



R.M.D. ENGINEERING COLLEGE

(An Autonomous Institution)

R.S.M Nagar, Kavaraipettai, Gummidipoondi Taluk,

Thiruvallur District, Tamil Nadu- 601206

Affiliated to Anna University, Chennai / Approved by AICTE, New Delhi /

Accredited by NAAC /All the Eligible UG Programs are Accredited by NBA, New Delhi

B.Tech. Degree in

INFORMATION TECHNOLOGY

CURRICULUM AND SYLLABI

REGULATIONS 2024

CHOICE BASED CREDIT SYSTEM

(For the students admitted in the Academic Year 2025 – 2026)

DEPARTMENT OF INFORMATION TECHNOLOGY

R.M.D. ENGINEERING COLLEGE

KAVARAIPETTAI – 601 206

TAMILNADU, INDIA.

R.M.D. ENGINEERING COLLEGE
(An Autonomous Institution)
B.TECH INFORMATION TECHNOLOGY
REGULATIONS – 2024
CHOICE BASED CREDIT SYSTEM

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

1. To ensure graduates will be proficient in utilizing the fundamental knowledge of basic sciences, mathematics and Information Technology for the applications relevant to various streams of Engineering and Technology.
2. To enrich graduates with the core competencies necessary for applying knowledge of computers and telecommunications equipment to store, retrieve, transmit, manipulate and analyze data in the context of business enterprise.
3. To enable graduates to think logically, pursue lifelong learning and will have the capacity to understand technical issues related to computing systems and to design optimal solutions.
4. To enable graduates to develop hardware and software systems by understanding the importance of social, business and environmental needs in the human context.
5. To enable graduates to gain employment in organizations and establish themselves as professionals by applying their technical skills to solve real world problems and meet the diversified needs of industry, academia and research.

PROGRAM OUTCOMES (POs)

ENGINEERING GRADUATES WILL BE ABLE TO:

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

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

PROGRAM SPECIFIC OBJECTIVES (PSOs)

After the successful completion of the program, the graduates will be able to:

1. To create, select, and apply appropriate techniques, resources, modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
2. To manage complex IT projects with consideration of the human, financial, ethical and environmental factors and an understanding of risk management processes, and operational and policy implications.
3. Identify and utilize the strengths of current technologies in the hardware/support and mobile technology domains in implementing IT enabled services for societal needs.

MAPPING OF PROGRAMME EDUCATIONAL OBJECTIVES WITH PROGRAMME OUTCOMES

A broad relation between the programme objective and the outcomes is given in the following table

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)	PROGRAMME OUTCOMES (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
PEO1	3	2										2
PEO2	3	3	1	1								2
PEO3			3			1						3
PEO4			3		1	2	3	1				
PEO5				3				1	1	2	2	1

MAPPING OF PROGRAM SPECIFIC OBJECTIVES WITH PROGRAMME OUTCOMES

A broad relation between the Program Specific Objectives and the outcomes is given in the following table

PROGRAM SPECIFIC OBJECTIVES (PSOs)	PROGRAMME OUTCOMES											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
PSO1	3	2			3				2	2		3
PSO2	3	3	3	3	3	3	3	3	3	3	3	3
PSO3				3			3	3			3	2

Contribution

1: Reasonable

2: Significant

3: Strong



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B.TECH-INFORMATION TECHNOLOGY

REGULATIONS 2024

I – VIII SEMESTER CURRICULUM

(For the Students Admitted During the Academic Year 2025-2026)

SEMESTER-I								
S.No	Course Code	Name of the Course	Category	Contact Periods	L	T	P	C
1	24MA101	Matrices and Calculus	BSC	4	3	1	0	4
2	24CS101	Programming in C++ (Lab Integrated)	ESC	6	3	0	3	4.5
3	24CS102	Software Development Practices (Lab Integrated)	ESC	6	3	0	3	4.5
4	24CH101	Engineering Chemistry (Lab Integrated)	BSC	5	3	0	2	4
5	24EC102	Digital Principles and System Design(Lab Integrated)	ESC	5	3	0	2	4
6	24GE102	Heritage of Tamils	HSMC	1	1	0	0	1
7	24MC101	Students Induction Program (Non-Credit)	MC 3 Weeks					
8	24MC103	Programming in C (Non-Credit)	MC 40 Periods					
9	24HS111	Interpersonal skills, Psychometric Analysis and Career Development	EEC	1	1	0	0	1
10	24GE111R	Idea Lab I (Non-Credit)	EEC	2	0	0	2	1
		Physical Education -I	AC	1	0	0	1	0
		NSS/YRC/UBA (Non Credit)	AC	1Week				
Total				31	17	1	13	24

SEMESTER-II								
S.No	Course Code	Name of the Course	Category	Contact Periods	L	T	P	C
1	24MA201	Linear Algebra and Applications (Lab Integrated)	BSC	5	3	0	2	4
2	24CS201	Data Structures (Lab Integrated)	ESC	6	3	0	3	4.5
3	24CS202	Java Programming (Lab Integrated)	ESC	6	3	0	3	4.5
4	24PH201	Physics for Information Science (Lab Integrated)	BSC	5	3	0	2	4
5	24AM201	Introduction to Artificial Intelligence (Lab Integrated)	ESC	4	2	0	2	3
6	24GE201	Tamils and Technology	HSMC	1	1	0	0	1
7	24GE211R	Idea Lab-II	EEC	4	0	0	4	2
8	24HS211	Innovation and Creativity Skills Development	EEC	1	1	0	0	1
9	24AC201	Yoga for Stress Management (Non-Credit)	AC	1	0	0	1	0
10	24MC102R	Environmental Science and Sustainability (Non-Credit)	MC	1	1	0	0	0
		Physical Education -II	AC	1	0	0	1	0
		Foreign Languages (Japanese/German/Korean)	AC	Basic Level 1 Certification				
Total				35	17	0	18	24

SEMESTER-III								
S.No	Course Code	Name of the Course	Category	Contact Periods	L	T	P	C
THEORY COURSES								
1	24MA301	Discrete Mathematics	BSC	4	3	1	0	4
2	24GE301	Universal Human Values II: Understanding Harmony	HSMC	3	2	1	0	3
3	24CS301	Computer Organization and Architecture	ESC	3	3	0	0	3
THEORY COURSES WITH LABORATORY COMPONENT								
4	24CS302	Advanced Java Programming (Lab Integrated)	PCC	6	3	0	3	4.5
5	24CS303	Database Management Systems (Lab Integrated)	PCC	6	3	0	3	4.5
6	24CS304	Operating Systems (Lab Integrated)	PCC	4	2	0	2	3
LABORATORY COURSES								
7	24GE311R	Product Development Lab-I	EEC	2	0	0	2	1
8	24CS311R	Aptitude and Coding Skills-I	EEC	4	0	0	4	2
9	24CS312	Internship/Seminar (1 Week)	EEC	1	0	0	1	0.5
MANDATORY COURSES								
10	24MC301	Indian Constitution(Non-Credit)	MC	1	1	0	0	0
Total				34	18	2	15	25.5

SEMESTER-IV								
S.No	Course Code	Name of the Course	Category	Contact Periods	L	T	P	C
THEORY COURSES WITH LABORATORY COMPONENT								
1	24MA401	Probability and Statistics (Lab Integrated)	BSC	5	3	0	2	4
2	24CS402	Design and Analysis of Algorithms(Lab Integrated)	PCC	5	3	0	2	4
3	24IT401	Managing Cloud and Containerization (Lab Integrated)	PCC	5	3	0	2	4
4	24IT402	Web Development Frameworks (Lab Integrated)	PCC	6	3	0	3	4.5
5		Professional Elective I (Lab Integrated)	PEC	4	2	0	2	3
EMPLOYABILITY ENHANCEMENT COURSES								
6	24GE411R	Product Development Lab-II	EEC	4	0	0	4	2
7	24CS411R	Aptitude and Coding Skills-II	EEC	4	0	0	4	2
AUDIT COURSES								
8	24AC401	Value Education (Non-Credit)	AC	1	1	0	0	0
Total				34	15	0	19	23.5

HONORS/MINOR SEMESTER IV

SEMESTER –IV								
Sl. No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
For Honors Degree								
1		Capstone Design Project – Level 1	EEC	12	0	0	12	6
OR								
1		Honors Elective -I	PEC	3	3	0	0	3
2		Honors Elective -II	PEC	3	3	0	0	3
TOTAL CREDITS								6
For Minor Degree								
1		Minor Elective - I	OEC	3	3	0	0	3
2		Minor Elective - II	OEC	3	3	0	0	3
TOTAL CREDITS								6

SEMESTER-V								
S.No	Course Code	Name of the Course	Category	Contact Periods	L	T	P	C
THEORY COURSES WITH LABORATORY COMPONENT								
1	24IT501	Data Communications and Computer Networks(Lab Integrated)	PCC	5	3	0	2	4
2	24CS701	Data Analytics (Lab Integrated)	PCC	4	2	0	2	3
3	24IT502	Machine Learning (Lab Integrated)	PCC	5	3	0	2	4
4		Professional Elective II (Lab Integrated)	PEC	4	2	0	2	3
5		Professional Elective III (Lab Integrated)	PEC	4	2	0	2	3
EMPLOYABILITY ENHANCEMENT COURSES								
6		Professional Communication-I (TOEFL)	HSMC	4	0	0	4	2
7	24CS511R	Advanced Aptitude and Coding Skills-I	EEC	4	0	0	4	2
8	24IT511	Internship/Seminar (2 Weeks)	EEC	2	0	0	2	1
9	24GE511	Industry Oriented Course - 1	EEC	2	0	0	2	1
MANDATORY COURSES								
10	24MC501	Essence of Indian Traditional Knowledge (Non-Credit)	MC	1	1	0	0	0
Total				35	13	0	22	23

HONORS/MINOR SEMESTER V

SEMESTER – V								
Sl. No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
For Honors Degree								
1		Capstone Design Project – Level II	EEC	12	0	0	12	6
OR								
1		Honors Elective -III	PEC	3	3	0	0	3
2		Honors Elective -IV	PEC	3	3	0	0	3
TOTAL CREDITS								6
For Minor Degree								
1		Minor Elective - III	OEC	3	3	0	0	3
2		Minor Elective - IV	OEC	3	3	0	0	3
TOTAL CREDITS								6

SEMESTER-VI								
S.No	Course Code	Name of the Course	Category	Contact Periods	L	T	P	C
THEORY COURSES								
1		Open Elective I	OEC	3	3	0	0	3
THEORY COURSES WITH LABORATORY COMPONENT								
2	24IT601	Mobile Application Framework and Development (Lab Integrated)	PCC	5	3	0	2	4
3	24IT602	Application System Design with UML (Lab Integrated)	PCC	4	2	0	2	3
4	24CS602	Cryptography and Cyber Security (Lab Integrated)	PCC	4	2	0	2	3
5		Design Thinking(Lab Integrated)	HSMC	3	1	0	2	2
6		Professional Elective IV (Lab Integrated)	PEC	4	2	0	2	3
EMPLOYABILITY ENHANCEMENT COURSES								
7		Professional Communication-II (TOEFL)	HSMC	2	0	0	2	1
8	24CS611R	Advanced Aptitude and Coding Skills-II	EEC	4	0	0	4	2
9		Industry Oriented Course – II /Self Learning Course	EEC	6	0	0	6	3
AUDIT COURSES								
10	24AC601	Personality Development (Non-Credit)	AC	2	2	0	0	0
Total				37	15	0	22	24

HONORS/MINOR SEMESTER VI

SEMESTER – VI								
Sl. No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
For Honors Degree								
1		Capstone Design Project – Level III	EEC	12	0	0	12	6
OR								
1		Honors Elective -V	PEC	3	3	0	0	3
2		Honors Elective -VI	PEC	3	3	0	0	3
TOTAL CREDITS								6
For Minor Degree								
1		Capstone Design Project	EEC	12	0	0	12	6
TOTAL CREDITS								6

SEMESTER-VII								
S.No	Course Code	Name of the Course	Category	Contact Periods	L	T	P	C
THEORY COURSES								
THEORY COURSES WITH LABORATORY COMPONENT								
1	24CS702	Wireless and Mobile Communication (Lab Integrated)	PCC	5	3	0	2	4
2	24IT701	Microservice Architecture (Lab Integrated)	PCC	4	2	0	2	3
3		Professional Elective V (Lab Integrated)	PEC	4	2	0	2	3
EMPLOYABILITY ENHANCEMENT COURSES								
4	24IT711	Internship/Seminar(4weeks)	EEC	4	0	0	4	2
Total				17	7	0	10	12

SEMESTER-VIII								
S.No	Course Code	Name of the Course	Category	Contact Periods	L	T	P	C
EMPLOYABILITY ENHANCEMENT COURSES								
1	24IT811	Project Work	EEC	16	0	0	16	8
Total				16	0	0	16	8

SUMMARY OF CREDIT DISTRIBUTION

S.NO	CATEGORY	CREDITS PER SEMESTER								TOTAL CREDITS
		I	II	III	IV	V	VI	VII	VIII	
1	HSMC	1	1	3	-	2	3	-	-	10
2	BSC	8	8	4	4	-	-	-	-	24
3	ESC	13	12	3	-	-	-	-	-	22
4	PCC	-	-	12	12.5	11	10	7	-	52.5
5	PEC	-	-	-	3	6	3	3	-	15
6	OEC	-	-	-	-	-	3	-	-	3
7	EEC	2	3	3.5	4	4	5	2	8	31.5
8	MC/AC	✓	✓	✓	✓	✓	✓			
TOTAL		24	24	25.5	23.5	23	24	12	8	164

HSMC - Humanities and Social Sciences including Management Course;

BSC – Basic Science Course;

ESC – Engineering Science Course;

PCC – Professional Core Course;

PEC – Professional Elective Course;

OEC – Open Elective Course;

EEC – Employability Enhancement Course;

MC – Mandatory Course;

AC – Audit Course.

PROFESSIONAL ELECTIVE COURSES - VERTICALS**VERTICAL I- DATA SCIENCE**

Sl. No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	24IT907	Foundations of Data Science	PEC	3	3	0	0	3
2.	24IT908	Data Engineering in Cloud	PEC	3	3	0	0	3
3.	24IT909	Image and Video Analytics	PEC	3	3	0	0	3
4.	24IT910	Text and Speech Analytics	PEC	3	3	0	0	3
5.	24IT911	Stream Processing and Analytics	PEC	3	3	0	0	3
6.	24IT912	Business Intelligence on Oracle Cloud(Oracle Cloud Business Intelligence Reporting 2021 Certified Specialist)	PEC	Credit Transfer Course				3

VERTICAL II- CYBER SECURITY

Sl. No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	24IT913	Social Network Security	PEC	4	2	0	2	3
2.	24IT914	Malware Analysis	PEC	3	3	0	0	3
3.	24IT915	Cloud and Data Security	PEC	3	3	0	0	3
4.	24IT916	Digital and Mobile Forensics	PEC	3	3	0	0	3
5.	24IT917	Vulnerability Analysis and Penetration Testing	PEC	3	3	0	0	3
6.	24IT918	Certified Ethical Hacking	PEC	Credit Transfer Course				3

VERTICAL III- FULL STACK ENGINEERING

Sl. No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	24IT901	Software Testing and Automation	PEC	4	2	0	2	3
2.	24IT902	Server-side Programming	PEC	4	2	0	2	3
3.	24IT903	REST Application Development using Spring Boot and JPA	PEC	4	2	0	2	3
4.	24IT904	DevOps	PEC	4	2	0	2	3
5.	24IT905	Web Application Security	PEC	4	2	0	2	3
6.	24IT906	Java Development on Oracle Cloud(Oracle Java SE 11 / 17 Developer Certification)	PEC	Credit Transfer Course				3

VERTICAL IV- MEDIA PROCESSING

Sl. No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	24IT919	Augmented and Virtual Reality	PEC	4	2	0	2	3
2.	24IT920	Computer Graphics and Multimedia	PEC	3	3	0	0	3
3.	24IT921	Human Computer Interaction	PEC	3	3	0	0	3
4.	24IT922	Visual Effects	PEC	3	3	0	0	3
5.	24IT923	Game Design	PEC	3	3	0	0	3
6.	24IT924	Unity Certified Associate: Game Developer	PEC	Credit Transfer Course				3

VERTICAL V- FIN TECH AND WEB 3.0

Sl. No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	24IT925	Blockchain Technologies	PEC	3	3	0	0	3
2.	24IT926	Introduction to Fintech	PEC	3	3	0	0	3
3.	24IT927	Bitcoin and Cryptocurrency	PEC	3	3	0	0	3
4.	24IT928	Blockchain Development	PEC	3	3	0	0	3
5.	24IT929	Decentralized Finance (DeFi)	PEC	3	3	0	0	3
6.	24IT930	Blockchain Developer	PEC	Credit Transfer Course				3

VERTICAL VI- ARTIFICIAL INTELLIGENCE AND MACHINNE LEARNING

Sl. No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	24IT931	Reinforcement and Ensemble Learning	PEC	3	3	0	0	3
2.	24IT932	Applied AI and ML	PEC	3	3	0	0	3
3.	24IT933	Social Network Analysis	PEC	3	3	0	0	3
4.	24IT934	Soft Computing	PEC	3	3	0	0	3
5.	24IT935	Computational Neuroscience	PEC	3	3	0	0	3
6.	24IT936	Machine Learning on Oracle Cloud(Oracle Machine Learning using Autonomous Database 2021 Certified Specialist)	PEC	Credit Transfer Course				3

VERTICAL VII- QUANTUM COMPUTING

Sl. No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	24IT937	Introduction to Quantum Computing	PEC	3	3	0	0	3
2.	24IT938	Quantum Information Theory	PEC	3	3	0	0	3
3.	24IT939	Quantum Computing Architecture	PEC	3	3	0	0	3
4.	24IT940	Quantum Algorithms	PEC	3	3	0	0	3
5.	24IT941	Quantum Statistical Data Analysis	PEC	3	3	0	0	3

OPEN ELECTIVE COURSES – OFFERED TO OTHER DEPARTMENTS

Sl. No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	24IT001	Software Testing and Automation	PEC	3	3	0	0	3
2.	24IT002	Managing Cloud and Containerization	PEC	3	3	0	0	3
3.	24IT003	REST Application Development using Spring Boot and JPA	PEC	3	3	0	0	3
4.	24IT004	UI and UX Design	PEC	3	3	0	0	3

**CURRICULUM OF B.TECH (HONOURS) IN INFORMATION TECHNOLOGY
WITH SPECIALIZATION IN**

**Data Science| Cyber Security | Full Stack Engineering | Media Processing|
Fintech and Web 3.0 | Artificial Intelligence | Quantum Computing
HONOURS DEGREE WITH SPECIALIZATION IN DATA SCIENCE**

Sl. No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	24IT950	Neural Networks and Deep Learning	PEC	3	3	0	0	3
2.	24IT951	Recommender Systems	PEC	3	3	0	0	3
3.	24IT952	Data Exploration and Visualization	PEC	3	3	0	0	3
4.	24IT953	Cognitive Science and Analytics	PEC	3	3	0	0	3
5.	24IT954	Capstone Design Project	EEC	12	0	0	12	6
Total				24	12	0	12	18

HONOURS DEGREE WITH SPECIALIZATION IN CYBER SECURITY

Sl. No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	24IT955	Engineering Secure Software Systems	PEC	3	3	0	0	3
2.	24IT956	Network Design and Programming	PEC	3	3	0	0	3
3.	24IT957	Fault Tolerant Computing	PEC	3	3	0	0	3
4.	24IT958	Enterprise Cyber Security	PEC	3	3	0	0	3
5.	24IT959	Capstone Design Project	EEC	12	0	0	12	6
Total				24	12	0	12	18

HONOURS DEGREE WITH SPECIALIZATION IN FULL STACK ENGINEERING

Sl. No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	24IT960	Front End Engineering	PEC	3	3	0	0	3
2.	24IT961	Server-Side Engineering	PEC	3	3	0	0	3
3.	24IT962	Scalable Messaging Infrastructure - Apache Kafka	PEC	3	3	0	0	3
4.	24IT963	Usability Design of Software Application	PEC	3	3	0	0	3
5.	24IT964	Capstone Design Project	EEC	12	0	0	12	6
Total				24	12	0	12	18

HONOURS DEGREE WITH SPECIALIZATION IN MEDIA PROCESSING

Sl. No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	24IT965	Design Programming	PEC	3	3	0	0	3
2.	24IT966	Computer Graphics for Virtual Reality	PEC	3	3	0	0	3
3.	24IT967	Concepts of Virtual and Augmented Reality	PEC	3	3	0	0	3
4.	24IT968	Mobile VR and AI in Moduley	PEC	3	3	0	0	3
5.	24IT969	Capstone Design Project	EEC	12	0	0	12	6
Total				24	12	0	12	18

HONOURS DEGREE WITH SPECIALIZATION IN FINTECH AND WEB 3.0

Sl. No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	24IT970	Fundamentals of Blockchain	PEC	3	3	0	0	3
2.	24IT971	Smart Contracts and Solidity	PEC	3	3	0	0	3
3.	24IT972	Blockchain Platforms and Usecases	PEC	3	3	0	0	3
4.	24IT973	Blockchain Security and Performance	PEC	3	3	0	0	3
5.	24IT974	Capstone Design Project	EEC	12	0	0	12	6
Total				24	12	0	12	18

HONOURS DEGREE WITH SPECIALIZATION IN ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

Sl. No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	24IT975	Foundations of Deep Learning	PEC	3	3	0	0	3
2.	24IT976	Knowledge Engineering	PEC	3	3	0	0	3
3.	24IT977	Computer Vision	PEC	3	3	0	0	3
4.	24IT978	Foundations of Natural Language Processing	PEC	3	3	0	0	3
5.	24IT979	Capstone Design Project	EEC	12	0	0	12	6
Total				24	12	0	12	18

HONOURS DEGREE WITH SPECIALIZATION IN QUANTUM COMPUTING

Sl. No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	24IT980	Quantum Computing Foundations	PEC	3	3	0	0	3
2.	24IT981	Quantum Programming	PEC	3	3	0	0	3
3.	24IT982	Quantum Cryptography	PEC	3	3	0	0	3
4.	24IT983	Machine Learning with Quantum Computing	PEC	3	3	0	0	3
5.	24IT984	Capstone Design Project	EEC	12	0	0	12	6
Total				24	12	0	12	18

MINOR DEGREE WITH SPECIALIZATION IN FULL STACK ENGINEERING

Sl. No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	24IT985	Front End Engineering	PEC	3	3	0	0	3
2.	24IT986	Server-side Programming	PEC	3	3	0	0	3
3.	24IT987	Microservice Architecture	PEC	3	3	0	0	3
4.	24IT988	DevOps	PEC	3	3	0	0	3
5.	24IT989	Capstone Design Project	EEC	12	0	0	12	6
Total				24	12	0	12	18

MINOR DEGREE WITH SPECIALIZATION IN ENTREPRENEURSHIP AND INNOVATION

Sl. No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	24IT990	Foundations of Entrepreneurship	PEC	3	3	0	0	3
2.	24IT991	Team Building and Leadership Management for Business	PEC	3	3	0	0	3
3.	24IT992	Creativity and Innovation in Entrepreneurship	PEC	3	3	0	0	3
4.	24IT993	Principles of Marketing Management for Business	PEC	3	3	0	0	3
5.	24IT994	Capstone Design Project	EEC	12	0	0	12	6
Total				24	12	0	12	18

Course Code	MATRICES AND CALCULUS	L	T	P	C
24MA101		3	1	0	4

OBJECTIVES:

The course will enable the learners to:

- explain the concepts of matrix algebra techniques.
- understand various techniques to solve second and higher order differential equations.
- demonstrate simple applications of functions of several variables and vector calculus.
- comprehend the basic concepts of multiple integrals.
- illustrate elementary ideas of vector calculus.

UNIT I MATRICES

12

Eigenvalues and Eigenvectors of a real matrix – Properties of eigenvalues and eigenvectors – Statement and applications of Cayley-Hamilton Theorem – Diagonalization of matrices by orthogonal transformation (excluding similarity transformation) – Reduction of a quadratic form to canonical form by orthogonal transformation – Nature of quadratic forms.

UNIT II DIFFERENTIAL EQUATIONS

12

Second and Higher order linear differential equations with constant coefficients - Method of variation of parameters – Homogenous equation of Euler’s and Legendre’s type – System of simultaneous linear differential equations with constant coefficients.

UNIT III FUNCTIONS OF SEVERAL VARIABLES

12

Total derivative – Differentiation of implicit functions – Jacobian and properties – Taylor’s series for functions of two variables – Maxima and minima of functions of two variables– Lagrange’s method of undetermined multipliers.

UNIT IV MULTIPLE INTEGRALS

12

Double integrals – Change of order of integration – Area enclosed by Cartesian Coordinates (excluding polar coordinates) – Triple integrals (excluding spherical and cylindrical coordinates) – Volume of solids (Cartesian Coordinates only).

UNIT V VECTOR CALCULUS

12

Gradient, divergence and curl (excluding vector identities) – Directional derivative – Irrotational and Solenoidal vector fields – Green’s theorem in a plane, Stoke’s theorem and Gauss divergencetheorem (Statement only) - Simple applications involving cubes and rectangular parallelepipeds.

TOTAL: 60 PERIODS

COURSE OUTCOMES:

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

CO1: compute the matrix inverse and their higher powers.

CO2: solve second and higher order differential equations.

CO3: determine the maxima and minima of functions of two variables.

CO4: determine the volume and surface area using multiple integrals.

CO5: evaluate integrals using the concept of vector calculus.

CO6: apply matrix algebra techniques to diagonalize the matrix.

TEXT BOOKS:

1. Erwin Kreyszig, "Advanced Engineering Mathematics", John Wiley and Sons, 10th Edition, New Delhi, 2016.
2. B.S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 44th Edition, 2021.

REFERENCES:

1. James Stewart, "Calculus: Early Transcendentals", Cengage Learning, 7th Edition, New Delhi, 2015.
2. M. K. Venkataraman, "Engineering Mathematics", Volume I, 4th Edition, The National Publication Company, Chennai, 2003.
3. Sivaramakrishna Dass, C. Vijayakumari, "Engineering Mathematics", Pearson Education India, 4th Edition 2019.
4. H. K. Dass, and Er. Rajnish Verma, "Higher Engineering Mathematics", S. Chand Private Limited, 3rd Edition 2014.
5. B.V. Ramana, "Higher Engineering Mathematics", Tata McGraw Hill Publishing Company, 6th Edition, New Delhi, 2008.
6. NPTEL course on "Engineering Mathematics - I", by Prof. Jitendra Kumar, IIT Kharagpur:
https://onlinecourses.nptel.ac.in/noc21_ma58/preview

Course Code	HERITAGE OF TAMILS	L	T	P	C
24GE102		1	0	0	1

OBJECTIVES:

The course will enable the learners to:

- recognize Tamil literature and its significance in Tamil culture.
- introduce the Tamils' rich artistic and cultural legacy.
- familiarize the different types of folk and martial arts that are unique to Tamil Nadu.
- acquaint the concept of Thinaï in Tamil literature and culture.
- comprehend the significance of Tamil in developing Indian culture.

UNIT I LANGUAGE AND LITERATURE 3

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

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

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

UNIT III FOLK AND MARTIAL ARTS 3

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

UNIT IV THINAI CONCEPT OF TAMILS 3

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

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

Contribution of Tamils to Indian Freedom Struggle – The Cultural Influence of Tamils over the other parts of India – Self-Respect Movement – Role of Siddha Medicine in Indigenous Systems of Medicine – Inscriptions & Manuscripts – Print History of Tamil Books.

TOTAL: 15 PERIODS

COURSE OUTCOMES:

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

- CO1: state the role of Tamil literature in shaping Tamil Cultural roots.
- CO2: express the cultural and religious significance of Tamil art and sculptures.
- CO3: identify and describe the techniques of folk and martial arts.
- CO4: glassify the role of Thinaï concept in Tamil culture and literature.
- CO5: compare the idea of cultural and intellectual contributions of Tamils.

REFERENCE BOOKS

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

2. கணினித் தமிழ் – முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).

3. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை
வெளியீடு)

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

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

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

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

8. Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by:

9. Department of Archaeology & Tamil Nadu Text Book and Educational
ServicesCorporation, Tamil Nadu)

10. Studies in the History of India with Special Reference to Tamil Nadu (Dr. K. K.
Pillay)(Published by: The Author)

11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil
NaduText Book and Educational Services Corporation, Tamil Nadu)

12. Journey of Civilization Indus to Vaigai (R. Balakrishnan) (Published by: RMRL)

Course Code	PROGRAMMING IN C++ (Theory Course with Laboratory Component)	L	T	P	C
24CS101		3	0	3	4.5

OBJECTIVES:

The Course will enable learners to:

- To learn problem solving and programming fundamentals.
- To gain knowledge on pointers and functions.
- To apply the principles of object orientated programming.
- To understand operator overloading, inheritance and polymorphism.
- To use the functionalities of I/O operations, files build C++ programs using exceptions.

UNIT I PROGRAMMING FUNDAMENTALS

9+9

Types of computer programming languages - Genesis of C++ - Program Life Cycle - Structure of C++ program - Identifiers - Variables - Keywords - Number System - Binary Number System - Octal Number System - Decimal Number System - Hexadecimal Number System - Data types - Constants - Errors – Operators- Expressions - Type Conversions - Control-Flow Statements - Conditional Statements - Iterative Statements - Unconditional Control Statements - Arrays - One-Dimensional Arrays - Two-Dimensional Arrays - Multi -Dimensional Arrays - Strings - String Manipulation Functions - Array of Strings.

List of Exercise/Experiments:

1. Write C++ programs for the following:
 - a. Find the sum of individual digits of a positive integer.
 - b. Compute the GCD of two numbers.
 - c. Find the roots of a number (Newton’s method)
2. Write C++ programs using arrays:
 - a. Find the maximum of an array of numbers.
 - b. Remove duplicates from an array of numbers.
 - c. Print the numbers in an array after removing even numbers.
3. Write C++ programs using strings:
 - a. Checking for palindrome.
 - b. Count the occurrences of each character in a given word.

UNIT II POINTERS AND FUNCTIONS

9+9

Pointers - Pointer Variables - Pointer Operators & Expressions - Pointers with Arrays - Functions - Scope Rules - Function Arguments - return Statement - Function Variables - Storage Classes - Types of storage classes - Create Header Files - User-Defined Functions - Inline Functions - Function Overloading - Recursion - Namespaces.

List of Exercise/Experiments:

1. Generate salary slip of employees using structures and pointers. Create a structure Employee with the following members: EID, Ename, Designation, DOB, DOJ, Basic pay Note that DOB and DOJ should be implemented using structure within structure.
2. Compute internal marks of students for five different subjects using structures and functions.

UNIT III CLASSES AND OBJECTS

9+9

Concepts of Object Oriented Programming – Benefits of OOP – Simple C++ program –
Classes and Objects - Member functions - Nesting of member functions - Private member functions
- Memory Allocation for Objects - Static Data Members - Static Member functions - Array of Objects
- Objects as function arguments - Returning objects - friend functions – Const Member functions -
Constructors – Destructors.

List of Exercise/Experiments:

1. Write a program Illustrating Class Declarations, Definition, and Accessing ClassMembers.
2. Program to illustrate default constructor, parameterized constructor and copy constructors.

Practice Questions & Scenario Based Questions:

1. Imagine you are working as a software engineer at a tech company. Your team is developing a mathematical software library that will be used in various applications across the company. One of the features that your team lead has asked you to implement is a function that calculates the number of trailing zeros in the factorial of a number.

The team lead has emphasized the importance of encapsulation in your implementation.

2. Create a C++ class Calculator representing a simple calculator. The class should have the following attributes and methods:

Attributes: Two operands and an operation (+, -, *, /)

Methods: Perform the operation and return the result

Implement constructors to initialize the calculator with default values (0,0) and with specified values. Also, implement a destructor to perform any necessary cleanup.

UNIT IV OPERATOR OVERLOADING, INHERITANCE AND POLYMORPHISM 9+9

Operator Overloading - Overloading Using Friend functions – Inheritance – Types of inheritance –
Virtual Base Class - Abstract Class – Constructors in Derived Classes - member class: nesting of
classes.

Pointer to objects – this pointer- Pointer to derived Class - Virtual functions – PureVirtual Functions
– Polymorphism.

List of Exercise/Experiments:

1. Write a Program to Demonstrate the i) Operator Overloading. ii) Function Overloading.
2. Write a Program to Demonstrate Friend Function and Friend Class.
3. Program to demonstrate inline functions.
4. Program for Overriding of member functions.
5. Write C++ programs that illustrate how the following forms of inheritance are supported:
Single inheritance b) Multiple inheritance c) Multi level inheritance d) Hierarchical inheritance.

Practice Questions & Scenario Based Questions:

1. Joy is a software developer at a 3D modeling company. The company is developing a new software tool that will be used by architects and engineers to design and analyze 3D models of various structures. One of the features that her project manager has asked is to implement a function that calculates the volume of basic 3D shapes like cylinders and cuboids. The project manager has emphasized the importance of using function overloading in her implementation..
2. Imagine you are a software developer tasked with creating a utility program for a school that handles student scores. The school wants a simple program where teachers can enter the scores of students for a particular test, and the program will then provide the highest and lowest scores among them. This will help the teachers quickly identify the top performer and the student who might need extra help.
Your task is to write program that satisfies the above scenario using **inline function**
3. Develop a software system to manage part-time worker students at a university. These students have unique attributes such as their name, student ID, hourly wage, and hours worked per week. Your goal is to create a C++ program that models this system.
4. Ramu is a software developer at a company specializing in developing software solutions for geometric shapes. Recently, a client approached with a request to create a program to calculate the areas of rectangles and triangles.

UNIT V I/O, FILES AND EXCEPTIONS

9+9

C++ Streams – Unformatted I/O - Formatted Console I/O – Opening and Closing File – File modes - File pointers and their manipulations – Templates – Class Templates – Function Templates - Exception handling.

List of Exercise/Experiments:

1. Program to demonstrate pure virtual function implementation.
2. Count the number of account holders whose balance is less than the minimum balance using sequential access file.
3. Write a Program to Demonstrate the Catching of all Exceptions.

Practice Questions & Scenario Based Questions:

1. Develop a simple library management system. Create a base class Book representing a book in the library. The class should have attributes such as title, author, and ISBN (International Standard Book Number). Implement a virtual function `displayDetails()` to display information about the book.
2. A software developer working on a banking application. One of the requirements is to analyze account holders' balances based on a minimum balance threshold. The application should read account information from a sequential access file, where each line represents an account record in the format: `account_holder_name, balance`.
3. The financial company is developing a new software tool that will be used by financial analysts to perform various calculations. One of the features of that project is to implement a function that performs division of two numbers.

Write a program that takes two integer inputs, numerator and denominator, from the user. Implement error handling to check if the denominator is zero. If the denominator is zero, display the message "Division by zero is not allowed!" using an exception. If the denominator is not zero, calculate the result of the division and display it.

4. Mini project.

TOTAL: 45+45 = 90 PERIODS

OUTCOMES:

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

CO1: Solve problems using basic constructs in C++.

CO2: Implement C++ programs using pointers and functions.

CO3: Apply object-oriented concepts and solve real world problems.

CO4: Develop C++ programs using operator overloading and polymorphism.

CO5: Implement C++ programs using Files and exceptions.

CO6: Develop applications using C++ concepts

TEXT BOOKS:

1. Herbert Schildt, "The Complete Reference C++", 4th edition, MH, 2015. (Unit 1 & 2)
2. E Balagurusamy, "Object Oriented Programming with C++", 4th Edition, TataMcGraw-Hill Education, 2008. (Unit 3, 4 & 5)

REFERENCES:

1. Karl Beecher, "Computational Thinking: A beginner's guide to problem-solving and programming", BCS Learning & Development Ltd, 2017. (Unit 1)
2. Nell Dale, Chip Weems, "Programming and Problem Solving with C++", 5th Edition, Jones and Barklett Publishers, 2010.
3. John Hubbard, "Schaum's Outline of Programming with C++", MH, 2016.

4. Yashavant P. Kanetkar, “Let us C++”, BPB Publications, 2020
5. ISRD Group, “Introduction to Object-oriented Programming and C++”, Tata McGraw-Hill Publishing Company Ltd., 2007.
6. D. S. Malik, “C++ Programming: From Problem Analysis to Program Design”, ThirdEdition, Thomson Course Technology, 2007.
https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01297200240671948837_shared/overview

LIST OF EQUIPMENTS:

1. Standalone desktops with C/C++ compiler (or) Server with C/C++ compiler.

Course Code	SOFTWARE DEVELOPMENT PRACTICES (Theory Course with Laboratory Component)	L	T	P	C
24CS102		3	0	3	4.5

OBJECTIVES:

The Course will enable learners to:

- discuss the essence of agile development methods.
- set up and create a GitHub repository.
- create interactive websites using HTML
- design interactive websites using CSS.
- develop dynamic web page using Java script.

UNIT I AGILE SOFTWARE DEVELOPMENT AND Git and GitHub 9+9

Software Engineering Practices – Waterfall Model - Agility – Agile Process – Extreme Programming - Agile Process Models – Adaptive Software Development – Scrum – Dynamic Systems Development Method – Crystal – Feature Driven Development – Lean Software Development – Agile Modeling – Agile Unified Process – Tool set for Agile Process.

Introduction to Git –Setting up a Git Repository - Recording Changes to the Repository - Viewing the Commit History - Undoing Things - Working with Remotes -Tagging - Git Aliases - Git Branching - Branches in a Nutshell - Basic Branching and Merging - Branch Management - Branching Workflows - Remote Branches - Rebasing.

Introduction to GitHub – Set up and Configuration - Contribution to Projects, Maintaining a Project – Scripting GitHub.

List of Exercise/Experiments:

1. Form a Team, Decide on a project:

- a) Create a repository in GitHub for the team.
- b) Choose and follow a Git workflow

- Each team member can create a StudentName.txt file with contents about themselves and the team project
- Each team member can create a branch, commit the file with a proper commit message and push the branch to remote GitHub repository.
- Team members can now create a Pull request to merge the branch to master branch or main development branch.
- The Pull request can have two reviewers, one peer team member and one faculty. Reviewers can give at least one comment for Pull Request updating.
- Once pull request is reviewed and merged, the master or main development branch will have files created by all team members.

2. Create a web page with at least three links to different web pages. Each of the web pages is to be designed by a team member. Follow Git workflow, pull request and peer reviews.

3. Form a Team, Decide on a project:

- c) Create a repository in GitHub for the team.
- d) Choose and follow a Git workflow

- Each team member can create a StudentName.txt file with contents about themselves and the team project
- Each team member can create a branch, commit the file with a proper commit message and push the branch to remote GitHub repository.
- Team members can now create a Pull request to merge the branch to master branch or main development branch.
- The Pull request can have two reviewers, one peer team member and one faculty. Reviewers can give at least one comment for Pull Request updation.
- Once pull request is reviewed and merged, the master or main development branch will have files created by all team members.

4. Create a web page with at least three links to different web pages. Each of the web pages is to be designed by a team member. Follow Git workflow, pull request and peer reviews.

UNIT II HTML

9+9

Introduction – Web Basics – Multitier Application Architecture – Client-Side Scripting versus Server-side Scripting – HTML5 – Headings – Linking – Images – Special Characters and Horizontal Rules – Lists – Tables – Forms – Internal Linking – meta Elements – Form input Types – input and datalist Elements – Page-Structure Elements.

List of Exercise/Experiments:

1. Create web pages using the following:

- Tables and Lists
- Image map
- Forms and Form elements
- Frames

UNIT III CSS

9+9

Inline Styles – Embedded Style Sheets – Conflicting Styles – Linking External Style Sheets – Positioning Elements – Backgrounds – Element Dimensions – Box Model and Text Flow – Media Types and Media Queries – Drop-Down Menus – Text Shadows – Rounded Corners – Colour – Box Shadows – Linear Gradients – Radial Gradients – Multiple Background Images – Image Borders – Animations – Transitions and Transformations – Flexible Box Layout Module – Multicolumn Layout.

List of Exercise/Experiments:

1. Apply Cascading style sheets for the web pages created.

UNIT IV JAVASCRIPT BASICS

9+9

Introduction to Scripting – Obtaining user input – Memory Concepts – Arithmetic – Decision Making: Equality and Relational Operators – JavaScript Control Statements – Functions – Program Modules – Programmer-defined functions – Scope rules – functions – Recursion – Arrays – Declaring and Allocating Arrays – References and Reference Parameters – Passing Arrays to Functions – Multidimensional arrays.

List of Exercise/Experiments:

1. Form Validation (Date, Email, User name, Password and Number validation) using JavaScript.

UNIT V JAVASCRIPT OBJECTS

9+9

Objects – Math, String, and Date, Boolean and Number, document Object – Using JSON to Represent objects – DOM: Objects and Collections – Event Handling.

List of Exercise/Experiments:

Implement Event Handling in the web pages.

Mini Projects-Develop any one of the following web applications (not limited to one) using above technologies.

- a. Online assessment system
- b. Ticket reservation system
- c. Online shopping
- d. Student management system
- e. Student result management system
- f. Library management
- g. Hospital management
- h. Attendance management system
- i. Examination automation system
- j. Web based chat application

TOTAL: 45+45=90 PERIODS

OUTCOMES:

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

CO1: Understand basic software engineering practices effectively.

CO2: Apply version control using Git and GitHub, and manage code repositories proficiently.

CO3: Design web applications using HTML, CSS, and JavaScript.

CO4: Analyze problems and create solutions using CSS for better web page presentation and usability.

CO5: Develop interactive web pages using JavaScript with an event-handling mechanism.

CO6: Apply the technological changes and improve skills continuously.

TEXT BOOKS:

1. Roger S. Pressman, “Software Engineering: A Practitioner,,s Approach”, McGraw Hill International Edition, Nineth Edition, 2020.
2. Scott Chacon, Ben Straub, “Pro GIT”, Apress Publisher, 3rd Edition, 2014.
Deitel and Deitel and Nieto, “Internet and World Wide Web - How to Program”, Pearson, 5th Edition, 2018.

REFERENCES:

1. Roman Pichler, “Agile Product Management with Scrum Creating Products that Customers Love”, Pearson Education, 1 st Edition, 2010.
2. Jeffrey C and Jackson, “Web Technologies A Computer Science Perspective”, Pearson Education, 2011.
3. Stephen Wynkoop and John Burke, “Running a Perfect Website”, QUE, 2nd Edition, 1999.
4. Chris Bates, “Web Programming – Building Intranet Applications”, 3rd Edition, Wiley Publications, 2009.
5. Gopalan N.P. and Akilandeswari J., “Web Technology”, Second Edition, Prentice Hall of India, 2014.
6. https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_013382690411003904735_shared/overview
7. https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_0130944214274703362099_shared/overview

LIST OF EQUIPMENTS:

1. Systems with either Netbeans or Eclipse
2. Java/JSP/ISP Webserver/Apache
3. Tomcat / MySQL / Dreamweaver or
4. Equivalent/ Eclipse, WAMP/XAMP

Course Code	ENGINEERING CHEMISTRY (Theory Course with Laboratory Component)	L	T	P	C
24CH101		3	0	2	4

OBJECTIVES:

The course will enable the learners

- To gain a comprehensive knowledge on polymers utilized in various industrial sectors.
- To acquire knowledge on the fundamental principles of energy storage devices.
- To gain insights into the basic concepts and applications of chemical sensors and cheminformatics.
- To identify the different types of smart materials and explore their applications in Engineering and Technology.
- To assimilate the preparation, properties and applications of nanomaterials in various fields.

UNIT I INDUSTRIAL POLYMERS

15

Polymers: Terminology – functionality, degree of polymerization, properties – glass transition temperature and molecular weight (weight average method).

Engineering plastics: preparation, properties and application of Polyethylene, Teflon, Polyethylene terephthalate and Epoxy resin- industrial applications of Polyethylene and Polyethylene terephthalate in packaging.

Special polymers: preparation, properties and applications of piezoelectric polymer - Polyvinylidene fluoride, electroactive polymer-Polyacetylene and biodegradable polymer - Polylactic acid .

(Theory-9)

1. Determination of the molecular weight of polymer using viscometer.
2. Determination of degradation of biodegradable polymer using photoreactor.
3. Demonstrate the applications of biodegradable plastic using 3D printing.

(Laboratory-6)

UNIT II ENERGY STORAGE DEVICES AND GREEN FUEL

15

Introduction to Electrochemical cell and its terminology - electrochemical series and its applications.

Batteries: classification - construction and working principle -primary alkaline battery - secondary battery - Pb-acid battery.

Green fuel – Hydrogen - production (Photo electrocatalytic and photo catalytic water splitting), construction, working principle and applications in H₂ -O₂ fuel cells.

Batteries used in E- vehicle: Ni-metal hydride battery, Li-ion Battery - recycling of Li-ion batteries by direct cycling method; environmental effects of different energy storage devices.

(Theory-9)

1. Construction of electrochemical cell.
2. Determination of discharging state of Pb-acid battery by estimating the strength of the acid correlates with specific gravity.
3. Study of performance of a battery using battery analyzing module.

(Laboratory-6)

UNIT III CHEMICAL SENSORS AND CHEMINFORMATICS

15

Introduction: classification of chemical sensors -principle, construction and working of chemical sensors; pH sensor – Glass electrode; Breath analyzer; Industrial sensor – CO₂ sensors- Sensor for health care – Glucose sensor.

Cheminformatics: definition, scope, and significance; applications in the environmental sector – carbon footprint measurements, data analysis and interpretation.

(Theory-9)

1. Determination of the amount of given hydrochloric acid using a pH meter.
2. Calculate the carbon footprint from the provided dataset, analyze the results and draw conclusions.

(Laboratory-6)

UNIT IV SMART MATERIALS

15

Shape Memory Alloys: introduction - shape memory effect – functional properties of SMAs – types of SMA - Nitinol (Ni-Ti) alloys and its applications.

Chromogenic materials: introduction – types, applications in chemical and biological detection, display technologies, smart windows and light- modulating devices, biomedical and healthcare.

Smart Hydrogels: Introduction - Super Absorbent Polymers (SAP) - preparation, properties and applications of polyacrylic acid and sodium polyacrylate

(Theory-9)

1. Demonstrate the shape memory effect using Nitinol wire.
2. Determination of pH sensitivity of bromothymol blue.
3. Determination of absorption efficiency of hydrogel by using kinetic study.

(Laboratory-6)

UNIT V NANO CHEMISTRY

15

Introduction – synthesis – top-down process (laser ablation, chemical vapor deposition), bottom-up process (precipitation, electrochemical deposition) - properties of nanomaterials – types –

nanotubes -carbon nanotubes, applications of CNT - nanocomposites – general applications of nanomaterials in electronics, information technology, medical and healthcare, energy, environmental remediation, construction and transportation industries.

(Theory-9)

1. Preparation of nano BaSO₄ by precipitation method.
2. Demonstrate the efficiency of nano adsorbents in polluted water.

(Laboratory-6)

TOTAL: 75 PERIODS

COURSE OUTCOMES:

Upon completion of the course, the students will be able

CO1: To examine the role of polymers in different industrial sectors.

CO2: To identify the suitability of batteries for various fields.

CO3: To apply the fundamental principles of chemical sensors, cheminformatics and their applications across various industries.

CO4: To analyze the types of smart materials used in various engineering fields.

CO5: To explore the applications of nanomaterials in various fields, considering their advantages and limitations.

CO6: To integrate the concepts of chemistry for various engineering applications.

TEXTBOOKS:

1. P. C. Jain and Monika Jain, “Engineering Chemistry”, Dhanpat Rai Publishing Company Pvt. Ltd., New Delhi, 19th Edition, 2024.
2. Sivasankar B., “Engineering Chemistry”, Tata McGraw-Hill Publishing Company Ltd., New Delhi, 2nd reprint, 2012.

REFERENCES:

1. S.S. Dara and S.S. Umare, “A Textbook of Engineering Chemistry, S. Chand & company, New Delhi, 12th Edition, 2022.
2. V.R. Gowarikar, Polymer Science, New Age International Publishers, 4th edition, 2021.
3. J. C. Kuriacose and J. Rajaram, “Chemistry in Engineering and Technology”, Volume -1 & Volume -2, Tata McGraw-Hill Education Pvt. Ltd., 2010.
4. Barry A. Bunin, Brian Siesel, and J. Bajorath, “Chemoinformatics: Theory, Practice, & Products”, Springer, First Edition, 2007.
5. Geoffrey A. Ozin, Andre C. Arsenault and Ludovico Cademartiri, “Nanochemistry: A Chemical Approach to Nanomaterials”, RSC publishers, 2nd Edition, 2015.

6. J. Mendham, R. C. Denney, J. D. Barnes, M. J. K. Thomas and B. Sivasankar, “Vogel’s Quantitative Chemical Analysis”, Pearson Education Pvt. Ltd., 6th edition, 2019.
7. NPTEL course on “Polymers: concepts, properties, uses and sustainability”
Prof. Abhijit P Deshpande, IIT-Madras,
https://onlinecourses.nptel.ac.in/noc20_ch41/preview
8. NPTEL course on “Electrochemical Energy Storage”
Prof. Subhasish Basu Majumder, IIT Kharagpur,
https://onlinecourses.nptel.ac.in/noc21_mm34/preview
9. NPTEL course on “Nanotechnology, Science and Applications”
Prof. Prathap Haridoss, IIT-Madras,
https://onlinecourses.nptel.ac.in/noc22_mm33/preview

LIST OF EQUIPMENTS FOR A BATCH OF 30 STUDENTS

S. No.	Description of Equipment	Quantity
1.	Conductivity meter	12 Nos.
2.	pH meter	12 Nos.
3.	UV-Visible Spectrophotometer	2 Nos.
4.	Potentiometer	12 Nos.
5.	CAN Enabled BMS unit	4 Nos.
6.	Photoreactor	2 Nos.

Course Code	DIGITAL PRINCIPLES AND SYSTEM DESIGN (Theory Course with Laboratory Component)	L	T	P	C
24EC102		3	0	2	4

OBJECTIVES:

The Course will enable learners to:

- acquire the knowledge in Digital fundamentals and its simplification methods.
- familiarize the design of various combinational digital circuits using logic gates.
- realize various sequential circuits using flip flops.
- elucidate various semiconductor memories and related technology.
- build various logic functions using Programmable Logic Devices

UNIT I BOOLEAN ALGEBRA AND LOGIC GATES

9

Review of number systems-representation-conversions, Review of Boolean algebra theorems, sum of product and product of sum simplification, canonical forms, min term and max term, Simplification of Boolean expressions-Karnaugh map, Implementation of Boolean expressions using logic gates and universal gates.

List of Exercise/Experiments:

1. Implementation of Boolean expression using logic gates.

UNIT II COMBINATIONAL LOGIC CIRCUITS

9

Design of combinational circuits - Half and Full Adders, Half and Full Subtractors, Binary Parallel Adder – Carry look ahead Adder, Magnitude Comparator, Decoder, Encoder, Priority Encoder, Mux/De-mux, Parity Generator/Checker

List of Exercise/Experiments:

2. Design of adders
3. Design of subtractors.
4. Design of binary adder using IC7483
5. Design of Multiplexers & Demultiplexers.
6. Design of Encoders and Decoders.
7. Implementation of a boolean function using a multiplexer

UNIT III SEQUENTIAL CIRCUITS

9

Flip flops – SR, JK, T, D, Master/Slave FF – operation and excitation tables, Asynchronous and Synchronous Counters Design - Shift registers, Universal Shift Register

List of Exercise/Experiments:

8. Design and implementation of 3 bit ripple counters.
9. Design and implementation of 3 bit synchronous counter
10. Design and implementation of shift registers

UNIT IV SYNCHRONOUS SEQUENTIAL CIRCUITS DESIGN

9

Design of clocked sequential circuits - Moore/Mealy models, state minimization, state assignment, circuit implementation

UNIT V MEMORY AND PROGRAMMABLE LOGIC DEVICES 9

Basic memory structure ROM: PROM – EPROM – EEPROM –RAM – Static and dynamic RAM – Programmable Logic Devices: Programmable Logic Array (PLA) – Programmable Array Logic (PAL) – Implementation of combinational logic circuits using PLA, PAL.

TOTAL: 45 PERIODS (THEORY) + 30 PERIODS (LAB) = 75 PERIODS

COURSE OUTCOMES:

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

- CO1: Apply Boolean algebra to simplify and implement digital circuits.
- CO2: Design combinational circuits to meet specific functional requirements using logic gates.
- CO3: Demonstrate the operation of counters and shift registers using flip-flops in sequential circuits.
- CO4: Analyze synchronous sequential circuits to determine their behavior and performance characteristics.
- CO5: Evaluate various types of memory devices, discussing their roles and functionalities in digital systems.
- CO6: Construct combinational circuits using Programmable Logic Devices (PLDs) to solve complex digital design problems.

TEXTBOOKS:

1. M. Morris Mano and Michael D. Ciletti, Digital Design, With an Introduction to the Verilog HDL, VHDL, and System Verilog, 6th Edition, Pearson, 2018.
2. S.Salivahanan and S.Arivazhagan, Digital Circuits and Design, 5th Edition, Oxford University Press, 2018.

REFERENCES:

1. A.Anandkumar, Fundamental of digital circuits, 4th Edition, PHI Publication, 2016.
2. William Kleitz, Digital Electronics-A Practical approach to VHDL, Prentice Hall International Inc, 2012.
3. Charles H. Roth, Jr. and Larry L. Kinney, Fundamentals of Logic Design, 7th Edition, Thomson Learning, 2014.
4. Thomas L. Floyd, Digital Fundamentals, 11th Edition, Pearson Education Inc, 2017. John.M Yarbrough, Digital Logic: Applications and Design, 1st Edition, Cengage India, 2006

NPTEL LINK:

<https://nptel.ac.in/courses/108105132>

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

IC Trainer Kit -15 Nos

ICs each - 30 Nos (7400/ 7404 / 7486 / 7408 / 7432 / 7483 / 7473 / 7411/7474)

Course Code	STUDENT INDUCTION PROGRAM (SIP)	L	T	P	C
24MC101		3 Weeks			

OBJECTIVES

The course will enable the learners to:

- Facilitate the adjustment of new students to the new environment, ensuring they feel comfortable and supported.
- Inculcate the institution's ethos and culture in new students, helping them internalize these values.
- Encourage the building of bonds among students and between students and faculty members.
- Expose students to a sense of larger purpose and guide them in their journey of self-exploration.

The various modules or core areas recommended for the 3-week SIP are

Module 1: Universal Human Values I **18**

Welcome and Introductions - Aspirations and Concerns - Self- Management - Health - Relationships - Society - Natural Environment - Sum Up - Self-evaluation and Closure.

Module 2: Physical Health and Related Activities **6**

Special Lecturers: Happy and Healthy lifestyle - Physical Health -Mental Health - Health and Fitness.

Module 3: Familiarization of Department/ Branch and Innovation **8**

Principal Address - Address by Head of Science and Humanities - Addresses by Respective Department HoDs – Campus Tour – CoE introduction – Introduction of Student Activity Cell (SAC).

Module 4: Visit to a Local Area **4**

Virtual tour: Government Museum - Theosophical Society - Fort St. George - Ripon Building - Kalakshetra Foundation - Anna Centenary Library - Marina Beach - St. Thomas Mount - Vivekananda House.

Module 5: Lectures by Eminent People **10**

Special Lecturers: Academics – industry – Careers – Art - Self-management.

Module 6: Proficiency Modules **30**

Basic Competencies: C Programming, Foundation in Mathematics, Interpersonal Communication.

Module 7: Literature / Literary Activities **7**

Literary Debate - Creative Writing Workshop - Literature Circle Discussions - Author Study and Presentation.

Module 8: Creative Practices **10**

Activity: Handicrafts (Painting / Drawing / Pottery / Knitting / Jewellery making, etc.)

Module 9: Extra Curricular Activities **10**

Students Activity Cell: Activities from Coding Club – Math Club -- Language Club - Astronomy Club - ECO Club - Photography Club - Tedx Club - Yoga Club.

Valedictory and Closing Ceremony **2**

TOTAL: 105 PERIODS

COURSE OUTCOMES

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

- Achieve a smooth transition where students feel comfortable and confident in their new environment.
- Demonstrate a strong understanding and practice of the institution's ethos and culture within the campus community.
- Build meaningful and supportive relationships with peers and faculty members.
- Develop a clear sense of purpose and engage in self-exploration, leading to a deeper understanding of personal goals and aspirations.

REFERENCE:

<https://www.aicte-india.org/sites/default/files/Detailed%20Guide%20on%20Student%20Induction%20program.pdf>

Course Code	INTERPERSONAL SKILLS, PSYCHOMETRIC ANALYSIS AND CAREER DEVELOPMENT	L	T	P	C
24HS111		1	0	0	1

OBJECTIVES

The course will enable the learners to:

- Evaluate and enhance language proficiency by using SMART Vox to assess communication skills and linguistic abilities.
- Explore future technologies, solve real-time problems, and prepare students for campus recruitment.
- Assess and develop work style, cognitive abilities, emotional intelligence, and work competencies
- Explore placements, internships, higher education options, GATE and CAT exams, and career development.
- Understand career milestones, assess personal skills and personality, and develop effective goal-setting strategies for successful career planning

UNIT I LANGUAGE PROFICIENCY EVALUATION

3

Identification of Strengths and Weaknesses - Assessing Language Skills (Diagnostic tests and interactive exercises) - Measuring Language Competence (Proficiency Levels) - Identifying Support Needs - Developing Individual Learning Plans - Enhancing Student Experience (Building Confidence) – Evaluation using SMART Vox

UNIT II CAREER GUIDANCE

3

Future of Engineering- Various aspects of Technology and its Applications - Future of Technologies – Branch Specific emerging technologies - Problems solving through open source - Campus recruitment process.

UNIT III PSYCHOMETRIC EVALUATION

3

Understanding Behavioural work style (Personality)- Testing of numerical, logical, and verbal reasoning skills (Cognitive Abilities / Aptitude) – Measure of emotional intelligence and interpersonal skills – Determination of Culture Preferences in various workplace scenarios – Evaluation of Work Competencies through targeted games and simulations

UNIT IV CAREER PREPARATION

3

Present Scenario of Engineering - Placement Opportunities - Internship Opportunities - Types of Internships- Higher Education opportunities in India and Abroad - Understanding GATE and CAT Exams - Other Opportunities - Career path development plans.

UNIT V CAREER VISION AND PLANNING

3

Introduction to career milestones - Overview of the Vision Assessment and its benefits -
Psychometric evaluation - Numeracy, Literacy, Visual Reasoning, Algorithmic Thinking -
Introduction to a goal-setting model - Identification career pathways aligned with personality profiles
- Evaluate personal skills and abilities in various areas.

COURSE OUTCOMES

TOTAL: 15 PERIODS

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

- CO1:** Assess and improve their English language proficiency using SMART Vox, gaining insights into their communication skills and linguistic competence
- CO2:** Understand future engineering trends, emerging technologies, importance of solving real-time problems, and the process of campus recruitment.
- CO3:** Evaluate their behavioral work style, cognitive abilities, emotional intelligence, cultural preferences, and work competencies.
- CO4:** Understand the current engineering landscape, placement opportunities, and higher education prospects to develop effective career path plans
- CO5:** Develop a clear and actionable vision for their future career path.

Course Code	IDEA LAB – I	L	T	P	C
24GE111		0	0	1	0

The students may be grouped into 3 to 4. The device/Machine/system/component are studied by the students and a final presentation to be done by the students about the study of various devices or machinery at the end of the semester.

OBJECTIVES:

Students completing this course are expected to

- Understand the functionalities and limitation of various machines/equipment
- Demonstrate various operations that can be performed using various machines

LIST OF EXPERIMENTS

1. Study of fundamental operations of 3D Printer and Scanner with Software.
2. Study of Laser cutting machine.
3. Study of CNC Router machine.
4. Study of Fundamentals of basic circuit design, Soldering and Desoldering.
5. Study of PCB Milling Machine.

OTAL: 15 PERIODS

OUTCOMES

After successful completion of the course the students will be able to

- CO1 Describe the working of the 3D Printer.
- CO2 Explain the operation of the CNC router and laser cutting machines.
- CO3 Explain the basic parts and PCB fabrication process.
- CO4 Develop the ability to handle delicate electronic components carefully, minimizing damage during the soldering process.
- CO5 Describe the process for converting ideas into prototypes.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

S.No	Equipment Name	Quantity
1	CNC Router	1 No
2	3D Printer	1 No
3	3D Scanner	1 No
4	Laser cutting Machine	1 No
5	Multimeter	5 Nos
6	Solder Stations	5 Sets
7	Desoldering Machine	1 No
8	PCB Milling Machine	1 No
9	Variable Power Supply	1 No
10	Electronic Components like Resistors, Transistors, Diode, Inductor, Capacitor, etc.	5 Sets

Course Code	TAMILS AND TECHNOLOGY	L	T	P	C
24GE201		1	0	0	1

OBJECTIVES:

The course will enable the learners to:

- recognize the historical significance of weaving and pottery technologies in ancient Tamil civilization.
- highlight the concepts of design and construction technology during the Sangam age.
- provide an overview of manufacturing technology and its role in Tamil society.
- illustrate the agricultural and irrigation techniques employed in ancient Tamil society.
- promote scientific Tamil and Tamil computing.

UNIT I WEAVING AND CERAMIC TECHNOLOGY 3

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

UNIT II DESIGN AND CONSTRUCTION TECHNOLOGY 3

Designing and Structural construction House & Designs in household materials during Sangam Age - Building materials and Hero stones of Sangam age – Details of Stage Constructions in Silappathikaram - Sculptures and Temples of Mamallapuram – Great Temples of Cholas and other worship places - Temples of Nayaka Period - Type study (Madurai Meenakshi Temple)-Thirumalai Nayakar Mahal - Chetti Nadu Houses, Indo - Saracenic architecture at Madras during British Period.

UNIT III MANUFACTURING TECHNOLOGY 3

Art of Ship Building - Metallurgical studies - Iron industry - Iron smelting, steel -Copper and gold-Coins as source of history - Minting of Coins – Beads making-industries Stone beads - Glass beads - Terracotta beads -Shell beads/ bone beads - Archeological evidences - Gem stone types described in Silappathikaram.

UNIT IV AGRICULTURE AND IRRIGATION TECHNOLOGY 3

Dam, Tank, ponds, Sluice, Significance of Kumizhi Thoompu of Chola Period, Animal Husbandry - Wells designed for cattle use - Agriculture and Agro Processing - Knowledge of Sea - Fisheries – Pearl - Conche diving - Ancient Knowledge of Ocean - Knowledge Specific Society.

UNIT V SCIENTIFIC TAMIL & TAMIL COMPUTING 3

Development of Scientific Tamil - Tamil computing – Digitalization of Tamil Books – Development of Tamil Software – Tamil Virtual Academy – Tamil Digital Library – Online Tamil Dictionaries – Sorkuvai Project.

TOTAL: 15 PERIODS

COURSE OUTCOMES:

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

CO1: identify the role of weaving and ceramic technology in ancient Tamil Culture.

CO2: assess the design and construction technology ideas in the current Tamil society.

CO3: identify the different types of manufacturing technology used in Tamil society and their significance.

CO4: classify agricultural and irrigation technologies in ancient Tamil society and its current relevance.

CO5: discuss the fundamentals of scientific Tamil and Tamil computing.

REFERENCE BOOKS

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

Course Code	LINEAR ALGEBRA AND APPLICATIONS (Theory Course with Laboratory Component)	L	T	P	C
24MA201		3	0	2	4

OBJECTIVES:

The course will enable the learners to:

- comprehend the fundamental concepts of matrices.
- illustrate the basic notions associated with vector spaces and its properties.
- utilize the Gram-Schmidt ortho normalization process.
- understand the components and implications for vector spaces by rank-nullity dimension theorem.
- calculate the eigenvalues and eigenvectors of linear transformations.

UNIT I MATRICES AND SYSTEM OF LINEAR EQUATIONS 15

Matrices – Row echelon form – Rank of a matrix – System of linear equations – Consistency – Gauss elimination method – Gauss Jordan method.

Experiments using C language:

1. Solve the system of equations using Gauss Elimination method.
2. Solve the system of equations using Gauss Jordan method.

UNIT II VECTOR SPACES 15

Real and Complex fields – Vector spaces over Real and Complex fields – Subspace – Linear space – Linear independence and dependence (Statement only) – Bases and dimensions.

Experiments using C language:

1. Check whether the given vectors are linearly independent or not.
2. Find the basis and dimension for given vectors.

UNIT III INNER PRODUCT SPACES 15

Inner product space and norms – Properties – Orthogonal, Orthonormal vectors – Gram- Schmidt ortho normalization process – Least squares approximation.

Experiments using C language:

1. Find the orthogonal vectors using inner product.
2. Find the orthonormal vectors using inner product.

UNIT IV LINEAR TRANSFORMATION 15

Linear transformation – Range and null space – Rank and nullity – Rank nullity Dimension theorem – Matrix representation of linear transformation – Eigenvalues and eigenvectors of linear transformation.

Experiments using C language:

1. Find the Rank and Nullity of a matrix.
2. Find the eigenvalues and eigenvectors of a matrix.

UNIT V EIGENVALUE PROBLEMS AND MATRIX DECOMPOSITION 15

Eigenvalue problems – Power method – Jacobi method – Singular value decomposition – QR decomposition.

Experiments using C language:

1. Solve the system of equations using Jacobi method.
2. Find QR decomposition of a matrix.

TOTAL: 75 PERIODS

COURSE OUTCOMES:**Upon completion of the course, the students will be able to:**

CO1: solve the system of linear equations using Gauss elimination and Gauss Jordan method.

CO2: analyze vector spaces to determine their bases and dimensions.

CO3: apply Gram-Schmidt process to ortho normalize sets of vectors.

CO4: apply rank nullity theorem to analyse linear transformations.

CO5: compute the eigenvalues and eigenvectors using singular value decomposition.

CO6: understand the ideas of least squares approximations and its applications.

TEXT BOOKS:

1. A.H. Friedberg, A. J. Insel, and L. Spence, “Linear Algebra”, Prentice Hall of India, 5th Edition, New Delhi, 2008.
2. Steven J. Leon, “Linear Algebra with Applications”, Pearson Educational International”, 9th Edition, United States of America, 2015.

REFERENCES:

1. G. Strang, “Linear Algebra and its applications”, Thomson (Brooks / Cole), 4th Edition, New Delhi, 2005.
2. C.F. Gerald and P.O. Wheatley, “Applied Numerical Analysis”, 7th Edition, Pearson Education, New Delhi, 2004.
3. Richard Branson, “Matrix Operations”, Schaum's outline series, 1989.
4. Bernard Kolman, R. David R. Hill, “Introductory Linear Algebra”, Pearson Educations, New Delhi, First Reprint, 2009.
5. S. Kumaresan, “Linear Algebra - A geometric approach”, Prentice Hall of India, New Delhi, Reprint, 2010.
6. NPTEL course on "Linear Algebra", by Prof. K. C. Sivakumar, IIT Madras:
<https://archive.nptel.ac.in/courses/111/106/111106051/#>

Course Code	DATA STRUCTURES (Theory Course with Laboratory Component)	L	T	P	C
24CS201		3	0	3	4.5

OBJECTIVES:

The Course will enable learners to:

- understand the concepts of List ADT.
- learn linear data structures – stacks and queues ADTs.
- understand and apply Tree data structures.
- understand and apply Graph structures.
- analyze sorting, searching and hashing algorithms.

UNIT I LINEAR DATA STRUCTURES – LIST

9+9

Algorithm analysis - running time calculations - Abstract Data Types (ADTs) – List ADT-array- based implementation – linked list implementation – singly linked lists -circularly linked lists - doubly-linked lists – applications of lists – Polynomial Manipulation – All operations (Insertion, Deletion, Merge, Traversal).

List of Exercise/Experiments:

- Array implementation of List ADTs.
- Linked list implementation of List ADTs.

UNIT II LINEAR DATA STRUCTURES – STACKS, QUEUES

9+9

Stack ADT – Stack Model - Implementations: Array and Linked list - Applications - Balancing symbols - Evaluating arithmetic expressions - Conversion of Infix to postfix expression - Queue ADT – Queue Model - Implementations: Array and Linked list - applications of queues - Priority Queues – Binary Heap – Applications of Priority Queues.

List of Exercise/Experiments:

- Array implementation of Stack and Queue ADTs.
- Linked list implementation of Stack and Queue ADTs.
- Applications of List – Polynomial manipulations
Applications of Stack – Infix to postfix conversion and expression evaluation.

UNIT III NON LINEAR DATA STRUCTURES – TREES

9+9

Tree ADT – tree traversals - Binary Tree ADT – expression trees – applications of trees – binary search tree ADT– AVL Tree.

List of Exercise/Experiments:

- Implementation of Binary Trees and operations of Binary Trees.
- Implementation of Binary Search Trees.
Implementation of Heaps using Priority Queues.

UNIT IV NON LINEAR DATA STRUCTURES – GRAPHS

9+9

Definition – Representation of Graph – Types of graph - Breadth-first traversal - Depth-first traversal – Topological Sort – Applications of graphs – BiConnectivity – Euler circuits.

List of Exercise/Experiments:

- Graph representation and Traversal algorithms.

Searching- Linear Search - Binary Search - Sorting - Bubble sort - Selection sort - Insertion sort – Hashing - Hash Functions – Separate Chaining – Open Addressing –Rehashing – Extendible Hashing.

List of Exercise/Experiments:

- Implement searching and sorting algorithms.

TOTAL: 45+45=90 PERIODS**OUTCOMES:**

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

CO1: Analyze algorithms and abstract data types (ADTs).

CO2: Evaluate fundamental data structures.

CO3: Implement linked data structures and its application.

CO4: Apply advanced tree data structures.

CO5: Understand basic graph theory concepts.

CO6: Evaluate various searching and sorting algorithms.

TEXTBOOKS:

1. Mark Allen Weiss, “Data Structures and Algorithm Analysis in C++”, 4th Edition, Pearson Education, 2014.
2. Sartaj Sahni, “Data Structures, Algorithms and Applications in C++”, Silicon paperpublications, 2004.

REFERENCES:

1. Rajesh K. Shukla, “Data Structures using C and C++”, Wiley India Publications, 2009.
2. Narasimha Karumanchi, “Data Structure and Algorithmic Thinking with Python: Data Structure and Algorithmic Puzzles”, CareerMonk Publications, 2020.
3. Jean-Paul Tremblay and Paul Sorenson, “An Introduction to Data Structures with Application”, McGraw-Hill, 2017.
4. Mark Allen Weiss, “Data Structures and Algorithm Analysis in Java”, Third Edition, Pearson Education, 2012.
5. Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed, “Fundamentals of Data Structures in C”, Second Edition, University Press, 2008.
6. Ellis Horowitz, Sartaj Sahni, Dinesh P Mehta, “Fundamentals of Data Structures in C++”, Second Edition, Silicon Press, 2007.
7. https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01350157816505139210584/overview

LIST OF EQUIPMENTS:

1. Systems with Linux/Ubuntu Operating System with gnu C++ compiler

Course Code	JAVA PROGRAMMING (Theory Course with Laboratory Component)	L	T	P	C
24CS202		3	0	3	4.5

OBJECTIVES:

The Course will enable learners to:

- explain object oriented programming concepts and fundamentals of Java
- apply the principles of packages, interfaces and exceptions
- develop a Java application with I/O streams, threads and generic programming
- build applications using strings and collections.
- apply the JDBC concepts

UNIT I JAVA FUNDAMENTALS

9+9

An Overview of Java - Data Types, Variables, and Arrays – Operators - Control Statements – Class Fundamentals – Declaring objects – Methods – Constructors – this keyword – Overloading methods - Overloading constructors - Access Control – Static – Final

List of Exercise/Experiments:

1. Develop a Java application to generate Electricity bill. You must use one super class called EB Bill and must have two sub classes namely Domestic Bill and Commercial Bill. Create a class with the following members: Consumer no., consumer name, previous month reading, current month reading, type of EB connection (i.e domestic or commercial). Compute the bill amount using the following tariff
 If the type of the EB connection is domestic, calculate the amount to be paid as follows: First 100 units - Rs. 1 per unit
 101-200 units - Rs. 2.50 per unit 201 -500 units - Rs. 4 per unit , > 501 units - Rs. 6 per unit
 If the type of the EB connection is commercial, calculate the amount to be paid as follows: First 100 units - Rs. 2 per unit , 101-200 units - Rs. 4.50 per unit 201 -500 units - Rs. 6 per unit, 501 units - Rs. 7 per unit
2. Arrays Manipulations: (Use Methods for implementing these in a Class)
 - Find kth smallest element in an unsorted array
 - Find the sub array with given sum
 - Matrix manipulations – Addition, Subtraction, Multiplication
 - Remove duplicate elements in an Array
 - Accept an integer value N and print the Nth digit in the integer sequence 1, 2, 3,4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15 and so on till infinity.
 Example: The 11th digit in the sequence 12345678910111213.... is 0.

UNIT II INHERITANCE, INTERFACES AND EXCEPTION HANDLING

9+9

Inheritance: Inheritance basics, Using super, Method Overriding, Using Abstract Classes, Using final with Inheritance - Package and Interfaces: Packages, Packages and member access, Importing Packages, Interfaces, Static Methods in an Interface – Exception Handling: Exception- Handling Fundamentals, Exception Types, Uncaught Exceptions, Using try and catch, Multiple catch Clauses, Nested try Statements, throw, throws, finally, Java's Built-in Exceptions.

List of Exercise/Experiments:

1. Develop a Java application to implement currency converter (Dollar to INR, EURO to INR, Yen to INR and vice versa), distance converter (meter to KM, miles to KM and vice versa), time converter (hours to minutes, seconds and vice versa) using packages.
2. Develop a Java application with Employee class with Emp_name, Emp_id, Address, Mail_id, Mobile_no as members. Inherit the classes, Programmer, Assistant Professor, Associate Professor and Professor from employee class. Add Basic Pay (BP) as the member of all the inherited classes with 97% of BP as DA, 10 % of BP as HRA, 12% of BP as PF, 0.1% of BP for staff club fund. Generate pay slips for the employees with their gross and net salary.
3. Design a Java interface for ADT Stack. Implement this interface using array and built-in classes. Provide necessary exception handling in both the implementations.
4. Write a Java Program to create an abstract class named Shape that contains two integers and an empty method named print Area(). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contains the methods print Area () that prints the area of the given shape and Number of sides() that prints the number of sides of the given shape.
5. Write a Java program to apply built-in and user defined exceptions.

UNIT III MULTITHREADING, I/O AND GENERIC PROGRAMMING

9+9

Multithreaded Programming: Creating a Thread, Thread Priorities, Synchronization, Interthread Communication – I/O: I/O Basics, Reading Console Input, Writing Console Output, Reading and Writing Files – Generics: Introduction, Generic class, Bounded Types, Generic Methods, Generic Interfaces, Generic Restrictions.

List of Exercise/Experiments:

1. Write a Java program to read and copy the content of one file to other by handling all file related exceptions.

UNIT IV STRING HANDLING AND COLLECTIONS

9+9

Lambda Expressions - String Handling – Collections: The Collection Interfaces, The Collection Classes – Iterator – Map - Regular Expression Processing.

List of Exercise/Experiments:

1. String Manipulation:
 - a. Reversing a set of words and count the frequency of each letter in the string.
 - b. Pattern Recognition - Find the number of patterns of form 1[0]1 where [0] represents any number of zeroes (minimum requirement is one 0) there should not be any other character except 0 in the [0] sequence in a given binary string.
 - c. Remove all the occurrences of string S2 in string S1 and print the remaining.
 - d. Find the longest repeating sequence in a string
 - e. Print the number of unique string values that can be formed by rearranging the letters in the string S.

2. Write a Java program that correctly implements producer consumer problem using the concept of inter thread communication.
3. Collections:
 - a. Write a program to perform string operations using Array List. Write functions for the following
 - i. Append - add at end
 - ii. Insert – add at particular index
 - iii. Search
 - iv. List all string starts with given letter
 - b. Find the frequency of words in a given text.

UNIT V JDBC CONNECTIVITY

9+9

JDBC – DataSource, Configurations, Connection, Connection Pools, Driver Types, ResultSet, Prepared Statement, Named Parameter, Embedded SQL (Insert, Update, Delete, Join, union etc), ResultSet Navigation, Connection Close and Clean up.

List of Exercise/Experiments:

Mini Project (using JDBC)

TOTAL: 45+45=90 PERIODS

OUTCOMES:

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

CO1: Solve core Java programming concepts.

CO2: Utilize object-oriented programming (OOP) principles.

CO3: Demonstrate competency in handling exceptions and implementing multithreading.

CO4: Develop expertise in input/output (I/O) operations and file handling.

CO5: Apply advanced Java programming concepts with generics and lambda expressions.

CO6: Implement database connectivity using JDBC.

TEXTBOOKS:

1. Herbert Schildt, “Java: The Complete Reference”, 11th Edition, McGraw Hill Education, 2019.

REFERENCES:

1. Cay S. Horstmann, Gary Cornell, “Core Java Volume – I Fundamentals”, 11th Edition, Prentice Hall, 2019.
2. Paul Deitel, Harvey Deitel, Java SE 8 for programmers, 3rd Edition, Pearson, 2015.
3. Steven Holzner, Java 2 Black book, Dream tech press, 2011.
4. Timothy Budd, Understanding Object-oriented programming with Java, Third Edition, Pearson Education, 2008.
5. https://infyspringboard.onwingspan.com/web/en/app/toc/lex_29959473947367270000_shared/overview

LIST OF EQUIPMENTS:

Java and Eclipse / NetBeans IDE or Equivalent

Course Code	PHYSICS FOR INFORMATION SCIENCE (Theory Course with Laboratory Component)	L	T	P	C
24PH201		3	0	2	4

OBJECTIVES:

The course will enable the learners to:

- understand the classical free electron theory and Fermi distribution function
- relate the theory of laser with its applications in optical fibers
- solve the Schrodinger's wave equation in one dimensional and three dimensional box
- gain the basic knowledge in quantum operators and quantum gates
- comprehend the behavior of semiconductor diodes in various electron devices and nano electronic devices

UNIT I ELECTRICAL PROPERTIES OF MATERIALS

15

Classical free electron theory - Expression for electrical conductivity and thermal conductivity - thermal conductivity of a bad conductor- Lee's disc method -Effect of temperature on Fermi function - Density of energy states and average energy of an electron at 0 K- Effective mass of electron - Concept of hole.

Semiconductors - Direct and Indirect bandgap semiconductors - Intrinsic Carrier Concentration - Bandgap Determination.

(Theory -9)

1. Determination of Thermal conductivity of a bad conductor - Lee's Disc Method
2. Bandgap determination of intrinsic semiconductor

(Laboratory- 6)

UNIT II LASER

18

Characteristics of Laser, Spatial and Temporal Coherence - Population inversion - Relation between Einstein's A and B coefficients - Components of Laser - Optical amplification (qualitative) - Semiconductor lasers: Homojunction and Heterojunction- Application: Engineering applications of lasers in data storage (qualitative), Principle of Fiber optics- Fiber optic communication system - Fiber optic sensors (pressure and displacement).

(Theory 9)

1. Determination of divergence of the laser beam
2. Determination of acceptance angle and numerical aperture of an optical fiber
3. Determination of wavelength of semiconductor laser

(Laboratory 9)

UNIT III QUANTUM THEORY

15

Introduction- Blackbody Radiation - Newton's law of cooling - Planck's quantum theory- matter waves, de-Broglie wavelength, Heisenberg's Uncertainty principle, Time independent and Time-dependent Schrödinger's wave equations, Physical significance of wave function, Particle in a one-dimensional potential box - Particle in a three-dimensional box (qualitative) - degenerate and non-degenerate energy levels- Quantum tunneling - Scanning Tunneling Microscope (STM).

(Theory -9)

1. Determination of emissivity (Newton's law of cooling)
2. Determination of Planck's constant

(Laboratory- 6)

UNIT IV BASICS OF QUANTUM COMPUTING

12

Quantum Operators: Linear vector spaces - inner product space - Hilbert space - examples Vectors and Tensors: Scalars and vectors, Dirac notations of Bra-Ket notation-Matrix representation of observables and states.

Quantum Computing: Quantum states - classical bits - quantum bits or qubits - Entanglement and superposition - multiple qubits - Bloch sphere - quantum gates - CNOT gate - Advantages of quantum computing over classical computing.

(Theory -9)

1. Truth table verification of CNOT gate through Virtual Laboratory

(Laboratory-3)

UNIT V NANOELECTRONIC DEVICES

15

Introduction to Nano materials – synthesis by sol gel method, properties - Quantum confinement - Quantum structures: Density of energy states of quantum wells, quantum wires and quantum dots - band gap of nanomaterials - Quantum dot laser- Single electron phenomena -single electron transistor - Quantum system for information processing.

(Theory -12)

1. Synthesis of Nano-powders by sol-gel method

(Laboratory- 3)

TOTAL: 75 PERIODS

COURSE OUTCOMES

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

- CO1: derive electrical and thermal conductivities using classical free electron theory
- CO2: calculate the electrical conductivity and bandgap in Intrinsic semiconductors
- CO3: associate the basic principles of working of laser and their applications in fiber optics
- CO4: calculate the energy eigen value and eigen function for a particle in a one- dimensional and three dimensional box using Schrodinger wave equations
- CO5: use quantum operators to frame equations for logic gates in Quantum computing
- CO6: relate the quantum properties of nanoscale materials with their applications

TEXTBOOKS:

1. Neil W Ashcroft and N David Mermin, Solid State Physics, Harcourt College Publishers,1976
2. M.N. Avadhanulu and P.G. Kshirsagar, A textbook of Engineering Physics, S. Chand and Company, New Delhi, 2014.
3. David J. Griffiths, Introduction to Quantum Mechanics, 2nd Edition, Pearson Prentice-Hall (2004).
4. Thomas G. Wong, Introduction to Classical and Quantum Computing, Rooted Grove (2022).

REFERENCES:

1. R. A. Serway and J.W. Jewett, Physics for Scientists and Engineers, Ninth Edition, Cengage Learning, 2014.
2. Marikani, Materials Science, PHI Learning Private Limited, Eastern Economy Edition, 2017.
3. R. Wolfson, Essential University Physics, Volume 1 and 2 with Mastering Physics, Global Edition,3rd Edition, Pearson 2017.
4. B.K. Pandey and S. Chaturvedi, Engineering Physics, Cengage Learning India, 2012.
5. Scott Aaronson, Quantum Computing Since Democritus, Cambridge University Press (2014).
6. Mermin, N. David, Making better sense of quantum mechanics. Reports on Progress in Physics 82.1 (2018): 012002.
7. Michael Nielsen, L. Isaac Chuang, Quantum Computation and Quantum Information, Cambridge University Press (2010).
8. NPTEL course on “Introduction to LASER” by Prof. M. R. Shenoy, IIT Delhi : https://onlinecourses.nptel.ac.in/noc24_ph45/preview

9. NPTEL course on “Introduction to Quantum Computing: Quantum Algorithms and Qiskit” by Prof. Prabha Mandayam, Prof. Anupama Ray, Prof. Sheshashayee Raghunathan, IIT Madras, IBM Research, IBM Systems : https://onlinecourses.nptel.ac.in/noc24_cs67/preview
10. NPTEL course on “Introduction to Semiconductor Devices” by Prof. Naresh Kumar Emani, IIT Hyderabad : https://onlinecourses.nptel.ac.in/noc24_ee99/preview
11. Physics for Computer Science and Information Technology Laboratory Manual, R.M.D. Engineering College, 2022.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

S. No.	Description of Equipment	Quantity
1.	Semiconductor Laser	6 Nos.
2.	Determination of optical fiber parameters	6 Nos.
3.	Lee’s disc apparatus	6 Nos.
4.	Bandgap determination set-up	6 Nos.
5.	Sol-gel synthesis of nano-powders	2 Nos.
6.	Planck’s constant apparatus	6 Nos.
7.	Emissivity Determination	6 Nos.

24AM202	INTRODUCTION TO ARTIFICIAL INTELLIGENCE (Common to all Branches)	L	T	P	C
		2	0	2	3
OBJECTIVES:					
The Course will enable learners to:					
<ul style="list-style-type: none"> • Understand the basics and applications of Artificial Intelligence. • Apply the basics of Python programming. • Use python libraries to solve simple problems. • Understand the different types of Machine Learning algorithms. • Solve real world problems using AI/ML. • Explore the various applications in the field of Artificial Intelligence and Machine Learning. 					
UNIT I	FOUNDATIONS OF AI AND PROBLEM SOLVING				6+6
Introduction – Types of AI – Narrow/General – Foundations – History - Intelligent Agents – Problem Solving Agents - Example Problems – Applications of AI in various industries – AI Tools – Teachable Machine – Google’s AI experiments.					
List of Exercise:					
1. Solve any classical AI problem.					
UNIT II	PYTHON PROGRAMMING FOR AI				6+6
Introduction to Python programming – Arithmetic Operators - values and types - variables, expressions, statements – Functions – Conditionals and Recursion –Iteration - Lists – Tuples – Set – Dictionary – File Manipulation.					
List of Exercises:					
1. Compute the GCD of two numbers.					
2. Operations on Tuples: a) finding repeated elements, b) slice a tuple c) reverse a tuple d) replace last value of a tuple.					
3. File Manipulations.					
UNIT III	PYTHON LIBRARIES				6+6
Introduction to Numpy - Multidimensional Ndarrays – Indexing – Properties – Constants – Data Visualization: Narray Creation – Matplotlib – Introduction to Pandas – Series – Dataframes – Visualizing the Data in Dataframes –Pandas Objects – Data Indexing and Selection –Hierarchical indexing – Combining datasets – Aggregation and Grouping – Joins- Pivot Tables - Working with time series data - Data Pre-processing.					
List of Exercises:					
1. Working with Numpy arrays – Create numpy arrays from tuples, Check array size, shape and dimensions, Change array shape – reshape into rows and column vectors, Slice arrays to create sub-arrays, Combine two arrays using concatenation.					
2. Working with Pandas data frames – Create Series and DataFrames using Pandas, Use loc and iloc to select data, Handle missing data: use isnull(), notnull(), dropna(), and fillna()).					
3. Perform the Statistics operation for the data (the sum, product, median, minimum and maximum, quantiles, arg min, arg max etc.).					
4. Apply Data Pre-processing and feature selection - Handle missing values, normalize data, and encode categorical variables on Titanic Data set.					
5. Use any data set and visualize using – Histograms, Scatter plots, Heatmaps, Time series plots.					
UNIT IV	MACHINE LEARNING				6+6
Introduction – ML Algorithms Overview – Types – Supervised – Classification – Decision Tree – Regression – Unsupervised – Clustering – K-Means – K-Nearest Neighbour – Semi-Supervised - Reinforcement Learning – Introduction to Neural Networks – Model Selection - Model Evaluation – Precision – Recall – Accuracy – Bias and variance – Overfitting and Underfitting.					

List of Exercise:		
<ol style="list-style-type: none"> 1. Train and test a decision tree or logistic regression model using Iris Dataset. 2. Build a predictive model using any Machine Learning algorithm to solve any one of the following real-world problems and evaluate the model. <ol style="list-style-type: none"> a. Sales prediction b. Predict fraudulent transactions c. Predict house prices d. Customer loan approval 		
UNIT V	CASE STUDIES	6+6
<p>Introduction to NLP – Bias in AI - Ethical consideration in AI and ML - Disease Prediction – Share Price Forecasting – Weather Forecasting – Domain Specific Case Studies.</p> <p>List of Domain Specific Case Studies:</p> <ul style="list-style-type: none"> • For CSE & allied: Sentiment analysis of product reviews using machine learning. • For ECE & allied: Smart homes using AI. • For EEE: Forecasting of Renewable energy availability during a specified period using AI. • Civil: Application of ML for crack detection on concrete structures. • Mech: Predictive Maintenance for CNC Machines Using AI and Machine Learning. <p>List of Exercise:</p> <ol style="list-style-type: none"> 1. Build a machine learning model to solve any real-world problem from your domain. 		
TOTAL: 30(L) + 30(P) = 60 PERIODS		
OUTCOMES:		
Upon completion of the course, the students will be able to:		
CO1: Elaborate the basics and applications of Artificial Intelligence.		
CO2: Apply the basics of Python programming to solve problems.		
CO3: Use python libraries to solve simple ML problems.		
CO4: Outline the different types of Machine Learning algorithms.		
CO5: Use Machine Learning Algorithms to solve real world problems.		
CO6: Outline the recent developments in the field of Artificial Intelligence.		
TEXT BOOKS:		
1. Allen B. Downey, “Think Python: How to Think Like a Computer Scientist”, 2nd edition, Updated for Python 3, Shroff/O’Reilly Publishers, 2016.		
2. Jake VanderPlas, “Python Data Science Handbook – Essential tools for working with data”, O’Reilly, 2017.		
3. Peter Norvig and Stuart Russel, Artificial Intelligence: A Modern Approach, Pearson, 4th Edition, 2020		
4. Saikat Dutt, Subramanian Chandramouli, Amit Kumar Das, “Machine Learning”, Pearson, 2019.		
REFERENCES:		
1. Vinod Chandra S S, Anand Hareendran S, Artificial Intelligence and Machine Learning, PHI Learning, 2014.		
2. Steve Abrams, “Artificial Intelligence and Machine Learning for Beginners: A simple guide to understanding and Applying AI and ML”, Independently published, May 14, 2024.		
3. Ethem Alpaydm, Introduction to Machine Learning, Second Edition, the MIT Press, Cambridge, Massachusetts, London, England.		
4. Stephen Marsland, Machine Learning - An Algorithmic Perspective, 2nd Edition, 2015, by Taylor & Francis Group, 2015.		
5. Tom M. Mitchell, Machine Learning, McGraw-Hill Science, ISBN: 0070428077		

6. Mayuri Mehta, Vasile Palade, Indranath Chatterjee, Explainable AI: Foundations, Methodologies and Applications, Springer, 2023.
7. Siddhartha Bhattacharyya, Indrajit Pan, Ashish Mani, Sourav De, Elizabeth Behrman, Susanta Chakraborti, "Quantum Machine Learning", De Gruyter Frontiers in Computational Intelligence, 2020.
8. https://teachablemachine.withgoogle.com/
9. https://experiments.withgoogle.com/
LIST OF EQUIPMENTS:
1. Systems with Anaconda, Jupyter Notebook, Python.

Course Code	IDEA LAB – II	L	T	P	C
24GE211		0	0	2	1

OBJECTIVES:

Students completing this course are expected to

- Develop hands-on experience and practical application of theoretical knowledge.
- Develop their ability to explain the process involved.

LIST OF EXERCISES:

1. Printing of a 3D part.
2. Scanning of a 3D part.
3. Design and fabrication of press fit object using laser cutting machine.
4. Design and fabrication of 3D part using CNC Router.
5. Design and fabrication of simple PCB.
6. Soldering and desoldering of given electronic circuit.

TOTAL: 30 PERIODS

OUTCOMES:

After successful completion of the course, the students will be able to

CO1 Analyze the latest manufacturing methods in advancements and technologies related to their field.

CO2 Understand the operations of a laser cutting machine and CNC Router.

CO3 Analyze the process of design and fabrication of PCB and Soldering operations

CO4 Develop technical proficiency and problem-solving abilities, making more competent and confident in their field.

CO5 Develop themselves with the skills needed to address industry-specific problems.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

S.No	Equipment Name	Quantity
1	CNC Router	1 No
2	3D Printer	1 No
3	3D Scanner	1 No
4	Laser cutting Machine	1 No
5	Multimeter	5 Nos
6	Solder Stations	5 Sets
7	Desoldering Machine	1 No
8	PCB Milling Machine	1 No
9	Variable Power Supply	1 No
10	Electronic Components like Resistors, Transistors, Diode, Inductor, Capacitor, etc.	5 Sets

Course Code	INNOVATION AND CREATIVITY SKILLS DEVELOPMENT	L	T	P	C
24HS211		1	0	0	1

OBJECTIVES:

The course will enable the learners to:

- Understand study plans, co-curricular activities, programming skills, recruitment test patterns, and hiring strategies through national qualifiers and hackathons.
- Equip students with strategies for higher education, resume enhancement, project management, and securing internships
- Understand entrepreneurship fundamentals, including key differences, global hubs, business ideas, and scalability.
- Develop essential entrepreneurial skills such as opportunity recognition, patience, risk management, communication, persistence, and leadership
- Understand life, success, self-confidence, health, scientific heritage, personal counseling, and cybercrime awareness

UNIT I STEPPING STONE – ENGINEERING CAREERS AND SKILL DEVELOPMENT 3

Study Plans and Resources - Identification of key resources and job opportunities - career prospects and academic growth through co-curricular activities - importance of programming/coding skills - Overview of test patterns and essential skills for popular campus recruiters - Comparison of IT Services, Dream, and Super Dream offers and their recruitment processes - National Qualifier Tests and their impact on hiring processes – Overview of Corporate contests and hackathons (e.g., TCS Codevita, HackerRank)

UNIT II STEPPING STONE – HIGHER EDUCATION AND CAREER DEVELOPMENT 3

Overview of higher education opportunities: GATE, GRE, GMAT, XAT, CAT, MAT - Exam formats, preparation strategies, and timelines - Resume Enhancement Strategies - Project Management - Steps to develop projects from proposal to prototype - Internship Pathways - Strategies for maximizing internship experiences for career advancement

UNIT III FUNDAMENTALS OF ENTREPRENEURSHIP: FROM IDEAS TO VENTURES 3

Introduction to Entrepreneurship – Intrapreneur vs. entrepreneur - Roles and Contributions - Global Entrepreneurship Hubs - Overview of Key Global Locations - Idea vs. Commercial Value - Transforming Ideas into Viable Business Models - Characteristics of Successful Business Ideas - Understanding Market Competition - Basics of Copyrights and Intellectual Property - Scalability in Business Ventures - Strategies for Scaling a Business

UNIT IV HUMAN SKILLS FOR ENTREPRENEURSHIP 3

Identifying and capitalizing on business opportunities - Case studies and anecdotes - Patience and Risk Management - The role of patience in entrepreneurial success and decision-making - Effective Communication - Techniques for clear and persuasive communication - Importance of communication in building and leading teams - Leadership qualities and their impact on entrepreneurial ventures - Analyzing success and failure stories

UNIT V FOUNDATIONS OF PERSONAL DEVELOPMENT AND WELL-BEING 3

Understanding Life and Success - Self-Confidence and Fear - Practical strategies for enhancing self-esteem - Adolescent Issues - Health Management - Basics of a balanced diet - Benefits of physical activity - Scientific Heritage of India - Overview of India's scientific achievements and contributions - Cyber Crime Awareness - Types and prevention strategies.

TOTAL: 15 PERIODS

COURSE OUTCOMES

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

CO1: Create study plans, value co-curricular activities, develop programming skills, and navigate for career advancement

CO2: Understand about higher education options, resume enhancement, project management, and securing internships

CO3: Learn entrepreneurship skills and strategies to develop successful business ideas.

CO4: Develop key entrepreneurial skills like opportunity recognition, risk management, and leadership through real-world examples

CO5: Explore personal development, health management, scientific heritage, and cybercrime awareness.

Course Code	ENVIRONMENTAL SCIENCE AND SUSTAINABILITY	L	T	P	C
24MC102		2	0	0	0

OBJECTIVES:

The course will enable the learners

- To gain knowledge of the environment and various natural resources.
- To identify the Scientific and Technological solutions to pollution issues and waste management.
- To understand the significance of the conservation of biodiversity.
- To recognize the needs and benefits of sustainability and its management.
- To comprehend the effects of human population on the environment.

UNIT I NATURAL RESOURCES 7

Definition, scope and importance of environment – need for public awareness. Introduction to natural resources - types - forest resources: use and over-exploitation, deforestation and its impacts, food resources: effects of modern agriculture, organic farming, renewable energy sources - solar, wind, geothermal, tidal, OTE and biomass. field activity -tree plantation

UNIT II POLLUTION AND WASTE MANAGEMENT 7

Pollution - definition –causes, effects and control measures of (a) air pollution (b) water pollution (c) soil pollution (d) noise pollution (e) nuclear hazards - nuclear accidents and holocaust - role of an individual in prevention of pollution –case studies.

Waste management- municipal solid wastes, E- waste, plastic waste.Field study – Solid waste management of the institution

UNIT III BIODIVERSITY AND ITS CONSERVATION 6

Biodiversity: types – values of biodiversity, India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity – endangered and endemic species, extinct, rare, vulnerable species of India – conservation of biodiversity: in-situ and ex-situ method.

Field study – Biodiversity of the institution

UNIT IV SUSTAINABILITY AND MANAGEMENT 5

Sustainability-concept, needs and challenges- circular economy - sustainable development goals- concept of carbon footprint, environmental impact assessment, clean development mechanism, solutions.

Field study – Alternate energy sources and its impacts

Introduction - population growth, variation among nations, population explosion, environment and human health – endemic/epidemic/pandemic – role of information technology in environment and human health.

Case Study – Pandemics of 21st century

TOTAL: 30 PERIODS

COURSE OUTCOMES:

Upon completion of the course, the students will be able

CO1: To investigate and use conservational practices to protect natural resources.

CO2: To identify the causes of pollutants and illustrate suitable methods for pollution abatement.

CO3: To analyze the values of biodiversity and its conservational methods.

CO4: To classify suitable sustainable development practices and apply it in day-to-day life.

CO5: To assess the impacts of human population and suggest suitable solutions.

CO6: To develop innovative solutions and strategies to address sustainability challenges.

TEXTBOOKS:

1. Anubha Kaushik and C.P. Kaushik, “Perspectives in environmental studies”, New Age International Publishers, 8th edition, 2024.
2. Benny Joseph, Environmental Science and Engineering, McGraw-Hill, 1st edition, 2017.
3. Gilbert M. Masters, Introduction to Environmental Engineering and Science, Pearson Education, 3rd edition, 2014.
4. Erach Bharuch, Textbook of Environmental Studies for Undergraduate Courses, Universities Press(I) Pvt. Ltd., 3rd edition, 2021.

REFERENCES:

1. William P. Cunningham and Mary Ann Cunningham Environmental Science: A Global Concern, McGraw Hill, 14th edition, 2017.
2. Rajagopalan, R, Environmental Studies-From Crisis to Cure, Oxford University Press, 2015.
3. G. Tyler Miller and Scott E. Spoolman, —Environmental Science, Cengage Learning India Pvt, Ltd., Delhi, 2014.
4. Allen, D. T. and Shonnard, D. R., Sustainability Engineering: Concepts, Design and Case Studies, Prentice Hall, 2012.
5. Bradley. A.S; Adebayo, A.O. and Maria, P. Engineering applications in sustainable design and development, Cengage learning, 2015.
6. Environment Impact Assessment Guidelines, Notification of Government of India, 2006 and subsequent amendments, 2022.

Course Code	YOGA FOR STRESS MANAGEMENT	L	T	P	C
24AC201		0	0	1	0

OBJECTIVES:

The course will enable the learners to:

- Understanding the different types of stress and managing stress.
- Develop an understanding of practicing yoga
- Learning to do asanas, including sitting, standing and lying postures

Unit I: Stress Management 3

Definition of Stress - Stress in Daily Life - Impact of Stress on Life - Identifying the Causes of Stress - Symptoms of Stress - Managing Stress (Habits, Tools, Training, Professional Help) - Complications of Stress Mismanagement - The Importance of Sleep for Mental Wellness - Connection Between Sleep and Digestion.

Unit II: Introduction to Yoga 3

Meaning and Definition of Yoga - Aims and Objectives of Yoga - Guidelines for Practicing Asanas - Benefits of Yoga

Unit III: Different Asanas 3

Methods of Performing Asanas - Pranayama - Suryanamaskar Asanas - Sitting Postures: Uttanpadasana, Paschimottanasana ,Janu Sirsasana , Baddha Konasana - Shishupal Asana - Vajrasana

Unit IV: Standing Postures 3

Uttanasana -Trikonasana -Vrikshasana -Tadasana - Superbrain asana

Unit 5: Lying Postures 3

Pavana Muktasana - Pada Sanchalanasana – Jhulana Lurhakanasana -Dhanurasana – Marjaryasana. BitilasanaDictionaries – Sorkuvai Project.

TOTAL: 15 PERIODS

COURSE OUTCOMES:

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

- CO1: relieve stress and achieve mental wellness.
- CO2: experience the benefits of yoga
- CO3: keep self and body healthy

REFERENCE BOOK:

1. Iyengar, Bellur Krishnamukar Sundara. "Light on yoga." (1965).
2. Desikachar, Tirumalai Krishnamacharya Venkata. The heart of yoga: Developing a personal practice. Simon and Schuster, 1999.
3. Davis, Martha, Elizabeth Robbins Eshelman, and Matthew McKay. The relaxation and stress reduction workbook. New Harbinger Publications, 2008.
4. Krishnamacharya, Tirumalai, et al. "Yoga makaranda: The nectar of yoga." Swathi Soft (2013).