CMS COLLEGE OF ENGINEERING AND TECHNOLOGY
(AN AUTONOMOUS INSTITUTION)
(Affiliated to Anna University | Approved by AICTE |Accredited by NAAC – 'A' Grade)
Appachigoundenpathy, Kummittipathi (PO), Coimbatore – 641 032.

REGULATIONS 2026

Curriculum & Syllabus.

B.E. – Computer Science and Engineering (Artificial Intelligence and Machine Learning).

Applicable to the students admitted during the Academic year 2026 – 2027 onwards.

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING (ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

B.E. Computer Science and Engineering (Artificial Intelligence and Machine Learning)

CHOICE BASED CREDIT SYSTEM(CBCS)

Regulations 2026

Curriculum & Syllabus

Chairman - Board of Studies
Department of Computer Science and Engineering
(Artificial Intelligence and Machine Learning)
CMS College of Engineering and Technology
(Autonomous)
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INSTITUTION VISION:

A Centre of excellence, capable of empowering seekers of knowledge through holistic education.

INSTITUTION MISSION:

Create worthy citizens by providing holistic, qualitative, value based education and makes them creative members of global society.

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING (ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

VISION:

To be a global frontier of excellence in Artificial Intelligence and Machine Learning, pioneering human centric innovation and empowering future leaders to architect transformative, ethical, and sustainable solutions for a complex, interconnected world.

MISSION:

- To provide a cutting-edge, transdisciplinary education through an agile curriculum that integrates foundational theory with emerging trends in Generative AI, Edge Computing, and Data Science.
- To cultivate a high-impact research ecosystem that fosters collaborative inquiry with global industries and research bodies to solve high-stakes societal and technological challenges.
- To nurture socially conscious technocrats who prioritize integrity, equity, and transparency in the development and deployment of intelligent systems.
- To bridge the gap between academia and industry through immersive experiential learning, entrepreneurship support, and a culture of lifelong curiosity.

CMS
CHALLENGE IS SUCCESS

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UNDERGRADUATE AUTONOMOUS CURRICULUM

Programme: B.E CSE (AIML) **Regulations:2026**

Abbreviations:

BS – Basic Science
HUM–Humanities and Management
ES – Engineering Science
G –General
PC – Programme Core
PE – Programme Elective
OE – Open Elective
MC – Mandatory Course
SL –Self-Learning
SD – Skill Development
OC – Off Campus Courses
SBP- Societal Need Based Projects
SDL - Self-Directed Learning Course
T – Theory Course
L – Laboratory Course
LIT – Laboratory Integrated Theory
LITP – Laboratory Integrated Theory with Project Component
PW – Project Work
CDP – Capstone Design Project
TCP – Total Contact Period(s)

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PEO1: Demonstrate profound expertise in designing and engineering autonomous systems and predictive models to solve multifaceted industrial and global problems.

PEO2: Excel in diverse roles such as lead engineers, researchers, or entrepreneurs by adapting to the rapidly evolving technological landscape through continuous learning and strategic thinking.

PEO3: Architect AI solutions that are inclusive, fair, and secure, demonstrating a commitment to professional ethics and the socio-economic advancement of the global community.

PROGRAM OUTCOMES (POs)

1. **Engineering Knowledge**: Apply math, science, and engineering fundamentals to complex problems.
2. **Problem Analysis:** Identify and analyze complex problems using research and sustainability principles.

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3. **Design Solutions:** Design systems and processes considering health, safety, cost, culture, and environment.
4. **Investigations:** Use experiments, modelling, and data analysis to reach valid conclusions.
5. **Engineering Tools:** Apply modern tools for modelling and problem-solving, recognizing their limits.
6. **Society & Environment:** Assess societal, legal, and environmental impacts of engineering solutions.
7. **Ethics:** Commit to ethics, human values, diversity, and legal compliance.
8. **Teamwork:** Work effectively as an individual and in multidisciplinary teams.
9. **Communication:** Communicate clearly in reports, presentations, and documentation across diverse groups.
10. **Management & Finance:** Apply management and economic principles in projects and teamwork.
11. **Lifelong Learning:** Engage in continuous learning, adapt to new technologies, and think critically.

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO 1: Architect, implement, and optimize end-to-end intelligent systems using advanced machine learning, deep learning, and natural language processing techniques across diverse data domains.

PSO 2: Leverage state-of-the-art frameworks (such as PyTorch, TensorFlow, and HuggingFace), cloud-native AI services, and distributed computing to build scalable and efficient production-grade applications.

PSO 3: Critically evaluate and mitigate biases, ensure data privacy, and implement explainable AI (XAI) frameworks to ensure the safety and reliability of intelligent deployments in sensitive sectors

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B.E. COMPUTER SCIENCE AND ENGINEERING (ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

REGULATIONS 2026

CURRICULUM AND SYLLABUS

CHOICE BASED CREDIT SYSTEM (CBCS)

SEMESTER – I

S.No.	Course Code	Course Name	Course Type	L - T - P - J	TCP	Credits	Category
1		Induction Programme	-	-	-	-	MC
2	26UHM101	Classical Tamil Heritage - I	T	1 - 0 - 0 - 0	1	1	HUM
3	26UMA101	Matrices and Calculus	LIT	3 - 0 - 2 - 0	5	4	BS
4	26UPH101	Engineering Physics - I	LIT	2 - 0 - 2 - 0	4	3	BS
5	26UCY101	Engineering Chemistry	LIT	2 - 0 - 2 - 0	4	3	BS
6	26UCS101	Computer Programming: C	LIT	2 - 0 - 2 - 0	4	3	ES(G)
7	26UCS102	Essentials of Programming Paradigm	LIT	2 - 0 - 2 - 0	4	3	ES(PC)
8	26UHM102	Functional English - I	LIT	1 - 0 - 2 - 0	3	2	HUM
9	26UME111	Engineering Practices Laboratory	L	0 - 0 - 4 - 0	4	2	ES(G)
10	26UHM103	Physical Education - I	-	0 - 0 - 2 - 0	2	1	HUM
					31	**22**	

SEMESTER – II

S.No.	Course Code	Course Name	Course Type	L - T - P - J	TCP	Credits	Category
1	26UPH201	Engineering Physics - II	T	3 - 0 - 0 - 0	3	3	BS
2	26UHM201	Classical Tamil Heritage - II	T	1 - 0 - 0 - 0	1	1	HUM
3	26UAD201	Python for Data Science	LIT	3 - 0 - 4 - 0	7	5	ES(PC)
4	26UMA201	Statistics and Numerical Methods	LIT	3 - 0 - 2 - 0	5	4	BS
5	26UCS202	Software Development Practices	LIT	3 - 0 - 2 - 0	5	4	ES(PC)
6	26UHM202	Functional English - II	LIT	1 - 0 - 2 - 0	3	2	HUM
7	26UME211	Integrated Engineering Design Laboratory	L	0 - 0 - 4 - 0	4	2	ES(G)
8		Foreign Language	T	1 - 0 - 0 - 0	1	1	HUM
9	26UHM203	Physical Education - II	-	0 - 0 - 2 - 0	2	1	HUM
10		NCC / NSS / NSO / YRC / CLUBS	-	-	-	-	MC
					31	**23**	

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SEMESTER – III

S.No.	Course Code	Course Name	Course Type	L - T - P - J	TCP	Credits	Category
1	26UMA301	Discrete Mathematics	T	3 - 1 - 0 - 0	4	4	BS
2	26UCS304	Software Engineering with Agile Methodologies	T	3 - 0 - 0 - 0	3	3	ES(PC)
3	26UIT301	Data Structures and Algorithms	LIT	3 - 0 - 4 - 0	7	5	ES(PC)
4	26UCS302	Java Programming	LIT	3 - 0 - 4 - 0	7	5	ES(PC)
5	26UCS303	Operating Systems	LIT	3 - 0 - 2 - 0	5	4	ES(PC)
6	26UEC305	Digital Principles and Computer Organization	LIT	3 - 0 - 2 - 0	5	4	ES(G)
7	26UALS01	Skill Development course - I	LIT	1 - 0 - 2 - 0	3	2	SD
					34	**27**	

SEMESTER – IV

S.No.	Course Code	Course Name	Course Type	L - T - P - J	TCP	Credits	Category
1	26UAD401	Artificial Intelligence	LIT	3 - 0 - 2 - 0	5	4	ES(PC)
2	26UAL401	Database Design and Management	LIT	3 - 0 - 2 - 0	5	4	ES(PC)
3	26UCS404	Computer Networks	LIT	3 - 0 - 2 - 0	5	4	ES(PC)
4	26UAD402	Big Data Analytics	LIT	2 - 0 - 2 - 0	4	3	ES(PC)
5	26UHM401	Engineering Entrepreneurship Development	LIT	2 - 0 - 2 - 0	4	3	HUM
6	26UALS02	Skill Development course - II	LIT	1 - 0 - 2 - 0	3	2	SD
7	26UALS03	Societal Impact Based Project - Mini Project - I	SBP	-	-	1	SD
8	26UMX401	Disaster and Risk Reduction Management	T	2 - 0 - 0 - 0	2	-	MC
						21	

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SEMESTER – V

S.No.	Course Code	Course Name	Course Type	L - T - P - J	TCP	Credits	Category
1	26UCB501	Cryptography and Cyber Security	T	3 - 1 - 0 - 0	4	4	ES(PC)
3	26UAL501	Machine Learning	LITP	2 - 0 - 2 - 2	6	4	ES(PC)
2	26UEC505	Embedded Systems and IoT	LIT	3 - 0 - 2 - 0	5	4	ES(PC)
4	26UAL502	Generative AI and Prompt Engineering	LIT	3 - 0 - 0 - 0	3	3	ES(PC)
5		Programme Elective - I	-	-	-	3	ES(PE)
6		Programme Elective - II	-	-	-	3	ES(PE)
7	26UALS04	Skill Development course - III	LIT	1 - 0 - 2 - 0	3	2	SD
8	26UALS05	Industry Oriented Course - I	-	-	-	1	SD
9	26UALS06	Summer Internship - I	-	-	-	1	SD
10		Self-Learning Courses	-	-	-	1	SL
						26	

SEMESTER – VI

S.No.	Course Code	Course Name	Course Type	L - T - P - J	TCP	Credits	Category
1	26UCY601	Environmental Sciences and Sustainability	T	2 - 0 - 0 - 0	2	2	BS
2	26UCS601	Full Stack Development	LITP	2 - 0 - 2 - 2	6	4	ES(PC)
3	26UAL601	Deep Learning	LIT	3 - 0 - 2 - 0	5	4	ES(PC)
4	26UAD601	Data Visualization and Visual Analytics	LIT	2 - 0 - 2 - 0	4	3	ES(PC)
5		Programme Elective - III	-	-	-	3	ES(PE)
6		Programme Elective - IV	-	-	-	3	ES(PE)
7		Open Elective - I	-	-	-	3	ES(OE)
8	26UALS07	Mini Project - II	L	0 - 0 - 0 - 2	2	1	SD
9	26UALS08	Industry Oriented Course - II	-	-	-	1	SD
						24	

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SEMESTER – VII

S.No.	Course Code	Course Name	Course Type	L - T - P - J	TCP	Credits	Category
1	26UHM701	Professional Ethics and Human Values	T	2 - 0 - 0 - 0	2	2	HUM
2	26UCB602	Ethical Hacking and Penetration Testing	LIT	2 - 0 - 2 - 0	4	3	ES(PC)
3		Programme Elective - V	-	-	-	3	ES(PE)
4		Programme Elective - VI	-	-	-	3	ES(PE)
5		Open Elective - II	-	-	-	3	ES(OE)
6	26UALS09	Summer Internship - II	-	-	-	1	SD
						15	

SEMESTER – VIII

S.No.	Course Code	Course Name	Course Type	L - T - P - J	TCP	Credits	Category
1	26UALS10	Project Work	PW	0 - 0 - 0 - 16	**16**	**8**	SD

Total Credits: 166

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PROGRAMME ELECTIVE COURSES: VERTICALS

Vertical I Emerging Technology	Vertical II Cloud Computing and Data Center Technologies	Vertical III Artificial Intelligence and Machine Learning	Vertical IV Cyber Security and Data Privacy	Vertical V Data Science	Vertical VI Internet of Things and Smart Applications	Vertical VII Product Development
26CSP101 3D Printing and Design	**26ITP201** Storage Technologies	**26ALP301** Knowledge Engineering	**26CBP401** Cyber threat for IoT and Cloud	**26ADP501** Bio Informatics	**26ITP601** Smart Agriculture and Precision Farming	**26CSP701** DevOps
26CSP102 Quantum Computing	**26ITP202** Distributed Computing	**26ALP302** Ethical and Legal Implications of AI	**26CBP402** Engineering Secure Software Systems	**26ADP502** Information Retrieval Techniques	**26ITP602** Smart IoT Architecture	**26CSP702** Java Spring Boot
26ITP101 Drone Technologies	**26ITP203** Edge and Fog computing	**26ALP308** Explainable AI and Responsible AI	**26CBP403** Social Network Security	**26ADP503** Recommender Systems	**26ITP603** Wearable Computing	**26CSP703** MERN Stack
26CSP103 Bio-inspired Computing	**26ITP207** Neuromorphic and Energy Efficient Computing	**26ALP311** AI in cyber Security	**26CBP408** Digital and Mobile Forensics	**26ADP506** Business Analytics	**26ITP604** IoT in 5G Networks	**26CSP704** Software Testing and Automation
26CSP104 Healthcare Analytics	**26ITP208** Data Center Architecture and Management	**26ALP312** Natural Language Processing	**26CBP409** Security and Privacy in Cloud	**26ADP507** Exploratory Data Analysis	**26ITP605** Dynamic Paradigm for IoT	**26CSP705** Vibe Coding
26CSP105 Metaverse and Extended Reality Technologies	**26ITP209** Software Defined Networks	**26ALP313** Reactive Machines and Self-Aware AI	**26CBP410** Privacy in Communication Networks	**26ADP508** Data Warehousing and Business Intelligence	**26ITP606** Connected Vehicles and Vehicular IoT	**26CSP706** Cloud Services Management
26CSP106 Robotic Process Automation	**26ITP210** Stream Processing	**26ALP314** Edge AI and TinyML	**26CBP412** Cloud Security and Zero Trust Architecture	**26ADP509** Image and Video Analytics	**26ITP607** Green IoT and Sustainable Smart Systems	**26CSP707** Power BI

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VERTICAL 1: EMERGING TECHNOLOGY

S.No	Course Code	Course Name	Course Type	L– T–P –J	TCP	Credits	Category
1	26CSP101	3D Printing and Design	T	3 - 0 - 0 - 0	3	3	ES(PE)
2	26CSP102	Quantum Computing	T	3 - 0 - 0 - 0	3	3	ES(PE)
3	26ITP101	Drone Technologies	T	3 - 0 - 0 - 0	3	3	ES(PE)
4	26CSP103	Bio-inspired Computing	LIT	2 - 0 - 2 - 0	4	3	ES(PE)
5	26CSP104	Healthcare Analytics	LIT	2 - 0 - 2 - 0	4	3	ES(PE)
6	26CSP105	Metaverse and Extended Reality Technologies	LIT	2 - 0 - 2 - 0	4	3	ES(PE)
7	26CSP106	Robotic Process Automation	LIT	2 - 0 - 2 - 0	4	3	ES(PE)

VERTICAL 2: CLOUD COMPUTING AND DATA CENTER TECHNOLOGIES

S.No	Course Code	Course Name	Course Type	L– T–P –J	TCP	Credits	Category
1	26ITP201	Storage Technologies	T	3 - 0 - 0 - 0	3	3	ES(PE)
2	26ITP202	Distributed Computing	T	3 - 0 - 0 - 0	3	3	ES(PE)
3	26ITP203	Edge and Fog computing	T	3 - 0 - 0 - 0	3	3	ES(PE)
4	26ITP207	Neuromorphic and Energy Efficient Computing	LIT	2 - 0 - 2 - 0	4	3	ES(PE)
5	26ITP208	Data Center Architecture and Management	LIT	2 - 0 - 2 - 0	4	3	ES(PE)
6	26ITP209	Software Defined Networks	LIT	2 - 0 - 2 - 0	4	3	ES(PE)
7	26ITP210	Stream Processing	LIT	2 - 0 - 2 - 0	4	3	ES(PE)

VERTICAL 3: ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

S.No	Course Code	Course Name	Course Type	L– T–P –J	TCP	Credits	Category
1	26ALP301	Knowledge Engineering	T	3 - 0 - 0 - 0	3	3	ES(PE)
2	26ALP302	Ethical and Legal Implications of AI	T	3 - 0 - 0 - 0	3	3	ES(PE)
3	26ALP308	Explainable AI and Responsible AI	LIT	2 - 0 - 2 - 0	4	3	ES(PE)
4	26ALP311	AI in cyber Security	LIT	2 - 0 - 2 - 0	4	3	ES(PE)
5	26ALP312	Natural Language Processing	LIT	2 - 0 - 2 - 0	4	3	ES(PE)
6	26ALP313	Reactive Machines and Self-Aware AI	LIT	2 - 0 - 2 - 0	4	3	ES(PE)
7	26ALP314	Edge AI and TinyML	LIT	2 - 0 - 2 - 0	4	3	ES(PE)

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VERTICAL 4: CYBER SECURITY AND DATA PRIVACY

S.No	Course Code	Course Name	Course Type	L– T–P –J	TCP	Credits	Category
1	26CBP401	Cyber threat for IoT and Cloud	T	3 - 0 - 0 - 0	3	3	ES(PE)
2	26CBP402	Engineering Secure Software Systems	T	3 - 0 - 0 - 0	3	3	ES(PE)
3	26CBP403	Social Network Security	T	3 - 0 - 0 - 0	3	3	ES(PE)
4	26CBP408	Digital and Mobile Forensics	LIT	2 - 0 - 2 - 0	4	3	ES(PE)
5	26CBP409	Security and Privacy in Cloud	LIT	2 - 0 - 2 - 0	4	3	ES(PE)
6	26CBP410	Privacy in Communication Networks	LIT	2 - 0 - 2 - 0	4	3	ES(PE)
7	26CBP412	Cloud Security and Zero Trust Architecture	LIT	2 - 0 - 2 - 0	4	3	ES(PE)

VERTICAL 5: DATA SCIENCE

S.No	Course Code	Course Name	Course Type	L– T–P –J	TCP	Credits	Category
1	26ADP501	Bio-Informatics	T	3 - 0 - 0 - 0	3	3	ES(PE)
2	26ADP502	Information Retrieval Techniques	T	3 - 0 - 0 - 0	3	3	ES(PE)
3	26ADP503	Recommender Systems	T	3 - 0 - 0 - 0	3	3	ES(PE)
4	26ADP506	Business Analytics	LIT	2 - 0 - 2 - 0	4	3	ES(PE)
5	26ADP507	Exploratory Data Analysis	LIT	2 - 0 - 2 - 0	4	3	ES(PE)
6	26ADP508	Data Warehousing and Business Intelligence	LIT	2 - 0 - 2 - 0	4	3	ES(PE)
7	26ADP509	Image and Video Analytics	LIT	2 - 0 - 2 - 0	4	3	ES(PE)

VERTICAL 6: INTERNET OF THINGS AND SMART APPLICATIONS

S.No	Course Code	Course Name	Course Type	L– T–P –J	TCP	Credits	Category
1	26ITP601	Smart Agriculture and Precision Farming	T	3 - 0 - 0 - 0	3	3	ES(PE)
2	26ITP602	Smart IoT Architecture	T	3 - 0 - 0 - 0	3	3	ES(PE)
3	26ITP603	Wearable Computing	T	3 - 0 - 0 - 0	3	3	ES(PE)
4	26ITP604	IoT in 5G Networks	LIT	2 - 0 - 2 - 0	4	3	ES(PE)
5	26ITP605	Dynamic Paradigm for IoT	LIT	2 - 0 - 2 - 0	4	3	ES(PE)
6	26ITP606	Connected Vehicles and Vehicular IoT	LIT	2 - 0 - 2 - 0	4	3	ES(PE)
7	26ITP607	Green IoT and Sustainable Smart Systems	LIT	2 - 0 - 2 - 0	4	3	ES(PE)

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VERTICAL 7: PRODUCT DEVELOPMENT

S.No	Course Code	Course Name	Course Type	L– T–P –J	TCP	Credits	Category
1	26CSP701	DevOps	LIT	2 - 0 - 2 - 0	4	3	ES(PE)
2	26CSP702	Java Spring Boot	LIT	2 - 0 - 2 - 0	4	3	ES(PE)
3	26CSP703	MERN Stack	LIT	2 - 0 - 2 - 0	4	3	ES(PE)
4	26CSP704	Software Testing and Automation	LIT	2 - 0 - 2 - 0	4	3	ES(PE)
5	26CSP705	Vibe Coding	LIT	2 - 0 - 2 - 0	4	3	ES(PE)
6	26CSP706	Cloud Services Management	LIT	2 - 0 - 2 - 0	4	3	ES(PE)
7	26CSP707	Power BI	LIT	2 - 0 - 2 - 0	4	3	ES(PE)

CATEGORY WISE OPEN ELECTIVE SELECTIONS

(In addition to all the verticals of other programmes)

OPEN ELECTIVE-I

S.No	Course Code	Course Name	Course Type	L– T–P –J	TCP	Credits	Category
1	26HMO601	Project Report Writing	T	3 - 0 - 0 - 0	3	3	OE
2	26EEO601	Renewable Energy Technologies	T	3 - 0 - 0 - 0	3	3	OE
3	26ECO601	Electronics Engineering	T	3 - 0 - 0 - 0	3	3	OE
4	26MEO601	Marketing Management	T	3 - 0 - 0 - 0	3	3	OE
5	26MEO602	Maintenance Engineering	T	3 - 0 - 0 - 0	3	3	OE

OPEN ELECTIVE-II

S.No	Course Code	Course Name	Course Type	L– T–P –J	TCP	Credits	Category
1	26HMO701	Human Resource Management	T	3 - 0 - 0 - 0	3	3	OE
2	26EEO701	Electric Vehicles	T	3 - 0 - 0 - 0	3	3	OE
3	26ECO702	Consumer Electronics	T	3 - 0 - 0 - 0	3	3	OE
4	26ECO703	Robotics and its Applications	T	3 - 0 - 0 - 0	3	3	OE
5	26MEO701	Industrial Safety Engineering	T	3 - 0 - 0 - 0	3	3	OE

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26UHM101	CLASSICAL TAMIL HERITAGE - I	T	L	T	P	J
			1	0	0	0

Course Objectives:

1	Understand the evolution, ethical values, and management principles found in classical and modern Tamil literature.
2	Appreciate the rich heritage of Tamil art, sculptures, temple architecture, and musical instruments.
3	Explore traditional Tamil folk arts, martial arts, and sports.
4	Examine the socio-economic life, global trade, and ecological 'Thinai' concept of ancient Tamils.
5	Recognize the vital contributions of Tamils to the Indian freedom struggle, social reforms, and indigenous knowledge systems.

Syllabus:

LANGUAGE AND LITERATURE	**3 Hours**
Language and Literature: Language Families in India, Dravidian Languages, Tamil as a Classical Language - Classical Literature in Tamil – Secular Nature of Sangam Literature, Distributive Justice in Sangam Literature, Management Principles in Thirukural, Tamil Epics and Impact of Buddhism & Jainism in Tamil Land, Bakthi Literature Azhwars and Nayanmars - Forms of minor Poetry - Development of Modern literature in Tamil, Contribution of Bharathiyar and Bharathidhasan.	
HERITAGE - ROCK ART PAINTINGS TO MODERN ART – SCULPTURE	**3 Hours**
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.	
FOLK AND MARTIAL ARTS	**3 Hours**
Folk and Martial Arts: Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leather puppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils.	
THINAI CONCEPT OF TAMILS	**3 Hours**
Thinai Concept of Tamils : 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.	
CONTRIBUTION OF TAMILS TO INDIAN NATIONAL MOVEMENT AND INDIAN CULTURE	**3 Hours**
Contribution of Tamils to Indian National Movement and Indian Culture: Contribution of Tamils to Indian Freedom Struggle, The Cultural Influence of Tamils over the other parts of India, Self-Respect Movement, Role of Siddha Medicine in Indigenous Systems of Medicine, Inscriptions & Manuscripts, Print History of Tamil Books.	
Total Lecture Periods: 15 Hours	

Text Books:

1	Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. hirunavukkarasu) (Published by: International Institute of Tamil Studies).
2	The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)

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References:	
1	Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – in print.
2	Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
3	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).
4	Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Publishedby: The Author).
5	Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu).
E-Resources:	
1	www.tamilvu.org
2	www.tnarch.gov.in
3	www.indianculture.gov.in
4	www.tamilheritage.org
5	www.tnarchives.tn.gov.in

Course Outcomes: Upon successful completion of the course, students will be able to	
CO No.	**Course Outcomes**
1	Describe the historical significance of the Tamil language and apply the ethical and management principles found in classical Tamil literature to modern contexts.
2	Identify and evaluate various forms of Tamil heritage, including the evolution of sculptures, traditional handicrafts, and the socio-economic role of temples.
3	Recognize and distinguish between the various folk arts, martial arts, and traditional games native to the Tamil land.
4	Analyze the 'Thinai' concept to understand the relationship between ancient Tamils and their environment, and summarize the educational and economic prosperity of the Sangam age.
5	Assess the cultural and historical contributions of Tamil Nadu to the broader Indian freedom struggle, social reform movements, and indigenous knowledge systems.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
1	-	-	-	-	-	1	3	-	2	2	1	-	-	1
2	-	-	-	-	-	2	1	-	-	-	1	-	-	-
3	-	-	-	-	-	1	-	2	-	-	1	-	-	-
4	-	-	-	-	-	3	1	-	-	1	1	-	-	-
5	-	-	-	-	-	2	2	-	1	-	1	-	-	1
Avg	-	-	-	-	-	1.8	1.75	2.0	1.5	1.5	1.0	-	-	1.0

"3"- High, "2"- Medium, "1"- Low,"-" No Correlation

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26UMA101	MATRICES AND CALCULUS	LIT	L	T	P	J	C
			3	0	2	0	4

Course Objectives:

1	To develop the use of matrix algebra techniques that are needed by engineers for practical applications.
2	To familiarize the students with differential calculus.
3	To familiarize the student with functions of several variables. This is needed in many branches of engineering.
4	To make the students understand various techniques of integration.
5	To acquaint the student with mathematical tools needed in evaluating multiple integrals and their applications.

Syllabus:

MATRICES **15 Hours**

Eigenvalues and Eigenvectors of a real matrix – Characteristic equation–Properties of Eigenvalues and Eigenvectors – Cayley - Hamilton theorem – Diagonalization of matrices by orthogonal transformation – Reduction of a quadratic form to canonical form by orthogonal transformation – Nature of quadratic Forms.

Activities: Problems on Eigenvalues, Cayley–Hamilton theorem, Matrix Diagonalization and Quadratic forms. Quiz: Objective -Type test.

Practicals:

1. Matrix Operations - Addition, Multiplication, Transpose, Inverse.
2. Eigenvalues and Eigenvectors of a real matrix.

DIFFERENTIAL CALCULUS **15 Hours**

Representation of functions- Limit of a function - Continuity-Derivatives-Differentiation rules (sum, Product, quotient, chain rules) - Implicit differentiation –Applications: Maxima and Minima of functions of one variable.

Activities: Problems on Limits, Differentiation Techniques and Applications of Derivatives. Quiz: Objective -Type test.

Practicals:

1. Solving Derivative Problems Using Differentiation Rules.
2. Determining Maxima and Minima of a function of one variable.

FUNCTIONS OF SEVERAL VARIABLES **15 Hours**

Partial differentiation – Homogeneous functions and Euler's theorem–Total derivative – Change of Variables – Partial differentiation of implicit functions –Applications: Maxima and minima of functions of two variables and Lagrange's method of undetermined multipliers.

Activities:

Problems on Techniques of Integration and Evaluation of Definite Integrals. Quiz: Objective -Type test.

Practicals:

1. Solving Problems Using Partial Differentiation
2. Determining Maxima and Minima of a function of two variables.

INTEGRAL CALCULUS **15 Hours**

Definite and Indefinite integrals - Substitution rule - Techniques of Integration: Integration by parts, Integration of rational functions by partial fraction, Integration of irrational functions.

Activities: Problems on Double Integrals, Triple Integrals and Applications to Area and

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Volume. Quiz: Objective -Type test.

Practicals:

1. Evaluation of definite Integrals.
2. Evaluation of Indefinite Integrals.

MULTIPLE INTEGRALS	**15 Hours**

Double integrals – Change of order of integration – Double integrals in polar coordinates – Area enclosed by plane curves –Triple integrals – Volume of solids (cylinder, sphere).

Activities: Problems on Partial Differentiation, Euler's Theorem and Constrained Optimization. Quiz: Objective -Type test.

Practicals:

1. Area as double integral.
2. Volume as a triple integral.

Total Lecture Periods: 45 Hours
Total Practical Periods: 30 Hours

Text Books:	
1	Kreyszig, E., *Advanced Engineering Mathematics*, 10th Edition (SI Units), John Wiley & Sons, 2019.
2	Grewal, B. S., *Higher Engineering Mathematics*, 46th Edition, Khanna Publishers, New Delhi, 2023.
3	Stewart, J., *Calculus: Early Transcendentals*, 9th Edition, Cengage Learning, 2020. *(For Units II & IV: Sections 1.1, 2.2, 2.3, 2.5, 2.7 (Tangents only), 2.8, 3.1–3.6, 3.11, 4.1, 4.3, 5.1 (Area only), 5.2–5.5, 7.1–7.4,and 7.8.)*
References:	
1	Anton, H., Bivens, I., & Davis, S., *Calculus*, 11^{th} Edition, Wiley, 2019.
2	Jain, R. K., & Iyengar, S. R. K., *Advanced Engineering Mathematics*, 6^{th} Edition, Narosa Publishing House, 2019.
3	Thomas, G. B., Hass, J., Heil, C., & Weir, M. D., *Thomas' Calculus*, 15^{th} Edition, Pearson, 2024.
4	Ramana, B. V., *Higher Engineering Mathematics*, McGraw Hill Education, 2023.
5	Bali, N. P., Goyal, M., & Watkins, C., *Advanced Engineering Mathematics*, 7^{th} Edition, Firewall Media, 2009.
E-Resources:	
1	https://www.scribd.com/document/605383865/Unit-1-Matrices
2	https://www.khanacademy.org/math/calculus-1
3	https://onlinecourses.nptel.ac.in/e-learning/preview/noc26_ma130
4	https://tutorial.math.lamar.edu/Classes/CalcII/CalcII.aspx
5	https://www.geogebra.org/3d

Course Outcomes: Upon successful completion of the course, students will be able to

CO No.	Course Outcomes
1	Use the matrix algebra methods for solving practical problems.
2	Apply differential calculus tools in solving various application problems
3	Able to use differential calculus ideas on several variable functions.

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4	Apply different methods of integration in solving practical problems.
5	Apply multiple integral ideas in solving areas, volumes and other practical problems.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
1	3	3	1	1	-	-	-	-	2	-	2	2	2	-
2	3	3	1	1	-	-	-	-	2	-	2	2	2	-
3	3	3	1	1	-	-	-	-	2	-	2	2	2	-
4	3	3	1	1	-	-	-	-	2	-	2	2	2	-
5	3	3	1	1	-	-	-	-	2	-	2	2	2	-
Avg	3	3	1	1	-	-	-	-	2	-	2	2	2	-

"3" – High, "2" – Medium, "1" – Low, "-" No Correlation.

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26UPH101	ENGINEERING PHYSICS - I	LIT	L	T	P	J	C
			2	0	2	0	3

Course Objectives: –

1	Analyze the elastic behavior of materials and the principles of fluid dynamics and thermal expansion.
2	Understand the mechanisms of oscillations and the propagation of electromagnetic waves.
3	Develop a conceptual framework for quantum mechanics and its technological applications.
4	Explore the principles of optics and photonics, specifically focusing on lasers and fiber optic communication.
5	Examine the structural properties of materials, crystal systems, and the role of defects in material science.

Syllabus:

PROPERTIES OF MATTER **12 Hours**

Elasticity – Stress-strain diagram and its uses- bending of beams- bending moment of a beam-Cantilever (theory and experiment)-Young's modulus -uniform bending method (theory and experiment) – I-shaped girders – Viscosity –Stokes method – Surface tension – drop weight method– thermal expansion– thermal stress.

Activities: Virtual demonstration of thermal stress.

Practicals:

1. Torsional pendulum - Determination of rigidity modulus of wire and moment of inertia of regular and irregular objects.
2. Non-uniform bending - Determination of Young's modulus.

OSCILLATION AND WAVES **12 Hours**

Oscillations: Basic Definition-Simple Harmonic motion – Representation of Displacement, velocity and acceleration in SHM-Derivation of time period and frequency for a spring-mass system, Energy in SHM. Damping and resonance in SHM Waves: Waves on a stretched string– Wave equation -standing waves – Ultrasonic waves and generation of ultrasonic waves – Maxwell's equation – Propagation of EM waves in free space.

Activities: Virtual demonstration of propagation of EM waves.

Practicals:

1. Simple harmonic oscillations of cantilever.
2. Determination of thermal conductivity of a bad conductor – Lee's Disc method.

QUANTUM MECHANICS **12 Hours**

Black body radiation –- Photoelectric effect – de Broglie hypothesis – Heisenberg Uncertainty Principle Schrödinger's wave equation (Time dependent and time independent) – particle in an infinite potential well: 1D Boxes – Barrier penetration and quantum tunneling – scanning tunneling microscope.

Activities: Virtual demonstration of Scanning Transmission Electron Microscope.

Practicals:

1. Compact disc- Determination of width of the grove using laser.
2. Ultrsonic interferometer-determination of the velocity of sound and compressibility of liquids.

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APPLIED OPTICS & LASERS	12 Hours
Introduction to Optics –Lenses and mirrors- image formation- determination of thickness of a thin film by air wedge method, micheloson's interferometer – applications. Adaptive optics– Fiber optics: Structure of a Fiber, Fiber Optic Communication System, Displacement, pressure and Temperature sensor, Spontaneous and stimulated emission– Einstein Co-efficient, Nd: YAG laser, 2 laser (construction, working and applications). **Activities**: Demonstration of sensors and Applications of Lasers. **Practicals:** 1. Laser- Determination of the wavelength of the laser using grating. **2.** Air wedge - Determination of thickness of a thin sheet/wire.	
SOLID STATE PHYSICS	**12 Hours**
Single crystalline, polycrystalline and amorphous materials – single crystals: unit cell, crystal systems, Bravais lattices, directions and planes in a crystal, Miller indices – inter-planar distances - coordination number and packing factor for SC, BCC, FCC, HCP and diamond structures –growth techniques: growth of single crystals- solution and melt crystals. **Activities**: Virtual demonstration of crystal structures. **Practicals:** **1.** Melde's experiment. **2.** Post office box – Determination of bandgap of a semiconductor.	
Total Lecture Periods: 30 Hours **Total Practical Periods: 30 Hours**	

Text Books:	
1	Bhattacharya, D.K. & Poonam, T. "Engineering Physics". Oxford University Press, 2015.
2	Pandey, B.K. &Chaturvedi, S. "Engineering Physics". Cengage Learning India, 2012.
References:	
1	Halliday, D., Resnick, R. & Walker, J. "Principles of Physics". Wiley, 2015.
2	Gaur, R. K., & Gupta, S. L. (2022). Engineering physics. Dhanpat Rai Publication.
3	Mathur, D. S. (2010). Elements of properties of matter. S. Chand Publishing.
4	Griffiths, D. J. (2018). Introduction to quantum mechanics. Cambridge UniversityPress.
5	Silfvast, W. T. (2008). Laser fundamentals. Cambridge University Press.
E-Resources:	
1	https://archive.nptel.ac.in/courses/115/104/115104096/
2	https://onlinecourses.nptel.ac.in/noc24_ee31/preview
3	https://onlinecourses.nptel.ac.in/noc25_ph03/preview
4	https://www.youtube.com/watch?v=WZQ8lvxdzDk
5	https://auece.digimat.in/nptel/courses/video/108106173/L02.html

Course Outcomes: Upon successful completion of the course, students will be able to	
CO No.	**Course Outcomes**
1	Evaluate the mechanical properties of materials and solve engineering problems related to stress, strain, bending moments, and thermal stress.

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2	Analyze oscillatory motion and wave propagation, including electromagnetic wave characteristics and the generation of ultrasonic waves.
3	Apply the Schrödinger wave equation to solve problems involving particle confinement, barrier penetration, and quantum tunneling.
4	Demonstrate an understanding of interference phenomena, fiber optic communication systems, and the operating principles of various laser systems.
5	Identify crystal structures using Miller indices, calculate packing factors, and analyze the impact of lattice imperfections on material properties.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
1	3	3	1	1	-	-	-	-	2	-	2	-	2	-
2	3	3	1	1	-	-	-	-	2	-	2	-	3	-
3	3	3	1	1	-	-	-	-	2	-	2	-	1	-
4	3	3	1	1	-	-	-	-	2	-	2	-	3	-
5	3	3	1	1	-	-	-	-	2	-	2	-	-	-
Avg	3	3	1	1	-	-	-	-	2	-	2	-	2.25	-

"3"-High,"2" -Medium,"1"- Low Correlation,"-" No Correlation

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26UCY101	ENGINEERING CHEMISTRY	LIT	L	T	P	J	C
			2	0	2	0	3

Course Objectives:

1	To inculcate sound understanding of water quality parameters and water treatment techniques.
2	To impart knowledge on the basic principles and preparatory methods of nanomaterials.
3	To impart practical applications of chemistry in commonly used engineering devices.
4	To familiarize the students with the sources, working processes and applications of energy conversion.
5	To inculcate the students with the operating principles, working processes and applications of energy storage devices.

Syllabus:

WATER TECHNOLOGY — **12 Hours**

Water: Sources and impurities, Water quality parameters, Municipal water treatment - Break Point Chlorination, Desalination of brackish water: Forward and Reverse Osmosis. Boiler troubles: Scale and sludge, Boiler corrosion, Caustic embrittlement, Priming & foaming, Treatment of boiler feed water - Internal treatment: phosphate, colloidal, sodium aluminate and calgon conditioning. External treatment: Ion-exchange, demineralization and zeolite process.

Activity: Coagulation of water sample using Alum.

Practical:

1. Analysis of alkalinity, hardness and dissolved oxygen.

NANOCHEMISTRY — **12 Hours**

Basics: Distinction between molecules, nanomaterials and bulk materials, Quantum Confinement, Preparation of nanomaterials: Top-down and Bottom-up approach. Size-dependent properties - optical, electrical, mechanical and magnetic. Types of nanomaterials - Definition, properties and uses of nanoparticle, nanocluster, nanorod, nanowire and nanotube. Applications of nanomaterials.

Activity: Flipped Class room.

Practical:

1. Preparation of nanoparticles by Sol-Gel method.

ELECTROCHEMISTRY — **12 Hours**

Basic Principles - Nernst equation, electrochemical series, and cell potential. Electrochemical cell - Reference Electrodes: Calomel electrode and glass electrode (pH measurement). Electrode potential - redox reaction. Conductivity of electrolytes - Factors affecting conductivity.

Activity: Electrochemical cell demonstration.

Practical:

1. Conductometric titrations.

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ENERGY RESOURCES	12 Hours
Sources of Energy, Nuclear fission - controlled nuclear fission, differences between nuclear fission and fusion - nuclear chain reactions. Nuclear energy: light water nuclear reactor – components, working, advantages and disadvantages. Energy Conversion: solar, wind and geothermal energy. **Activity:** Energy Auditing & Grid Mapping. **Practical:** 1. Charge and Discharge Characteristics.	
BATTERIES	**12 Hours**
Conventional, Contemporary and Emerging battery storage technologies. Primary Batteries: Dry Cell, Secondary Batteries: Lead-Acid and Li-Ion. Battery Management System: Battery Pack, Battery Materials, Performance Parameters, Testing, Safety aspects. **Activity:** Demonstration of battery pack in e-vehicles. **Practical:** 1. Measurement of EMF, Internal Resistance.	
Total Lecture Periods: 30 Hours **Total Practical Periods: 30 Hours**	

Text Books:	
1	Jain, P. C., & Jain, M. (2015). *Engineering Chemistry*. Dhanpat Rai Publishing Company (P) Ltd.
2	Dara, S. S. (2004). *A Textbook of Engineering Chemistry*. Chand Publications.
References:	
1	B. S. Murty, P. Shankar, Baldev Raj, B. B. Rath and James Murday, "Text book of nanoscience and nanotechnology", Universities Press-IIM Series in Metallurgy and Materials Science, 2018.
2	O.G. Palanna, "Engineering Chemistry" McGraw Hill Education (India) Private Limited, 2nd Edition, 2017.
3	Friedrich Emich, "Engineering Chemistry", Scientific International PVT, LTD, New Delhi, 2014.
4	ShikhaAgarwal, "Engineering Chemistry-Fundamentals and Applications", Cambridge University Press, Delhi, Second Edition, 2019.
5	O.V. Roussak and H.D. Gesser, Applied Chemistry-A Text Book for Engineers and Technologists, Springer Science Business Media, New York, 2nd Edition, 2013.
E-Resources:	
1	https://nptel.ac.in/courses/105106202.
2	https://nptel.ac.in/courses/113106028.
3	https://batteryuniversity.com/articles –
4	https://phet.colorado.edu/en/simulations/nuclear-fission
5	https://nptel.ac.in/courses/115106130

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Course Outcomes: Upon successful completion of the course, students will be able to	
CO No.	**Course Outcomes**
1	Infer the quality of water from quality parameter data and propose suitable treatment methodologies to treat water.
2	Identify and apply basic concepts of nanoscience and nanotechnology in designing the synthesis of nanomaterials for engineering and technology applications.
3	Apply the knowledge of electricity and chemical changes for material selection requirements.
4	Examine suitable energy resources for engineering processes and applications.
5	Analyze different forms of energy resources and apply them for suitable applications in energy sectors.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
1	3	2	1	2	-	3	-	-	-	-	1	1	-	-
2	3	1	2	1	-	1	-	-	-	-	2	-	2	-
3	3	2	1	2	-	1	-	-	-	-	1	-	2	-
4	3	2	1	-	-	3	-	-	-	-	2	-	2	-
5	3	3	2	-	-	3	-	-	-	-	2	-	2	-
Avg	3	2	1.4	1.7	-	2.2	-	-	-	-	1.6	1	2	-

"3"- High, "2" - Medium, "1" - Low Correlation, "-" No Correlation

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26UCS101	COMPUTER PROGRAMMING: C	LIT	L	T	P	J	C
			2	0	2	0	3

Course Objectives:

1	To equip students with a strong foundation in C programming by introducing the core concepts of the C language
2	To develop C Programs using basic programming constructs
3	To develop students' ability to organize, manipulate, and process data efficiently using arrays and strings
4	To develop modular applications in C using functions
5	To provide students with the knowledge and skills to develop C applications using structures, pointers, and file handling techniques to perform efficient input/output operations

Syllabus:

INTRODUCTION TO C — **12 Hours**

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

Activity: Quiz / Crossword Puzzle on Constants, Variables, and Data Types

Practical: Create Problem Analysis Charts, Flowcharts and Pseudocode for simple C programs

OPERATORS, CONTROL FLOW & LOOPING IN C PROGRAMMING — **12 Hours**

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

Activity: Problem-Based Learning: Applying Decision-Making and Looping to Design a Simple Calculator and Student Record System

Practical: Usage of conditional logics in programs.

ARRAYS AND STRINGS IN C PROGRAMMING — **12 Hours**

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

Activity: Gamified Learning: Applying Array Concepts Through an Interactive Bingo Activity

Practical: Usage of functions ,string manipulations, array operations in programs.

USER-DEFINED FUNCTIONS IN C PROGRAMMING — **12 Hours**

User-defined Functions: Introduction, need for User-defined Functions, A Multi-Functional Program, Elements of User-defined Functions, Definition of Function, Return Values and their Types, Function Calls, Function Declaration, No Arguments and no Return Values, Arguments but no Return Values, Nesting of Functions.

Activity: Think–Pair–Share: Designing a Library Management System and Bank Management System Using User-defined Functions

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Practical: Usage of functions in programs. string manipulations, array operations.	
STRUCTURES, POINTERS & FILE HANDLING IN C PROGRAMMING	**12 Hours**
Structures, Pointers and File Handling**:** Introduction, defining a Structure, Declaring and Accessing Structure Variables and Members, Structure Initialization, Copying and Comparing Structure Variables, Structures vs Unions. Pointers: Introduction, Understanding Pointers, Accessing the Address of Variable, declaring pointer variables, initialization of pointers, accessing variables through its pointer. File Handling and Command-Line Arguments - File I/O Functions: fopen(), fclose(), fread(), fwrite(), fprintf(), fscanf(), Text Files and Binary Files, Command-line Arguments. **Activity:** Code Debugging Challenge: Identifying and Resolving Errors in Structures, Pointers, and File Handling **Practical:** Programs using structures, pointers and files.	
Total Lecture Periods: 30 Hours **Total Laboratory Periods: 30 Hours**	

Text Books:	
1	Balagurusamy, E. (2024). Programming in ANSI C (9th ed.). McGraw Hill Education India
2	Thareja, R. (2023). Programming in C (3rd ed.). Oxford University Press.
References:	
1	Forouzan, B. A., & Gilberg, R. F. (2022). Computer science: A structured programming approach in C (4th ed.). Cengage Learning.
2	Kernighan, B. W., & Ritchie, D. M. (2015). The C programming language (2nd ed.). Prentice Hall of India.
E- resources:	
1	Learn-C.org - https://www.learn-c.org/
2	GeeksforGeeks - C Programming - https://www.geeksforgeeks.org/c-programminglanguage/
3	https://onlinecourses.swayam2.ac.in/e-learning/preview/imb25_mg71

Course Outcomes: Upon successful completion of the course, students will be able to

CO No.	Course Outcomes
1	Develop and execute simple C programs by applying the fundamental concepts of C programming
2	Apply decision-making and iterative control structures to solve simplereal world computational problems.
3	Develop programs using arrays and string operations to solve real-world problems.
4	Construct user-defined functions to modularize the solution to the given problems.
5	Build programs using structures and pointers for complex data representation and access.

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1	3	2	1	1	1	-	-	-	-	-	-	2	1	-
2	3	3	2	1	1	-	-	-	-	-	-	3	1	-
3	2	3	2	2	1	-	-	-	-	-	-	3	2	-
4	2	2	3	1	3	-	-	-	-	-	-	2	3	-
5	2	3	3	2	3	-	-	-	-	-	-	3	3	-
Avg	2.4	2.6	2.2	1.4	1.8	-	-	-	-	-	-	2.6	2	-

"3" -High, "2" -Medium, "1" – Low, "-" – No Correlation

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26UCS102	ESSENTIALS OF PROGRAMMING PARADIGM	LIT	L	T	P	J	C
			2	0	2	0	3

Course Objectives:

1	To understand the fundamentals of computers, computational thinking, data representation, number systems, and Boolean logic.
2	To develop problem-solving skills using logical reasoning, decomposition, abstraction, and algorithmic thinking.
3	To apply program design techniques such as algorithms, flowcharts, and pseudocode to represent and solve computational problems.
4	To design and develop interactive programs using Scratch by employing variables, control structures, loops, lists, and other programming constructs.
5	To create simple mobile applications by applying software development principles, testing, debugging, and modular design to solve real-world problems.

Syllabus:

COMPUTER FUNDAMENTALS — **12 Hours**

Computer, Characteristics of Computers, History of Computers, Classification of Computers, Applications of Computers, Basic Organization of a Computer. Data Representation, using spread sheets for basic operations on data and visualize the data. What is Computational Thinking, Decomposition, Abstraction, Real World Information to Computable Data, Number Systems, Conversions among Number systems, what is Logic, Boolean Logic, Applications of Propositional Logic.

Activities: Diagnostic grammar drills, technical article skimming/scanning exercises, and contextual vocabulary building activities.

Practicals:

1. Office documentation and presentation.
2. Spreadsheet calculations and data visualization.
3. Number system and Boolean logic exercises.

PROBLEM SOLVING BASICS — **12 Hours**

Problem Definition, Logical Reasoning, Decomposition, Software Design Concept of an Algorithm, Algorithm Representation – Algorithm Discovery – Iterative Structures – Recursive Structures – Efficiency and Correctness - Implementation of Algorithms - Fundamental Algorithms: Exchanging the values of two variables, Counting, Summation of a set of numbers, Factorial computation, Generation of Fibonacci Sequence, Reversing the digits of an Integer, Base Conversion.

Activities: Solve real-life computational problems by developing algorithms using decomposition and abstraction techniques, followed by peer discussion and analysis.

Practicals:

1. Algorithm development for simple problems.
2. Flowchart design for basic algorithms.
3. Problem solving using decomposition.

PROGRAMMING LANGUAGES — **12 Hours**

Program Development Life Cycle, Program Design Tools, Algorithms, Flowcharts, Pseudocodes, Role of Algorithms, Programming Languages, Programming Paradigms Traditional Programming Concepts, Procedural Units, Language Implementation, Declarative Programming.

Activities: Design algorithms, flowcharts, and pseudocode for everyday applications such as ATM transactions, library management, or student result processing and present the

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solutions in groups.

Practicals:

1. Pseudocode development for simple problems.
2. Flowchart and pseudocode comparison.
3. Program design using algorithms

SCRATCH PROGRAMMING	**12 Hours**

What is Scratch, Scratch Programming Environment, Paint Editor, Scratch Blocks, Arithmetic Operators and Functions, Use Motion Commands, Pen Commands and Easy Draw, Looks Palette, Sound Palette, Power of Repeat, Data Types, Variables, Getting Input from Users. Making Decisions, Comparison Operators, Decision Structures, Logical Operators, Repetition, Loop Blocks, Stop Commands, Counters, Nested Loops, Recursion, String Processing, String Manipulation, Lists, Dynamic Lists, Numerical Lists, Searching and Sorting Lists.

Activities: Develop an interactive Scratch project (game, animation, or educational simulation) using variables, loops, decisions, lists, and user interaction. Conduct a live demonstration of the project.

Practicals:

1. Scratch programming using variables and operators.
2. Scratch animations using loops and conditions.
3. Scratch game and drawing development.

APP DEVELOPMENT	**12 Hours**

Building Apps using problem, solving techniques on any app development platform, Modeling, incremental and iterative, reuse, modularization, algorithmic thinking, abstracting and modularizing, decomposition, testing and debugging.

Activities: Design and develop a simple mobile application using MIT App Inventor (or a similar platform) to solve a real-world problem such as attendance management, waste management, medicine reminder, or expense tracking. Test and debug the application before presentation.

Practicals:

1. Mobile app interface design.
2. Simple app development using App Inventor.
3. App testing and debugging.

Total Lecture Periods: 30 Hours
Total Laboratory Periods: 30 Hours

Text Books:

1	Thareja, R. (2020). Fundamentals of computers. Oxford University Press.
2	Rajaraman, V., & Adabala, N. (2014). Fundamentals of computers. PHI Learning.
3	Brookshear, J. G., & Brylow, D. (2015). Computer science: An overview. Pearson
4	Dromey, R. G. (1982). How to solve it by computer. Prentice Hall International.

References:

1	Marji, M. (2014). Learn to program with Scratch: A visual introduction to programming with games, art, science and math. No Starch Press.
2	Riley, D. D., & Hunt, K. A. (2014). Computational thinking for the modern problem solver. CRC Press
3	Venkatesh, G., & Mukund, M. (2021). Computational thinking. Notion Press.
4	Abelson, H., Sussman, G. J., & Sussman, J. (1996). Structure and interpretation of computer programs (2nd ed.). MIT Press.

E- resources:

1	Brennan and Resnick's CT Framework 2012:

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	https://scratched.gse.harvard.edu/ct/files/AERA2012.pdf
2	https://teachinglondoncomputing.org/resources/developing-computational-thinking/
3	Scratch software: https://scratch.mit.edu/
4	software: https://appinventor.mit.edu/
5	app.diagrams.net

Course Outcomes: Upon successful completion of the course, students will be able to	
CO No.	**Course Outcomes**
1	Explain the fundamentals of computers, computational thinking, data representation, number systems, and Boolean logic.
2	Construct algorithms to solve computational problems using logical reasoning, decomposition, and abstraction.
3	Illustrate problem solutions using algorithms, flowcharts, and pseudocode by applying the program development life cycle.
4	Develop interactive programs, animations, and games using Scratch programming constructs such as variables, operators, control structures, loops, and lists.
5	Build simple mobile applications by applying software design principles, modularization, testing, and debugging to solve real-world problems.

CO	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PSO 1**	**PSO 2**	**PSO 3**
1	3	2	1	2	2	-	-	-	-	1	-	3	1	-
2	2	3	2	2	1	-	-	-	-	-	-	2	3	-
3	2	2	3	2	2	-	-	-	1	-	-	2	3	1
4	2	2	3	2	3	-	-	-	2	1	-	2	3	2
5	2	3	3	2	3	2	-	-	2	2	1	2	2	3
Avg	2.2	2.4	2.4	2.0	2.2	2.0	0	0	1.5	1.3	1.0	2.2	2.4	2.0

"3" -High, "2" -Medium, "1" – Low, "-" – No Correlation

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26UHM102	FUNCTIONAL ENGLISH I	LIT	L	T	P	J	C
			1	0	2	0	2

Course Objectives:

1	To refine functional grammatical competence for constructing error-free, precise, and structurally sound professional communications.
2	To expand functional and technical vocabulary metrics tailored for engineering environments.
3	To develop specialized writing skills including structural documentation, interactive correspondence, and graphical data transcoding.
4	To cultivate advanced writing skills for drafting clear process documentation, digital correspondence, and interactive professional artifacts.
5	To equip learners with the linguistic capabilities to transcode complex non-verbal graphical data arrays cleanly into fluent written prose.

Syllabus:

FOUNDATIONS OF TECHNICAL COMMUNICATION — **9 Hours**

Parts of Speech (Functional application); Definite and Indefinite Articles; Subject-Verb Agreement (Concord rules and exceptions). Synonyms and Antonyms (Contextual engineering definitions); Acronyms and Abbreviations (Industrial and technical frameworks). Reading Comprehension (Skimming, scanning, inferential analysis of technical articles).

Activities: Diagnostic grammar drills, technical article skimming/scanning exercises, and contextual vocabulary building activities.

Practicals:

1. Improve vocabulary through contextual word usage.
2. Analyze technical texts for meaning and coherence

ANALYTICAL LISTENING AND INTERACTIVE CORRESPONDENCE — **9 Hours**

Framing Questions (Wh- Questions, Yes/No Questions, and Question Tags). Parsing professional engineering podcasts, tech-panel event narrations, and corporate audio tracks. Delivering experiential presentations; sharing technical insights from personal projects; mastering vocal clarity and articulation.

Activities: Audio tracking analysis, simulated question-and-answer sessions, and short individual presentations on project backgrounds.

Practicals:

1. Conduct pair-work interviews using different question forms.
2. Present a technical topic and answer questions professionally**.**

BUSINESS WRITING — **9 Hours**

Tense Matrix (Present, Past, and Future timelines in technical contexts); Reported Speech (Direct to Indirect discourse conversions for meeting logs). Idioms and Phrases (Professional expressions); Phrasal Verbs common to workplace communication. Paragraph Writing (Descriptive, narrative, and argumentative structures); The Art of Paraphrasing (Avoiding plagiarism in technical abstracts).

Activities: Drafting technical abstracts, transforming direct meeting notes into narrative reports,

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and paragraph structure workshops.

Practicals:

1. Use idioms and phrases in professional communication.
2. Paraphrase technical texts to avoid plagiarism.

WORKPLACE COMMUNICATION	**9 Hours**

Active and Passive Voice (With specific emphasis on the Impersonal Passive Voice for scientific reporting). Homophones and Homonyms (Eliminating lexical ambiguity in documentation). Informal Letter Writing (Interpersonal professional networks); Digital Correspondence (Formal email writing mechanics, subject lines, and professional etiquette). Writing clear, imperative Instructions; Formulating professional Recommendations; Technical Process and Product Descriptions.

Activities: Drafting professional email templates, creating step-by-step user instruction sheets for lab tools, and writing passive-voice process descriptions.

Practicals:

1. Technical Writing - Describe the working of a technical process.
2. Editing and Proofreading- Prepare technical documentation for products and processes.

TECHNICAL WRITING	**9 Hours**

Sentence Typology (Analysis and construction of Simple, Compound, and Complex sentences). Advanced One-Word Substitutions for technical concepts and operational profiles. Transcoding / Information Transfer (translating visual data matrices, tables, pie charts, and bar graphs into fluent prose); Drafting professional Checklists (Safety protocols and pre-operation compliance logs). Formulating tactical "Small Talk" within corporate hubs and networking events

Activities: Chart-to-prose technical analysis exercises, safety checklist design, and corporate elevator pitch simulations.

Practicals:

1. Sentence Construction- Practice networking conversations with peers.
2. Small Talk and Professional Communication - Simulate workplace written conversations for professional information exchange

Total Lecture Periods: 15 Hours

Total Laboratory Periods: 30 Hours

Text Books:

1	Miller, K. Q., & Wahl, S. T. (2023). Business and Professional Communication: KEYS for Workplace Excellence (5th ed.). SAGE Publications.
2	Kumar, Sanjay & Pushpalatha. (2018). English Language and Communication Skills for Engineers, India: Oxford University Press.

References:

1	Sharma, S., & Mishra, B. (2024). Communication Skills for Engineers and Scientists (2nd ed.). PHI Learning.
2	Raman, Meenakshi & Sharma, Sangeeta. (2016). Technical Communication – Principles and Practices. New Delhi: Oxford University Press.
3	Rizvi, A. M. (2018). *Effective Technical Communication* (2nd ed.). McGraw Hill Education.

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4	Tyagi, K., & Misra, P. (2011). *Advanced Technical Communication*. PHI Learning.
5	Guffey, M. E., & Loewy, D. (2022). *Essentials of Business Communication* (12th ed.). Cengage Learning.
E – Resources:	
1	https://www.youtube.com/watch?v=jAb4AuW4A_4
2	https://www.youtube.com/watch?v=1GT9IyTVPvw
3	https://youtu.be/RuYACsWJcF4?si=8A3_qghCFukXq0ai
4	https://www.youtube.com/watch?v=6JkhX6YP9hc
5	https://youtu.be/ztFlTZMV_TY?si=qh56EX-fN2wrgbLj

Course Outcomes: Upon successful completion of the course, students will be able to

CO No.	Course Outcome
1	Apply precise grammar parameters (tenses, concord, sentence structures) to eliminate ambiguity in communication.
2	Author high-impact technical paragraphs, accurate paraphrases, and maintain professional email/letter correspondence.
3	Construct standard checklists, step-by-step process instructions, strategic recommendations, and detailed product descriptions.
4	Transcode complex non-verbal graphical data arrays cleanly into precise, analytical written English.
5	Extract quantitative metrics from advanced technical audio tracks and pitch engineering prototypes with professional verbal fluency.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO 1	PSO 2	PSO 3
1	1	1	-	-	-	-	-	-	3	-	-	1	2	-
2	1	2	-	-	-	-	-	-	3	-	-	1	2	-
3	1	2	-	-	-	-	-	-	3	-	-	1	2	-
4	1	2	-	-	-	-	-	-	3	-	-	1	2	-
5	1	2	-	-	-	-	-	-	3	-	-	1	2	-
Avg	1	1.8	-	-	-	-	-	-	3	-	-	1	2	-

"3" - High, "2" - Medium, "1" – Low, "-" – No Correlation

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26UME111	ENGINEERING PRACTICES LABORATORY	LIT	L	T	P	J	C
			0	0	4	0	2

Course Objectives:

1	To understand basic tools and safety used in engineering workshops.
2	To learn dis-assembly and assembly of common mechanical systems like appliances and bicycle.
3	To understand welding processes and perform basic welding operations safely.
4	To gain basic skills in electrical wiring, electronics and simple circuit work.
5	To learn modern manufacturing techniques like CAD Software

Syllabus:

DIS-ASSEMBLY & ASSEMBLY PRACTICES — **12 Hours**

1. Study of Tools and its handling techniques.
2. Home appliances – Grinder, Mixer Grinder, Ceiling Fan, Table Fan &Washing Machine.
3. Air-Conditioners & Refrigerators.
4. Bicycle

WELDING PRACTICES — **12 Hours**

1. Study of Welding Procedure, Selection & Safety Measures.
2. Power source of Arc Welding – Gas Metal Arc Welding & Gas Tungsten Arc Welding processes.
3. Hands-on session of preparing base material & Joint groove for welding.
4. Hands-on session of MAW, GMAW, GTAW on Carbon Steel & Stainless Steel plates/ pipes for fabrication of a simple part.

ELECTRICAL WIRING PRACTICES — **12 Hours**

1. Study of Electrical Installation tools, equipment & safety measures.
2. Hands-on session of basic electrical connections for Fuses, Miniature Circuit Breakers and Distribution Box.
3. Hands-on session of electrical connections for Lightings, Fans, Calling Bells.
4. Hands-on session of electrical connections for Motors & Uninterruptible Power Supply Electrical Wiring Practices

ELECTRONICS COMPONENTS / EQUIPMENT PRACTICES — **12 Hours**

1. Study of Electronic components, equipment & safety measures.
2. Dis-assembly and assembly of Computers.
3. Hands-on session of Soldering Practices in a Printed Circuit Board.
4. Hands-on session of Bridge Rectifier, Op-Amp and Transimpedance amplifier.
5. Hands-on session of integration of sensors and actuators with a Microcontroller.
6. Demonstration of Programmable Logic Control Circuit.

CONTEMPORARY SYSTEMS — **12 Hours**

1. Study of solid modelling software and basic CAD interface.
2. Demonstration of Solid Modelling of components.
3. Demonstration of Assembly Modelling of components.

Total Periods: 60 Hours

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References:	
1	Stephen Christena, Learn to Weld: Beginning MIG Welding and Metal Fabrication Basics, Crestline Books, 2014.line Books, 2014.
2	Code of Practice for Electrical Wiring Installations (IS 732:2019)

Course Outcomes: Upon successful completion of the course, students will be able to	
CO No.	**Course Outcomes**
1	Explain the basic tools, equipment and safety practices used in engineering workshops.
2	Apply skills in dis-assembly and assembly of mechanical systems such as home appliances and bicycles.
3	Perform basic welding operations and understand different welding processes safely.
4	Apply basic knowledge of electrical wiring and electronic circuits in simple practical applications.
5	Use modern manufacturing techniques such as CAD for basic design and modelling.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
1	3	1	1	1	1	-	-	-	-	-	-	3	1	-
2	2	2	3	2	1	-	-	-	-	-	-	3	1	-
3	2	2	3	2	1	-	-	-	-	-	-	3	1	-
4	2	2	3	2	3	-	-	-	-	-	-	2	2	-
5	2	2	3	2	3	-	-	-	-	-	-	1	3	-
Avg	2.2	1.8	2.6	1.8	1.8	-	-	-	-	-	-	2.4	1.6	-

"3" -High, "2" -Medium, "1" – Low, "-" – No Correlation

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26UHM103	PHYSICAL EDUCATION - I	L	T	P	J	C
		0	0	2	0	1

Course Objectives:

1	To impart the fundamentals of physical education for development of students' physical, mental, and social well-being.
2	To instill a lifelong appreciation for physical activity towards the development of positive attitude and fostering values of team work and sportsmanship.

Syllabus:

INTRODUCTION TO PHYSICAL EDUCATION	**7 Hours**
Introduction to physical education: Exercise for Good Posture – Conditioning and Calisthenics for Before start, Jogging, Bending, Twisting, Standing, Sitting and Relaxation, Training on First Aid Practices.	
PARTICIPATION OF ATHLETIC EVENTS	**7 Hours**
Rules and regulations of important athletic events, Sprint, Jumps, Throws and Hurdles.	
SKILL DEVELOPMENT IN ANY ONE OF THE FOLLOWING OUTDOOR GAMES	**8 Hours**
Basket Ball, Volley Ball, Ball Badminton, Football, Hockey, Kho-Kho, Kabaddi, Cricket, Hand ball and Tennis.	
SKILL DEVELOPMENT IN ANY ONE OF THE FOLLOWING INDOOR GAMES	**8 Hours**
Shuttle Badminton, Chess and Table Tennis.	
Total Periods: 30 Hours	

References:

1	Singh, A. (2008). Essentials of physical education. Kalyani Publishers.
2	Kamlesh, M. L. (2006). Psychology in physical education and sport (3rd ed.). Metropolitan Book Co. 3. Mangal, S. K. (2009). Psychology of sports performance. Sports Publication
3	Mangal, S. K. (2009). Psychology of sports performance. Sports Publication

E-Resource:

1	https://www.who.int/health-topics/physical-activity

Course Outcomes: Upon successful completion of the course, students will be able to

CO No.	Course Outcomes
1	Understand the importance of physical activity for mental and physical health.
2	Apply basic principles of exercise science in the routine life.
3	Develop teamwork, discipline, and leadership through sports and group activities and collaborate effectively.
4	Demonstrate independent learning in health, nutrition, and fitness-related topics.

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1	1	-	-	-	-	-	-	-	-	-	-	-	-	-
2	3	-	-	-	-	-	-	-	-	-	-	1	-	-
3	-	-	-	-	-	-	-	3	-	-	-	-	-	2
4	-	-	-	-	-	-	-	-	-	-	2	-	-	2
Avg	2	-	-	-	-	-	-	3	-	-	2	1	-	2

"3"- High, "2" - Medium, "1" - Low Correlation, "-" No Correlation

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26UPH201	ENGINEERING PHYSICS - II	T	L	T	P	J	C
			3	0	0	0	3

Course Objectives: –

1	To understand how different magnetic materials work and how they are used to store data in computers.
2	To learn the physics behind semiconductors, how charge carriers move, and how basic electronic components function.
3	Know the concept of thermodynamic equilibrium of a system and the corresponding thermodynamic variables and the relations between them.
4	To explore the world of nanotechnology, understanding how materials behave at the nanoscale and how Nano-devices operate.
5	To grasp the fundamentals of quantum computing, including qubits, quantum gates, and how they differ from classical computers.

Syllabus:

MAGNETIC MATERIALS — **9 Hours**

Magnetic dipole moment – atomic magnetic moments- magnetic permeability and susceptibility – Magnetic material classification: diamagnetism – Para magnetism – ferromagnetism– Domain Theory of Ferromagnetism– Domain Theory of M versus H behaviour –Hysteresis loops- Hard and soft magnetic materials – examples and uses –Magnetic hard disc (GMR sensor). Superconductivity: Properties, types of superconductors (Type I and Type II)- Applications of superconductors.

Activities: Determination of Hysteresis loop for ferromagnetic materials.

ELECTRICAL PROPERTIES OF MATERIALS — **9 Hours**

Classical free electron theory - Expression for electrical conductivity – Thermal conductivity, expression - Wiedemann-Franz law – Success and failures - electrons in metals – degenerate states – Fermi- Dirac statistics – Density of energy states – Electron in periodic potential – Energy bands in solids – tight binding approximation - Electron effective mass – concept of hole.

Activities: Virtual demonstration of Lee Disc's Method.

SEMICONDUCTOR PHYSICS — **9 Hours**

Intrinsic and extrinsic Semiconductors – Energy band diagram – direct and indirect band gap semiconductors– Carrier concentration in intrinsic semiconductors – extrinsic semiconductors – Carrier concentration in N-type & P-type semiconductors – Variation of carrier concentration with temperature – variation of Fermi level with temperature and impurity concentration – Hall effect –Ohmic contacts – Schottky diode.

Activities: Virtual demonstration of Hall effect.

NANO-DEVICES — **9 Hours**

Nanomaterials synthesis Bottom-up and Top-down approach - Precipitation methods -sol gel technique-Nano technology applications-quantum confinement – quantum structures: quantum wells, wires and dots – band gap of nanomaterials. Tunneling- Coulomb blockade - single electron transistor - resonant-tunneling diode- Carbon nanotubes: Properties and applications.

Activities: Virtual demonstration of single electron transistor.

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QUANTUM COMPUTING	9 Hours
Quantum system for information processing - quantum states –classical bits – quantum bits or qubits – Bloch sphere -CNOT gate – Single and multiple qubits – quantum gates (Pauli – X, Y and Z Gates, Hadamard Gate, Phase gate - T gate, CNOT Gate) – advantage of quantum computing over classical computing. **Activities:** Virtual demonstration of quantum computing.	
Total Lecture Periods: 45 Hours	

Text Books:	
1	Bhattacharya, D.K. & Poonam, T. "Engineering Physics". Oxford University Press, 2015.
2	Pandey, B.K. &Chaturvedi, S. "Engineering Physics". Cengage Learning India, 2012.
References:	
1	Kasap, S. O. (2007). Principles of electronic materials and devices. McGraw-Hill Education.
2	Bernhardt, C. (2019). Quantum computing for everyone. MIT Press.
3	Hanson, G. W. (2009). Fundamentals of Nano electronics. Pearson Education.
E-Resources :	
1	https://youtu.be/MTT729LtB-o?si=RGaEhGgmyWJWcZib
2	https://lab.quantumflytrap.comPage 40 of 54
3	http://vlabs.iitkgp.ac.in/tcad
4	http://www.digimat.in/nptel/courses/video/106106232/L01.html
5	https://www.youtube.com/watch?v=B3U1NDUiwSA

Course Outcomes: Upon successful completion of the course, students will be able to

CO No.	Course Outcomes
1	Explain the different types of magnetic materials (like dia, para, and ferro) and describe how they are used in modern computer hard drives.
2	Differentiate between intrinsic and extrinsic semiconductors, and analyze how temperature affects their conductivity and Fermi levels.
3	Understand the concept of thermodynamic equilibrium, the thermodynamic variables of a system, and the relationships among these variables.
4	Understand the concept of quantum confinement in nanomaterials (wells, wires, and dots)and explain the working principles of single-electron and tunneling devices.
5	Describe the concept of a qubit using the Bloch sphere and demonstrate how quantum gates manipulate information differently than classical bits.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
1	3	2	1	2	-	-	-	-	-	-	-	2	2	-
2	3	3	2	2	1	-	-	-	-	-	-	2	3	1
3	3	3	3	1	2	-	-	-	-	-	-	1	1	3
4	3	2	2	3	2	-	1	-	-	-	-	3	3	-
5	3	3	2	2	3	-	-	-	-	-	-	3	-	2
Avg	3.0	2.6	2.0	2.0	2.0	-	1.0	-	-	-	-	2.2	2.25	2.0

"3" - High, "2" - Medium, "1"- Low, "-" No Correlation

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26UHM201	CLASSICAL TAMIL HERITAGE - II	T	L	T	P	J
			1	0	0	0

Course Objectives:

1	To understand the sophisticated weaving mechanisms, ceramic technologies, and socio-cultural expressions through material graffiti during the Sangam Age.
2	To analyze structural design frameworks, theatrical staging, and architectural evolution across the Sangam, Pallava, Chola, Nayaka, and British colonial periods.
3	To explore ancient manufacturing, metallurgical systems, numismatics, and precision bead-making technologies validated by archaeological evidence.
4	To evaluate irrigation infrastructure, agro-processing methods, and the deep oceanographic and maritime insights possessed by ancient Tamil societies.
5	To investigate the development of Scientific Tamil, digital localization tools, language repositories, and computational frameworks driving modern Tamil computing.

Syllabus:

WEAVING AND CERAMIC TECHNOLOGY	**3 Hours**
Weaving and Ceramic Technology: Weaving Industry during Sangam Age, Ceramic technology, Black and Red Ware Potteries (BRW), Graffiti on Potteries.	
DESIGN AND CONSTRUCTION TECHNOLOGY	**3 Hours**
Design and Construction Technology: 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	
MANUFACTURING TECHNOLOGY	**3 Hours**
Manufacturing Technology: 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 Stonebeads, Glass beads, Terracotta beads -Shell beads/ bone beats, Archeological evidences - Gem stone types described in Silappathikaram.	
AGRICULTURE AND IRRIGATION TECHNOLOGY:	**3 Hours**
Agriculture and Irrigation Technology: Dam, Tank, ponds, Sluice, Significance of Kumizhi Thoompuof Chola Period, Animal Husbandry - Wells designed for cattle use - Agriculture and Agro Processing - Knowledge of Sea, Fisheries, Pearl, Conche diving - Ancient Knwledge of Ocean -Knowledge Specific Society.	
SCIENTIFIC TAMIL & TAMIL COMPUTING	**3 Hours**
Scientific Tamil & Tamil Computing: 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 Lecture Periods: 15 Hours	

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

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2	Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
References:	
1	Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies
2	The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
3	Keeladi - 'Sangam City civilization on the banks of river Vaigai' (Jointly Published by: Department ofArchaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
4	Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Publishedby: The Author)
5	Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Bookand Educational Services Corporation, Tamil Nadu)
E-Resources:	
1	www.tnarch.gov.in
2	www.sahapedia.org
3	www.tamilheritage.org
4	www.tamilvu.org
5	www.sorkuvai.tn.gov.in

Course Outcomes: Upon successful completion of the course, students will be able to	
CO	**Course Outcomes**
1	Analyze material artifacts, ceramic types, and decorative practices of the Sangam Age to reconstruct ancient production workflows.
2	Deconstruct the structural design principles, spatial layout, and theatrical engineering parameters of architectural monuments and traditional dwellings.
3	Evaluate ancient metallurgical methods, coin minting techniques, and fine bead-making processes through scientific and archaeological viewpoints.
4	Appraise hydro-engineering configurations, marine navigation insights, and resource extraction methodologies optimized by historical Tamil communities.
5	Apply computer science paradigms to localized software design, linguistic parsing, and structural data archiving within digital Tamil infrastructure.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
1	-	1	-	-	-	2	-	-	-	-	-	-	-	-
2	-	-	2	-	-	2	-	-	-	-	-	-	-	-
3	-	-	-	2	-	1	-	-	-	-	-	-	-	-
4	-	-	2	-	-	3	1	-	-	-	-	-	-	-
5	-	-	-	-	3	-	-	-	-	-	2	3	3	-
Avg	-	1.0	2.0	2.0	3.0	2.0	1.0	-	-	-	2.0	3.0	3.0	-

"3"- High, "2"- Medium, "1"- Low,"-" No Correlation

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26UAD201	PYTHON FOR DATA SCIENCE	LIT	L	T	P	J	C
			3	0	4	0	5

Course Objectives:

1	To Understand the basic concepts of data science and learn fundamentals of Python programming.
2	To Develop applications to extract useful insights from data and Enhance decision-making capabilities using data analysis.
3	To develop learners' ability to organize, summarize, analyze, and interpret data using statistical methods, graphical tools, correlation, and regression techniques for effective decision-making.
4	To Perform various data operations through Python implementation and to write short Python scripts for data pre-processing
5	To Conduct exploratory data analysis (EDA) and create data visualizations to interpret and present data.

Syllabus:

GETTING STARTED WITH PYTHON: **21 Hours**

Basics of Python including data types, operators, variables, expressions, control structures, conditional statements, looping structure, functions, OOP concepts. Python sequence data structures including String, Array, List, Tuple, Set, Dictionary and its associated operations.

Activities: Algorithm-to-Code Activity, Quiz - a mix of multiple-choice, output-based, and short-answer questions

Practicals:

1. Program to demonstrate data types, variables, operators, expressions, type casting, control structures (conditional statements and looping structures), and functions.
2. Program to exhibit object-oriented programming concepts, including classes, objects, constructors, instance methods, and encapsulation.
3. Program to show Python sequence data structures (String, Array, List, Tuple, Set, and Dictionary) and perform common operations such as insertion, deletion, searching, updating, sorting, and traversal.

DATA SCIENCE AND DESCRIPTIVE STATISTICS **21 Hours**

Understanding data, its type and data science, Considering the emergence and fundamentals of data science, Data science life cycle, Data analysis (Univariate, bivariate and Multivariate), Data analytics, Data measurement scale, Data descriptive statistics (Measures of central tendency, dispersion/variation, measure of location, Shape and symmetry), Understanding Python's role in data science.

Activities: Case Study Analysis - Students analyze real-world datasets (e.g., healthcare, retail, or weather data)

Practicals:

1. Program to load a dataset, identify data types and measurement scales, and perform basic data exploration to understand the role of Python in data science.
2. Program to perform descriptive statistical analysis by computing measures of central tendency, dispersion, location, and shape for a given dataset.
3. Program to perform univariate, bivariate, and multivariate data analysis using appropriate statistical techniques and summarize the insights obtained from the dataset.

DESCRIPTIVE ANALYTICS **21 Hours**

Facets of Data, Types of Variables, Statistical Description of Data, Describing Data with Tables and Graphs, Describing Data with Averages, Describing Variability, Normal Distributions and Standard (z) Scores, Correlation, Scatter plots, correlation coefficient for

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quantitative data –computational formula for correlation coefficient, Regression, Regression line.

Activities: Graph Interpretation - create and interpret histograms, bar charts, box plots, and scatter plots to describe data and identify patterns.

Practicals:

1. Program to perform statistical description of data by generating frequency tables, graphical representations, measures of central tendency, measures of variability, and standard (z) scores for a given dataset.
2. Program to perform correlation analysis by creating scatter plots and computing the correlation coefficient for quantitative data using the computational formula.
3. Program to perform simple linear regression by determining the regression equation, plotting the regression line, and predicting the dependent variable for given input values.

DATA PREPARATION	**21 Hours**

Data loading, Data cleaning, dealing with missing data, removing duplicates, Slicing and Dicing, Filtering, and selecting data, Concatenating and transforming, adding new cases and variables, removing data, Sorting and shuffling, Aggregating data, Handling outliers, Data wrangling, Data Normalization.

Activities: Dataset Exploration Activity - inspect datasets to identify missing values, inconsistent data types, duplicate records, and outliers before applying cleaning techniques.

Practicals:

1. Program to load a dataset and perform data cleaning by handling missing values, removing duplicate records, and detecting and treating outliers.
2. Program to perform data manipulation operations, including slicing, dicing, filtering, selecting, sorting, shuffling, adding and removing rows and columns, and concatenating datasets.
3. Program to perform data wrangling by transforming data, aggregating data using grouping operations, creating new variables, and applying normalization techniques to prepare the dataset for analysis.

DATA VISUALIZATION	**21 Hours**

Visualizing data through figure, subplot and its properties, graphs, plots in matplotlib, basics of advanced visualizations with Seaborn.

Activities: Visualization Challenge - create different types of plots for the same dataset and justify why each visualization is appropriate for the data.

Practicals:

1. Program to create and customize figures and subplots using Matplotlib by setting titles, axis labels, legends, gridlines, and other figure properties.
2. Program to visualize a dataset using Matplotlib by creating and customizing line plots, bar charts, histograms, pie charts, and scatter plots.
3. Program to perform advanced data visualization using Seaborn by creating box plots, violin plots, pair plots, and heatmaps to analyze data distributions and relationships.

Total Lecture Periods: 45 Hours
Total Laboratory Periods: 60 Hours

Text Books:

1	Mueller, J. P., & Massaron, L. (2019). Python for data science for dummies (2nd ed.). John Wiley & Sons.
2	Savaliya, M. T., Maurya, R. K., & Magar, G. M. (2018). Programming through Python. StarEdu Solutions.

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References:	
1	Chen, D.Y. (2018). Pandas for everyone: Python data analysis. Pearson Education.
2	Cielen, D., Meysman, A. D. B., & Ali, M. (2016). Introducing data science: Big data, machine learning, and more, using Python tools. Manning Publications.
3	Galea, A. (2018). Applied data science with Python and Jupyter. Packt Publishing.
4	Kumar, U. D. (2021). Business analytics: The science of data-driven decision making (2nd ed.). Wiley India.
E- resources:	
1	Coursera course in Introduction to Data Science in python by Christopher Brooks. https://www.coursera.org/learn/python-data-analysis.
2	Coursera course in Python for Data Science by Fractal Analytics. https://www.coursera.org/learn/python-data-science.
3	NPTEL course in Python for Data Science by Prof. Ragunathan Rengasamy-IIT Madras. https://onlinecourses.nptel.ac.in/noc22_cs32/preview.
4	https://numpy.org/doc/
5	https://pandas.pydata.org/docs/

Course Outcomes: Upon successful completion of the course, students will be able to	
CO No.	**Course Outcomes**
1	To identify the need for data science and solve basic problems using python basic concepts.
2	To learn the fundamentals of some of the widely used python packages and apply them into data analytics and visualization.
3	To apply descriptive statistical techniques, correlation, and regression analysis to organize, visualize, interpret, and draw meaningful insights from data for informed decision-making.
4	To prepare the data for design applications through various data preprocessing operations.
5	To synthesize exploratory data analysis and evaluate statistical metrics for business insights.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
1	3	3	-	-	3	-	-	-	-	-	-	-	3	-
2	3	-	-	3	3	-	-	-	-	-	-	-	3	-
3	-	3	3	-	3	-	-	-	-	-	-	3	-	-
4	3	3	-	-	-	-	-	-	-	-	-	-	-	3
5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Avg	**2.25**	**2.25**	**0.75**	**1.50**	**2.25**	**0**	**0**	**0**	**0**	**0**	**0**	**0.75**	**1.50**	**0.75**

"3" -High, "2" -Medium, "1" – Low, "-" – No Correlation

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26UMA201	STATISTICS AND NUMERICAL METHODS	LIT	L	T	P	J	C
			3	0	2	0	4

Course Objectives:

1	This course aims at providing the necessary basic concepts of a few statistical and numerical methods and give procedures for solving numerically different kinds of problems occurring in engineering and technology.
2	To acquaint the knowledge of testing of hypothesis for small and large samples this plays an important role in real life problems.
3	To introduce the basic concepts of solving algebraic and transcendental equations.
4	To introduce the numerical techniques of interpolation in various intervals and numerical techniques of differentiation and integration this plays an important role in engineering and technology disciplines.
5	To acquaint the knowledge of various techniques and methods of solving ordinary differential equations.

Syllabus:

TESTING OF HYPOTHESIS — **15 Hours**

Sampling distributions -Tests for single mean, proportion and difference of means (Large and small samples) –Tests for single variance and equality of variances – Chi square test for goodness of fit – Independence of attributes.

Activities: Assignment: Applications of Hypothesis Testing Using Real-World Data. Quiz: Objective -Type test.

Practicals:

1. Application of Student – t test
2. Application of Chi-square test

DESIGN OF EXPERIMENTS — **15 Hours**

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

Activities: Assignment: Design and Analysis of Experiments Using ANOVA. Quiz: Objective -Type test.

Practicals:

1. ANOVA – one way classification
2. ANOVA – two way classification

SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS — **15 Hours**

Solution of algebraic and transcendental equations – Newton Raphson method- Solution of linear system of equations - Gauss elimination method - Gauss Jordan method –Iterative methods of Gauss Jacobi and Gauss Seidel.

Activities: Assignment: Direct and Iterative Methods for Solving Linear Systems, Numerical Techniques for Solving Equations. Quiz: Objective -Type test.

Practicals:

1. Root Extraction of Transcendental and Algebraic Functions by Newton Raphson's method.
2. Solution of a System of Linear Equations using Gauss–Seidel Iterative Method.

INTERPOLATION, NUMERICAL DIFFERENTIATION AN NUMERICAL INTEGRATION — **15 Hours**

Lagrange's and Newton's divided difference interpolations – Newton's forward and backward difference interpolation – Numerical single and double integrations using Trapezoidal and Simpson's 1/3 rules.

Activities: Assignment: Numerical Interpolation and Integration of Experimental Data. Quiz: Objective -Type test.

Practicals:

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1. Polynomial Interpolation using Lagrange's Methods. 2. Numerical Evaluation of Double Integrals using Trapezoidal and Simpson's Rules.	
NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS	**15 Hours**
Single step methods: Euler's method - Modified Euler's method - Fourth order Runge-Kutta method for solving first order differentia equations- Multi step methods: Milne's and Adams - Bash forth predictor corrector methods for solving first order differential equations. **Activities:** Assignment: Single-Step and Multi-Step Methods for Ordinary Differential Equations, Numerical Techniques for Initial Value Problems. Quiz: Objective -Type test. **Practicals:** 1. Numerical Solution of First-Order Ordinary Differential Equations using Euler's and Modified Euler's Methods. 2. Numerical Solution of First-Order ODEs using Fourth-Order Runge-Kutta Method.	
Total Lecture Periods: 45 Hours **Total Practical Periods: 30 Hours**	

Text Books:	
1	Grewal, B. S., & Grewal, J. S., *Numerical Methods in Engineering and Science*, 11^{th} Edition, Khanna Publishers, New Delhi, 2013.
2	Johnson, R. A., Miller, I., Freund, J. E., & Miller, M., *Miller and Freund's Probability and Statistics for Engineers*, 9^{th} Edition, Pearson, 2018.
References:	
1	Burden, R. L., & Faires, J. D., *Numerical Analysis*, 10^{th} Edition, Cengage Learning, 2016.
2	Devore, J. L., *Probability and Statistics for Engineering and the Sciences*, 10^{th} Edition, Cengage Learning, 2021.
3	Gerald. C.F. and Wheatley. P.O., *Applied Numerical Analysis*, Pearson Education, Asia, New Delhi, 7th Edition, 2007.
4	Gupta, S. C., & Kapoor, V. K., *Fundamentals of Mathematical Statistics*, 12^{th} Edition, Sultan \ Chand & Sons, New Delhi, 2020.
5	Spiegel, M. R., Schiller, J., & Srinivasan, R. A., *Schaum's Outline of Probability and Statistics*, 5th Edition, McGraw Hill Education, 2021.
E-Resources:	
1	https://nptel.ac.in/courses/111105041
2	https://online.stat.psu.edu/stat503/
3	https://math.libretexts.org/Special:Search?qid=&fpid=230&fpth=&query=STATIS
4	https://nptel.ac.in/courses/111107105
5	https://www.r-project.org/

Course Outcomes: Upon successful completion of the course, students will be able to	
CO	**Course Outcomes**
1	Apply the concept of testing of hypothesis for small and large samples in real life problems.
2	Apply the basic concepts of classifications of design of experiments in the field of agriculture.
3	Appreciate the numerical techniques of interpolation in various intervals and apply the numerical techniques of differentiation and integration for engineering problems.

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4	Understand the knowledge of various techniques and methods for solving first and second order ordinary differential equations.
5	Solve the partial and ordinary differential equations with initial and boundary conditions by using certain techniques with engineering applications.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
1	3	3	1	1	1	-	-	-	2	-	2	2	2	-
2	3	3	1	1	1	-	-	-	2	-	2	2	2	-
3	3	3	1	1	1	-	-	-	2	-	2	2	2	-
4	3	3	1	1	1	-	-	-	2	-	2	2	2	-
5	3	3	1	1	1	-	-	-	2	-	2	2	2	-
Avg	3	3	1	1	1	-	-	-	2	-	2	2	2	-

"3" – High, "2" – Medium, "1" – Low, "-" No Correlation.

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26UCS202	SOFTWARE DEVELOPMENT PRACTICES	T	L	T	P	J	C
			3	0	2	0	4

Course Objectives:

1	Apply standard SDLC methodologies to analyse user requirements, create basic UI wireframes using Figma, and develop structured web pages using HTML5 and CSS.
2	Develop interactive web applications by applying JavaScript programming concepts, including variables, control statements, functions, arrays, string manipulation, and input validation.
3	Develop dynamic web pages by applying DOM manipulation techniques and event handling to access, modify, and manage HTML elements.
4	Develop interactive browser-based applications by applying Browser Object Model (BOM) features, Fetch API, JSON processing, and browser APIs to manage user interactions and dynamic content.
5	Apply Git and GitHub tools to manage source code repositories, collaborate on software projects, and deploy static web applications using GitHub Pages.

Syllabus:

SOFTWARE DEVELOPMENT PROCESS AND WEB FUNDAMENTALS — **15 Hours**

SDLC- Phases of SDLC – Requirement Analysis – Introduction to Figma – Basics of HTML5 – HTML Document Structure – Text, Lists, Images, Tables and Forms – Introduction to CSS – Selectors, Colors and Basic Page Layout.

Activity: Design and Develop a College Club Web Page

Practicals:

1. Requirement Analysis and UI Prototype Design using Figma.
2. Developing Web Pages using Semantic HTML5
3. Designing Responsive Web Pages using CSS

JAVASCRIPT PROGRAMMING — **15 Hours**

Introduction to JavaScript – Variables and Data Types – Operators – Decision Making and Looping Statements – Functions – Arrays – String Methods – Input Validation using JavaScript.

Activity: Online Student Registration System

Practical:

1. JavaScript Programming Fundamentals
2. Functions, Arrays and String Manipulation
3. Form Validation Using JavaScript

DOM MANIPULATION — **15 Hours**

Introduction to DOM – HTML elements access using DOM (find, change the content and replace/remove HTML elements) - Events Fundamentals – event listener and its methods– mouse, keyboard and from events

Activity: Interactive To-Do List Manager

Practical:

1. Accessing and Manipulating HTML Elements Using DOM
2. Mouse and Keyboard Event Handling
3. Interactive Form Validation Using DOM Events

BROWSER INTERACTION TECHNIQUES — **15 Hours**

Browser Object Model (BOM)- Window mechanics, screen positioning, history management, navigator properties, location routing architectures, Interactive Device APIs- Drag and Drop API lifecycles, Data Integration- Remote server consumption via the Fetch API, parsing structured JSON payloads, and dynamic browser DOM updates based on

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external data states.

Activity: Real-Time Weather Dashboard

Practical:

1. Exploring Browser Object Model (BOM)
2. Implementing Drag and Drop API
3. Fetching and Displaying Data from a Remote Server

GIT FUNDAMENTALS	**15 Hours**

Git fundamentals--Repository management--Branching and merging -GitHub collaboration -GitHub Pages-Static Deployment**:** Launching production application builds, root configuration settings, and static routing via GitHub Pages.

Activity: Collaborative Web Project Development and Deployment

Practical:

1. Git Repository Management
2. Branching, Merging and GitHub Collaboration
3. Deploying a Static Website using GitHub Pages

Total Lecture Periods: 45 Hours

Total Laboratory Periods: 30 Hours

Text Books:	
1	Become an App Inventor: The Official Guide from MIT App Inventor – 1st Edition by Karen Lang, 2022
2	Secrets of the JavaScript Ninja – 3rd Edition by Trevor Burnham, Bear Bibeault, Josip Maras, and John Resig, 2025
3	Eloquent JavaScript: A Modern Introduction to Programming (4th Edition) by Marijn Haverbeke, 2024
References:	
1	Version Control with Git (3rd ed.). O'Reilly Media by Prem Kumar Ponuthorai & Jon Loeliger., & McCullough, M. ,2022
2	HTML, CSS, & JavaScript All-in-One For Dummies – by Paul McFedries, 2023
E- resources:	
1	**NPTEL**: https://nptel.ac.in
2	MDN Web Docs – https://developer.mozilla.org
3	Typescript Documentation – https://www.typescriptlang.org/docs
4	GitHub Skills – https://skills.github.com

Course Outcomes: Upon successful completion of the course, students will be able to

CO No.	**Course Outcomes**
1	Analyze user requirements to design interactive Figma wireframes and develop mobile-responsive using semantic HTML5.
2	To build highly functional, visually polished user interfaces by synthesizing core JavaScript programming with modern utility-first styling patterns like Tailwind CSS
3	To develop dynamic user interfaces by programmatically generating, modifying, and restructuring DOM elements.
4	To manipulate the integrate native browser APIs to create real-time, interactive, and event-driven browser applications.
5	To organize secure code repositories using Git/GitHub for team collaboration and write automated bash scripts to streamline local development environments.

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1	2	2	3	-	3	1	-	-	-	3	2	2	1	3
2	3	3	2	1	-	-	-	-	-	-	-	3	-	1
3	3	2	3	-	2	-	-	-	-	-	-	3	1	2
4	3	3	3	2	2	-	-	-	-	-	-	3	1	2
5	1	-	2	-	3	-	-	1	3	2	3	2	3	3
Avg	**2.4**	**2.0**	**2.6**	**0.6**	**2.0**	**0.2**	**-**	**0.2**	**0.6**	**1.0**	**1.0**	**2.6**	**1.2**	**2.2**

"3" -High, "2" -Medium,"1" – Low,"-" – No Correlation

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26UHM202	FUNCTIONAL ENGLISH II	LIT	L	T	P	J	C
			1	0	2	0	2

Course Objectives:

1	To advance grammatical agility for constructing sophisticated, persuasive, and nuanced arguments in high-stakes corporate and engineering documentation.
2	To master technical nomenclature, idiomatic industry vernacular, and stylistic syntax required for international business operations and research environments.
3	To develop the technical writing capabilities, including formal investigative reports, grant proposals, and system-level white papers.
4	To cultivate professional verbal-linguistic strategies for leading cross-functional meetings, executing crisis communication, and defending technical projects.
5	To refine multi-dimensional data synthesis skills, enabling the translation of multi-variate data matrices, trend vectors, and system architectures into executive summaries.

Syllabus:

FOUNDATIONS OF ORAL COMMUNICATION — **9 Hours**

Verbal vs. Nonverbal Communication (body language, kinesics, proxemics, and paralanguage); telephonic etiquette and active listening; parts of speech overview, correct usage of nouns and pronouns, subject-verb agreement, and basic tense structures for clear verbal delivery.

Activities: Delivering 3-to-5-minute short presentations; listening and responding to short podcasts to practice targeted oral feedback and identifying spoken grammatical errors.

Practicals:

1. Deliver short conversations with correct verbal and nonverbal cues.
2. Identify and apply parts of speech in spoken communication.

EXPRESSING CAUSAL RELATIONS IN WRITING — **9 Hours**

Reading - Reading longer technical texts– Cause and Effect Essays, and Letters / emails of complaint, Writing – Writing responses to complaints. Grammar - Active Passive Voice transformations, Infinitive and Gerunds, if conditional sentences.

Activities: Delivering 3-to-5-minute short presentations; listening and responding to short podcasts topractice targeted oral feedback and identifying spoken grammatical errors.

Practicals:

1. Integrate grammar structures into professional writing tasks.
2. Practice kinesics, proxemics, and paralanguage through role plays

BUSINESS CORRESPONDENCE & MEETING DOCUMENTATION — **9 Hours**

Digital correspondence mechanics and professional email etiquette; formal letter writing formats for business complaints, requests, and permissions; business meeting architecture.

Activities: Writing and drafting formal emails and letters based on situational prompts.

Practicals:

1. Demonstrate collaborative communication in business meetings.
2. Formal Business Letter Writing and Business Meeting Architecture

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ACADEMIC WRITING & TECHNICAL DOCUMENTATION	9 Hours

Resume Writing, Bio-data, CV Writing, planning protocols; punctuation mechanics (commas, semicolons, apostrophes), common spelling errors, sentence fragments.

Activities: Business meeting to practice drafting an agenda and capturing the minutes of the meeting.

Practicals:

1. Proofread resumes and CVs for grammatical accuracy.
2. Prepare employment documents using professional standards.

TEAMWORK, LEADERSHIP & COLLABORATIVE PROBLEM SOLVING	9 Hours

Leadership dynamics and the distinct roles of a team leader and team player; strategic negotiation techniques, interest-based bargaining, and conflict resolution; collaborative problem-solving frameworks.

Activities: Conducting a personal or case-study SWOT analysis; participating in collaborative brainstorming sessions and structured recruitment-style group discussions.

Practicals:

1. Develop leadership competencies through team exercises.
2. Conduct structured brainstorming sessions.

Total Lecture Periods: 15 Hours
Total Practical Periods: 30 Hours

Text Books:	
1	English for Engineers & Technologists (2020 edition) Orient Blackswan Private Ltd. Department of English, Anna University
2	English for Science & Technology Cambridge University Press 2021.
References:	
1	Raman. Meenakshi, Sharma. Sangeeta (2019). Professional English. Oxford university press. New Delhi.
2	Improve Your Writing ed. V.N. Arora and Laxmi Chandra, Oxford Univ. Press, 2001, NewDelhi.
3	Lesikar, R. V., Flatley, M. E., & Rentz, K. (2018). *Business Communication: Connecting in a Digital World* (13th ed.). McGraw Hill Education.
4	Anderson, P. V. (2019). *Technical Communication: A Reader-Centered Approach* (9th ed.). Cengage Learning.
5	Sethi, A., & Dhamija, P. V. (2017). *A Course in Phonetics and Spoken English* (2nd ed.). PHI Learning
E – Resources:	
1	https://youtu.be/2R_LGnt9Y6U?si=c8p1P0rwXhm3uRbE
2	https://youtu.be/wzeARCKDr70
3	https://youtu.be/Ow2k2J13Cts?si=OIxRRqt2tutesR-j
4	https://youtu.be/QgjkjsqAzvo?si=zJSlhDKebd76V2Z0

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5	https://youtu.be/EzGH3hZuJVk?si=bNuet2B-E7Y7KQee

Course Outcomes: Upon successful completion of the course, students will be able to	
CO No.	**Course Outcomes**
1	Apply listening strategies to comprehend spoken English in various contexts.
2	Understand the importance of communication and drafting skills in engineering and technology.
3	Create written reports coherently for various purposes.
4	Adapt communication styles to global, multicultural environments.
5	Participate actively in group discussions by analysing critically from different views.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
1	1	-	-	-	-	-	-	2	3	-	2	-	1	-
2	2	-	-	-	-	-	-	2	3	-	2	-	1	-
3	2	-	-	-	-	-	-	2	3	-	2	-	1	-
4	2	-	-	-	-	-	-	2	3	-	2	-	1	-
5	2	-	-	-	-	-	-	2	3	-	2	-	1	-
Avg	1.8	-	-	-	-	-	-	2	3	-	2	-	1	-

"3" -High, "2" -Medium, "1" – Low "-" – No Correlation.

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26UME211	INTEGRATED ENGINEERING DESIGN LABORATORY	LIT	L	T	P	J	C
			0	0	4	0	2

Course Objectives:

1	To understand the fundamentals of product development and reverse engineering concepts.
2	To develop skills in disassembly, measurement and sketching of simple engineering products.
3	To gain knowledge in CAD modelling and virtual assembly of product components.
4	To acquire basic skills in embedded systems, sensor interfacing and automation applications.
5	To develop innovative thinking through prototyping, 3D printing and product redesign.

Syllabus:

INTRODUCTION TO PRODUCT DEVELOPMENT & REVERSE ENGINEERING	**12 Hours**
1. Study of product lifecycle and product development stages 2. Identification of components in a simple product 3. Basic reverse engineering of a household product (observation only)	
PRODUCT DISASSEMBLY, MEASUREMENT & SKETCHING	**12 Hours**
1. Disassembly of a simple product (pen, toy, mouse, etc.) 2. Identification and documentation of individual parts 3. Measurement of components using basic measuring instruments (Vernier, Micrometer, Scale, etc.) 4. Freehand sketching of disassembled parts	
CAD MODELLING & VIRTUAL ASSEMBLY	**12 Hours**
1. 2D CAD modelling of individual components 2. 3D CAD modelling of simple parts 3. Virtual assembly of disassembled product using CAD tools	
EMBEDDED SYSTEMS & SENSOR INTERFACING	**12 Hours**
1. Introduction to embedded development platform (Arduino/ESP32 etc.) 2. Sensor interfacing (temperature, proximity, light, etc.) 3. Data reading and display on serial monitor/LCD 4. Simple automation project (home/agriculture/healthcare based)	
PROTOTYPING, 3D PRINTING & PRODUCT DEVELOPMENT	**12 Hours**
1. Brainstorming and concept design for improved product 2. Sketching and redesign of existing product 3. 3D modelling of redesigned prototype 4. Fabrication of prototype using 3D printing or workshop tools 5 . Final assembly and testing of prototype product	
Total Periods: 60 Hours	

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References:	
1	Wang, W. (2010). Reverse engineering: Mechanisms, structures, systems & materials. CRC Press.oks,2014.
2	Margolis, M. (2020). Arduino cookbook: Recipes to begin, expand, and enhance your projects (3rd ed.). O'Reilly Media.
3	H. Lipson, Fabricated - The New World of 3D Printing, Wiley, 1st edition, 2013.
E- resources:	
1	GrabCAD – https://grabcad.com/14.
2	GitHub – https://github.com/,

Course Outcomes: Upon successful completion of the course, students will be able to	
CO No.	**Course Outcomes**
1	Explain the basics of product development lifecycle and reverse engineering concepts.
2	Apply skills in disassembly, measurement and sketching of simple products.
3	Create CAD models and perform virtual assembly of mechanical components.
4	Apply embedded system programming and sensor interfacing for simple automation tasks.
5	Design and develop a prototype using reverse engineering, CAD, and 3D printing techniques

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
1	3	1	1	2	1	-	-	-	-	-	3	3	1	-
2	2	2	3	2	1	-	-	-	-	-	2	3	1	-
3	2	2	3	2	3	-	-	-	-	-	3	2	3	-
4	2	2	3	2	3	-	-	-	-	-	3	2	3	-
5	2	3	3	3	3	-	-	-	-	-	3	3	3	-
Avg	2.2	2	2.6	2.2	2.2	-	-	-	-	-	2.8	2.6	2.2	-

"3" -High, "2" -Medium, "1" – Low, "-" – No Correlation

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26UHM204	KOREAN	T	L	T	P	J	C
			1	0	0	0	1

Course Objective:

1	To impart fundamentals of the Korean language, including reading, writing systems,pronunciation, and speaking.

Syllabus:

FUNDAMENTALS OF KOREAN	**5 Hours**

Introduction to Hangul: consonants and vowels, Basic pronunciation and syllable formation, Common greetings and self-introductions, Numbers (Sino-Korean and Native Korean basics), Basic sentence structure (Subject-Object-Verb), Simple expressions (e.g., 감사합니다, 안녕하세요).

Activities: Writing and reading Hangul practice sheets, Pronunciation drills and audio repetition, Dialogue practice for greetings and self-introduction, Counting and number exercises.

ESSENTIAL GRAMMAR AND VOCABULARY	**5 Hours**

Particles (은/는, 이/가, 을/를) and usage, Basic verbs and present tense conjugation, Sentence patterns: affirmative, negative, interrogative, Common adjectives and descriptive sentences, Expressing possession and location, Asking simple questions (어디, 뭐, 누구).

Activities: Verb conjugation and sentence formation drills, Role-play conversations for shopping and daily routines, Descriptive writing and speaking exercises, Question and answer practice.

EVERYDAY KOREAN COMMUNICATION	**5 Hours**

Polite speech levels and honorifics introduction, Talking about time, dates, and schedules, Ordering food, shopping phrases, counting objects, Simple directions and transportation vocabulary, Listening practice with short dialogues, Cultural notes on etiquette and communication.

Activities: Role-play ordering at a restaurant or buying items, Listening comprehension exercises, Giving and asking for directions practice, Group conversations and presentations.

Total Lecture Periods: 15 Hours

Text Books:

1	King, R., Yeon, J., & Brown, A. (2015). Elementary Korean (2nd ed.). Tuttle Publishing.
2	Cho, Y., Lee, H., Schulz, C., Sohn, H.-M., & Sohn, S.-O. (2001). Integrated Korean: Beginning 1. University of Hawai'i Press.

References:

1	Ross, C., & Maeng, J. (2019). *Korean Made Easy for Beginners*. Darakwon
2	Talk To Me In Korean. (2020). *Talk To Me In Korean Level 1*. Talk To Me In Korean.
3	The National Institute of the Korean Language. (2015). *Korean Grammar in Use: Beginning*. Darakwon.

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E-Resources:	
1	Foreign Language | Introduction to HANGUL (KOREAN) | CMSCET
2	[1 hour] Learn to Read Korean | Full Hangeul Course
3	https://youtu.be/yoUtQr606vI?si=sGjPZoKZsK0xTLzH&t=72

Course Outcomes: Upon successful completion of the course, students will be able to	
CO No.	**Course Outcomes**
1	Understand simple spoken Korean in everyday contexts.
2	Communicate with widely used Korean words effectively
3	Develop the skills necessary for self-directed learning and continuous improvement in Korean language

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
1	1	1	-	-	-	-	-	-	3	-	2	1	-	-
2	2	2	2	2	-	-	-	-	3	-	2	-	2	-
3	2	2	2	2	-	-	-	-	3	-	2	-	2	-
Avg	1.8	1.8	2	2	-	-	-	-	3	-	2	1	2	-

"3" - High, "2" - Medium,"1" – Low, "-" No Correlation

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26UHM205	JAPANESE	T	L	T	P	J	C
			1	0	0	0	1

Course Objective:

1	To impart fundamentals of the Japanese language, including reading, writing systems, pronunciation, and speaking.

Syllabus:

WRITING SYSTEMS & BASIC COMMUNICATION	**5 Hours**

Introduction to Hiragana: vowels, basic characters, reading & writing, Introduction to Katakana: basic characters and usage, Basic greetings and farewells (こんにちは, おはようございます, さようなら), Introducing yourself (名前、出身、年齢), Basic sentence structure: Subject–Object– Verb, Numbers 1–100, days of the week, classroom expressions.
Activities: Flashcard games and writing drills, Self-introduction, Numbers & datematching, Greeting expressions, Listening to audio.

GRAMMAR & EVERYDAY VOCABULARY	**5 Hours**

Particles: は (wa), を (wo), の (no), へ (e), に (ni), Present tense verbs: です, ます-form conjugation (たべます、のみます), Negative forms: ではありません, ません, Describing people and objects using adjectives (い and な), Question formation: なに、どこ、だれ、いつ, Vocabulary for family, food, colors, and basic actions.
Activities: Verb conjugation drills, Guessing game, Picture description, “Shopping” with food vocab and counters

CONVERSATION & CULTURAL ETIQUETTE	**5 Hours**

Polite speech levels and honorifics introduction, Talking about time, dates, and schedules, Ordering food, shopping phrases, counting objects, Simple directions and transportation vocabulary, Listening practice with short dialogues, Cultural notes on etiquette and communication.
Activities: Role-play ordering at a restaurant or buying items, Listening comprehension exercises, Giving and asking for directions practice, Group conversations and presentations.
Practice worksheets and flashcards for hiragana, Writing drills and reading simple katakana words,

Total Lecture Periods: 15 Hours

Text Books:

1	Banno, E., Ikeda, Y., Ohno, Y., Shinagawa, C., & Tokashiki, K. (2011). Genki I: An integrated course in elementary Japanese. The Japan Times
2	The Japan Foundation. (2017). Marugoto Japanese language and culture starter (A1) course book for communicative language activities. Goyal Publishers

References:

1	Banno, E., Ohno, Y., Sakane, Y., & Shinagawa, C. (2020). *Genki II: An Integrated Course in Elementary Japanese* (3rd ed.). The Japan Times Publishing.
2	Tae, K. (2014). *A Guide to Japanese Grammar: A Japanese Approach to Learning Japanese Grammar*. CreateSpace Independent Publishing Platform.

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3	Makino, S., & Tsutsui, M. (2012). *A Dictionary of Basic Japanese Grammar*. The Japan Times Publishing.
E-Resources:	
1	Learn Japanese – Tae Kim's Guide to Learning Japanese
2	Japanese from scratch: the game-changing course in organic Japanese - YouTube
3	Erin's Challenge! I Can Speak Japanese. Contents Library | The Japan Foundation

Course Outcomes: Upon successful completion of the course, students will be able to	
CO No.	**Course Outcomes**
1	Understand simple spoken Japanese in everyday contexts.
2	Communicate with widely used Japanese words effectively
3	Develop the skills necessary for self-directed learning and continuous improvement in Japanese language.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
1	1	1	-	-	-	-	-	-	3	-	2	1	-	-
2	2	2	2	2	-	-	-	-	3	-	2	-	2	-
3	2	2	2	2	-	-	-	-	3	-	2	-	2	-
Avg	1.8	1.8	2	2	-	-	-	-	3	-	2	1	2	-

"3" - High, "2" - Medium,"1" – Low, "-" No Correlation

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26UHM206	DEUTSCH	T	L	T	P	J	C
			1	0	0	0	1

Course Objective:

1	To impart fundamentals of the Deutsch language, including reading, writing systems, pronunciation, and speaking.

Syllabus:

BASICS & INTRODUCTION	**5 Hours**

German alphabet and pronunciation, Basic greetings and farewells, Introducing yourself and others (Ich heiße…, Wer bist du?), Numbers 1–100 and days of the week, Personal pronouns (ich, du, er, sie…), Sentence structure (SVO word order).
Activities: Alphabet spelling game, short skits, Use color-coded cards for SVO sentences.

GRAMMAR ESSENTIALS & EVERYDAY VOCABULARY	**5 Hours**

Present tense of regular verbs (spielen, arbeiten, machen…), Common irregular verbs: sein (to be), haben (to have), gehen, kommen, Articles and gender (der, die, das; ein, eine), Simple questions and negation (nicht, kein), Describing people and things: adjectives and colors, Family, school, food, and common objects vocabulary.
Activities: Conjugate regular and irregular verbs, "Question Chain" game, Create a simple family tree.

EVERYDAY COMMUNICATION IN GERMAN	**5 Hours**

Asking for and giving directions, telling the time and talking about schedules, ordering food and drinks at a café or restaurant, talking about hobbies, weather, and daily routines, listening to short conversations and responding appropriately, introduction to german culture and formal/informal language use (du vs sie).
Activities: ordering food and drinks, give directions, formal / informal greetings, do's and don'ts.

Total Lecture Periods: 15 Hours

Text Books:

1	Funk, H., Kuhn, C., & Demme, S. (2015). Menschen A1: Deutsch als Fremdsprache Kursbuch.Hueber Verlag.

References:

1	Dengler, S., Mayr-Sieber, T., Schuster, T., & Sieber, T. (2016). *Sicher! A1+: Deutschals Fremdsprache Kursbuch*. Hueber Verlag.
2	Perlmann-Balme, M., Schwalb, S., & Weers, D. (2018). *Netzwerk Neu A1: Kurs- und Übungsbuch*. Ernst Klett Sprachen.
3	Albrecht, U., Dengler, S., Paul, R., & Sieber, T. (2016). *Ideen A1: Deutsch als Fremdsprache Kursbuch*. Hueber Verlag.

E-Resources:

1	Learn German A1 from Scratch | Complete Beginner Course | Lesson 1
2	https://youtube.com/@yourgermanteacher?si=mL3zshsV3T79zh48
3	https://learngerman.dw.com/en/beginners/s-62078399

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Course Outcomes: Upon successful completion of the course, students will be able to	
CO No.	**Course Outcomes**
1	Understand simple spoken Deutsch in everyday contexts.
2	Communicate with widely used Deutsch words effectively.
3	Develop the skills necessary for self-directed learning and continuous improvement in Deutsch language.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
1	1	1	-	-	-	-	-	-	3	-	2	1	-	-
2	2	2	2	2	-	-	-	-	3	-	2	-	2	-
3	2	2	2	2	-	-	-	-	3	-	2	-	2	-
Avg	1.8	1.8	2	2	-	-	-	-	3	-	2	1	2	-

"3" - High, "2" - Medium,"1" – Low, "-" No Correlation

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26UHM203	PHYSICAL EDUCATION - II	L	T	P	J	C
		0	0	2	0	1

Course Objective:

1	To impart knowledge on gymnastic exercises and pressing needs for up skilling in a particular game.

Syllabus:

BASIC GYMNASTICS EXERCISES	**15 Hours**
Warming up, Suitable exercise, Lead up games, Safety education, Movement education, Balanced Walk, execution, floor exercise, tumbling/acrobatics, grip, release, swinging, parallel bar exercise, horizontal bar exercise, flic-flac-walk and pyramids.	
UPSKILLING IN ANY ONE OF THE ATHLETICS	**15 Hours**
Broad Jump, High Jump, Triple Jump, Relay Sprints, Javelin Throw, Discuss Throw, Shot Put, Short and Long-distance Running.	
Total Periods: 30 Hours	

References:

1	Singh, A. (2008). Essentials of physical education. Kalyani Publishers.
2	Kamlesh, M. L. (2006). Psychology in physical education and sport (3rd ed.). Metropolitan Book Co.

E-Resources:

1	https://www.who.int/health-topics/physical-activity
2	https://www.gymnastics.sport
3	https://nptel.ac.in

Course Outcomes: Upon successful completion of the course, students will be able to

CO No.	Course Outcomes
1	Understand the importance of physical activity for mental and physical health.
2	Apply safety principles and methods during sports activities.
3	Develop teamwork, discipline, and leadership through sports and group activities and collaborate effectively.
4	Demonstrate the advanced technical skills and strategic understanding in the game of their interest.

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CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
1	1	-	-	-	-	-	-	-	-	-	-	-	-	-
2	3	-	-	-	-	-	-	-	-	-	-	-	-	1
3	-	-	-	-	-	-	-	3	-	-	-	-	-	2
4	-	-	-	-	-	-	-	-	-	-	1	-	-	2
Avg	2	-	-	-	-	-	-	3	-	-	1	-	-	1.6

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