R.M.D. ENGINEERING COLLEGE
RSM Nagar, Kavaraipettai – 601206, Gummidipoondi (T.K), Thiruvallur (D.T), TamilNadu
(An Autonomous Institution)
Approved by AICTE, New Delhi/ Affiliated to Anna University, Chennai
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Curriculum 2024

Bachelor of Engineering

Electronics & Communication Engineering (2025-2029 Batch)

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REGULATIONS-2024

CHOICE BASED CREDIT SYSTEM

Mapping of Programme Educational Objectives with Department Mission

Mission	PEO1	PEO2	PEO3	PEO4	PEO5
To provide the needed resources and infrastructure and to establish a Conducive Ambience for the Teaching-Learning and Research Processes and to meet with the technological developments.	3	2	2	1	2
To create High Quality Professionals and Entrepreneurs in the field of Electronics and Communication Engineering with the right attitude to serve the society with ethical values.	2	3	2	2	2
To Modernize the Laboratories on par with industry standards and to collaborate with them to improve the skill set of the students for providing Innovative Solutions to the Industry.	1	2	2	1	1
To provide a good ambience which encourages the students to Pursue Higher Education.	2	1	3	3	3

Contribution 1: Reasonable 2: Significant 3: Strong

PROGRAMME EDUCATIONAL OBJECTIVES

PEO1: Graduates will develop the ability to Identify, Formulate and Solve Challenging Problems in the field of Electronics and Communication Engineering.

PEO2: Graduates will acquire the Professional Skills that make them ready for Immediate Employment or to Pursue Higher Studies in the related disciplines.

PEO3: Graduates will be moulded with a Strong Educational Foundation that prepares them for Leadership Roles.

PEO4: Graduates will show the understanding of Impact of Engineering Solutions in the Society and also will be aware of Contemporary Issues.

PEO5: Graduates will develop Confidence to Communicate their Ideas effectively to Industry and Society.

PROGRAMME OUTCOMES

Engineering Graduates will be able to:

a) **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.

b) **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.

c) **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.

d) **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.

e) **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations**.**

f) **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.

g) **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, demonstrate the knowledge of, and need for sustainable development.

h) **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice**.**

i) **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings

j) **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.

k) **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.

l) **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change.

PROGRAM SPECIFIC OBJECTIVES (PSOs)

1. Apply the principles of Semiconductor Devices, Digital Systems, Microprocessor and Signal Processing in the fields of Consumer Electronics, Medical, Defense and Spacecraft Electronics industry.
2. Design a variety of Computer-based Components and Systems for applications including Communications, Networking and Control Systems.
3. Develop Indigenous Components and methods for producing High Quality, Compact, Energy Efficient and Eco-Friendly consumer goods at an affordable price.
4. Apply acquired knowledge in information and communication technologies to the benefit of society.

MAPPING OF PROGRAMME EDUCATIONAL OBJECTIVES WITH PROGRAMME OUTCOMES

A broad relation between the Programme Educational Objectives and the Programme Outcomes is given in the following table

PROGRAMME EDUCATIONAL OBJECTIVES	PROGRAMME OUTCOMES											
	a	b	c	d	e	f	g	h	i	j	k	l
1	3	3	3	3	3	3	2	3	3	3	3	3
2	3	3	3	3	2	2	2	3	3	3	3	3
3	3	3	3	2	2	2	2	3	2	3	2	2
4	2	2	2	2	2	2	3	3	3	2	3	2
5	3	3	3	3	3	2	3	2	2	3	2	3

MAPPING OF PROGRAM SPECIFIC OBJECTIVES WITH PROGRAMME OUTCOMES

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

PROGRAM SPECIFIC OBJECTIVES	PROGRAMME OUTCOMES											
	a	b	c	d	e	f	g	h	i	j	k	l
1	3	3	3	3	3	2	2	2	2	2	3	3
2	3	3	3	3	3	1	1	1	2	2	1	2
3	3	3	3	3	1	2	2	1	2	2	2	2
4	3	3	3	3	1	2	2	1	2	2	1	2

Contribution 1: Reasonable 2: Significant 3: Strong

B.E. ELECTRONICS AND COMMUNICATION ENGINEERING REGULATIONS-2024
CHOICE BASED CREDIT SYSTEM
MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES:

A broad relation between the Course Outcomes and Programme Outcomes is given in the table

COURSE COUTCOMES		PROGRAMME OUTCOMES											
Sem	COURSE NAME	a	b	c	d	e	f	g	h	i	j	k	l
I	Programming in C++ (Lab Integrated)	✓	✓	✓					✓	✓	✓		✓
	Software Development Practices (Lab Integrated)	✓	✓	✓		✓	✓		✓	✓	✓		✓
	Physics for Electrical and Electronics Engineering (Lab Integrated)	✓	✓	✓	✓							✓	✓
	Electronic Devices and Circuit theory (Lab Integrated)	✓	✓	✓	✓	✓	✓					✓	✓
	Heritage of Tamils	✓								✓	✓		✓
	Matrices and Calculus	✓	✓	✓	✓	✓	✓	✓					✓
	Students Induction Program (Non Credit)						✓	✓	✓	✓	✓	✓	
	Interpersonal skills, Psychometric Analysis and Career Development						✓	✓	✓	✓	✓	✓	
	Environmental Science & Sustainability (Non Credit)	✓	✓	✓	✓	✓						✓	✓
	Idea Lab I	✓	✓	✓	✓	✓	✓	✓	✓				✓
	Programming in C (Non Credit)	✓	✓	✓					✓	✓	✓		✓
	Physical Education (Non-Credit)						✓	✓	✓	✓	✓	✓	
	NSS/YRC/UBA (Non-Credit)						✓	✓	✓	✓	✓	✓	
II	Transforms and Complex Analysis (Lab Integrated)	✓	✓	✓	✓	✓	✓						✓
	Data Structures (Lab Integrated)	✓	✓	✓		✓			✓	✓	✓		✓
	Java Programming (Lab Integrated)	✓	✓	✓		✓			✓	✓	✓		✓
	Chemistry for Electrical & Electronics Engineering (Lab Integrated)	✓	✓	✓	✓	✓						✓	✓
	Introduction to Artificial Intelligence (Lab Integrated)	✓	✓	✓					✓	✓	✓		✓
	Tamils and Technology	✓								✓	✓		✓
	Innovation and Creativity Skills Development						✓	✓	✓	✓	✓	✓	
	Idea Lab II	✓	✓	✓	✓	✓	✓	✓	✓				✓
	Yoga for Stress Management (Non Credit)							✓	✓	✓	✓	✓	✓
	Physical Education – II (Non Credit)							✓	✓	✓	✓	✓	✓
	Foreign Language (Japanese/German/others)							✓	✓	✓	✓	✓	✓

III	Universal Human Values 2: Understanding Harmony	✓	✓	✓	✓								✓
	Probability and Random Processes	✓	✓	✓	✓					✓	✓		✓
	Analog Circuits(Lab Integrated)	✓	✓	✓	✓	✓				✓	✓		✓
	Database Management Systems (Lab Integrated)	✓	✓	✓	✓	✓	✓		✓		✓		✓
	Control Systems	✓	✓	✓	✓	✓					✓		✓
	Advanced Java Programming (Lab Integrated)	✓	✓	✓	✓	✓	✓		✓		✓		✓
	Product Development Lab - 1	✓	✓	✓	✓	✓	✓	✓	✓				✓
	Aptitude and Coding Skills I	✓	✓							✓	✓		
	Internship/Seminar (1 Week)	✓	✓							✓	✓		
	Indian Constitution (Non Credit)	✓	✓	✓		✓			✓	✓	✓		✓
IV	Statistics and Linear Algebra (Lab Integrated)	✓	✓	✓	✓					✓	✓		✓
	Analog and Digital Communication(Lab Integrated)	✓	✓	✓	✓	✓	✓		✓		✓		✓
	Web Development Frameworks (Lab Integrated)	✓	✓	✓	✓	✓	✓		✓		✓		✓
	Linear Integrated Circuits(Lab Integrated)	✓	✓	✓	✓	✓	✓		✓		✓		✓
	Digital System Design(Lab Integrated)	✓	✓	✓	✓	✓				✓	✓		✓
	Product Development Lab - 2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Aptitude and Coding Skills II	✓	✓	✓	✓	✓				✓	✓		✓
	Self Learning Course	✓	✓	✓	✓	✓				✓	✓		✓
	Value Education (Non Credit)	✓	✓							✓	✓		
V	Digital VLSI Design(Lab Integrated)	✓	✓	✓	✓	✓				✓	✓		✓
	Microprocessors and Microcontrollers (Lab Integrated)	✓	✓	✓	✓	✓				✓	✓		✓
	Electromagnetics and Antennas	✓	✓	✓	✓	✓	✓						✓
	Wireless Communication	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓
	Professional Elective I												
	Professional Communication – I (TOEFL)	✓					✓			✓	✓		✓
	Advanced Aptitude and Coding Skills I	✓	✓	✓	✓	✓				✓	✓		✓
	Internship/Seminar (2 Weeks)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

	Industry Oriented Course - I	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

	Essence of Indian Traditional Knowledge (Non Credit)	✓	✓						✓	✓	✓		✓
VI	Discrete Time Signal Processing(Lab Integrated)	✓	✓	✓	✓	✓	✓		✓	✓	✓		✓
	Professional Elective III	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Computer Networks	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
	Professional Elective II												
	Open Elective I												
	Professional Communication – II	✓					✓			✓	✓		✓
	Advanced Aptitude and Coding Skills II	✓	✓	✓	✓	✓				✓	✓		✓
	Industry Oriented Advanced Certification Course	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Personality Development (Non-Credit)						✓	✓	✓	✓	✓	✓	
VII	Embedded Systems (Lab Integrated)	✓	✓	✓	✓	✓	✓			✓	✓		✓
	Professional Ethics in Engineering	✓	✓				✓	✓	✓	✓	✓		✓
	Professional Elective IV												
	Professional Elective V												
	Cognitive Radio Network												
	Internship/Seminar (4 weeks)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
VIII	Project Work	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

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B.E- ELECTRONICS AND COMMUNICATION ENGINEERING

REGULATIONS–2024

CHOICE BASED CREDIT SYSTEM

I-VIII SEMESTER CURRICULUM

(For the students admitted from the academic year 2025-26 onwards)

SEMESTER–I								
Sl. No.	**Course Code**	**Course Title**	**Category**	**Contact Periods**	**L**	**T**	**P**	**C**
THEORY COURSES								
1	24MA101	Matrices and Calculus	BSC	4	3	1	0	4
2	24GE101	Heritage of Tamils	HSMC	1	1	0	0	1
THEORY COURSES WITH LABORATORY COMPONENT								
3	24CS101	Programming in C++ (Lab Integrated)	ESC	6	3	0	3	4.5
4	24CS102	Software Development Practices (Lab Integrated)	ESC	6	3	0	3	4.5
5	24PH101	Physics for Electrical and Electronics (Lab Integrated)	BSC	5	3	0	2	4
6	24EC101	Electronic Devices and Circuit theory (Lab Integrated)	PCC	5	3	0	2	4
LABORATORY COURSE								
7	24EC111R	Idea Lab I	EEC	2	0	0	2	1
EMPLOYABILITY ENHANCEMENT COURSES								
8	24HS111	Interpersonal skills, Psychometric Analysis and Career Development	EEC	1	1	0	0	1
MANDATORY COURSES								
9	24MC101	Students Induction Program (Non Credit)	MC	**3Weeks**				
10	24MC102	Programming in C (Noncredit)	MC	40 periods				
11	24CH102R	Environmental Science & Sustainability (Non Credit)	MC	1	1	0	0	0
AUDIT COURSES								
12		Physical Education – I (Non Credit)	AC	1	0	0	1	0

13		NSS/YRC/UBA(Non Credit)	AC	**1 Week**				
TOTAL				**32**	**18**	**1**	**13**	**24**

SEMESTER–II								
Sl. No.	**Course Code**	**Course Title**	**Category**	**Contact Periods**	**L**	**T**	**P**	**C**
THEORY COURSE								
1	24GE201	Tamils and Technology	HSMC	1	1	0	0	1
THEORY COURSES WITH LABORATORY COMPONENT								
1	24MA202	Transforms and Complex Analysis (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	24CH201	Chemistry for Electrical & Electronics Engineering (Lab Integrated)	BSC	5	3	0	2	4
5	24AI202	Introduction to Artificial Intelligence(Lab Integrated)	ESC	4	2	0	2	3
LABORATORY COURSE								
6	24EC211R	Idea Lab II	EEC	4	0	0	4	2
EMPLOYABILITY ENHANCEMENT COURSES								
7	24HS211	Innovation and Creativity Skills Development	EEC	1	1	0	0	1
AUDIT COURSES								
8	24MC201	Yoga for Stress Management (Non Credit)	AC	1	0	0	1	0
9		Physical Education – II (Non Credit)	AC	1	0	0	1	0
10		Foreign Language (Japanese/German/Others)	AC	**Basic (Level1) Certification**				
TOTAL				**34**	**16**	**0**	**18**	**24**

SEMESTER–III								
Sl. No.	**Course Code**	**Course Title**	**Category**	**Contact Periods**	**L**	**T**	**P**	**C**
THEORY COURSES								
1	24MA302	Probability and Random Processes	BSC	4	3	1	0	4
2	24EC302	Control Systems	PCC	3	3	0	0	3
3	24GE301	Universal Human Values 2: Understanding Harmony	HSMC	3	2	1	0	3
THEORY COURSES WITH LABORATORY COMPONENT								
4	24EC301	Analog Circuits (Lab Integrated)	PCC	4	2	0	2	3
5	24CS302	Advanced Java Programming (Lab Integrated)	ESC	6	3	0	3	4.5
6	24CS303	Database Management Systems (Lab Integrated)	ESC	6	3	0	3	4.5
LABORATORY COURSE								
7	24EC311R	Product Development Lab - 1	EEC	2	0	0	2	1
EMPLOYABILITY ENHANCEMENT COURSES								
8	24EC311	Internship/Seminar (1 week)	EEC	1	0	0	1	0.5
9	24CS311R	Aptitude and Coding Skills -I	EEC	4	0	0	4	2
MANDATORY COURSES								
10	24MC301	Indian Constitution (Non-Credit)	MC	1	1	0	0	0
TOTAL				**34**	**17**	**2**	**15**	**25.5**

SEMESTER–IV								
Sl. No.	**Course Code**	**Course Title**	**Category**	**Contact Periods**	**L**	**T**	**P**	**C**
THEORY COURSES WITH COMPONENT								
1	24EC401	Analog and Digital Communication (Lab Integrated)	PCC	5	3	0	2	4
2	24EC402	Linear Integrated Circuits (Lab Integrated)	PCC	4	2	0	2	3
3	24EC403	Digital System Design (Lab Integrated)	PCC	5	3	0	2	4
4	24IT402	Web Development Frameworks (Lab Integrated)	ESC	6	3	0	3	4.5
5	24MA402	Statistics and Linear Algebra (Lab Integrated)	BSC	5	3	0	2	4
LABORATORY COURSE								
6	24ME411R	Product Development Lab - 2	EEC	4	0	0	4	2
EMPLOYABILITY ENHANCEMENT COURSES								
7	24CS411R	Aptitude and Coding Skills- II	EEC	4	0	0	4	2
8		Self Learning Course	EEC	**Self Learning**				1
AUDIT COURSES								
8	24AC401	Value Education (Non Credit)	AC	1	1	0	0	0
TOTAL				**34**	**15**	**0**	**19**	**24.5**
FOR HONOURS DEGREE								
1		Capstone Design Project – Level I	EEC	12	0	0	12	6
OR								
1		Honours Elective I	PEC	3	3	0	0	3
2		Honours Elective II	PEC	3	3	0	0	3
FOR MINOR DEGREE								

1		Minor Elective I	OEC	3	3	0	0	3

SEMESTER–V								
Sl. No.	**Course Code**	**Course Title**	**Category**	**Contact Periods**	**L**	**T**	**P**	**C**
THEORY COURSES								
1	24EC503	Electromagnetics and Antennas	PCC	3	3	0	0	3
2	24EC504	Wireless Communication	PCC	3	3	0	0	3
3		Professional Elective I	PEC	3	3	0	0	3
THEORY COURSES WITH LABORATORY COMPONENT								
4	24EC501	Digital VLSI Design (Lab Integrated)	PCC	5	3	0	2	4
5	24EC502	Microprocessors and Microcontrollers (Lab Integrated)	PCC	5	3	0	2	4
LABORATORY COURSE								
6		Professional Communication – I (TOEFL)	HSMC	4	0	0	4	2
EMPLOYABILITY ENHANCEMENT COURSES								
7	24ME511	Industry Oriented Course - I	EEC	2	0	0	2	1
8	24EC511	Internship / Seminar (2 Weeks)	EEC	2	0	0	2	1
9	24CS511R	Advanced Aptitude and Coding Skills I	EEC	4	0	0	4	2
MANDATORY COURSES								
10	24MC501	Essence of Indian Traditional Knowledge (Non Credit)	MC	1	1	0	0	0
TOTAL				**32**	**16**	**0**	**16**	**23**
FOR HONOURS DEGREE								
1		Capstone Design Project – Level II	EEC	12	0	0	12	6
OR								
1		Honours Elective III	PEC	3	3	0	0	3
2		Honours Elective IV	PEC	3	3	0	0	3
FOR MINOR DEGREE								
1		Minor Elective II	OEC	3	3	0	0	3

SEMESTER–VI								
Sl. No.	**Course Code**	**Course Title**	**Category**	**Contact Periods**	**L**	**T**	**P**	**C**
THEORY COURSES								
1	24EC602	Computer Networks	PCC	3	3	0	0	3
2		Professional Elective II	PEC	3	3	0	0	3
3		Open Elective I	OEC	3	3	0	0	3
THEORY COURSES WITH LABORATORY COMPONENT								
4	24EC601	Discrete Time Signal Processing (Lab Integrated)	PCC	5	3	0	2	4
5		Professional Elective III	PEC	3	3	0	0	3
LABORATORY COURSE								
6		Professional Communication – II	HSMC	2	0	0	2	1
EMPLOYABILITY ENHANCEMENT COURSES								
7	24CS611R	Advanced Aptitude and Coding Skills II	EEC	4	0	0	4	2
8	24ME611R	Industry Oriented Advanced Certification Course	EEC	4	0	0	4	2
AUDIT COURSES								
9	24AC601	Personality Development (Non Credit)	AC	2	2	0	0	0
TOTAL				**29**	**17**	**0**	**12**	**21**
FOR HONOURS DEGREE								
1		Capstone Design Project – Level III	EEC	12	0	0	12	6
OR								
1		Honours Elective V	PEC	3	3	0	0	3
2		Honours Elective VI	PEC	3	3	0	0	3
FOR MINOR DEGREE								
1		Minor Elective III	OEC	3	3	0	0	3

SEMESTER–VII								
Sl. No.	**Course Code**	**Course Title**	**Category**	**Contact Periods**	**L**	**T**	**P**	**C**
THEORY COURSES								
1	24EC702	Professional Ethics in Engineering	HSMC	3	3	0	0	3
2		Professional Elective IV	PEC	3	3	0	0	3
3		Professional Elective V	PEC	3	3	0	0	3
4		Cognitive Radio Network	PCC	3	3	0	0	3
THEORY COURSES WITH LABORATORY COMPONENT								
5	24EC701	Embedded Systems	PCC	5	3	0	2	4
EMPLOYABILITY ENHANCEMENT COURSES								
6	24EC711	Internship/Seminar (4 weeks)	EEC	4	0	0	4	2
TOTAL				**21**	**15**	**0**	**6**	**18**
FOR MINOR DEGREE								
1		Minor Elective IV	OEC	3	3	0	0	3
2		Capstone Design Project	EEC	12	0	0	12	6

SEMESTER–VIII								
Sl. No.	**Course Code**	**Course Title**	**Category**	**Contact Periods**	**L**	**T**	**P**	**C**
EMPLOYABILITY ENHANCEMENT COURSES								
1	24EC811	Project Work	EEC	16	0	0	16	8

TOTAL	**16**	**0**	**0**	**16**	**8**

CREDIT DISTRIBUTION

S. No.	Subject Area	CREDITS AS PER SEMESTER								Total Credits	Anna University
		I	II	III	IV	V	VI	VII	VIII		
1	HSMC	1	1	3	-	2	1	3	-	11	12
2	BSC	8	8	4	4	-	-	-	-	24	25
3	ESC	9	12	9	4.5	-	-	-	-	34.5	21
4	PCC	4	-	6	11	14	7	7	-	49	58
5	PEC	-	-	-	-	3	6	6	-	15	18
6	OEC	-	-	-	-	-	3	-	-	3	12
7	EEC	2	3	3.5	5	4	4	2	8	31.5	16
8	MC	-	-	-	-	-	-	-	-	-	12
TOTAL		24	24	25.5	24.5	23	21	18	8	168	162

PROFESSIONAL ELECTIVES
IOT

Sl. No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1	24EC901	Sensors and Actuator Devices	PEC	3	3	0	0	3
2	24EC902	Application of IoT in Robotics	PEC	3	3	0	0	3
3	24EC903	Data Analytics for IoT	PEC	3	3	0	0	3
4	24EC904	Image Processing and Computer Vision	PEC	3	3	0	0	3
5	24EC905	Introduction to Industry 4.O	PEC	3	3	0	0	3
6	24EC906	IoT & Edge Computing	PEC	3	3	0	0	3

PROFESSIONAL ELECTIVES VLSI								
Sl. No.	**Course Code**	**Course Title**	**Category**	**Contact Periods**	**L**	**T**	**P**	**C**
1	24EC907	FPGA Architecture and Applications	PEC	3	3	0	0	3
2	24EC908	Low Power VLSI Design	PEC	3	3	0	0	3
3	24EC909	VLSI Verification and Testing	PEC	3	3	0	0	3
4	24EC910	RTL Design & Logic Synthesis	PEC	3	3	0	0	3
5	24EC911	VLSI Signal Processing	PEC	3	3	0	0	3
6	24EC912	VLSI Physical Design Automation	PEC	3	3	0	0	3
	24EC913	ASIC Design	PEC	3	3	0	0	3
8	24EC914	CAD for VLSI Design	PEC	3	3	0	0	3

PROFESSIONAL ELECTIVES EMBEDDED								
Sl. No.	**Course Code**	**Course Title**	**Category**	**Contact Periods**	**L**	**T**	**P**	**C**
1	24EC915	Design of Embedded Systems	PEC	3	3	0	0	3
2	24EC916	Embedded RToS	PEC	3	3	0	0	3
3	24EC917	Embedded networking	PEC	3	3	0	0	3
4	24EC918	Software for Embedded Systems	PEC	3	3	0	0	3
5	24EC919	Embedded Processor Development	PEC	3	3	0	0	3
6	24EC920	Embedded System Security	PEC	3	3	0	0	3
7	24EC921	Embedded Control for Electric Drives	PEC	3	3	0	0	3

8	24EC922	Automotive Embedded Systems	PEC	3	3	0	0	3

PROFESSIONAL ELECTIVES TELECOM								
Sl. No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1	24EC923	Satellite Communication	PEC	3	3	0	0	3
2	24EC924	Optical Communication & Networking	PEC	3	3	0	0	3
3	24EC925	Introduction to 5G Technology	PEC	3	3	0	0	3
4	24EC926	Wireless Sensor Networks	PEC	3	3	0	0	3
5	24EC927	Multimedia Compression and Communication	PEC	3	3	0	0	3
6	24EC928	4G/5G Communication Networks	PEC	3	3	0	0	3

2024

CURRICULUM OF B.E (HONOURS)IN ELECTRONICS AND COMMUNICATION ENGINEERING WITH SPECIALIZATION IN

Internet of Things / VLSI / High Speed Communication / Bio Medical Technology / Signal & Image Processing / Robotics &Automation

INTERNET OF THINGS

S.NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1	24EC941	Industrial and Medical IoT	PEC	3	3	0	0	3
2	24EC942	Programming and Web Technologies for IoT	PEC	3	3	0	0	3
3	24EC943	Robotic Operating System	PEC	3	3	0	0	3
4	24EC944	Design of Smart Cities	PEC	3	3	0	0	3
5	24EC979	Capstone Project	PEC	12	0	0	12	6
6	24EC945	Introduction to internet of Thinks	PEC	3	3	0	0	3

VLSI

S.NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1	24EC947	Semiconductor Devices and Fabrication Processes	PEC	3	3	0	0	3
2	24EC948	RFIC Design	PEC	3	3	0	0	3
3	24EC949	VLSI Algorithms and Architectures	PEC	3	3	0	0	3
4	24EC952	Reconfigurable Architectures	PEC	3	3	0	0	3

5	24EC979	Capstone Project	PEC	12	0	0	12	6

HIGH SPEED COMMUNICATION

S.NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1	24EC953	Advanced Wireless Communication	PEC	3	3	0	0	3
2	24EC954	Advanced Wireless Networks	PEC	3	3	0	0	3
3	24EC955	Software-defined networks	PEC	3	3	0	0	3
4	24EC956	Satellite Communication & Navigation Systems	PEC	3	3	0	0	3
5	24EC979	Capstone Project	PEC	12	0	0	12	6

BIO MEDICAL TECHNOLOGY

S.NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1	24EC959	Biometric Systems	PEC	3	3	0	0	3
2	24EC960	Bio-signal Processing	PEC	3	3	0	0	3
3	24EC962	Medical Imaging Techniques	PEC	3	3	0	0	3
4	24EC963	Brain Computer Interface and Applications	PEC	3	3	0	0	3
5	24EC979	Capstone Project	PEC	12	0	0	12	6

SIGNAL & IMAGE PROCESSING

S.NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1	24EC965	Computer Vision	PEC	3	3	0	0	3
2	24EC966	Big Data Analytics	PEC	3	3	0	0	3
3	24EC967	Image Processing with Python	PEC	3	3	0	0	3
4	24EC970	Pattern Recognition	PEC	3	3	0	0	3
5	24EC979	Capstone Project	EEC	12	0	0	12	6

SIGNAL & IMAGE PROCESSING

S.NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1	24EC971	Concepts in Mobile Robotics	PEC	3	3	0	0	3
2	24EC972	Sensors and Actuators for Robotics	PEC	3	3	0	0	3
3	24EC973	Microcontrollers for Robotics	PEC	3	3	0	0	3
4	24EC974	Process Control Automation	PEC	3	3	0	0	3
5	24EC979	Capstone Project	EEC	12	0	0	12	6

ROBOTICS & AUTOMATION

S.NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1	24EC971	Concepts in Mobile Robotics	PEC	3	3	0	0	3
2	24EC972	Sensors and Actuators for Robotics	PEC	3	3	0	0	3
3	24EC973	Microcontrollers for Robotics	PEC	3	3	0	0	3
4	24EC974	Process Control Automation	PEC	3	3	0	0	3
5	24EC979	Capstone Project	EEC	12	0	0	12	6

R2024

B. E. (HONOURS) IN ELECTRONICS AND COMMUNICATION ENGINEERING

Additional 18 credits to be completed from the courses offered in the Professional Elective Verticals.

R2024

MINOR DEGREE CURRICULUM OFFERED BY DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING (FOR OTHER B.E. / B. TECH PROGRAMMES)

MINOR'S DEGREE IN INTERNET OF THINGS

S.NO	COURSE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1	24EC404	Introduction to Internet of Things	PEC	3	3	0	0	3
2	24EC901	Sensors and Actuator Devices	PEC	3	3	0	0	3
3	24EC977	Image and Video Analytics	PEC	3	3	0	0	3
4	24EC943	Robot Operating Systems	PEC	3	3	0	0	3
5	24EC979	Capstone Project	EEC	12	0	0	12	6

OPEN ELECTIVES (multidisciplinary)

S.NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1	24EC001	PCB Design	OEC	3	3	0	0	3
2	24EC002	Embedded Systems	OEC	3	3	0	0	3
3	24EC003	Principles of Analog and Digital Communication	OEC	3	3	0	0	3
4	24EC004	Sensors and Instrumentation	OEC	3	3	0	0	3
5	24EC005	Automotive Electronics	OEC	3	3	0	0	3
6	24EC006	Robotic Systems	OEC	3	3	0	0	3
7	24EC007	Consumer Electronics	OEC	3	3	0	0	3
8	24EC008	Healthcare Electronics	OEC	3	3	0	0	3
9	24EC009	Semiconductor Physics	OEC	3	3	0	0	3
10	24EC010	Biomedical Instrumentation	OEC	3	3	0	0	3
11	24EC011	MATLAB Programming	OEC	3	3	0	0	3
12	24EC012	Industrial IoT Applications	OEC	3	3	0	0	3

SEMESTER-I

24CS101	PROGRAMMING IN C++ (Common to All Branches)	L	T	P	C
		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

Procedural Languages vs Object Oriented Languages - 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 Class Members.
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 – Pure Virtual 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:
   a) 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.

3 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 is 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 (L) + 45 (P) = 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.
2. E Balagurusamy," Object Oriented Programming with C++", 4th Edition, Tata McGraw- Hill Education, 2008.

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", Third Edition, Thomson Course Technology, 2007.
7. Paul Deitel, Harvey Deitel, "C++ How to Program", 10th Edition, Pearson Education Inc. 2017.
8. 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.

24CS102	SOFTWARE DEVELOPMENT PRACTICES (Common to All Branches)	L	T	P	C
		3	0	3	4.5

OBJECTIVES:

The Course will enable learners to:

- To discuss the essence of agile development methods.
- To set up and create a GitHub repository.
- To create interactive websites using HTML
- To design interactive websites using CSS.
- To 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 – Cline-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**	**15**

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 (L) + 45 (P) = 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.
3. 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_013094421427470336209 9_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	PHYSICS FOR ELECTRICAL AND ELECTRONICS ENGINEERING	L	T	P	C
24PH101	Theory Course with Laboratory Component (Common to B.E.-ECE, EEE, EC(ACT) AND EE(VLSI)	3	0	2	4

OBJECTIVES:

The course will enable the learners to:

- understand the classical free electron theory and Fermi distribution function
- differentiate the types of semiconductors and derive their carrier concentration
- relate the theory of laser with its applications in optical devices.
- solve the Schrodinger's wave equation in one dimensional and three dimensional box
- comprehend the behavior of semiconductor diodes in various electron devices and nano electronic devices.

UNIT I CONDUCTING MATERIALS 12

Drude and Lorentz classical free electron theory - Expressions for electrical conductivity and thermal conductivity -Wiedemann-Franz law - Success and failures of classical free electron theory - thermal conductivity of a bad conductor- Lee's disc method -Fermi-Dirac distribution function - Effect of temperature on Fermi-Dirac distribution function- Density of energy states – Total energy and average energy of an electron at 0 K. (Theory-9)

1. Determination of thermal conductivity of a bad conductor- Lee's disc method

(Laboratory-3)

UNIT II SEMICONDUCTING MATERIALS 15

Elemental and Compound semiconductors – Energy-wave vector diagram – Intrinsic semiconductor- carrier concentration in intrinsic semiconductors- Determination of Fermi energy and Bandgap - Extrinsic semiconductors - Carrier concentration in n-type and p-type semiconductors – Law of mass action -Variation of Fermi level with temperature and impurity concentration - Hall effect and its applications.

(Theory -9)

1. Band gap determination of intrinsic semiconductor
2. Determination of Hall-coefficient of semiconductor

(Laboratory -6)

UNIT III LASER AND OPTICAL DEVICES 18

Laser characteristics - 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- Principle and propagation of light through an optical fiber -Acceptance angle and Numerical aperture, LED, PN photodiodes - PIN photodiode and Avalanche photodiode - -Engineering applications of lasers (qualitative)-.

(Theory -9)

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

(Laboratory-9)

UNIT IV QUANTUM PHYSICS **15**

Planck's quantum theory- Black body radiation- Newton's law of Cooling – Heisenberg's Uncertainty principle – Schrodinger's wave equations (time independent and time dependent)- Physical significance of wave function - de Broglie hypothesis -Particle in a one-dimension box – Particle in a three- dimensional box (Qualitative) – Degenerate and Non degenerate energy states Tunneling through a potential barrier.

(Theory -9)

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

(Laboratory -6)

UNIT V NANO ELECTRONIC DEVICES **15**

Introduction to Nano materials – synthesis by sol gel method, properties – Moore's law - Electron density in bulk material (qualitative) -Size dependence of Fermi energy- Band gap of nanomaterial - Quantum confinement -Quantum Structures-Density of states in quantum well, quantum wire and quantum dot structures – Application: Quantum dot laser.

(Theory -9)

1. Synthesis of nano-powders by sol-gel method
2. Determination of particle size using laser source

(Laboratory -6)

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: use Fermi Dirac distribution function to determine the density of energy states

CO3: distinguish between the types of semiconductors using the hall effect experiment

CO4: associate the basic principles of working of laser and their applications in opto-electronic devices

CO5: calculate the energy eigen value and eigen function for a particle in a one- dimensional and three dimensional box using Schrodinger wave equations

CO6: relate the quantum properties of nanoscale materials with their applications

TEXT BOOKS

1. Arthur Beiser, Concepts of Modern Physics, Tata McGraw-Hill, New Delhi, 2010.
2. M.N. Avadhanulu and P.G. Kshirsagar, A text book of Engineering Physics, S. Chand and Company, New Delhi, 2014.
3. Kasap, S.O. Principles of Electronic Materials and Devices, McGraw-Hill Education, 2007.
4. Wahab, M.A., Solid State Physics: Structure and Properties of Materials. Narosa Publishing House,2009.
5. William T. Silfvast, Laser Fundamentals, 2nd Edition, Cambridge University press, New York, 2004.

REFERENCES

1. R.K. Gaur and S.L. Gupta, Engineering Physics, Dhanpat Rai Publications (P) Ltd., Eighth Edition., New Delhi, 2001.
2. Hanson, G.W., Fundamentals of Nanoelectronics, Pearson Education, 2009
3. R. A. Serway and J.W. Jewett, Physics for Scientists and Engineers, Ninth Edition. Cengage Learning, 2014.
4. Rogers, B., Adams, J. & Pennathur, S. Nanotechnology: Understanding Small Systems. CRC Press, 2014.
5. Marikani, Materials Science, PHI Learning Private Limited, Eastern Economy Edition, 2017.
6. R. Wolfson, Essential University Physics, Volume 1 and 2 with Mastering Physics, Global Edition,3rd Edition, Pearson 2017.
7. B.K. Pandey and S. Chaturvedi, Engineering Physics, Cengage Learning India, 2012.
8. J. Singh, Semiconductor Optoelectronics: Physics and Technology, McGraw-Hill Inc., 1995.

9. Garg, H.P., Treatise on Solar Energy, John Wiley & Sons, 2006.
10. Wilson J.D. and Hernandez C.A., Physics Laboratory Experiments, Houghton Mifflin Company, New York 2005.
11. NPTEL course on "Introduction to LASER" by Prof. M. R. Shenoy, IIT Delhi : https://onlinecourses.nptel.ac.in/noc24_ph45/preview
12. NPTEL course on "Introduction to Semiconductor Devices" by Prof. Naresh Kumar Emani, IIT Hyderabad : https://onlinecourses.nptel.ac.in/noc24_ee99/preview
13. Physics for Electronics Engineering – Laboratory Manual, R.M.K. Engineering College, 2022.

LIST OF EQUIPMENTS 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.	Emissivity Determination	6 Nos.
5.	Bandgap determination set up	6 Nos.
6.	Sol-gel synthesis of nano powders	6 Nos.
7.	Planck's constant apparatus	6 Nos.
8.	Hall effect set-up	2 Nos.

COURSE CODE	COURSE TITLE	L	T	P	C
24EC101	**ELECTRONIC DEVICES AND CIRCUIT THEORY** (Theory course with laboratory component)	3	0	2	4

COURSE OBJECTIVES:

- To discuss the behavior of semiconductor diodes in various applications.
- To familiarize the operation of BJT and FET.
- To construct electronic circuits using special semiconductor devices.
- To understand the fundamental laws of electric circuits.
- To analyze the response of electric circuits using network theorems.

UNIT I	Overview of Electronic Devices and Electrical Circuits	9+6

Basic Electronic Components: Resistors, Capacitors, Inductors; Diodes types-PN Junction, Special purpose diodes- Zener Diode, Photodiode, LED, Solar Cell-Characteristics. **Basic Electrical Circuits:** Ohm's Law, Short and open circuits, Voltage division in series, current division in parallel. Analysis of series and parallel circuits.

List of Experiments:

1. VI Characteristics of PN diode.
2. VI Characteristics of Zener diode.

UNIT II	Bipolar Junction Transistor	9+6

BJT Types - NPN and PNP transistors, Transistor Characteristics: Input and output characteristics, and the concept of operating regions (active, cutoff, saturation) in common base, common emitter and common collector Configurations -Advantages and Disadvantages of BJT.

List of Experiments:

3. VI Characteristics of BJT in Common Emitter Configuration & also Simulate using PSPICE
4. VI Characteristics of BJT in Common Base Configuration & also Simulate using PSPICE
5. VI Characteristics of BJT in Common Collector Configuration & also Simulate using PSPICE

UNIT III	Field Effect Transistors	9+6

Theory and Operation of JFET: Structure, types, operation and characteristics of JFET. Advantages and Disadvantages of JFET. **Theory and Operation of MOSFET**: Structure, types, operation and characteristics of MOSFET (enhancement-mode, depletion-mode). Advantages andDisadvantages of MOSFET.

List of Experiments:

6. Characteristics of JFET & also Simulate using PSPICE or Multisim.
7. Characteristics of MOSFET & also Simulate using PSPICE or Multisim

UNIT IV	Circuit Theory	9+6

Equivalent resistance, Star-Delta conversion; Kirchhoff's Laws: Kirchhoff's Voltage Law (KVL) and Kirchhoff's Current Law (KCL); Mesh Analysis and Node Analysis (AC and DC).

List of Experiments:

8. Verification of Kirchhoff's current law and Kirchhoff's voltage law

UNIT V	Network Theorems	9+6

Thevenin's and Norton's theorems – Superposition Theorem –Maximum power transfer theorem, Millman's theorem.

List of Experiments:

9. Verification of Thevenin's theorem.

10. Verification of Norton's theorem.

TOTAL: 45 Theory + 30 Lab = 75 PERIODS

COURSE OUTCOMES:

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

CO1: Explain the operating principles of electronic devices

CO2: Analyze the V-I characteristics of electronic devices.

CO3: Design basic electronic circuits using various electron

devices.CO4: Analyze electric circuits using network theorems.

CO5: Evaluate the Performance of Electrical and Electronic Circuits Using Simulation Tools

CO6: Develop simple circuits for real time applications.

TEXTBOOKS:

1. Charles K. Alexander, Matthew N. O. Sadiku, Fundamentals of Electric Circuits, 7thEdition, McGraw Hill, 2022.
2. Robert L. Boylestad, Louis Nashelsky, Electronic Devices and Circuit Theory, 11thEdition, 2017.

REFERENCES:

1. W.H.Hayt, J.E.Kemmerly and S.M.Durbin, Engineering Circuit Analysis, 9th Edition, McGraw Hill Education, New Delhi, India, 2019.
2. Joseph Edminister and Mahmood Nahvi, Electric Circuits, Schaum's Outline Series, 5th Edition Reprint, Tata McGraw Hill Publishing Company, New Delhi, 2016.
3. David A Bell, Electric Circuits and Electronic Devices, Oxford University Press, 2010.
4. Thomas L.Floyd, Electronic Devices, 9th Edition, Pearson, 2017.
5. Donald A.Neaman, Semiconductor Physics and Devices, 4th Edition, McGraw Hill, 2017.
6. Dr.R.S.Sedha, A Textbook of Applied Electronics, S Chand and company limited, 2019.

NPTEL LINK

1. https://archive.nptel.ac.in/courses/108/108/108108122/2.
2. https://onlinecourses.nptel.ac.in/noc22_ee93/preview

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

Bread Boards -15 Nos CRO (30MHz) - 10 Nos

Signal Generator /Function Generators (3 MHz) - 15 Nos Transistor/FET/BJT(NPN-PNP) and

MOSFET(NMOS/PMOS) - 25 Nos Dual power supply/ single mode power supply - 15 Nos
Multimeter -15 Nos Ammeter(0-50) mA -15 Nos Voltmeter (0-30) V-15 Nos
Standalone desktops PC with SPICE

Course Code	MATRICES AND CALCULUS Theory Course (Common to B.E./B.Tech., all branches except CSBS)	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 ideads 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 divergence theorem (Statement only) - Simple applications involving cubes and rectangular parallelopipeds.

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, "EngineeringMathematics", 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 (Common to all branches of First Year B.E. / B. Tech)	L	T	P	C
24GE101		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 Thinai 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 Thinai concept in Tamil culture and literature.

CO5: compare the idea of cultural and intellectual contributions of Tamils.

REFERENCE BOOKS

1. தமிழக வரலாறு – மக்களும் பண்பாடும் – கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் – முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. 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	INTERPERSONAL SKILLS, PSYCHOMETRIC ANALYSIS AND CAREER DEVELOPMENT (Common to all the branches)	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.

CO 4: 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	ENVIRONMENTAL SCIENCE AND SUSTAINABILITY (Common to All Branches)	L	T	P	C
24CH102R		1	0	0	MC

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 3

Environment – scope and importance – need for awareness. Natural resources –impacts of deforestation, food resources - modern agriculture and organic farming.Renewableenergy sources – solar and wind.
Field Activity: Tree plantation.

UNIT II POLLUTION AND WASTE MANAGEMENT 3

Pollution – causes, effects and control of air, waterand nuclear hazards – role of individualsin prevention of pollution – case studies, Waste management – solid, plastic and e-waste.
Field Study: Solid waste management practices of the institution.

UNIT III BIODIVERSITY AND ITS CONSERVATION 3

Biodiversity – types, values, hot spots in India, threats – endangered, endemic and extinctspecies – conservation: in-situ and ex-situ.
Field Study: Institutional biodiversity survey.

UNIT IV SUSTAINABILITY AND MANAGEMENT 3

Sustainability – concept, need, challenges – circular economy – Sustainable Development Goals – carbon footprint – Environmental Impact Assessment.
Field Study: Alternate energy practices.

UNIT - V HUMAN POPULATION 3

Population growth – variation and explosion – environment and health – epidemics and pandemics, role of information technology in environment and human health.

Case Study: Major pandemics of the 21st century.

TOTAL: 15 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

24EC111R	IDEA LAB - I (Common to all Branches)	L	T	P	C
		0	0	2	1

OBJECTIVES:

The Course will enable learners to:

- Develop basic hands-on skills in dis-assembly and assembly of computer hardware and in the installation of operating systems and software.
- Develop basic hands-on skills in dis-assembly and assembly of household appliances
- Gain practical knowledge of electrical wiring practices and familiarize with electronic components and instruments.
- Enrich knowledge in contemporary systems and technologies such as 3D Printing and Heat press, highlighting their role in modern society and industry.
- Understand and apply geospatial tools for analysing long-term land use changes in smart cities, using GIS and Google Earth Engine.

LIST OF EXPERIMENTS

(A). Dis-assembly, Assembly and Installation Practices

1. Dis-assembly and assembly of CPU.
2. Dis-assembly and assembly of home appliances –Ceiling Fans, Iron box.
3. Installation of OS and Application Software's in Desktop and Laptop.

(B). Electrical Wiring and Electronics Components / Equipment Practices

1. Hands on session of basic electrical connections – Fuses, Miniature circuit Breakers and Distribution box.
2. Hands-on session of soldering practices in a Printed circuit board.

(C). Contemporary Systems

1. Design and fabrication of spur gear using 3D Modelling and 3D Printing.
2. Heat press sublimation printing on cups/plates/T-Shirts/Caps.

(D). GIS-Based Monitoring of Land Use Patterns

1. GIS based decadal change in land use patterns across smart cities using Google Earth Engine.

TOTAL: 30 PERIODS

OUTCOMES:

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

CO1 Demonstrate the dis-assembly and assembly procedures of CPU and household appliances.

CO2 Analyze faults in wiring systems and electronic circuits and suggest suitable troubleshooting methods.

CO3 Construct simple electronic circuits using discrete components and verify their functionality.

CO4 Evaluate the role of contemporary systems in addressing societal and industrial needs.

CO5 Analyze decadal changes in land use patterns across smart cities using GIS techniques.

LIST OF EQUIPMENT

S. No.	Equipment Name	Quantity
1	Desktop	30 Nos
2	OS(Windows/Linux)	1 No
3	Application Software like Libre office, Broswer, PDF reader, compression tools, etc.	30 Nos
4	Toolkit	1 No
5	Ceiling Fan	1 No
6	Iron box	1 No
7	Miniature circuit Breaker	2 Nos
8	Distribution box	1 No
9	Electrical Tool Kit	1 No
10	Cathode Ray Oscilloscope	10 Nos
11	Function Generator	10 Nos

Course Code	Student Induction Program (SIP) (Common to all branches of First Year B.E. / B. Tech)	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

24MC102	PROGRAMMING IN C (Common to All Branches)

OBJECTIVES:

The Course will enable learners to:

- To learn problem solving and programming fundamentals in C.
- To gain knowledge on Arrays and Functions.
- To understand Pointers, Structures and File handling concepts.

UNIT I	INTRODUCTION TO C PROGRAMMING	10

Introduction to C, Comments, Tokens, Character set, Identifiers- Variables, Keywords, Bits and Bytes representations- Data Types, Type Qualifiers- Symbolic Constants, One's and Two's Complement Forms, Expressions and Statements- Operators- Operator Precedence and Associativity- Pre-Processor Directives- I/O Functions- Control Structures: Decision Making Statements For Loop-While and do-while Loops

UNIT II	ARRAYS AND FUNCTIONS	15

Array Operations-One dimensional array-Multi Dimensional Array - Practice Programs-Searching-Sorting-String Handling Functions- Function: Declaration, Definition, Function Call and Return Statements-Passing Parameters to Functions-Types of Functions-Calling Functions from Another Function and Recursive Functions. Variable Scope, Lifetime and Storage Classes-Storage Classes-Problem Solving using Recursion- Towers of Hanoi Problem, Advantages and Disadvantages of Recursion.

UNIT III	POINTERS, STRUCTURES AND FILE HANDLING CONEPTS	15

Introduction to Pointers-Dynamic Memory Allocation-Pointers of Arrays and Strings- Pointer Arithmetic - Pointers to Functions-Introduction to User Defined Data Types- Structures, Functions and Nested Structures-Bit Fields in Structure and Union Enumerated Data Types-Introduction to File Handling-Advanced File Operations-

Command Line Arguments & Error Handling.

TOTAL HOURS: 40

OUTCOMES:

Upon completion of the course, the students will be able to develop a C program, control the sequence of the program and give logical outputs, implement strings in C program, store different data types in the memory, write functions in C and also handle

files

REFERENCES:

1. Programming in C. E. Balagurusamy. 9th Edition, Tata McGraw-Hill Publishing, 2020. ISBN
2. The C programming language. BW Kemighan, DM Ritchie. Prentice Hall, Englewood Cliffs 2015

Course Code	TRANSFORMS AND COMPLEX ANALYSIS Theory with Laboratory Component (Common to B.E. ECE, EC(ACT), EE(VLSI)	L	T	P	C
24MA202		3	0	2	4

OBJECTIVES:

The course will enable the learners to:

- comprehend the concepts of Laplace transforms.
- understand the basic ideas of Z-Transforms.
- illustrate the application of transforms in solving differential and difference equations.
- understand the concepts of analytic functions and conformal mapping.
- impart the knowledge of complex integration.

UNIT I LAPLACE TRANSFORMS 15

Laplace transforms – Sufficient condition for existence – Transform of elementary functions – Basic properties – Transforms of derivatives and integrals of functions – Derivatives and integrals of transforms –Transforms of unit step function and impulse functions – Transform of periodic functions – Inverse Laplace transform – Convolution theorem (Statement only).

Experiments using C Program:

1. Find the Laplace Transform of simple functions.
2. Find the inverse Laplace Transform of simple functions.

UNIT II Z – TRANSFORMS 15

Z-transforms – Elementary properties – Inverse Z-transforms – Partial fractions method – Residue method – Convolution theorem.

Experiments using C Program:

1. Find the Poles of X(z).
2. Resolve the X(z) by partial fraction method.

UNIT III SOLUTION OF DIFFERENTIAL AND DIFFERENCE EQUATIONS 15

Solution of linear ordinary differential equation of second order with constant coefficients and first order simultaneous equations with constant coefficients using Laplace transform. Formation of difference equations – Solution of first and second order difference equations with constant coefficients using Z-transform.

Experiments using C Program:

1. Find the solution of Ordinary Differential Equations.
2. Find the solution of Difference Equations.

UNIT IV ANALYTIC FUNCTIONS 15

Analytic functions – Necessary and sufficient conditions in Cartesian coordinates (statement only) – Properties (only Cartesian coordinates) – Harmonic conjugates – Construction of an analytic function – Conformal mapping – Mapping by functions W= c+z, cz, 1/z – Bilinear transformation.

Experiments using C Language:

1. Compute Real and Imaginary Parts of the Exponential Function.
2. Compute the harmonic conjugate of a given function.

UNIT V COMPLEX INTEGRATION 15

Cauchy's integral theorem (statement only) – Cauchy's integral formula (statement only) – Taylor's and Laurent's series – Singularities – Residues – Cauchy's Residue theorem (statement only) – Evaluation of real integrals using circular and semicircular contour (excluding poles on real axis).

Experiments using C Language:

1. Find the Taylor's series expansion of X(z) at any point.
2. Find the Residues of X(z).

TOTAL: 75 PERIODS

COURSE OUTCOMES:

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

CO1: determine Laplace transform and inverse Laplace transform of simple functions.

CO2: determine Z- transform and inverse Z- transform of simple functions.

CO3: solve ordinary differential equations using Laplace transform and difference equations using Z-Transform.

CO4: construct an analytic function and analyze conformal mapping.

CO5: evaluate the real integrals using complex integration.

CO6: identify singularities using Taylor's and Laurent's series.

TEXT BOOKS:

1. N. Bali, M. Goyal and C. Watkins, "Advanced Engineering Mathematics", Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.,), New Delhi, 7th Edition, 2009.
2. B.S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 44th Edition, 2021.

REFERENCES:

1. Erwin. Kreyszig, “Advanced Engineering Mathematics”, John Wiley and Sons, 10th Edition, New Delhi, 2016.
2. R.K. Jain and S.R.K Iyengar “Advanced Engineering Mathematics”, Narosa Publications, New Delhi, 3rd Edition, 2007.
3. R.C. Wylie and L.C. Barrett, “Advanced Engineering Mathematics”, Tata McGraw Hill Education Pvt. Ltd, 6th Edition, New Delhi, 2012.
4. M.K. Venkataraman, “Engineering Mathematics, Volume II”, 4th Edition, The National Publication Company, chennai, 2003.
5. B.V. Ramana“Higher Engineering Mathematics”, Tata McGraw Hill Publishing Company, 6th Edition, New Delhi, 2008.
6. NPTEL course on "Transform Techniques for Engineers", by S.R.Manam, IIT Madras: https://archive.nptel.ac.in/courses/111/106/111106111/
7. NPTEL course on "Advanced Engineering Mathematics", by Prof. P. N. Agarwal, IIT Roorkee: https://onlinecourses.nptel.ac.in/noc23_ma90/preview

24CS201	DATA STRUCTURES	L	T	P	C
		3	0	3	4.5

OBJECTIVES:

The Course will enable learners to:

- To understand the concepts of linear structures ADTs.
- To gain the knowledge of searching and sorting algorithms.
- To learn hashing algorithms and its applications.
- To understand the tree data structures.
- To understand graph structures.

UNIT I INTRODUCTION 9+9

Asymptotic Notations and Analysis of algorithms- Introduction to Data Structures, abstract data types, Linear list – singly linked list implementation - circular linked list implementation - Double linked list implementation -Applications of linked lists. Stack: Operations, array and linked representations of stacks, stack applications. Queues: Operations, array and linked representations of Queue, Queue applications.

List of Exercise/Experiments:

1. Implementation of Singly,Doubly and Circular Linked List
2. Implementation of Stack using Arrays and Linked List
3. Implementation of Stack applications
4. Implementation of Queue using Arrays and Linked List
5. Implementation of Queue applications

UNIT II SEARCHING AND SORTING ALGORITHMS 9+9

Incremental Design Strategies- Searching:Linear and binary search,Sorting: Bubble sort, Insertion sort-Selection sort–Divide & Conquer -Quick sort –Merge sort.

List of Exercise/Experiments:

1. Implementation of searchingand sorting algorithms

UNIT III TREES 9+9

Trees: Binary Tree - Terminology and Properties - Binary Search Tree - Insertion, Deletion, Traversal – In order, Preorder and Post order, Level order traversal, finding min and max, finding the kth minimum element in a BST

List of Exercise/Experiments:

1. Implementation of Binary Search Tree

UNIT IV GRAPHS 9+9

Graphs –Representation-Traversal - BFS and DFS, Greedy Algorithms: Minimum spanning Tree-Prims and Kruskal's,Shortest path algorithm- Dijkstra, Floyd and Warshall – Backtracking

List of Exercise/Experiments:

1. Implementation of Graph Traversal algorithms
2. Implementation of Minimum spanning tree algorithm
3. Implementation of Prims and Kruskal'salgorithm
4. Implementation of Shortest path algorithm

UNIT V	**HEAPS AND HASHING**	**9+9**

Heaps and Hashing - Implementation of Heaps, Binary Heap, Heap sort - Applications - Hash functions, open hashing-separate chaining, closed hashing - linear probing, quadratic probing, double hashing, random probing, rehashing

List of Exercise/Experiments:

1. Implementation of Hashing techniques
2. Implementation of Heap

TOTAL:45+45=90 PERIODS

OUTCOMES:

Uponcompletionofthecourse, thestudentswill beable to:

CO1: Analyze and compare functions using asymptotic analysis andUnderstand the concepts of basic data structures such as array and linked list.
CO2: Applying a suitable algorithm for searching and sorting.
CO3: Analyze the various tree algorithms for solving real time computing problems.
CO4: Understanding graph algorithms, operations, and applications **CO5:**Understanding the importance of hashing.
CO6: Apply the appropriate data structure to solve real world problems

TEXTBOOKS:

1. Thomas H. Cormen, C.E. Leiserson, R L.Rivest and C. Stein, Introduction to Algorithms, Third edition, MIT Press, 2009.
2. Anany Levitin, Introduction to the Design and Analysis of Algorithms, 3rdedition, Pearson Education, 2021

REFERENCES:

1. Kurt Mehlhorn, and Peter Sanders – Algorithms and Data Structures - The Basic Toolbox, Springer-Verlag Berlin Heidelberg, 2008.
2. Debasis Samanta, "Classic Data Structures", Prentice Hall of India, 2nd edition, 2014.

LIST OF EQUIPMENTS:

1. Systems with Linux Operating System and GNU Compiler

24CS202	JAVA PROGRAMMING (Common to All Branches)	L	T	P	C
		3	0	3	4.5

OBJECTIVES:

The Course will enable learners to:

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

a. Find kth smallest element in an unsorted array

b. Find the sub array with given sum

c. Matrix manipulations – Addition, Subtraction, Multiplication

d. Remove duplicate elements in an Array

e. 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 Numberofsides() 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 ArrayList. 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 (L) + 45 (P) = 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:

1. Java and Eclipse / NetBeans IDE or Equivalent

Course Code	CHEMISTRY FOR ELECTRICAL AND ELECTRONICS ENGINEERING	L	T	P	C
24CH201	Theory Course with Laboratory Component (Common for B.E.- ECE, EEE, ECA and EEV)	3	0	2	4

OBJECTIVES:

The course will enable the learners

- To acquire knowledge on the fundamental principles of energy storage devices.
- To provide an overview of corrosion, its types and corrosion control methods.
- 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 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 H_2 -O_2 fuel cell.

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 II CORROSION AND ITS CONTROL 15

Corrosion – causes of corrosion – principles of chemical corrosion – Pilling – Bedworth rule – principles of electrochemical corrosion – differences between chemical and electrochemical corrosion – factors influencing corrosion – types of corrosion – galvanic corrosion – differential aeration corrosion – stress corrosion– pitting corrosion, water line corrosion, impacts of corrosion on power plants.

Corrosion control and prevention – selection of materials and proper designing - cathodic protection – sacrificial anode — protective coatings - anodization, galvanization, anti-corrosive agents – molybdates and phosphates.

(Theory-9)

1. Determination of influence of pH on the rate of corrosion.
2. Demonstrate the effectiveness of the sacrificial anode in protecting the metal from corrosion.
3. Determination of corrosion rate at various % of NaCl - by weight loss method.

(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 – CO_2 sensors- sensor for health care – Glucose sensor.

Cheminformatics – definition, scope, and significance; applications in 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) alloy 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. Synthesis of nano $BaSO_4$ 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 identify the suitability of batteries for various fields.

CO2: To analyze the different types and impacts of corrosion, and evaluate methods for corrosion control and prevention.

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. J. C. Kuriacose and J. Rajaram, "Chemistry in Engineering and Technology", Volume -1 & Volume -2, Tata McGraw-Hill Education Pvt. Ltd., 2010.

3. Barry A. Bunin, Brian Siesel, and J. Bajorath, "Chemoinformatics: Theory, Practice, & Products", Springer, First Edition, 2007.
4. Geoffrey A. Ozin, Andre C. Arsenault and Ludovico Cademartiri, "Nanochemistry: A Chemical Approach to Nanomaterials", RSC publishers, 2nd Edition, 2015.
5. 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.
6. Pierre R. Roverge, Handbook of Corrosion Engineering, McGraw-Hill Publishers, 3rd Edition, 2019.
7. NPTEL course on "Electrochemical Energy Storage" Prof. Subhasish Basu Majumder, IIT Kharagpur, https://onlinecourses.nptel.ac.in/noc21_mm34/preview
8. NPTEL course on "Corrosion Protection Methods" Prof. Kallol Mondal, IIT Kanpur, https://onlinecourses.nptel.ac.in/noc24_mm01/preview
9. NPTEL course on "Nanotechnology, Science and Applications" Prof. Prathap Haridoss, IIT-M, https://onlinecourses.nptel.ac.in/noc22_mm33/preview

LIST OF EQUIPMENTS FOR A BATCH OF 30 STUDENTS

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

24AI202	INTRODUCTION TO ARTIFICIAL INTELLIGENCE (Common to all Branches)	L	T	P	C
		2	0	2	3

OBJECTIVES:

The Course will enable learners to:

- 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: Ndarray 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, Combinetwo arrays using concatenation.
2. Working with Pandas data frames –Create Series andDataFrames using Pandas, Useloc andiloc to select data, Handle missing data: use isnull(), notnull(), dropna(), andfillna()).
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:

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.
    a. Sales prediction
    b. Predict fraudulent transactions
    c. Predict house prices
    d. Customer loan approval

UNIT V	**CASE STUDIES**	**6+6**

Introduction to NLP – Bias in AI - Ethical consideration in AI and ML - Disease Prediction – Share Price Forecasting – Weather Forecasting – Domain Specific Case Studies.

List of Domain Specific Case Studies:

- 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.

List of Exercise:

1. Build a machine learning model to solve any real-world problem from your domain.

TOTAL: 30(L) + 30(P) = 60 PERIODS

OUTCOMES:

Uponcompletionofthecourse, thestudentswill beable 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.

TEXTBOOKS:

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 Alpaydın, 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	TAMILS AND TECHNOLOGY	L	T	P	C
24GE201	(Common to all branches of First Year B.E. / B. Tech)	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 beats - Archeological evidences - Gem stone types described in Silappathikaram.

UNIT IV AGRICULTURE AND IRRIGATION TECHNOLOGY 3

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

UNIT V SCIENTIFIC TAMIL & TAMIL COMPUTING 3

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

TOTAL: 15 PERIODS

COURSE OUTCOMES:

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. தமிழக வரலாறு – மக்களும் பண்பாடும் – கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் – முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. 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	INNOVATION AND CREATIVITY SKILLS AND DEVELOPMENT (Common to all the branches)	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 DEVELOPMENT3

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.

24ME211R	IDEA LAB - II (Common to all Branches)	L	T	P	C
		0	0	4	2

OBJECTIVES:

The Course will enable learners to:

- Familiarize with the basic features and functionalities of office software packages for documentation, data processing, and presentation.
- Develop a foundational understanding of smart electronic systems by designing and implementing basic sensor-based applications using Arduino.
- Design, fabricate and test printed circuit boards (PCBs) for simple electronic circuits using PCB design software and milling machines.
- Enrich their knowledge in contemporary systems and technologies such as laser cutting machine and CNC router, highlighting their role in modern society and industry.
- Perform a smart land audit by leveraging geospatial tools, specifically Google Earth, for mapping, analyzing, and interpreting land usage, boundaries, terrain features, and other geospatial attributes.

LIST OF EXERCISES

(A). Introduction to office Application

1.Introduction to office package.

(B). Smart Electronic Systems using Sensors and Arduino

1. Design and build Arduino based door bell system.

2. Build a simple Arduino-Based Water Level Indicator for a Tank/Container.

3. Build a simple Interfacing circuit of LM35 Temperature Sensor with Arduino.

4. Design and build Ultrasonic Distance Measurement System and LED Indication using Arduino and Ultrasonic Sensor.

5. Design and build a simple home automation system (e.g., LED turns on when room is dark using LDR + Arduino).

(C). Hands-on Practice in PCB Design

1. Design, mill, populate, and validate a single-sided printed circuit board (PCB) for a simple low-power electronic circuit using a PCB milling machine.

(D). Contemporary Systems

1. Laser cutting of 2D profiles for press-fit cube assembly.

2. CNC Router machining of MDF for press-Fit design.

(E). GIS and Smart cities

1. Geospatial Smart Land Audit using Google Earth.

TOTAL: 60 PERIODS

OUTCOMES:

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

CO1: Analyze data using a spreadsheet application.

CO2: Design and construct simple but practical electronic systems such as doorbells, water level indicators, and proximity detectors.

CO3: Evaluate the effectiveness of PCB-based implementation compared to breadboard or wired circuits.

CO4: Evaluate the role of contemporary systems in addressing societal and industrial needs.

CO5: Comprehend basic concepts of GIS (Geographic Information Systems), remote sensing, and digital land analysis.

LIST OF EQUIPMENT

S. No.	Description of Equipment	Quantity
1	Desktop	30 Nos
2	MS Office/LibreOffice/Google Docs	30 Nos
3	PCB Milling machine	1 No
4	Arduino UNO/NANO Board	10 Nos
5	CNC Router	1 No
6	Laser cutting Machine	1 No
7	Google Earth	Open-Source Software

Course Code	Yoga for Stress Management	L	T	P	C
24MC201	(Common to all branches of First Year B.E. / B. Tech)	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).