Dr. MAHALINGAM
COLLEGE OF ENGINEERING AND TECHNOLOGY
Udumalai Road, Pollachi, Coimbatore District - 642003
Established in 1998 ♦ Approved by AICTE ♦ Affiliated to Anna University
(A DIVISION OF NIA EDUCATIONAL INSTITUTIONS)
An Autonomous Institution
NAAC A++ GRADE
Cycle 3 (2023-2030)
The Highest Grade

Curriculum and Syllabi

Semesters I to IV

Regulations 2023

(Batch 2023 only)

Programme: B.E Electronics and Communication (Advanced Communication Technology)
Curriculum and Syllabi: Semester I to IV
Recommended by Board of Studies on: 11.01.2024
Approved by Academic Council on: 23.3.2024

Action	**Responsibility**	**Signature of Authorized Signatory**
Designed and Developed By	BoS Electronics and Communication (Advanced Communication Technology)	
Compiled By	Office of Controller of Examination	
Approved By	Principal	

Dr. Mahalingam College of Engineering and Technology, Pollachi 642003.

(An autonomous institution approved by AICTE and affiliated to Anna University)

Department of Electronics and Communication Engineering

Electronics and Communication (Advanced Communication Technology)

Vision

To strive for excellence in Electronics and Communication Engineering education, research and technological services imparting quality training to students, to make them competent and motivated engineers.

Mission

- Impart high quality technical education in Electronics and Communication Engineering through effective teaching- learning process and updated curriculum.
- Equip the students with professionalism and technical expertise to provide appropriate solutions to societal and industrial needs.
- Provide stimulating environment for continuously updated facilities to pursue research through creative thinking and team work.

Programme Educational Objectives (PEOs) – Regulations 2023

B.E. Electronics and Communication (Advanced Communication Technology) graduates will:

PEO1. Actively apply knowledge and technical skills in engineering practices towards the progress of the organization in competitive and dynamic environment.

PEO2. Own their professional and personal development by continuous learning and apply the learning at work to create new knowledge.

PEO3. Conduct themselves in a responsible and ethical manner supporting sustainable economic development which enhances the quality of life.

Programme Outcomes (POs) - Regulations 2023

On successful completion of B.E. Electronics and Communication (Advanced Communication Technology) programme, graduating students/graduates will be able to:

1. **Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem Analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/Development of Solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct Investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. **Modern Tool Usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The Engineer and Society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice
7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Lifelong Learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Programme Specific Outcomes (PSOs) - Regulations 2023

On successful completion of B.E. Electronics and Communication (Advanced Communication Technology) programme, graduating students/graduates will be able to:

PSO1: Advanced Communication System Design: Design and implement advanced communication systems while leveraging simulation tools and hardware platforms.

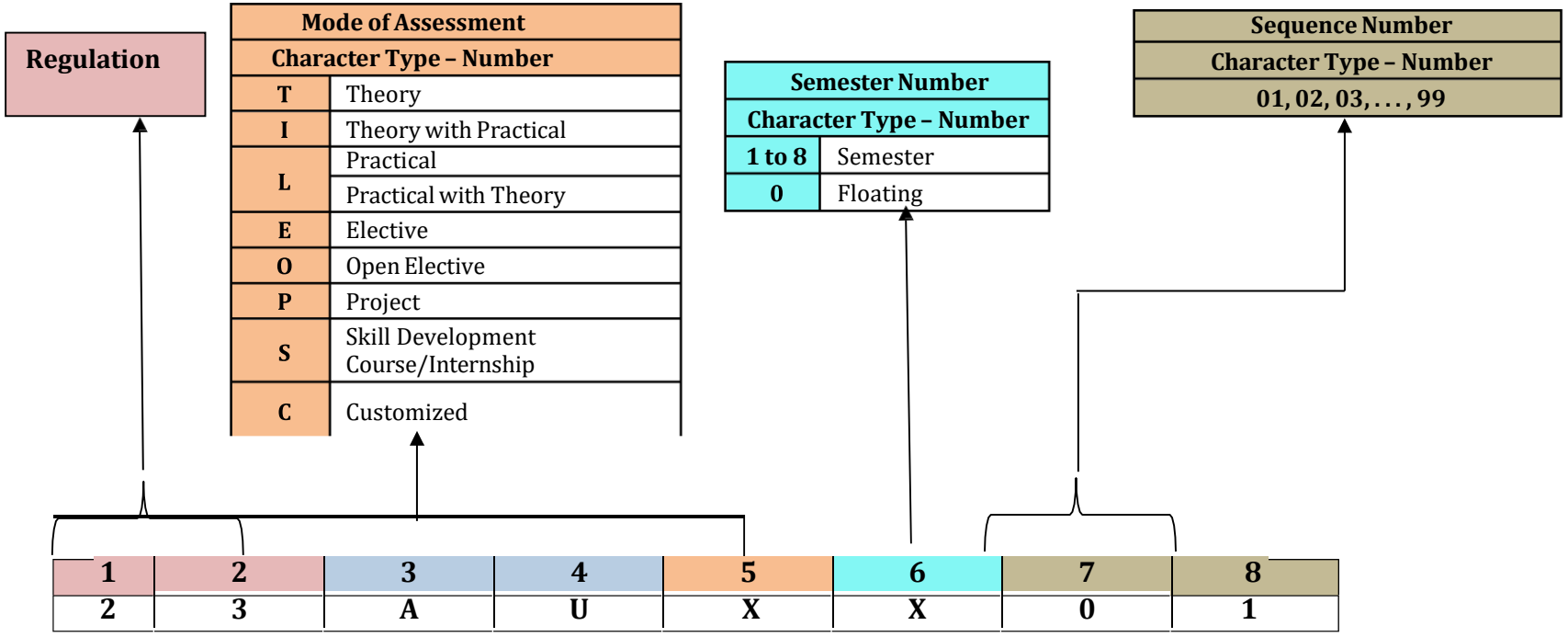
PSO2: Emerging Wireless Technologies: Develop expertise in wireless protocols such as MIMO, mmWave, and SDR systems to create innovative solutions for high-speed data transmission, energy-efficient communication, and reliable network connectivity.

TL Coordinator **Programme Coordinator** **Head of the Department**

Head - TLC

Dr.Mahalingam College of Engineering and Technology,Pollachi

2023 Regulations - Course Code Generation Procedure for UG Courses



Board/Department/Programme/Course Type			
Character Type – Alphabet			
AD	Artificial Intelligence & Data Science	**ME**	Mechanical
AM	CSE (Artificial Intelligence & Machine Learning)	**SC**	CSE (Cyber Security)
AU	Automobile	**PH**	Physics
CE	Civil	**CH**	Chemistry
CS	Computer Science	**EN**	English
EA	Advanced Communication Technology	**MA**	Mathematics
EC	Electronics and Communication	**ES**	Employability Skills
EE	Electrical and Electronics	**VA**	Value Added Course
EV	VLSI Design & Technology	**SA**	Studio Activities
IT	Information Technology		

Programme: B.E. Electronics and Communication (Advanced Communication Technology)

2023 Regulations

Curriculum for Semester I to IV

Type of Course	Course Code	Course Title	Duration	Credits	Marks
VAC	23VAL101	Induction Program	3 Weeks	-	100

Semester I

Type of Course	Course Code	Course Title	Hours/Week			Credits	Marks	Common to Programmes
			L	T	P			
AEC	23ENI101	Communication Skills I	2	0	2	3	100	All
Minor	23MAI102	Matrices and Calculus	3	0	2	4	100	AU,EA,EC, EE,EV&ME
Major	23ECT101	Electron Devices	3	0	0	3	100	EA,EC&EV
Major	23ECT001	Circuit Theory	3	0	0	3	100	EA,EC&EV
Multi Disciplinary	23ADT001	C Programming	3	0	0	3	100	CE,EA,EC & EV
Major	23ECL001	Electric Circuits and Electron Devices Laboratory	0	0	3	1.5	100	EA,EC&EV
Multi Disciplinary	23ADL001	C Programming Laboratory	0	0	3	1.5	100	CE,EA,EC &EV
VAC	23VAL102	Wellness for Students	0	0	2	1	100	All
VAC	23VAT101	தமிழர் மரபு /Heritage of Tamils	1	0	0	1	100	All
AEC	23SAL101	Studio Activities	0	0	2	-	-	All
		Total	15	0	14	21	900	

Passed in 01st Board of Studies Meeting held on 11.01.2024
Approved in 18th Academic Council Meeting held on 23.03.2024

BOS Chairman

Semester II

Type of Course	Course Code	Course Title	Hours/Week			Credits	Marks	Common to Programmes
			L	T	P			
AEC	23ENI201/ 23FLT201/ 23FLT202	Communication Skills II/ Foreign Language -Japanese/ Foreign Language - German	2 3 3	0 0 0	2 0 0	3	100	All
Minor	23MAI204	Linear Algebra and Complex Variable	3	0	2	4	100	--
Minor	23PHI201	Physics for Electrical Sciences	3	0	2	4	100	EA,EC,EE & EV
Major	23EAI201	Digital Principles and System Design	3	0	2	4	100	--
Multi Disciplinary	23ITT202	Problem Solving and Python Programming	3	0	0	3	100	EA,EC & EV
Multi Disciplinary	23MEL001	Engineering Drawing	1	0	3	2.5	100	AD,AM,AU,CS, EA,EC,EE,EV,IT, ME & SC
SEC	23ESL201	Professional Skills 1:Problem solving skills & Logical Thinking 1	0	0	2	1	100	All
VAC	23VAT201	தமிழரும் தொழில் நுட்பமும் / Tamils and Technology	1	0	0	1	100	All
Multi Disciplinary	23CHT202	Environmental Sciences	1	0	0	-	100	All
AEC	23SAL201	Studio Activities	0	0	2	-	-	All
		Total	17	0	15	22.5	900	

Passed in 01st Board of Studies Meeting held on 11.01.2024
Approved in 18th Academic Council Meeting held on 23.03.2024

BOS Chairman

Semester III

Type of Course	Course Code	Course Title	Hours/Week			Credits	Marks	Common to Programmes
			L	T	P			
Minor	23MAT304	Probability Theory for Communication Engineers	3	1	0	4	100	--
Major	23EAT301	Electronic Circuits	3	0	0	3	100	--
Major	23EAT302	Analog Communication	3	0	0	3	100	--
Major	23ECT002	Transmission Lines and Waveguides	3	0	0	3	100	EA & EC
Multi Disciplinary	23ITI001	Data Structures using C	3	0	2	4	100	EA & EC
Major	23EAL301	Electronic Circuits Laboratory	0	0	3	1.5	100	--
SEC	23ESL301	Professional Skills 2: Problem solving skills & Logical Thinking 2	0	0	2	1	100	All
VAC	23VAT301	Universal Human Values 2 :Understanding Harmony	2	1	0	3	100	All
AEC	23SAL301	Studio Activities	0	0	2	-	-	All
		Total	17	2	9	22.5	800	

Semester IV

Type of Course	Course Code	Course Title	Hours/Week			Credits	Marks	Common to Programmes
			L	T	P			
Minor	23MAT402	Numerical methods and optimization	3	1	0	4	100	--
Major	23EAT401	Antenna Design Technologies	3	0	0	3	100	--
Major	23EAT402	Microcontroller and its applications	3	0	0	3	100	--
Major	23EAT403	Digital Communication	3	0	0	3	100	--
Major	23EAT404	CMOS VLSI design	3	0	0	3	100	--
Major	23EAL401	Analog and Digital Communication Laboratory	0	0	3	1.5	100	--
Major	23EAL402	Microcontroller Laboratory	0	0	3	1.5	100	--
SEC	23ESL401	Professional Skills 3: Professional Development and Etiquette	0	0	2	1	100	All
AEC	23SAL401	Studio Activities	0	0	2	-	-	All
		Total	15	1	10	20	800	

Type of Course	Course Code	Course Title	Duration	Credits	Marks
Summer Internship	23XXXXXX	Internship 1/Community Internship /Skill Development	2 Weeks	1	100

Passed in 01st Board of Studies Meeting held on 11.01.2024
Approved in 18th Academic Council Meeting held on 23.03.2024

BOS Chairman

Tentative curriculum for semester V to VIII
Semester V

Type of Course	Course Code	Course Title	Hours/Week			Credits	Marks	Common to Programmes
			L	T	P			
Major	23XXXXXX	Signal Processing for Communication	3	0	2	4	100	--
Major	23XXXXXX	Microwave and optical communication	3	0	0	3	100	--
Major	23XXXXXX	Wireless Commuication	3	0	0	3	100	--
SEC	23XXXXXX	Microwave and Optical Communication Laboratory	0	0	3	1.5	100	--
Major	23XXXXXX	Professional Elective I	3	0	0	3	100	--
Major	23XXXXXX	Professional Elective II	3	0	0	3	100	--
SEC	23XXXXXX	Professional Skills :4	0	0	2	1	100	All
Research Project	23XXXXXX	Reverse Engineering Project	0	0	6	3	100	All
AEC	23SAL501	Studio Activities	0	0	2	-	-	All
		Total	15	0	15	21.5	800	

Semester VI

Type of Course	Course Code	Course Title	Hours/Week			Credits	Marks	Common to Programmes
			L	T	P			
Major	23XXXXXX	Software Defined Radio	3	0	0	3	100	--
Major	23XXXXXX	MIMO and OFDM techniques	3	0	0	3	100	--
Major	23XXXXXX	Professional Elective III	3	0	0	3	100	--
Major	23XXXXXX	Professional Elective IV	3	0	0	3	100	--
Minor	23XXXXXX	Open Elective I	3	0	0	3	100	--
Major	23XXXXXX	Software Defined Radio Laboratory	0	0	3	1.5	100	-
Major	23XXXXXX	MIMO and OFDM laboratory	0	0	3	1.5	100	-
SEC	23XXXXXX	Professional Skills :5	0	0	2	1	100	All
AEC	23SAL601	Studio Activities	0	0	2	-	-	All
		Total	15	0	10	19	800	

Type of Course	Course Code	Course Title	Duration	Credits	Marks
Summer Internship	23XXXXXX	Internship 2/ Research Internship/ Skill Development	2 Weeks	1	100

Passed in 01st Board of Studies Meeting held on 11.01.2024
Approved in 18th Academic Council Meeting held on 23.03.2024

BOS Chairman

Semester VII

Type of Course	Course Code	Course Title	Hours/Week			Credits	Marks	Common to Programmes
			L	T	P			
Major	23XXXXXX	5G Communication Technologies	3	0	0	3	100	--
Major	23XXXXXX	RF Circuit Design	3	0	0	3	100	--
Major	23XXXXXX	Millimeter wave communication	3	0	0	3	100	--
SEC	23XXXXXX	RF Circuit Design Laboratory	0	0	3	1.5	100	--
Major	23XXXXXX	Professional Elective V	3	0	0	3	100	--
Major	23XXXXXX	Professional Elective VI	3	0	0	3	100	--
Minor	23XXXXXX	Open Elective II	3	0	0	3	100	--
Research Project	23XXXXXX	Project Phase I	0	0	8	4	100	--
		Total	18	0	11	23.5	800	

Semester VIII

Type of Course	Course Code	Course Title	Hours/Week			Credits	Marks	Common to Programmes
			L	T	P			
Research Project	23XXXXXX	Project Phase II	0	0	12	6	200	--
Summer Internship	23XXXXXX	Internship 3/ Skill Development	8 Weeks			4	100	--
		Total	0	0	12	10	300	

Total Credits: 162

Passed in 01st Board of Studies Meeting held on 11.01.2024
Approved in 18th Academic Council Meeting held on 23.03.2024

BOS Chairman

SEMESTER I

Course Code:23VAL101		Course Title: Induction Program (Common to all B.E/B.Tech Programmes)	
Course Category: VAC		Course Level: Introductory	
Duration: 3 weeks	Mandatory Non-Credit Course	Max Marks:100	

Pre–requisites

- NIL

Course Objectives

The course is intended to:

1. Explain various sources available to meet the needs of self, such as personal items and learning resources
2. Explain various career opportunities, opportunity for growth of self and avenues available in the campus
3. Explain the opportunity available for professional development
4. Build universal human values and bonding amongst all the inmates of the campus and the society.

List of Activities:

1. History of Institution and Management: Overview on NIA Educational Institutions – Growth of MCET – Examination Process –OBE Practices –Code of Conduct – Centre of Excellence.
2. Lectures, interaction sessions and Motivational Talks by Eminent people, Alumni, Employer and Industry Experts
3. Familiarisation of Department / Branch:HoD's & Senior Interaction- Department Associatio
4. Universal Human Value Modules : Aspirations and concerns, Self Management, Relations Social and Natural Environment.
5. Orientation on Professional Skills Courses
6. Proficiency Modules : Mathematics, English, Physics and Chemistry
7. Introduction to various Chapters, Cells, Clubs and its events
8. Creative Arts : Painting, Music and Dance
9. Physical Activity :Games, Sports and Yoga
10. Group Visits: Visit to local area and Campus Tour

Course Outcomes	Cognitive Leve
At the end of this course, students will be able to:	
CO1 : Explain various sources available to meet the needs of self, such as personal items and learning resources through visit to local areas and campus	Understand
CO2: Explain various career opportunities and avenues available in the campus through orientation sessions	Understand
CO3: Explain the opportunity available for professional development through professional skills, curricular, co-curricular and extracurricular activities	Understand
CO4: Build universal human values and bonding amongst all the inmates of the campus and society for having a better life	Apply

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1	PO1	PO1	PSO	PSO
CO1	1	-	-	-	-	-	-	2	1	2	-	-	-	-
CO2	1	-	-	-	-	-	-	2	1	2	-	-	-	-
CO3	1	-	-	-	-	-	-	2	1	2	-	-	-	-
CO4	2	-	-	-	-	-	-	2	1	2	-	-	-	-

High : 3, Medium :2, Low: 1

Text Book(s):

T1. Reading material, Workbook prepared by PS team of the college

Reference Book(s):

R1. Sean Covey, “Seven habits of highly effective teenagers”, Simon & Schuster Uk, 2004.

R2. Vethathiri Maharishi Institute For Spiritual and Intuitional Education, aliyar, “value educat harmonious life (Manavalakalai Yoga)”, Vethathri Publications, Erode, 2010.

R3. Dr.R.Nagarathna, Dr.H.R. Nagendra, “ Integrated approach of yoga therapy for positive Swami Vivekananada Yoga Prakashana Bangalore,2008 Ed.

Web References:

1. https://youtube.com/playlist?list=PLYwzG2fd7hzc4HerTNkc3pS_IvcCfKznV
2. https://www.youtube.com/watch?v=P4vjfEVk&list=PLWDeKF97v9SO0frdgmpaghDMjkom1
3. https://fdp-si.aicte-india.org/download/AboutSIP/About%20SIP.pdf

Course Code: 23ENI101	Course Title: Communication Skills I (Common to all B.E/B.Tech Programmes)		
Course Category: AEC		Course Level: Introductory	
L:T:P(Hours/Week) 2:0:2	Credits: 3	Total Contact Hours:60	Max Marks:100

Course Objectives

The course is intended to impart formal and informal language effectively and accurately in various real-life contexts on par with B1 level of CEFR Scale.

Module I **20 Hours**

Grammar: Synonyms & Antonyms -Tense forms - Modals - Passives – Reported Speech – Comparatives and Descriptive adjectives.

Listening: Listening for gist and specific information - Listening to past events, experiences and job preferences - Listening to descriptions of monuments - Listening for excuses - Listening to description: transportation systems and public places.

Speaking: Introducing oneself - Exchanging personal information – Effective Conversations: Role Play Situations (Describing personality traits - Describing landmarks, monuments and festivals - Making polite requests and excuses - Discussing facts - Asking for and giving information – Expressing wishes - Talking about lifestyle changes - Talking about transportation and its problems - Describing positive and negative features of things and places - Making comparisons)

Reading: Skimming and Scanning - Reading Comprehension - Reading and comprehending online posts and emails – Case Studies

Writing: Letter writing (Permission letters - Online cover letter for job applications) - Instructions - Recommendations - Write a blog (General) - Report Writing (Industrial Visit Report and Event Reports) - formal and informal emails.

Module II **20 Hours**

Grammar: Sequence adverbs - Phrasal verbs - Relative clauses – Imperatives - Infinitives - Conditionals.

Listening: Listening to review of food items - Listening to results of surveys- Listening to motivational talks & podcasts

Speaking: Expressing likes and dislikes - Describing a favourite snack - Giving advices and suggestions - Speculating about past and future Events – Group Discussion

Reading: Reading different expository texts - Reading to factual texts - Print and online media- Reading Comprehension

Writing: Process Descriptions – Email Writing (Requesting for information) - Reviewing Movie – Social media feeds/posts (Any Social Media)

List of Experiments: **20 Hours**

1. Mini Presentation and Picture Prompt Discussion
2. Debate Tournament
3. Listening, Mind Mapping & Summarization
4. Listening to Stories and Providing the Innovative Climax
5. Reading Comprehension
6. Writing - Interpretation of Visuals

Course Outcomes	**Cognitive Level**
At the end of this course, students will be able to:	
CO 1 : Utilize the basic English grammar and vocabulary to acquire professional communication skills.	Apply
CO 2 : Develop listening and speaking skills through classroom activities based on listening comprehension, recapitulation, interpretation and debate on the same	Apply
CO 3 : Read and write social media posts and comments	Apply
CO 4 : Perform as a member of a team and engage in individual presentation	Apply

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO4	-	-	-	-	-	-	-	-	2	3	-	-	-	-

High-3; Medium-2;Low-1

Textbooks:

T1. Jack C. Richards, Jonathan Hull, and Susan Proctor, “Interchange - Student’s book 2”, 5thEdition, Cambridge University Press, South Asia Edition, 2022.

T2. Jack C. Richards, Jonathan Hull, and Susan Proctor, “Interchange - Student’s Book 1”, 5thEdition, Cambridge University Press, South Asia Edition, 2022.

Reference Book(s):

R1. David Bohlke, Jack C. Richards, “Four Corners”, 2nd Edition, Cambridge University Press,2018.

R2. Adrian Doff, Craig Thaine, Herbert Puchta, Jeff Stranks, Peter Lewis-Jones, Graham Burton,Empower B1 – Student’s Book, Cambridge University Press, 2020.

R3. Raymond Murphy, “Intermediate English Grammar” 30th Edition, Cambridge University Press,2022.

Web References:

1. https://speakandimprove.com/
2. https://writeandimprove.com/
3. https://www.cambridgeenglish.org/exams-and-tests/linguaskill/

Course Code: 23MAI102		Course Title: Matrices and Calculus (Common to AU, EA, EC, EE, EV & ME)	
Course Category: Minor		Course Level: Introductory	
L:T:P(Hours/Week) 3:0 :2	Credits: 4	Total Contact Hours:75	Max Marks:100

Course Objectives:

The course is intended to impart knowledge on the use of matrix algebra techniques for practical applications, familiarize with differential calculus and acquire knowledge of mathematical tools to evaluate multiple integrals.

Module I **23 Hours**

Matrices

Definitions and examples of symmetric, skew symmetric and orthogonal matrices - Eigenvalues and Eigenvectors – Properties of Eigenvalues and Eigenvectors-Diagonalization of matrices through orthogonal transformation - Cayley-Hamilton Theorem (without proof) – verification problems and properties - Transformation of quadratic forms to canonical forms through orthogonal transformation.

Differential and Integral Calculus

Curvature – Radius of curvature –Centre of curvature- Circle of curvature - Evolutes and Involutes - Evaluation of definite and improper integrals - Beta and Gamma functions – Properties and applications.

Multivariable Differentiation I

Limit – continuity - Mean value theorems and partial derivatives - Taylor's series and Maclaurin's series – Jacobian of functions of several variables.

Module II **22 Hours**

Multivariable Differentiation II

Maxima, Minima and saddle points of functions of several variables - Method of Lagrange's multipliers.

Multiple Integral

Multiple Integration: Double integrals - Change of order of integration in double integrals - Change of variables (Cartesian to polar, Cartesian to spherical and Cartesian to cylindrical) - Triple integrals - Applications: Finding areas and volumes.

Ordinary Differential Equations Of Second and Higher Orders

Second and higher order linear differential equations with constant coefficients – Second order linear differential equations with variable coefficients (Cauchy - Euler equation, Legendre's equation) – Method of variation of parameters – Solution of first order simultaneous linear ordinary differential equations

List of Experiments: **30 Hours**

1. Introduction to MATLAB.
2. Rank of matrix and solution of system of linear algebraic equations.
3. Finding Eigen values and Eigen vectors of a matrix.
4. Solving ordinary differential equation.
5. Gram Schmidt Procedure.
6. Finding Maxima, Minima of a function.

Course Outcomes	**Cognitive Level**
At the end of this course, students will be able to:	
CO1: Determine the canonical form of a quadratic form using orthogonal transformation.	Apply
CO2: Identify the evolute of a curve and solve the improper integrals using beta gamma functions.	Apply
CO3: Examine the extreme value of multivariate functions.	Apply
CO4: Evaluate the area and volume using multiple integrals and solve the higher order differential equations.	Apply
CO5: Demonstrate the understanding of calculus concepts through modern tools.	Apply

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	3	-	-	-	-	-	-	-	-	-

High-3; Medium-2;Low-1

Text Book(s):

T1. Erwinkreyzig, Advanced Engineering Mathematics, 9th edition, John Wiley& Sons, 2006.

T2. Veerarajan T., Engineering Mathematics for first year, 3rd edition, Tata McGraw-Hill,

Reference Book(s):

R1. G.B.Thomas and R.L Finney, Calculus and Analytic Geometry, 9th edition, Pearson, Reprint, 2002.

R2. B.S.Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.

R3. P. Sivaramakrishna Das , C. Vijayakumari , Engineering Mathematics, Pearson India, 2017.

Web References:

1. https://nptel.ac.in/courses/111107112
2. https://nptel.ac.in/courses/111104031

Course Code: 23ECT101		Course Title: Electron Devices (Common to EA ,EC & EV)	
Course Category: Major		Course Level: Introductory	
L:T:P(Hours/Week) 3: 0: 0	Credits:3	Total Contact Hours:45	Max Marks:100

Course Objective:

The course is intended to impart knowledge of basic electronic devices such as diodes, Bipolar junction Transistors and Field effect transistors.

Module I **23 Hours**

Semiconductor Diode: PN junction - forward and reverse bias conditions. V-I Characteristics and its Temperature dependence – Diode specifications - Diode Resistance – Diode junction Capacitance – Transition and Diffusion capacitances - Rectifiers - Clipper - Clamper

Special Diodes: Zener diode - Characteristics of Zener diode - Avalanche and Zener breakdown - Application of Zener diode :Voltage regulator - Varactor diode, Tunnel diode, Light emitting diodes – Photo diodes

Bipolar Junction Transistors: Bipolar Junction Transistor and its types: NPN and PNP Transistor - Transistor operation - Configurations of BJT : Input and output characteristics of CE, CB and CC configurations - Transistor as a Switch and Amplifier.

Module II **22 Hours**

Field Effect Transistors: JFET and its types, construction and operation of n- channel and p-channel JFETs – characteristics curves – FET applications – Comparison of BJT and JFET

MOSFETS and Power Devices: MOSFETs: Depletion MOSFETs and Enhancement MOSFETs – construction and operation - Drain and Transfer characteristics - Differences between JFETs and MOSFETs – Precaution in handling MOSFETs - MOSFET as a switch.

Construction, operation and characteristics of SCR, DIAC, TRIAC, Power transistor and IGBT

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO 1: Understand and explain the construction and characteristics of PN junction diode, special diodes, BJTs, FETs and Power devices.	Understand
CO 2: Identify a suitable electronic device and develop appropriate circuit for the given application.	Analyze
CO 3: Engage in independent study as a member of a team and make an effective oral presentation on the applications of various Electron devices.	Apply

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	-	-	-	-	-	-	-	2	2	-	1	1	-

High-3; Medium-2; Low-1

Text Book:

T1. Millman J. , Halkias C. C. "Electronic Devices and Circuits ", Tata McGraw Hill, New Delhi, 2011.

Reference Book(s):

R1. Salivahanan.S, Suresh kumar.N and Vallavaraj.A, “Electronic Devices and Circuits”, Second Edition, TMH, New Delhi, 2008.

R2. Robert Boylestad and Louis Nashelsky, “Electron Devices and Circuit Theory”, Pearson Prentice Hall, Tenth Edition, 2008.

R3. Streetman Ben G. and Banerjee Sanjay, “Solid State Electronic devices”, PHI, Sixth Edition, 2006

R4. David A. Bell, “Electronic Devices and Circuits”, Oxford University Press, Fifth Edition, 2008

Web References:

1. http://nptel.ac.in/video.php?subjectId=117103063
2. http://nptel.ac.in/video.php?subjectId=117106091
3. www.youtube.com/watch?v=Wf19II0ts84

Course Code: 23ECT001		Course Title: Circuit Theory (Common to EA ,EC&EV)	
Course Category: Major		Course Level: Introductory	
L:T:P(Hours/Week) 3:0:0	Credits:3	Total Contact Hours:45	Max Marks:100

Course Objective:

The course is intended to impart knowledge of the fundamentals of Electric circuits and its analysis.

Module I **23 Hours**

Fundamentals of Electric Circuits: Ohm's law - Kirchoff's Laws –Series resistive circuit- Voltage division rule- Parallel resistive circuit – Current division rule– Source transformation – Star to delta and delta to star transformation

Time period, Frequency, Angular frequency, Average value, Root mean square value, Form factor and Peak factor of sinusoidal.

Analysis of DC and AC Circuits: Mesh and node method of analysis - Networks theorem: Superposition Theorem , Thevenin's Theorem, Norton's theorem and Maximum power transfer theorem.

Module II **22 Hours**

Resonance and Coupled Circuits: Series resonance-Voltage and Current in a series resonance, Impedance and phase angle. Parallel resonance-Resonant frequency - Variation of Impedance with frequency Coupled circuits- mutual inductance, Coefficient of coupling.

Transient Response of Networks: Steady state and Transient response - Response of an R-L, R-C and R-L-C circuits under DC excitation.

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO1: Define, understand, and explain the various laws for analyzing Electric circuits.	Understand
CO2: Apply the knowledge of network laws and theorems to the given electric circuit to obtain the required parameters.	Apply
CO3: Analyze the resonance and transient behaviour of the given electric circuit using appropriate mathematical tools.	Analyze

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	-	-	-	-	-	-	-	-	-	-	1	1	-
CO3	-	3	-	-	-	-	-	-	-	-	-	-	-	-

High-3; Medium-2; Low-1

Text Book(s):

T1.Sudhakar A, Shyammohan S. Pillai "Circuits and Networks -Analysis and Synthesis", McGraw Hill., New Delhi, 2015

Reference Book(s):

R1. William H. Hayt and Jack E. Kemmerly, “Engineering Circuit Analysis ", McGraw Hill International Edition, 2006

R2. Singh "Network Analysis and Synthesis", McGraw-Hill Education., New Delhi, 2013

R3. M. Arumugham and N.Prem kumar, “Electric Circuit Theory”, Khanna publishers, 2010

R4. Alexander C, Sadiku M. N. O "Fundamentals of Electric Circuits", Tata McGraw Hill., New Delhi, 2013

Web References:

1. http://nptel.ac.in/video.php?subjectId=108102042
2. http://nptel.ac.in/courses/108102042/
3. http://nptel.ac.in/courses/108105053/
4. http://freevideolectures.com/Course/2336/Circuit-Theory/

Course Code: 23ADT001		Course Title: C Programming (Common to CE,EA,EC , & EV)	
Course Category: Multi-disciplinary		Course Level: Introductory	
L:T:P(Hours/Week) 3: 0: 0	Credits:3	Total Contact Hours:45	Max Marks:100

Course Objectives:

The course helps to understand the structured and procedural programming skills. The major objective is to provide students with understanding of code organization and functional hierarchical decomposition using complex data types.

Module I **22 Hours**

Basics Of Computer Organization: Generation and Classification of Computers – Basic Organization of a Computer **—** Softwaredevelopment life cycle – Problem Solving Techniques, Algorithm, Pseudo code and Flow Chart.

Introduction To C Programming: Introduction – Structure of a C program – Keywords – Identifiers – Constants – Variables – Data Types – Operators and Expressions – Formatted & Unformatted I/O functions – Decision statements – Loop control statements.

Arrays: Characteristics – Declaration- One-dimensional array, Two-dimensional arrays

Module II **23 Hours**

Functions: Declaration & Definition of function – Built in function – User defined function -Types of functions – Call by value & reference.

Strings and Pointers: Formatting strings – String handling functions. Pointers: Features and Types of pointers – Arithmetic operations with pointers–Pointers and Arrays- Array of Pointers-Pointers and Strings

Structures and Union: Structures: Features – Operations on Structures – Array of structures – Pointers to Structures -Unions-Union of Structures.

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO1: Correlate the fundamental concepts of computer organization such as architectures of the processors and project management for real time application	Apply
CO2: Infer the fundamental concepts of programming, such as variables, data types and control structures for real time problems	Analyze
CO3: Apply programs solving skills and knowledge of C programming constructs to solve the given one dimensional and two dimensional datasets	Apply
CO4: Build a modules to solve the given application using functions	Apply
CO5: Develop a program by accessing the address of the variable using pointers and manipulation of characters using string handling functions	Apply
CO6: Test the performance of the students by group assignments and projects on real time problems	Evaluate

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	2	-	-	-	-	-	-	-
CO3	3	-	-	-	-	-	-	-	-	-	-	-
CO4	2	-	1	-	-	-	-	-	-	-	-	-
CO5	3	-	-	1	-	-	-	-	-	-	-	-
CO6	-	1	-	3	2	-	-	-	2	-	-	2

High-3; Medium-2; Low-1

Text Book(s):

T1. Ashok N.Kamthane, Amit.N.Kamthane, "Programming in C", 3rd Edition,Pearson Education, 2015.

T2. Deitel H M and Deitel P J, "C How to Program", Prentice Hall, 2013.

Reference Book(s):

R1. Ajay Mittal, "Programming in C-A Practical Approach", 3rd Edition, Pearson Education, 2010.

R2. Yashavant P.Kanetkar," Let Us C" , 16th Edition, BPB Publications, 2018.

R3. Herbert Schildt, "C The Complete Reference", Tata McGraw Hill, 2010.

R4. S Gottfried Byron, "Programming With C", Tata McGraw Hill, 2011.

Web References:

1. NPTEL course content on Introduction To Programming In https://onlinecourses.nptel.ac.in/noc22_cs40
2. Complete guide on Learn C programming: http://www.cprogramming.com/
3. Complete reference manual on C programming: http://www.c4learn.com/

Course Code: 23ECL001	Course Title: Electric Circuits and Electron Devices Laboratory (Common to EA, EC & EV)		
Course Category: Major		Course Level: Introductory	
L:T:P (Hours/Week) 0:0:3	Credits:1.5	Total Contact Hours:45	Max Marks:100

Course Objective:

The course is intended to verify the electric circuit, network theorems and characteristics of the basic electronic devices.

List of Experiments:

1. PN Junction Diode and Zener diode Characteristics
2. Half wave and Full wave Rectifier circuits
3. Regulator using Zener diode
4. Wave shaping circuits: Clippers and clampers
5. Characteristics of Common Emitter configuration
6. Characteristics of Common Base configuration
7. FET characteristics and its application as a switch
8. Verification of Kirchhoff's Voltage and Current laws
9. Verification of Super Position Theorem
10. Verification of Thevenin's and Norton's theorems
11. Verification of Maximum Power transfer theorem
12. Determination of Resonance frequency of Series & Parallel RLC Circuits

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO1: Conduct experiments to verify the characteristics of devices and theorems for Electric circuits.	Evaluate
CO2: Compare the experimental results obtained during verification of network theorems with simulation results.	Analyze

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	3	-	-	-	-	1	1	-	-	-	-
CO2	-	3	-	-	3	-	-	-	-	-	-	1	1	-

High-3; Medium-2; Low-1

Reference:

1. Laboratory Manual Prepared by Faculty of Electronics and Communication Engineering, Dr. Mahalingam College of Engineering and Technology.

Passed in 01st Board of Studies Meeting held on 11.01.2024
Approved in 18th Academic Council Meeting held on 23.03.2024 BOS Chairman

Course Code:23ADL001	Course Title: C Programming Laboratory (Common to CE,EA,EC,&EV))		
Course Category: Multi-disciplinary		Course Level: Introductory	
L:T:P(Hours/Week) 0:0:3	Credits:1.5	Total Contact Hours:45	Max Marks:100

Course Objectives

The course introduces students to the practical knowledge of programming using C programming language as an implementation tool. It aims at providing students with understanding of programming essentials used within the framework of imperative and structural programming paradigms.

List of Experiments:

1. Implement basic C programs using data types
2. Implement programs using Operators and Expressions
3. Develop Programs using Branching statements
4. Implement Programs using Control Structures
5. Develop programs using Arrays
6. Implement programs using Functions
7. Implement programs using String Operations
8. Develop programs using Pointers
9. Implement programs using Structures
10. Develop programs using Union

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO1: Write programs using appropriate programming constructs.	Apply
CO2: Apply programs solving skills and knowledge of C programming constructs to solve the given one dimensional and two dimensional dataset	Apply
CO3: Develop a program by accessing the address of the variable using pointers and manipulation of characters using string handling functions	Analyze
CO4: Evaluate modular programming techniques to break down complex programs into smaller and manageable modules	Evaluate

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	-	-	3	-	-	-	-	-	-	-
CO2	3	-	-	-	3	-	-	-	-	-	-	-
CO3	-	2	-	-	3	-	-	-	-	-	-	-
CO4	-	-	-	3	3	-	-	-	-	-	-	1

High-3; Medium-2; Low-1

Text Book(s):

T1. Ashok N.Kamthane,Amit.N.Kamthane, “Programming in C”, 3rd Edition, Pearson education, 2015.

T2. Deitel H M and Deitel P J, “C How to Program”, Prentice Hall, 2013.

Reference Book(s):

R1. Ajay Mittal, “Programming in C-A Practical Approach”, 3rd Edition, Pearson Education, 2010.

R2. Yashavant P.Kanetkar, “Let Us C”, 16th Edition, BPB Publications, 2018.

R3. Herbert Schildt, “C The Complete Reference", Tata McGraw Hill, 2010.

Web References:

1. C programming resources: https://electronicsforu.com/resources/15-free-c-programming-ebooks
2. C programming tutorials: https://www.fromdev.com/2013/10/c-programming-tutorials.html
3. C Manual: https://books.goalkicker.com/CBook

Course Code: 23VAL102		Course Title: Wellness for Students (Common to all B.E/B.Tech Programmes)	
Course Category: VAC		Course Level: Introductory	
L:T:P(Hours/Week) 0: 0 :2	Credits:1	Total Contact Hours:30	Max Marks:100

Course Objectives:
The course is intended to impart knowledge on setting SMART goals for academic, career and life, applying time management techniques, articulating the importance of wellness for success in life and understanding the dimensions of wellbeing and relevant practices.

Module I **15 Hours**

GOAL SETTING Understanding Vision and mission statements - Writing personal mission statements – 'Focus' as a way of life of most successful people. Clarifying personal values, interests and orientations – Awareness of opportunities ahead – Personal SWOT analysis - Principles driving goal setting: Principle of response and stimuli, Circle of influence and circle of concern, What you see depends on the role you assume. Potential obstacles to setting and reaching your goals - Five steps to goals setting: SMART goals, Inclusive goals, Positive stretch, Pain vs gain, Gun-point commitment.

TIME MANAGEMENT - TOOLS AND TECHNIQUES Importance of planning and working to time. Pareto 80-20 principle of prioritization – Time quadrants as a way to prioritize weekly tasks – The glass jar principle - Handling time wasters – Assertiveness, the art of saying 'NO' – Managing procrastination.

CONCEPT OF WELLNESS – impact of absence of wellness - Wellness as important component to achieve success. Wellbeing as per WHO - Dimensions of Wellbeing: Physical, Mental, Social, Spiritual – indicators and assessment methods

Module II **15 Hours**

Simplified Physical Exercises. Fitness as a subset of Wellness – health related physical fitness - skill related physical fitness. Joint movements, Warm up exercises, simple asanas, WCSC simplified exercises.

PRACTICES FOR MENTAL WELLNESS

Meditation: Mind and its functions - mind wave frequency – Simple basic meditation – WCSC meditation and introspection tables. Greatness of friendship and social welfare – individual, family and world peace – blessings and benefits.
Food & sleep for wellness: balanced diet - good food habits for better health (anatomic therapy) – hazards of junk food - food and the gunas.

PUTTING INTO PRACTICE
Practicals: Using the weekly journal – Executing and achieving short term goals – Periodic reviews.

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO 1: Set well-articulated goals for academics, career, and personal aspirations	Apply
CO 2: Apply time management techniques to complete planned tasks on time	Apply
CO 3: Explain the concept of wellness and its importance to be successful in career and life	Apply
CO 4: Explain the dimensions of wellness and practices that can promote wellness	Apply
CO 5: Demonstrate the practices that can promote wellness	Valuing

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	-	-	-	1	1	-	1
CO2	-	-	-	-	-	-	-	-	1	-	1	1
CO3	-	-	-	-	-	-	-	-	1	-	-	1
CO4	-	-	-	-	-	-	-	-	1	-	-	1
CO5	-	-	-	-	-	1	1	-	1	-	-	1

High-3; Medium-2;Low-1

Text Book(s):

T1. Reading material, workbook and journal prepared by PS team of the college

Reference Book(s):

R1. Stephen R Covey, “First things first”, Simon & Schuster UK, Aug 1997

R2. Sean Covey, “Seven habits of highly effective teenagers”, Simon & Schuster UK, 2004.

R3. Vethathiri Maharishi Institute for Spiritual and Intuitional Education, Aliyar, “Value education for harmonious life (Manavalakalai Yoga)”, Vethathiri Publications, Erode, I Ed. (2010).

R4. Dr. R. Nagarathna, Dr. H.R. Nagendra, “Integrated approach of yoga therapy for positive health”, Swami Vivekananda Yoga Prakashana, Bangalore, 2008 Ed.

R5. Tony Buzan, Harper Collins, “The Power of Physical Intelligence English”

Course Code: 23VAT101	Course Title: HERITAGE OF TAMILS (Common to all B.E/B.Tech Programmes)		
Course Category: VAC		Course Level: Introductory	
L:T:P (Hours/Week) 1: 0 :0	Credit: 1	Total Contact Hours: 15	Max Marks:100

Pre–requisites

- NIL

Course Objectives

மாணவர்கள் இப்பாடத்தை கற்றலின் மூலம்

CO.1 மொழி மற்றும் இலக்கியம், பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை – சிற்பக் கலை , நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுகள் , திணைக் கோட்பாடுகள் மூலம் தமிழர் மரபை அறிந்து கொள்ள இயலும்.

CO.2இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பை அறிந்து கொள்ள இயலும்.

தமிழர் மரபு

அலகு 1 – 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 2 – மரபு – பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை – சிற்பக் கலை 3

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

அலகு 3 – நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுகள் 3

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

அலகு 4 – தமிழர்களின் திணைக் கோட்பாடுகள் **3**

தமிழகத்தின் தாவரங்களும், விலங்குகளும் – தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புறக் கோட்பாடுகள் – தமிழர்கள் போற்றிய அறக் கோட்பாடு – சங்க காலத்தில் தமிழகத்தில் எழுத்தறிவும், கல்வியும் – சங்ககால நகரங்களும் துறைமுகங்களும் – சங்க காலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி – கடல் கடந்த நாடுகளில் சோழர்களின் வெற்றி.

அலகு 5 – இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு **3**

இந்திய விடுதலைப் போரில் தமிழர்களின் பங்கு – இந்தியாவின் பிறபகுதிகளில் தமிழ்ப் பண்பாட்டின் தாக்கம் – சுய மரியாதை இயக்கம் – இந்திய மருத்துவத்தில் சித்த மருத்துவத்தின் பங்கு – கல்வெட்டுகள், கையெழுத்துப் படிகள்– தமிழ்ப் புத்தகங்களின் அச்சு வரலாறு.

TOTAL : 15 PERIODS

Course Outcomes	**Cognitive Level**
மாணவர்கள் இப்பாடத்தை கற்றபின்	
CO.1 மொழி மற்றும் இலக்கியம், பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை – சிற்பக் கலை , நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுகள் , திணைக் கோட்பாடுகள் மூலம் தமிழர் மரபை அறிந்து கொள்வார்கள்.	அறிதல் (Understand)
CO.2 இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பை அறிந்து கொள்வார்கள்.	அறிதல் (Understand)

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	-	-	-	1	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	1	-	-

High–3; Medium–2; Low–1

Passed in 01st Board of Studies Meeting held on 11.01.2024
Approved in 18th Academic Council Meeting held on 23.03.2024 BOS Chairman

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 சங்க கால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)

4. பொருநை – ஆற்றங்கரை நாகரிகம் (தொல்லியல் துறை வெளியீடு)

5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)

6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.

7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).

8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)

9. Keeladi - 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by:
Department of Archaeology & Tamil Nadu 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.

Passed in 01st Board of Studies Meeting held on 11.01.2024
Approved in 18th Academic Council Meeting held on 23.03.2024 BOS Chairman

Course Code: 23VAT101	Course Title: HERITAGE OF TAMILS (Common to all B.E/B.Tech Programmes)		
Course Category: VAC		Course Level: Introductory	
L:T:P (Hours/Week) 1: 0 :0	Credit: 1	Total Contact Hours: 15	Max Marks:100

Pre–requisites

- NIL

Course Objectives

The course is intended to:

1. Understand the Heritage of Tamils in terms of Language and Literature, Rock Art Paintings to Modern Art – Sculpture, Folk and Martial Arts, Thinai Concept.
2. Understand the Contribution of Tamils to Indian National Movement and Indian Culture.

HERITAGE OF TAMILS

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

Course Outcomes	**Cognitive Level**
At the end of this course, students will be able to:	
CO.1 Understand the Heritage of Tamils in terms of Language and Literature, Rock Art Paintings to Modern Art – Sculpture, Folk and Martial Arts, Thinai Concept.	Understand
CO.2 Understand the Contribution of Tamils to Indian National Movement and Indian Culture.	Understand

Course Articulation Matrix

CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	-	-	-	-	-	-	-	-	-	-	-	1	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	1	-	-

High–3; Medium–2; Low–1

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 சங்க கால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)

4. பொருநை – ஆற்றங்கரை நாகரிகம் (தொல்லியல் துறை வெளியீடு)

5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)

6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.

7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).

8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)

9. Keeladi - 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by:
Department of Archaeology & Tamil Nadu 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.

Passed in 01st Board of Studies Meeting held on 11.01.2024
Approved in 18th Academic Council Meeting held on 23.03.2024 BOS Chairman

SEMESTER II

Course Code: 23ENI201		Course Title: Communication Skills II (Common to all B.E/B.Tech Programmes)	
Course Category: AEC		Course Level: Introductory	
L:T:P(Hours/Week) 2:0:2	Credits: 3	Total ContactHours:60	Max Marks:100

Course Objectives

The course is intended to impart effective and accurate language in business correspondence on par with B2 level of CEFR Scale.

20 Hours

Module I

Grammar: Linking Words - Collocations –Sentence Completion - Articles –Adverbs– Indefinite Pronoun

Listening: Listening to short conversations - Listening for gist and summarizing - Listening for detail - Responding to straightforward questions.

Speaking: Making statements of facts - Agreeing and disagreeing to opinions - Respond to queries - Group Discussion.

Reading: Read and select (phrasal verbs & relative clause)- Cloze Test - Gapped sentences - Multiple- choice gap-fill

Writing: Paragraph Writing: Descriptive, narrative, persuasive and argumentative - Emails: Giving information - Making enquiries - Responding to enquiries - Power Point Presentation

Module II **20 Hours**

Grammar: Expressions of cause and result – Concord - Error Spotting (Parts of Speech & Indian English) - Prepositions

Listening: Listening for identifying main points - Responding to a range of questions about different topics - Listening to identify relevant information

Speaking: Empathetic Enunciation – Situation handling – Visual Interpretation - - Short presentations

Reading: Intensive Reading: Comprehending business articles, reports and proposals and company websites-- Open gap-fill - Extended reading

Writing: – Report Writing - Memo – Complaint letter - Business Letters (Seeking permission & Providing Information)

List of Experiments: **20 Hours**

1. Listening to Monologue and Extended Listening Activity I
2. Listening to Monologue and Extended Listening Activity II
3. Expressing Opinions and Situational based speaking
4. Mini Presentation and Visual Interpretation
5. Reading Comprehension
6. Writing letter, email and report

Course Outcomes	**Cognitive Level**
At the end of this course, students will be able to:	
CO1: Identify the common errors in written and spoken correspondence.	Apply
CO2: Develop listening, reading and speaking skills through task based activities in listening, reading comprehension, recapitulation, interpretation and discussion.	Apply
CO3: Read business correspondences like memo, Email, letter, proposals and write reports and website entries and product launches.	Apply
CO4: Perform as an individual and member of a team and engage effectively in group discussion and individual presentation.	Apply

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO4	-	-	-	-	-	-	-	-	2	3	-	-	-	-

High-3; Medium-2;Low-1

Textbooks:

T1. Guy Brook- Hart, "Business Benchmark Upper Intermediate", 2nd Edition, South Asian, Cambridge University Press, 2020.

T2. Norman Whitby, "Business Benchmark pre-intermediate to Intermediate", 2nd Edition, South Asian, Cambridge University Press, 2014.

Reference Book(s):

R1. Hewings Martin - Advanced Grammar in use Upper-intermediate Proficiency, CUP,3rd Edition,2013.

R2. Clark David – Essential BULATS (Business Language Testing Service), CUP, 2006.

R3. Adrian Doff, Craig Thaine, Herbert Puchta, Jeff Stranks, Peter Lewis-Jones, Rachel Godfrey,Gareth Davies, Empower B1+ – Student's Book, Cambridge University Press,2015.

Web References:

1. https://speakandimprove.com/
2. https://writeandimprove.com/
3. https://www.cambridgeenglish.org/exams-and-tests/linguaskill/

Course Code:23FLT201		Course Title: FOREIGN LANGUAGE -JAPANESE (Common to all B.E/B.Tech Programmes)	
Course Category: AEC		Course Level: Introductory	
L:T:P (Hours/Week) 3: 0: 0	Credits:3	Total Contact Hours:45	Max. Marks:100

Course Objectives:

The course objectives intended to:

1. Express a basic exposure on Japanese language and culture
2. Express thoughts and communicate in the beginner level of Japanese with native Japanese speaker
3. Identify the kanji etymology as well as use it in basic vocabulary required for the JLPT/NAT 5 examination level
4. Read and write 100 kanji of the official JLPT N5
5. Choose the appropriate verb forms for learning and practicing the Japanese language

UNIT I Introduction to Japan and greetings 9 Hours

Japan : Land and culture - Introduction to Japanese language – Greetings – Seasons - Days of the week - Months of the year – Dates of the month - Self introduction – Numbers (Upto 99,999) – Expressing time – Conversation audio and video.

Listening: Listening to Greetings - Listening for Specific Information: Numbers, Time. Speaking: Self-Introduction

UNIT II Building vocabulary 9 Hours

Family relationships - Colours - Parts of body - Profession - Directions - Time expressions (today, tomorrow, yesterday, day before, day after) - Japanese housing and living style - Food and transport (vocabulary) - Stationery, fruits and vegetables

Listening: Listening for Specific Information: Directions, Family Members, Parts of body Speaking: Introducing one's family.

UNIT III Writing systems 9 Hours

Hiragana Chart 1 - vowels and consonants and related vocabulary – Hiragana Charts 2&3, double consonants, vowel elongation and related vocabulary – Introduction to Kanji – Basic Vocabulary – Basic Conversational Phrases.

Listening: Listening to Japanese Alphabet Pronunciation, Simple Conversation.

Speaking: Pair Activity (Day to day situational conversation)

UNIT IV Kanji and preposition 9 Hours

Katakana script and related vocabulary – Basic kanjis: naka, ue, shita, kawa , yama , numbers (1- 10, 100, 1000, 10,000 and yen) , person, man, woman, child, tree , book , hidari, migi, kuchi , 4 directions - Usage of particles wa, no, mo and ka and exercises - Usage of kore, sore, are, kono, sono, ano, arimasu and imasu - Particles – ni (location) and ga , donata and dare - Particles ni (time), kara, made , ne , koko, soko, asoko and doko - Directions : kochira, sochira, achira and dochira , associated vocabulary (mae, ushiro, ue, shita, tonari, soba, etc.)

Listening: Listening to conversation with related particles

UNIT V Verb forms 9 Hours

Introduction to Verbs - Verbs –Past tense, negative - i-ending and na-ending adjectives introduction - ~masen ka, mashou - Usage of particles de, e , o, to, ga(but) and exercises - Adjectives (present/past – affirmative and negative) – Counters - ~te form

Listening: Listening to different counters, simple conversations with verbs and adjectives.

Speaking: Pair Activity (Explaining one's daily routine by using appropriate particles and verbs)

Course Outcomes		**Cognitive Level**
At the end of this course, students will be able to:		
CO1:	Recognize and write Japanese alphabet	Understand
CO2:	Comprehend the conversation and give correct meaning	Understand
CO3:	Apply appropriate vocabulary needed for simple conversation in Japanese language	Apply
CO4:	Apply appropriate grammar to write and speak in Japanese language	Apply
CO5:	Speak using words of the Japanese language	Apply

Text Book:

T1. Genki 1 Textbook: An Integrated Course in Elementary Japanese by Eri Banno, Yoko Ikeda, Yutaka Ohno, Yoko Sakane, Chikako Shinagawa, Kyoko Tokashiki published by The Japan Times

T2. Genki 1 Workbook: An Integrated Course in Elementary Japanese by Eri Banno published by The Japan Times

Reference:

1. *Japanese for Everyone: Elementary Main Textbook1-1*, Goyal Publishers and Distributors Pvt. Ltd., Delhi, 2007
2. *Japanese for Everyone: Elementary Main Textbook1-2*, Goyal Publishers and Distributors Pvt. Ltd., Delhi, 2007
3. www.japaneselifestyle.com
4. www.learn-japanese.info/

5. www.learn.hiragana-katakana.com/typing-hiragana-characters/
6. www.kanjisite.com/

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO2
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	3	-	1	-	-
CO4	-	-	-	-	-	-	-	-	-	3	-	1	-	-
CO5	-	-	-	-	-	-	-	-	2	3	-	1	--	-

High-3; Medium-2; Low-1

Course Code:23FLT202	Course Title: FOREIGN LANGUAGE - GERMAN (Common to all B.E/B.Tech Programmes)		
Course Category: AEC		Course Level: Introductory	
L:T:P (Hours/Week) 3: 0: 0	Credits:3	Total Contact Hours:45	Max. Marks:100

Course Objectives:

The course is intended to:

1. Listen and understand numbers, names and dialogues of a native speaker on par with A1 level.
2. Speak and introduce self in simple sentences to convey their opinion and ideas on par with A1 level.
3. Read simple passages and given text on par with A1 level.
4. Write letter and simple sentences on par with A1 level.

UNIT I BASIC INTRODUCTION TO GERMAN SCRIPTS 9

Theme and Text (Introduction to German - German script, Deutsche Namen, Daily Greetings and Expressions) – Grammar ('wh' questions, das Alphabet)– Speak Action (Buchstabieren, sich und andere vorstellen nach Namen und Herkunft fragen, internationale Wörter auf Deutsch verstehen, jemanden begrüßen)– pronunciation (Buchstabieren J,V,W,Y, - Long vowels A,E,I,O,U - Pronunciation of Ä,Ü,Ö) – To learn (internationale Wörter in Texten finden, Wörter sortieren)

Theme and Text (Gespräche im caf'e, Getränkekarte, Telefon-buch, Namen, Rechnungen) – Grammar (Frägesatze mit wie, woher, wo, was Verben in präsens Singular und Plural, das Verb Sein, Personalpronomen und Verben)– Speak Action (eine Gespräch beginnen sich und andere vorstellen zählen, etwas bestellen und bezhalen Telefonnummern und verstehen)– pronunciation (Wortakzent in Verben und in Zahlen) – To learn (Grammatiktabelle ergänzen, mit einem Redemittelkasten arbeiten)

UNIT II NUMBERS AND NOMINATIVE CASE 9

Theme and Text (Numbers – 1 to 12 (Eins bis Zwolf) – 20, 30, 40, 90 (zwanzig-Neunzig) – All Numbers (1-10000) – German Currency (Euro) – Basic Mathematics (plus, Minus, Malen, Geteilt durch)) – Grammar (Introduction of verbs –Have Verb – To Come, To Speak, To Read, To Drive, To Fly, To write, To Eat, To sleep, To take etc.,)

Theme and Text (Communication in course) – Grammar (Singular and Plural, Artikel: der,das,die/ ein,eine, verneinung: kein, keine, Komposita: das Kursbuch) – Speak Action (Gegenständen

fragen/ Gegenstände benennen im kurs:) – pronunciation (word accent Marking, Umlaute ö ä ü hören und sprechen) – To learn (Lernkarten schreiben, Memotipps, eine Regel selbst finden)

Theme and Text (City, Town, Language: Nachbar, Sprachen, Sehenswürdigkeiten in Europa) – Grammar (Past tense for Sein, W-Frage, Aussagesatz und Satzfrage) – Speak Action (about city and siteseeing) – pronunciation (Satzakzent in Frage- und Aussagesätzen) – To learn (eine Regel ergänzen, eine Grammatiktabelle erarbeiten, Notizen machen)

UNIT III AKKUSATIVE CASE AND PREPOSITIONS 9

Theme and Text (Menschen und Hauser, Furniture catalogue, E-Mail, House information) – Grammar (possesivartikel im Nominativ, Artikel im Akkusativ, Adjektive im satz, Graduierung mit zu)– Speak Action (Whonung bescreiben about perons and things)– pronunciation (consonant - ch) – To learn (wortschatz systematisch)

Theme and Text (Termine - Appointment and punctuality in Germany) – Grammar (questions with wann?, Preposition (am, um, von... bis), verneinung mit nicht, trennbare verben, präteritum von haben) – Speak Action (Daily plan making, time commitment, excuse for late coming) – pronunciation (consonants- p,b,t,d / k,g) – To learn (Rollenkarten arbeiten)

Theme and Text (orientation in working area, go for work, floor plan city plan, office and computer) – Grammar (preposition: in,neben, unter, auf, vor, hinter, an, zwischen, bei und mit + Datic)– Speak Action (work place, work, giving appointments)– pronunciation (consonants: f,w und v) – To learn (Making notice in calender)

UNIT IV DATIV CASE AND PREPOSITIONS 9

Theme and Text (Holiday and Party, holiday plan, party plan in Germany) – Grammar (regular and iregular verbs) – Speak Action (holiday speak, accident, Ich-Text schreiben) – pronunciation (lange und kurze vokale markieren) – To learn (Text Order)

Theme and Text (organising an Excursion to Berlin through city orientation, Bus plan, City plan, post card, Excursion programme) – Grammar (preposition: in, durch, über + Akkusativ: zu, an... vorbei + Dativ, Modalverb wollen) – Speak Action (Tourism, culture, postcard preparation, travel description) – pronunciation (r and l)– To learn (plaket making)Theme and Text (Beruf und all Tag, Visiten karten, wörterbuch) – Grammar – Speak Action (profession, statistic speaking) – pronunciation (n,ng and nk)– To learn (wörterbuch , text information in tabel)

UNIT V ADJECTIVES AND PRONUNCIATION 9

Theme and Text (Haushaltstipp, kochrezept, maße und gewichte, Mahlzeiten und Gerichte) – Grammar (jeden Tag, manchmal, nie, Question - welche, Comparison – viel, gut, gern) – Speak Action (about eat, drink question and answers) – pronunciation (e,en,el,er) – To learn (Text auswerten und zusammenfassen)

Theme and Text (Clothing , colour, weather) – Grammar (Adjecktive im Akkusativ, unbestimmer Artikel) – Speak Action (weather, dress and colour understanding) – pronunciation (e-o- ö and ie-u- ü) – To learn (wetter and Farben interkulturelle)

Theme and Text (in super market,purchase, House Maintainence, Emotion, Sports, Body parts) – Grammar (Modal Verb) – Speak Action (Body parts) – To learn (Rollenkarten arbeiten)

Total:45 Hours

Course Outcomes		**Cognitive Level**
At the end of this course, students will be able to:		
CO1	Recognize and write German alphabet, numbers.	Understand
C02	. Comprehend the conversation and give correct meaning	Understand
CO3	Apply appropriate grammar and vocabulary to write and speak.	Apply
CO4	Apply appropriate cases and texts to listen, write and speak.	Apply
CO5	Speak and read using words of the German language	Apply

TEXT BOOK

T1. Netzwerk, "Deutsch als Fremdsprache" by Stefanie Dengler, Paul Rusch, Helen Schmitz published

T2. Funk, Kuhn, Demme, "Studio D A1 Deutsch als Fremdsprache" published by Goyal Publishers & Distributors Pvt Ltd;

REFERENCES

R1. Hueber, "Fit for Goethe- Zertifikat A1 (Start Deutsch 1)" by GOYAL PUBLISHERS AND DISTRIBUTORS; 2016

Course Articulation Matrix

CO	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO2**
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	-	-	-

CO3	-	-	-	-	-	-	-	-	-	3	-	1	-	-
CO4	-	-	-	-	-	-	-	-	-	3	-	1	-	-
CO5	-	-	-	-	-	-	-	-	2	3	-	1	--	-

High-3; Medium-2;Low-1

Course Code: 23MAI204		Course Title: Linear Algebra and Complex Variables	
Course Category: Minor		Course Level: Introductory	
L:T:P(Hours/Week) 3: 0: 2	Credits: 4	Total Contact Hours: 75	Max Marks: 100

Course Objectives:

This course is intended to enable the student to acquire the knowledge on the linear algebra and calculus of functions of complex variables.

Module I **23 Hours**

Systems of linear algebraic equations

System of linear algebraic equations - Gaussian elimination, Gauss Jordan methods and LU factorizations - permutation matrix - Inverse matrices by Gauss Jordan method.

Vector spaces

Euclidean space and vector space - subspace – linear combination – span - linearly independent and dependent - bases – dimensions - Finite dimensional Euclidean space.

Subspace Properties

Row and column spaces -Rank and nullity – Bases for subspace – inevitability- Application in interpolation.

Module II **22 Hours**

Complex Variables (Differentiation)

Cauchy – Riemann equation – Analytic function – Properties – Harmonic function – Finding harmonic and harmonic conjugate – Conformal mapping (w=z+a, w=1/z) – Mobius transformation and their properties.

Complex Variables (Integration)

Cauchy Integral formula – Cauchy Integral theorem – Taylor's series – Singularities of analytic function – Laurent's series – Residues – Cauchy Residue theorem – Contour integrals – Evaluation of real definite integrals around unit circle and semi-circle (Excluding poles on the real axis)

List of Experiments(Using Python): **30 Hours**

1. Compute the solution of system of linear equations using Gauss elimination method.
2. Compute inverse of a matrix.
3. Check the linear independency and orthogonality between vectors.
4. Find the basis and dimension of row space, column space and null space of a given set of vectors.
5. Compute arithmetic operations using complex() function.

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO1: Apply the concepts of matrices and system of linear equations using decomposition methods and concept of vector spaces and subspaces.	Apply
CO2: Compute the basis and dimension of sub spaces, row and column space.	Apply
CO3: Use the concepts of complex variables to construct analytical function.	Apply
CO4: Use the concepts of complex integration to evaluate definite integrals.	Apply
CO5: Develop programs using Linear Algebra and Complex Variables concepts through modern tool.	Apply

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	3	-	-	-	-	-	-	-	-	-

High-3; Medium-2;Low-1

Text Book(s):

T1. David C Lay, Linear Algebra and its Applications, 3rd Edition, Pearson Education, 2009.

T2. Erwin Kreyzig, Advanced Engineering Mathematics, 10th edition, John Wiley & Sons, 2015.

Reference Book(s):

R1. K. Hoffman and R. Kunze, Linear Algebra, Pearson, 2015.

R2. Gilbert Strang, Linear Algebra and its Applications, 3rd, Harcourt College Publishers, 2005.

R3. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 43rd edition, 2014.

Web References:

1. https://nptel.ac.in/courses/111106051
2. https://www.classcentral.com/course/matrix-algebra-engineers-11986

Course Code: 23PHI201		Course Title: Physics for Electrical Sciences (Common to EA, EC, EE & EV)	
Course Category: Minor		Course Level: Introductory	
L:T:P(Hours/Week) 3: 0: 2	Credits: 4	Total Contact Hours:75	Max Marks:100

Course Objectives:

The course is intended to impart knowledge on the fundamental laws and relations in electricity, magnetism, electromagnetism and electromagnetic waves.

Module I **22 Hours**

Electrostatics: Definition of electric charge-Coulomb's Law – Electric field intensity – Field intensity due to point and line charges – Electric flux density -Gauss's law- Application of Gauss's law: Determine the field due to a line charge and a plane sheet of charge – Electric potential-Equipotential surfaces-Potential gradient.

Magnetostatics: Definition of magnetic flux- magnetic field intensity-Lorentz Law of force- Biot – Savart law, Ampere's Law- Application of Ampere's Law: Magnetic induction due to a long linear conductor and solenoid - Magnetic field due to straight conductors-circular loop – Magnetic flux density (B) - Magnetic potential.

Electric Fields in Materials: Dielectrics: An atomic view - Dielectric Polarization-Dielectrics and Gauss's law- Dielectric Strength- Energy stored in a dielectric medium - Capacity of a condenser - Capacitance - coaxial, Spherical capacitor- Poisson and Laplace Equation.

Module II **23 Hours**

Magnetic Fields in Materials: Magnetic susceptibility and permeability- properties of dia, para and ferro magnetic materials-hysteresis loop.

Electromagnetic Induction: Faraday's law – Lenz's law – Time varying magnetic field - self Inductance - self Inductance of a solenoid- Mutual inductance- Mutual inductance of two solenoids. Charge conservation law - continuity equation- displacement current-Maxwell's equations.

Electromagnetic Waves: Electromagnetic waves in free space - Poynting vector - Propagation of electromagnetic waves in dielectrics – Phase velocity- Propagation of electromagnetic waves through conducting media- penetration or skin depth.

List of Experiments (Any six) **30 Hours**

1. Verification of Ohms' law.
2. Test the Faraday's hypothesis of magnetic field induction.
3. Determination of specific resistance of the given material using Carey foster's bridge.
4. Measurement of capacitance using Schering Bridge.
5. Measurement of inductance using Maxwell Bridge.
6. Determination of wavelength of the given light source using spectrometer.
7. Determination of Dielectric constant of a given Material.

Course Outcomes	**Cognitive Level**
At the end of the course students will able to	
CO1: **Apply** the concepts of static electric and magnetic fields to obtain the electric and magnetic characteristics of the materials.	Apply
CO2: **Interpret** the behavior of materials in electric and magnetic fields.	Apply
CO3: **Apply** the concept of time-varying electric and magnetic fields to obtain the propagation characteristics of electromagnetic waves in different media.	Apply
CO4: **Conduct, analyze and interpret** the data and results from the physics laboratory experiments.	Evaluate

Course Articulation Matrix

CO Vs PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	3	-	3	-	-	-	-	-	-	-	-	-	-

High-3; Medium-2; Low-1

Textbooks:

T1. R.K.Gaur and S.L.Gupta, “Engineering Physics”, Dhanpat Rai publications, New Delhi, 8th Edition, 2011.

T2. W. H. Hayt and John A. Buck, “Engineering Electromagnetics”, Tata McGraw Hill, New Delhi, 6th Edition, 2014.

Reference Book(s):

R1. David Griffiths, “Introduction to Electrodynamics”, Pearson Education, 4th Edition, 2013

R2. K. A. Gangadhar and P. M. Ramanathan, “ Electromagnetic Field Theory”, Khanna Publishers, New Delhi, 5th Edition, 2013.

R3. Mathew. N. O. Sadiku, “Elements of Electromagnetics”, Oxford University Press, 4th Edition, 2009.

Web References:

1. http://nptel.iitm.ac.in
2. http://openems.de/start/index.php
3. https://bop-iitk.vlabs.ac.in/List%20of%20experiments.html

Course Code: 23EAI201		Course Title: Digital Principles and System Design	
Course Category: Major		Course Level: Introductory	
L:T:P(Hours/Week) 3:0:2	Credits:4	Total Contact Hours:75	Max Marks:100

Course Objectives:

The course is intended to impart knowledge on the design of combination and sequential digital circuits

Module I **22 Hours**

Number System: Review of decimal, binary, octal and hexadecimal numbers – Complements: 1's and 2's – Arithmetic operation of Signed binary numbers - Digital Logic Gates – Universal gate Implementation.

Boolean algebra: Basic Theorems, properties and– Representation of Boolean functions in Canonical and standard forms

Minimization Techniques: Simplifications of Boolean expression using 3 and 4 variable K map method and Mc-Cluskey method.

Logic Families: Characteristics and operation of TTL, ECL, CMOS logic.

Combinational Circuits: Design Procedure of adder-half adder, full adder,4-bit RCA, Subtractor: half subtractor, full subtractor,4-bit subtractor, Comparator: 4-bit magnitude comparator, code converters-binary to excess-3,binary to gray,Encoders-8 to 3, Decoders- 3 to 8, Multiplexers-8 X 1 and De-multiplexers-1 X 8.

Module II **23 Hours**

Synchronous Sequential Logic

Flip flops: SR, JK, T, D – Level and Edge Triggering – Analysis of sequential circuits - Design of sequential circuits– **Registers:** Shift registers – SISO, SIPO, PISO, PIPO –**Counters:** Design of 3-bit synchronous and ripple counter.

Asynchronous Sequential Logic

Analysis of Asynchronous Sequential Circuits - Design of Asynchronous Sequential Circuits with primitive flow table, state reduction and state assignment – Races, Cycles and Hazards: Static, Dynamic, Essential, Hazards elimination.

List of Experiments: **30 Hours**

1. Design and implementation of combinational circuits using basic gates for arbitrary functions, code converters.
2. Design and implement Half/Full Adder and Subtractor.
3. Design and implement combinational circuits using MSI devices: Parity generator / checker, Application using multiplexers
4. Design and implement shift-registers.
5. Design and implement synchronous counters.
6. Design and implement asynchronous counters.
7. Self-study: Verilog HDL

Course Outcomes	**Cognitive Level**
At the end of this course, students will be able to:	
CO1:Understand number system and Boolean algebra.	Understand
CO2:Design and implement various combinational circuits using various minimization techniques.	Apply
CO3:Analyze a given requirement and design a hazard free Sequential circuit.	Analyze
CO4:Participate in individual study and make an oral presentation as a team on HDL concepts.	Apply

Course Articulation Matrix

CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	2	-	2	-	-	-	-	-	-	-	-	-	2	2
CO3	-	3	-	-	-	-	2	-	-	-	-	-	2	2
CO4	-	-	-	-	-	-	-	-	2	-	-	2	-	-

High-3; Medium-2;Low-1

Text Book(s):

T1. M. Morris Mano, Digital Design, 3rd Edition, Prentice Hall of India Pvt. Ltd,2002

T2. Donald D. Givone, “Digital Principles and Design”, McGraw-Hill , 2003

Reference Book(s):

R1. John F. Wakerly ,”Digital Design : Principles and Practices”, 4th Edition, Pearson education,2008

R2. Charles Roth Jr , Eugene John, Larry Kinney ”Fundamental of Logic Design” Enhanced Edition, CL Engineering,2020

R3. Samir Palnitkar,” Verilog HDL: A Guide to Digital Design and Synthesis”, 2nd Edition, Pearson India,2003

Web References:

1. https://nptel.ac.in/courses/117105080
2. https://www.tutorialspoint.com/digital_circuits/index.htm
3. https://www.circuitlab.com/

Course Code: 23ITT202		Course Title: Problem solving and Python Programming (Common to EA, EC & EV)	
Course Category: Multidisciplinary		Course Level: Introductory	
L:T:P(Hours/Week) 3: 0: 0	Credits:3	Total Contact Hours:45	Max Marks:100

Course Objectives:

The objective of the course is to introduce learners to the fundamentals of programming using the Python language. The course aims to equip participants with the necessary skills and knowledge to write efficient, readable, and maintainable Python code.

Module I **23 Hours**

Basics of Python: Features - Variables and Data Types - Expressions and Statements - Operators.

Control Flow: Conditional Statements – Looping and Iterative Statements

Functions and File Handling: Introduction to Functions - Recursive Functions - Introduction to Files and File Handling

Data Structures in Python: Lists: Functions and Methods - Tuples: Operations and Built-in Functions - Sets: Functions and Methods - Dictionaries: Functions and Methods - Strings: Operators and Built-In String Functions

OOP Concepts: Classes and Objects: Modifiers in Classes - Method Invocation in Classes - Inheritance and Polymorphism.

Module II **22 Hours**

Exception Handling: Errors and Exceptions

GUI Programming with TKinter: GUI Basics - Working with the TKinter Library

Widgets and Events: Adding Widgets and Binding Events - Message and Entry Widgets - Checkboxes and Radio Buttons - Menus and Lists - Canvas for Drawing

Data Visualization with Matplotlib: Introduction to Matplotlib Library - Line and Bar Plots - Scatter Plots - Pie Charts - Working with Multiple Figures - 3D Plots - Plotting Using Files.

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO1: Apply Python programming constructs and data structure techniques to solve practical problems and build functional applications.	Apply
CO2: Categorize the OOPs concepts to create modular and extensible Python programs.	Analyze

CO3: Infer the errors and exceptions in Python programs using exception handling techniques to ensure robust and fault-tolerant code	Analyze
CO4: Build graphical user interfaces (GUIs) using TKinter, effectively incorporating various widgets and event binding to create interactive and visually appealing applications	Apply
CO5:. Employ the Matplotlib library for data visualization to present data and insights in a visually impactful method	Apply
CO6: Combine the Python language features and libraries to provide solutions collaboratively with Ethical values to the practical problems	Create

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-
CO3	-	3	-	-	-	-	-	-	-	-	-	-
CO4	3	-	-	-	-	-	-	-	-	-	-	-
CO5	3	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	3	2	2	-	-	3	3	3	3	3

High-3; Medium-2; Low-1

Text Book(s):

T1. Peter Wentworth, Jeffrey Elkner, Allen B. Downey, and Chris Meyers, “How to Think Like a Computer Scientist: Learning with Python”,3rd Edition, O’Reilly, 2020.

T2. Mark Lutz, “Powerful Object-Oriented Programming Python”, 4th Edition, O’Reilly, 2013.

Reference Book(s):

R1. Mark Lutz, “Learning Python, Powerful OOPs”, 5th Edition, O’Reilly, 2013.

R2. Zelle, John M, “Python Programming: An Introduction to Computer Science”, Franklin Beedle& Associates, 2003.

Web References

1. https://docs.python.org/3/tutorial/
2. https://www.learnpython.org/
3. https://www.pyschools.com/
4. https://archive.nptel.ac.in/courses/106/106/106106182/

Course Code: 23MEL001		Course Title: ENGINEERING DRAWING (Common to AD,AM,AU,CS,EA ,EC,EE,EV,IT,ME, SC)	
Course Category: Multidisciplinary		Course Level: Introductory	
L:T:P(Hours/Week) 1: 0: 3	Credits:2.5	Total Contact Hours: 60	Max Marks:100

Course Objectives:

The course is intended to

- To impart knowledge on basic dimensioning. 2D and 3 D drawings such as points, lines, planes and solids on first quadrant.

Module I **8 Hours**

Basics of Engineering Drawing: Importance of graphics in engineering applications – Use of drafting instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets – Lettering and dimensioning. Basic Geometrical constructions –Orthographic projection- Free hand Sketching.

Projection of Points, Lines: First angle projection-projection of points. Projection of straight lines (only First angle projections) inclined to both the principal planes - Determination of true lengths and true inclinations by rotating line method and traces by rotating object method.

Projection of Solids: Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one of the principal planes by rotating object method. Practicing three dimensional modeling of simple objects by CAD Software (Not for examination).

Module II **7 Hours**

Sectioned Solids: Sectioning of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one reference plane by cutting planes inclined to one reference plane and perpendicular to the other – Orthographic views of sections of simple solids.

Development of Surfaces: Development of lateral surfaces of simple and truncated solids – Prisms, pyramids, cylinders using straight line and radial line method.

Isometric Projection: Principles of isometric projection – Isometric scale –Isometric projections of simple solids and truncated solids. Practicing three dimensional modeling of isometric projection of simple objects by CAD Software (Not for examination).

List of Experiments **45 Hours**

1. Lettering & Dimensioning
2. Projection of Points & Lines
3. Orthographic projections
4. Projection of Simple Solids
5. Projection of Section of Simple Solids
6. Development of Surfaces
7. Isometric Projections

Course Outcomes:

CO 1: Apply the concepts related to free hand sketching, orthographic and Isometric projection in first quadrant.	Understand
CO2: Apply the concepts and draw projections of points in four different quadrants and lines located first quadrant.	Apply
CO3: Apply the concepts and draw projections and sections of simple solids using rotatingobject method.	Apply
CO4: Apply the concepts and draw lateral surface of simple solids using straight line andradial line development methods.	Apply
CO5: Apply the concepts and draw isometric view of simple solids and truncated solids using principles of isometric projection.	Apply
CO6: Conduct experiments to demonstrate concepts, implement and analyze the drawing concepts using engineering tool : Using AutoCAD.	Analyze

Textbook:

T1. Cencil Jensen, Jay D.Helsel and Dennis R. Short, " Engineering Drawing and Design", Tata McGraw Hill India, New Delhi, 3rd edition, 2019.

Reference Book(s):

R1. Basant Agarwal and Agarwal C.M., "Engineering Drawing", Tata McGraw Hill India, New Delhi, 2nd edition, 2014.

R2. Dhananjay A. Jolhe, "Engineering Drawing with an introduction to AutoCAD" Tata McGraw India, New Delhi, 3rd edition, 2010.

R3. Bhatt N.D. and Panchal V.M., "Engineering Drawing", Charotar Publishing House, Gujarat, 54rd edition, 2023.

PUBLICATIONS OF BUREAU OF INDIAN STANDARDS

1. IS 10711 – 2001: Technical products Documentation – Size and lay out of drawing sheets.IS 9609 (Parts 0 & 1) – 2001: Technical products Documentation – Lettering.
2. IS 10714 (Part 20) – 2001 & SP 46 – 2003: Lines for technical drawings.IS 11669 – 1986 & SP 46 – 2003: Dimensioning of Technical Drawings.
3. IS 15021 (Parts 1 to 4) – 2001: Technical drawings – Projection Methods. The mode of delivery is like practical.

Web References:

1 http://nptel.ac.in/courses/112103019/

2 https://www.coursera.org/specializations/autodesk-cad-cam-cae-mechanical-engineering

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	3	-	-	3	-	-	-	1	1	-	1	-	-

High-3; Medium-2; Low-1

Passed in 01st Board of Studies Meeting held on 11.01.2024
Approved in 18th Academic Council Meeting held on 23.03.2024 BOS Chairman

Course Code: 23ESL201		Course Title: Professional Skills 1: Problem solving skills & Logical Thinking 1 (Common to all B.E/B.Tech Programmes)	
Course Category: SEC		Course Level: Introductory	
L:T:P(Hours/Week) 0: 0: 2	Credits: 1	Total Contact Hours:30	Max Marks:100

Course Objectives:

To enhance the students' numerical, analytical and logical reasoning ability.

To make them prepare for various public and private sector exams and placement drives.

Module I Quantitative Ability 20 Hours

Number System and LCM & HCF- Percentage- Ratio and Proportion - Average- Progressions- Ages-Partnership- Mixture & Allegation - Profit and loss- Interest calculation- Data interpretation.

Module II Reasoning Ability 10 Hours

Seating Arrangement- Linear, circular and Complex – Direction Problems- Blood Relation- Puzzles- Crypt arithmetic- Venn diagrams- Statement and conclusion- Statement and argument- Causes and effects- Self-Learning.

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO1: Build the competence in numerical, analytical and logical Reasoning ability	**Apply**

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	3	-	-

High-3; Medium-2; Low-1

Passed in 01st Board of Studies Meeting held on 11.01.2024
Approved in 18th Academic Council Meeting held on 23.03.2024 BOS Chairman

Textbook(s):

T1: Dr. R. S. Aggarwal. “Quantitative Aptitude for Competitive Examinations” Sultan Chand & Sons Pvt. Ltd, New Delhi, 2018.

T2: Dr. R. S. Aggarwal. “A Modern Approach to Logical Reasoning”, Sultan Chand & Sons Pvt. Ltd, New Delhi, 2018

Reference Book(s):

R1: R. V. Praveen. “Quantitative Aptitude and Reasoning” 2nd Revised Edition, Prentice-Hall of India Pvt.Ltd, 2013

R2: Arun Sharma. “Quantitative Aptitude for Common Aptitude Test”, McGraw Hill Publications, 5th Edition, 2020

R3: Arun Sharma. “Logical Reasoning for Common Aptitude Test”, McGraw Hill Publications, 6th Edition, 2021.

Web References:

1 https://www.indiabix.com/aptitude/questions-and-answers/

2 https://www.geeksforgeeks.org/aptitude-questions-and-answers/

Course Code: 23VAT201	Course Title: TAMILS AND TECHNOLOGY (Common to all B.E/B.Tech Programmes)		
Course Category: VAC		Course Level: Introductory	
L:T:P (Hours/Week) 1: 0 :0	Credit: 1	Total Contact Hours: 15	Max Marks:100

Pre–requisites

- NIL

Course Objectives

மாணவர்கள் இப்பாடத்தை கற்றலின் மூலம்

CO.1 நெசவு மற்றும் பானைத் தொழில்நுட்பம், வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம், உற்பத்தித் தொழில்நுட்பம், வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில்நுட்பம் ஆகியன குறித்து அறிந்து கொள்ள இயலும்.

CO.2 அறிவியல் தமிழ் மற்றும் கணினித் தமிழ் குறித்து அறிந்து கொள்ள இயலும்.

தமிழரும் தொழில்நுட்பமும்

அலகு 1 – நெசவு மற்றும் பானைத் தொழில்நுட்பம் 3

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

அலகு 2 – வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம் 3

சங்க காலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் ஷ சங்க காலத்தில் வீட்டுப் பொருட்களில் வடிவமைப்பு – சங்க காலத்தில் கட்டுமானப் பொருட்களும் நடுகல்லும் – சிலப்பதிகாரத்தில் மேடை அமைப்பு பற்றிய விவரங்கள் – மாமல்லபுரச் சிற்பங்களும், கோவில்களும் – சோழர் காலத்துப் பெருங்கோயில்கள் மற்றும் பிற வழிபாட்டுத் தலங்கள் – நாயக்கர் காலக் கோயில்கள் – மாதிரி கட்டமைப்புகள் பற்றி அறிதல், மதுரை மீனாட்சி அம்மன் ஆலயம் மற்றும் திருமலை நாயக்கர் மஹால் – செட்டிநாட்டு வீடுகள், பிரிட்டிஷ் காலத்தில் சென்னையில் இந்தோ – சாரோசெனிக் கட்டிடக் கலை.

அலகு 3 – உற்பத்தித் தொழில்நுட்பம் 3

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

அலகு 4 வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில்நுட்பம் 3

அணை, ஏரி, குளங்கள், மதகு – சோழர்காலக் குமுழித் தூம்பின் முக்கியத்துவம் – கால்நடை பராமரிப்பு – கால்நடைகளுக்காக வடிவமைக்கப்பட்ட கிணறுகள் – வேளாண்மை மற்றும வேளாண்மைச் சார்ந்த செயல்பாடுகள் – கடல்சார் அறிவு – மீன் வளம் – முத்து மற்றும் முத்துக் குளித்தல் – பெருங்கடல் குறித்த பண்டைய அறிவு – அறிவுசார் சமூகம்.

அலகு 5 – அறிவியல் தமிழ் மற்றும் கணினித் தமிழ் 3

அறிவியல் தமிழின் வளர்ச்சி – கணினித் தமிழ் வளர்ச்சி – தமிழ் நூல்களை மின் பதிப்பு செய்தல் – தமிழ் மென் பொருட்கள் உருவாக்கம் – தமிழ் இணையக் கல்விக் கழகம் – தமிழ் மின் நூலகம் – இணையத்தில் தமிழ் அகராதிகள் – சொற்குவைத் திட்டம்.

TOTAL : 15 PERIODS

Course Outcomes	**Cognitive Level**
மாணவர்கள் இப்பாடத்தை கற்றபின்	
CO.1 நெசவு மற்றும் பானைத் தொழில்நுட்பம், வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம், உற்பத்தித் தொழில்நுட்பம், வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில்நுட்பம் ஆகியன குறித்து அறிந்து கொள்வார்கள்.	அறிதல் (Understand)
CO.2 அறிவியல் தமிழ் மற்றும் கணினித் தமிழ் குறித்து அறிந்து கொள்வார்கள்.	அறிதல் (Understand)

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	-	-	-	1	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	1	-	-

High–3; Medium–2; Low–1

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 சங்க கால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)

4. பொருநை – ஆற்றங்கரை நாகரிகம் (தொல்லியல் துறை வெளியீடு)

5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)

6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.

7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).

8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)

9. Keeladi - 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu 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.

Course Code: 23VAT201	Course Title: TAMILS AND TECHNOLOGY (Common to all B.E/B.Tech Programmes)		
Course Category: VAC		Course Level: Introductory	
L:T:P (Hours/Week) 1: 0 :0	Credit: 1	Total Contact Hours: 15	Max Marks:100

Pre–requisites

- NIL

Course Objectives

The course is intended to:

1. Understand Weaving and Ceramic Technology, Design and Construction Technology, Manufacturing Technology, Agriculture and Irrigation Technology.
2. Understand the Scientific Tamil & Tamil Computing.

TAMILS AND TECHNOLOGY

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 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

Course Outcomes	**Cognitive Level**
At the end of this course, students will be able to:	
CO.1 Understand Weaving and Ceramic Technology, Design and Construction Technology, Manufacturing Technology, Agriculture and Irrigation Technology.	Understand
CO.2 Understand the Scientific Tamil & Tamil Computing.	Understand

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	-	-	-	1	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	1	-	-

High–3; Medium–2; Low–1

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 சங்க கால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)

4. பொருநை – ஆற்றங்கரை நாகரிகம் (தொல்லியல் துறை வெளியீடு)

5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)

6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.

7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).

8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)

9. Keeladi - 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu 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.

Course Code: 23CHT202		Course Title: Environmental Sciences (Common to all B.E/B.Tech Programmes)	
Course Category: Multidisciplinary		Course Level: Introductory	
L:T:P(Hours/Week) 1: 0: 0	Credits: Mandatory Non-Credit Course	Total Contact Hours: 15	Max Marks:100

Course Objectives:

The course is intended to impart knowledge on sustainable utilization of natural resources, prevention of pollution, disaster management and environmental issues & public awareness on ecosystem.

Module I **8 Hours**

Natural Resources

Role of individual in conservation of natural resources; Equitable use of resources for sustainable lifestyles.

Environmental Pollution and Disaster Management

Role of an individual in prevention of pollution; Disaster management : floods, earthquake, cyclone and landslides.

Environmental Ethics and Legislations

Environmental ethics : Environment Protection Act; Air Act; Water Act ; Wildlife Protection Act; Forest Conservation Act; Issues involved in enforcement of environmental legislation.

Module II **7 Hours**

Environmental Issues and Public Awareness

Public awareness - Environment and human health.

Environmental Activities

(a) Awareness Activities:

i. Small group meetings about water management, promotion of recycle use, generation of less waste, avoiding electricity waste.
ii. Slogan making event.
iii. Poster making event.

(b) Actual Activities:

i. Plantation.
ii. Cleanliness drive.
iii. Drive for segregation of waste.
iv. To know about the different varieties of plants.
v. Shutting down the fans and ACs of the campus for an hour or so.

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO 1: Explain the use of natural resources for a sustainable life as an individual in prevention of pollution.	Understand
CO 2: Apply the environmental ethics and legislations for various environmental issues.	Apply
CO 3: Create the public awareness on environment and human health as an individual or team through various activity based learning.	Apply

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	-	-	-	-	-	3	3	-	-	-	-
CO3	3	-	-	-	-	3	3	-	3	3	-	-

High-3; Medium-2;Low-1

Text Book(s):

T1. Benny Joseph, "Environmental Studies", Tata McGraw Hill, New Delhi, 2006.

T2. Mackenzie Davis and Susan Masten, "Principles of environmental engineering and science", Mc-Graw Hill, 3rd Edition, 2014.

Reference Book(s):

R1. Trivedi R.K. "Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards", Vol.I and II, Enviro Media.

R2. Cunningham, W.P.Cooper, T.H. Gorhani, "Environmental Encyclopedia", Jaico Publishing House, Mumbai, 2001.

Web References:

1. https://onlinecourses.nptel.ac.in/noc23_hs155/preview.
2. https://en.wikipedia.org/wiki/Environmental_science.

SEMESTER III

Course Code: 23MAT304		Course Title: Probability Theory for Communication Engineers	
Course Category: Minor		Course Level : Intermediate	
L:T:P(Hours/Week) 3:1 :0	Credits: 4	Total Contact Hours:60	Max Marks:100

Course Objectives:

This course aims at providing the student to acquire the knowledge on probability theory and random variables and probability distributions.

Module I **22+8 Hours**

Probability Theory: Definition of Probability – Axiomatic definition of Probability – Addition theorem of Probability – Conditional Probability – Multiplication theorem of Probability – Baye‟s Theorem (Statement only) – Related Problems.

Random Variables: Random Variable- Probability distribution function - Probability density function – Cumulative distribution function – Properties- Moments- Moment generating functions and their properties - Two Dimensional random variable – Joint distributions – Marginal and conditional distributions- Independence of random variable. Covariance – Correlation and its properties - Spearman's Rank correlation- Regression - Transformation of random variables.

Module II **23+7 Hours**

Discrete Distributions: Bernoulli Distribution – Binomial Distribution – Poisson Distribution– Geometric Distribution - Properties- M.G.F, mean and variance.

Continuous Distributions: Normal Distribution – Properties – Uniform Distribution – Exponential Distribution – Gamma Distribution – Beta Distribution- Central limit theorem M.G.F, mean and variance.

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO1: Demonstrate the probability concepts to solve communication engineering problems.	Understand
CO2: Construct probability models and function of random variables based on discrete and continuous random variables.	Apply
CO3: Apply the knowledge of correlation and regression to identify the relationship between two variables.	Apply
CO4: Relate the concept of probability distributions to solve real life problems.	Apply

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	-	-	-	-	-	-	-	-	1	-	-	-	-
CO2	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	-	-	-	-	-	-	-	-	-	-	-	-	-

High-3; Medium-2;Low-1

Text Book(s):

T1. Veerajan T, “Probability, Statistics and Random process”, 3rd Edition, Tata McGraw-Hill,New Delhi, 2017.

T2. Dr.J.Ravichandran, “Probability and Statistics for Engineers”, 1stEdition, Wiley IndiaPvt. Ltd., 2010.

Reference Book(s):

R1. R.E. Walpole, R.H. Myers, S.L. Myers, and K Ye, “Probability and Statistics for Engineersand Scientists”, 9th Edition Pearson Education, Asia, 2013.

R2. M.R. Spiegel, J. Schiller and R.A. Srinivasan, “Schaum's Outlines Probability and Statistics”, 4th Edition Tata McGraw Hill edition, 2012.

R3. Morris DeGroot, Mark Schervish, “Probability and Statistics”, Pearson Educational Ltd, 4th Edition, 2014.

Web References:

1 https://archive.nptel.ac.in/courses/111/105/111105090/

2. https://archive.nptel.ac.in/courses/111/105/111105041/

Course Code: 23EAT301		Course Title: Electronic Circuits	
Course Category: Major		Course Level: Intermediate	
L:T:P(Hours/Week) 3: 0 : 0	Credits:3	Total Contact Hours: 45	Max Marks:100

Course Objectives:

The course is intended to impart knowledge on fundamental concepts of electronic circuits and its design procedure.

Module I **23 Hours**

BJT and FET amplifiers: Biasing techniques for BJT and FET - fixed bias and voltage divider bias. Analysis of CE Amplifier using h-parameter model. Hybrid π model of CE amplifier. Large Signal Amplifiers: Class A, Class B and Class C amplifiers. Feedback and Tuned amplifiers: Types of Feedback- Feedback amplifiers: Voltage series, Current series, current shunt and voltage shunt. Single tuned amplifier–Neutralization techniques.

Module II **22 Hours**

Applications of Op-amp and Special function ICs: Ideal Op-amp characteristics and its equivalent circuit –DC characteristics - AC characteristics –Inverting and Non-inverting amplifier - Instrumentation Amplifier. Oscillators and Multivibrators: RC phase shift Oscillator using OP-AMP - LC oscillators using BJT: Hartley and Colpitt's oscillator - Astable multivibrator, Monostable multivibrator and Bistable multivibrator. Special function ICs and its applications: IC 555 timer - IC 565 PLL.

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO1: Define and Explain various terms and characteristics of Electronic Circuits	Understand
CO2 Apply the concept of network theorems to analyze the input and output parameters of electronic circuits.	Apply
CO3: Identify and Analyze Electronic Circuits for the given specifications	Analyze
CO4: Design Electronic circuits using appropriate Electronic components for the given application.	Analyze
CO5: Develop a simple mini-project using suitable Electronic components and demonstrate as a team or individual (for internal assessment only)	Evaluate

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	-	-	-	-	-	-	-	-	-	-	-	1	-
CO3	-	3	-	-	-	-	-	-	-	-	-	-	1	-
CO4	-	-	3	-	-	-	-	-	-	-	-	-	1	-
CO5	-	-	-	3	-	-	-	-	1	1	-	1	1	-

High-3; Medium-2;Low-1

Text Book(s):

T1. Anil K.Maini and Varsha Agarwal, “Electronic Devices and Circuits”, Wiley India Pvt. Ltd, New Delhi, 2009.

T2. D.Roy Choudhry, Shail Jain, “Linear Integrated Circuits”, New Age International Pvt. Ltd., Fifth Edition, 2018.

Reference Book(s):

R1.S. Salivahanan, N. Suresh Kumar and A. Vallavaraj, “Electronic Devices and Circuits”, Second Edition, Tata McGraw-Hill, New Delhi, 2007.

R2. Sergio Franco, “Design with Operational Amplifiers and Analog Integrated Circuits”, 4th Edition, Tata Mc Graw-Hill, 2016

R3. A.V.N. Tilak, Design of Analog Circuits, Khanna Publishing House, 2022.

Web References:

1. https://www.ee.iitm.ac.in/videolectures/doku.php?id=ec201
2. https://nptel.ac.in/courses/117101106
3. https://onlinecourses.nptel.ac.in/noc24_ee73/preview

Course Code: 23EAT302		Course Title: Analog Communication	
Course Category: Major		Course Level: Intermediate	
L:T:P(Hours/Week) : 3:0:0	Credits:3	Total Contact Hours:45	Max Marks:100

Course Objectives:

The course is intended to impart knowledge on various modulation techniques, noise in communication systems and to characterize the information by quantitative theory

Module I **22 Hours**

Amplitude Modulation systems-Need for modulation, Amplitude Modulation–time domain and frequency domain description – AM power distribution – DSBSC,SSB,VSB. Generation of AM waves: DSBSC(Balanced modulator)– SSB(Phase shift method), Detection of AM waves: Super heterodyne Receiver, Frequency Division Multiplexing.

Angle Modulation systems - Phase Modulation - Frequency Modulation-Narrow band and wideband FM, Generation of FM waves: Direct Method-Indirect Method-Detection of FM waves: Balanced slope detector - Foster Seeley discriminator - Ratio detector -Phase locked loop. Analysis of AM and FM signals using simulation tools.

Module II **23 Hours**

Random Process-Random variables, Central limit Theorem, Random Process, Stationary Processes, Mean, Correlation and Covariance functions, Power Spectral Density, Ergodic Processes, Gaussian Process, Transmission of a Random Process Through a LTI filter.

Noise characterization-Noise sources and types – Signal to noise ratio - Noise figure and noise temperature – Noise in cascaded systems–Noise performance in AM systems
Noise performance in FM systems – Pre-emphasis and de-emphasis –Capture effect and threshold effect

Information Theory - Uncertainty, Information and entropy, source coding theorem, Discrete Memory less channels, Mutual Information, Channel capacity, Channel coding theorem, Differential entropy, Information capacity theorem

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO 1: Demonstrate the amplitude, frequency and phase modulation systems and compute the transmission efficiency .	Apply
CO 2: Experiment AM and FM using MATLAB or any other relevant tools (for internal assessment only)	Analyze
CO 3: Analyze the Random Process in Communication systems. Prepare an oral presentation collaboratively as a team.	Analyze
CO 4 : Compare the noise performance of AM and FM systems and formulate the methods to reduce noise interference	Analyze
CO 5: Examine the various information theories in communication systems	Analyze

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	3	-	-	-	-	-	-	-	2	-
CO3	-	1	-	-	-	-	-	-	3	3	-	-	2	-
CO4	-	2	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	3	-	-	-	-	-	-	-	-	-	-	2	-

High-3; Medium-2;Low-1

Text Book(s):

T1.Simon Haykin, “Communication Systems”, John Wiley and Sons, Inc, 4th Edition, 2010

T2.George Kennedy, Bernard Davis, “Electronic Communication Systems”,

Tata McGraw-Hill, 4th Edition, 2008

Reference Book(s):

R1.Wayne Tomasi, “Electronic communication systems”, Prentice Hall of India Ltd., New Delhi, 2004.

R2.Taub and D. Schilling, Gautam Sahe, “Principles of Communication Systems”, TMH, 3rd Edition, 2007.

R3.Frenzel, Louis E., Jr., “Principles of Electronic Communication Systems”,4thEdition, McGraw-Hill, 2008

Web References:

1. https://onlinecourses.nptel.ac.in/noc19_ee46/preview
2. https://www.tutorialspoint.com/analog_communication/index.htm
3. https://t.ly/NoRIh

Course Code: 23ECT002		Course Title: Transmission Lines and Waveguides (common to EA and EC)	
Course Category : Major		Course Level: Intermediate	
L:T:P (Hours/Week): 3:0:0	Credits:3	Total Contact Hours:45	Max Marks:100

Course Objectives:

Empower students with essential skills in transmission line networks, power measurement, impedance matching, and expertise in waveguide propagation modes and cavity resonators for RF and Microwave applications.

Module I **22 Hours**

Basics of Transmission Lines: Concept and definition, Different kinds of transmission lines, Applications, Equivalent circuit, Primary and Secondary constants –General transmission line equations- Transmission line Parameters -The lossless transmission line, The infinite long transmission line, The distortion less transmission line and condition for distortion less and minimum attenuation

High Frequency Transmission Lines: Approximations at high frequencies - Line of zero dissipation - Voltage and current on the dissipation-less line, Standing Waves, Standing Wave Ratio - Input impedance of the dissipation-less line - Open and short-circuited lines - Power and impedance measurement on lines

Impedance matching: Quarter wave transmission line, Single stub matching, Construction of smith chart, Smith chart as impedance chart, smith chart as admittance chart, single stub matching Problems using smith chart - Impedance matching network design using smith chart utility in ADS software.

Module II **23 Hours**

Waveguides: Introduction, Wave propagation in parallel plane waveguide, Rectangular Waveguides-Transverse Electric (TE) and Transverse Magnetic (TM) mode analysis – Field expressions, Characteristic equation, Cut-off frequency, Phase velocity, Group velocity, Wavelength and Impedance, Dominant and degenerate modes

Cavities and Planar transmission lines: Rectangular Cavity Resonators-Dominant modes and Resonant Frequencies, Q factor, Unloaded Q for TE_{101} mode, Types of coupling and Coupling coefficients.

Losses in transmission lines - Strip Lines, Micro strip Lines, Slot lines, Coplanar lines

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO 1: Apply the analytical and graphical tool such as smith chart for the transmission line problems and impedance calculations	Apply
CO 2: Analyze the transmission line characteristics at microwave frequency range under various load conditions.	Analyze
CO 3:Design waveguides and microstrip lines for a given specification	Apply
CO4: Integrate through independent or team learning and employ modern tools for the design of transmission lines and impedance matching networks (for internal assessments only)	Analyze

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	2	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-	2	-
CO3	-	-	3	-	-	-	-	-	-	-	-	-	2	-
CO4	-	3	-	-	3	-	-	-	3	3	-	-	3	-

High-3; Medium-2;Low-1

Text Book(s):

T1. John D Ryder, “Networks, Lines and Fields”, PHI, 2nd Edition New Delhi, 1999.
T2. Jordan. E.C. and Balmain.K.G, “Electromagnetic Waves and Radiating Systems”, 2nd Editon, PHI, New Delhi, 1995.

Reference Book(s):

R1. R.K. Shevgaonkar, “Electromagnetic Waves”, Tata McGraw Hill India, 2005
R2. Umesh Sinha, “Transmission Lines and Networks”, Satya Prakashan (Tech. India Publications, New Delhi), 2001
R3. David M. Pozar, “Microwave Engineering”, 3rd Edition, John Wiley, 2009.

Web References:

1. https://nptel.ac.in/courses/117101057
2. https://www.microwaves101.com/encyclopedias/transmission-lines
3. http://www.amanogawa.com/archive/transmissionB.html

Course Code: 23ITI001		Course Title: Data Structures using C (Common to EA,EC)	
Course Category: Multidisciplinary		Course Level: Intermediate	
L:T:P(Hours/Week) 3: 0: 2	Credits:4	Total Contact Hours:75	Max Marks:100

Course Objectives:

The objective of this course is to impart knowledge of fundamental data structures and its implementation. Additionally, learn the application of data structures for solving various problems.

Module I **23 Hours**

Linked List: Introduction- Types of Data Structures - Abstract Data type, List ADT: Array Implementation of list - Linked List Implementation of list – Doubly Linked List – Circularly Linked List-Applications: Radix sort, Stack ADT: Stack Model – Array and Linked List Implementation of Stack Applications: Balancing Symbols - Postfix Expressions- Infix to Postfix Conversion, Queue ADT: Queue Model – Array and Linked List Implementation of Queue-Double ended Queue- Applications of Queue

Module II **22 Hours**

Trees: Implementation of Trees - Tree Traversals ,Binary Trees: Implementation – Expression Trees – Binary Search Tree: Implementation, AVL Trees: Single Rotation – Double Rotation – Implementation, Graphs: Definitions – Representation of Graphs – Graph Traversals: Breadth First Search –Depth First Search -Topological Sort ,Weighted and Unweighted Shortest Path Algorithms: Dijkstra's Algorithm - Breadth-First Search Algorithm, All Pairs Shortest Path: Floyds Algorithm, Minimum Spanning Tree: Prim's Algorithm – Krushkal's Algorithm ,Internal Sorting: Insertion Sort-Merge Sort-Quick Sort-Bucket Sort.

List of Exercises: **30 Hours**

1. Implementation of List ADT using array and Linked list
2. Implementation of Stack ADT and Queue ADT in array
3. Implementation of Stack ADT and Queue ADT in Linked list
4. Implement the Binary Search Tree Algorithm
5. Implement Graph traversals
6. Implement Sorting Algorithms

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO1: Develop various applications using arrays and linked list	Apply
CO2: Examine the performance of tree operations and compare their time complexities.	Analyze
CO3: Correlate different graph algorithms and different sorting algorithms to determine the most appropriate one for a given context.	Analyze
CO4: Design and integrate multiple data structures and algorithms to create a consistent and innovative solution for a problem.	Apply

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	3	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	2	-	-	-	-	-	-	-	-	2	-	-

High-3; Medium-2; Low-1

Text Book(s):

T1. Mark Allen Weiss, “Data Structures and Algorithm Analysis in C”, 2nd Edition, Pearson Education Asia, New Delhi, 2015.

Reference Book(s):

R1. Sahni Horowitz , “Fundamentals of Data Structures in C”, 2nd Edition Tata McGraw-Hill, New Delhi, 2008.

R2. Seymour Lipschutz, “Data Structures with C”, McGraw Hill, 2014.

R3. Thomas H Cormen, Charles E Leiserson, Ronald L Rivest, Clifford Stein, “Introduction to Algorithms” 3rd Edition, The MIT Press Cambridge, 2014

Web References:

1. https://www.coursera.org/specializations/data-structures-algorithms
2. http://www.csse.monash.edu.au/~lloyd/tildeAlgDS
3. http://freevideolectures.com/Course/2279/Data-Structures-And-Algorithms

Course Code: 23EAL301		Course Title: Electronic Circuits Laboratory	
Course Category: Major		Course Level: Intermediate	
L:T:P(Hours/Week) 0:0 :3	Credits:1.5	Total Contact Hours:45	Max Marks: 100

Course Objectives:
The course is intended to impart knowledge of the design of various electronic circuits using discrete electronic components and also enables the students to design and verify the circuit using simulation software.

List of Experiments:

1. Frequency Response of CE& CS amplifiers.
2. Frequency Response of RC coupled amplifier
3. Complementary symmetry Class-B and Class AB amplifier.
4. Class C tuned amplifier.
5. Feedback amplifiers using BJT.
6. Adder, Subtractor, Integrator and Differentiator using op-amp
7. RC oscillators using Op-amp
8. LC oscillators using BJT.
9. Multivibrators using 555.
10. Applications of IC 565
11. Fixed and Variable voltage regulators
12. Simulation of above experiments using Multisim software.

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO1: Conduct experiments to obtain the frequency response of various electronic circuits for a given specifications.	Evaluate
CO2: Compare experimental results of electronic circuits using discrete components with simulation results.	Analyze

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	3	-	-	-	-	1	1	-	-	-	-
CO2	-	3	-	-	3	-	-	-	-	-	-	1	1	-

High-3; Medium-2;Low-1

Reference Book(s):

R1. Laboratory Manual Prepared by Faculty of Electronics and Communication Engineering, Dr. Mahalingam College of Engineering and Technology.

R2. A.V.N. Tilak, Design of Analog Circuits, Khanna Publishing House, 2022

Passed in 01st Board of Studies Meeting held on 11.01.2024
Approved in 18th Academic Council Meeting held on 23.03.2024

BOS Chairman

Course Code: 23ESL301		Course Title:Professional Skills 2: Problem solving skills & Logical Thinking 2 (Common to all B.E/B.Tech Programmes)	
Course Category: SEC		Course Level: Intermediate	
L:T:P(Hours/Week) 0: 0: 2	Credits: 1	Total Contact Hours:30	Max Marks:100

Course Objectives:

The course is intended to enhance the students' numerical, analytical and logical reasoning ability. Also course focus to make learners prepare for various public and private sector exams and placement drives.

Module I **20 Hours**

Quantitative Ability

Time and work –Pipes and cisterns- - Time Speed Distance-Problems on Trains-Boats and Streams- Permutation and Combination-Probability, Mensuration- Heights and distance- Logarithms- Clocks and Calendars – Data Sufficiency

Module II **10 Hours**

Reasoning Ability

Number & Alpha series- Odd man out-Coding and Decoding-Syllogisms- -Problems on Cubes and Dices- Logical Venn diagram -Visual Reasoning- Element & logical series-Analogies

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO1: Enhance their problem solving skills & Logical thinking Skills	**Apply**

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	3	-	-

High-3; Medium-2; Low-1

Textbook(s):

T1: Dr. R. S. Aggarwal. "Quantitative Aptitude for Competitive Examinations" Sultan Chand & Sons Pvt. Ltd, New Delhi, 2018.

T2: Dr. R. S. Aggarwal. "A Modern Approach to Logical Reasoning", Sultan Chand & Sons Pvt. Ltd, New Delhi, 2018

Reference Book(s):

R1: R. V. Praveen. “Quantitative Aptitude and Reasoning” 2nd Revised Edition, Prentice-Hall of India Pvt.Ltd, 2013

R2: Arun Sharma. “Quantitative Aptitude for Common Aptitude Test”, McGraw Hill Publications, 5th Edition, 2020

R3: Arun Sharma. “Logical Reasoning for Common Aptitude Test”, McGraw Hill Publications, 6th Edition, 2021.

Web References:

1 https://www.indiabix.com/aptitude/questions-and-answers/

2 https://www.geeksforgeeks.org/aptitude-questions-and-answers/

Course Code: 23VAT301		Course Title: Universal Human Values 2: Understanding Harmony	
Course Category: VAC		Course Level: Intermediate	
L:T:P (Hours/Week) 2:1: 0	Credits:3	Total Contact Hours:45	Max Marks:100

Pre-requisites

- Induction Program

Course Objectives

The course is intended to:

1. Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.
2. Strengthening of self-reflection
3. Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence
4. Development of commitment and courage to act
5. Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.

Unit I Introduction to Value Education 9 Hours

Need for the Value Education; Self -exploration as the process for value education; Continuous Happiness and Prosperity: A look at basic Human Aspirations; Right understanding: Relationship and Physical Facilities; Happiness and Prosperity: current scenario; Method to fulfill the Basic human aspirations

Unit II Harmony in Human Being 9 Hours

Human being as a co-existence of self (‘I’) and the material ‘Body’; needs of Self ('I') and 'Body'; The Body as an instrument of ‘I’; Harmony in the self (‘I’); Harmony of the self (‘I’) with body; Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail. Programs to ensure Sanyam and Swasthya.

Unit III Harmony in the Family and Society 9 Hours

Harmony in the Family the basic unit of human interaction; Values in human to human relationship; Trust as the foundational values of relationship; Respect as the right evaluation ;Understanding harmony in the society (society being an extension of family); Vision for the universal human order.

Unit IV Harmony in the Nature 9 Hours

Understanding the harmony in the Nature Interconnectedness, self-regulation and mutual fulfillment among the four orders of nature; Existence as Co-existence at all levels; Holistic perception of harmony in existence.

Unit V **Harmony on Professional Ethics** **9 Hours**

Natural acceptance of human values; Definitiveness of Ethical Human Conduct; Basic for Humanistic Education, Humanistic Constitution and Humanistic Universal Order; Competence in professional ethics; Case study: holistic technologies, management models and production systems; Strategy for transition towards value-based life and profession

Course Outcomes	**Cognitive Level**
At the end of this course, students will be able to:	
CO.1 Reflect on values, aspiration, relationships and hence identify strengths and weaknesses.	Responding
CO.2 Appraise physical, mental and social wellbeing of self and practice techniques to promote wellbeing.	Responding
CO.3 Value human relationships in family and society and maintain harmonious relationships.	Valuing
CO.4 Respect nature and its existence for survival and sustainable of all life forms and hence practice conservation of nature	Valuing
CO.5 Appreciate ethical behaviour as a result of value system in personal and professional situations	Receiving

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO 2
CO1	-	-	-	-	-	-	1	2	2	-	-	2	-	-
CO2	-	-	-	-	-	1	2	2	2	1	-	2	-	-
CO3	-	-	-	-	-	2	2	2	2	1	-	2	-	-
CO4	-	-	-	-	-	2	2	2	2	-	-	2	-	-
CO5	-	-	-	-	-	1	2	2	2	-	-	2	-	-

High-3; Medium-2;Low-1

Text Book(s):

T1. Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010.

Reference Book(s):

R1. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.

R2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.

R3. The story of stuff, Annie Leonard, Free Press, New York 2010.

Web References:

1. https://aktu.ac.in/hvpe/ResourceVideo.aspx
2. http://hvpenotes.blogspot.com/
3. https://nptel.ac.in/courses/109/104/109104068/

SEMESTER IV

Course Code: 23MAT402		Course Title: Numerical Methods and Optimization	
Course Category: Minor		Course Level : Intermediate	
L:T:P(Hours/Week) 3:1:0	Credits: 4	Total Contact Hours: 60	Max Marks: 100

Course Objectives:

This course is designed to give an overview of numerical methods and provide knowledge and skills needed to apply these tools and techniques for decision making in organizations

Module I **22 + 8 Hours**

Solution of System of Linear Equations and Eigenvalue: Solution of system of linear equations – Gauss elimination method – Crout"s method – Iterative methods of Gauss Jacobi and Gauss Seidal method – Eigen values of matrix by Power method.

Solution of Non-Linear Equations and Curve Fitting: Solution of non-linear equations: Method of false position - Newton Raphson method – Order of convergence. Curve fitting: Method of least square – Fit a straight line – Fitting a parabola.

Interpolation, Polynomial Approximation : Interpolation with equal intervals – Newton's forward and backward difference formulae – Interpolation with unequal interval – Lagrange's interpolation

Module II **23 + 7 Hours**

Numerical Differentiation and Integration: Numerical differentiation – Numerical integration – Trapezoidal rule, Simpson's rule – Double integration using Trapezoidal rule.

Transportation & Assignment Models: Transportation problems, transportation simplex method– Assignment problems, Hungarian method- LP formulation of transportation and Assignment networks- Traveling sales man problem.

Network Models: Maximal flow problem – Shortest route problem – Minimal spanning tree problem – Project networks, CPM, PERT, Crashing of networks – LP model for crashing, project costing and control.

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO1: Determine the solution of system of linear and non-linear equations using numerical techniques.	Apply
CO2: Solve the interpolation problems and identify the basic concept of numerical differentiation and integration.	Apply
CO3: Demonstrate the application of numerical techniques in real-life situations	Apply
CO4: Calculate the optimal solution for transportation and assignment models and critical paths in projects based on minimumduration of activities.	Apply

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	2	-	-	-	-	-	-	-	-	1	-	-	-	-
CO4	3	-	-	-	-	-	-	-	-	-	-	-	-	-

High-3; Medium-2;Low-1

Text Book(s):

T1. Grewal, B.S. and Grewal, J. S., “Numerical Methods in Engineering and Science”, Eleventh Edition, Khanna Publishers, New Delhi, 2013.

T2. Hamdy A Taha, “Operations Research – An Introduction”, Prentice Hall India, 2003.

Reference Book(s):

R1. Iyengar S.R.K.” Numerical Methods”, New Age International Private Limited (2008)

R2. Philips, Ravindran and Solberg, “Operations Research”, John Wiley,2002

Web References:

1 https://archive.nptel.ac.in/courses/127/106/127106019/

2 https://onlinecourses.swayam2.ac.in/cec20_ma10/preview

Course Code: 23EAT401		Course Title: Antenna Design Technologies	
Course Category: Major		Course Level: Intermediate	
L:T:P Hours/Week) 3:0:0	Credits: 3	Total Contact Hours: 45	Max Marks: 100

Course Objectives:

Empower students with essential antenna engineering skills, encompassing radiation mechanisms, array analysis, special antennas, microstrip antennas, smart antennas, and radio wave propagation modes, fostering hands-on design expertise

Module I **22 Hours**

Fundamental Concepts: Antenna Radiation Mechanism– Radiation pattern, near-and far-field regions, reciprocity, directivity and gain, effective aperture, polarization, input impedance, efficiency, Friis transmission equation- Radiation from Wires and Loops: Infinitesimal dipole – finite-length dipole – linear elements near conductors – dipoles for mobile communication – small circular loop.

Aperture Antennas: Huygens' principle – radiation from rectangular and circular apertures – design considerations – Babinet's principle – Radiation from Sectoral and pyramidal horns – design concepts- prime-focus parabolic reflector and Cassegrain antennas.

Antenna Arrays: Analysis of uniformly spaced arrays with uniform and non-uniform excitation amplitudes – extension to planar arrays.

Module II **23 Hours**

Microstrip Antennas: Basic characteristics of microstrip antennas–feeding methods-Design of rectangular patch antennas – Planar Inverted-F Antenna (PIFA), Design of microstrip patch antenna using relevant software for given applications.

Special Antennas and Design Techniques: Frequency Independent antennas-LPDA, Antenna miniaturization, Fractal antennas, Broadband Antennas-Helical Antenna- Bandwidth Improvement techniques.

Different modes of Radio Wave propagation used in current practice

Smart Antennas: Types of Smart Antennas, Beamforming Techniques, Adaptive Algorithms, Applications of Smart Antennas, Challenges and Future Trends.

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO 1: Identify the suitable antenna for given application	Apply
CO 2: Analyze the parameters and design concepts of Antennas and smart antennas.	Analyze
CO 3: Examine the techniques and methods to improve antenna performance.	Analyze
CO4: Involve in independent/team learning and use Modern tools to design antenna for practical applications (for internal assessments only)	Analyze

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	3	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	3	-	-	-	2	2	-	-	3	-

High-3; Medium-2;Low-1

Text Book(s):

T1. C.A.Balanis,"Antenna Theory and Design", 3 rd Ed., John Wiley & Sons. 2005.
T2. J.D.Kraus, R.J.Marhefka, “Antennas for all Applications”, Tata McGraw Hill, Third Edition, 2002.

Reference Book(s):

R1.Girish Kumar, K. P. Ray, “Broadband Microstrip Antennas” Artech House,2003
R2. Frank Gross, Smart antennas for wireless communications, McGra-Hill, 2006.
R3 R.S.Elliot,"Antenna Theory and Design", Revised edition, Wiley-IEEE Press., 2003.

Web References:

1. https://www.antenna-theory.com/
2. https://www.mathworks.com/help/antenna/ref/antennadesigner-app.html
3. https://www.ansys.com/en-in/blog/common-antenna-designs

Course Code: 23EAT402	Course Title: Microcontroller and Its Applications		
Course Category: Major		Course Level: Intermediate	
L:T:P(Hours/Week) 3:0:0	Credits:3	Total Contact Hours:45	Max Marks:100

Course Objectives:

The course is intended to impart knowledge on the fundamentals of 8051, PIC microcontrollers & ARM processors and to demonstrate its practical applications in everyday situations.

Module I Introduction to Microprocessor and 8051 Microcontroller 22 Hours

Evolution of Microprocessor - 8085 Architecture and 8086 Architecture, Microprocessor and Microcontrollers, 8051 – Architecture, Special Function Registers (SFRs), Instruction set, Addressing modes,/O Ports, Timers / counters, Interrupts and serial communication. Introduction to embedded C for peripheral interfacing.

Interfacing: LED 7-segment and multiplexing techniques, LCD Interfacing, Switch and matrix Keyboard Interfacing, ADC, DAC and Sensor Interfacing, RTC interfacing, Relay Interfacing, DC Motor, stepper motor and PWM.

Module II PIC Microcontroller and ARM processor 23 Hours

PIC18xx microcontroller family, Architecture, Instruction set, ROM, RAM, Timer programming, Serial port programming, Interrupt programming, ADC and DAC interfacing, CCP module and programming.

ARM processor: RISC Vs CISC Architecture, ARM Processor Architecture-ARM7TDMI, ARM Core data flow model, Barrel Shifter, ARM processor modes and families, pipelining , ARM instruction Set and its Programming.

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO1: Apply the knowledge of microprocessors to identify a suitable Processor and solution for a given task.	Apply
CO2: Analyze a real time application and write a suitable code using embedded C	Analyze
CO3: Design an embedded system to meet given specifications with appropriate interfacing.	Apply
CO4: Work as a team and make an oral presentation for real- time applications using appropriate tools. (for internal assessment only)	Analyze

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	3	-	-	-	-	-	-	-	-	-	2	2
CO4	-	-	-	-	3	-	-	-	1	2	-	1	-	-

High-3; Medium-2;Low-1

Text Book(s):

T1. Muhammad Ali Mazidi, Janice Gillispie Mazidi, Rolin D.McKinlay, —The 8051 Microcontroller and Embedded Systems: Using Assembly and C, 2nd Edition, Pearson education, 2011

T2. Muhammad Ali Mazidi, Rolin D.McKinlay, Danny Causey, "PIC Microcontroller and Embedded Systems: Using Assembly and C for PIC18", Prentice Hall publications, 2007

Reference Book(s):

R1. Steve Furber,“Arm System-On-Chip Architecture”, 2/E, Pearson Education,2001

R2. Krishna Kant, “Microprocessor and Microcontroller Architecture, Programming and System Design using 8085, 8086, 8051 and 8096”, PHI, 2011.

R3. Kenneth J. Ayala “The 8051 Microcontroller”, 3rd Edition, Thompson Delmar Learning, New Delhi, 2007.

R4. Dogan Ibrahim,” Microcontroller projects in C for the 8051” Newnes, Oxford, 2000

Web References:

1. https://archive.org/details/microcontrollerp0000ibra/page/n1/mode/2up
2. https://archive.nptel.ac.in/courses/108/105/108105102/#

Course Code: 23EAT403		Course Title: Digital Communication	
Course Category: Major		Course Level: Intermediate	
L:T:P(Hours/Week) 3: 0: 0	Credits:3	Total Contact Hours:45	Max Marks:100

Course Objective:

The course is intended to impart knowledge on digital communication such as sampling, Quantization, waveform coding, baseband transmission and digital modulation scheme.

Module I **23 Hours**

Sampling and quantization :

Low pass sampling – Aliasing- Signal Reconstruction-Quantization - Uniform & non-uniform quantization - quantization noise - Logarithmic Companding of speech signal, Analog Pulse modulation techniques: PAM– PPM– PWM, TDM

Waveform coding :

PCM -Prediction filtering and DPCM - Delta Modulation - ADPCM & ADM principles-Linear Predictive Coding

Baseband transmission :

Properties of Line codes, Power Spectral Density of Unipolar, Polar and Bipolar RZ & NRZ Manchester, ISI, Nyquist criterion for distortion less transmission, Correlative coding, M-ary schemes, Eye pattern

Module II **22 Hours**

Digital modulation scheme:

Generation, detection, PSD & BER of Coherent BPSK, BFSK & QPSK - QAM - Principle of DPSK, Pseudo noise sequences, Discrete sequence spread spectrum with coherent BPSK, Frequency hop spread spectrum modulation

Error control coding :

Channel coding theorem, Linear block codes, Hamming codes, Cyclic codes, Convolutional codes, Viterbi decoding, Trellis coding

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO1: Analyze the different pulse modulation systems and waveform coding techniques.	Analyze
CO2: Apply the characteristics of the line codes used for digital data transmission	Apply
CO3: Compare the performance of digital modulation techniques and spread spectrum techniques	Analyze
CO 4: Analyze and implement various error control codes to detect and correct errors in digital communication	Analyze

Course Articulation Matrix

CO Vs PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	3	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	3	-	-	-	-	-	-	-	-	-	-	3	-
CO4	-	3	-	-	-	-	-	-	-	-	-	-	-	-

High-3; Medium-2; Low-1

Text Book:

T1. S. Haykin, “Digital Communications”, John Wiley, 20

T2. B.P.Lathi, Zhi Ding, “Modern Digital and Analog Communication Systems” 4thEdition, Oxford University Press 2011

Reference Book(s):

R1. Bernard Sklar, “Digital Communications: Fundamentals and Applications”, 2ndEdition, Prentice Hall,2009

R2. J.G Proakis, “Digital Communication”, 4th Edition, Tata McGraw Hill Company, 2001

R3. H P Hsu, Schaum Outline Series - “Analog and Digital Communications”, TMH 2006

R4. Leon W “Couch , “Digital and Analog Communication Systems” , 6th Edition, Prentice Hall , 2001

Web References:

1. https://www.tutorialspoint.com/principles_of_communication/principles_of_communication_digital_modulation_techniques.htm

Course Code: 23EAT404		Course Title: CMOS VLSI Design	
Course Category: Major		Course Level: Intermediate	
L:T:P(Hours/Week) 3: 0 : 0	Credits:3	Total Contact Hours: 45	Max Marks:100

Course Objectives:
The course is intended to impart knowledge on fundamentals of CMOS VLSI design, design of VLSI subsystems and concepts related to CMOS memories and clocking styles.

Module I **22 Hours**

Introduction to MOS Transistor: Moore's law, VLSI Design Process: Design specification – design entry – function simulation – planning, Placement and routing – timing simulation, flipflop and latch related timing issues, fabricating into chip – CMOS processing technologies – nWell – pWell – Twin tub – Silicon on insulator, BiCMOS – FINFET Technology.

MOS Transistor and Inverters: Basic MOS Transistors and Operation: NMOS enhancement transistor and PMOS enhancement transistor – Threshold Voltage – Derivation of drain current – Channel length modulation – Body Effect – Trans conductance – MOSFETs as switches – CMOS Inverter – latchup in CMOS Circuit – power dissipation in CMOS circuits.

Module II **23 Hours**

Logic Design with CMOS: Logic gates in static CMOS – Transistor sizing – Stick diagram, Layout diagrams and design rules – rationed circuits: pseudo NMOS – cascade voltage switch logic – Dynamic CMOS logic: domino logic, dual rail domino logic – Transmission gate – pass transistor circuits – CMOS Design and functional Verification of Basic logic gates.

VLSI Subsystem Design: CMOS Multiplexer, Equality Detector – Shift and Rotation Operation – Parity generators – Ripple carry Adder – Carry look Ahead Adder – Carry Skip Adder – Carry Select – Carry Save Array – Braun / Baugh Wooley – Modified Booth Encoded Multiplier, Introduction to Verilog.

CMOS Memories and Clocking: Conventional CMOS Latches, CMOS D Flip-flop, SDFF – TSPC Flip-flop – CMOS static RAM Dual Port SRAM – SRAM arrays – DRAM and Floating Gate MOSFET – Flash Memory CMOS Clocking Styles Pipelined Systems.

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO1: Analyze different fabrication steps involved in VLSI design process and examine various fabrication technologies.	Analyze
CO2: Model drain current equations and solve latchup in CMOS circuits.	Apply
CO3: Design different subsystems and develop HDL for adders and multipliers**.**	Apply
CO4: Examine CMOS memories and different clocking styles.	Analyze

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	2	-	-	-	-	-	-	-	-	-	-	-	2
CO2	3		-	-	-	-	-	-	-	-	-	-	-	2
CO3	-	-	3	-	-	-	-	-	-	-	-	-	-	3
CO4	-	2	-	-	-	-	-	-	-	-	-	-	-	2

High-3; Medium-2;Low-1

Text Book(s):

T1. Weste and Harris, CMOS VLSI Design: A circuit and System perspective, Third edition, Pearson Education, 2005.

T2. Samirpalnitkar, Verilog HDL: A Guide to digital design and Synthesis, Second edition, Pearson Education, 2003.

Reference Book(s):

R1.Umeyura John P *,* Introduction to VLSI Circuits and Systems*,* John Wiley and Sons, 2004.

R2.Douglass A Pucknell, Basic VLSI Design, Prentice Hall of India Publication, 2002.

Web References:

1.https://nptel.ac.in/courses/117101105/

2.https://www.nptel.ac.in/117101006/

3.https://www.siliconmentor.com/analog-vlsi-design/

Course Code: 23EAL401		Course Title: Analog and Digital Communication Laboratory	
Course Category: Major		Course Level: Intermediate	
L:T:P(Hours/Week) 0:0 : 3	Credits:1.5	Total Contact Hours:45	Max Marks:100

Course Objectives:

The course is intended to impart practical knowledge on various modulation and demodulation techniques using hardware kits and MATLAB software.

List of Experiments

1. Carry out the Amplitude modulation/Demodulation using hardware.
2. Carry out the Frequency modulation/Demodulation using hardware.
3. Verify the sampling theorem in the hardware.
4. Carry out the PAM, PWM and PPM using hardware.
5. Perform the operation of PCM encoding/ decoding using hardware.
6. Perform the operation of ASK and FSK using hardware.
7. Carry out the modulation and demodulation of BPSK using hardware.
8. Carry out the modulation and demodulation of QPSK using hardware.
9. Carry out the CRC Error control coding using hardware.
10. Carry out the Convolutional coding using hardware.
11. Simulate AM, FM using MATLAB software.
12. Simulate ASK, FSK, PSK using MATLAB software.

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO1: Analyze the various analog modulation systems with various modulation index	**Analyze**
CO2: Evaluate the different pulse modulation techniques based on its characteristics	**Evaluate**
CO3: Verify various error control coding schemes by using a suitable encoding and decoding methods	**Analyze**
CO4: Evaluate the various digital modulation schemes using their appropriate characteristics using Matlab	**Evaluate**

Course Articulation Matrix

CO Vs PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	-	3	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	3	2	-	-	-	-	-	-	-	1	-
CO3	-	3	-	-	-	-	-	-	-	-	-	-	2	-
CO4	-	-	1	2	3	-	-	1	-	1	-	-	3	-

High-3; Medium-2; Low-1

Reference Books :

R1. John G.Prokias, Masoud Salehi and Gerhard Bauch, "Contemporary Communication Systems using MATLAB", 3rd Edition, Cengage learning, 2012.
R2. “Communication Systems Laboratory manual”, prepared by the ECE Department.
R3. Kwonhue Choi, Huaping Liu, “Problem-Based Learning in Communication Systems Using MATLAB and Simulink”, Wiley IEEE Press, 2016.

Course Code: 23EAL402		Course Title: Microcontroller Laboratory	
Course Category: Major		Course Level: Intermediate	
L:T:P(Hours/Week) 0:0:3	Credits: 1.5	Total Contact Hours: 45	Max Marks: 100

Course Objectives:

The course is intended to impart knowledge on basic concepts of 8051,PIC microcontroller & ARM processor with its peripheral devices interfacing and to develop the assembly language programming, C programming skills of 8051 microcontroller.

List of Experiments:

1. Arithmetic Operations using 8051 assembly language programming.
2. Sorting/ Searching of Data using 8051 assembly language programming

C programming

3. Stepper Motor interfacing with 8051
4. ADC /DAC interfacing with 8051
5. Interfacing LED with Time Delay using Inbuilt Timer in 8051
6. Asynchronous serial communication using PIC Microcontroller
7. Dc motor control using PIC microcontroller
8. Seven segment display using PIC Microcontroller
9. LCD interfacing with PIC Microcontroller
10. LED, Switch and Buzzer interfacing with LPC2148 ARM processor
11. Generation of PWM Signal with LPC2148 ARM processor
12. Relay interfacing with LPC2148

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO 1: :Develop assembly language program using 8051 instructions given operations	Apply
CO 2: Engage as an individual and Conduct experiment to Interface the given processor with an external device and verify its functionality for real time problems.	Evaluate
CO 3: Use an appropriate tool to simulate the program for on-chip peripherals of the given processor for the given specifications.	Apply

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	3	-	-	-	-	3	2	-	-	-	-
CO3	-	-	-	-	3	-	-	-	-	-	-	3	2	2

High-3; Medium-2; Low-1

References: “Laboratory manual”, prepared by the department

Passed in 01st Board of Studies Meeting held on 11.01.2024
Approved in 18th Academic Council Meeting held on 23.03.2024 BOS Chairman