AWARENESS		**4**
NI 1	National Integration: Importance & Necessity	1
NI 2	Factors Affecting National Integration	1
NI 3	Unity in Diversity & Role of NCC in Nation Building	1
NI 4	Threats to National Security	1
PERSONALITY DEVELOPMENT		**7**
PD 1	Self-Awareness, Empathy, Critical & Creative Thinking, Decision Making and Problem Solving	2
PD 2	Communication Skills	3
PD 3	Group Discussion: Stress & Emotions	2
LEADERSHIP		**5**
L 1	Leadership Capsule: Traits, Indicators, Motivation, Moral Values, Honour Code	3
L 2	Case Studies: Shivaji, Jhasi Ki Rani	2
SOCIAL SERVICE AND COMMUNITY DEVELOPMENT		**8**
SS 1	Basics, Rural Development Programmes, NGOs, Contribution of Youth	3
SS 4	Protection of Children and Women Safety	1
SS 5	Road / Rail Travel Safety	1
SS 6	New Initiatives	2
SS 7	Cyber and Mobile Security Awareness	1
	TOTAL: 30 PERIODS	

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/05/2024

Chairman
Board of Studies
Department of Humanities & Sciences

NAVAL WING

NCC GENERAL		**6**
NCC 1	Aims, Objectives & Organization of NCC	1
NCC 2	Incentives	2
NCC 3	Duties of NCC Cadet	1
NCC 4	NCC Camps: Types & Conduct	2
NATIONAL INTEGRATION AND AWARENESS		**4**
NI 1	National Integration: Importance & Necessity	1
NI 2	Factors Affecting National Integration	1
NI 3	Unity in Diversity & Role of NCC in Nation Building	1
NI 4	Threats to National Security	1
PERSONALITY DEVELOPMENT		**7**
PD 1	Self-Awareness, Empathy, Critical & Creative Thinking, Decision Making and Problem Solving	2
PD 2	Communication Skills	3
PD 3	Group Discussion: Stress & Emotions	2
LEADERSHIP		**5**
L 1	Leadership Capsule: Traits, Indicators, Motivation, Moral Values, Honour Code	3
L 2	Case Studies: Shivaji, Jhasi Ki Rani	2
SOCIAL SERVICE AND COMMUNITY DEVELOPMENT		**8**
SS 1	Basics, Rural Development Programmes, NGOs, Contribution of Youth	3
SS 4	Protection of Children and Women Safety	1
SS 5	Road / Rail Travel Safety	1
SS 6	New Initiatives	2
SS 7	Cyber and Mobile Security Awareness	1
		TOTAL: 30 PERIODS

ARMY WING

NCC GENERAL		**6**
NCC 1	Aims, Objectives & Organization of NCC	1
NCC 2	Incentives	2
NCC 3	Duties of NCC Cadet	1
NCC 4	NCC Camps: Types & Conduct	2

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/05/2019

S. Narasimhan
Chairman
Board of Studies
Department of Humanities & Sciences

NATIONAL INTEGRATION AND AWARENESS		**4**
NI 1	National Integration: Importance & Necessity	1
NI 2	Factors Affecting National Integration	1
NI 3	Unity in Diversity & Role of NCC in Nation Building	1
NI 4	Threats to National Security	1
PERSONALITY DEVELOPMENT		**7**
PD 1	Self-Awareness, Empathy, Critical & Creative Thinking, Decision Making and Problem Solving	2
PD 2	Communication Skills	3
PD 3	Group Discussion: Stress & Emotions	2
LEADERSHIP		**5**
L 1	Leadership Capsule: Traits, Indicators, Motivation, Moral Values, Honour Code	3
L 2	Case Studies: Shivaji, Jhasi Ki Rani	2
SOCIAL SERVICE AND COMMUNITY DEVELOPMENT		**8**
SS 1	Basics, Rural Development Programmes, NGOs, Contribution of Youth	3
SS 4	Protection of Children and Women Safety	1
SS 5	Road / Rail Travel Safety	1
SS 6	New Initiatives	2
SS 7	Cyber and Mobile Security Awareness	1
	TOTAL: 30 PERIODS	

SEMESTER - II

24ESGE102 - SDG NO. 4,9,12	ENGINEERING PRACTICES LABORATORY	L	T	P	CP	C
		0	0	4	4	2

OBJECTIVES:

- To provide exposure to the students with hands-on experience on various basic engineering practices in Electrical and Electronics Engineering, Civil and Mechanical Engineering.

ELECTRICAL ENGINEERING PRACTICE

1. Residential house wiring using switches, fuse, indicator, lamp, and energy meter.
2. Fluorescent lamp wiring.
3. Staircase wiring.

Recommended by
Board of Studies of Mech dept.
Meeting No. 9 Dated: 21.3.25

CHAIRMAN
Board of Studies
Mechanical Engineering

4. Measurement of electrical quantities – voltage, current, power & power factor in RLC circuit.
5. Measurement of energy using single phase energy meter.
6. Measurement of resistance to earth of electrical equipment.

ELECTRONICS ENGINEERING PRACTICE

1. Study of Electronic components and equipment – Resistor- colour coding, measurement of AC signal parameter (peak-peak RMS, period, frequency) using CRO.
2. Study of logic gates AND, OR, EX-OR, and NOT.
3. Generation of Clock Signal.
4. Soldering practice – Components, Devices, and Circuits – Using general purpose PCB.
5. Measurement of ripple factor of Half Wave Rectifier and Full Wave Rectifier.
6. Simulation of Half Wave Rectifier and Full Wave Rectifier using TinkerCAD.

CIVIL ENGINEERING PRACTICE

Buildings:

Study of plumbing and carpentry components of residential and industrial buildings, safety aspects.

Plumbing Works:

1. Study of pipeline joints, its location and functions: valves, taps, couplings,unions, reducers, elbows in household fittings.
2. Study of pipe connections requirements for pumps and turbines.
3. Preparation of plumbing line sketches for water supply and sewage works.
4. Hands-on-exercise: Basic pipe connections – Mixed pipe material connection – Pipe connections with different joining components.
5. Demonstration of plumbing requirements of high-rise buildings.

Carpentry using Power Tools only:

1. Study of the joints in roofs, doors, windows and furniture.
2. Hands-on-exercise: Wood work, joints by sawing, planing and cutting.

Recommended by
Board of Studies of Mech dept.
Meeting No. 9 Dated: 21.2.21

CHAIRMAN
Board of Studies
Mechanical Engineering

MECHANICAL ENGINEERING PRACTICE

Welding:

1. Preparation of butt joints, lap joints and T- joints by Shielded metal arc welding.
2. Gas welding demo practice.

Basic Machining:

1. Simple Turning and Taper turning.
2. Drilling Practice.

Sheet Metal Work:

1. Forming & Bending.
2. Model making – Trays and funnels.
3. Different type of joints.

Demonstration on:

1. Smithy operations, upsetting, swaging, setting down and bending. Example – Exercise – Production of hexagonal headed bolt.
2. Foundry operations like mould preparation for gear and step cone pulley.
3. Fitting – Exercises – Preparation of square fitting and V – fitting models.

TOTAL: 60 PERIODS

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

ELECTRICAL

1. Assorted electrical components for house wiring	15 Sets
2. Electrical measuring instruments	10 Sets
3. Study purpose items:	
Iron box, fan and regulator, emergency lamp	1 Each
4. Megger (250V/500V)	1 No
5. Power Tools:	
Range Finder	2 Nos
Digital Live-wire detector	2 Nos

ELECTRONICS

1. Soldering guns	10 Nos
2. Assorted electronic components for making circuits	50 Nos
3. Small PCBs	10 Nos
4. Multimeters	40 Nos

Recommended by
Board of Studies of Mech dept.
Meeting No. 9 Dated 21.3.25

CHAIRMAN
Board of Studies
Mechanical Engineering

CIVIL

1.	Assorted components for plumbing consisting of metallic pipes, plastic pipes, flexible pipes, couplings, unions, elbows, plugs and other fittings.	15 Sets
2.	Carpentry vice (fitted to work bench).	15 Nos
3.	Standard woodworking tools.	15 Sets
4.	Models of industrial trusses, door joints, furniture joints	5 each
5.	Power Tools:	
	Rotary Hammer	2 Nos
	Demolition Hammer	2 Nos
	Circular Saw	2 Nos
	Planner	2 Nos
	Hand Drilling Machine	2 Nos
	Jigsaw	2 Nos

MECHANICAL

1.	Arc welding transformer with cables and holders	5 Nos
2.	Arc welding transformer with cables and holders	5 Nos
3.	Welding accessories like welding shield, chipping hammer, wire brush, etc.	5 Sets
4.	Oxygen and acetylene gas cylinders, blow pipe and other welding outfit.	2 Nos
5.	Centre lathe.	2 Nos
6.	Hearth furnace, anvil and smithy tools.	2 Sets
7.	Moulding table, foundry tools.	2 Sets
8.	Power Tool: Angle Grinder.	2 Nos
9.	Study-purpose items: centrifugal pump, air-conditioner.	1 each

OUTCOMES:

Upon completion of the course, the student will be able to:

1. Infer the values of resistance, peak to peak RMS values, time period, frequency. [K2]
2. Outline the logic gates, rectifier, timer circuits and soldering practices. [K2]
3. Demonstrate the measurement of electrical parameters such as voltage, current, resistance, power and energy. (K2)
4. Illustrate the residential wiring, staircase wiring and fluorescent lamp wiring. [K2]
5. Prepare the carpentry and plumbing joints. (K2)

Recommended by
Board of Studies of Mech dept.
Meeting No. 9 Dated: 21.3.25

CHAIRMAN
Board of Studies
Mechanical Engineering

6. Perform the basic operations of welding, sheet metal work and basic machining operations in Lathe and Drilling (K2)

CO-PO, PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	2	2
CO2	3	-	-	-	-	-	-	-	-	-	-	2	2
CO3	3	-	-	-	-	-	-	-	-	-	-	2	2
CO4	3	-		-	-	-	-	-	-	-	-	2	2
CO5	2	-	-	-	-	-	-	-	-	-	-	2	2
CO6	2	-	-	-	-	-	-	-	-	-	-	2	2

SEMESTER - II

24ENTP201 - SDG NO. 4	DIGITAL DYNAMICS	L	T	P	CP	C
		1	0	1	2	0

OBJECTIVES:

- Explore online communication
- Master computer skills
- Use virtual platforms
- Understand digital ethics and cyber security
- Observe and follow do's and don'ts

MODULE - I DIGITAL CULTURE AND SOCIETY 6

Adapting to changes
Importance in today's digital landscape
Digital identity and self- presentation
Online communities and forums
Digital divide and consequences
Online collaboration and collective action

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/05/2024

Chairman
Board of Studies
Department of Humanities & Sciences

MODULE - II DIGITAL LITERACY AND ACCESS TO TECHNOLOGY 5

Computer skills
Social and cultural understanding
Social media campaign and Activism
Netiquettes
Trending Technologies
Digital tools and softwares

MODULE - III DIGITAL ETHICS 3

Digital ethics and moral panics
The art of protecting secrets
Overview of digital tools

MODULE - IV CYBER SECURITY 3

Threats, vulnerability and consequences
Data making and usage practice
Importance of security

MODULE - V DIGITAL NETWORKING 7

Remote work and virtual teams
Authenticity in digital interactions
Engaging content creation
Tools and and techniques for insightful usage
Balancing online and offline interactions
Collaboration for research and innovation

MODULE - VI BUREAU OF INDIAN STANDARDS (BIS): BASIC CONCEPTS, STANDARDS FORMATION PROCESS AND CHALLENGES 6

Standardization –Basic Concepts:

Basic concepts of standardization
Purpose of standardization, marking and certification of articles and processes
Importance of standards to industry, policy makers, trade, sustainability and innovation

Standards Formulation Process and Challenges:

Objectives, roles and functions of BIS, Bureau of Indian Standards Act, ISO/ IEC Directives
WTO Good Practices for Standardization

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/05/24

S. Lakshmanan
Chairman
Board of Studies
Department of Humanities & Sciences

World of Standards:
Important Indian and International Standards

TOTAL: 30 PERIODS

REFERENCES:

1. Communication Skills and Soft Skills – an Integrated Approach. Edited by E. Sureshkumar, P. Sreehari and J. Savithri, Pearson.
2. Silvia. P.J.2007. How to Read a Lot. Washington DC, American Psychological Association.

WEB REFERENCES:

1. https://swayam.gov.in/nd1_noc19_hs31/preview
2. https://www.sscnasscom.com/ssc-projects/capacity-building-and-development/training/gbfs/

OUTCOMES:

Upon completion of the course, the student will be able to:

1. Apply online communication techniques and collaboration skills (K3)
2. Enumerate the principles of digital ethics in online interactions (K2)
3. Understand the importance of Bureau of Indian Standards (BIS). (K2)

CO-PO, PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	3	-	2	-	-
CO2	-	-	-	-	-	-	-	-	3	-	2	-	-
CO3	-	-	-	-	-	-	-	3	2	-	2	-	-

SEMESTER - II

24ESID201 SDG NO. 1-17	IDEA ENGINEERING LAB - II	L	T	P	CP	C
		0	0	2	2	1

OBJECTIVES:

To impart the basics of technologies that are used to identify sustainable solutions to societal problems

- To Provide awareness on Printed Circuit Board (PCB) design using ORCAD software.
- To Raise awareness of at least three Internet of Things (IoT) projects and their applications.

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/05/2024

S. Ramesh Babu
Chairman
Board of Studies
Department of Humanities & Sciences

- To Upskill learners through practical experience with 3D printing and scanning technologies.
- To prepare the learners to correctly align the ideas to SDGs
- To comprehensive knowledge on entrepreneurship and effective idea presentation techniques.
- To evaluate the effectiveness of SDGs and implementation strategy

MODULE-1 BASICS OF DESIGN THINKING IN ELECTRICAL AND ELECTRONIC COMPONENTS 4

- Awareness Session on Basics of Design Thinking
- Study of Active & Passive Electronic Components
- Study of Basic AC & DC Electrical Circuits
- Study of Microprocessors & Microcontrollers
- Demonstration of Arduino Board, ESP 32 Board ,Raspberry Pi Board & PCB design software-Eagle
- Demonstration of PCB design using the software's Orcad, Eagle etc.

MODULE-2 EMBEDDED SYSTEMS, IOT AND ROBOTICS 4

- Study of sensors and transducers
- Study of embedded protocols, IOT Protocols & Embedded C
- Demonstration of Robotics & Drone models

MODULE-3 BASICS OF MECHANICAL ENGINEERING 4

- Study of Mechanical Modeling using Fusion 360
- Demonstration of 3D Scanner,3D Printer, Laser Cutter &RD Works Software
- Study of Slicer Software & Master Cam Software

MODULE 4 ALIGNMENT AND MAPPING OF IDEAS 4

- **Project Title:** Justification of SDG and SAP - Problem Statement & Solution

MODULE-5 ENTREPRENEURSHIP SKILLS 4

- Startup Awareness
- Entrepreneurship Opportunities
- Mock Presentations
- Innovation
- Novelty
- Feasibility
- Presentation Skills

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/05/2024

S. Ramakrishnan
Chairman
Board of Studies
Department of Humanities & Sciences

MODULE-6 SCOUT for SDG IDEATHON 12

Evaluation Stages:

- First Round
- Second Round
- Idea Pitching

TOTAL: 30 PERIODS

REFERENCES:

1. D P Kothari and I.J Nagarath, "Basic Electrical and Electronics Engineering", McGraw Hill Education (India) Private Limited, Second Edition, 2020
2. S.K. Bhattacharya, Basic Electrical Engineering, Pearson Education, 2019
3. Elements of Mechanical Engineering by N M Bhatt and J R Mehta, Mahajan Publishing House
4. Basic Mechanical Engineering by Pravin Kumar, Pearson Education
5. Robert Barton, Patrick Grossetete, David Hanes, Jerome Henry, Gonzalo Salgueiro, "IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things", CISCO Press, 2017.
6. R.K.Mittal and I.J.Nagrath, Robotics and Control, Tata McGraw Hill, New Delhi, 4th Reprint, 2017.
7. JohnJ.Craig, Introduction to Robotics Mechanics and Control, Third edition, Pearson Education, 2009.

WEB REFERENCES

1. https://onlinecourses.nptel.ac.in/noc24_ee112/preview
2. https://onlinecourses.nptel.ac.in/noc24_cs115/preview
3. https://onlinecourses.nptel.ac.in/noc24_me104/preview
4. https://onlinecourses.nptel.ac.in/noc24_me88/preview

OUTCOMES:

Upon completion of the course, the student will be able to:

1. Gain the knowledge on Basic Electronics & Electrical Circuits (K2)
2. Understand the Basics of Embedded systems,IOT & Robotics (K1)
3. Explore the the Basics of Mechanical Modeling (K2)
4. Interpret the mapping of SDGs to ideas. (K4)
5. Illustrate the ideas in the Ideathon event emphatically .(K4)

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/05/2024

S. Ramakrishnan
Chairman
Board of Studies
Department of Humanities & Sciences

CO-PO, PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	1	-	-	-	1	-	-	-	-	-	-
CO2	1	-	-	-	1	-	-	-	-	-	-
CO3	1	-	-	-	1	-	-	-	-	-	-
CO4	-	-	-	-	-	2	-	3	3	-	2
CO5	-	-	-	-	-	3	-	3	3	-	2

Recommended by
Board of Studies of H+S dept.
Meeting No. 6 Dated: 31/05/2019

S. Narasakrishnan
Chairman
Board of Studies
Department of Humanities & Sciences

SEMESTER - III

24BSMA302 - SDG NO. 4	LINEAR ALGEBRA AND PARTIAL DIFFERENTIAL EQUATIONS	L	T	P	CP	C
		3	1	0	4	4

OBJECTIVES:

- The aim of this course is to impart knowledge in the concepts of linear algebra as a prerequisite for the recent thrust areas of technological advancement.
- To know the importance of partial differential equations in modelling various engineering problems.

MODULE - I VECTOR SPACES 9

Vectors and Linear combinations-Vector spaces (Definitions and examples) – Subspaces (Definitions and examples) – Linear independence and linear dependence – Bases and dimensions.

MODULE - II LINEAR TRANSFORMATION 12

Linear transformation - Null and range spaces - Dimension theorem (Statement only) - Matrix of a linear transformation

MODULE - III INNER PRODUCT SPACES 9

Inner product - Norm - Gram Schmidt orthogonalization process(Statement only) - QR decomposition.

MODULE - IV ADJOINT OPERATORS 9

Adjoint of a linear operator - Least square approximation- Normal and self - adjoint operators.

MODULE - V SOLUTIONS OF FIRST ORDER PARTIAL DIFFERENTIAL EQUATIONS 12

Solutions of standard types of first order partial differential equations - Singular integral - Complete integral – Lagrange's linear equation.

MODULE - VI SOLUTIONS OF LINEAR PARTIAL DIFFERENTIAL EQUATIONS 9

Linear homogeneous and non-homogeneous partial differential equations of second and higher order with constant coefficients.

TOTAL: 60 PERIODS

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/08/2024

S. Narasakeshwary
Chairman
Board of Studies
Department of Humanities & Sciences

TEXT BOOKS:

1. Linear Algebra, Friedberg A.H., Insel A.J. and Spence L., 4th Edition, Pearson, 2018.
2. Transforms and Partial Differential Equation, Veerarajan T., 3rd Edition, Tata McGraw Hill Education Pvt. Ltd., , New Delhi, 2016.

REFERENCES:

1. Linear Algebra and its applications, Strang G., 4th Edition, Thomson (Brooks/Cole), New Delhi, 2005.
2. Linear Algebra and its Applications ,Lay D. C. , 5th Edition, Pearson Education, 2015.
3. Linear Algebra – A Geometric Approach, Kumaresan S.,1st Edition, Prentice Hall of India, New Delhi, Reprint, 2010.
4. Higher Engineering Mathematics, B. V. Ramana, 11th reprint, Tata McGraw-Hill, New Delhi, 2010.
5. A text-book of Engineering Mathematics, N.P. Bali and Manish Goyal, Reprint, Laxmi Publications, 2008.
6. Higher Engineering Mathematics, B. S. Grewal, 40th Edition, Khanna Publishers, New Delhi, 2007.

WEB RESOURCES

1. https://nptel.ac.in/courses/111/103/111103021/
2. https://ocw.mit.edu/courses/18-06-linear-algebra-spring-2010/download/
3. https://theengineeringmaths.com/wp-content/uploads/2016/02/Partial-differential-equations.pdf

ONLINE RESOURCES:

1. https://www.khanacademy.org/math/linear-algebra
2. https://ocw.mit.edu/courses/mathematics/18-06-linear-algebra-spring-2010/video-lectures/
3. https://freevideolectures.com/course/3244/advanced-engineering-mathematics
4. https://ocw.mit.edu/courses/18-06-linear-algebra-spring-2010/video_galleries/video-lectures/
5. https://nptel.ac.in/courses/111106135

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/05/2019

S. Ramakrishnan
Chairman
Board of Studies
Department of Humanities & Sciences

COURSE OUTCOMES

Upon completion of the course, the student should be able to:

1. Determine the bases and dimension of vector spaces and subspaces. (K3)
2. Analyse the matrix of a linear transformation for its rank and nullity. (K4)
3. Construct an orthonormal basis using Gram-Schmidt orthogonalization process and use it for QR decomposition of a matrix. (K3)
4. Determine the adjoint of a linear operator and solve least squares approximation problems. (K3)
5. Classify the solutions of first order partial differential equations including Lagrange's linear equation. (K4)
6. Solve linear homogeneous and non-homogeneous partial differential equations of second and higher order with constant coefficients. (K3)

CO – PO, PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	3	3
CO2	-	3	-	-	-	-	-	-	-	-	-	3	3
CO3	3	-	-	-	-	-	-	-	-	-	-	2	2
CO4	3	-	-	-	-	-	-	-	-	-	-	3	3
CO5	-	3	-	-	-	-	-	-	-	-	-	2	2
CO6	3	-	-	-	-	-	-	-	-	-	-	3	3

SEMESTER - III

24IXPC301 108108147 SDG NO. 4, 9	SENSORS TRANSDUCERS AND ACTUATORS	L	T	P	CP	C
		3	0	0	3	3

OBJECTIVES:

- To introduce the fundamentals of measurement systems including units, standards, calibration procedures, and error analysis.
- To provide a clear understanding of the characteristics and selection criteria of sensors, transducers, and transmitters used in instrumentation systems.

Recommended by
Board of Studies of EICE dept.
Meeting No. 7 Dated 1/2/2025

CHAIRMAN
Board of Studies
Electronic Instrumentation and Control Engineering

- To explore the working principles, construction, and applications of variable resistance transducers such as strain gauges, potentiometers, and thermistors.
- To develop knowledge on inductive transducers like LVDT and variable reluctance sensors for displacement and position measurements.
- To explain the design and application of capacitive transducers used in proximity sensing, pressure measurement, and acoustic applications.
- To apply knowledge of various actuators (pneumatic, electro-pneumatic, hydraulic, mechanical) for real-time control and automation systems.

MODULE - I SCIENCE OF MEASUREMENTS **7**

Units and standards – Static calibration – Classification of errors, Limiting error and probable error – Error analysis – Statistical methods – Odds and uncertainty.

MODULE - II SENSOR AND TRANSDUCER CHARACTERISTICS **7**

Difference between sensor, transmitter and transducer - Primary measuring elements - selection and characteristics: Range; resolution, Sensitivity, error, repeatability, linearity and accuracy, impedance, backlash, Response time, Dead band.

MODULE - III VARIABLE RESISTANCE TRANSDUCERS **7**

Principle of operation, construction details, characteristics and applications of potentiometer, strain gauge, resistance thermometer, Thermistor, hot-wire anemometer

MODULE - IV VARIABLE INDUCTANCE TRANSDUCERS **8**

Inductive transducers: – Principle of operation, construction details, characteristics and applications of LVDT, Induction potentiometer – Variable reluctance transducers..

MODULE - V VARIABLE CAPACITANCE TRANSDUCERS **8**

Principle of operation, construction details, characteristics of capacitive transducers – Different types & Signal Conditioning – Applications:- Capacitor microphone, Capacitive pressure sensor, Proximity sensor.

Recommended by
Board of Studies of ETCE dept.
Meeting No. 4 Dated: 1/3/2025

CHAIRMAN
Board of Studies
Electronic Instrumentation and Control Engineering

MODULE - VI ACTUATORS *8*

Definition, types and selection of Actuators; linear; rotary; Logical and Continuous Actuators, Pneumatic actuator- Electro-Pneumatic actuator; cylinder, rotary actuators, Mechanical actuation system: Hydraulic actuator.

TOTAL : 45 PERIODS

TEXT BOOKS:

1. Sawney A K , "A course in electrical and Electronic Measurements and Instrumentation', 12th edition, Dhanpat Rai & Co, New Delhi, 2023.
2. Mechatronics: Electronic Control Systems in Mechanical and Electrical Engineering 4th Edition ,Pearson Education,2010.

REFERENCES:

1. Patranabis D, "Sensors & Transducers", 2nd Edition, PHI, New Delhi, 2010.
2. Ernest O Doebelin, "Measurement Systems – Applications and Design", Tata McGraw-Hill, 2009.
3. Patranabis D, "Sensors & Transducers", 2nd Edition, PHI, New Delhi, 2010.
4. John P. Bentley, Principles of Measurement Systems, III Edition, Pearson Education, 2000.
5. J.B.Gupta, 'A Course in Electronic and Electrical Measurements and Instrumentation',S.K.Kataria& Sons, Delhi, 2003.

WEB REFERENCES:

1. https://swayam.gov.in/nd1_noc19_ee41/preview

ONLINE RESOURCES:

1. https://instrumentationtools.com/tag/sensors-and-transducers-nptel pdf/
2. https://edurev.in/courses/24749_Electrical-and-Electronic-Measurements

OUTCOMES

Upon completion of the course, the student will be able to:

1. Apply concepts of units, calibration, and error analysis to evaluate the performance of measurement systems. (K3)
2. Utilize sensor and transducer characteristics to select appropriate components for specific measurement applications. (K3)

Recommended by
Board of Studies of EICE dept.
Meeting No. 7 Dated: 1/2/2025

CHAIRMAN
Board of Studies
Electronic Instrumentation and Control Engineering

3. Implement variable resistance transducers like strain gauges and thermistors in basic sensing applications. (K3)
4. Demonstrate the use of inductive transducers such as LVDTs and variable reluctance devices in displacement measurement. (K3)
5. Employ capacitive transducers for sensing proximity, pressure, and sound in practical scenarios. (K3)
6. Select and operate suitable actuators for linear and rotary motion in automation or control systems. (K3)

CO – PO, PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	-	2	-	-	-	-	-	-	-	3	2
CO2	3	2	-	-	-	-	-	-	-	-	-	2	3
CO3	3	-	-	-	2	-	-	-	-	-	-	2	3
CO4	3	-	-	-	2	-	-	-	-	-	-	2	3
CO5	3	-	-	-	2	2	-	-	-	-	-	2	3
CO6	3	-	3	-	2	2	-	-	-	-	-	2	3

SEMESTER - III

24IXPC302 108105153 SDG NO. 4, 9	ELECTRICAL AND ELECTRONIC MEASUREMENTS	L	T	P	CP	C
		3	0	0	3	3

OBJECTIVES:

- To Understand the construction, working principles, and types of analog measuring instruments such as ammeters and voltmeters.
- To Learn various techniques for measuring electrical parameters like resistance, inductance, and capacitance using bridge methods.
- To Gain knowledge of potentiometers and instrument transformers and their applications in precise measurements
- To Explore the features and functionalities of analog and digital measuring instruments including microprocessor-based systems.
- To Study the operating principles and applications of different types of oscilloscopes and signal generators.
- To Familiarize with modern display and recording devices including digital displays, chart recorders, and IoT-enabled systems.

Recommended by
Board of Studies of EICE dept.
Meeting No. 7 Dated: 1/3/2025

CHAIRMAN
Board of Studies
Electronic Instrumentation and Control Engineering

MODULE - I MODULE I MEASUREMENT OF VOLTAGE AND CURRENT 7

Types of ammeters and voltmeters: PMMC Instruments, Moving Iron Instruments, Dynamometer type Instruments -Extension of meters-Errors and compensation.

MODULE - II MEASUREMENT OF RESISTANCE, INDUCTANCE AND CAPACITANCE 7

Resistance measurement: Wheatstone bridge, Kelvin double bridge and Megger Measurement of Inductance: Maxwell-Wein Bridge and Hay's bridge - Measurement of Capacitance: Schering Bridge.

MODULE - III POTENTIOMETERS AND INSTRUMENT TRANSFORMERS 7

D.C. Potentiometers: Student type potentiometer, Precision potentiometer -A.C. Potentiometers: Polar and coordinate types – Applications – Instrument Transformer: Construction and theory of Current Transformers and Potential Transformers.

MODULE - IV ANALOG AND DIGITAL INSTRUMENTS 8

Wave analyzers – Q meter – Digital voltmeter and multimeter – Microprocessor based DMM with auto ranging and self diagnostic features – Frequency & time period measurement, digital LCR meter

MODULE - V OSCILLOSCOPES AND SIGNAL GENERATORS 8

CRT-Block diagram and working -Dual beam and Dual Trace CROs-Analog storage and Digital storage oscilloscope-Standard Signal generator-Laboratory type signal generator-AF Sine and Square wave generators-Function generator-Square and Pulse generator

MODULE - VI DISPLAY AND RECORDING DEVICES 8

Digital Display system-LED - LCD-Seven segment display--Strip chart recorders-XY recorders-Magnetic recorder- Digital XY Recorder - Plotter - Dot Matrix display - Digital memory waveform recorder-IOT enabled Recorder.

TOTAL : 45 PERIODS

TEXT BOOKS:

1. E.W. Golding & F.C. Widdis, "Electrical Measurements and Measuring Instruments", Reem publications Pvt, Ltd, Third Edition, 2011.
2. Kalsi, H.S.," Electronic Instrumentation", Tata McGraw-Hill, New Delhi, 3rd Edition, 2017
3. Albert D Helfrick, William D Cooper, "Modern Electronic Instrumentation & Measurement Techniques", Pearson India Education, 2015.

Recommended by
Board of Studies of EICE dept.
Meeting No. 1 Dated: 1/3/25

CHAIRMAN
Board of Studies
Electronic Instrumentation and Control Engineering

REFERENCE BOOKS:

1. David.A.Bell, Electronic Instrumentation and Measurements, Oxford University Press, Third Edition, 2013.
2. Sawhney, A.K., "A Course in Electrical & Electronic Measurements & Instrumentation", Dhanpat Rai and Co, New Delhi, 2015
3. Carr, J.J., "Elements of Electronic Instrumentation and Measurement", Pearson India Education, New Delhi, 2011
4. Northrop, R.B., "Introduction to Instrumentation and Measurements", TaylorElectronic Measurements and Instrumentation Dr.R.S.Sedha S.Chand & Company Pvt.Ltd.

WEB RESOURCES:

1. https://www.youtube.com/watch?v=_53fed6mpLs

ONLINE RESOURCES:

1. https://npteLac.in/courses/108105153

OUTCOMES

Upon completion of the course, the student will be able to:

1. Describe various analog measuring instruments, and demonstrate their usage for voltage and current measurement(K3)
2. Apply bridge methods to measure resistance, inductance, and capacitance accurately.(K3)
3. Explain types of potentiometers and instrument transformers with their applications in precise electrical measurements.(K2)
4. Illustrate the working of analog and digital measuring instruments including wave analyzers, digital multimeters, and microprocessor-based systems with auto-ranging and diagnostic features.(K2)
5. Operate various types of oscilloscopes and signal generators, and interpret their applications in waveform analysis and signal testing.(K3)
6. Demonstrate the functionalities of modern display and recording devices including digital displays, recorders, and IoT-enabled systems used for electrical measurements.(K3)

Recommended by
Board of Studies of EICE dept.
Meeting No. 7 Dated: 1/2/2025

CHAIRMAN
Board of Studies
Electronic Instrumentation and Control Engineering

CO – PO, PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	-	1	2	-	-	-	-	1	-	3	2
CO2	3	3	-	3	2	-	-	-	-	1	-	3	2
CO3	3	2	-	2	2	-	-	-	-	1	-	3	2
CO4	2	2	-	2	3	-	-	-	-	1	-	3	2
CO5	2	2	-	3	3	-	-	-	-	1	-	3	2
CO6	2	2	-	2	3	-	-	-	-	1	-	3	2

SEMESTER - III

24ESIT301 106105225 SDG NO. 4	DATA STRUCTURES	L	T	P	CP	C
		3	0	0	3	3

OBJECTIVES:

- To Understand and analyze fundamental data structures and their applications.
- To Implement linear data structures such as arrays, linked lists, stacks, and queues.
- To Design and apply non-linear data structures like trees and graphs.
- To Evaluate and implement searching and sorting algorithms efficiently.
- To Apply advanced structures such as heaps and hashing for optimized data access.

MODULE - I LINEAR DATA STRUCTURES - LIST 7

Algorithm Analysis: Running time calculations; Abstract Data Types (ADTs); List ADT: Array implementation of lists – Linked lists – Circular linked lists – Doubly linked lists – Applications of Lists: Polynomial manipulation.

MODULE - II LINEAR DATA STRUCTURES – STACKS AND QUEUES 7

Stack ADT: Stack model – Implementation of stacks – Applications: Balancing symbols – Infix to postfix conversion – Evaluating postfix expressions – Function calls; Queue ADT: Queue model – Array implementation of queues – Applications of queues.

Recommended by
Board of Studies of IT dept.
Meeting No 7 Dated: 9.4.2025

CHAIRMAN
Board of Studies
Information Technology

MODULE - III NON-LINEAR DATA STRUCTURES - TREES 7

Preliminaries; Binary trees: Expression trees; Binary search tree ADT; AVL trees; Tree traversals; BTrees; Priority Queues: Binary heap.

MODULE - VI NON LINEAR DATA STRUCTURES - GRAPHS 8

Graph Algorithms: Definitions – Representation of graphs; Graph Traversals: Breadth-first traversal – Depth-first traversal; Topological sort – Shortest-Path Algorithms: Dijkstra's algorithm – All-pairs shortest path

MODULE - V SEARCHING AND SORTING SORTING TECHNIQUES 8

Sorting: Quick Sort – Shell Sort – Heap Sort – Bucket Sort – Merge Sort– Radix Sort – Analysis of Sorting Algorithms – Searching: Linear Search – Binary Search – Applications.

MODULE - VI HASHING TECHNIQUES AND HEAP 8

Hash Functions – Open Hashing – Separate Chaining, Closed Hashing – Linear Probing, Quadratic Probing, Double Hashing, Random Probing, Rehashing, Extendible Hashing. Heaps – Min/Max Heaps – Operation on Heap – Binary Heaps

TOTAL : 45 PERIODS

TEXT BOOKS:

1. 1M. A. Weiss, "Data Structures and Algorithm Analysis in C", Pearson Education Asia, 2002.
2. Richard F Gilberg, Behrouz A Forouzan, "Data Structures: A Pseudocode Approach withC", 2ndEdition, Cengage India, 2007.
3. Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, "Computer Algorithms/ C++", Second Edition, Universities Press, 2007.

REFERENCES:

1. Thomas H. Cormen, Charles E. Leiserson, Ronald L.Rivest, Clifford Stein, "Introduction to Algorithms", Second Edition, Mcgraw Hill, 2002.
2. Stephen G. Kochan, "Programming in C", 3rd edition, Pearson Education.
3. Aho, Hopcroft and Ullman, "Data Structures and Algorithms", Pearson Education,1983
4. Yashavant Kanetkar," Data Structures Through C", BPB, ISBN-13:978-9388511391,2019.

WEB REFERENCES :

1. https://www.programiz.com/dsa
2. http://masterraghu.com/subjects/Datastructures/ebooks/remathareja.pdf

Recommended by
Board of Studies of IT dept.
Meeting No. 7 Dated: 9.4.2025

CHAIRMAN
Board of Studies
Information Technology

3. https://archive.nptel.ac.in/noc/courses/noc18/SEM1/noc18-cs25/
4. https://nptel.ac.in/courses/106102064

OUTCOMES

Upon completion of the course, the student will be able to:

1. Build the ability to evaluate algorithm performance and implement linear data structures such as arrays and linked lists.(K3)
2. Utilize stack and queue operations to construct solutions for expression evaluation and control flow in programming. (K3)
3. Classify different types of tree structures and construct appropriate trees like BSTs, AVL trees, and heaps for various applications.(K4)
4. Inspect graphical representations to evaluate traversal and shortest-path algorithms for solving real-world problems.(K4)
5. Experiment various sorting and searching algorithms to determine their efficiency in data organization tasks.(K3)
6. Examine and apply hashing techniques and heap structures to enhance data access and retrieval performance.(K4)

CO – PO, PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	2	-	-	-	-	-	-	-	-	2	2	2
CO2	2	-	2	-	-	-	-	-	-	-	-	2	2
CO3	-	3	3	-	-	-	-	-	-	-	2	3	3
CO4	2	3	-	-	-	-	-	-	-	-	2	2	2
CO5	-	2	3	-	-	-	-	-	-	-	3	2	2
CO6	2	3	2	-	-	-	-	-	-	-	2	2	2

Recommended by
Board of Studies of IT dept.
Meeting No. 7 Dated: 9.4.2025

CHAIRMAN
Board of Studies
Information Technology

SEMESTER - III

24IXPC304 108105158 SDG NO. 4, 9	ANALOG ELECTRONICS AND LINEAR INTEGRATED CIRCUITS	L	T	P	CP	C
		3	0	0	3	3

OBJECTIVES:

- To Understand the structure, working principles, and characteristics of diodes and transistors.
- To Analyze the operation and characteristics of thyristors and field-effect transistors (FETs).
- To Comprehend the classification and design aspects of power amplifiers including their efficiency.
- To Examine the functioning and advantages of feedback amplifiers and various types of oscillators.
- To Explore the characteristics and applications of operational amplifier (Op-Amp) based circuits.
- To Investigate the functionality and practical uses of specialized ICs such as 555 timers, voltage regulators, and function generators.

MODULE - I OPERATION AND CHARACTERISTICS OF DIODES & TRANSISTOR 7

PN junction diode: structure, operation and V-I characteristics, diffusion and transition capacitance-Zener diode characteristics- Zener Reverse characteristics – Zener as regulator.BJT: NPN and PNP transistors, Characteristics of CE, CB and CC amplifier configurations, Biasing circuits.

MODULE - II OPERATION AND CHARACTERISTICS OF THYRISTORS & FET 8

Thyristors: SCR and UJT. FET: JFET and MOSFET, Characteristics of CS, CG and CD amplifier configurations – Small signal analysis of FET amplifier.

MODULE - III OPERATION AND CHARACTERISTICS OF POWER DEVICES 7

Classification of Power amplifiers:- Class A, B, AB and C Power amplifiers- Push-Pull amplifiers - Design of power output, efficiency and cross-over distortion.

MODULE - IV OPERATION OF FEEDBACK AMPLIFIERS AND DIFFERENT TYPES OF OSCILLATORS 8

Advantages of negative feedback – voltage / current, series, Shunt feedback –positive feedback – Condition for oscillations, phase shift – Wien Bridge, Hartley, Colpitts and Crystal oscillators.

Recommended by
Board of Studies of EICE Dept.
Meeting No. 7 Dated: 11/3/2025

CHAIRMAN
Board of Studies
Electronic Instrumentation and Control Engineering

MODULE - V WORKING OF DIFFERENT OP-AMP CIRCUITS AND ITS APPLICATIONS 7

Ideal op-amp - Block diagram - Inverting and Non-inverting Amplifiers, differential amplifier - differentiator and integrator - Instrumentation amplifier – comparator - Astable and Monostable multivibrator - clippers, clampers, peak detector, S/H circuit.

MODULE - VI OPERATION AND THE APPLICATIONS OF SPECIAL ICS LIKE TIMERS AND REGULATOR CIRCUITS 8

555 Timer - Functional block diagram – Astable and Monostable mode – applications. LM317, 723 Variable voltage regulators, switching regulator - IC8038 function generator IC.

TOTAL : 45 PERIODS

TEXT BOOKS:

1. David A. Bell, "Electronic devices and circuits", Oxford University higher education, 5th edition2008.
2. Sedra and Smith, "Microelectronic circuits", 7th Ed., Oxford University Press.
3. D. Roy Choudhary, Sheil B. Jani, 'Linear Integrated Circuits', II edition, New Age, 2003.

REFERENCE BOOKS:

1. Thomas L.Floyd, "Electronic devices" Conventional current version, Pearson prentice hall, 10th Edition, 2017.
2. Robert L.Boylestad, "Electronic devices and circuit theory", 2002
3. Prof. K.R.K. Rao, IITM. NPTEL video lectures on "Electronics for Analog Signal Processing I".
4. Jacob Millman, Christos C.Halkias, "Integrated Electronics - Analog and Digital circuits system", McGraw Hill, 2003.
5. Floyd ,Buchla, "Fundamentals of Analog Circuits", Pearson,2013.

WEB RESOURCES:

1. http://www.freebookcentre.net/electronics-ebooks-download/Electronic-Devices-and-Circuits-(PDF-313p).html
2. https://www.researchgate.net/publication/275408225_Electronic_Devices_and_Circuits
3. https:// www. tutorialspoint. com/ l inear_integrated_circuits_applications/linear_integrated_circuits_applications_comparators.htm

Recommended by
Board of Studies of EIC dept.
Meeting No. 7 Dated: 11/3/2025

CHAIRMAN
Board of Studies
Electronic Instrumentation and Control Engineering

ONLINE RESOURCES:

1. https://nptel.ac.in/courses/117103063/
2. https://www.coursera.org/specializations/semiconductor-devices/
3. https://nptel.ac.in/courses/108108111/

OUTCOMES

Upon completion of the course, the student will be able to:

1. Explain the working principles and characteristics of diodes and BJTs in various configurations such as CE, CB, and CC.(K2)
2. Interpret the characteristics and operations of thyristors (SCR, UJT) and FETs (JFET, MOSFET) in different amplifier setups.(K2)
3. Classify and Apply different types of power amplifiers (Class A, B, AB, C) and the concepts to calculate power output and efficiency.(K3)
4. Illustrate and Apply the operation of feedback amplifiers and common oscillator types, and the conditions for sustained oscillation.(K3)
5. Apply operational amplifier concepts to basic analog circuits such as amplifiers, comparators, integrators, and multivibrators.(K3)
6. Use timer ICs (555), voltage regulators (LM317, 723), and function generator ICs (IC8038) in simple electronic applications.(K3)

CO – PO, PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	-	-	-	-	-	-	-	-	-	3	2
CO2	3	2	-	-	-	-	-	-	-	-	-	3	2
CO3	3	2	-	-	2	-	-	-	-	-	-	3	2
CO4	3	2	-	2	-	-	-	-	-	-	-	3	2
CO5	3	-	-	-	-	-	-	-	-	-	-	3	2
CO6	3	-	-	-	-	-	-	-	-	-	-	3	2

Recommended by
Board of Studies of EIC dept.
Meeting No. 7 Dated: 1/3/25

CHAIRMAN
Board of Studies
Electronic Instrumentation and Control Engineering

8. Understanding the needs of Self ('I') and 'Body' - happiness and physical facility
9. Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer)
10. Understanding the characteristics and activities of 'I' and harmony in 'I'
11. Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail

Include practice sessions to discuss the role others have played in making material goods available to me. Identifying from one's own life. Differentiate between prosperity and accumulation. Discuss program for ensuring health vs dealing with disease

MODULE - III UNDERSTANDING HARMONY IN THE FAMILY AND SOCIETY HARMONY IN HUMAN-HUMAN RELATIONSHIP (6+2)

12. Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values ofrelationship
13. Understanding the meaning of Trust; Difference between intention and competence
14. Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship
15. Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals

Include practice sessions to reflect on relationships in family, hostel and institute as extended family, real life examples, teacher-student relationship, goal of education etc. Gratitude as a universal value in relationships. Discuss with scenarios. Elicit examples from students' lives.

MODULE - IV UNDERSTANDING HARMONY IN THE NATURE AND EXISTENCE - WHOLE EXISTENCE AS COEXISTENCE (6+2)

16. Understanding the harmony in the Nature
17. Interconnectedness and mutual fulfilment among the four orders of nature- recyclability and self- regulation in nature
18. Understanding Existence as Co-existence of mutually interacting units in all-pervasive space
19. Holistic perception of harmony at all levels of existence.

Include practice sessions to discuss human being as cause of imbalance in nature (film "Home" can be used), pollution, depletion ofresources and role of technology etc.

Recommended by
Board of Studies of EICE dept.
Meeting No. 7 Dated: 1/3/25

CHAIRMAN
Board of Studies
Electronic Instrumentation and Control Engineering

MODULE - V IMPLICATIONS OF THE ABOVE HOLISTIC UNDERSTANDING OF HARMONY ON PROFESSIONAL ETHICS (4+4)

20. Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family
21. Natural acceptance of human values
22. Definitiveness of Ethical Human Conduct
23. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order
24. Competence in professional ethics: a. Ability to utilize the professional competence for augmenting universal human order b. Ability to identify the scope and characteristics of people- friendly and eco friendly production systems, c. Ability to identify and develop appropriate technologies and management patterns for above production systems.

MODULE - VI UNIVERSAL HUMAN ORDER (4+3)

25. Programs to ensure Sanyam and Health
26. Case studies of typical holistic technologies, management models and production systems
27. Strategy for transition from the present state to Universal Human Order: a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers b. At the level of society: as mutually enriching institutions and organizations
28. Sum up.

Include practice Exercises and Case Studies will be taken up in Practice (tutorial) Sessions eg. to discuss the conduct as an engineer or scientist etc

TOTAL : 45 PERIODS

TEXT BOOKS:

1. A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G P Bagaria, 3rd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1.

REFERENCES:

1. AICTE Model Curriculum in Humanities, Social Science and Management Courses (UG Engineering & Technology)Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
2. Human Values,A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi
5. Small is Beautiful - E. F Schumacher.

Recommended by
Board of Studies of EICE dept.
Meeting No. 7 Dated: 1/3/2025

CHAIRMAN
Board of Studies
Electronic Instrumentation and Control Engineering

6. Slow is Beautiful - Cecile Andrews
7. Economy of Permanence-JC Kumarappa
8. Bharat Mein Angreji Raj- Pandit Sunderlal
9. Rediscovering India- by Dharampal
10. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi
11. India Wins Freedom - Maulana Abdul Kalam Azad
12. Vivekananda- Romain Rolland (English)
13. Gandhi - Romain Rolland (English)

OUTCOMES

Upon completion of the course, the student will be able to:

1. Express the harmony of relationship among human being, family, society, nature and existence with right understanding and right feeling. (K2)
2. Develop the responsibility of handling problems by finding holistic and sustainable solutions based on the natural acceptance for maintaining mutual human relationships. (K2)
3. Develop a holistic perspective of life based on self-exploration about self, family, society and nature/existence. (K2)
4. Elucidate a critical ability for dedicative commitment towards human values, relationships and society. (K2)
5. Implement the process of verification and validation of learning in daily life. (K2)
6. Develop self reflection, commitment and courage to act in life challenging situations. (K2)

CO – PO, PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	-	-	-	-	-	3	3	2	-	-	3
CO2	-	1	-	-	-	3	3	2	-	-	-
CO3	-	-	3	-	-	3	3	2	-	-	-
CO4	-	-	-	-	-	3	3	2	-	2	3
CO5	-	-	-	-	-	3	3	-	-	-	3
CO6	-	-	-	-	-	3	3	-	-	3	2

Recommended by
Board of Studies of EICE dept.
Meeting No. 7 Dated: 1/3/2025

CHAIRMAN
Board of Studies
Electronic Instrumentation and Control Engineering

SEMESTER - III

24HSNC301 - SDG NO. 4	NCC COURSE LEVEL 2	L	T	P	CP	C
		3	0	0	3	0

ARMY WING

PERSONALITY DEVELOPMENT 9

PD 3 Group Discussion: Change your mindset, Time Management, Social Skills 6

PD 5 Public Speaking 3

LEADERSHIP 7

L 2 Case Studies: APJ Abdul Kalam, Deepa Malik, Maharana Pratap, N Narayan Murty, Ratan Tata, Rabindra Nath Tagore, Role of NCC cadets in 1965 7

DISASTER MANAGEMENT 13

DM 1 Disaster Management Capsule: Organisation, Types of Disasters, Essential Services, Assistance, Civil Defence Organisation 3

DM 2 Initiative Training, Organising Skills, Do's & Don't's, Natural Disasters, Man Made Disasters 9

DM 3 Fire Service & Fire Fighting 1

ENVIRONMENTAL AWARENESS & CONSERVATION 3

EA 1 Environmental Awareness and Conservation 3

GENERAL AWARENESS 4

GA 1 General Knowledge 4

ARMED FORCES 6

AF 1 Armed Forces, Army, CAPF, Police 6

ADVENTURE 1

AD 1 Introduction to Adventure Activities 1

BORDER & COASTAL AREAS 2

BCA 1 History, Geography & Topography of Border/Coastal areas 2

TOTAL: 45 PERIODS

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/05/24

S. Nanasaheb May
Chairman
Board of Studies
Department of Humanities & Sciences

NAVAL WING

PERSONALITY DEVELOPMENT		**9**
PD 3	Group Discussion: Change your mindset, Time Management, Social Skills	6
PD 5	Public Speaking	3
LEADERSHIP 7		
L 2	Case Studies: APJ Abdul Kalam, Deepa Malik, Maharana Pratap, N Narayan Murty, Ratan Tata, Rabindra Nath Tagore, Role of NCC cadets in 1965	7
DISASTER MANAGEMENT		**13**
DM 1	Disaster Management Capsule: Organisation, Types of Disasters, Essential Services, Assistance, Civil Defence Organisation	3
DM 2	Initiative Training, Organising Skills, Do's & Don't's, Natural Disasters, Man Made Disasters	9
DM 3	Fire Service & Fire Fighting	1
ENVIRONMENTAL AWARENESS & CONSERVATION		**3**
EA 1	Environmental Awareness and Conservation	3
GENERAL AWARENESS		**4**
GA 1	General Knowledge	4
NAVAL ORIENTATION 6		
AF 1	Armed Forces and Navy Capsule	3
EEZ 1	EEZ Maritime Security and ICG	3
ADVENTURE	**1**	
AD 1	Introduction to Adventure Activities	1
BORDER & COASTAL AREAS		**2**
BCA 1	History, Geography & Topography of Border/Coastal areas	2
		TOTAL: 45 PERIODS

AIR FORCE WING

PERSONALITY DEVELOPMENT 9		
PD 3	Group Discussion: Change your mindset, Time Management, Social Skills	6
PD 5	Public Speaking	3

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/05/2019

S. Narasimhan
Chairman
Board of Studies
Department of Humanities & Sciences

LEADERSHIP	**7**	
L 2	Case Studies: APJ Abdul Kalam, Deepa Malik, Maharana Pratap, N Narayan Murty, Ratan Tata, Rabindra Nath Tagore, Role of NCC cadets in 1965	7
DISASTER MANAGEMENT		**13**
DM 1	Disaster Management Capsule: Organisation, Types of Disasters, Essential Services, Assistance, Civil Defence Organisation	3
DM 2	Initiative Training, Organising Skills, Do's & Don't's, Natural Disasters, Man Made Disasters	9
DM 3	Fire Service & Fire Fighting	1
ENVIRONMENTAL AWARENESS & CONSERVATION		**3**
EA 1	Environmental Awareness and Conservation	3
GENERAL AWARENESS		**4**
GA 1	General Knowledge	4
GENERAL SERVICE KNOWLEDGE		**6**
GSK 1	Armed Forces & IAF Capsule	2
GSK 2	Modes of Entry in IAF, Civil Aviation	2
GSK 3	Aircrafts - Types, Capabilities & Role	2
ADVENTURE	**1**	
AD 1	Introduction to Adventure Actitivities	1
BORDER & COASTAL AREAS		**2**
BCA 1	History, Geography & Topography of Border/Coastal areas	2
	TOTAL :45 PERIODS	

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/05/2019

S. Narasakrishnan
Chairman
Board of Studies
Department of Humanities & Sciences

SEMESTER - III

24IXPL301 - SDG NO. 4	ELECTRON DEVICES AND LINEAR CIRCUITS LABORATORY	L	T	P	CP	C
		0	0	4	4	2

OBJECTIVES:

- To enable students to study and analyze the characteristics and applications of various types of diodes, including Zener and LED.
- To provide hands-on experience in the analysis and operation of transistors such as Bipolar Junction Transistors (BJT) and Unijunction Transistors (UJT).
- To offer practical exposure to the characteristics and functioning of Field Effect Transistors (FETs), including JFET and MOSFET.
- To develop students' understanding of operational amplifiers (Op-Amps) and their applications in analog signal processing.
- To familiarize students with the working principles and practical implementation of voltage regulators in electronic circuits.

MODULE I BASIC STATISTICS 9

LIST OF EXPERIMENTS:

1. Simulation and experimental Characterization of Semiconductor diode & Zener diode.
2. Simulation and experimental Characterization of a NPN Transistor under common emitter configurations.
3. Simulation and experimental Characterization of JFET
4. Simulation of Single-Phase half-wave and full wave rectifiers.
5. Simulation and experimental Characterization of UJT and generation of sawtooth waveforms.
6. Characteristics of SCR and application as a controlled rectifier
7. Implement Inverting and Non Inverting amplifier using Op Amp 741/LM324 IC and determine the gain.
8. Implement Integrator and Differentiator using Op-Amp 741/LM324 IC and observe output waveform.
9. Implement Comparator using Op Amp 741/LM324 IC and observe output waveform.
10. Design Astable multi vibrator using IC 555 timer and determine its frequency of operation
11. Design of Instrumentation amplifier using 3 opamp configuration.
12. Design of Signal Conditioning Circuits.

TOTAL : 60 PERIODS

Recommended by
Board of Studies of EICE dept.
Meeting No. 7 Dated: 11/3/2025

CHAIRMAN
Board of Studies
Electronic Instrumentation and Control Engineering

LIST OF EQUIPMENTS FOR A BATCH OF 30 STUDENTS:

Sl No.	Name of the equipment / component	Quantity	Remarks
1.	Zener diodes	30	
2.	Dual,(0-30V)variable Power Supply	10	
3.	CRO	10	30MHz
4.	Digital Multimeter	10	
5.	Function Generator	10	1MHz
6.	IC Tester (Analog)	2	
7.	Breadboard	30	
8.	IC741/ICNE555	10	
9.	Transistor-BC 107	30	
10.	Diodes,IN4001	30	
11.	Capacitors	(Sufficient Quantity)	
12.	JFET semiconductor device -BFW10	30	
13.	Resistors	(Sufficient Quantity)	
14.	Single Strand Wire	(Sufficient Quantity)	
15.	Consumables	(Sufficient Quantity)	

OUTCOMES

Upon completion of the course, the student will be able to:

1. To Apply electronic equipment and simulation tools to analyze circuit behavior(K3)
2. To Analyze the characteristics of semiconductor devices through simulation (K4)
3. To Simulate and analyze basic electronic circuits (K4)
4. To Simulate and evaluate the characteristics of operational amplifiers(K4)
5. To Design, simulate, and analyze operational amplifier applications(K4)
6. Design and evaluate voltage regulator circuits through simulation (K3)

CO – PO, PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	2	3	3	1	1	-	-	-	-	2	2	2
CO2	3	-	3	3	-	1	-	-	-	-	2	3	2
CO3	2	2	2	2	2	-	-	-	-	-	-	3	3
CO4	3	-	3	3	3	2	-	-	-	3	1	3	3
CO5	2	2	2	1	2	-	-	-	-	3	1	3	3
CO6	3	-	3	3	3	2	1	-	2	3	3	3	3

Recommended by
Board of Studies of EICE dept.
Meeting No. 7 Dated: 1/3/2023

CHAIRMAN
Board of Studies
Electronic Instrumentation and Control Engineering

SEMESTER - III

24IXID301 - SDG NO. 4,9	INNOVATIVE DESIGN LAB - I	L	T	P	CP	C
		0	0	2	2	1

OBJECTIVES:

- To provide opportunities for students to develop an entrepreneurial mindset and explore real-world problem-solving through a startup-centric approach.
- To enable hands-on experience in identifying market needs
- To enable development of skill sets for designing, validating, and realizing a Minimum Viable Product (MVP) for an entrepreneurial venture.
- To guide students in validating market opportunity, and formulating a solution with realistic constraints.
- To inculcate ethical research practices, foster a commitment to lifelong learning, and promote the development of socially responsible and sustainable innovations aligned with relevant Sustainable Development Goals (SDGs).
- To prepare students to design sustainable business models and present entrepreneurial ideas through structured, outcome-driven business pitches using core startup frameworks.

COURSE METHODOLOGY:

1. This initiative is designed to inculcate ethical principles of research and to get involved in a life-long learning process for the students, specifically through the lens of entrepreneurship and innovation.
2. The project work must involve identifying a problem, validating market opportunity, and developing a solution with realistic constraints, culminating in a business plan and prototype/MVP. It must also include appropriate elements of the following: market research, competitive analysis, value proposition design, business model development, financial feasibility, go-to-market strategy, and potentially software/hardware development for the MVP.
3. Project can be individual work or a group project, with a maximum of 3 students. In case of a group project, the individual project report of each student should specify the individual's contribution to the group project. The roles and responsibilities of all team members must be well-defined and documented.
4. On completion of the project, the student shall submit a detailed project report outlining their entrepreneurial journey, solution development, and business plan. The project should be reviewed and the report shall be evaluated, and the students shall appear for a viva-voce oral examination on the project approved by the Coordinator and the project guide.

Recommended by
Board of Studies of EICE dept.
Meeting No. 7 Dated: 1/3/2025

CHAIRMAN
Board of Studies
Electronic Instrumentation and Control Engineering

EVALUATION:

1. First evaluation (Milestone 1 - Week 4): 20 marks (Focus on Problem Identification, Opportunity Discovery, Customer & Markets, Value Proposition)
2. Second evaluation (Milestone 2 - Week 8): 30 marks (Focus on Competitive Advantage, Business Model, and MVP Development)
3. Final evaluation (Milestone 3 & 4 - Last week of the semester): 50 marks (Focus on Financial Feasibility, Go-to-Market Strategy, Growth and Scale, Funding Strategy, and Overall Project Report & Viva-Voce)

Note: All three evaluations are mandatory for course completion and for awarding the final grade.

TOTAL: 45 PERIODS

OUTCOMES:

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

1. Apply entrepreneurial thinking to identify and articulate real-world problems and explore market needs using structured approaches. (K3)
2. Develop skill sets to design potential solutions and validate market opportunities within realistic constraints. (K4)
3. Evaluate sustainable, ethical, and responsible innovation strategies, and communicate business models effectively. (K5)

CO – PO, PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	2	-	-	-	-	2	-	-	-	2	2
CO2	3	3	2	-	-	-	-	2	-	-	-	2	2
Co3	3	3	2	-	-	-	-	2	-	-	-	2	2

SEMESTER - III

24IXTP301 - SDG NO. 4	APTITUDE SKILLS - I	L	T	P	CP	C
		0	0	2	2	1

APTITUDE & COGNITIVE SKILLS – PHASE 1

OBJECTIVES:

- Enrich students on quantitative ability, reasoning ability, and verbal ability
- Build a strong foundation for solving recruitment-based problems with speed and accuracy.
- Enhance creative thinking skills and Strengthen problem-solving skills.

Recommended by
Board of Studies of EICE dept.
Meeting No. 7 Dated: 1/3/2025

CHAIRMAN
Board of Studies
Electronic Instrumentation and Control Engineering

MODULE - I QUANTITATIVE ABILITY 22

- Number Properties, Speed Math, HCF and LCM, Percentages, Time and Work, Time Speed and Distance, Ratio Proportion and Variations, Averages Mixtures and Alligation

MODULE - II QUANTITATIVE ABILITY REASONING ABILITY 16

- Profit and Loss, Simple Interest and Compound Interest, Blood Relation, Directions, Coding and Decoding, Series, Ranking and Arrangements

MODULE - III VERBAL ABILITY 7

- Subject-Verb Agreement, Tenses, Prepositions - Concepts, Error Spotting, Sentence Correction, Fill in the Blanks

TOTAL: 45 PERIODS

REFERENCES:

1. Quantitative Aptitude for Competitive Examinations – R.S. Aggarwal
2. A Modern Approach to Logical Reasoning – R.S. Aggarwal
3. High School English Grammar & Composition – Wren & Martin
4. Word Power Made Easy – Norman Lewis.
5. Fast Track Objective Arithmetic – Rajesh Verma

LIFE SKILLS,RANGER AND ROVER & BIS STANDARDS – PHASE 2

OBJECTIVES:

- Understand team building and acquire leadership skills.
- Gain Scouting spirit.
- Familiarize with the standards relevant to EICE.

MODULE - I JEEVAN KAUSHAL 2.0 – TEAM SKILLS AND LIFE SKILLS 12

Trust and Collaboration: Importance of Trust in Creating a Collaborative Team- Agree to Disagree and Disagree to Agree – Spirit of Teamwork - Understanding Fear of Being Judged and Strategies to Overcome.

Brainstorming: Basics and the process – Effective technique for ideation – Types – Importance and Benefits

Internal Communication: Internal Communication – Meaning and the Need, Use of Various Channels for Transmitting Information to Team Members including Digital and Physical.

Leadership Skills: Leadership concept - Leadership skills – Leadership moralities – Leadership models

Recommended by
Board of Studies of EICE dept.
Meeting No. 7 Dated: 1/3/2025

CHAIRMAN
Board of Studies
Electronic Instrumentation and Control Engineering

MODULE - II RANGER AND ROVER **10**

Four Bonds of BSG: Sign, Salute, Left Handshake, Moto and Good Turn.

Discipline and Uniform: Uniform of Rovers and Rangers, 14 Programme ideals.

Knowledge of Merit: Know about Knowledge of Merit Badges (Proficiency Badge).

Sustainability E-learning: (Online Course Available in WOSM Learning Zone).

Activating the Earth Tribe Initiative in your Community.

MODULE - IIIIS 13875-1 AND IS 13875-2(PART I AND II) -STANDARD FOR DIGITAL MEASURING INSTRUMENTS FOR MEASUREMENT, CONTROL **8**

General specifications concerning -terms, tests, data sheet details-Terms Relating to measuring Instruments Display-Influence Quantity reference Conditions -vibration test, data sheet for digital measuring Instruments. Terms.tests,data sheet details of Instruments for measuring Analog Quantities

TOTAL: 30 PERIODS

REFERENCES:

1. Curriculum and Guidelines for Life Skills (Jeevan Kaushal) 2.0, UGC, New Delhi.
2. A World Built on Standards: A Textbook for Higher Education, Published by: Danish Standards Foundation, 2015.
3. SO / IEC Guide 59, BIS Standards Formulation Manual, 2nd Revision, 2022.

ONLINE RESOURCES

1. https://www.cambridgeenglish.org/learning-english
2. https://lms.scout.org/course_items/show/1172182?course_id=214307#course-item-id=1172182
3. https://lms.scout.org/courses/show/214123?force_course_hub=true

OUTCOMES

Upon completion of this course, the students will be able to:

1. Apply quantitative aptitude for solving numerical problems [K3]
2. Describe logical reasoning to tackle emotional challenges. [K2]
3. Use verbal communication and comprehension skills through grammar and language exercises. [K3]
4. Apply critical thinking and problem-solving skills in various cognitive scenarios. [K3]

Recommended by
Board of Studies of EICE dept.
Meeting No. 1 Dated: 1/3/2025

CHAIRMAN
Board of Studies
Electronic Instrumentation and Control Engineering

5. Interpret language nuances in diversified situations and exhibit scouting spirits amidst communities. [K2]
6. Explain the basic principle of BIS Standards relevant to EMC and EMI. [K2]

CO – PO, PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	-	-	-	-	-	-	-	-	-	1	-	-
CO2	-	-	-	-	-	2	-	-	-	-	1	-	-
CO3	-	-	-	-	-	-	-	-	2	-	1	-	-
CO4	-	2	-	-	-	-	-	-	-	-	1	-	-
CO5	-	-	-	-	-	-	-	2	3	-	1	-	-
CO6	-	-	-	-	-	3	-	-	-	-	1	-	-

Recommended by
Board of Studies of ETCE dept.
Meeting No. 7 Dated: 11/3/2025

CHAIRMAN
Board of Studies
Electronic Instrumentation and Control Engineering

SEMESTER - IV

24BSMA403 - SDG NO. 4	STATISTICS AND NUMERICAL METHODS	L	T	P	CP	C
		3	1	0	5	4

OBJECTIVES:

- To acquaint the knowledge of testing of hypothesis for small and large samples which plays an important role in real life problems
- To identify relationship between multiple input variables
- To introduce the basic concepts of solving algebraic and transcendental equations
- To introduce the numerical techniques of interpolation in various intervals and numerical techniques of differentiation and integration which plays an important role in engineering and technology disciplines
- To introduce the knowledge of various techniques and methods of solving ordinary and partial differential equations

MODULE - I TESTING OF HYPOTHESIS **12**

Sampling distributions - Statistical hypothesis - large sample tests based on single proportion and difference proportions, single mean and difference of means -Tests based on t, and F-distributions for mean, variance respectively - Chi-square test for independence of attributes - Goodness of fit.

MODULE - II DESIGN OF EXPERIMENTS **9**

One way and two-way classifications - Completely randomized design – Randomized block design – Latin square design.

MODULE - III SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS **12**

Solution of algebraic and transcendental equations - Fixed point iteration method – Newton Raphson method - Solution of linear system of equations - Gauss elimination method – Pivoting - Gauss Jordan method – Iterative methods of Gauss Jacobi and Gauss Seidel - Maximum Eigenvalues of a matrix by Power method.

MODULE - IV INTERPOLATION, NUMERICAL DIFFERENTIATION AND NUMERICAL INTEGRATION **9**

Lagrange's and Newton's divided difference interpolation – Newton's forward and backward difference interpolation – Approximation of derivatives using interpolation polynomials – Numerical single integrals using Trapezoidal and Simpson's 1/3 rules.

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/05/2024

S. Narasimhan
Chairman
Board of Studies
Department of Humanities & Sciences

MODULE - V NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS 9

Single step methods: Taylor's series method - Euler's method - Modified Euler's method - Fourth order Runge-Kutta method for solving first order differential equations - Multi step method : Milne's predictor corrector method for solving first order differential equations.

MODULE - VI NUMERICAL SOLUTION OF PARTIAL DIFFERENTIAL EQUATIONS 9

Solution of two-dimensional Laplace's and Poisson's equations on rectangular domain-Forward time central space scheme - One dimensional heat flow equation by Crank Nicholson Method-One dimensional wave equation by explicit method.

TOTAL : 60 PERIODS

TEXT BOOKS:

1. 1. Miller and Freund's Probability and Statistics for Engineers, Johnson, R.A., Miller, I and Freund J., 8th Edition, Pearson Education, Asia, 2015.
2. Numerical methods for Scientific and Engineering Computation, Jain M. K., Iyengar S. R. K. , Jain R. K., 4th Edition, New Age International Publishers, 2003
3. Numerical Methods in Engineering and Science, Grewal. B.S. and Grewal. J.S., 10th Edition, Khanna Publishers, New Delhi, 2015.

REFERENCES:

1. Numerical Analysis, Burden, R. L. and Faires, J. D., 9th Edition, Cengage Learning, 2016.
2. Probability and Statistics for Engineering and the Sciences, Devore J. L., 8th Edition, Cengage Learning, New Delhi, 2014.
3. Applied Numerical Analysis, Gerald C. F. and Wheatley P.O., 7th Edition, Pearson Education, Asia, New Delhi, 2006.
4. Probability and Statistics for Engineers and Scientists, Walpole. R.E., Myers. R.H., Myers. S.L. and Ye. K., , 8th Edition, Pearson Education, Asia, 2007.
5. Numerical methods, Kandasamy P., Thilagavathy K., Gunavathy K., 3rd Edition, S. Chand, 2006.

WEB REFERENCES:

1. https://www.classcentral.com/course/swayam-numerical-analysis-17709
2. https://online-learning.harvard.edu/course/statistics-and-r?delta=1

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/05/2024

S. Narayanan
Chairman
Board of Studies
Department of Humanities & Sciences

ONLINE RESOURCES:

1. https://freevideolectures.com/course/3057/numerical-methods-and-computation
2. https://nptel.ac.in/courses/111107105/

COURSE OUTCOMES

Upon completion of the course, the student should be able to:

1. Apply appropriate statistical hypothesis tests for large and small samples to make inferences about population parameters using t, F, and Chi-square distributions. (K3)
2. Apply appropriate experimental designs such as CRD, RBD, and Latin Square to analyze and interpret data from one-way and two-way classifications. (K3)
3. Apply numerical methods to solve algebraic, transcendental, and linear systems of equations, and compute dominant Eigenvalues using the Power method. (K3)
4. Apply interpolation techniques and numerical methods to approximate derivatives and evaluate definite integrals. (K3)
5. Apply single-step and multi-step numerical methods to solve first-order ordinary differential equations. (K3)
6. Apply finite difference methods to solve partial differential equations such as Laplace, Poisson, heat, and wave equations. (K3)

CO – PO, PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	3	2
CO2	3	-	-	-	-	-	-	-	-	-	-	3	2
CO3	3	-	-	-	-	-	-	-	-	-	-	3	3
CO4	3	-	-	-	-	-	-	-	-	-	-	3	3
CO5	3	-	-	-	-	-	-	-	-	-	-	3	3
CO6	3	-	-	-	-	-	-	-	-	-	-	3	3

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/05/2019

S. Narayanasamy
Chairman
Board of Studies
Department of Humanities & Sciences

SEMESTER - IV

24IXPC401 108105064 SDG NO. 4, 9	INDUSTRIAL MEASUREMENT AND INSTRUMENTATION	L	T	P	CP	C
		3	0	0	3	3

OBJECTIVES:

- To introduce the measurement techniques of viscosity, humidity and moisture
- To introduce the measurement of pressure
- To introduce the measurement of temperature
- To introduce the flow measurement techniques
- To introduce the level measurement techniques
- To introduce transmitters and real time applications

MODULE - I MEASUREMENT OF VISCOSITY, HUMIDITY AND MOISTURE 8

Viscosity: Saybolt viscometer - Rotameter type & Torque type viscometers- Humidity: Dry and wet bulb psychrometers - Dew cell - Moisture: Capacitive sensors - IR and NMR sensors - Moisture measurement in solids

MODULE - II PRESSURE MEASUREMENTS 8

Manometers: Different types, Bourdon tube, Bellows, Diaphragms and Capsules, Pressure gauge selection, installation and calibration using dead weight tester

MODULE - III TEMPERATURE MEASUREMENT 9

Definition and standards - Low Temperature measurement: Thermocouple, Infrared sensors, Thermistor - High Temperature measurement: Pyrometers, high temperature thermocouple, Bimetallic strip - Temperature sensor selection, Installation and Calibration

MODULE - IV FLOW MEASUREMENT 7

Orifice plate: Types - Venturi tube - Pitot tube - Rotameter - Dall tube - Installation and application of head flow meters - Calibration & selection of flow meters

MODULE - V LEVEL MEASUREMENTS 7

Float gauge - Displacer type, ultrasonic gauge - Boiler drum level measurement: Differential pressure method & Hydrastep method- Solid level measurements

Recommended by
Board of Studies of EICE dept.
Meeting No. 7 Dated: 1/2/2024

CHAIRMAN
Board of Studies
Electronic Instrumentation and Control Engineering

MODULE - VI TRANSMITTERS

Principle operation of flow, level,temperature and pressure sensor. Real time application of the transmitters used in industries.

TOTAL : 45 PERIODS

TEXT BOOKS:

1. B C Nakra and K K Chaudhry "Instrumentation Measurement and Analysis" 4th Edition 2016 McGraw Hill Education.
2. Alan S Morris and Reza Langari, "Measurement and Instrumentation Theory And Application", 3rd Edition.
3. Alok Baura, Fundamentals of Industrial Instrumentation, Wiley India Pvt. Ltd, 2011

REFERENCES:

1. Liptak, B.G., "Instrumentation Engineers Handbook (Measurement)", CRC Press, 2005.
2. Patranabis, D.. "Principles of Industrial Instrumentation", 3rd Edition, McGraw-Hill Education, 2017.
3. Eckman D.P. "Industrial Instrumentation", Wiley Eastern Limited, 1990,
4. Singh.S.K.. "Industrial Instrumentation and Control", Tata Mc-Graw-Hill Education Pvt. Ltd., New Delhi, 2009.
5. A.K. Sawhney and PuneetSawhney, "Mechanical Measurements and Instrumentation and Control", DhanpatRai& Co. (P) Limited, 2015.
6. Jain, R.K.. Mechanical and Industrial Measurements. Khanna Publishers. Delhi, 1999.McGraw-Hill, 2002.

WEB REFERENCES:

1. https://nptel.ac.in/courses/108/105/108105064/

ONLINE RESOURCES:

1. https://instrumentationtools.com/
2. https://instrumentationandcontrol.net/

OUTCOMES

Upon completion of the course, the student will be able to:

1. Apply measurement techniques for viscosity, humidity, and moisture using suitable instruments like viscometers and sensors. (K3)
2. Select and calibrate appropriate pressure measurement devices such as Bourdon tubes, manometers, and capsules. (K3)

Recommended by
Board of Studies of EICE dept.
Meeting No. 7 Dated: 1/3/2025

CHAIRMAN
Board of Studies
Electronic Instrumentation and Control Engineering

3. Use thermocouples, pyrometers, and thermistors for accurate temperature measurement and calibration. (K3)
4. Implement flow measurement techniques using differential pressure and velocity-based instruments like orifice and Venturi tubes(K3)
5. Measure liquid and solid levels using float gauges, ultrasonic sensors, and other industrial methods. (K3)
6. Demonstrate the working and industrial applications of transmitters for pressure, level, temperature, and flow. (K3)

CO – PO, PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	-	-	2	-	-	-	-	-	-	3	2
CO2	3	3	-	2	2	-	-	-	-	-	-	3	2
CO3	3	2	-	2	2	-	-	-	-	-	-	3	2
CO4	3	3	2	2	2	-	-	-	-	-	-	3	2
CO5	3	2	-	2	2	-	-	-	-	-	-	3	2
CO6	3	3	2	2	2	-	-	-	-	-	-	3	2

CHAIRMAN
Board of Studies
Electronic Instrumentation and Control Engineering

SEMESTER - IV

		L	T	P	CP	C
24EIPC403 108104091 SDG NO. 4, 11	PRINCIPLES OF COMMUNICATION ENGINEERING	3	0	0	3	3

OBJECTIVES:

- Introduce the fundamental principles of amplitude modulation and demodulation techniques.
- Explain the concepts and types of angle modulation used in analog communication.
- Provide an understanding of sampling, quantization, pulse modulation, and multiplexing techniques.
- Introduce basic digital modulation techniques and their significance in communication systems.
- Impart knowledge on information theory and coding techniques for error detection and correction.
- Familiarize students with wireless communication concepts and multiple access techniques.

Recommended by
Board of Studies of EIE dept.
Meeting No. 7 Dated: 1.3.2025

CHAIRMAN
Board of Studies
Electronics and Instrumentation Engg

MODULE - I AMPLITUDE MODULATION 7

Amplitude Modulation – AM, DSBSC, SSBSC, VSB, modulators and demodulators – Super heterodyne receivers.

MODULE - II ANGLE MODULATION 7

Angle modulation – PM and FM, modulators and demodulators - Comparison of NBFM and WBFM.

MODULE - III PULSE MODULATION 8

Low pass sampling theorem – Quantization – PAM,PTM – Line coding – PCM, DM, and ADM - Time Division Multiplexing, Frequency Division Multiplexing– Inter Symbol interference– Eye pattern.

MODULE - IV DIGITAL MODULATION AND TRANSMISSION 7

Amplitude Shift Keying-Frequency Shift Keying- Phase shift keying – BPSK,QPSK, 8 PSK,8 QAM,Telemetry-RFID applications

MODULE - V INFORMATION THEORY AND CODING 8

Measure of information – Entropy – Source coding theorem -Shannon–Fanocoding, Huffman Coding-Mutual Information – Channel capacity – Error control codes- Cyclic codes, Syndrome calculation – Convolution Coding and Viterbi coding.

MODULE - VI WIRELESS COMMUNICATION 8

Spread Spectrum-DSSS-FHSS-Multiple AccessTechniques - FDMA, TDMA, CDMA –Global system for Mobile Communication (GSM)- Satellite Communication.

TOTAL : 45 PERIODS

TEXT BOOKS:

1. H Taub, D L Schilling, G Saha, "Principles of Communication Systems" 3/e, TMH2011.
2. S. Haykin "Digital Communications" John Wiley2013.

REFERENCES:

1. B.P.Lathi, "Modern Digital and Analog Communication Systems", 3rd edition, OxfordUniversity Press,2007
2. H P Hsu, Schaum Outline Series – "Analog and Digital Communications" TMH2006
3. B.Sklar, Digital Communications Fundamentals and Applications" 2/e Pearson Education2007.

Recommended by
Board of Studies of G1E dept.
Meeting No. 7 Dated: 1.2.2025

CHAIRMAN
Board of Studies
Electronics and Instrumentation Engineering

WEB REFERENCES:

1. https://swayam.gov.in/nd1_noc20_ee16/preview
2. https://www.scientechworld.com/education-software-training-and-skill- development/ sku- online- learning/ analog- and- digital-communication

ONLINE RESOURCES:

1. https://freevideolectures.com/search/communication-engineering/
2. https://www.tutorialspoint.com/principles_of_communication/index.htm

OUTCOMES

Upon completion of the course, the student will be able to:

1. Describe the principles of amplitude modulation techniques including AM, DSB-SC, SSB-SC, VSB. (K2)
2. Illustrate the working of frequency and phase modulation systems and differentiate NBFM and WBFM. (K2)
3. Apply Sampling and Quantization techniques to generate pulse modulated signals like like PAM, PCM. (K3)
4. Apply DigitalModulation Schemes like ASK, FSk,PSK and analyze their usage in telemetry /RFID. (K3)
5. Apply the basics of information theory to calculate entropy, channel capacity, and perform coding. (K3)
6. Describe Wireless Communication Techniques and Multiple access methods including GSM and Satellite Systems. (K2)

CO – PO, PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	-	-	-	-	-	-	-	1	-	3	-
CO2	3	2	-	-	-	-	-	-	-	1	-	3	-
CO3	3	2	2	-	2	-	-	-	-	1	-	3	3
CO4	3	2	2	-	2	-	-	-	-	1	-	3	3
CO5	3	2	2	-	2	-	-	-	-	1	-	3	3
CO6	3	2	-	-	2	2	1	-	-	1	-	3	3

Recommended by
Board of Studies of ECE dept.
Meeting No. 7 Dated: 1.3.2025

CHAIRMAN
Board of Studies
Electronics and Instrumentation Engineering

SEMESTER - IV

24EIPC404 107106081 SDG NO. 4, 9	CONTROL SYSTEMS	L	T	P	CP	C
		3	1	0	4	3

OBJECTIVES:

- To Understand and model various physical systems using mathematical representations.
- To Analyze time-domain and frequency-domain responses of control systems.
- To Apply stability analysis techniques to determine system behavior.
- To Design compensators for feedback systems using frequency domain techniques.
- To Develop state-space representations and analyze system properties using state variable methods.
- To Apply appropriate control strategies to meet system performance requirements.

MODULE - I MATHEMATICAL MODELLING OF SYSTEM 8

Open loop and closed loop systems - Physical system - Linear and Non-Linear systems Transfer function Mathematical modeling of Electrical and Mechanical systems Analogous systems - Block diagram representation - Signal flow graphs and their properties Mason's gain formula.

MODULE - II TIME DOMAIN ANALYSIS 8

Standard test signals-Time response of first order and second order feedback control system to step input-Time domain specifications-Steady state error-Static error constants - Dynamic error coefficients - Introduction to P, PI, PID modes of feedback control.

MODULE - III FREQUENCY DOMAIN ANALYSIS 8

Frequency domain specifications - Correlation between frequency domain and time domain specifications Bode plot - Polar plot - Determination of closed loop response from open loop response.

MODULE - IV STABILITY ANALYSIS 8

Concepts of Stability: Necessary conditions for stability Routh Hurwitz stability criterion - Relative stability analysis. Root locus: Concepts of root - locus construction of root locus Determination of open loop gain for a specified damping of the dominant roots.

Recommended by
Board of Studies of EIE dept.
Meeting No. 7 Dated: 1.3.2025

CHAIRMAN
Board of Studies
Electronics and Instrumentation Engineering

MODULE - V DESIGN OF FEEDBACK CONTROL SYSTEM 6

Design specifications: Lead, Lag and Lag-Lead compensators using Bode plot techniques.

MODULE - VI STATE VARIABLE METHODS 7

Concept of state variables – State models for linear and time invariant Systems – Solution of state and output equation in controllable canonical form – Concepts of controllability and observability – Effect of state feedback

TOTAL : 45 PERIODS

TEXT BOOKS:

1. Benjamin C. Ku and Farid Golnaraghi, "Automatic Control Systems", 10th edition McGraw-Hill Education, 2017.
2. Nagarath, I.J. and Gopal, M., "Control Systems Engineering", 7th edition New Age International Publishers, 2017.

REFERENCES:

1. M.Gopal, "Control System–Principles and Design", Tata McGraw Hill,4th Edition, 2012.
2. Richard C.Dorf and Bishop, R.H., "Modern Control Systems", Pearson Education, 13th impression 2017
3. John J.D., Azzo Constantine, H. and Houpis Stuart, N Sheldon, "Linear Control System Analysis and Design with MATLAB", CRC Taylor & Francis Reprint, 2014
4. Katsuhiko Ogata, "Modern Control Engineering", PHI Learning Private ltd, PEARSON 5th edition 2015.
5. NPTEL Video Lecture Notes on "Control Engineering "by Prof. S. D. Agashe, IIT Bombay.

WEB REFERENCES:

1. https://nptel.ac.in/courses/108106098/
2. https://nptel.ac.in/courses/108101037/

ONLINE RESOURCES:

1. https://lecturenotes.in/notes/15854-note-for-control-system-engineering-cse-by-amity-kumar
2. https://lecturenotes.in/notes/23763-note-for-control-system-engineering-cse-by-suman-kumar-acharya

Recommended by
Board of Studies of EIE dept.
Meeting No. 7 Dated: 1.3.2025

CHAIRMAN
Board of Studies
Electronics and Instrumentation Engineering

OUTCOMES

Upon completion of the course, the student will be able to:

1. Apply the mathematical modeling techniques to represent physical, mechanical, and electrical systems. (K3)
2. Apply time-domain analysis to a physical model system to compute steady-state and dynamic errors using error constants (K3)
3. Apply frequency-domain techniques such as Bode and polar plots to the transfer function model and relate the outcomes to time-domain behavior (K3)
4. Apply the Routh-Hurwitz criterion and Root Locus methods to evaluate system stability and gain margins. (K3)
5. Design lead, lag, and lag-lead compensators to satisfy specified performance requirements. (K4)
6. Analyze state-space representations of linear time-invariant systems to evaluate controllability, observability, and the impact of state feedback. (K4)

CO – PO, PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	1	2
CO2	3	-	-	-	-	-	-	-	-	-	-	1	2
CO3	3	-	-	-	-	-	-	-	-	-	-	1	2
CO4	3	-	-	-	-	-	-	-	-	-	-	2	3
CO5	-	-	3	-	-	-	-	-	-	-	-	2	3
CO6	-	3	-	-	-	-	-	-	-	-	2	2	3

SEMESTER - IV

24EIPC401 108105155 SDG NO. 4, 9	ELECTRICAL MACHINES AND DRIVES	L	T	P	CP	C
		3	0	0	3	3

OBJECTIVES:

- To introduce the principle of operation of DC machines as motor and as generator
- To introduce the principle of operation of Transformers
- To introduce the principle of operation of Induction machines
- To provide comprehensive introduction to various power electronic devices, their structure, operating principle and characteristics

Recommended by
Board of Studies of EIG dept.
Meeting No. 7 Dated: 1.3.2025

CHAIRMAN
Board of Studies
Electronics and Instrumentation Engineering

- To introduce other special machines
- To get an overview about dc and ac drives and their control using power electronic circuits.

MODULE - I DC MACHINES **7**

Construction of D.C. Machines – DC Generator: Principle of operation – Characteristics- DC Motor: Principle of operation -Types-Torque equation-Characteristics.

MODULE - II TRANSFORMERS **7**

Transformer – Principle – Theory of ideal transformer – EMF equation – Construction details of shell and core type transformers – Tests on transformers.

MODULE - III SINGLE-PHASE INDUCTION MOTOR **7**

Constructional details of single-phase induction motor – Double field revolving theory and operation – Equivalent circuit – No load and blocked rotor test – Types of Induction motor– Capacitor-start capacitor run induction motor - Shaded pole induction motor - Linear Induction motor.

MODULE - IV SPECIAL ELECTRICAL MACHINES **8**

Construction, working and principle of operation of Stepper motor, Switched reluctance motor, Synchronous reluctance motors, Permanent Magnet Brushless DC motor, Permanent magnet synchronous motors.

MODULE - V CONTROL OF INDUCTION MOTOR DRIVE **8**

VSI and CSI fed induction motor drives-principles of V/f control-closed loop variable frequency PWM inverter with dynamic braking- static Scherbius drives- power factor considerations– modified Kramer drives-principle of vector control.

MODULE - VI DRIVES AND CONTROL **8**

Static and Dynamic equations of DC and AC machines – Rectifier and chopper control of DC drives– implementation-block diagram, Design of closed loop operation of V/f control of Induction motor drive systems.

TOTAL : 45 PERIODS

TEXT BOOKS:

1. Fitzgerald A.E., Kingsley C., Umans, S. and Umans S.D., "Electric Machinery", McGraw-Hill, Singapore, 2003. 6th Edition.

Recommended by
Board of Studies of EIE dept.
Meeting No. 7 Dated: 1.3.2025

CHAIRMAN
Board of Studies
Electronics and Instrumentation Engineering

2. Theraja, B.L., "A Textbook of Electrical Technology", Vol.II, S.C Chand and Co., New Delhi, 2007
3. T. Kenjo, "Stepping Motors and Their Microprocessor Controls", Clarendon Press London,1995
4. T.J.E.Miller, "Brushless Permanent-Magnet and Reluctance Motor Drives", Oxford University Press, 1989.
5. Mohan, Udeland and Robbins., "Power Electronics", John Wiley and Sons, New York, 1995.
6. Rashid, M.H., "Power Electronics – Circuits, Devices and Applications", PHI, 3rd Edition, 2004.
7. Mohan, Udeland and Robbins., "Power Electronics", John Wiley and Sons, New York,1995

REFERENCE BOOKS:

1. Del Toro, V., "Electrical Engineering Fundamentals", Prentice Hall of India, New Delhi, 1995.
2. Cotton, H., "Advanced Electrical Technology", Sir Isaac Pitman and Sons Ltd., London, 1999.
3. Lecture series on "Electrical Machines I" and "Electrical Machines II" by Dr.Krishna Vasudevan, IIT Madras.
4. R.Krishnan, "Switched Reluctance Motor Drives – Modeling, Simulation, Analysis, Design and Application", CRC Press, 2017.
5. T. Kenjo and S. Nagamori, "Permanent Magnet and Brushless DC Motors", Clarendon Press, London,1988.
6. E.G. Janardanan, "Special Electrical Machines", PHI learning Private Limited, Delhi, 2014.
7. K.Venkataratnam, "Special Electrical Machines", Universities Press (India) Private Limited,2008.
8. NPTEL Lecture Series on "Power Electronics" by Dr. B.G. Fernandes, IIT Bombay.
9. Singh, M.D., and Khanchandani, K.B., "Power Electronics", 2nd Edition., TataMcGraw-Hill, 2011.
10. Bose, B.K., "Modern Power Electronics and AC Drives", Pearson Education,2002.
11. Bimbra, P.S., "Power Electronics", Khanna Publishers, 5th edition, 2012.
12. Moorthi, V.R., "Power Electronics - Devices, Circuits and Industrial Applications", Oxford University Press, 2005.
13. NPTEL Lecture Series on "Power Electronics" by Dr.B.G.Fernandes, IIT Bombay

Recommended by
Board of Studies of EIE dept.
Meeting No. 7 Dated: 1.3.2025

CHAIRMAN
Board of Studies
Electronics and Instrumentation Engineering

WEB RESOURCES:

1. https://www.st.com/en/applications/industrial-drives.html
2. https://www.designworldonline.com/stepper-motor-basics/
3. https://www.electronicshub.org/brushless-dc-motor-bldc-motor/

ONLINE RESOURCES:

1. https://nptel.ac.in/courses/108108077
2. https://swayam.gov.in/nd1_noc19_ee65/preview

OUTCOMES

Upon completion of the course, the student will be able to:

1. Demonstrate a clear understanding of the construction and operating principles of DC generators and DC motors.(K3)
2. Explore the key components of construction of transformers-single phase-three phase (K3)
3. Examine the construction , working and testing methods and different types of Single phase induction motor (K3)
4. Investigate the construction , working of special electrical machines (K3)
5. Design and analyze power electronic circuits, focusing on applications such as rectifiers, inverters, and voltage regulators. (K3)
6. Analyze various control techniques such as open-loop, closed-loop, V/f control, vector control, and direct torque control.(K3)

CO – PO, PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	-	1	2	1	-	-	1	1	2	1	1
CO2	3	2	-	1	2	1	-	-	1	1	2	-	-
CO3	3	2	-	1	2	1	-	-	1	1	2	-	-
CO4	3	3	1	-	-	-	-	-	1	1	2	1	3
CO5	3	2	-	2	2	2	-	-	1	1	2	2	3
CO6	3	1	-	2	1	2	-	-	1	1	2	2	3

Recommended by
Board of Studies of EIE dept.
Meeting No. 7 Dated: 1.3.2025

CHAIRMAN
Board of Studies
Electronics and Instrumentation Engineering

SEMESTER - IV

24HSNC401 - SDG NO. 4	NCC COURSE LEVEL 3	L	T	P	CP	C
		3	0	0	3	0

ARMY WING

PERSONALITY DEVELOPMENT		**9**
PD 3	Group Discussion: Team Work	2
PD 4	Career Counselling, SSB Procedure & Interview Skills	3
PD 5	Public Speaking	4
BORDER & COASTAL AREAS		**4**
BCA 2	Security Setup and Border/Coastal management in the area	2
BCA 3	Security Challenges & Role of cadets in Border management	2
ARMED FORCES 3		
AF 2	Modes of Entry to Army, CAPF, Police	3
COMMUNICATION		**3**
C 1	Introduction to Communication & Latest Trends	3
INFANTRY		**3**
INF 1	Organisation of Infantry Battalion & its weapons	3
MILITARY HISTORY		**23**
MH 1	Biographies of Renowned Generals	4
MH 2	War Heroes - PVC Awardees	4
MH 3	Study of Battles - Indo Pak War 1965, 1971 & Kargil	9
MH 4	War Movies	6

TOTAL: 45 PERIODS

NAVAL WING

PERSONALITY DEVELOPMENT		**9**
PD 3	Group Discussion: Change your mindset, Time Management, Social Skills	6
PD 5	Public Speaking	3
LEADERSHIP 7		
L 2	Case Studies: APJ Abdul Kalam, Deepa Malik, Maharana Pratap, N Narayan Murty, Ratan Tata, Rabindra Nath Tagore, Role of NCC cadets in 1965	7

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/05/2024

Chairman
Board of Studies
Department of Humanities & Sciences

DISASTER MANAGEMENT		**13**
DM 1	Disaster Management Capsule: Organisation, Types of Disasters, Essential Services, Assistance, Civil Defence Organisation	3
DM 2	Initiative Training, Organising Skills, Do's & Don't's, Natural Disasters, Man Made Disasters	9
DM 3	Fire Service & Fire Fighting	1
ENVIRONMENTAL AWARENESS & CONSERVATION		**3**
EA 1	Environmental Awareness and Conservation	3
GENERAL AWARENESS		**4**
GA 1	General Knowledge	4
NAVAL ORIENTATION 6		
AF 1	Armed Forces and Navy Capsule	3
EEZ 1	EEZ Maritime Security and ICG	3
ADVENTURE 1		
AD 1	Introduction to Adventure Activities	1
BORDER & COASTAL AREAS		**2**
BCA 1	History, Geography & Topography of Border/Coastal areas	2
		TOTAL: 45 PERIODS
AIR FORCE WING		
PERSONALITY DEVELOPMENT		**9**
PD 3	Group Discussion: Team Work	2
PD 4	Career Counselling, SSB Procedure & Interview Skills	3
PD 5	Public Speaking	4
BORDER & COASTAL AREAS		**4**
BCA 2	Security Setup and Border/Coastal management in the area	2
BCA 3	Security Challenges & Role of cadets in Border management	2
AIRMANSHIP		**1**
A 1	Airmanship	1
BASIC FLIGHT INSTRUMENTS		**3**
FI 1	Basic Flight Instruments	3

Recommended by
Board of Studies of H&S dept.
Meeting No. 6 Dated: 31/05/2019

Chairman
Board of Studies
Department of Humanities & Sciences

AERO MODELLING		**3**
AM 1	Aero Modelling Capsule	3
GENERAL SERVICE KNOWLEDGE		**2**
GSK 4	Latest Trends & Acquisitions	2
AIR CAMPAIGNS		**6**
AC 1	Air Campaigns	6
PRINCIPLES OF FLIGHT		**6**
PF 1	Principles of Flight	3
PF 2	Forces acting on Aircraft	3
NAVIGATION		**5**
NM 1	Navigation	2
NM 2	Introduction to Met and Atmosphere	3
		TOTAL :45 PERIODS

SEMESTER - IV

24IXPT402 108105132 SDG NO. 4, 9	DIGITAL SYSTEM DESIGN LABORATORY WITH THEORY	L	T	P	CP	C
		1	0	4	5	3

OBJECTIVES:

- To understand and implement digital logic gates and expressions
- To design and analyze fundamental combinational circuits
- To explore and construct synchronous and asynchronous sequential circuits
- To understand and apply programmable logic devices (PLDs)
- To simulate and verify digital systems using VHDL programming

MODULE - I NUMBER SYSTEMS AND DIGITAL LOGIC FAMILIES **7**

Realization of basic gates (AND, OR, NOT) using NAND & NOR - Verification of DeMorgan's Theorem - SOP and POS expressions using universal gates – Karnough map.

List of Experiments

1. To realize

(a) Basic gates (AND, OR, NOT) From Universal Gates (NAND & NOR).

(b) To verify Demorgan's Theorem for 2 variables

The sum-of product and product-of-sum expressions using universal gates

Recommended by
Board of Studies of EICE Dept.
Meeting No. 7 Dated: 1/3/2025

CHAIRMAN
Board of Studies
Electronic Instrumentation and Control Engineering

MODULE - II COMBINATIONAL CIRCUITS 9

Half Adder- Full Adder – Full Subtractor - 4-bit Comparator using logic gates - Multiplexer using gates - Demultiplexer using gates - Decoder and Encoder – Code Convertors

List of Experiments

1. To design and implement 4-bit Parallel Adder/ subtractor using IC 7483
2. To realize

(a) 4:1 Multiplexer using gates
(b) 1:8 Demultiplexer and
© 3:8 Decoder using IC74138

3. To realize

(a) Binary to Gray code convertor
(b) Gray to Binary code convertor

MODULE - III SYNCHRONOUS SEQUENTIAL CIRCUITS 9

Flip-Flops: SR, JK, D, T – characteristics and excitation tables - Shift registers –serial / parallel - Counters: synchronous, ripple, and mod-N design Timing diagrams and counter operation

List of Experiments

1. To realize the following flip-flops using NAND Gates:

(a) Clocked SR Flip-Flop
(b) JK Flip-Flop

2. To realize the following shift registers using Ic7474:

(a) SISO
(b) SIPO
© PISO
(d) PIPO

3. To realize the Mod-10 Counter

MODULE - IV ASYNCHRONOUS SEQUENTIAL CIRCUITS 6

Ripple Counter Operation - Race conditions and race-around problem – Hazards

List of Experiments

1. To design 4 bit Ripple counter using JK Flip flops - Ic7476

MODULE - V PROGRAMMABLE LOGIC DEVICES (PLDS) 5

PROM, PLA, and PAL architectures - Implementation of logic functions using PROM, PLA and PAL - Applications of PLDs in digital systems

Recommended by
Board of Studies of EICE Dept.
Meeting No. 7 Dated: 1/3/2025

CHAIRMAN
Board of Studies
Electronic Instrumentation and Control Engineering

MODULE - VI VHDL PROGRAMMING 9

Introduction to HDL and VHDL - VHDL design flow - Dataflow, behavioral, and structural modeling styles Adder - Subtractor – Multiplexer - Demultiplexer - Flip-Flops (D, T) -Counters (synchronous/ripple) – Test benches and simulation outputs

List of Experiments

1. VHDL simulation of Adder and Subtactor
2. VHDL simulation of Multiplexer and Demultiplexer
3. VHDL simulation of D and T Flip flop
4. VHDL simulation of 2 bit and 3 bit Counters

TOTAL : 45 PERIODS

OUTCOMES

Upon completion of the course, the student will be able to:

1. Apply universal gates (NAND, NOR) to realize basic logic gates and verify Boolean theorems such as DeMorgan's Theorem using logic simplification techniques and Karnaugh maps (K3)
2. Implement and analyze combinational circuits including adders, subtractors, comparators, multiplexers, demultiplexers, decoders, and encoders using gates and digital Ics. (K3)
3. Apply knowledge of flip-flop operations to design and construct sequential circuits such as shift registers and synchronous counters using JK flip-flops and ICs. (K3)
4. Construct asynchronous sequential circuits such as ripple counter and recognize issues like race conditions and hazards.(K3)
5. Implement logic functions using programmable logic devices (PROM, PLA, PAL) and analyze their applications in digital systems.(K3)
6. Develop and simulate combinational and sequential digital circuits using VHDL in behavioral and dataflow modeling styles with appropriate test benches.(K3)

CO – PO, PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	-	-	-	-	-	-	-	-	-	3	-
CO2	3	2	3	-	-	-	-	-	-	-	-	3	2
CO3	3	2	3	-	2	-	-	-	-	-	-	3	2
CO4	3	2	-	2	-	-	-	-	-	-	-	3	2
CO5	3	2	2	-	3	-	-	-	-	-	-	3	3
CO6	3	2	3	2	3	-	-	-	-	-	-	3	3

Recommended by
Board of Studies of EICE dept.
Meeting No. 7 Dated: 1/3/2025

CHAIRMAN
Board of Studies
Electronic Instrumentation and Control Engineering

SEMESTER - IV

24IXPL401 - SDG NO. 4	SENSORS AND INSTRUMENTATION LABORATORY	L	T	P	CP	C
		0	0	4	4	2

OBJECTIVES:

- To understand and analyze the operating principles of various sensors and transducers such as potentiometers, strain gauges, LVDTs, Hall Effect sensors, and photoelectric devices.
- To perform characterization experiments for temperature sensors like thermistors, thermocouples (J, K, E types), and RTDs, and analyze their behavior in different conditions.
- To measure and interpret mechanical variables such as displacement, angular movement, speed, torque, and vibration using appropriate transducers.
- To understand and perform calibration techniques for pressure and level measuring instruments using tools such as dead weight testers and d/p transmitters.
- To apply instrumentation techniques for process variables such as flow, conductivity, moisture, and viscosity using appropriate sensors and measurement methods.
- To investigate the optical properties of materials by measuring absorbance and transmittance using UV-Visible spectrophotometry.

LIST OF EXPERIMENTS:

1. Displacement versus output voltage characteristics of a potentiometric transducer.
2. Characteristics of Strain gauge.
3. Characteristics of LVDT, Hall Effect transducer and photoelectric transducer.
4. Characteristics of LDR, thermistor and thermocouple (J, K, E types).
5. Measurement of Angular displacement using resistive and capacitive transducer.
6. Step response characteristic of RTD and thermocouple.
7. Measurement of speed, torque and vibration.
8. Measurement of level using d/p transmitter and fibre optics system
9. Calibration of pressure gauge using dead weight tester.
10. Measurement of flow using Discharge coefficient of orifice plate.
11. Measurement of Conductivity, Moisture and Viscosity of test solutions.
12. Measurement of Absorbance and Transmittance of Test solutions using UV- Visible Spectrometer

TOTAL: 60 PERIODS

Recommended by
Board of Studies of EICE dept.
Meeting No. 7 Dated: 1/3/2025

CHAIRMAN
Board of Studies
Electronic Instrumentation and Control Engineering

LIST OF EQUIPMENTS FOR A BATCH OF 30 STUDENTS:

1. Measurement of Linear displacement using Potentiometer – 1 No.
2. Strain gauge characterization and application - 1 No
3. Hall Effect characterization and application - 1 No
4. Angular displacement kit- 1 No
5. Thermocouples - 1 No
6. RTD - 1 No
7. LDR – 1 No
8. Thermistor-1 No
9. Orifice plate – 1 No
10. Dead weight tester with pressure gauge - 1 No
11. Torque trainer - 1 No
12. Saybolt Viscometer - 1 No
13. DP transmitter - 1 No
14. UV – Visible spectrophotometer - 1 No
15. Conductivity meter - 1 No

OUTCOMES

Upon completion of the course, the student will be able to:

1. Identify and characterize the static and dynamic behavior of electromechanical and semiconductor transducers such as potentiometers, strain gauges, LVDTs, and Hall Effect sensors. (K3)
2. Demonstrate and interpret the characteristics and step responses of temperature sensors including RTDs, thermistors, and thermocouples (J, K, E types). (K4)
3. Analyze and Measure mechanical parameters such as linear and angular displacement, speed, torque, and vibration using appropriate transducers. (K4)
4. Compare and Measure pressure and level measurement instruments using standard methods like dead weight testers and d/p transmitters, and evaluate their performance. (K4)
5. Apply appropriate techniques to measure process parameters such as flow, conductivity, moisture, and viscosity using relevant instruments.(K3)
6. Operate UV-Visible spectrophotometers to measure absorbance and transmittance and analyze the optical characteristics of test solutions. (K4)

Recommended by
Board of Studies of EICE dept.
Meeting No. 7 Dated: 1/3/2025

CHAIRMAN
Board of Studies
Electronic Instrumentation and Control Engineering

CO – PO, PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	2	3	3	1	1	-	-	-	-	2	2	2
CO2	3	-	3	3	-	1	-	-	-	-	2	3	2
CO3	2	2	2	2	2	-	-	-	-	-	-	3	3
CO4	3	-	3	3	3	2	-	-	-	3	1	3	3
CO5	2	2	2	1	2	-	-	-	-	3	1	3	3
CO6	3	-	3	3	3	2	1	-	2	3	3	3	3

SEMESTER - IV

24IXID401 - SDG NO. 4,9,15	INNOVATIVE DESIGN LAB – II	L	T	P	CP	C
		0	0	2	2	1

OBJECTIVES:

- To empower students to transform innovative ideas into viable venture blueprints through structured entrepreneurial exploration and opportunity framing.
- To provide experiential learning in adaptive product evolution by focusing on user-centric redesign, iterative testing, and technical refinement.
- To develop proficiency in assessing market traction, decoding customer behavior, and aligning product strategy with investment-readiness metrics.
- To instill a foundation of ethical entrepreneurship by integrating inclusive design principles, sustainability values, and responsible leadership.
- To enable data-driven innovation by leveraging field research, applying performance analytics, and integrating emerging technologies for solution optimization.
- To facilitate multidisciplinary problem-solving through advanced engineering integration, MVP systemization, and standards-compliant validation.

COURSE METHODOLOGY:

1. This initiative is designed to inculcate ethical principles of research and to get involved in a life-long learning process for the students, focusing on the practical execution and refinement of entrepreneurial ventures.

Recommended by
Board of Studies of EICE dept.
Meeting No. 7 Dated: 1/3/2025

CHAIRMAN
Board of Studies
Electronic Instrumentation and Control Engineering

2. The project work must involve the continuous development, iterative enhancement, and potential launch of an entrepreneurial solution. It must also include appropriate elements of the following: compliance with advanced engineering standards, iterative design analysis, enhanced prototyping, robust experimentation, real-world user feedback collection, data correlation, and advanced software/hardware development for the solution.
3. Projects can be individual work or group projects, with a maximum of Three students. In case of a group project, each student must submit an individual project report clearly specifying their unique contributions to the collective work.
4. On completion of the project, the student shall submit a detailed project report encompassing the evolution of their venture, technical implementation, market validation, and future roadmap. The project shall undergo a formal review process, after which the report will be evaluated. Students shall appear for a mandatory viva-voce examination on the project, approved jointly by the Coordinator and the respective project guide.

EVALUATION:

1. First evaluation (Immediately after first internal examination): 20 marks (Focus on refined problem statement, advanced MVP design, and detailed development plan)
2. Second evaluation (Immediately after second internal examination): 30 marks (Focus on prototype/MVP implementation, initial testing, and preliminary market validation results)
3. Final evaluation (Last week of the semester): 50 marks (Focus on the complete refined solution, comprehensive market validation, growth strategy, final project report, and viva-voce)

Note: All three evaluations are mandatory for course completion and for awarding the final grade.

TOTAL: 45 PERIODS

OUTCOMES:

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

1. Apply entrepreneurial frameworks to identify, articulate, and transform innovative ideas into structured venture opportunities (K3)
2. Analyze product performance through iterative design cycles, incorporating user feedback and technical optimization techniques.(K4)
3. Evaluate customer insights and market data to formulate investment-ready product positioning and growth strategies. (K5)

Recommended by
Board of Studies of EICE dept.
Meeting No. 7 Dated: 1/3/2025

CHAIRMAN
Board of Studies
Electronic Instrumentation and Control Engineering

4. Justify entrepreneurial decisions based on ethical considerations, sustainability goals, and inclusive innovation principles.. (K5)
5. Integrate real-world observations and data analytics to enhance product functionality using appropriate emerging technologies. (K5)
6. Design a systems-based MVP using multidisciplinary knowledge and validate it against advanced engineering standards. (K6)

CO – PO, PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	2	-	-	-	-	2	-	-	-	2	2
CO2	3	3	2	-	-	-	-	2	-	-	-	2	2
CO3	3	2	2	-	-	-	-	3	-	-	-	-	3
CO4	3	3	2	-	-	-	-	2	-	-	-	-	2
CO5	3	3	3	-	-	-	-	2	-	-	-	2	2
CO6	3	3	3	-	-	-	-	2	-	-	-	-	2

SEMESTER - IV

24IXTP401 - SDG NO. 4	APTITUDE SKILLS - II	L	T	P	CP	C
		0	0	2	2	0

PROBLEM SOLVING TECHNIQUES USING C PROGRAMMING – PHASE 1

OBJECTIVES:

- Build a strong foundation in C programming concepts and problem-solving techniques.
- Develop the ability to write efficient and modular code.
- Enhance understanding of data structures, memory management, and algorithms for optimized solutions.

MODULE - I FOUNDATIONS OF PROGRAMMING **12**

- Understanding Programming Languages: Why they are essential and their various types.
- Operators in C: Exploring assignment, arithmetic, relational, and logical operators.
- Tokens and Identifiers: Learning about keywords, naming conventions, and best practices.

Recommended by
Board of Studies of EICE dept.
Meeting No. 7 Dated: 1/3/2025

CHAIRMAN
Board of Studies
Electronic Instrumentation and Control Engineering

- Control Structures in C: Choosing the right structure for efficient programming:
- Selective Control (Decision-making statements)
- Iterative Control (Loops for repetition)
- Unconditional Control (Jump statements)

MODULE - II DATA TYPES, NUMBER SYSTEMS, AND FUNCTIONS 12

- Operators in Depth: Understanding increment, decrement, and short-circuit operators.
- Number Systems & Conversions: Mastering different number systems, conversions, and format specifiers.
- Data Types in C: Exploring signed and unsigned types (int, float, char) and their usage.
- Functions in C:
- Importance of modular programming.
- Writing and using functions effectively.

MODULE - III POINTERS, ARRAYS, AND PROBLEM-SOLVING 21

- Pointers in C:
- Understanding memory management.
- How pointers enable direct hardware communication.
- Arrays in C:
- Efficiently storing multiple elements.
- Single-dimensional and multi-dimensional arrays.
- Problem-Solving Techniques:
- Tackling challenges related to arrays and strings.
- Optimizing algorithms for efficiency.

TOTAL: 45 PERIODS

REFERENCES:

1. Let Us C – Yashavant Kanetkar
2. Programming in ANSI C – E. Balagurusamy
3. The C Programming Language – Brian W. Kernighan and Dennis M. Ritchie
4. C: How to Program – Paul Deitel and Harvey Deitel
5. Problem Solving and Program Design in C – Jeri R. Hanly and Elliot B. Koffman

Recommended by
Board of Studies of EICE dept.
Meeting No. 7 Dated: 1/3/2025

CHAIRMAN
Board of Studies
Electronic Instrumentation and Control Engineering

PHASE 2

(BIS STANDARDS, RANGER AND ROVER, LIFE SKILLS)

OBJECTIVES:

- Explore core domain BIS standards related to Information security and AI.
- Implement strategies to learn career and managerial skills for career growth.

MODULE - I JEEVAN KAUSHAL 2.0 – CAREER SKILLS AND MANAGERIAL SKILLS **14**

Group Discussion Skills - Meaning and Methods of Group Discussion - Procedure of Group Discussion - Group Discussion - Simulation - Group Discussion - Common Errors.

Managerial Skills - Basic Managerial Skills - Planning for effective management - How to organize teams? - Recruiting and retaining talent - Delegation of tasks - Learn to coordinate - Conflict management - Self- management Skills - Understanding self-concept - Developing self- awareness - Self-examination - Self-reflection and Introspection - Self- regulation.

Entrepreneurial Skills - Basics of Entrepreneurship - Meaning of entrepreneurship – Classification and types of entrepreneurships - Traits and competencies of entrepreneur -. Creating Business Plan - Problem identification and idea generation - Idea validation - Pitch making.

Managing Personal Finance - Budgeting - Setting personal goals - Estimate likely expenses Monitor spending to obtain the most value for the available funds - Saving and Investing - Advantages of saving money - Concept of present and future value of money.

MODULE - II RANGER AND ROVER **10**

Scouting for Boys: Scout Craft, Campaigning.

Knots: Managing of rope, types of ropes and uses, Basic Knots: - Clove Hitch, Reef Knot, Fisherman knot, Sheet bend, Bowline, Sheep shank, whippings.

Growing Together: Understanding the growth context.

Intergenerational Dialogue: How to enhance learning and cooperation across generations.

MODULE - III INDIAN STANDARDS ON INSULATORS, CABLE AND POWER CAPACITOR **6**

Insulators: Design characteristic of Overhead Insulators and overview of faults in transmission system. Cable: Introduction to selection, design and testing of Cables in distribution and transmission system. Power Capacitor:

Recommended by
Board of Studies of EICE dept.
Meeting No. 7 Dated: 1/3/2025

CHAIRMAN
Board of Studies
Electronic Instrumentation and Control Engineering

Working principle, Classification of Power Capacitors, Test methods, Indian Standards available on various types of Power Capacitors.

TOTAL: 30 PERIODS

REFERENCES:

1. Curriculum and Guidelines for Life Skills (Jeevan Kaushal) 2.0, UGC, New Delhi.
2. A World Built on Standards: A Textbook for Higher Education, Published by: Danish Standards Foundation, 2015.
3. SO / IEC Guide 59, BIS Standards Formulation Manual, 2nd Revision, 2022.

ONLINE RESOURCES

1. https://lms.scout.org/courses/show/214175?force_course_hub=true
2. https://lms.scout.org/courses/show/214194?force_course_hub=true
3. https://www.ugc.gov.in/pdfnews/4874522_Draft-Curriculum-for-Life-SKill-Jeevan-Kaushal.pdf (ugc.gov.in)

OUTCOMES

Upon completion of this course, the students will be able to:

1. Understand and apply the fundamentals of C programming for problem-solving. (K1)
2. Apply control structures, operators, and functions to write modular programs. (K3)
3. Apply pointers and arrays for efficient memory and data management. (K3)
4. Solve real-world problems by designing and optimizing algorithms. (K3)
5. Demonstrate career and managerial skills. (K2)
6. Understand BIS standards for various electrical components. (K2)

CO – PO, PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	2	-	-	-	-	-	-	-	-	2	2	-
CO2	2	2	2	-	-	-	-	-	-	-	2	2	-
CO3	2	2	2	-	2	-	-	-	-	-	-	2	2
CO4	2	2	2	2	-	-	-	-	-	-	2	2	2
CO5	-	-	-	-	-	-	-	2	2	2	2	-	2
CO6	2	-	2	2	2	2	-	-	-	-	2	2	2

Recommended by
Board of Studies of EICE dept.
Meeting No. 7 Dated: 1/3/2025

CHAIRMAN
Board of Studies
Electronic Instrumentation and Control Engineering

We build a Better nation through Quality education.

Sairam INSTITUTIONS

Sri

SAI RAM ENGINEERING COLLEGE

An Autonomous Institution

Affiliated to Anna University & Approved by AICTE, New Delhi

*Accredited by **NBA** and **NAAC** "A+" | BIS/EOMS ISO 21001 : 2018 and **ISO** 9001:2015 Certified and MHRD **NIRF** ranked institutions*

College Campus

Sai Leo Nagar, West Tambaram,
Chennai - 600 044. Ph : 044-2251 2222

Administrative Office

"Sai Bhavan", 31B, Madley Road, T.Nagar,
Chennai - 600 017. Ph : 044-4226 7777

e-mail : sairam@sairamgroup.in

www.sairamgroup.in