



SENGUNTHAR ENGINEERING COLLEGE (AUTONOMOUS)

(Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai)
Recognized Under Section 2(f) & 12(B) of the UGC Act, 1956
NAAC Accredited with 'A' Grade

TIRUCHENGODE - 637 205 NAMAKKAL (Dt) TAMILNADU



CURRICULUM & SYLLABI B.E. ELECTRICAL AND ELECTRONICS ENGINEERING

(CHOICE BASED CREDIT SYSTEM)

REGULATIONS-2023

(I - IV SEMESTER)

(For the students admitted from the Academic year 2023-2024 onwards)



Note: The regulations here under are subject to amendments as may be decided by the Academic Council of the Sengunthar Engineering College from time to time. Any or all such amendments will be effective from such date and to such batches of candidates including those already undergoing the programme under the same Regulation as may be decided by the Academic Council.





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Chairman - BoS


DEAN (ACADEMICS)
SENGUNTHAR ENGINEERING COLLEGE
TIRUCHENGODE-637 205


PRINCIPAL
SENGUNTHAR ENGINEERING COLLEGE
(AUTONOMOUS)
TIRUCHENGODE - 637 205





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REGULATIONS 2023 CHOICE BASED CREDIT SYSTEM B. E. ELECTRICAL AND ELECTRONICS ENGINEERING

VISION

To develop globally competent Engineers in Electrical and Electronics Engineering by imparting cutting-edge knowledge, research and entrepreneurial skills for societal and sustainable development.

MISSION

- To provide a conducive learning environment that fosters academic excellence and the integration of cutting-edge knowledge in Electrical and Electronics Engineering.
- To enhance research and development initiatives that address societal challenges.
- To empower students with leadership excellence, entrepreneurial skills, moral and ethical values.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

The Program Educational Objectives (PEOs) broad statements describe the career and professional accomplishments that the graduates are expected to achieve within three to five years after graduation.

Graduates of B.E. - Electrical and Electronics Engineering program will

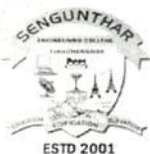
- Exhibit leadership qualities and the ability to work effectively in multidisciplinary teams to achieve organizational and project goals.
- Engage in higher studies, leveraging expertise across diverse domains to create impactful and sustainable solutions.
- Develop entrepreneurial skills and an innovative approach to identifying opportunities, creating value, and driving business ventures.

PROGRAM OUTCOMES (POs)

Engineering Graduates will be able to:

PO1	Engineering knowledge	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	Problem analysis	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first





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		principles of mathematics, natural sciences, and engineering sciences.
PO3	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.
PO4	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.
PO5	Model tool usage	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6	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.
PO7	Environment and sustainability	Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	Ethics	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	Individual and team work	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	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.
PO11	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.
PO12	Life-long learning	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOME (PSOs)

PSO1	Utilize cutting-edge tools, techniques, and methodologies to solve complex engineering challenges in areas such as Power Electronics and Automation.
PSO2	Develop and implement smart grid technologies and renewable energy solutions to ensure reliable and sustainable energy systems.





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MAPPING OF COURSE OUTCOME AND PROGRAM OUTCOME																
Year	Sem	Course Name	PO												PSO	
			1	2	3	4	5	6	7	8	9	10	11	12	1	2
I		23HST101 - Professional English	1	1	1.5	2	1	-	-	-	1.8	3	1.5	2	-	-
		23MAT101 - Matrices and Calculus	3	3	2	-	-	-	-	-	-	-	-	2	-	-
		23HST102 - தமிழர் மரபு /Heritage of Tamils	-	-	-	-	-	-	-	2	1	2	-	1	-	-
		23PHE103 - Applied Physics for Electronics Engineering	3	3	1	1	-	-	-	-	-	-	-	-	-	-
		23CYE101 - Engineering Chemistry	2.3	2.2	2.5	1.6	1.7	1.8	1.8	1.4	1.5	1.4	1.3	1.3	-	-
		23GEE101 - Programming in C	2.8	2.8	2.5	1.5	3.0	-	-	1.0	1.0	1.3	1.0	2.0	2.0	-
		23EEC101 - Soft Skills & Life Skills	1.3	1.6	1	1	3	1.4	1.4	2	2.6	2.8	2.6	2	-	-
		23MDC101 - Induction Program (2Weeks)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		23MAT202 - Differential Equations and Numerical Methods	3	2.4	2	1.4	2	-	-	-	-	-	-	2	-	-
		23PHT203 - Advanced Physics for Electronics Engineering	3	2	1	1	-	-	-	-	-	-	-	-	-	-
		23CYT201 - Environmental Science and Sustainability	2	1.4	3	1.6	2.2	3	3	3	0.8	1.6	2.4	2.2	-	-
		23HST202 - தமிழரும் தொழில்நுட்பமும் / Tamils and Technology	-	-	-	-	-	-	-	2	1	-	-	1	-	-
		23HSE201 - English for Engineers: Theory and Practice	1	2	-	2	1	2	2	1.5	2.3	3	2	1.6	-	-
		23EEE201 - Electric Circuit Analysis	3	3	3	3	3	-	-	-	-	2	1	1	3	2
		23GEL201 - Engineering Practices Laboratory														
		23GEL202 - Engineering Drawing for Electrical and Electronics	3	2	-	-	2	1	1	-	-	3	-	2	-	-
		23EEC201 - Indian Language (Except Mother Tongue) / Foreign Language														
		Hindi	-	-	-	-	-	1	1	1.3	1.6	2.8	-	1.6	-	-
		German	-	-	-	-	-	1	1	1.5	1.7	3	-	1.6	-	-
		Japanese	-	-	-	-	1.4	1.6	1.6	1	2	2.6	-	1	-	-
		23MDC201 - Aptitude Skills	-	-	-	-	-	-	-	-	-	-	-	-	-	-
II	III	23MAT301 - Transforms and Complex Functions	3	3	1	-	2	-	-	-	1	2	-	2	-	-
		23EET301 - Electromagnetic Theory	3	3	3	3	3	-	-	-	-	-	-	2	3	3
		23EET302 - Measurements and Instrumentation	3	3	3	3	3	-	-	-	-	-	-	2	3	3
		23EEE301 - DC Machines and	3	2.8	2.3	2.2	1.8	-	-	-	3	3	-	2	2	2





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	Transformers														
	23EEE302 - Analog Electronics and Circuits	3	3	3	3	3	2	2	2	3	3	2	3	3	2
	23EEE303 - Digital Electronics and Linear Integrated Circuits	3	3	3	2.2	2	-	-	1	3	1.3	-	1	3	2
	23EEEC301 – Professional Development	-	-	-	-	-	-	-	-	-	-	-	-	-	-
IV	23EET401 - Electrical Power Transmission and Distribution	3	3	3	2	2	1	1	1	-	2	-	2	1	3
	23EET402 - Power Electronics	3	3	3	3	3	-	-	-	-	-	-	3	3	3
	23EET403 - Control Systems Engineering	3	3	3	3	3	1	1	-	-	1	-	2	3	3
	23EEE401 – Microprocessor and Microcontrollers	2.8	2.8	2.6	2.4	3	2.2	2.2	-	3	3	3	2	3	2.6
	23EEE402 -Induction and Synchronous Machines	3	3	2.8	2.8	3	2.2	2.2	-	3	3	3	2	2.6	2.3
	23GEE301 - Problem Solving and Python Programming	2.8	2.7	2.2	1.5	2.8	-	-	1	1	1.5	1	2	3	1
	23EEEC401 - Online Certification Courses	-	-	-	-	-	-	-	-	-	-	-	-	-	-





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FOR B.E. / B.Tech. DEGREE PROGRAMMES

(For the Students Admitted in the Academic Year 2023-2024 onwards)

B.E. - ELECTRICAL AND ELECTRONICS ENGINEERING - FIRST SEMESTER

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		C	CIA	ESE
THEORY									
23HST101	Professional English	HS	3	0	0	3	40	60	100
23MAT101	Matrices and Calculus	BS	3	1	0	4	40	60	100
23HST102	தமிழர் மரபு /Heritage of Tamils	HS	1	0	0	1	40	60	100
EMBEDDED COURSE									
23PHE103	Applied Physics for Electronics Engineering	BS	3	0	2	4	40	60	100
23CYE101	Engineering Chemistry	BS	3	0	2	4	40	60	100
23GEE101	Programming in C	ES	3	0	2	4	50	50	100
EMPLOYABILITY ENHANCEMENT COURSE									
23EEC101	Soft Skills & Life Skills	EEC	1	0	0	1	100	-	100
MANDATORY COURSE									
23MDC101	Induction Program (2 Weeks)	MC	-	-	-	-	-	-	-
TOTAL CREDITS IN SEMESTER - I					21				

HS	:	Humanities and Social Sciences
BS	:	Basic Sciences
ES	:	Engineering Sciences
PC	:	Professional Core
PE	:	Professional Elective
GE	:	General Elective
OE	:	Open Elective
EEC	:	Employability Enhancement Courses
MC	:	Mandatory Courses
L	:	Lecture
T	:	Tutorial
P	:	Practical
C	:	Credit Point
CIA	:	Continuous Internal Assessment
ESE	:	End Semester Examination
TOT	:	Total





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B.E. - ELECTRICAL AND ELECTRONICS ENGINEERING - SECOND SEMESTER

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		C	CIA	ESE
THEORY									
23MAT202	Differential Equations and Numerical Methods	BS	3	1	0	4	40	60	100
23PHT203	Advanced Physics for Electronics Engineering	BS	3	0	0	3	40	60	100
23CYT201	Environmental Science and Sustainability	HS	3	0	0	3	40	60	100
23HST202	தமிழரும் தொழில்நுட்பமும் / Tamils and Technology	HS	1	0	0	1	40	60	100
EMBEDDED COURSE									
23HSE201	English for Engineers: Theory and Practice	HS	3	0	2	4	50	50	100
23EEE201	Electric Circuit Analysis	PC	3	0	2	4	50	50	100
PRACTICALS									
23GEL201	Engineering Practices Laboratory	ES	0	0	4	2	60	40	100
23GEL202	Engineering Drawing for Electrical and Electronics	ES	0	0	4	2	60	40	100
EMPLOYABILITY ENHANCEMENT COURSE									
23EEC201	Indian Language (Except Mother Tongue) / Foreign Language	EEC	0	0	4	2	100	-	100
MANDATORY COURSE									
23MDC201	Aptitude Skills	MC	3	0	0	0	-	-	-
TOTAL CREDITS IN SEMESTER - II					25				

HS	:	Humanities and Social Sciences
BS	:	Basic Sciences
ES	:	Engineering Sciences
PC	:	Professional Core
PE	:	Professional Elective
GE	:	General Elective
OE	:	Open Elective
EEC	:	Employability Enhancement Courses
MC	:	Mandatory Courses
L	:	Lecture
T	:	Tutorial
P	:	Practical
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B.E. – ELECTRICAL AND ELECTRONICS ENGINEERING – THIRD SEMESTER

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		C	CIA	ESE
THEORY									
23MAT301	Transforms and Complex Functions	BS	3	1	0	4	40	60	100
23EET301	Electromagnetic Theory	PC	3	1	0	4	40	60	100
23EET302	Measurements and Instrumentation	PC	3	0	0	3	40	60	100
EMBEDDED COURSE									
23EEE301	DC Machines and Transformers	PC	3	0	2	4	50	50	100
23EEE302	Analog Electronics and Circuits	PC	3	0	2	4	50	50	100
23EEE303	Digital Electronics and Linear Integrated Circuits	PC	3	0	2	4	50	50	100
EMPLOYABILITY ENHANCEMENT COURSE									
23EEEC301	Professional Development	EEC	0	0	2	1	100	-	100
TOTAL CREDITS IN SEMESTER III			24						

HS	:	Humanities and Social Sciences
BS	:	Basic Sciences
ES	:	Engineering Sciences
PC	:	Professional Core
PE	:	Professional Elective
GE	:	General Elective
OE	:	Open Elective
EEC	:	Employability Enhancement Courses
MC	:	Mandatory Courses
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B.E. – ELECTRICAL AND ELECTRONICS ENGINEERING – FOURTH SEMESTER

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		C	CIA	ESE
THEORY									
23EET401	Electrical Power Transmission and Distribution	PC	3	0	0	3	40	60	100
23EET402	Power Electronics	PC	3	0	0	3	40	60	100
23EET403	Control Systems Engineering	PC	3	0	0	3	40	60	100
EMBEDDED COURSE									
23EEE401	Microprocessor and Microcontrollers	PC	3	0	2	4	50	50	100
23EEE402	Induction and Synchronous Machines	PC	3	0	2	4	50	50	100
23GEE301	Problem Solving and Python Programming	ES	3	0	2	4	50	50	100
EMPLOYABILITY ENHANCEMENT COURSE									
23EEEC401	Online Certification Courses	EEC	3	0	0	3	100	-	100
TOTAL CREDITS IN SEMESTER IV			24						

HS	:	Humanities and Social Sciences
BS	:	Basic Sciences
ES	:	Engineering Sciences
PC	:	Professional Core
PE	:	Professional Elective
GE	:	General Elective
OE	:	Open Elective
EEC	:	Employability Enhancement Courses
MC	:	Mandatory Courses
L	:	Lecture
T	:	Tutorial
P	:	Practical
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CIA	:	Continuous Internal Assessment
ESE	:	End Semester Examination
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B.E. – ELECTRICAL AND ELECTRONICS ENGINEERING – FIFTH SEMESTER

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		C	CIA	ESE
THEORY									
23EET501	Power System Analysis	PC	3	1	0	4	40	60	100
	Professional Elective I	PE	3	0	0	3	40	60	100
	Professional Elective II	PE	3	0	0	3	40	60	100
	Professional Elective III	PE	3	0	0	3	40	60	100
EMBEDDED COURSE									
23EEE501	Electrical Drives	PC	3	0	2	4	50	50	100
23EEE502	Renewable Energy and Energy Storage System	PC	3	0	2	4	50	50	100
EMPLOYABILITY ENHANCEMENT COURSE									
23EEEC501	Industrial Training	EEC	0	0	4	2	100	-	100
MANDATORY COURSE									
	Mandatory Course -I	MC	3	0	0	0	-	-	-
TOTAL CREDITS IN SEMESTER V						23			

HS	:	Humanities and Social Sciences
BS	:	Basic Sciences
ES	:	Engineering Sciences
PC	:	Professional Core
PE	:	Professional Elective
GE	:	General Elective
OE	:	Open Elective
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MC	:	Mandatory Courses
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B.E. – ELECTRICAL AND ELECTRONICS ENGINEERING – SIXTH SEMESTER

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		C	CIA	ESE
THEORY									
	Professional Elective IV	PE	3	0	0	3	40	60	100
	Professional Elective V	PE	3	0	0	3	40	60	100
	Professional Elective VI	PE	3	0	0	3	40	60	100
	Open Elective – I / NCC L1 / L3	OE	3	0	0	3	40	60	100
EMBEDDED COURSE									
23EEE601	Power System Operation and Control	PC	3	0	2	4	50	50	100
EMPLOYABILITY ENHANCEMENT COURSE									
23EEJ601	Project Work – Phase I	EEC	0	0	8	4	60	40	100
MANDATORY COURSE									
	Mandatory Course - II	MC	3	0	0	0	-	-	-
TOTAL CREDITS IN SEMESTER VI					20				

HS	:	Humanities and Social Sciences
BS	:	Basic Sciences
ES	:	Engineering Sciences
PC	:	Professional Core
PE	:	Professional Elective
GE	:	General Elective
OE	:	Open Elective
EEC	:	Employability Enhancement Courses
MC	:	Mandatory Courses
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(For the Students Admitted in the Academic Year 2023-2024 onwards)

B.E.- ELECTRICAL AND ELECTRONICS ENGINEERING – SEVENTH SEMESTER

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		C	CIA	ESE
THEORY									
23HST701	Human Values and Ethics	HS	3	0	0	3	40	60	100
	Elective-Management	GE	3	0	0	3	40	60	100
	Open Elective-II/NCC-II L2/ L4	OE	3	0	0	3	40	60	100
	Open Elective-III	OE	3	0	0	3	40	60	100
EMPLOYABILITY ENHANCEMENT COURSE									
23EEJ701	Project Work – Phase II	EEC	0	0	8	4	60	40	100
TOTAL CREDITS IN SEMESTER VII					16				

HS	:	Humanities and Social Sciences
BS	:	Basic Sciences
ES	:	Engineering Sciences
PC	:	Professional Core
PE	:	Professional Elective
GE	:	General Elective
OE	:	Open Elective
EEC	:	Employability Enhancement Courses
MC	:	Mandatory Courses
L	:	Lecture
T	:	Tutorial
P	:	Practical
C	:	Credit Point
CIA	:	Continuous Internal Assessment
ESE	:	End Semester Examination
TOT	:	Total





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CURRICULUM

FOR B.E. / B.Tech. DEGREE PROGRAMMES

(For the Students Admitted in the Academic Year 2023-2024 onwards)

B.E. – ELECTRICAL AND ELECTRONICS ENGINEERING – EIGHTH SEMESTER

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		C	CIA	ESE
EMPLOYABILITY ENHANCEMENT COURSE									
23EEJ801	Product Development	EEC	0	0	12	6	60	40	100
23EEC801	Internship	EEC	0	0	4	2	100	-	100
TOTAL CREDITS IN SEMESTER VIII						8			

HS	:	Humanities and Social Sciences
BS	:	Basic Sciences
ES	:	Engineering Sciences
PC	:	Professional Core
PE	:	Professional Elective
GE	:	General Elective
OE	:	Open Elective
EEC	:	Employability Enhancement Courses
MC	:	Mandatory Courses
L	:	Lecture
T	:	Tutorial
P	:	Practical
C	:	Credit Point
CIA	:	Continuous Internal Assessment
ESE	:	End Semester Examination
TOT	:	Total



LIST OF HUMANITIES AND SOCIAL SCIENCES

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		CIA	ESE	TOT
23HST101	Professional English	HS	3	0	0	3	40	60	100
23HST102	/Heritage of Tamils	HS	1	0	0	1	40	60	100
23CYT201	Environmental Sciences and Sustainability	HS	3	0	0	3	40	60	100
23HST202	தமிழரும் தொழில்நுட்பமும் / Tamils and Technology	HS	1	0	0	1	40	60	100
23HSE201	English for Engineers: Theory and Practice	HS	3	0	2	4	50	50	100
23HST701	Human Values and Ethics	HS	3	0	0	3	40	60	100

LIST OF BASIC SCIENCES

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		CIA	ESE	TOT
23MAT101	Matrices and calculus	BS	3	1	0	4	40	60	100
23PHE103	Applied Physics for Electronics Engineering	BS	3	0	2	4	50	50	100
23CYE101	Engineering Chemistry	BS	3	0	2	4	50	50	100
23MAT202	Differential Equations and Numerical Methods	BS	3	1	0	4	40	60	100
23PHT203	Advanced Physics for Electronics Engineering	BS	3	0	0	3	40	60	100
23MAT301	Transforms and Complex Functions	BS	3	1	0	4	40	60	100

LIST OF ENGINEERING SCIENCES

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		CIA	ESE	TOT
23GEE101	Programming in C	ES	3	0	2	4	50	50	100
23GEL201	Engineering Practices Laboratory	ES	0	0	4	2	60	40	100
23GEL202	Engineering Drawing for Electrical and Electronics	ES	0	0	4	2	60	40	100
23GEE301	Problem Solving and Python Programming	ES	3	0	2	4	50	50	100

LIST OF PROFESSIONAL CORE

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		CIA	ESE	TOT
23EEE201	Electric Circuit Analysis	PC	3	0	2	4	50	50	100
23EET301	Electromagnetic Theory	PC	3	1	0	4	40	60	100
23EET302	Measurements and Instrumentation	PC	3	0	0	3	40	60	100
23EEE301	DC Machines and Transformers	PC	3	0	2	4	50	50	100
23EEE302	Analog Electronics and Circuits	PC	3	0	2	4	50	50	100
23EEE303	Digital Electronics and Linear Integrated Circuits	PC	3	0	2	4	50	50	100
23EET401	Electrical Power Transmission and Distribution	PC	3	0	0	3	40	60	100
23EET402	Power Electronics	PC	3	0	0	3	40	60	100
23EET403	Control Systems Engineering	PC	3	0	0	3	40	60	100
23EEE401	Microprocessors and Microcontrollers	PC	3	0	2	4	50	50	100
23EEE402	Induction and Synchronous Machines	PC	3	0	2	4	50	50	100
23EET501	Power System Analysis	PC	3	1	0	4	40	60	100
23EEE501	Electrical Drives	PC	3	0	2	4	50	50	100
23EEE502	Renewable Energy and Energy Storage System	PC	3	0	2	4	50	50	100
23EEE601	Power System Operation and Control	PC	3	0	2	4	50	50	100

LIST OF PROFESSIONAL ELECTIVE COURSES

PROFESSIONAL ELECTIVE - I

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		CIA	ESE	TOT
23EEP501	Under Ground Cable	PE	3	0	0	3	40	60	100
23EEP502	Power Quality	PE	3	0	0	3	40	60	100
23EEP503	Flexible AC Transmission Systems	PE	3	0	0	3	40	60	100
23EEP504	High Voltage Engineering	PE	3	0	0	3	40	60	100
23EEP505	Utilization of Electrical Energy	PE	3	0	0	3	40	60	100
23EEP506	Smart Grid	PE	3	0	0	3	40	60	100



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PROFESSIONAL ELECTIVE - II

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		CIA	ESE	TOT
23EEP507	SMPS and UPS	PE	3	0	0	3	40	60	100
23EEP508	Special Electrical Machines	PE	3	0	0	3	40	60	100
23EEP509	Multi Level Power Converter	PE	3	0	0	3	40	60	100
23EEP510	Protection and Switchgear	PE	3	0	0	3	40	60	100
23EEP511	Modern Power Converters	PE	3	0	0	3	40	60	100
23EEP512	Power Electronics for Renewable Energy System	PE	3	0	0	3	40	60	100

PROFESSIONAL ELECTIVE - III

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		CIA	ESE	TOT
23EEP513	Discrete Time System and Signal processing	PE	3	0	0	3	40	60	100
23EEP514	Embedded System Design	PE	3	0	0	3	40	60	100
23EEP515	Embedded C Programming	PE	3	0	0	3	40	60	100
23EEP516	Embedded Control for Electrical Drives	PE	3	0	0	3	40	60	100
23EEP517	Microcontroller Based System Design	PE	3	0	0	3	40	60	100
23EEP518	Embedded System for Automotive Applications	PE	3	0	0	3	40	60	100

PROFESSIONAL ELECTIVE - IV

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		CIA	ESE	TOT
23EEP601	Electric Vehicle Architecture	PE	3	0	0	3	40	60	100
23EEP602	Electric Vehicle Design, Mechanics and Control	PE	3	0	0	3	40	60	100
23EEP603	Design of Electric Vehicle Charging System	PE	3	0	0	3	40	60	100
23EEP604	Design of Motor and Power Converters for Electric Vehicles	PE	3	0	0	3	40	60	100
23EEP605	Electric Vehicles	PE	3	0	0	3	40	60	100
23EEP606	Testing of Electric Vehicles	PE	3	0	0	3	40	60	100





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PROFESSIONAL ELECTIVE - V

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		CIA	ESE	TOT
23EEP607	Process Modeling and Simulation	PE	3	0	0	3	40	60	100
23EEP608	Soft Computing	PE	3	0	0	3	40	60	100
23EEP609	Optimal Control	PE	3	0	0	3	40	60	100
23EEP610	Adaptive Control	PE	3	0	0	3	40	60	100
23EEP611	Computer Control of Process	PE	3	0	0	3	40	60	100
23EEP612	Machine Monitoring System	PE	3	0	0	3	40	60	100

PROFESSIONAL ELECTIVE - VI

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		CIA	ESE	TOT
23EEP613	Design of Electrical Apparatus	PE	3	0	0	3	40	60	100
23EEP614	Energy Storage Systems	PE	3	0	0	3	40	60	100
23EEP615	Grid Integrating Techniques and Challenges	PE	3	0	0	3	40	60	100
23EEP616	Hybrid Energy Technology	PE	3	0	0	3	40	60	100
23EEP617	Power Systems Transients	PE	3	0	0	3	40	60	100
23EEP618	PLC Programming	PE	3	0	0	3	40	60	100

LIST OF OPEN ELECTIVE COURSES

OPEN ELECTIVE - I

Offered by the Departments	Course Code / Course Name	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		CIA	ESE	TOT
CIVIL	23CEO607 / Environmental and Social Impact Assessment	OE	3	0	0	3	40	60	100
CSE	23CSO610 / Introduction to Drone Technologies	OE	3	0	0	3	40	60	100
ECE	23ECO602 / Fundamentals of Electronic Devices and Circuits	OE	3	0	0	3	40	60	100





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EEE	23EEO603 / Electric Vehicle Technology	OE	3	0	0	3	40	60	100
	23EEO604 / Renewable Energy Systems	OE	3	0	0	3	40	60	100
MECHANICAL	23MEO601 / Introduction to Industrial Engineering	OE	3	0	0	3	40	60	100
	23MEO605 / CNC Machining Technology	OE	3	0	0	3	40	60	100
MEDICAL ELECTRONICS	23MDO611 / Hospital Management	OE	3	0	0	3	40	60	100
ROBOTICS AND AUTOMATION	23RAO609 / Fundamentals of Robotics	OE	3	0	0	3	40	60	100
CSE(Cyber Security)	23CSO612 / Cyber Forensics and Ethical Hacking	OE	3	0	0	3	40	60	100
PHARMACEUTICAL TECHNOLOGY	23PMO608 / Pharamaceutical Nanotechnology	OE	3	0	0	3	40	60	100
MATHEMATICS	23MAO606 / Graph Theory	OE	3	0	0	3	40	60	100

OPEN ELECTIVE- II

Offered by the Departments	Course Code / Course Name	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		CIA	ESE	TOT
CIVIL	23CEO704 / Remote Sensing Concepts	OE	3	0	0	3	40	60	100
ECE	23ECO708 / Energy Technology	OE	3	0	0	3	40	60	100
EEE	23EEO709 / Sensors, Actuators and its Application	OE	3	0	0	3	40	60	100
MECHANICAL	23MEO703 / Fundamentals of Mechatronics	OE	3	0	0	3	40	60	100
	23MEO704 / Nano Technology	OE	3	0	0	3	40	60	100
	23MEO712 / Smart Manufacturing	OE	3	0	0	3	40	60	100
MEDICAL ELECTRONICS	23MDO705 / Ultrasound Principles and its Medical Applications	OE	3	0	0	3	40	60	100
ROBOTICS AND AUTOMATION	23RAO707 / Mobile Robots	OE	3	0	0	3	40	60	100
CSE(Cyber Security)	23CSO711 / Introduction to Cyber Security	OE	3	0	0	3	40	60	100
PHARMACEUTICAL TECHNOLOGY	23PMO706 / Intellectual Property Rights for Pharma Industry	OE	3	0	0	3	40	60	100
MATHEMATICS	23MAO710 / Operations Research	OE	3	0	0	3	40	60	100





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OPEN ELECTIVE - III

Offered by the Departments	Course Code / Course Name	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		CIA	ESE	TOT
CIVIL	23CEO717 / Geographical Information System	OE	3	0	0	3	40	60	100
CSE	23CSO715 / Fundamentals of Blockchain Technology	OE	3	0	0	3	40	60	100
ECE	23ECO718 / VLSI Design	OE	3	0	0	3	40	60	100
EEE	23EEO716 / Electrical, Electronic and Magnetic Materials	OE	3	0	0	3	40	60	100
MECHANICAL	23MEO720 / Marine Vehicles	OE	3	0	0	3	40	60	100
MEDICAL ELECTRONICS	23MDO719 / Wearable Technology	OE	3	0	0	3	40	60	100
	23MDO723 / Medical Waste Management								
	23MDO724 / Lifestyle Diseases								
ROBOTICS AND AUTOMATION	23RAO721 / Robotics Process Automation	OE	3	0	0	3	40	60	100
MATHEMATICS	23MAO714 / Advanced Numerical Methods	OE	3	0	0	3	40	60	100
MANAGEMENT	23MGO722 / Cost management of Engineering Projects	OE	3	0	0	3	40	60	100

GENERAL ELECTIVES

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		CIA	ESE	TOT
23NCCL01	NCC AIRFORCE LEVEL-1	GE	3	0	0	3	40	60	100
23NCCL02	NCC AIRFORCE LEVEL - 2	GE	3	0	0	3	40	60	100
23NCCL03	NCC ARMY WING LEVEL - 3	GE	3	0	0	3	40	60	100
23NCCL04	NCC ARMY WING LEVEL - 4	GE	3	0	0	3	40	60	100



ELECTIVE - MANAGEMENT

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		CIA	ESE	TOT
23MGT701	Principles of Management	GE	3	0	0	3	40	60	100
23MGT702	Total Quality Management	GE	3	0	0	3	40	60	100
23MGT703	Engineering Economics and Financial Accounting	GE	3	0	0	3	40	60	100
23MGT704	Human Resource Management	GE	3	0	0	3	40	60	100
23MGT705	Knowledge Management	GE	3	0	0	3	40	60	100
23MGT706	Industrial Management	GE	3	0	0	3	40	60	100
23MGT707	Supply Chain Management	GE	3	0	0	3	40	60	100
23MGT708	e-Waste Management	GE	3	0	0	3	40	60	100

LIST OF EMPLOYABILITY ENHANCEMENT COURSES

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		CIA	ESE	TOT
23EEC101	Soft Skills & Life Skills	EEC	1	0	0	1	100	-	100
23EEC201	Indian Language (Except Mother Tongue / Foreign Language)	EEC	0	0	4	2	100	-	100
23EEC301	Professional Development	EEC	0	0	2	1	100	-	100
23EEC401	Online Certification Courses	EEC	3	0	0	3	100	-	100
23EEC501	Industrial Training	EEC	0	0	4	2	100	-	100
23EEJ601	Project Work - Phase I	EEC	0	0	8	4	60	40	100
23EEJ701	Project Work - Phase II	EEC	0	0	8	4	60	40	100
23EEJ801	Product Development	EEC	0	0	12	6	60	40	100
23EEC801	Internship	EEC	0	0	4	2	100	-	100



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LIST OF MANDATORY COURSES

MANDATORY COURSES - I

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		CIA	ESE	TOT
23MDC501	Introduction to Women and Gender Studies	MC	3	0	0	0	-	-	-
23MDC502	Elements of Literature	MC	3	0	0	0	-	-	-
23MDC503	Film Appreciation	MC	3	0	0	0	-	-	-
23MDC504	Disaster Risk Reduction and Management	MC	3	0	0	0	-	-	-
23MDC505	Constitution of India	MC	3	0	0	0	-	-	-

MANDATORY COURSES - II

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		CIA	ESE	TOT
23MDC601	Well Being with Traditional Practices- Yoga, Ayurveda and Siddha	MC	3	0	0	0	-	-	-
23MDC602	History of Science and Technology in India	MC	3	0	0	0	-	-	-
23MDC603	Political and Economical Thought for a Human Society	MC	3	0	0	0	-	-	-
23MDC604	State, Nation Building and Politics in India	MC	3	0	0	0	-	-	-
23MDC605	Industrial Safety	MC	3	0	0	0	-	-	-





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CURRICULUM AND SYLLABI

FOR B.E. / B.Tech. DEGREE PROGRAMMES

(For the Students Admitted in the Academic Year 2025-2026 onwards)

CREDIT SUMMARY

B.E. ELECTRICAL AND ELECTRONICS ENGINEERING

Category	Credits Per Semester								Credit Total
	I	II	III	IV	V	VI	VII	VIII	
HS	4	8	-	-	-	-	3	-	15
BS	12	9	4	-	-	-	-	-	25
ES	4	2	-	4	-	-	-	-	10
PC	-	4	19	17	12	4	-	-	56
PE	-	-	-	-	9	9	-	-	18
OE	-	-	-	-	-	3	6	-	9
GE	-	-	-	-	-	-	3	-	3
EEC	1	2	1	3	2	4	4	8	25
MC	-	-	-	-	0	0	-	-	0
Total	21	25	24	24	23	20	16	8	161





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SEMESTER I

23HST101

PROFESSIONAL ENGLISH

L T P C

(Common to all B.E. & B.Tech. Branches)

3 0 0 3

OBJECTIVES

- To build vocabulary proficiency and familiarity with varied lexical and contextual usages.
- To strengthen grammatical accuracy for effective sentence construction and language application.
- To develop clarity and coherence in written communication across academic and business contexts.
- To enhance oral fluency, confidence, and interactive communication skills.
- To promote efficient reading strategies for comprehension, analysis, and note-making.

UNIT I VOCABULARY

8

Synonyms and Antonyms - Word Formation - Sentence Types (declarative, imperative, interrogative & exclamatory) - Single Word Substitutes - Use of Abbreviations and Acronyms- Homonyms and Homophones - Collocation - British and American Vocabulary.

UNIT II GRAMMAR

10

Parts of speech - Be, Have and Do verbs - Punctuation - Tenses - Numerical Adjectives - modal verbs - Single line Definition - Direct and Indirect Speech - Gerunds and Infinitives - Same Word Used as Different Parts of Speech.

UNIT III WRITING

9

Letter Writing - Business communications - quotations, placing orders, complaints, replies to queries from business customers - Dialogue Writing - Paragraph Writing (descriptive, narrative, expository & persuasive) - Essay Writing - Writing Instructions.

UNIT IV SPEAKING

9

Self-introduction - Giving personal and factual information - Talking about present circumstances, past experiences and future plans - Expressing opinions and justifying opinions - Agreement / disagreement - Likes and dislikes - Tongue twisters

UNIT V READING SKILLS

9

Reading Comprehension - Reading techniques, pre-reading, post-reading, comprehension questions (multiple choice questions or short questions) - Short Comprehension Passages, practice



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skimming - Scanning and Predicting - Reading the passage and taking (Note making) Notes - Scan and understand main contents of the passage.

TOTAL: 45 PERIODS

OUTCOMES

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

- Use a wide range of vocabulary effectively in oral and written communication.
- Frame grammatically and meaningful sentences.
- Write formal and informal letters, develop coherent paragraphs and essays, and engage in meaningful dialogues.
- Apply speaking skills for self-introduction, speeches, and technical presentations.
- Read, comprehend, and take organized notes from passages and technical content.

TEXT BOOKS

1. "Using English A Course book for Undergraduate Engineers and Technologists", Orient Black Swan Limited, Hyderabad, Board of Editors: 2015.
2. Richards, C. Jack, "Interchange Students' Book-2", 2015.

REFERENCES

1. Department of English, Anna University, "Mindscapes: English for Technologists and Engineers", First Edition, Orient Black Swan, 2012.
2. Krishna Mohan, Meera Banerji, "Developing Communication Skills", Paperback, MacMillan, 2019.

E-RESOURCES

1. <http://www.usingenglish.com>
2. <https://www.khanacademy.org/humanities/grammar>

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	1	-	-	-	1	-	-	-	2	3	-	2	-	-
2	1	-	-	-	1	-	-	-	2	3	-	2	-	-
3	-	1	2	-	1	-	-	-	2	3	1	2	-	-
4	-	-	1	-	-	-	-	-	2	3	2	2	-	-
5	1	1	-	2	1	-	-	-	1	3	-	2	-	-
AVG	1	1	1.5	2	1	-	-	-	1.8	3	1.5	2	-	-

1- Low 2-Medium 3-High '-' - No Correlation

Chairman - BoS



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23MAT101

MATRICES AND CALCULUS

L T P C

(Common to all B.E./B.Tech. Branches)

3 1 0 4

OBJECTIVES

- To develop the use of matrix algebra and its properties.
- To explore the techniques of differential and integral calculus.
- To categorize methods for functions of several variables.
- To introduce the use of multiple integrals and their applications.
- To provide knowledge of vector calculus.

UNIT I MATRICES

9+3

Eigen values and Eigen vectors – Properties of Eigen values – Cayley-Hamilton theorem – Reduction of quadratic form to canonical form by orthogonal transformation – Nature of quadratic form.

UNIT II DIFFERENTIAL AND INTEGRAL CALCULUS

9+3

Differentiation rules: Derivatives of polynomials and exponential functions – The product and quotient Rules – Derivatives of trigonometric functions – The Chain rule – Implicit differentiation – Applications of differentiation: Maximum and Minimum Values – Techniques of integration: Integration by parts – Trigonometric integrals – Integration of rational functions by partial fractions.

UNIT III FUNCTIONS OF SEVERAL VARIABLES

9+3

Partial derivatives – Homogeneous functions – Euler's theorem – Total derivative – Jacobians – Taylor's theorem for functions of two variables – Maxima and minima of functions of two variables – Lagrange's method of undetermined multipliers.

UNIT IV MULTIPLE INTEGRALS

9+3

Double integrals – Change of order of integration – Double integrals in polar coordinates – Area enclosed by plane curves – Triple integrals – Volume of solids – Change of variables in double integrals.

UNIT V VECTOR CALCULUS

9+3

Scalar and vector point functions – Gradient – Divergence and curl – Line integral – Surface integral – Green's theorem in a plane – Volume integral – Divergence theorem – Irrotational and Solenoidal fields.



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LIST OF EXPERIMENTS

1. Computation of Eigen values and Eigenvectors.
2. Matrix addition and multiplications.
3. Calculate differentiations of simple functions.
4. Calculate integrations of simple functions.
5. Determining Maxima and minima of functions for one variable.
6. Determining Maxima and minima of functions for two variables.
7. Evaluating double integral with constant limits.
8. Evaluating triple integral with constant limits.
9. Computing Gradient, divergence and curl of point functions.
10. Evaluating line integral in vector calculus.

TOTAL: 45+15 PERIODS

OUTCOMES

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

- Apply matrix algebra methods to solve practical problems.
- Apply the concepts of differential and integral calculus.
- Analyze the ideas of differential calculus for functions of several variables.
- Apply multiple integral ideas in solving areas and volumes.
- Solve the engineering problems using the concepts of vector calculus.

TEXT BOOKS

1. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, Forty Third Edition, New Delhi, 2014.
2. James Stewart, "Calculus: Early Transcendentals", Cengage Learning, Seventh Edition, New Delhi, 2015.

REFERENCES

1. Bali N.P, Goyal M. and Watkins C., "Advanced Engineering Mathematics", Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.), New Delhi, Seventh Edition, 2009.
2. Kanti B. Dutta., "Mathematical Methods of Science and Engineering – Aided with MATLAB", Cengage Learning, New Delhi, Second Edition, 2013.



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E-RESOURCES

1. <https://nptel.ac.in/courses/111105121>- (Differential Calculus and Integral Calculus)
2. <https://nptel.ac.in/courses/111107112> -(matrix analysis)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	3	2	-	-	-	-	-	-	-	-	2	-	-
2	3	3	2	-	-	-	-	-	-	-	-	2	-	-
3	3	3	2	-	-	-	-	-	-	-	-	2	-	-
4	3	3	2	-	-	-	-	-	-	-	-	2	-	-
5	3	3	2	-	-	-	-	-	-	-	-	2	-	-
AVG	3	3	2	-	-	-	-	-	-	-	-	2	-	-

1-Low 2-Medium 3-High '-' – No Correlation


Chairman - BoS



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23HST102

HERITAGE OF TAMILS

L T P C

(Common to all Branches)

1 0 0 1

OBJECTIVES

- To familiarize the students on extensive literature of classical Tamil.
- To analyze rock art paintings to modern art.
- To acquire knowledge on folk and martial arts.
- To apply the concepts of Thinaï in Tamils.
- To realize the contribution of Tamils in Indian freedom struggle.

UNIT I LANGUAGE AND LITERATURE

3

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

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

3

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

UNIT III FOLK AND MARTIAL ARTS

3

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

UNIT IV THINAI CONCEPT OF TAMILS

3

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

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

3

Contribution of Tamils to Indian Freedom Struggle - The Cultural Influence of Tamils over the other parts of India– Self-Respect Movement- Role of Siddha Medicine in Indigenous Systems of



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Medicine – Inscriptions & Manuscripts – Print History of Tamil Books.

TOTAL: 15 PERIODS

OUTCOMES

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

- Analyze the extensive literature Tamil and classical nature.
- Understand the heritage of sculpture, painting and musical instruments.
- Classify the folk and martial arts of Tamil people.
- Examine Thinaï concepts, trade and victory of Chozha dynasty.
- Interpret the contribution of Tamils in Indian freedom struggle, Self-esteem movement and siddha medicine.

TEXT-CUM-REFERENCE BOOKS

1. தமிழகவரலாறு - மக்களும்பண்பாடும் - கே. கே. பிள்ளை
(வெளியீடு:தமிழ்நாடுபாடநூல்மற்றும்கல்வியியல்பணிகள்கழகம்).
2. கணினித்தமிழ் - முனைவர்இல. சுந்தரம். (விகடன்பிரசுரம்).
2. கீழடி - வைகைநதிக்கரையில் சங்ககால நகரநாகரிகம் (தொல்லியல் துறைவெளியீடு)
3. பொருநை -ஆற்றங்கரைநாகரீகம். (தொல்லியல்துறைவெளியீடு).
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 the river Vaigai' (Jointly Published by: Department of Archaeology & Tamilnadu Textbook and Educational Services Corporation, Tamilnadu.)
9. Studies in the History of India with Special Reference to Tamilnadu (Dr.K.K.Pillay) (Published by: The Author)
10. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamilnadu Textbook and Educational Services Corporation, Tamilnadu.)
11. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.



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Mapping of COs-POs & PSOs

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1	-	-	-	-	-	-	-	2	1	2	-	1	-	-
2	-	-	-	-	-	-	-	2	1	2	-	1	-	-
3	-	-	-	-	-	-	-	2	1	2	-	1	-	-
4	-	-	-	-	-	-	-	2	1	2	-	1	-	-
5	-	-	-	-	-	-	-	2	1	2	-	1	-	-
AVG	-	-	-	-	-	-	-	2	1	2	-	1	-	-

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


Chairman - BoS



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23HST102

தமிழர்மரபு

L T P C

(அனைத்து துறைகளுக்கும் பொதுவானது)

1 0 0 1

நோக்கங்கள்

மாணவர்கள் கண்டிப்பாக அறியவேண்டுவன

- செம்மொழியான தமிழ்மொழியின் விரிவான இலக்கியத்தைப் பற்றி அறிதல்.
- பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை உள்ள கலைகளை பகுப்பாய்வு செய்தல்.
- நாட்டுப் புறக்கலைகள் மற்றும் வீர விளையாட்டுகளைப் புரிந்து கொள்ளுதல்.
- தமிழர்களின் திணைக் கோட்பாடுகளைச் செயல்படுத்துதல்.
- இந்திய விடுதலைப் போராட்டத்திற்கும் புண்பாட்டிற்கும் தமிழர்களின் பங்களிப்பை உணருதல்.

அலகு 1 மொழிமற்றும் இலக்கியம்

3

இந்திய மொழிக் குடும்பங்கள் - திராவிட மொழிகள் - தமிழ் ஒரு செம்மொழி - தமிழ் செவ்விலக்கியங்கள் - சங்க இலக்கியத்தின் சமயச்சார் பற்ற தன்மை - சங்க இலக்கியத்தில் பகிர்தல் அறம் - திருக்குறளில் மேலாண்மைக் கருத்துக்கள் - தமிழகக்காப்பியங்கள், தமிழகத்தில் சமண பௌத்த சமயங்களின் தாக்கம் - பக்தி இலக்கியம், ஆழ்வார்கள் மற்றும் நாயன்மார்கள் - சிற்றிலக்கியங்கள் - தமிழில் நவீன இலக்கியத்தின் வளர்ச்சி - தமிழ் இலக்கியவளர்ச்சியில் பாரதியார் மற்றும் பாரதிதாசன் ஆகியோரின் பங்களிப்பு.

அலகு II மரபு - பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை - சிற்பக்கலை

3

நடுகல் முதல் நவீன சிற்பங்கள் வரை - ஐம்பொன்சிலைகள் - பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப் பொருட்கள், பொம்மைகள் - தேர் செய்யும் கலை - சுடுமண் சிற்பங்கள் - நாட்டுப்புறத் தெய்வங்கள் - குமரிமுனையில் திருவள்ளுவர் சிலை - இசைக்கருவிகள் - மிருதங்கம், பறை, வீணை, யாழ், நாதஸ்வரம் - தமிழர்களின் சமூக பொருளாதார வாழ்வில்



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கோவில்களின் பங்கு.

அலகு III நாட்டுப்புறக் கலைகள் மற்றும் வீரவிளையாட்டுகள்

3

தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான்கூத்து, ஓயிலாட்டம், தோல்பாவைக் கூத்து, சிலம்பாட்டம், வளரி, புலியாட்டம், தமிழர்களின் விளையாட்டுகள்.

அலகு IV தமிழர்களின் திணைக் கோட்பாடுகள்

3

தமிழகத்தின் தாவரங்களும், விலங்குகளும் - தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புறக்கோட்பாடுகள் - தமிழர்கள் போற்றிய அறக்கோட்பாடு - சங்ககாலத்தில் தமிழகத்தில் எழுத்தறிவும், கல்வியும் - சங்ககால நகரங்களும் துறைமுகங்களும் -சங்ககாலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி - கடல் கடந்த நாடுகளில் சோழர்களின் வெற்றி.

அலகு V இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு

3

இந்திய விடுதலைப் போரில் தமிழர்களின் பங்கு - இந்தியாவின் பிறப்பகுதிகளில் தமிழ்ப்பண்பாட்டின் தாக்கம் - சுயமரியாதை இயக்கம் - இந்திய மருத்துவத்தில் சித்த மருத்துவத்தின் பங்கு - கல்வெட்டுகள், கையெழுத்துப் படிக்கல்கள் - தமிழ்ப் புத்தகங்களின் அச்ச வரலாறு.

TOTAL: 15 PERIODS

முடிவுகள்

பாடத்தின்முடிவில், மாணவர்கள் அறிந்து கொள்வன:

- தமிழ்மொழியின் செம்மொழி தன்மையையும் சங்க இலக்கியத்தின் முக்கியத்துவத்தையும் உணர்வார்கள்.
- தமிழர்களின் சிற்ப, ஓவிய, இசை மரபுகளை புரிந்து கொள்வார்கள்.
- நாட்டுப்புறக் கலைகளையும் வீர விளையாட்டுகளையும் வகைப்படுத்துவார்கள்.
- தமிழர்களின் திணைக்கோட்பாடுகளும் சங்ககால வர்த்தகமும் புரிந்து கொள்வார்கள்.



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- இந்திய விடுதலைப் போராட்டம், சுயமரியாதை இயக்கம், சித்த மருத்துவம் ஆகியவற்றில் தமிழர்களின் பங்களிப்பை விளக்குவார்கள்.

உரைமற்றும் குறிப்புத்தகங்கள்

1. தமிழகவரலாறு – மக்களும் பண்பாடும் – கே. கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள்கழகம்).
2. கணினித்தமிழ் - முனைவர் இல. சுந்தரம். (விகடன்பிரசுரம்).
3. கீழடி – வைகைநதிக் கரையில் சங்ககால நகரநாகரிகம் (தொல்லியல் துறைவெளியீடு)
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CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	-	-	-	-	-	-	-	2	1	2	-	1	-	-
2	-	-	-	-	-	-	-	2	1	2	-	1	-	-
3	-	-	-	-	-	-	-	2	1	2	-	1	-	-
4	-	-	-	-	-	-	-	2	1	2	-	1	-	-
5	-	-	-	-	-	-	-	2	1	2	-	1	-	-
AVG	-	-	-	-	-	-	-	2	1	2	-	1	-	-

1 - Low, 2 - Medium, 3 - High, “-” - No Correlation

Chairman - BoS



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23PHE103

APPLIED PHYSICS FOR ELECTRONICS ENGINEERING

L T P C

(Common to ECE, EEE & Medical Electronics)

3 0 2 4

OBJECTIVES

- To impart knowledge of different crystal lattices and crystal structures.
- To introduce the fundamental principles of lasers and their general scientific and engineering applications.
- To provide an understanding of the principles of optical fiber and its engineering applications.
- To explain the fundamentals and industrial applications of acoustics and ultrasonics.
- To enable students to understand the principles of quantum mechanics and Schrödinger's wave equation for analyzing complex physical phenomena.
- To understand and apply the fundamental principles of lasers, quantum mechanics, nanomaterials, digital circuits, and storage devices

UNIT I CRYSTAL PHYSICS

9

Lattice and Unit cell – Crystal Systems and Bravais Lattice – Lattice Planes – Miller Indices – d - Spacing in Cubic Lattice – Calculation of Number of Atoms per Unit Cell – Atomic Radius, Coordination number, Packing factor for SC, BCC, FCC and HCP Structures – Crystal Growth Techniques : Melt Growth Techniques (Bridgman and Czochralski).- Silicon chip Production Process.

UNIT II PHOTONICS

9

Spontaneous and Stimulated Emission- Population Inversion-Source of excitation- active medium, optical resonator - Derivation of Einstein's A and B co-efficient – Principle and Working of He Ne Laser - Direct Band gap and Indirect Bandgap Semiconductors - Semiconductor Diode Laser (Homo junction & hetero junction) - Applications of Lasers in Science, Engineering and Medicine - Digital Laser Material Processing Technology.

UNIT III FIBRE OPTICS

9

Principle and Propagation light in Optical Fibres- Derivation of Numerical Aperture and Acceptance angle - Classification of Optical Fibres - Fibre optic sensors. (Pressure, Temperature Sensors)-Local area Network (qualitative) -Advantages & Application of Optical Fibre: Fibre Optic Communication System, Medical Endoscope



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UNIT IV ACOUSTICS & ULTRASONICS

9

ACOUSTICS: Classification of Sound – Decibel - Weber Fechner law- Reverberation-Sabine's formula (Concept only) - Factors affecting Acoustics of Buildings and their remedies.

ULTRASONICS: Properties -Production of ultrasonic's - Magnetostriction and Piezoelectric methods - Non Destructive Testing: Pulse Echo System, through Transmission and Reflection modes.

UNIT V QUANTUM PHYSICS

9

Black Body Radiation – Planck's Theory (Derivation) – Electron Diffraction – Wave function and its Physical Significance – Schrödinger's Wave Equations: Time Independent and Time Dependent Equation – Scanning Electron Microscope - Transmission Electron Microscope - Quantum Tunnelling & Scanning Tunnelling Electron Microscope.

LIST OF EXPERIMENTS

(Any Eight experiments to be conducted)

1. Determination of wavelength of laser.
2. Determination of particle Size lycopodium powder using laser.
3. Fibre Optics: Determination of Numerical Aperture and Acceptance angle.
4. Determination of wavelength of mercury spectrum- Spectrometer.
5. Determination of velocity of ultrasonic in liquid.
6. Verification of truth tables of logic gates using IC's: (OR, AND, NOT, XOR, NOR and NAND)
7. Determination of thickness of wire - Air wedge method.
8. Determination of bandgap of a given semiconductor diode.
9. Determination of reverse bias characteristics of the photodiode. (Virtual)
10. Compact disc- Determination of width of the groove using laser. (Virtual)

TOTAL: 45 + 15 = 60 PERIODS

OUTCOMES

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

- Apply crystallographic concepts to examine the structure of crystalline solids.
- Explain the principles of lasers and it's their applications.
- Explain the principles of optical fiber and its applications.
- Explain the fundamentals of sound waves and ultrasonic's and their engineering applications.



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- Analyze the principles of quantum mechanics and Schrödinger's wave equation to identify complex physical phenomena.
- Demonstrate an understanding of the principles of lasers, quantum mechanics, nanomaterials, digital circuits, and storage devices.

TEXT BOOKS

- P.Mani, "Engineering Physics Practicals", Dhanam Publications, 2019.
- Rajendiran V, "Engineering Physics" Tata McGraw Hill, 2017
- Arthur Beiser, Shobhit Mahajan, S. Rai Choudhury, "Concepts of Modern Physics", McGrawHill (Indian Edition), 2017

REFERENCES

- Avadhanulu M.N & Kshirsagar P.G "Text Book of Engineering Physics". S.Chand, 2016.
- Wahab, M.A. "Solid State Physics: Structure and Properties of Materials" Narosa Publishing House, 2019
- K.Thyagarajan and A.Ghatak. "Lasers: Fundamentals and Applications", Laxmi Publications, (Indian Edition), 2019

E-RESOURCES

- <https://archive.nptel.ac.in/courses/122/107/122107035/>
- <https://archive.nptel.ac.in/courses/115/101/115101107/>

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	3	1	1	-	-	-	-	-	-	-	-	-	-
2	3	3	1	1	-	-	-	-	-	-	-	-	-	-
3	3	3	1	1	-	-	-	-	-	-	-	-	-	-
4	3	3	1	1	-	-	-	-	-	-	-	-	-	-
5	3	3	1	1	-	-	-	-	-	-	-	-	-	-
6	3	3	1	1	-	-	-	-	-	-	-	-	-	-
AVG	3	3	1	1	-	-	-	-	-	-	-	-	-	-

1-Low 2-Medium 3-High '-' – No Correlation


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23CYE101

ENGINEERING CHEMISTRY

L T P C

(Common to CSE, EEE, ECE, CSE (CS), MDE, AIDS, IT, PT& CSE (AIML) 3 0 2 4

OBJECTIVES

- To introduce the characteristics of water and water treatment methods for industrial applications.
- To familiarize students with the types, properties, and applications of polymers and related materials.
- To employ the principles of phase rule, alloy formation, and heat treatment methods.
- To discuss the synthesis, characterization, and applications of nanomaterials.
- To apply electrochemical principles to understand corrosion mechanisms and corrosion control methods.
- To inculcate practical skills in the determination of water quality parameters and instrumental analysis.

UNIT I WATER TECHNOLOGY

9

Introduction - Characteristics – Hardness – Estimation of hardness by EDTA method – Alkalinity and its estimation - Boiler feed water – Requirements –Boiler troubles (Scale and Sludge) – Internal conditioning (phosphate, calgon and carbonate conditioning methods) – External conditioning – Zeolite process, Demineralization process – Desalination of brackish water by reverse osmosis.

UNIT II POLYMER CHEMISTRY

9

Introduction - Classification of polymers – Natural and Synthetic; Thermoplastic and Thermosetting plastic. Functionality – Degree of polymerization. Types of polymerization: Addition Condensation and Copolymerization, Property of polymer: Glass transition temperature, Preparation, properties and uses of PVC, Nylon 6,6, Polyethylene - Rubbers – Types – Vulcanization of rubber – Plastics – Moulding constituents of plastics – Moulding of plastics – Compression and injection - Biodegradable polymers-Conducting polymers.

UNIT III PHASE RULE AND ALLOYS

9

Phase rule - Explanation of terms involved – One component system – Water system – Condensed phase rule- Simple eutectic systems (Lead – Silver system only). Alloys: Introduction – Definition- Properties of alloys- Significance of alloying, functions and effect of alloying elements - Ferrous alloys – Nichrome and stainless steel – Heat treatment of steel, non-ferrous alloy – Brass.



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UNIT IV CHEMISTRY OF NANO MATERIALS

9

Nano chemistry – Basics (Surface area to volume ratio - Distinction between molecules, nanoparticles and bulk materials- Characterization of nanomaterials using EDX and HR-TEM. Synthesis of nano materials: Top down approach - Ball milling - Bottom up approach - Sol-gel method, Chemical vapour deposition -Applications of nanomaterials (Nano products of today).

UNIT V ELECTROCHEMISTRY, CORROSION AND ITS CONTROL

9

Introduction- Electrochemical cells, applications of electrochemical series-Reference Electrode- standard calomel electrode, ion selective electrode, glass electrode, Corrosion – Types – Chemical Corrosion – Electrochemical Corrosion (galvanic and differential aeration) - Factors influencing corrosion – Material selection and design aspects-Control methods of corrosion –sacrificial anodic and impressed current cathodic protection.

LIST OF EXPERIMENTS

(Any Eight Experiments to be conducted)

1. Determination of total, temporary & permanent hardness of water by EDTA method.
2. Determination of alkalinity in water sample.
3. Determination of DO content of water sample by Winkler's method.
4. Determination of chloride content of water sample by Argentometric method.
5. Determination of strength of given hydrochloric acid using pH meter.
6. Estimation of sodium and potassium present in water using flame photometer.
7. Conductometric Precipitation Titration using BaCl_2 and Na_2SO_4 .
8. Conductometric titration of strong acid vs strong base.
9. Estimation of Ferrous ions by Potentiometric Titration.
10. Estimation of copper content in the brass by Iodometry.

TOTAL: 45 + 15 = 60 PERIODS

OUTCOMES

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

- Explain the quality parameters of water and identify appropriate methods for removing impurities for both domestic and industrial applications.



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- Describe various types of polymers, their polymerization processes, and discuss their special properties and engineering applications.
- Apply the phase rule to understand alloy formation and its relevance in engineering applications.
- Discuss the fundamentals of nanomaterials and apply the core concepts of nanochemistry to engineering problems.
- Analyze the causes of corrosion and propose effective prevention and control strategies.
- Determine the water quality parameters and perform quantitative chemical analysis by pH meter, flame photometry, conductometry and potentiometry.

TEXT BOOKS

- Jain P.C and Monika Jain, "Engineering Chemistry", Seventeenth Edition, Dhanpet Rai Publishing Company (P) Ltd. New Delhi, 2015.
- Viswanathan B, "Nanomaterials" First Edition, Alpha Science International Ltd, 2009.

REFERENCES

- S. S. Dara and S. S. Umare, "A Textbook of Engineering Chemistry", Tenth Edition, S. Chand & Company Ltd, New Delhi, 2015.
- Sivasankar B., "Engineering Chemistry", Second Edition, Tata McGraw-Hill Publishing Company Ltd, New Delhi, 2012.

E-RESOURCES

- <https://nptel.ac.in/courses/104105084>
- <http://library.iitbbs.ac.in/open-access-e-resources.php>

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
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2	1	2	2	2	1	1	1	-	2	1	2	1	-	-
3	3	3	3	2	2	2	2	1	1	2	1	1	-	-
4	2	2	2	1	2	2	2	1	-	1	1	1	-	-
5	3	2	3	2	3	2	2	1	2	1	-	2	-	-
6	3	3	2	1	1	2	2	1	1	2	-	-	-	-
AVG	2.3	2.2	2.5	1.6	1.7	1.8	1.8	1.4	1.5	1.4	1.3	1.3	-	-

1-Low 2-Medium 3-High '-' – No Correlation

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23GEE101

PROGRAMMING IN C

LT P C

(Lab Embedded Theory Course)

3 0 2 4

OBJECTIVES

- To impart fundamental knowledge of C programming concepts, syntax, data types, operators, control structures, and program development.
- To develop students' understanding of arrays, strings, searching, and sorting techniques for solving computational problems.
- To train students in designing modular programs using functions, recursion, pointers, and parameter passing mechanisms.
- To familiarize students with structures, unions, dynamic memory allocation, and their applications in software development.
- To enable students to perform file handling operations and develop efficient C programs using sequential and random file processing.
- To develop C programs to solve real-world programming problems.

UNIT I BASICS OF C PROGRAMMING

9

Introduction to programming paradigms – Structure of C program – C programming: Data Types– variables–Storage classes – Constants – Enumeration Constants – Keywords – Operators: Precedence and Associativity – Expressions –Input/Output statements, Assignment statements – Decision making statements – Switch statement – Looping statements – Pre-processor directives – Compilation process.

Coding practices :

1. Develop a program to find the largest of three numbers using nested if statements.
2. Develop a program to generate multiplication tables using loops.

Problem - solving assignments :

1. Write a program to calculate the area and perimeter of a rectangle, circle, and triangle.
2. Write a program to calculate simple interest and compound interest.

UNIT II ARRAYS AND STRINGS

9

Introduction to Arrays: Declaration, Initialization – One dimensional array – Example Program: Computing Mean, Median and Mode – Two dimensional arrays – Example Program: Matrix Operations (Addition, Scaling, Determinant and Transpose) – String operations: length, compare, concatenate, copy –Sorting – Selection sort, Insertion sort, Merge sort, quick sort –Searching – linear and binary search.

Coding practices :



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1. Develop a program to perform matrix addition and transpose using two-dimensional arrays.
2. Write a program to sort an array using Insertion Sort.

Problem - solving assignments :

1. Develop a program to perform matrix operations such as addition and transpose using two-dimensional arrays.
2. Write a program to search for an element in an array using Linear Search and Binary Search.

UNIT III FUNCTIONS AND POINTERS

9

Introduction to functions: Function prototype, function call, Built-in functions (string functions, math functions) – Recursion – Example Program: Computation of Sine series, Scientific calculator using built-in functions – Pointers – Pointer operators – Arrays and pointers – Example Program: Sorting of names – Parameter passing: Pass by value, Pass by reference – Example Program: Swapping of two numbers and changing the value of a variable using pass by reference.

Coding practices :

1. Develop a recursive program to generate the Fibonacci series.
2. Develop a program to implement a scientific calculator using built-in mathematical functions.

Problem - solving assignments :

1. Write a program to perform arithmetic operations using user-defined functions.
2. Write a program to swap two numbers using pass-by-value and pass-by-reference.

UNIT IV STRUCTURES AND UNION

9

Structure – Example Programs – Nested structures – Pointer in Structures – Array of structures Example Program using structures and pointers – Self referential structures – Dynamic memory allocation, Union- Storage classes.

Coding practices :

1. Develop a program to generate an employee salary slip using structures and pointers.
2. Develop a program using nested structures to represent student academic details.

Problem - solving assignments :

1. Write a program to store and display employee details using an array of structures.
2. Develop a program to demonstrate dynamic memory allocation using structures.

UNIT V FILE PROCESSING

9

Files – Operations of File – Types of file processing: Sequential access, Random access – Sequential access file – Random access file – Command line arguments.

Coding practices :



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1. Write a program to create, write, and read a text file.
2. Develop a program to copy the contents of one file to another.

Problem - solving assignments :

1. Write a program to create, write, and read student records using sequential file processing.
2. Write a program to implement command-line arguments for performing arithmetic operations or file processing.

LIST OF EXPERIMENTS

(Any Eight Experiments to be conducted)

1. Programs using I/O statements, expressions and decision-making constructs.
2. Write a program to find whether the given year is leap year or Not.
3. Design a calculator to perform the operations, namely, addition, subtraction, multiplication, division and square of a number.
4. Check whether a given number is Armstrong number or not?
5. Given a set of numbers like <10, 36, 54, 89, 12, 27>, find sum of weights based on the following conditions.
 - a) 5 if it is a perfect cube.
 - b) 4 if it is a multiple of 4 and divisible by 6.
 - c) 3 if it is a prime number.
6. Populate an array with height of persons and find how many persons are above the average height.
7. From a given paragraph perform the following using built-in functions:(i)Find the total number of words.(ii) Capitalize the first word of each sentence.(iii)Replace a given word with another word.
8. Solve towers of Hanoi using recursion.
9. Locate and Display the Contents of an Array using Pointers.
10. Generate salary slip of employees using structures and pointers.
11. Count the number of account holders whose balance is less than the minimum balance using sequential access file.

TOTAL: 45 +15 = 60 PERIODS

OUTCOMES

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

- Explain the fundamental concepts of C programming and develop programs using data types, operators, expressions, and control structures.
- Develop C programs using arrays, strings, searching, and sorting techniques to solve



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computational problems.

- Construct modular C programs by applying functions, recursion, pointers, and parameter passing techniques.
- Develop applications using structures, unions, pointers, and dynamic memory allocation for efficient data organization and manipulation.
- Analyze file processing techniques using sequential and random access methods to perform data storage and retrieval operations.
- Develop reliable software solutions using C programming for real-world applications

TEXT BOOKS

1. E.Balagurusamy, "Programming in ANSI C", Tata McGraw Hill, Eighth Edition, 2019.
2. Kernighan, B.W and Ritchie, D.M, "The C Programming Language", Pearson Education, Second Edition, 2006.

REFERENCES

1. Reema Thareja, "Programming in C", Oxford University Press, Second Edition, 2016.
2. Juneja, B. L and Anita Seth, "Programming in C", CENGAGE Learning India pvt.Ltd., First Edition, 2011.

E – RESOURCES

1. <https://nptel.ac.in/courses/106/105/106105085/> (Introduction to C Programming)
2. <https://nptel.ac.in/courses/106/106/106106210/> (File operations)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	2	2	–	2	–	–	1	–	1	–	2	2	–
2	3	3	3	2	3	–	–	1	1	1	–	2	2	–
3	3	3	3	2	3	–	–	1	1	1	–	2	2	–
4	3	3	3	2	3	–	–	1	1	1	–	2	2	–
5	3	3	2	3	3	–	–	2	1	1	–	3	2	–
6	3	3	3	3	3	2	1	2	2	2	2	3	2	–
AVG	3	2.8	2.7	2.4	2.8	2	1	1.3	1.2	1.2	2	2.3	2	–

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23EEC101

SOFT SKILLS & LIFE SKILLS

LT P C

(Common to all First year / First Semester B.E., B.Tech., Branches)

1 0 0 1

OBJECTIVES

- To understand the Universal Human Values
- To have an overview on Life skills required in their profession
- To manage the behavior with emotional intelligent skills
- To learn professional Skills required for 21st century
- To formulate and implement effective leadership strategies.

UNIT I UNIVERSAL HUMAN VALUES

3

Understanding harmony in the human being - understanding harmony in the family and society - understanding harmony in the nature and existence - understanding of harmony on professional ethics

UNIT II LIFE SKILLS

3

Soft Skills – Positive Attitude - Empathy - Effective Communication - Decision-Making Skills - Communication Skills - Problem Solving - Critical Thinking- Analytical thinking

UNIT III EMOTIONAL SKILLS

3

Self-Awareness - Interpersonal Relationship - Stress – Stress management - Focus and Self Control - Positive Thinking – Anger management

UNIT IV PROFESSIONAL SKILLS

3

21st century skills – Hard Skills - General computer skills - Spreadsheet proficiency - Career Skills - developing a long - term career plan – Team Work -- Time management

UNIT V LEADERSHIP SKILLS

3

Leadership, Levels of Leadership, Making of a leader, Types of leadership, describing a leadership style.

TOTAL: 15 PERIODS



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OUTCOMES

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

- Treat and respect the human beings with harmony,
- Develop the capabilities needed to utilize their potential wherever required.
- Control their emotional feelings and manage the stress.
- Explore the career & professional skills.
- Become highly confident as a leader and find new ways of influencing the teams they lead.

TEXT BOOKS

1. Life Skills for Engineers, McGraw Hill Education (India) Private Ltd., 2016
2. E. Suresh Kumar et al. Communication for Professional Success. Orient Blackswan: Hyderabad, 2015
3. Sydänmaanlakka Pentti. "Intelligent leadership and leadership competencies". Dissertation Series.

REFERENCES

1. Barun K. Mitra; (2011), "Personality Development & Soft Skills", First Edition; Oxford Publishers.
2. Kalyana; (2015) "Soft Skill for Managers"; First Edition; Wiley Publishing Ltd.

E-RESOURCES

1. <https://uhv.org.in/>
2. <https://nptel.ac.in>

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2	1	3	1	1	-	1	1	-	2	3	3	1	-	-
3	-	1	-	-	-	1	1	-	3	3	3	1	-	-
4	2	2	1	1	3	1	1	-	2	3	3	3	-	-
5	1	1	1	-	-	2	2	-	3	3	3	3	-	-
AVG	1.25	1.6	1	1	3	1.4	1.4	2	2.6	2.8	2.6	2	-	-

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23MDC101

INDUCTION PROGRAMME (2 Weeks)

This is a mandatory 2 week programme to be conducted as soon as the students enter the institution. Normal classes start only after the induction program is over.

The induction programme has been introduced by AICTE with the following objective:

Engineering colleges were established to train graduates well in the branch/department of admission, have a holistic outlook, and have a desire to work for national needs and beyond. The graduating student must have knowledge and skills in the area of his/her study. However, he/she must also have a broad understanding of society and relationships. Character needs to be nurtured as an essential quality by which he/she would understand and fulfill his/her responsibility as an engineer, a citizen and a human being. Besides the above, several meta-skills and underlying values are needed."

"One will have to work closely with the newly joined students in making them feel comfortable, allow them to explore their academic interests and activities, reduce competition and make them work for excellence, promote bonding within them, build relations between teachers and students, give a broader view of life, and build character."

Hence, the purpose of this programme is to make the students feel comfortable in their new environment, open them up, set a healthy daily routine, create bonding in the batch as well as between faculty and students, develop awareness, sensitivity and understanding of the self, people around them, society at large, and nature.

The following are the activities under the induction program in which the student would be fully engaged throughout the day for the entire duration of the program.

Physical Activity

This would involve a daily routine of physical activity with games and sports etc.

Universal Human Values

This is the anchoring activity of the Induction Programme. It gets the student to explore oneself and allows one to experience the joy of learning, stand up to peer pressure, make decisions with courage, be aware of relationships with colleagues and supporting stay in the hostel and department, be sensitive to others, etc. A module in Universal Human Values provides the base. Methodology of teaching this content is extremely important. It must not be through do's and don'ts, but get students to explore and think by engaging them in a dialogue. It is best taught through group discussions and real life activities rather than lecturing.

Discussions would be conducted in small groups of about 20 students with a faculty mentor each. It would be effective that the faculty mentor assigned is also the faculty advisor for the student for the full duration of the UG programme.



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Lectures by Eminent People

Motivational lectures by eminent people from all walks of life should be arranged to give the students exposure to people who are socially active or in public life.

Proficiency Modules

This would address some lacunas that students might have, for example, English, computer familiarity etc.

Visits to Local Area

A couple of visits to the landmarks of the city, or a hospital or orphanage could be organized. This would familiarize them with the area as well as expose them to the underprivileged.

Familiarization to Dept./Branch & Innovations

They should be told about what getting into a branch or department means what role it plays in society, through its technology. They should also be shown the laboratories, workshops & other facilities.

Induction Programme is totally an activity based programme and therefore there shall be no tests / assessments during this programme.

References: Guide to Induction program from AICTE


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SEMESTER II

23MAT202

DIFFERENTIAL EQUATIONS AND NUMERICAL METHODS

L T P C

[Common to Civil, EEE, ECE and MDE]

3 1 0 4

OBJECTIVES

- To explore techniques for solving ordinary differential equations and recurrence relations.
- To compose the purpose of using Laplace transforms to create a new domain in which problems can be handled more easily.
- To develop the concepts of solving algebraic, transcendental and system of linear equations.
- To introduce the numerical techniques of interpolation and integration.
- To explain various numerical methods of solving ordinary differential equations.

UNIT I ORDINARY DIFFERENTIAL EQUATIONS AND RECURRENCE RELATIONS

9+3

Higher order linear differential equations with constant coefficients – Method of variation of parameters – Legendre's linear equations – Simultaneous linear equations with constant coefficients – Recurrence relations: Solving linear homogeneous recurrence relations with constant coefficients.

UNIT II LAPLACE TRANSFORMS

9+3

Definition – Conditions for existence – Transforms of elementary functions – Properties of Laplace transforms – Transform of Periodic functions – Transforms of derivatives and integrals – Multiplication by t^n and division by 't' – Evaluation of integrals by Laplace transforms – Inverse transforms – Convolution theorem – Application to solution of linear second order ordinary differential equations with constant coefficients.

UNIT III SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS

9+3

Solution of algebraic and transcendental equations by Newton Raphson method – Solution of simultaneous algebraic equations by Gauss elimination, Gauss Jordan and Gauss Seidel methods – Matrix Inversion by Gauss Jordan method – Eigen values of a matrix by Power method.

UNIT IV INTERPOLATION AND NUMERICAL INTEGRATION

9+3

Interpolation with equal intervals: Newton's forward interpolation formula – Newton's backward interpolation formula – Interpolation with unequal intervals: Lagrange's interpolation formula – Divided differences – Newton's divided difference formula – Numerical integration: Trapezoidal rule – Simpson's one-third rule – Numerical double integration by Trapezoidal rule.



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UNIT V NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS

9+3

Taylor's series method – Euler's method – Modified Euler's method – Runge-Kutta method – Predictor-corrector methods: Milne's method – Adams-Bashforth method.

LIST OF EXPERIMENTS

1. Solving ordinary differential equations.
2. Compute homogeneous recurrence relations.
3. Calculate Laplace Transform of simple functions.
4. Calculate Inverse Laplace transform of a given function.
5. Solution of simultaneous algebraic equations by Gauss Seidel method.
6. Find the Eigen values of a matrix by Power method.
7. Illustrate Lagrange's interpolation formula.
8. Evaluation of line integral by Simpson's one-third rule.
9. Solving ordinary differential equations by Euler's method.
10. Solving ordinary differential equations by Runge-Kutta method.

TOTAL: 45+15 = 60 PERIODS

OUTCOMES

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

- Apply appropriate techniques to solve ordinary differential equations and recurrence relations.
- Solve engineering problems using the concept of Laplace transforms.
- Compute the numerical solution of algebraic, transcendental and system of linear equations.
- Apply the numerical techniques of interpolation and integration.
- Evaluate the numerical solution of ordinary differential equations.

TEXT BOOKS

1. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, Fourty Fourth Edition, 2022.
2. Grewal, B.S., "Numerical Methods in Engineering and Science", Khanna Publishers, Eleventh Edition, 2023.



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REFERENCES

1. Kreyszig Erwin, "Advanced Engineering Mathematics", John Wiley and Sons, Tenth Edition, 2016.
2. Burden, R.L and Faires, J.D, "Numerical Analysis", Cengage Learning, Ninth Edition, 2016.

E-RESOURCES

1. <https://archive.nptel.ac.in/courses/111/105/111105121/> - (Ordinary differential equations)
2. <https://nptel.ac.in/courses/111106139> - (Laplace transforms)
3. <https://nptel.ac.in/courses/111/107/111107105/> - (Numerical Methods)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	3	2	2	2	-	-	-	-	-	-	2	-	-
2	3	3	2	2	2	-	-	-	-	-	-	2	-	-
3	3	2	2	1	2	-	-	-	-	-	-	2	-	-
4	3	2	2	1	2	-	-	-	-	-	-	2	-	-
5	3	2	2	1	2	-	-	-	-	-	-	2	-	-
AVG	3	2.4	2	1.4	2	-	-	-	-	-	-	2	-	-

1-Low 2-Medium 3-High '-' – No Correlation


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23PHT203

ADVANCED PHYSICS FOR ELECTRONICS ENGINEERING

L T P C

(Common to ECE, EEE & Medical Electronics)

3 0 0 3

OBJECTIVES

- To explain the fundamental conduction mechanisms in conducting and dielectric materials.
- To provide knowledge on semiconductor physics and the principles of plastic electronics and their technological applications.
- To teach the basic concepts and properties of magnetic and superconducting materials.
- To introduce the principles of spintronics and nanoelectronic devices.
- To impart understanding of the fundamentals of biophotonics and biomaterials for biomedical applications.

UNIT I CONDUCTING MATERIALS & DIELECTRIC MATERIALS

9

Conductors – Classical Free Electron Theory of Metals – Electrical and Thermal Conductivity – Wiedemann – Franz law, Lorentz number – Draw backs of Classical Theory. Dielectric Materials: Electrical Susceptibility – Dielectric constant – Electronic, Ionic, Orientation and Space Charge Polarization- Internal field and Clausius-Mosotti Relation.

UNIT II SEMICONDUCTING MATERIALS & PLASTIC ELECTRONICS

9

Elemental and Compound Semiconductors – Intrinsic Semiconductor & Extrinsic semiconductor – Carrier concentration derivation in Intrinsic Semiconductor - Hall effect and applications. Plastic Electronics: Introduction - Materials for Plastic Electronics - Conducting Polymers and Organic Semiconductors - Fabrication Techniques - Organic Light Emitting Diodes (OLEDs) - Organic Field Effect Transistors (OFETs).

UNIT III MAGNETIC & SUPERCONDUCTING MATERIALS

9

Electron theory of magnetism; Dia, Para, Ferromagnetism and their Properties- Domain theory of Ferromagnetism – Hard and Soft magnetic Materials - Ferrites - Superconductivity: Properties – Type I and Type II Superconductors – BCS theory of superconductivity - High TC Superconductors – General applications of Superconductors – Cryotron and Magnetic levitation.

UNIT IV SPINTRONICS & NANO ELECTRONIC DEVICES

9

Introduction- Quantum confinement - Quantum well, Quantum Wire and Quantum Dot structure – Tunnelling: Single Electron Phenomena and Single Electron Transistor (SET) - Spintronics – Quantum Dot Laser- Quantum Bits (qubits) - Quantum Computing- Carbon Nano Tubes (CNT) structure, Properties and applications. Concepts of Molecular Transistor & Graphene Transistor –



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Carbon nano tube transistor (qualitative) - Applications of Nanodevices and Nanosensors.

UNIT V BIOPHOTONICS & BIOMATERIALS

9

Bio Photonics: Basic principles of light - Reflection - Refraction - Absorption - Polarization - Interference - Coherence- Principles of Optical biosensing - Immobilization of Bio-recognition elements-Types of Optical Biosensor

Bio Materials: Definition and classification of Bio-Material- Viscoelasticity and biomaterial performance- Stainless Steel Alloys and its applications- Biopolymers and its Applications - Shape Memory Alloy.

TOTAL: 45 PERIODS

OUTCOMES

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

- Explain the conduction mechanisms in conducting and dielectric materials.
- Describe the fundamentals of semiconductor physics and plastic electronics and relate them to electronic device applications.
- Explain the properties and applications of magnetic and superconducting materials.
- Describe the working principles of spintronic and nanoelectronic devices.
- Explain the basic principles and applications of biophotonics and biomaterials.

TEXT BOOK

1. Rajendran V, "Engineering Physics", Tata McGraw Hill Publications, 2015.
2. Murugesan R, Kiruthiga Sivaprasath E, "Modern Physics", S.Chand, Tenth Edition, 2019.
3. Gupta and Kumar, "Solid State Physics", K. Nath & Co, 2018.

REFERENCES

1. Sujata V, Bhatt, "Biomaterials", Seventh Edition, Narosa Publishing House, 2016.
2. Avadhanulu M.N, Kshirsagar P.G, "Text Book of Engineering Physics", S.Chand, 2015.
3. Charles Kittel, "Introduction to Solid State Physics", Wiley, 2019.

E – RESOURCES

1. <https://archive.nptel.ac.in/courses/115/101/115101092/>
2. <https://nptel.ac.in/courses/108104113>



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Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	2	1	1	-	-	-	-	-	-	-	-	-	-
2	3	2	1	1	-	-	-	-	-	-	-	-	-	-
3	3	2	1	1	-	-	-	-	-	-	-	-	-	-
4	3	2	1	1	-	-	-	-	-	-	-	-	-	-
5	3	2	1	1	-	-	-	-	-	-	-	-	-	-
AVG	3	2	1	1	-	-	-	-	-	-	-	-	-	-

1- Low 2-Medium 3-High '-' – No Correlation


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23CYT201

ENVIRONMENTAL SCIENCE AND SUSTAINABILITY

L T P C

(Common to All B.E. /B.Tech. Branches)

3 0 0 3

OBJECTIVES

- To familiarize students with the concepts of environment, ecosystems, biodiversity, and their conservation.
- To create awareness about environmental pollution, individual responsibilities in pollution prevention, and basic disaster management.
- To impart knowledge about major social and environmental issues, environmental protection laws, and green chemistry principles.
- To analyze population-related issues, human health, social welfare, and the role of information technology in environmental and human health.
- To develop an understanding of sustainability concepts, climate change issues, and sustainable management practices for addressing environmental challenges.

UNIT I ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY

9

Definition, scope and importance of environment – Need for public awareness - Concept of an ecosystem – Structure and function of an ecosystem – Producers, consumers and decomposers – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the (a) forest ecosystem (b) grassland ecosystem (d) aquatic ecosystems (oceans) – Introduction to biodiversity definition: genetic, species and ecosystem diversity –Value of biodiversity – Threats to biodiversity – Endangered and endemic species of India – Conservation of biodiversity: In-Situ and Ex-Situ conservation of biodiversity.

Activity: Biodiversity in and around the campus and report submission.

UNIT II ENVIRONMENTAL POLLUTION

9

Definition – Causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution – Solid waste management: causes, effects and control measures of municipal solid wastes - E-waste – Role of an individual in prevention of pollution - Pollution case studies – Disaster management: floods, earthquake and cyclone.

Activity: Local pollution case study and report submission.

UNIT III SOCIAL ISSUES AND THE ENVIRONMENT

9

Water conservation, rain water harvesting, watershed management – Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies. – Green Chemistry and principles - Environment production act – Air (Prevention and Control of Pollution) act



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–Water (Prevention and control of Pollution) act

Activity: Creating environmental awareness.

UNIT IV HUMAN POPULATION AND THE ENVIRONMENT

9

Population growth, variation among nations – Population explosion – Family welfare programme – Environment and human health – Human rights – Value education – HIV / AIDS – Women and child welfare – Role of information technology in environment and human health – Case studies.

Activity: Visit to local primary health center.

UNIT V SUSTAINABLE MANAGEMENT

9

Sustainability-Concept, needs and challenges-economic, social and aspects of sustainability-From unsustainability to sustainability—Sustainable Development Goals-Targets, indicators and intervention areas Climate change- Global, Regional and local environmental issues and possible solutions-Case studies. Zero waste, Material Life cycle assessment, Sustainable habitat: Energy efficiency, Sustainable transports.

Activity: Field trips to local organizations or facilities with sustainable practices in place.

TOTAL: 45 PERIODS

OUTCOMES

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

- Explain the basics of environment, ecosystems, biodiversity, and conservation.
- Identify major sources of pollution and understand individual responsibilities in pollution prevention and disaster management.
- Describe key social and environmental issues, environmental laws, and green chemistry principles.
- Analyze population growth, human health, social welfare, and the role of IT in environmental and health management.
- Apply sustainability concepts, climate change mitigation, and sustainable management practices to environmental challenges.

TEXT BOOKS

1. Benny Joseph, "Environmental Science and Engineering", Tata McGraw-Hill, 2019.
2. Gilbert M.Masters, "Introduction to Environmental Engineering and Science", Eighth Edition, Pearson Education, 2021.



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- Allen, D. T. and Shonnard, D. R., "Sustainability Engineering: Concepts, Design and Case Studies", Third Edition, Prentice Hall, 2018.

REFERENCES

- Erach Bharucha, "Textbook of Environmental Studies", Universities Press (I) Pvt Ltd, 2016.
- Dharmendra S. Sengar, "Environmental law", Prentice hall of India Pvt Ltd, 2018.
- Rajagopalan, R, "Environmental Studies-From Crisis to Cure", Oxford University Press, 2019.

E-RESOURCES

- <https://nptel.ac.in/courses/122102006/>
- https://swayam.gov.in/nd1_noc19_ge22/preview

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2	2	3	-	-	3	3	3	-	-	2	1	-	-
2	2	2	3	2	3	3	3	3	-	-	3	3	-	-
3	2	1	3	2	2	3	3	3	-	2	3	3	-	-
4	2	1	3	2	3	3	3	3	2	3	2	2	-	-
5	2	1	3	2	3	3	3	3	2	3	2	2	-	-
AVG	2	1.4	3	2	2.8	3	3	3	2	2.7	2.4	2.2	-	-

1 - Low 2 - Medium 3 - High '-' - No Correlation


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23HST202

TAMILS AND TECHNOLOGY

LT P C

1 0 0 1

OBJECTIVES

- To gain knowledge about weaving and ceramic Technology
- To create a design and construction Technology
- To analyze manufacturing Technology
- To apply agriculture and irrigation Technology
- To remember scientific and 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)- ThirumalaiNayakar Mahal - Chetti Nadu Houses, Indo - Saracenic architecture at Madras during British Period.

UNIT III MANUFACTURING TECHNOLOGY

3

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

UNIT IV AGRICULTURE AND IRRIGATION TECHNOLOGY

3

Dam, Tank, ponds, Sluice, Significance of KumizhiThoompu 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



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Tamil Software – Tamil Virtual Academy – Tamil Digital Library – Online Tamil Dictionaries – Sorkuvai Project

TOTAL: 15 PERIODS

OUTCOMES

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

- Understand weaving under ceramic Technology.
- Develop new design and construction Technology.
- Identify the manufacturing Technology.
- Understand agriculture and irrigation.
- Knowledge of scientific Tamil and Tamil computing.

TEXT-CUM-REFERENCE BOOKS

1. தமிழகவரலாறு - மக்களும்பண்பாடும் - கே. கே. பிள்ளை-
(வெளியீடு:தமிழ்நாடுபாடநூல்மற்றும்கல்வியியல்பணிகள்கழகம்).
2. கணினித்தமிழ் - முனைவர் இல. சுந்தரம். (விகடன்பிரசுரம்).
3. கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம்
(தொல்லியல் துறைவெளியீடு)
4. பொருறை -ஆற்றங்கரை நாகரீகம். (தொல்லியல் துறை வெளியீடு).
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies).
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi – 'Sangam City Civilization on the banks of the river Vaigai' (Jointly Published by: Department of Archaeology & Tamilnadu Textbook and Educational Services Corporation, Tamilnadu.)
10. Studies in the History of India with Special Reference to Tamilnadu (Dr.K.K.Pillay) (Published by: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamilnadu Textbook and Educational Services Corporation, Tamilnadu.)



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

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	-	-	-	-	-	-	-	2	1	-	-	1	-	-
2	-	-	-	-	-	-	-	2	1	-	-	1	-	-
3	-	-	-	-	-	-	-	2	1	-	-	1	-	-
4	-	-	-	-	-	-	-	2	1	-	-	1	-	-
5	-	-	-	-	-	-	-	2	1	-	-	1	-	-
AVG	-	-	-	-	-	-	-	2	1	-	-	1	-	-

1 - Low 2 - Medium 3 - High '-' – No Correlation


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23HST202

தமிழரும் தொழில்நுட்பமும்

(அனைத்து துறைகளுக்கும் பொதுவானது)

L T P C

1 0 0 1

நோக்கம்

மாணவர்கள் கண்டிப்பாக அறியவேண்டுவன:

- நெசவு மற்றும் பீங்கான் தொழில்நுட்பம் பற்றிய அறிவைப் பெறுதல்.
- வடிவமைப்பு மற்றும் கட்டுமான தொழில்நுட்பத்தை உருவாக்குதல்.
- உற்பத்தி தொழில்நுட்பத்தைப் பகுப்பாய்வு செய்தல்.
- விவசாயம் மற்றும் நீர்ப்பாசனத் தொழில்நுட்பத்தைப் பயன்படுத்துதல்.
- அறிவியல்மற்றும்அறிவியல்தமிழ்மற்றும்தமிழ்கணிப்பொறிதொடர்பானஅறிவைநினைவில்கொள்ளுதல்.

அலகு 1 நெசவு மற்றும் பாணை தொழில்நுட்பம்

3

சங்ககாலத்தில் நெசவுத்தொழில் - பாணை தொழில்நுட்பம் - கருப்பு, சிவப்பு பாண்டங்கள் - பாண்டுகளில் கீறல்குறியீடுகள்.

அலகு 2 வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம்

3

சங்ககாலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் & சங்ககாலத்தில் வீட்டுப் பொருட்களில் வடிவமைப்பு- சங்ககாலத்தில் கட்டுமான பொருட்களும் நடு கல்லும் - சிலப்பதிகாரத்தில் மேடை அமைப்பு பற்றிய விவரங்கள் - மாமல்லபுரச் சிற்பங்கள், கோவில்களும் - சோழர் காலத்தா பெருங்கோயில்கள் மற்றும் பிறவழிபாட்டுத் தலங்கள் நாயக்கர் கால கோயில்கள் - மாதிரி கட்டமைப்புகள் பற்றி அறிதல், மதுரை மீனாட்சி அம்மன் ஆலயம் மற்றும் திருமலை நாயக்கர் மஹால் - செட்டிநாட்டு வீடுகள் - பிரிட்டிஷ் காலத்தில் சென்னையில் இந்தோ - சாரோசெனிக் கட்டிடக்கலை.

அலகு 3 உற்பத்தித் தொழில்நுட்பம்

3

கப்பல் கட்டும் கலை - உலோகவியல் - இரும்பு தொழிற்சாலை - இரும்பை உருக்குதல், எஃகு - வரலாற்றுச் சான்றுகளாக செம்பு மற்றும் தங்க நாணயங்கள் - நாணயங்கள் அச்சடிகள் - மணி உருவாக்கும் தொழிற்சாலைகள் - கல்மணிகள், கண்ணாடி மணிகள் - சுடுமண் மணிகள் - சங்கு மணிகள் - எலும்பு துண்டுகள் -



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தொல்லியல் சான்றுகள் - சிலப்பதிகாரத்தில் மணிகளின் வகைகள்.

அலகு 4 வேளாண்மை மற்றும் நீர்ப்பாசன தொழில்நுட்பம் 3
அணை, குளங்கள், மடகு - சோழர் கால குழுளி தூம்பின் முக்கியத்துவம் -
கால்நடை பராமரிப்பு - கால்நடைகளுக்காக வடிவமைக்கப்பட்ட கிணறுகள் -
வேளாண்மை மற்றும் வேளாண்மை சார்ந்த செயல்பாடுகள் - கடல்சார் அறிவு -
மீன்வளம் - முத்து மற்றும் முத்துகுளித்தல் - பெருங்கடல் குறித்த பண்டைய அறிவு -
அறிவுசார்சமூகம்.

அலகு 5 அறிவியல் தமிழ் மற்றும் கணித்தமிழ் 3
அறிவியல் தமிழின் வளர்ச்சி - கணித்தமிழ் வளர்ச்சி - தமிழ் நூல்களை மின்பதிப்பு
செய்தல் - தமிழ் மென்பொருட்கள் உருவாக்கம் - தமிழ் இணையக்கல்விக்கழகம் -
தமிழ்மின்னூலகம் - இணையத்தில் தமிழ் அகராதிகள் - சொற்குவைத்திட்டம்.

TOTAL: 15 PERIODS

முடிவுகள்

பாடத்தின் முடிவில், மாணவர்கள் அறிந்துகொள்வன

- பீங்கான் மற்றும் நெசவு தொழில்நுட்பத்தைப் புரிந்து கொள்ளுதல்.
- புதிய வடிவமைப்பு மற்றும் கட்டுமான தொழில்நுட்பத்தை உருவாக்குதல்.
- உற்பத்தித் தொழில்நுட்பத்தை அடையாளம் காணுதல்.
- விவசாயம் மற்றும் நீர்ப்பாசனத்தைப் புரிந்து கொள்ளுதல்.
- அறிவியல் தமிழ் மற்றும் தமிழ் கணிப்பொறி தொடர்பான அறிவை பெறுதல்.

உரைமற்றும் குறிப்புத்தகங்கள்

1. தமிழகவரலாறு - மக்களும் பண்பாடும் - கே. கே. பிள்ளை-
(வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித்தமிழ் - முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம்
(தொல்லியல் துறை வெளியீடு)
4. பொருளை - ஆற்றங்கரை நாகரீகம். (தொல்லியல் துறை வெளியீடு).



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5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies).
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi – 'Sangam City Civilization on the banks of the river Vaigai' (Jointly Published by: Department of Archaeology & Tamilnadu Textbook and Educational Services Corporation, Tamilnadu.)
10. Studies in the History of India with Special Reference to Tamilnadu (Dr.K.K.Pillay) (Published by: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamilnadu Textbook and Educational Services Corporation, Tamilnadu.)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	-	-	-	-	-	-	-	2	1	-	-	1	-	-
2	-	-	-	-	-	-	-	2	1	-	-	1	-	-
3	-	-	-	-	-	-	-	2	1	-	-	1	-	-
4	-	-	-	-	-	-	-	2	1	-	-	1	-	-
5	-	-	-	-	-	-	-	2	1	-	-	1	-	-
AVG	-	-	-	-	-	-	-	2	1	-	-	1	-	-

1 - Low 2 - Medium 3 - High '-' – No Correlation

Chairman - BoS



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23HSE201

ENGLISH FOR ENGINEERS: THEORY AND PRACTICE

L T P C

(Common to all B.E. & B.Tech. Branches)

3 0 2 4

OBJECTIVES

- To strengthen grammatical accuracy for effective communication.
- To develop listening and reading comprehension skills.
- To improve writing proficiency for academic and formal purposes.
- To train in business and professional correspondence.
- To enhance speaking abilities for social and professional contexts.
- To provide practical exposure through interactive language activities.

UNIT I GRAMMAR

9

Articles - Prepositions - Conditionals - Subject verb agreement- Error Spotting - Active and Passive voice.

UNIT II LISTENING & READING

9

Syllabification -Improving Vocabulary - Reading Newspapers - Listening to Youtube Documentaries- Listening to Podcast- Listening to Motivational Movies.

UNIT III WRITING

9

Checklist - Recommendations - Formal letters – inviting guests – acceptance/declining letters

UNIT IV BUSINESS WRITING

9

E-mail writing - fixing an appointment, cancelling appointment, paper submission for seminars and conferences - Job Application Letter andRésumé.

UNIT V SPEAKING

9

Collaborative task - Turn taking (initiating and responding appropriately) - Negotiating - Exchanging - Suggesting - Comparing and Contrasting - Situational Role-play.



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TIRUCHENGODE - 637 205 NAMAKKAL (Dt) TAMILNADU
LIST OF EXERCISES



1. Stage Dynamics (Body Language and Paralanguage - Presentation)
2. Day today real time speaking exposures – Story narration, simple, general topics and incidents.
3. Group Discussion
4. Power Point Presentation (Corporate Skills & Public Speaking)
5. Loud Reading
6. Picture Description
7. Interview Skills (Mock Interview & Interview Etiquette)
8. Case Study Report

TOTAL: 45+15 = 60 PERIODS

OUTCOMES

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

- Use correct grammar in speech and writing.
- Understand and interpret information from various audio and reading sources.
- Write clear, structured, and formal documents.
- Prepare professional emails, résumés, and job-related letters.
- Communicate effectively in group discussions and presentations.
- Apply communication skills confidently in real-time situations.

TEXT BOOKS

1. S. Sumant, "Technical English II", Maven Learning Private Limited, 2012.
2. Joshi, Manmohan, "Soft Skills", First Edition, Bookboon, 2017.

REFERENCES

1. Dr K Elango, Dr. Veena Selvam, Dr. Sujatha Priyadarshini, "Resonance English for Engineers and Technologists", Cambridge University Press, First Edition, 2013.
2. Seely, John. "Oxford Guide to Effective Writing and Speaking", Oxford University Press, UK, 2013.

E-RESOURCES

1. <https://www.fluentu.com/Blog/english/english-small-talk>
2. <https://www.britishcouncil.com>



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EXTENSIVE READING

1. Stephen R. Covey, "The 7 Habits of Highly Effective People", Simon & Schuster, 2019.

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	1	-	-	-	1	-	-	-	2	3	-	2	-	-
2	1	2	-	2	-	-	-	-	-	3	-	1	-	-
3	1	-	-	-	-	-	-	1	-	3	2	2	-	-
4	-	-	-	-	1	-	-	2	-	3	2	2	-	-
5	-	-	-	-	-	-	-	1	3	3	2	1	-	-
6	-	-	-	-	-	2	2	2	2	3	-	2	-	-
AVG	1	2	-	2	1	2	2	1.5	2.3	3	2	1.6	-	-

1- Low 2-Medium 3-High '-' – No Correlation


Chairman - BoS



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23EEE201

ELECTRIC CIRCUIT ANALYSIS

LT P C

(Lab Embedded Theory Course)

3 0 2 4

OBJECTIVES

- To instruct basic concepts, basic laws and methods of analysis of DC and AC circuits.
- To inculcate the various methods of circuit analysis using network theorems.
- To impart knowledge in resonance and coupled circuits.
- To develop the understanding of steady state and transient response of RLC circuits.
- To familiarize the balanced and unbalanced three phase circuits.
- To enhance the practical skills providing hands-on experience in applying network theorems and analyzing transient circuits.

UNIT I BASIC CIRCUIT ANALYSIS

9

Introduction DC and AC Circuits - Basic circuit elements - Ohm's Law - Kirchhoff's laws - Voltage and Current division - Source Transformation - Resistors in series and parallel circuits - Star-delta transformation - Mesh and nodal analysis for DC Circuits

UNIT II NETWORK THEOREMS FOR DC CIRCUITS

9

Thevenin's and Norton's Theorem - Superposition Theorem - Maximum power transfer theorem - Reciprocity Theorem

UNIT III RESONANCE AND COUPLED CIRCUITS

9

Series and parallel resonance - Frequency response - Quality factor and Bandwidth - Self and mutual inductance - Dot rule - Coefficient of coupling - Analysis of coupled circuits.

UNIT IV TRANSIENT ANALYSIS

9

Natural response - Forced response - Transient response of RL, RC and RLC circuits using Laplace transform for DC input and AC sinusoidal input.

UNIT V THREE PHASE CIRCUITS

9

Average and RMS value - Phasor diagram - Power, Power factor and Energy - Analysis of three phase star and delta connected circuits with balanced and unbalanced loads - Power and Power factor measurements.



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LIST OF EXPERIMENTS

1. Simulation and Experimental verification of electrical circuit problems using Kirchhoff's voltage and current laws.
2. Simulation and Experimental verification of electrical circuit problems using Thevenin's theorem and Norton's theorem.
3. Simulation and Experimental verification of electric circuit problems using Superposition theorem.
4. Simulation and Experimental verification of electric circuit problems using Maximum Power transfer Theorem.
5. Simulation and Experimental validation of R-C electric circuit transients
6. Simulation and Experimental validation of frequency response of RLC electric circuit.
7. Simulation of three phase balanced and unbalanced star, delta networks circuits

TOTAL :45+15 = 60 PERIODS

OUTCOMES

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

- Apply the basic concepts to solve and evaluate DC and AC electrical circuits.
- Analyze complex electric circuits by applying network theorems
- Analyze the performance of resonance and coupled circuits.
- Examine the transient response behavior of RL, RC and RLC electrical circuits.
- Examine the parameters balanced and unbalanced three phase circuits.
- Apply the circuit theorems and concepts in engineering applications.

TEXT BOOKS

1. William H. Hayt Jr, Jack E. Kemmerly and Steven M. Durbin, "Engineering Circuits Analysis", Tata McGraw Hill publishers, New Delhi, Ninth edition, 2020.
2. Charles K. Alexander, Mathew N.O. Sadiku, "Fundamentals of Electric Circuits", McGraw Hill, Second Edition, 2019.

REFERENCES

1. Chakrabati A, "Circuits Theory (Analysis and synthesis), Dhanpat Rai Publishing Co Pvt Ltd, New Delhi, Seventh Edition, 2018.
2. Sudhakar A and Shyam Mohan SP, "Circuits and Network Analysis and Synthesis", Tata McGraw Hill, Fifth Edition, 2021.



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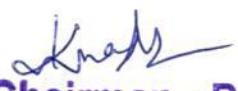
E-RESOURCES

1. <https://nptel.ac.in/courses/108102042/> - (Circuit Theory)
2. <https://nptel.ac.in/courses/108104139/> - (Basic Electric Circuit)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	3	3	3	3	-	-	-	-	2	-	-	3	2
2	3	3	3	3	3	-	-	-	-	2	-	-	3	2
3	3	3	3	3	3	-	-	-	-	2	-	-	3	2
4	3	3	3	3	3	-	-	-	-	2	-	-	3	2
5	3	3	3	3	3	-	-	-	-	2	-	-	3	2
6	3	3	3	3	3	-	-	-	-	2	1	1	3	2
AVG	3	3	3	3	3	-	-	-	-	2	1	1	3	2

1-Low 2-Medium 3-High '-' – No Correlation.


Chairman - BoS



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TIRUCHENGODE - 637 205 NAMAKKAL (Dt) TAMILNADU



23GEL201

ENGINEERING PRACTICES LABORATORY

LT P C

(Lab Embedded Theory Course)

0 0 4 2

OBJECTIVES

The main learning objective of this course is to provide hands on training to the students in:

- Drawing pipe line plan; laying and connecting various pipe fittings used in common household plumbing work; Sawing; planning; making joints in wood materials used in common household wood work.
- Wiring various electrical joints in common household electrical wire work.
- Welding various joints in steel plates using arc welding work; Machining various simple processes like turning, drilling, tapping in parts; Assembling simple mechanical assembly of common household equipments; Making a tray out of metal sheet using sheet metal work.
- Soldering and testing simple electronic circuits; Assembling and testing simple electronic components on PCB.

GROUP – A (CIVIL & ELECTRICAL)

PART I CIVIL ENGINEERING PRACTICES

15

PLUMBING WORK:

- a) Connecting various basic pipe fittings like valves, taps, coupling, unions, reducers, elbows and other components which are commonly used in household.
- b) Preparing plumbing line sketches.
- c) Laying pipe connection to the suction side of a pump
- d) Laying pipe connection to the delivery side of a pump.
- e) Connecting pipes of different materials: Metal, plastic and flexible pipes used in household appliances.

WOOD WORK:

- a) Sawing,
- b) Planning and
- c) Making joints like T-Joint, Mortise joint and Tenon joint and Dovetail joint.

Wood Work Study:

- a) Studying joints in door panels and wooden furniture
- b) Studying common industrial trusses using models.



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PART II ELECTRICAL ENGINEERING PRACTICES

15

- Introduction to switches, fuses, indicators and lamps - Basic switch boardwiring with lamp, fan and three pin socket
- Staircase wiring
- Fluorescent Lamp wiring with introduction to CFL and LED types.
- Energy meter wiring and related calculations/ calibration
- Study of Iron Box wiring and assembly
- Study of Fan Regulator (Resistor type and Electronic type using Diac /Triac /quadric)
- Study of emergency lamp wiring/Water heater

GROUP – B (MECHANICAL AND ELECTRONICS)

PART III MECHANICAL ENGINEERING PRACTICES

15

WELDING WORK:

- Welding of Butt Joints, Lap Joints, and Tee Joints using arc welding.
- Practicing gas welding.

BASIC MACHINING WORK:

- (simple)Turning.
- (simple)Drilling.
- (simple)Tapping.

ASSEMBLY WORK:

- Assembling a centrifugal pump.
- Assembling a household mixer.
- Assembling an air conditioner.

SHEET METAL WORK:

- Making of a square tray

FOUNDRY WORK:

- Demonstrating basic foundry operations.

PART IV ELECTRONIC ENGINEERING PRACTICES

15

SOLDERING WORK:

- Soldering simple electronic circuits and checking continuity.

ELECTRONIC ASSEMBLY AND TESTING WORK:

- Assembling and testing electronic components on a small PCB.



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ELECTRONIC EQUIPMENT STUDY:

- Study an elements of smart phone..
- Assembly and dismantle of LED TV.
- Assembly and dismantle of computer/ laptop.

TOTAL: 60 PERIODS

OUTCOMES

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

- Draw pipe line plan; lay and connect various pipe fittings used in common household plumbing work; Saw; plan; make joints in wood materials used in common household wood work.
- Wire various electrical joints in common household electrical wire work.
- Weld various joints in steel plates using arc welding work; Machine various simple processes like turning, drilling, tapping in parts; Assemble simple mechanical assembly of common household equipments; Make a tray out of metal sheet using sheet metal work.
- Solder and test simple electronic circuits; Assemble and test simple electronic components on PCB.

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	2	-	-	1	1	1	-	-	-	-	2	2	1
2	3	2	-	-	1	1	1	-	-	-	-	2	2	1
3	3	2	-	-	1	1	1	-	-	-	-	2	2	1
4	3	2	-	-	1	1	1	-	-	-	-	2	2	1
AVG	3	2	-	-	1	1	1	-	-	-	-	2	2	1

1-Low 2-Medium 3-High '-' – No Correlation.

Chairman - BoS



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23GEL202

ENGINEERING DRAWING FOR ELECTRICAL AND ELECTRONICS

(Common For ECE, EEE & MDE)

LT P C

0 0 4 2

OBJECTIVES

- To impart knowledge of engineering drawing concepts through multiple views of engineering components.
- To familiarize students with the projection of solids in different positions using engineering drawing principles.
- To develop the ability to prepare engineering drawings of electrical appliances.
- To familiarize students with computer-aided drafting and 3D modeling software for engineering components.
- To enhance students' knowledge of software tools used for designing human anatomy and orthopedic implant models.

LIST OF EXPERIMENTS

1. Conversion of isometric views into orthographic
2. Conversion of orthographic views into isometric
3. Projection of solids - Hexagonal pyramid.
4. Projection of solids - Square prism.
5. Draw Fluorescent lamp wiring diagram and layout.
6. Draw staircase wiring diagram and layout.
7. Design and Implementation of NOR/XOR
8. Layout diagram of CMOS inverter and CMOS NAND gate.
9. Design of Human Anatomical structures.
10. Design of orthotics model.

TOTAL: 30 PERIODS

OUTCOMES

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

- Construct multiple views of engineering components.
- Develop the projection of solids.
- Design and develop the circuit connections of an electrical appliance.
- Apply logic design principles to draw the layout of logic gates and CMOS inverter.
- Design a functional orthotic model based on human anatomy and biomechanics .



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Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	2	-	-	2	1	1	-	-	3	-	2	-	-
2	3	2	-	-	2	1	1	-	-	3	-	2	-	-
3	3	2	-	-	2	1	1	-	-	3	-	2	-	-
4	3	2	-	-	2	1	1	-	-	3	-	2	-	-
5	3	2	-	-	2	1	1	-	-	3	-	2	-	-
AVG	3	2	-	-	2	1	1	-	-	3	-	2	-	-

1-Low 2-Medium 3-High '-' – No Correlation.


Chairman - BoS



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23EEEC201 INDIAN LANGUAGE (EXCEPT MOTHER TONGUE) / FOREIGN LANGUAGE L T P C

(Common to all B.E. & B.Tech. Branches)

0042

OBJECTIVES

- To learn the Hindi alphabet, pronunciation, and basic writing.
- To understand and use basic Hindi grammar correctly.
- To develop basic reading, writing, listening, and speaking skills in Hindi.
- To use Hindi for simple everyday communication.
- To prepare learners to successfully clear the Hindi Examination.

UNIT I वर्णमाला एवं मूलभूत व्याकरण (ALPHABET AND BASIC GRAMMAR)

5

Hindi Vowels (स्वर)- Hindi Consonants (व्यंजन) -Matras (मात्राएँ)- Barakhadi (बारहखड़ी)-Word Formation (शब्दनिर्माण)- Gender (लिंग)- Number (वचन)- Basic Sentence -Formation (सरलवाक्यरचना)

UNIT II शब्दभंडार एवं व्याकरण (VOCABULARY AND GRAMMAR)

7

Nouns (संज्ञा)- Pronouns (सर्वनाम) -Adjectives (विशेषण) -Verbs (क्रिया) -Tenses (काल- Present, Past, Future) - Opposite Words (विलोमशब्द) -Synonyms (पर्यायवाची) -One-word Substitutions (अनेकशब्दोंकेलिएएकशब्द)

UNIT III पठन एवं लेखन कौशल (READING AND WRITING SKILLS)

7

Reading Simple Hindi Passages -Comprehension (गद्यांश) -Paragraph Writing (अनुच्छेदलेखन)- Letter Writing (पत्रलेखन)- Dialogue Writing (संवादलेखन) -Picture Description (चित्रवर्णन) -Dictation Practice (श्रुतिलेख)

UNIT IV दैनिक जीवन में हिंदी (HINDI FOR EVERYDAY COMMUNICATION)

7

Greetings and Introductions -Family Members (परिवार)- Days, Months, Seasons -Numbers (१-१००) -Time and Date - Colours, Fruits, Vegetables - Shopping Conversations - School and Classroom Vocabulary -Common Everyday Conversations

UNIT V साहित्य एवं पुनरावृत्ति (LITERATURE AND REVISION)

4

Simple Poems (कविताएँ)- Short Stories (लघुकथाएँ)- Proverbs and Idioms (मुहावरे एवं लोकोक्तियाँ- basic) - Moral Stories - Translation (English/Tamil to Hindi - Simple Sentences) - Revision of Grammar -



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Model Question Papers and Practice Tests

TOTAL: 30 PERIODS

OUTCOMES

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

- Write basic Hindi words and sentences.
- Apply fundamental Hindi grammar in simple communication.
- Develop basic reading, writing, listening, and speaking skills in Hindi.
- Use Hindi confidently in day-to-day conversations.
- Develop proficiency required to successfully clear the **Hindi Examination**.

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	-	-	-	-	-	-	-	-	-	3	-	1	-	-
2	-	-	-	-	-	-	-	1	1	3	-	1	-	-
3	-	-	-	-	-	-	-	1	2	3	-	2	-	-
4	-	-	-	-	-	1	1	2	2	3	-	1	-	-
5	-	-	-	-	-	-	-	-	-	2	-	3	-	-
AVG	-	-	-	-	-	1.0	1.0	1.3	1.6	2.8	-	1.6	-	-

1-Low 2-Medium 3-High '-' – No Correlation.

P. Gaby
Chairman - BoS



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23EEEC201 INDIAN LANGUAGE (EXCEPT MOTHER TONGUE) / FOREIGN LANGUAGE L T P C

(Common to all B.E. & B.Tech. Branches)

0042

OBJECTIVES

- To learn the German alphabet, pronunciation, and basic communication.
- To understand and use basic German grammar and vocabulary.
- To communicate in German in simple everyday situations.
- To develop basic reading, writing, listening, and speaking skills in German.
- To apply basic German language skills confidently through practice and revision.

UNIT I INTRODUCTION TO GERMAN LANGUAGE

6

German alphabet and pronunciation – Greetings - Self-introduction (Name, age, nationality, profession) - Numbers (0–100) -Days, months, seasons, and dates - Basic classroom expressions - Personal pronouns -Verb sein (to be) -Simple sentence formation

UNIT II BASIC GRAMMAR AND VOCABULARY

7

Definite and indefinite articles (der, die, das; ein, eine) - Nouns and gender - Singular and plural forms - Verb conjugation (regular verbs) - Present tense - Question words (Wer, Was, Wo, Wann, Wie, Warum) - Negation (nicht, kein) - Vocabulary: Family, occupations, countries, languages, colors

UNIT III EVERYDAY COMMUNICATION

7

Daily routine - Time and clock reading - Food and beverages - Shopping conversations - Asking for and giving directions -Making simple requests -Modal verbs (möchten, können) -Vocabulary: Home, school, transportation, weather

UNIT IV READING, WRITING, LISTENING, AND SPEAKING SKILLS

5

Reading short dialogues - Listening to simple conversations - Writing short paragraphs - Describing people, places, and objects - Introducing family and friends

UNIT V PRACTICAL APPLICATIONS AND REVISION

5

Travel and tourism vocabulary - At the restaurant - At the railway station and airport - Revision of grammar topics - Translation of simple sentences (English to German and German to English)

TOTAL: 30 PERIODS



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OUTCOMES

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

- Identify the German alphabet and pronounce basic German words correctly.
- Use basic German vocabulary and simple grammar in sentences.
- Practice in simple German for everyday situations.
- Understand basic German texts and conversations.
- Apply basic German language skills confidently in simple real-life situations.

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	-	-	-	-	-	-	-	-	-	3	-	1	-	-
2	-	-	-	-	-	-	-	1	1	3	-	1	-	-
3	-	-	-	-	-	1	1	2	2	3	-	2	-	-
4	-	-	-	-	-	-	-	1	2	3	-	2	-	-
5	-	-	-	-	-	1	1	2	2	3	-	2	-	-
AVG	-	-	-	-	-	1	1	1.5	1.7	3	-	1.6	-	-

1-Low 2-Medium 3-High '-' – No Correlation.

P. Sanyal
Chairman - BoS



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23EEC201 INDIAN LANGUAGE (EXCEPT MOTHER TONGUE) / FOREIGN LANGUAGE L T P C

(Common to all B.E. & B.Tech. Branches)

0042

OBJECTIVES

- To learn the Japanese writing system, pronunciation, and basic vocabulary.
- To understand and use basic Japanese grammar and sentence patterns.
- To communicate in Japanese in simple everyday situations.
- To develop basic reading, writing, listening, and speaking skills in Japanese.
- To apply basic Japanese language skills confidently through practice and real-life communication.

UNIT I WRITING SYSTEMS & PRONUNCIATION

5

Hiragana chart reading and writing - Katakana chart reading and writing - Basic pronunciation rules (long vowels, double consonants) – Numbers - Colours, body parts, pets description

UNIT II KANJI & BASIC GRAMMAR

7

First 50 Kanji (Numbers, Time & Days, Basic Directions & People) - Topic marker は (wa) - Identification sentences: Noun + です (desu) - Possession particle の (no) - Inclusion particle も (mo) - Subject marker が (ga) - Direction particles へ (he) and に (ni) - Self-introductions and greetings (Aisatsu) - Numbers, prices, shopping terms - Days, months, relative time - Family members and occupations

UNIT III KANJI & FUNCTIONAL GRAMMAR

8

Next 50 Kanji (Nature, Core Verbs, Adjectives & Nouns) - Verb groups (Group 1, Group 2, Group 3) - Masu forms (Present, Past, Positive & Negative) - Te-form (〜て): requests, connecting sentences, continuous actions (〜ている) - Adjective conjugation (い & な adjectives) - Desires (〜たい) and Invitations (〜ましょう)

UNIT IV VOCABULARY & FUNCTIONAL COMMUNICATION

5

Action verbs (daily routine, hobbies) - Adjectives for people, food, and places - Positional words (inside, outside, next to, between) - Transport, travel, and location vocabulary - Simple conversations in everyday situations

UNIT V READING & LISTENING COMPREHENSION

5

Reading short sentences in Hiragana, Katakana, and basic Kanji - Understanding classroom



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instructions - Listening to slow, clear daily-life conversations - Understanding simple shopping dialogues

TOTAL: 30 PERIODS

OUTCOMES

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

- Identify the Japanese writing system and pronounce basic Japanese words correctly.
- Use basic Japanese vocabulary and simple grammar in sentences.
- Communicate in simple Japanese for everyday situations.
- Read, write, listen to, and understand basic Japanese texts and conversations.
- Apply basic Japanese language skills confidently in simple real-life situations.

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	-	-	-	-	1	1	1	-	1	2	-	-	-	-
2	-	-	-	-	1	2	2	-	2	2	-	-	-	-
3	-	-	-	-	2	2	2	1	2	3	-	1	-	-
4	-	-	-	-	2	2	2	1	3	3	-	1	-	-
5	-	-	-	-	1	1	1	1	2	3	-	1	-	-
AVG	-	-	-	-	1.4	1.6	1.6	1	0.2	2.6	-	1	-	-

1-Low 2-Medium 3-High '-' – No Correlation.

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23MDC201

APTITUDE SKILLS

L T P C

(Common to all Branches)

3 0 0 0

OBJECTIVES

- To introduce the basics concepts and techniques of numbers, Highest common factor and Least common multiple.
- To develop the use of decimal fraction and problems on ages.
- To introduce the basic concepts of time, work, distance, calendar and clock.
- To explain the student with the concept of simple and compound interest.
- To provide the knowledge of polynomial and quadratic equations.

UNIT I NUMBERS, HIGHEST COMMON FACTOR AND LEAST COMMON MULTIPLE 9

Numbers and their basic classification – Types of number – Basic operations of numbers – Progression – Tests of divisibility – Highest common factor – Least common multiple

UNIT II DECIMAL FRACTION AND PROBLEMS BASED ON AGES 9

Decimal fraction – Types of fraction – Comparison of fractions – Inserting fractions in between two given fractions – Relation between decimal fraction and normal fraction – Conversion of a decimal fraction into a vulgar fraction – Types of decimals – Conversion of mixed recurring decimal into a vulgar fraction – Standard form of decimal – Problems based on ages.

UNIT III TIME, WORK, DISTANCE, CALENDER AND CLOCK 9

General rule for time and work – General rule for work and wages – Speed – Unit of speed – Average speed – Some useful relations – Problems on Trains – Calendars and clocks – Odd days – Ordinary year – Leap year.

UNIT IV SIMPLE INTEREST, COMPOUND INTEREST AND ELEMENTARY ALGEBRA 9

Simple interest – Compound interest – Some useful relations – Difference between compound interest and simple interest – Short cut methods to solve special types of problems – Elementary Algebra and averages

UNIT V POLYNOMIAL AND QUADRATIC EQUATIONS 9

Polynomial introduction – Degree of a polynomial – Types of polynomial – Operations on polynomial – Remainder and factor theorem – Quadratic equation – Pure Quadratic equation – Discriminant – Roots of the Quadratic equations – Solution of Quadratic equation – Framing of a Quadratic



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equation – Special types of roots.

TOTAL: 45 PERIODS

OUTCOMES

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

- Apply basic concepts and techniques highest common factor and least common multiple on numbers.
- Apply the concept of decimal fraction and problems on ages.
- Apply the concept of time, work, distance, calendar and clock.
- Develop proficiency in simple interest, compound interest and basic algebraic skills.
- Explain the concepts and properties of polynomial and quadratic equations.

TEXT BOOKS

1. Agarwal R.S., "Quantitative Aptitude", S. Chand & Company Ltd, New Delhi, 2012.
2. Dinesh Khattar, "Quantitative Aptitude for competitive examinations", Pearson India Education Services Pvt. Ltd., New Delhi, 2019.

REFERENCES

1. Praveen R.V., "Quantitative Aptitude and Reasoning", PHI Learning Private Limited, Delhi, 2013.
2. Gupta P, "A unique Approach to Quantitative Aptitude ", Unique Publishers (I) Pvt. Ltd, New Delhi, 2017.

E-RESOURCES

1. <https://youtube.com/playlist?list=RDQM5XI256aOq24>
2. <https://youtu.be/KE7tQf9spPg>


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SEMESTER III

23MAT301

TRANSFORMS AND COMPLEX FUNCTIONS

L T P C

3 1 0 4

OBJECTIVES

- To introduce the basics of Fourier transforms and their properties.
- To compute the Z-transforms of standard functions and their properties.
- To provide knowledge of Fourier series and half-range series.
- To explain analytic functions, bilinear transformations and conformal mapping.
- To explore the standard techniques of complex integration.

UNIT I FOURIER TRANSFORMS

9+3

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

UNIT II Z-TRANSFORMS AND DIFFERENCE EQUATIONS

9+3

Z-transforms: Some standard Z-transforms – Elementary properties – Some useful Z- transforms and inverse Z- transforms – Convolution theorem – Evaluation of Inverse Z-transforms by partial fraction method – Application to difference equations.

UNIT III FOURIER SERIES

9+3

Euler's formulae – Conditions for a Fourier expansion – Functions having points of discontinuity – Odd and even function – Half range series – Parseval's formula – Practical Harmonic analysis.

UNIT IV ANALYTIC FUNCTIONS

9+3

Cauchy-Riemann equations – Analytic functions – Properties of analytic functions – Harmonic functions – Orthogonal system – Construction of analytic functions – Bilinear transformation – Conformal transformation by $w = 1/z$.

UNIT V COMPLEX INTEGRATION

9+3

Cauchy's theorem – Cauchy's integral formula – Taylor's and Laurent's series – Residues: Residue theorem – Calculation of residues – Evaluation of real definite integrals: Integration around the unit circle.

TOTAL: 45+15 = 60 PERIODS



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OUTCOMES

Upon completion of the course, Students will be able to

- Apply various Fourier transform techniques in physical problems of engineering.
- Solve engineering problems using the concept of Z transforms.
- Analyze Fourier series for periodic functions and functions with discrete data.
- Apply the concept of analytic functions, bilinear transformations and conformal mapping.
- Evaluate the integrals using Cauchy's integral formula and residue theorem.

TEXT BOOKS

1. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, Fourty Third Edition, 2014.
2. Erwin Kreyszig, "Advanced Engineering Mathematics ", John Wiley, India, Tenth Edition, 2016.

REFERENCES

1. N.P. Bali. and Manish Goyal, "A Textbook of Engineering Mathematics", Laxmi Publications Pvt. Limited, Nineth Edition, 2014.
1. Dr.Kandasamy. P, Dr.Thilagavathy . K and Dr. Gunavathy .K., "Engineering Mathematics – Volume III", S. Chand and Company Ltd., New Delhi, Fourth Edition, 2010.

E-RESOURCES

1. <https://archive.nptel.ac.in/courses/111/102/111102129/#> - (Transforms)
2. <https://archive.nptel.ac.in/courses/111/105/111105134/> - (Complex functions)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	3	1	-	2	-	-	-	1	2	-	2	-	-
2	3	3	1	-	2	-	-	-	1	2	-	2	-	-
3	3	3	1	-	2	-	-	-	1	2	-	2	-	-
4	3	3	1	-	2	-	-	-	1	2	-	2	-	-
5	3	3	1	-	2	-	-	-	1	2	-	2	-	-
AVG	3	3	1	-	2	-	-	-	1	2	-	2	-	-

1-Low 2-Medium 3-High '-' – No Correlation

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23EET301

ELECTROMAGNETIC THEORY

LT P C

3 1 0 4

OBJECTIVES

- To impart knowledge on vector analysis and coordinate systems used in electromagnetic field studies.
- To familiarize with electrostatic field concepts and their engineering applications.
- To acquire knowledge on magnetostatic fields and related physical laws.
- To enhance understanding of electromagnetic field variations and governing equations.
- To foster concepts of electromagnetic wave propagation in different media.

UNIT I VECTOR ANALYSIS

9+3

Sources and effects of electromagnetic fields - Scalar and Vector fields - Coordinate systems: Rectangular, Cylindrical and Spherical - Relationship between coordinate systems - Gradient, Divergence and Curl - Divergence theorem - Stoke's theorem - Simulation on coordinate systems.

UNIT II ELECTROSTATICS

9+3

Coulomb's Law - Electric field intensity and Electric potential: due to point and continuous charges - Electric field and potential due to finite line charge, circular disc and infinite sheet of charge, two concentric shells and coaxial cylinders - Electric flux density - Gauss's law and applications - Electric field in dielectric and equipotential plots - Electric Dipole - Electric field in multiple dielectrics - Boundary conditions, Poisson's and Laplace's equations, Capacitance, Energy density, Applications.

UNIT III MAGNETOSTATICS

9+3

Lorentz force, Magnetic field intensity (H) - Biot-Savart's Law - Ampere's Circuit Law - H due to straight conductors, Circular loop, Infinite sheet of current, Magnetic flux density (B) - B in free space, conductor, magnetic materials - Magnetization, Magnetic field in multiple media - Boundary conditions, Scalar and Vector potential, Poisson's Equation, Magnetic force, Torque, Inductance, Energy density - Finite Element Method Magnetic (FEMM) simulation tool - Applications.

UNIT IV ELECTRODYNAMIC FIELDS

9+3

Magnetic Circuits - Faraday's law - Transformer and motional EMF - Conduction and Displacement current - Maxwell's equations (Differential and Integral form) - Ohm's law in point form - Relation between field theory and circuit theory - Applications.



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UNIT V ELECTROMAGNETIC WAVES

9+3

Electromagnetic wave generation and equations - Wave parameters, velocity, intrinsic impedance, propagation constant - Waves in free space, lossy and lossless dielectrics, conductors- skin depth - Poynting vector - Plane wave reflection and refraction - Standing Wave - Applications.

TOTAL : 45 + 15 = 60 PERIODS

OUTCOMES

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

- Explain the basic mathematical concepts related to electromagnetic vector fields.
- Apply basic laws of electrostatics to various applications and to determine force, electric field intensity.
- Analyze the principles of magnetostatics to the solutions of problems relating to magnetostatic fields.
- Examine the concepts of electrodynamics & to derive and discuss the Maxwell's equations.
- Apply Maxwell's equations to solutions of problems relating to wave propagation.

TEXT BOOKS

1. Mathew N. O. Sadiku, "Principles of Electromagnetics", Oxford University Press Inc. First India, Seventh Edition, 2020.
2. William H. Hayt and John A. Buck, "Engineering Electromagnetics", Tata McGraw Hill Ninth Revised Edition, 2020.

REFERENCES

1. Joseph. A. Edminister, "Schaum's Outline of Electromagnetics", Schaum's Outline Series), Tata McGraw Hill, Second Edition, 2017.
2. K A Gangadhar, "Electromagnetic Field Theory", Khanna Publishers, Eighth Reprint, 2019.

E-RESOURCES

1. <https://archive.nptel.ac.in/courses/108/104/108104087/> - (Electromagnetic Theory).
2. <https://nptel.ac.in/courses/108106157> - (Transmission lines and Electromagnetic Waves).



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JAS-ANZ



ISO 9001 REGISTERED

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	3	3	3	3	-	-	-	-	-	-	2	3	3
2	3	3	3	3	3	-	-	-	-	-	-	2	3	3
3	3	3	3	3	3	-	-	-	-	-	-	2	3	3
4	3	3	3	3	3	-	-	-	-	-	-	2	3	3
5	3	3	3	3	3	-	-	-	-	-	-	2	3	3
AVG	3	3	3	3	3	-	-	-	-	-	-	2	3	3

1-Low 2-Medium 3-High '-' – No Correlation.


Chairman - BoS



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23EET302

MEASUREMENTS AND INSTRUMENTATION

LT P C

3 0 0 3

OBJECTIVES

- To familiarize the basic concepts, characteristics, errors, standards and calibration of electrical measurements.
- To impart knowledge on the working principles and operation of electrical and electronic measuring instruments.
- To inculcate comparative methods of electrical measurements using bridges, grounding techniques and basic MATLAB programming.
- To acquire knowledge of digital measuring instruments, display devices, oscilloscopes, recorders and smart meters.
- To enhance the principles, selection and applications of transducers and data acquisition systems.

UNIT I INTRODUCTION

9

Functional elements of an instrument - Static characteristics: true value, static error, static correction, reproducibility, drift, repeatability, noise, signal to noise ratio, accuracy and precision, sensitivity, linearity, threshold, dead zone, resolution - Dynamic characteristics: Speed of response, fidelity, lag, dynamic error - Errors: gross error, systematic error and random error - Statistical evaluation of measurement data - Standards and calibration.

UNIT II ELECTRICAL AND ELECTRONICS INSTRUMENTS

9

Principle and operation of analog voltmeters and ammeters: Moving iron: Attraction and repulsion type instruments. Moving coil instruments: PMMC, Dynamometer type, torque equation - Single phase dynamometer type watt meter, torque expression - Single phase induction type energy meters - Measurement of power using instrument transformers - Single phase electro-dynamometer power factor meters and Weston frequency meter.

UNIT III COMPARATIVE METHODS OF MEASUREMENTS

9

DC bridges: Wheatstone bridge, Kelvin's double bridge, Megger - AC bridges: Maxwell's, Anderson, Schering, Wien - Transformer ratio & Self - balancing bridges - Interference & Screening - Multiple earths and earth loops - Electrostatic and electromagnetic interference - Grounding techniques - Basic Script based Matlab Programming



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UNIT IV DIGITAL INSTRUMENTS AND DISPLAY DEVICES

9

Digital voltmeter: Ramp, Integrating and Successive approximation - Digital multi-meter - CRT display, dot matrix display, LED and LCD display - Digital energy meter - Digital Storage Oscilloscope (DSO) - Mixed Signal Oscilloscope (MSO) - Recorders: X-Y graphic recorders - Q-meter - Data loggers - Smart meters.

UNIT V TRANSDUCERS AND DATA ACQUISITION SYSTEMS

9

Classification of transducers - Selection of transducers - Resistive, capacitive and inductive transducers - Measurement of temperature - RTD, thermistors and thermocouples - Piezoelectric transducers - Digital transducers - Optical encoders - Elements of data acquisition system - Smart sensors.

TOTAL: 45 PERIODS

OUTCOMES

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

- Explain the characteristics, errors, standards and calibration techniques used in electrical measurements.
- Apply the operating principles of electrical and electronic measuring instruments for measurement of technical quantities.
- Analyze the bridge methods, interference reduction techniques, grounding methods, and basic MATLAB programming for electrical measurements.
- Illustrate the performance of digital measuring instruments, display devices, oscilloscopes and smart meters.
- Identify the suitable transducers and data acquisition systems for measurement and monitoring applications.

TEXT BOOKS

1. A.K.Sawhney, "A Course in Electrical & Electronic Measurements & Instrumentation", Dhanpat Rai & Co, Second Edition, 2021.
2. R.K.Rajput, "Electrical Measurements and Measuring Instruments", S.Chand and Company Pvt. Ltd. Fourth Edition, 2018.

REFERENCES

1. D.V.S. Moorthy, "Transducers and Instrumentation", Prentice Hall of India Pvt Ltd, Third Edition, 2022.



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2. E.O.Doebelin, "Measurement Systems - Application and Design", Tata McGraw Hill Publishing Company, Sixth Edition, 2019.

E-RESOURCES

1. <https://nptel.ac.in/courses/108105153/> - (Electrical Measurement and Electronic Instruments)
2. <https://archive.nptel.ac.in/courses/108/105/108105064/> - (Industrial Instrumentation)

Mapping of COs-POs & PSOs

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1	3	3	3	3	3	-	-	-	-	-	-	2	3	3
2	3	3	3	3	3	-	-	-	-	-	-	2	3	3
3	3	3	3	3	3	-	-	-	-	-	-	2	3	3
4	3	3	3	3	3	-	-	-	-	-	-	2	3	3
5	3	3	3	3	3	-	-	-	-	-	-	2	3	3
AVG	3	3	3	3	3	-	-	-	-	-	-	2	3	3

1-Low 2-Medium 3-High '-' – No Correlation


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23EEE301

DC MACHINES AND TRANSFORMERS

L T P C

(Lab Embedded Theory Course)

3 0 2 4

OBJECTIVES

- To enhance the magnetic circuits, energy conversion principles and magnetic field systems in rotating machines.
- To inculcate the construction, operation, characteristics and performance of DC generators.
- To familiarize the operation, characteristics, speed control and braking methods of DC motors.
- To acquire knowledge about transformer construction, operation, connections and performance analysis.
- To impart knowledge the testing methods used for DC machines and transformers.
- To provide knowledge about the testing, characteristics and performance analysis of DC machines and transformers.

UNIT I BASIC CONCEPTS IN ROTATING MACHINES

9

Magnetic circuits and calculations - Statically and dynamically induced EMF - Principle of electromechanical energy conversion forces and torque in magnetic field systems - Energy balance in magnetic circuits - Magnetic force- co-energy in singly excited and multi excited magnetic field system.

UNIT II DC GENERATORS

9

Construction - Principle of operation - E.M.F equations - Types of DC Generators - Characteristics of DC generators - Losses and Efficiency - Armature reaction - Commutation and inter poles - Compensating winding - Simulation on DC Machine Characteristics.

UNIT III DC MOTORS

9

Principle and operations - Back E.M.F. - Types of DC motors - Characteristics of DC Motors - Starting and speed control of DC motors - Plugging, Dynamic and Regenerative braking - Types of Starter - Necessity of Starters - Applications of DC motors.

UNIT IV TRANSFORMERS

9

Construction - Principle of operation - E.M.F Equation - Transformer ratio - Transformer on no Load



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- Transformer on load - Equivalent circuit – Losses and Efficiency - All day efficiency.- Regulation -
- Three phase transformers connections - Phasing of transformer - Parallel operation of transformers
- Auto transformer - Simulation on Three phase Transformers.

UNIT V TESTING OF DC MACHINES AND TRANSFORMERS

9

Testing of DC Machines: Brake test, Swinburne's test, Retardation test, Hopkinson's test and Field's test for series motor - Testing of transformers: Load test, open circuit and short circuit test.

LIST OF LAB EXPERIMENTS

1. Open circuit and load characteristics of Self-Excited DC shunt generator.
2. Load test of DC shunt and series motor.
3. Load test on DC compound motor.
4. Speed control of DC shunt motor.
5. Swinburne's test of DC shunt motor.
6. Load test on single-phase transformer.
7. Open circuit and short circuit tests on single phase transformer.

TOTAL: 45+15 = 60 PERIODS

OUTCOMES

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

- Explain the magnetic circuits and electromechanical energy conversion principles.
- Analyze the operating principles and characteristics of DC generators.
- Apply the speed control and braking methods of DC motors.
- Identify the transformer operation and performance characteristics.
- Analyze the performance and efficiency of DC machines and transformers using testing methods.
- Apply the testing procedures to evaluate the performance of DC machines and transformers.

TEXT BOOKS

1. B.L.Thereja and A.K.Theraja, "A Text of Electrical Technology", S.Chand publications, Volume 1 & 2, 2021.
2. D P Kothari and I.J Nagarath, "Electrical Machines", McGraw Hill Education (India) Private Limited, Tenth Edition, 2017.



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REFERENCES

1. P.S.Bimbhra, "Electrical Machinery", Khanna Publication Pvt. Ltd, Second Edition, 2021.
2. B.R.Gupta, "Fundamental of Electric Machines", New age International Publishers, Third Edition Reprint, 2019.

E-RESOURCES

1. <https://nptel.ac.in/courses/108102146> - (DC Machines & Transformers)
2. <https://www.classrcentral.com/course> - (Electrical Machines)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
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2	3	3	2	2	1	-	-	-	-	-	-	2	2	2
3	3	3	3	2	1	-	-	-	-	-	-	2	2	2
4	3	3	2	2	2	-	-	-	-	-	-	2	2	2
5	3	3	3	2	2	-	-	-	-	-	-	2	2	2
6	3	3	3	3	3	-	-	-	3	3	-	2	2	2
AVG	3	2.8	2.3	2.2	1.8	-	-	-	3	3	-	2	2	2

1-Low 2-Medium 3-High '-' – No Correlation


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23EEE302

ANALOG ELECTRONICS AND CIRCUITS

(Lab Embedded Theory Course)

LT P C

3 0 2 4

OBJECTIVES

- To impart knowledge on the structure, operation, and applications of diodes and rectifier circuits.
- To familiarize with the characteristics and biasing of BJT, JFET, and UJT.
- To acquire knowledge on amplifier models, configurations, and frequency response.
- To enhance understanding of differential amplifiers and switching circuits.
- To foster concepts of feedback amplifiers and oscillators.
- To inculcate practical skills in analyzing and verifying electronic circuits through laboratory experiments.

UNIT I DIODE AND ITS APPLICATION

9

PN junction diodes: structure, operation and V-I characteristics - Diffusion and transition capacitance - Clipping & Clamping circuits - Rectifiers: Half Wave and Full Wave Rectifier - Display devices: LED, Laser diodes - Zener diode: structure, operation and V-I characteristics, Reverse characteristics - Zener diode as regulator - MATLAB Simulation on VI Characteristics of Diode.

UNIT II TRANSISTORS AND FET

9

BJT, JFET and UJT - structure, operation, characteristics and Biasing, Simulation on Characteristics of BJT.

UNIT III AMPLIFIERS

9

BJT small signal model - Analysis of CE, CB, CC amplifiers- Gain and frequency response - MOSFET small signal model - Analysis of CS and Source follower - Gain and frequency response - High frequency analysis , Introduction to power amplifier (qualitative treatment only).

UNIT IV DIFFERENTIAL AMPLIFIER AND SWITCHING CIRCUITS

9

BIMOS cascade amplifier, Differential amplifier - Common mode and Difference mode analysis - Switching circuits; Multivibrators; Astable, Monostable, Bistable Multivibrator - Schmitt Trigger.



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UNIT V FEEDBACK AMPLIFIERS AND OSCILLATORS

9

Advantages of negative feedback - Voltage / Current, Series, Shunt feedback - Positive feedback - Oscillators: RC phase shift, Wien bridge, Hartley, Colpitts and Crystal oscillators.

LIST OF EXPERIMENTS

1. Characteristics of PN junction diode and Zener diode.
2. Design and Verification of Diode Clipper and Clampers.
3. Single Phase half-wave and full wave rectifiers with capacitive filter.
4. Characteristics of a NPN Transistor under CE configurations.
5. Characteristics of JFET and UJT.
6. Characteristics of photo diode and Photo Transistor.
7. Design and testing of RC phase shift and LC oscillators.

TOTAL: 45+15 = 60 PERIODS

OUTCOMES

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

- Explain the operation and characteristics of diodes and rectifier circuits.
- Apply biasing techniques to analyze transistor characteristics.
- Analyze amplifier configurations for gain and frequency response.
- Examine differential amplifiers and switching circuits.
- Analyze the performance of feedback amplifiers and oscillator circuits.
- Design and testing of electronic circuits through experiments

TEXT BOOKS

1. David A. Bell, "Electronic Devices and Circuits", Oxford University higher education, Fifth Edition, 2018.
2. S.Salivahanan, N.Sureshkumar, "Electronic devices and circuits", McGraw Hill Education, Fifth Edition, 2022.

REFERENCES

1. Thomas L.Floyd, "Electronic devices", Conventional current version, Pearson prentice hall, Tenth Edition, 2021.
2. V.K.Mehta, Rohit Mehta, "Principles of Electronics", S.Chand Publishing, Twelfth Edition, 2020.



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E-RESOURCES

1. <https://nptel.ac.in/courses/108/102/108102095/> - (Analog Electronic Circuits)
2. <https://nptel.ac.in/courses/108/102/108102097/> - (Introduction to Electronic Circuits)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	3	3	3	3	-	-	-	-	-	-	3	3	2
2	3	3	3	3	3	-	-	-	-	-	-	3	3	2
3	3	3	3	3	3	-	-	-	-	-	-	3	3	2
4	3	3	3	3	3	-	-	-	-	-	-	3	3	2
5	3	3	3	3	3	-	-	-	-	-	-	3	3	2
6	3	3	3	3	3	2	2	2	3	3	2	3	3	2
AVG	3	3	3	3	3	2	2	2	3	3	2	3	3	2

1-Low 2-Medium 3-High '-' – No Correlation


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23EEE303

DIGITAL ELECTRONICS AND LINEAR INTEGRATED CIRCUITS

LT P C

(Lab Embedded Theory Course)

3 0 2 4

OBJECTIVES

- To familiarize with various number systems, Boolean algebra theorems and logic minimization techniques.
- To impart knowledge on the design of various combinational digital circuits using logic gates.
- To inculcate the skills for the analysis and design for synchronous sequential circuits.
- To develop understanding of operational amplifier characteristics and their linear and nonlinear applications.
- To enhance the knowledge in application ICs.
- To acquire practical skills in designing, testing and characterizing circuits using digital and analog ICs.

UNIT I NUMBER SYSTEMS AND BOOLEAN ALGEBRA

9

Review of number systems, Types and conversion, Binary codes - Error detection and correction codes (Parity and Hamming code). Boolean theorems and properties - DeMorgan's theorem, SOP and POS forms - Logic gates - Switching functions and minimization using K-maps - Simulation of logic gates using MATLAB.

UNIT II COMBINATIONAL CIRCUITS AND PROGRAMMABLE LOGIC DEVICES

9

Design of adders, subtractors - Multiplexers and Demultiplexers - Magnitude comparator - Code Converters - Encoders and Decoders - Introduction to Programmable Logic Devices: PROM, PLA, PAL, CPLD, FPGA - Simulation of Adder and Subtractor using MATLAB.

UNIT III SYNCHRONOUS SEQUENTIAL CIRCUITS

9

Level triggering and edge triggering - Sequential logic- SR, JK, D and T flip flops - Counters: Asynchronous and synchronous type - Modulo counters - Design of synchronous sequential circuits - Shift registers - Moore and Mealy models - State diagram, state reduction, state assignment.

UNIT IV OPERATIONAL AMPLIFIER CHARACTERISTICS & APPLICATIONS

9

Introduction to IC - Operational Amplifier: Ideal Op-Amp, DC and AC characteristics, Inverting and Non-inverting Amplifiers - Differentiator and integrator - First and second order low pass and high pass active filters - D/A converter (R - 2R ladder and weighted resistor types) - A/D converter (Flash and Successive approximation types).



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UNIT V APPLICATION ICs

9

IC voltage regulators: LM78XX, LM79XX fixed series voltage regulator - LM317, LM723 adjustable voltage regulators - Switched mode power supply - IC555 multivibrator - Phase Locked Loop - VCO.

LIST OF EXPERIMENTS

1. Verification of Boolean theorems using digital logic gates.
2. Design and implementation of adder, subtractor.
3. Design and implementation of multiplexers and demultiplexers.
4. Design and implementation of 3-bit modulo counters as synchronous and Asynchronous types.
5. Design and implementation of 4-bit shift registers in SISO, SIPO, PISO, PIPO modes.
6. Application of Op-Amp: Inverting and non-inverting amplifier, Adder, Subtractor.
7. Application of Op-Amp: Integrator and Differentiator.
8. Timer IC application: Study of NE/SE 555 timer in Astability, Monostability operation.

TOTAL: 45+15 = 60 PERIODS

OUTCOMES

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

- Analyze number systems, binary codes, and Boolean algebra to perform logic minimization.
- Construct the various combinational digital circuits and PLDs.
- Analyze and design the synchronous sequential circuits using flip-flops.
- Apply operational amplifier concepts to design waveform generation circuits.
- Examine the operation and applications of integrated circuits (ICs).
- Design digital and analog circuits using ICs such as decoders, multiplexers, timers and VCOs.

TEXT BOOKS

1. M. Morris Mano, Michael D.Ciletti, "Digital Design: With an Introduction to the Verilog HDL, VHDL, and System Verilog", Pearson Education, Sixth Edition, 2019.
2. D. Roy Choudhary, Shail B. Jain, "Linear Integrated Circuits", New Age International Publishers, First Edition, 2021.

REFERENCES

1. A. Anand Kumar, "Fundamentals of Digital Circuits", PHI Education, Fourth Edition, 2020.



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2. S.Salivahanan, V.S.Kanchan Bhaaskaran, "Linear Integrated Circuits", Tata McGraw Hill Education, Second Edition, 2017.

E-RESOURCES

1. <https://archive.nptel.ac.in/courses/117/105/117105080/> - (Digital Systems Design)
2. <https://archive.nptel.ac.in/courses/108/108/108108111/> - (Integrated Circuits)

Mapping of COs-POs & PSOs

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2	3	3	3	2	2	-	-	1	-	1	-	1	3	2
3	3	3	3	2	2	-	-	1	-	1	-	1	3	2
4	3	3	3	2	2	-	-	1	-	1	-	1	3	2
5	3	3	3	2	2	-	-	1	-	1	-	1	3	2
6	3	3	3	3	-	-	-	-	3	3	-	1	3	2
AVG	3	3	3	2.2	2	-	-	1	3	1.3	-	1	3	2

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23EEEC301

PROFESSIONAL DEVELOPMENT

L T P C

0 0 2 1

OBJECTIVES

To be proficient in important Microsoft Office tools: MS WORD, EXCEL and POWERPOINT.

- To be proficient in using MS WORD to create quality technical documents, by using standard templates, widely acceptable styles and formats, variety of features to enhance the presentability and overall utility value of content.
- To be proficient in using MS EXCEL for all data manipulation tasks including the common statistical, logical, mathematical etc., operations, conversion, analytics, search and explore, visualize, interlink, and utilizing many more critical features offered.
- To be able to create and share quality presentations by using the features of MS PowerPoint, including: organization of content, presentability, aesthetics, using media elements and enhance the overall quality of presentations.

MS WORD:

10 Hours

Create and format a document

Working with tables

Working with Bullets and Lists

Working with styles, shapes, smart art, charts

Inserting objects, charts and importing objects from other office tools

Creating and Using document templates

Inserting equations, symbols and special characters

Working with Table of contents and References, citations

Insert and review comments

Create bookmarks, hyperlinks, endnotes footnote

Viewing document in different modes

Working with document protection and security

Inspect document for accessibility

MS EXCEL:

10 Hours

Create worksheets, insert and format data

Work with different types of data: text, currency, date, numeric etc.

Split, validate, consolidate and Convert data

Sort and filter data



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Perform calculations and use functions: (Statistical, Logical, Mathematical, date, Time etc,)

Work with Lookup and reference formulae

Create and Work with different types of charts

Use pivot tables to summarize and analyze data

Perform data analysis using own formulae and functions

Combine data from multiple worksheets using own formulae and built-in functions to generate results

Export data and sheets to other file formats

Working with macros

Protecting data and Securing the workbook

MS POWERPOINT:

10 Hours

Select slide templates, layout and themes

Formatting slide content and using bullets and numbering

Insert and format images, smart art, tables, charts

Using Slide master, notes and handout master

Working with animation and transitions

Organize and Group slides

Import or create and use media objects: audio, video, animation

Perform slideshow recording and Record narration and create presentable videos

TOTAL: 30 PERIODS

OUTCOMES

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

- Use MS Word to create quality documents, by structuring and organizing content for their day to day technical and academic requirements.
- Use MS EXCEL to perform data operations and analytics, record, retrieve data as per requirements and visualize data for ease of understanding.
- Use MS PowerPoint to create high quality academic presentations by including common tables, charts, graphs, interlinking other elements, and using media objects.


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SEMESTER IV

23EET401

ELECTRICAL POWER TRANSMISSION AND DISTRIBUTION

LT P C

3 0 0 3

OBJECTIVES

- To explore expressions for the computation of transmission line parameters.
- To gain knowledge of equivalent circuits for transmission lines, voltage regulation, and efficiency.
- To discuss mechanical design of transmission lines, types, and voltage distribution in insulators.
- To examine types and grading of underground cables.
- To provide knowledge of distribution systems, types of substations, grounding methods, and modern trends like EHVAC, HVDC, and FACTS

UNIT I TRANSMISSION LINE PARAMETERS

9

Introduction to power generation: Steam, Hydroelectric, Nuclear - Parameters of single and three phase transmission lines with single and double circuits - Resistance, inductance and capacitance of solid, stranded and bundled conductors, Symmetrical and unsymmetrical spacing and transposition - Application of self and mutual GMD: Skin and Proximity effects - Effects of earth on the capacitance of the transmission line - interference with neighboring communication circuits.

UNIT II MODELLING AND PERFORMANCE OF TRANSMISSION LINES

9

Performance of Transmission lines - Short line, medium line and long line - Equivalent circuits, phasor diagram, attenuation constant, phase constant, surge impedance - Transmission efficiency and voltage regulation - Ferranti effect- Formation of Corona - Critical Voltages – Modeling of transmission line using MATLAB .

UNIT III MECHANICAL DESIGN OF LINES AND INSULATORS

9

Mechanical design of OH lines - Line Supports - Types of towers – Tension and Sag Calculation - Effects of Wind and Ice loading - Methods of grounding.

Insulators: Types, voltage distribution in insulator string, improvement of string efficiency-Testing of insulators.

UNIT IV UNDERGROUND CABLES

9

Underground cables - Types of cables - Construction of single core and 3 core cables - Insulation



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Resistance - Potential Gradient - Capacitance of Single-core and 3 core cables - Grading of cables - Power factor and heating of cables - DC cables

UNIT V DISTRIBUTION SYSTEMS

9

Distribution Systems - General Aspects – Kelvin's Law - AC and DC distributions - Distribution Loss - Types of Substations - Recent Trends in Transmission and Distribution: EHVAC, HVDC and FACTS (Qualitative treatment only) .

TOTAL: 45 PERIODS

OUTCOMES

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

- Analyze the performance parameters of power generation systems and transmission lines under different operating conditions.
- Apply the performance of short, medium, and long transmission lines and apply MATLAB to model their behavior.
- Examine mechanical design principles of transmission lines and voltage distribution in insulators.
- Identify the types and grading of underground cables and their performance characteristics.
- Analyze distribution systems, substation types, grounding methods, and trends like EHVAC, HVDC, and FACTS.

TEXT BOOKS

1. V.K.Mehta, Rohit Mehta, "Principles of Power System", S. Chand & Company Ltd, New Delhi, Revised Edition, 2021
2. C.L.Wadhwa, "Electrical Power Systems", New Age International Publishers, Seventh Edition, 2016.

REFERENCES

1. A.Chakrabarti, M.L.Soni, P.V.Gupta, R.V.Bhatnagar, "A Text book on Power System Engineering", Dhanpat Rai & Co (limited), New Delhi, Second Edition, 2016.
2. D.P.Kothari, I.J. Nagarath, "Power System Engineering", McGraw - Hill Publishing Company limited, New Delhi, Third Edition, 2019.



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E-RESOURCES

1. <https://nptel.ac.in/courses/108/102/108102047/> - (Power system)
2. <https://archive.nptel.ac.in/courses/108/105/108105104/> - (Power System Engineering)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	3	3	2	-	1	1	1	-	2	-	2	1	3
2	3	3	3	2	2	1	1	1	-	2	-	2	1	3
3	3	3	3	2	-	1	1	1	-	2	-	2	1	3
4	3	3	3	2	-	1	1	1	-	2	-	2	1	3
5	3	3	3	2	-	1	1	1	-	2	-	2	1	3
AVG	3	3	3	2	2	1	1	1	-	2	-	2	1	3

1-Low 2-Medium 3-High '-' – No Correlation


Chairman - BoS



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23EET402

POWER ELECTRONICS

L T P C

3 0 0 3

OBJECTIVES

- To impart knowledge on the structure, operation, characteristics, and control of power semiconductor devices and their associated circuits.
- To enhance the operation, performance, and applications of AC to DC converters and controlled rectifiers.
- To familiarize with DC to DC converters, control strategies, and switched mode power supplies.
- To develop understanding of DC to AC converters, PWM techniques, and harmonic control methods.
- To foster awareness of AC to AC converters, control strategies, and their industrial applications

UNIT I OVERVIEW OF POWER ELECTRONICS AND POWER DEVICES

9

Structure, operation and characteristics of SCR, Power transistor, MOSFET, MCT and IGBT - Firing circuit for thyristor - Voltage and Current commutation of thyristor - Gate drive circuit for MOSFET and IGBT - Design of driver and snubber circuit.

UNIT II AC TO DC CONVERTERS

9

2-pulse, 3-pulse and 6-pulse converters - Performance parameters - Effect of source inductance - Gate Circuit Schemes for Phase Control - Dual converters, Applications of controlled rectifiers.

UNIT III DC TO DC CONVERTERS

9

Step-down and step-up chopper - Control strategy - Switched mode regulators - Buck, boost, buck-boost converter, Introduction to Resonant Converters.

UNIT IV DC TO AC CONVERTERS

9

Single phase and three phase voltage source inverters (both 120° mode and 180° mode) - Voltage & harmonic control - PWM techniques: Sinusoidal PWM, modified sinusoidal PWM - multiple PWM - Introduction to space vector modulation - Current source inverter.

UNIT V AC TO AC CONVERTERS

9

Single phase and Three phase AC voltage controllers - Control strategy - Power Factor Control - Multistage sequence control - Single phase and three phase cyclo converters - Introduction to Matrix



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converters, Applications of cyclo converter.

TOTAL: 45 PERIODS

OUTCOMES

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

- Apply the knowledge of power electronic devices and converters.
- Describe the performance of converters and power semiconductor devices.
- Analyze the performance of DC-DC converters.
- Discuss the operation of inverter circuits.
- Examine the performance of ac regulator and cycloconverter.

TEXT BOOKS

1. M. H. Rashid, "Power Electronics: Circuits, Devices and Applications", Pearson Education, New Delhi, PHI Fourth Edition, 2020.
2. P. S. Bimbira "Power Electronics", Khanna Publishers, Sixth Edition, 2018.

REFERENCES

1. Ned Mohan, Tore. M. Underland, William. P. Robbins, "Power Electronics: Converters, Applications and Design", John Wiley and sons, Fourth Edition, 2021.
2. M.D. Singh and K.B. Khanchandani, "Power Electronics," Mc Graw Hill India, Third Edition, 2019.

E-RESOURCES

1. <https://nptel.ac.in/courses/108/102/108102145/> - (Power Electronics)
2. <https://nptel.ac.in/courses/108/105/108105066/> - (Power Electronics)

Mapping of COs-POs & PSOs

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1	3	3	3	3	3	-	-	-	-	-	-	3	3	3
2	3	3	3	3	3	-	-	-	-	-	-	3	3	3
3	3	3	3	3	3	-	-	-	-	-	-	3	3	3
4	3	3	3	3	3	-	-	-	-	-	-	3	3	3
5	3	3	3	3	3	-	-	-	-	-	-	3	3	3
AVG	3	3	3	3	3	-	-	-	-	-	-	3	3	3

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23EET403

CONTROL SYSTEMS ENGINEERING

L T P C

3 0 2 4

OBJECTIVES

- To impart knowledge of the basic principles and system representations used in control engineering.
- To familiarize the time-domain behavior of control systems under standard test inputs.
- To acquire the system performance using frequency domain analysis
- To enhance the stability of control systems and methods of stability analysis
- To develop the compensator design and state-space modeling of control systems.

UNIT I BASIC CONCEPTS AND SYSTEM REPRESENTATION

9

Introduction - Open Loop and Closed Loop Systems - Mathematical Model of Control Systems - Transfer Functions: Mechanical Translational Systems, Mechanical Rotational Systems, Block Diagram, Signal Flow Graph - Synchro's.

UNIT II TIME RESPONSE ANALYSIS

9

Standard Test Signals - Type and Order of Control System - Time Response of First order and Second order System for Unit Step, Unit Ramp and Impulse Input - Time Domain Specifications - Steady State Error and Static Error Constants - P, PI and PID Controllers - Simulation of study of first and second order systems.

UNIT III FREQUENCY RESPONSE ANALYSIS

9

Frequency Response - Frequency Domain Specifications - Resonant Peak - Resonant Frequency - Bandwidth - Cut-off Rate - Gain margin and Phase margin - Frequency response plots - Bode plot - Polar plot.

UNIT IV STABILITY ANALYSIS

9

Concepts of Stability - Necessary Conditions for Stability - Relative Stability - Routh Hurwitz Stability Criterion - Root Locus - Effect of addition of poles and zeros - Nyquist Stability Criterion - MATLAB Simulation on stability analysis.

UNIT V COMPENSATORS AND STATE SPACE ANALYSIS

9

Compensators: Introduction - Types, Lag, Lead and Lag-Lead Design using Bode Plots. State Space Analysis: Concepts of State - State Variables and State phase Model for Linear Time Invariant System - Controllability and Observability.



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TOTAL: 45 PERIODS

OUTCOMES

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

- Analyze the transfer function of mechanical system, Block diagram reduction and signal flow graph.
- Examine the time domain specifications and steady state error.
- Analyze the frequency response characteristics of open loop system response.
- Examine the system stability using Routh-Hurwitz, Root locus and Nyquist stability criterion.
- Design the compensator and state space modeling of linear time invariant systems.

TEXT BOOKS

1. I.J.Nagrath and M.Gopal, "Control Systems Engineering", New Age International (P) Ltd, Publishers, Sixth Edition, 2021.
2. K. Ogata, "Modern Control Engineering", Prentice Hall, Fourth Edition, 2018.

REFERENCES

1. M. Gopal, Control Systems, "Principles and Design", Tata McGraw Hill, New Delhi, Fourth Edition, 2019.
2. A. Nagoorkani, "Control Systems Engineering", RBA Publications, Third Edition, 2021.

E-RESOURCES

1. [http://www.nptel.ac.in/courses/107/106/107106081-\(Introduction of Control Systems\)](http://www.nptel.ac.in/courses/107/106/107106081-(Introduction of Control Systems))
2. [http://www.nptel.ac.in/courses/108/106/108106098-\(Introduction of system & control\)](http://www.nptel.ac.in/courses/108/106/108106098-(Introduction of system & control))

Mapping of COs-POs & PSOs

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3	3	3	3	3	3	1	1	-	-	1	-	2	3	3
4	3	3	3	3	3	1	1	-	-	1	-	2	3	3
5	3	3	3	3	3	1	1	-	-	1	-	2	3	3
AVG	3	3	3	3	3	1	1	-	-	1	-	2	3	3

1-Low 2-Medium 3-High '-' – No Correlation

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23EEE401

MICROPROCESSOR AND MICROCONTROLLERS

LT P C

(Lab Embedded Theory Course)

3 0 2 4

OBJECTIVES

- To impart knowledge on the architecture, instruction set, and interfacing of the 8085 microprocessor.
- To familiarize with the architecture, memory organization, and programming features of the 8051 microcontroller.
- To develop understanding of 8051 programming and its applications in interfacing and control systems.
- To foster skills in Arduino programming, interfacing sensors, actuators, and peripheral devices
- To inculcate understanding of PIC microcontroller architecture, instructions, and peripheral operations.
- To perform assembly language programming and peripheral interfacing in microprocessor and microcontroller systems.

UNIT I 8085 MICROPROCESSOR

9

Introduction to Microprocessor - Hardware Architecture of 8085 - Signals - Memory interfacing - I/O ports and data transfer concepts - Timing Diagram - Interrupt structure - Instruction format and Addressing modes - Instruction sets.

UNIT II 8051 MICROCONTROLLER

9

Hardware Architecture - Pin Description - Memory Organization - Timer - I/O ports - Addressing modes and Instruction sets - Interrupt structure - Simple programming.

UNIT III 8051 PROGRAMMING AND APPLICATIONS

9

A/D and D/A interfacing - Keyboard and display interface - Temperature control system - Stepper motor control - Washing Machine Control - Simulation of stepper motor control and Traffic light control using MATLAB.

UNIT IV ARDUINO

9

Introduction to the Arduino - Creating an Arduino programming Environment - Using the Arduino IDE - Creating an Arduino program - Using Libraries - Working with Digital Interfaces - Interfacing with Analog devices - Adding Interrupts - Communicating with devices - Using sensors - Working with Motors - Using an LCD.



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UNIT V PIC MICROCONTROLLER

9

Introduction to PIC Microcontroller - PIC16C6X: Architecture - Data and program memory organization - Addressing modes - Instruction set - Timers - I/O Ports - Interrupt Programming - Speed Control of Induction Motor.

LIST OF EXPERIMENTS

8085 Programs using kits

1. Basic arithmetic and Logical operations.
2. Code conversion, sorting and searching.

Peripherals and Interfacing Experiments

1. Stepper motor control.
2. Key board and Display.
3. A/D and D/A interface and Waveform Generation.

8051 Experiments using kits

1. Basic arithmetic and Logical operations.
2. Displaying a moving/ rolling message in the student arduino trainer kit's output device.
3. Programming PIC architecture with software tools.

TOTAL: 45 + 15 = 60 PERIODS

OUTCOMES

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

- Explain the architecture, timing, addressing modes, and instruction set of the 8085 microprocessor.
- Summarize the hardware, memory organization, interrupts, and programming concepts of the 8051.
- Analyze interfacing of A/D, D/A, motors, displays, and embedded applications using the 8051.
- Apply Arduino programming, libraries, and I/O interfacing techniques for real-time control.
- Identify the PIC architecture, memory structure, instructions, and peripheral functions including motor control.
- Develop the assembly language programs and interfacing of peripheral with microprocessor and microcontroller.

TEXT BOOKS

1. R.S.Gaonkar, "Microprocessor Architecture, Programming and Applications with the 8085",



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Penram International Publishing, Sixth Edition, 2018.

2. Krishna Kant, "Microprocessor and Microcontrollers Architecture, Programming and System design 8085, 8086, 8051, 8096 ", Prentice Hall of India, New Delhi, Third Edition, 2021.

REFERENCES

1. Richard Blum, "Arduino Programming in 24 Hours", Sams Teach Yourself, Second Edition, 2022.
2. Muhammad Ali Mazidi, Rolin D. Mckinlay, Danny Causey "PIC Microcontroller and Embedded Systems using Assembly and C for PIC18", Pearson Education, Second Edition, 2021.

E-RESOURCES

1. <https://nptel.ac.in/courses/108/105/108105102/>-(Microprocessors & Microcontrollers)
2. <https://nptel.ac.in/courses/117/104/117104072/>-(Microcontrollers & Applications)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	3	2	2	3	2	2	-	-	-	-	2	3	2
2	3	3	3	2	3	2	2	-	-	-	-	2	3	2
3	3	3	3	3	3	2	2	-	-	-	-	2	3	3
4	3	3	3	3	3	2	2	-	-	-	-	2	3	3
5	3	3	3	3	3	2	2	-	-	-	-	2	3	3
6	2	2	2	2	3	3	3	-	3	3	3	2	3	3
AVG	2.8	2.8	2.6	2.4	3	2.2	2.2	-	3	3	3	2	3	2.6

1-Low 2-Medium 3-High '-' – No Correlation

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23EEE402

INDUCTION AND SYNCHRONOUS MACHINES

LT P C

(Lab Embedded Theory Course)

3 0 2 4

OBJECTIVES

- To familiarize the construction, operation, performance and testing of three phase induction motors.
- To impart knowledge the starting methods, speed control techniques and braking of three phase induction motors.
- To enhance the operation, performance and applications of single-phase induction motors and special machines.
- To acquire knowledge of construction, operation, regulation and testing of synchronous generators.
- To inculcate the operating principles, performance characteristics and applications of synchronous motors.
- To provide knowledge about the operating characteristics, losses and efficiency, regulation, speed control of synchronous and induction machines.

UNIT I THREE PHASE INDUCTION MOTOR

9

Constructional details - Types of rotors - Principle of operation - Slip - Cogging and crawling - Equivalent circuit - Torque-Slip characteristics - Torque Equation - Condition for maximum torque - Losses and efficiency - Load test - No load and blocked rotor tests - Circle diagram - Separation of losses - Double cage induction motors - Induction generators - Synchronous induction motor - Simulation of circle diagram using MATLAB.

UNIT II STARTING AND SPEED CONTROL OF THREE PHASE INDUCTION MOTOR

9

Need for starting - Types of starters - DOL, Rotor resistance, Autotransformer and Star delta starters - Speed control - Voltage control, Frequency control and pole changing - Cascaded Connection - V/f control - Slip power recovery Scheme - Braking of three phase induction motor.

UNIT III SINGLE PHASE INDUCTION MOTORS AND SPECIAL MACHINES

9

Constructional details of single phase induction motor - Double field revolving theory and operation - Equivalent circuit - No load and blocked rotor test - Performance analysis - Starting methods of single-phase induction motors - Capacitor-start capacitor run Induction motor - Shaded pole induction motor - Working Principle: Stepper motors, Hysteresis motor, Reluctance motor, Universal motor, BLDC Motor.



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UNIT IV SYNCHRONOUS GENERATOR

9

Constructional details - Types of rotors - winding factors - EMF equation - Synchronous reactance - Armature reaction - Phasor diagrams of non-salient pole synchronous generator connected to infinite bus - Synchronizing and parallel operation - Synchronizing torque - Change of excitation and mechanical input - Voltage regulation - EMF, MMF and ZPF method - Two reaction theory - Slip test.

UNIT V SYNCHRONOUS MOTOR

9

Principle of operation - Torque equation - Operation on infinite bus bars - V and Inverted V curves - Power input and power developed equations - Starting methods - Current loci for constant power input, constant excitation and constant power Developed-Hunting - Natural frequency of oscillations - Damper windings - Synchronous condenser - Simulation of Torque equation of synchronous motor using MATLAB.

LIST OF EXPERIMENTS

1. Load test on three-phase Slip ring and Squirrel cage induction motor.
2. No load and blocked rotor tests on three-phase induction motor. (Determination of equivalent circuit parameters).
3. Separation of No-load losses of three-phase induction motor.
4. Load test on single-phase induction motor.
5. No load and blocked rotor test on single-phase induction motor.
6. Regulation of three phase alternator by EMF and MMF methods.
7. Regulation of three phase salient pole alternator by slip test.
8. V and Inverted V curves of Three Phase Synchronous Motor.

TOTAL: 45+15 = 60 PERIODS

OUTCOMES

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

- Analyze the torque-slip characteristics and performance of three phase induction motors.
- Explain the suitable starting and speed control methods for three phase induction motors.
- Identify the working principles of single-phase induction motors and special machines.
- Examine the performance and voltage regulation of synchronous generators.
- Summarize the synchronous motor concepts for power factor improvement and industrial applications.



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- Analyze the performance and operating characteristics of induction and synchronous machines.

TEXT BOOKS

- D.P. Kothari and I.J. Nagrath, "Electric Machines", McGraw Hill Publishing Company Ltd, Fifth Edition, 2017
- P.S. Bhimbhra, "Electrical Machinery", Khanna Publishers, Second Edition, 2021.

REFERENCES

- Prithwiraj Purkait, Indrayudh Bandyopadhyay, "Electric Machines", Pearson India Education, 2017.
- B.R.Gupta, "Fundamental of Electric Machines" New age International Publishers, Third Edition, Reprint 2015.

E – RESOURCES

- <https://nptel.ac.in/courses/108/106/108106072/> - (Introduction on Induction Machines)
- <https://archive.nptel.ac.in/courses/108/105/108105131/> - (Electrical machines II)

Mapping of COs-POs & PSOs

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2	3	3	3	3	3	2	2	-	-	-	-	2	3	2
3	3	3	3	3	3	2	2	-	-	-	-	2	3	3
4	3	3	3	3	3	2	2	-	-	-	-	2	3	2
5	3	3	3	3	3	2	2	-	-	-	-	2	2	3
6	3	3	3	3	3	3	3	-	3	3	3	2	2	2
AVG	3	3	2.8	2.8	3	2.2	2.2	-	3	3	3	2	2.6	2.3

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23GEE301

PROBLEM SOLVING AND PYTHON PROGRAMMING

L T P C

(Lab Embedded Theory Course)

3 0 2 4

OBJECTIVES

- To impart the fundamentals of computational thinking, algorithm design, and problem-solving techniques for developing efficient software solutions.
- To develop students proficiency in Python programming using data types, expressions, operators, statements, and debugging techniques.
- To enable students to apply control structures, functions, recursion, and string manipulation for solving computational problems.
- To train students to use lists, tuples, dictionaries, and advanced data processing techniques for structured programming.
- To inculcate the knowledge of file handling, exception handling, modules, packages, and data visualization for developing robust Python applications.
- To develop the students in analytical, programming, and computational skills through coding practices, and to solve real-world problems using Python.

UNIT I COMPUTATIONAL THINKING AND PROBLEM SOLVING

9

Fundamentals of Computing – Identification of Computational Problems – Algorithms, building blocks of algorithms (statements, state, control flow, functions), notation (pseudocode, flowchart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion). Illustrative problems: find minimum in a list, insert a card in a list of sorted cards, guess an integer number in a range, Towers of Hanoi.

Coding practices:

1. Develop Algorithm and flowchart to find the greatest of three numbers.
2. Develop Algorithm and flowchart to find a minimum number in a List.

Problem-solving Assignments:

1. Develop Algorithm and Flowchart to solve Towers of Hanoi Problem.
2. Develop Algorithm, Pseudo code and flowchart for finding factorial of a given number using recursion.

UNIT II DATA TYPES, EXPRESSIONS, STATEMENTS

9

Python interpreter and interactive mode, debugging; values and types: int, float, boolean, string, and list; variables, expressions, statements, tuple assignment, precedence of operators, comments; Illustrative programs: exchange the values of two variables, circulate the values of n variables,



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distance between two points

Coding practices:

1. Develop python program to find area of a Circle
2. Develop python program to convert Fahrenheit to Celsius.

Problem-solving Assignments:

1. Develop Python program to find Quadratic Equation

Develop Python program to find Student mark statement based on 5 subjects.

UNIT III CONTROL FLOW, FUNCTIONS, STRINGS

9

Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else); Iteration: state, while, for, break, continue, pass; Fruitful functions: return values, parameters, local and global scope, function composition, recursion; Strings: string slices, immutability, string functions and methods, string module; Lists as arrays. Illustrative programs: square root, gcd, exponentiation, sum an array of numbers, linear search, binary search.

Coding practices:

1. Develop python program to find GCD of a given number.
2. Develop python program to find factorial of a number.
3. Develop Python program to find sum of array of given numbers.

Problem-solving Assignments:

1. Develop Python program to find whether an element is found in the List by using (A) Linear Search and (B) Binary Search method
2. Develop Python program to print Fibonacci Series

UNIT IV LISTS, TUPLES, DICTIONARIES

9

Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing – list comprehension; Illustrative programs: simple sorting, histogram, Students marks statement, Retail bill preparation.

Coding practices:

1. Develop python program for Insertion Sorting & Selection Sorting.
2. Develop python program for Histogram

Problem-solving Assignments:

1. Develop Python program for student mark statement using List
2. Develop Python program to print Retail bill statement



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UNIT V FILES, MODULES, PACKAGES & DATA VISUALIZATION

9

Files and exceptions: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, packages; Illustrative programs: word count, copy file – Importing Matplotlib – Introduction to plotting – visualizing errors – Histogram.

Coding practices:

1. Develop python program to append the contents of one file to another.
2. Develop python program to copy contents of one file to another file using command Line Arguments

Problem-solving Assignments:

1. Develop a python program for calculator using python packages.
2. Develop a suitable python program to demonstrate each case in Exceptional Handling.
3. Develop a suitable python program using Matplotlib for Visualizing Errors.

LIST OF EXPERIMENTS

1. Identification and solving of simple real life or scientific or technical problems, and developing flow charts for the same. (Electricity Billing, Retail shop billing, Sin series, weight of a motorbike, Weight of a steel bar, compute Electrical Current in Three Phase AC Circuit, etc.)
2. Python programming using simple statements and expressions (exchange the values of two variables, circulate the values of n variables, distance between two points).
3. Scientific problems using Conditionals and Iterative loops. (Number series, Number Patterns, pyramid pattern)
4. Implementing real-time/technical applications using Lists, Tuples. (Items present in a library/Components of a car/ Materials required for construction of a building –operations of list & tuples)
5. Implementing real-time/technical applications using Sets, Dictionaries. (Language, components of an automobile, Elements of a civil structure, etc.- operations of Sets & Dictionaries)
6. Implementing programs using Functions. (Factorial, largest number In a list, area of shape)
7. Implementing programs using Strings. (reverse, palindrome, character count, replacing characters)
8. Implementing programs using written modules and Python Standard Libraries (pandas, numpy, Matplotlib, scipy)
9. Implementing real-time/technical applications using File handling. (copy from one file to another, word count, longest word)



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10. Implementing real-time/technical applications using Exception handling. (divide by zero error, voter's age validity, student mark range validation)

TOTAL: 45 +15 = 60 PERIODS

OUTCOMES

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

- Analyze computational problems to develop effective problem-solving strategies.
- Apply python constructs to develop programs for python applications.
- Apply control structures and functions to solve computational problems.
- Apply Python built-in data structures such as lists, tuples, and dictionaries to process and manipulate data efficiently.
- Analyze the operations of file handling, exception handling, modules, packages, and data visualization techniques for real-world applications.
- Implement python programs for solving various computational problems.

TEXTBOOKS

1. Allen B. Downey, "Think Python: How to Think like a Computer Scientist", O'Reilly Publishers, Second Edition, 2016.
2. Karl Beecher, "Computational Thinking: A Beginner's Guide to Problem Solving and Programming", BCS Learning & Development Limited, First Edition, 2017.

REFERENCES

1. Paul Deitel and Harvey Deitel, "Python for Programmers", Pearson Education, First Edition, 2021.
2. G Venkatesh and Madhavan Mukund, "Computational Thinking: A Primer for Programmers and Data Scientists", Notion Press, First Edition, 2021.

E – RESOURCES

1. <https://nptel.ac.in/courses/106104074> (Introduction to Algorithms)
2. <https://archive.nptel.ac.in/courses/106/106/106106182/> (Joy of Computing)



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Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	3	3	2	2	-	-	1	1	1	-	2	3	1
2	3	3	3	2	3	-	-	1	1	1	-	2	3	1
3	3	3	3	2	3	-	-	1	1	1	-	2	3	1
4	3	3	3	2	3	-	1	1	1	1	-	3	3	1
5	3	3	3	3	3	1	1	2	2	2	-	3	3	1
6	3	3	3	3	3	1	1	2	3	2	2	3	3	1
AVG	3	3	3	2.3	2.8	1	1	1.3	1.5	1.3	2	2.5	3	1

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


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23EEC401

ONLINE CERTIFICATION COURSES

L T P C

3 0 0 3

Students may be permitted to study online courses (NPTEL, SWAYAM or any Proctored Assessment Certification Courses) with 3 credits during the 4th semester curriculum for all B.E./B.Tech. Programmes. Such courses offered to students shall be recommended by the Department Academic Committee (DAC). The DAC shall ensure that the courses offered are not core courses in their respective curriculum.

The number of credits and transfer of credits are based on the procedure explained in following Table. The mapping of marks with grades is applicable only if the student passes the course as per the guidelines of NPTEL.

S.No.	No. of Weeks	Credits
1	4	1
2	8	2
3	12	3
4	16	4


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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

REGULATIONS 2023

MINOR / HONOURS DEGREE

ELECTRIC VEHICLES

CURRICULUM AND SYLLABI





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CURRICULUM AND SYLLABI

FOR B.E. / B.Tech. DEGREE PROGRAMMES

(MINOR/HONOURS DEGREE – ELECTRIC VEHICLES)

B.E. ELECTRICAL AND ELECTRONICS ENGINEERING

CourseCode	Name of the Subject	Category	Periods /Week			Credit	Maximum Marks			
			L	T	P		C	CIA	ESE	TOT
THEORY										
23EEET01	Electric and Hybrid Vehicles	PC	3	0	0	3	40	60	100	
23EEET02	Electric Motors and Drives for Electric Vehicles	PC	3	0	0	3	40	60	100	
23EEET03	Advanced EV Technologies	PC	3	0	0	3	40	60	100	
EMBEDDED COURSE										
23EEEE01	Battery and Controls for Electric Vehicles	PC	3	0	2	4	50	50	100	
EMPLOYABILITY ENHANCEMENT COURSE										
23EEEP01	Project Work	EEC	0	0	12	6	60	40	100	
Total			19							

- PC : Professional Core
- EEC : Employability Enhancement Courses
- L : Lecture
- T : Tutorial
- P : Practical
- C : Credit Point
- CIA : Continuous Internal Assessment
- ESE : End Semester Examination
- TOT : Total



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SEMESTER III

23EEET01

ELECTRIC AND HYBRID VEHICLES

LT P C

3 0 0 3

OBJECTIVES

- To impart knowledge on the fundamentals, components, and classifications of electric vehicles.
- To familiarize with battery technologies and battery pack design for EV applications.
- To acquire knowledge on electric machines used in electric vehicles.
- To enhance understanding of EV drive train systems and their components.
- To foster awareness of hybrid electric vehicle architectures and energy management strategies.

UNIT I INTRODUCTION TO ELECTRIC VEHICLES

9

History and evolution of Evs - Components of electric vehicles - Comparison with internal combustion engines: Technology, benefits, and challenges - EV classification and electrification levelsb - EV terminology and concepts - Efficiency analysis for EVs vs. ICE vehicles.

UNIT II BATTERY TECHNOLOGIES FOR EVs

9

Battery basics and types - Key parameters: Capacity, discharge rate, state of charge, depth of discharge - Technical characteristics of EV batteries - Battery pack design principles - Properties and performance of EV batteries - Overview of battery safety and thermal runaway prevention.

UNIT III ELECTRIC MACHINES FOR EV APPLICATIONS

9

Motor and engine rating for Evs - Requirements of EV motors - DC machines and BLDC in Evs - Three-phase AC machines - Induction motors for Evs - Permanent magnet machines - Switched reluctance machines in EV applications - Introduction to motor cooling techniques.

UNIT IV EV DRIVE TRAIN SYSTEMS AND COMPONENTS

9

Transmission configurations for Evs - Drive train components: Gears, chain Drive, Belt drive differentials, clutches - Brake systems and regenerative braking - Motor sizing for EV applications - Integration of drive train components - Basics of torque vectoring in EV drive trains.

UNIT V HYBRID ELECTRIC VEHICLE ARCHITECTURES

9

Types of hybrid configurations - Series, parallel, and series-parallel - Design considerations for HEVs - Drive train layouts for different hybrid architectures - Sizing of components in hybrid



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systems - Energy management strategies in HEVs - Range extenders in hybrid vehicles - Retrofit hybrid system design.

TOTAL: 45 PERIODS

OUTCOMES

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

- Explain the concepts, components, and classifications of electric vehicles.
- Apply battery technologies and battery pack design principles for EV applications.
- Analyze the performance of electric machines used in electric vehicles.
- Examine the operation of EV drive train systems and their components.
- Apply hybrid electric vehicle architectures and energy management strategies.

TEXT BOOKS

1. Iqbal Hussain, "Electric & Hybrid Vehicles – Design Fundamentals", CRC Press, Third Edition, 2022.
2. James Larminie, "Electric Vehicle Technology Explained", John Wiley & Sons, Second Edition, 2019.

REFERENCES

1. Mehrdad Ehsani, Yimin Gao, Ali Emadi, "Modern Electric, Hybrid Electric, and Fuel Cell Vehicles: Fundamentals", CRC Press, Third Edition, 2020.
2. Sandeep Dhameja, "Electric Vehicle Battery Systems", Newnes, Second Edition, 2022

E-RESOURCES

1. <https://nptel.ac.in/courses/108103009> - (Hybrids and Electric Vehicle)
2. <http://nptel.ac.in/courses/108103009/> - (Electric Vehicle)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	3	3	3	2	-	-	-	-	-	-	2	3	2
2	3	3	3	3	2	-	-	-	-	-	-	2	3	2
3	3	3	3	3	2	-	-	-	-	-	-	2	3	2
4	3	3	3	3	2	-	-	-	-	-	-	2	3	2
5	3	3	3	3	2	-	-	-	-	-	-	2	3	2
AVG	3	3	3	3	2	-	-	-	-	-	-	2	3	2

1-Low 2-Medium 3-High '-' – No Correlation.

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SEMESTER IV

23EEET02

ELECTRIC MOTORS AND DRIVES FOR ELECTRIC VEHICLES

L T P C

3 0 0 3

OBJECTIVES

- To impart knowledge on electric vehicle motor requirements, drive systems, and power semiconductor devices.
- To acquire knowledge on the operation and control of DC motors and drives for electric vehicle applications.
- To provide knowledge on induction motor drives, inverter configurations, and control techniques used in EVs.
- To develop knowledge on permanent magnet synchronous motor drives and their field-oriented control strategies.
- To familiarize with special electric machines and emerging drive technologies for electric vehicle applications.

UNIT I FUNDAMENTALS OF EV MOTORS AND DRIVES

9

EV motor requirements - Comparison of motor types for EVs - Torque-speed characteristics - Power semiconductors in EV drives - IGBTs and MOSFETs - Basic drive types and selection criteria for EVs - Overview of motor efficiency maps.

UNIT II DC MOTORS AND DRIVES FOR EVs

9

PMDC motor principles and characteristics - DC motor control techniques - DC-DC converters for PMDC motors - Chopper control - Closed-loop control strategies - Regenerative braking in DC drives - Introduction to multiphase DC motors for EVs.

UNIT III AC INDUCTION MOTORS AND DRIVES FOR EVs

9

Induction motor operation in EVs; IGBT-based inverter design; PWM techniques for induction motor control; V/f control principles; Vector control basics; Efficiency considerations in induction motor drives. Brief overview of thermal management in EV drives

UNIT IV PERMANENT MAGNET SYNCHRONOUS MOTORS (PMSM) AND DRIVES

9

PMSM principles and advantages for EVs - PMSM types - surface mounted and interior - Field-oriented control of PMSM - PMSM drive system design - Comparison between PMSM and induction motor drives for EVs - Introduction to noise, vibration, and harshness (NVH) considerations in PMSM.



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UNIT V SPECIAL ELECTRIC MACHINES FOR EVs

9

Brushless DC (BLDC) motors - hub and inner rotor types - BLDC motor control techniques - Switched Reluctance Motors (SRM) for EVs - SRM drive strategies - In-wheel motor technology - Axial flux motors - Thermal management in EV motors and Drive - Overview of fault-tolerant motor designs.

TOTAL : 45 PERIODS

OUTCOMES

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

- Discuss characteristics and parameters of various EV motors
- Analyze electric drive concepts specific to EVs
- Design and analyze control systems for DC and AC EV motors
- Examine advanced motor technologies used in modern EVs
- Develop drive systems for special EV motors

TEXT BOOKS

1. Iqbal Hussain, "Electric & Hybrid Vehicles – Design Fundamentals", CRC Press, Third Edition, 2022.
2. James Larminie, "Electric Vehicle Technology Explained", John Wiley & Sons, Second Edition, 2019.

REFERENCES

1. Ali Emadi, "Advanced Electric Drive Vehicles", CRC Press, First Edition, 2023.
2. Mehrdad Ehsani, Yimin Gao, Ali Emadi, "Modern Electric, Hybrid Electric, and Fuel Cell Vehicles", CRC Press, Third Edition, 2020.

E-RESOURCES

1. <https://nptel.ac.in/courses/108104140> - Electric Drives
2. <https://nptel.ac.in/courses/108108077> - Electric Vehicles

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	3	3	3	2	-	-	-	-	-	-	2	3	2
2	3	3	3	3	2	-	-	-	-	-	-	2	3	2
3	3	3	3	3	2	-	-	-	-	-	-	2	3	2
4	3	3	3	3	2	-	-	-	-	-	-	2	3	2
5	3	3	3	3	2	-	-	-	-	-	-	2	3	2
AVG	3	3	3	3	2	-	-	-	-	-	-	2	3	2

1-Low 2-Medium 3-High '-' – No Correlation.

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SEMESTER V

23EEET03

ADVANCED EV TECHNOLOGIES

LT P C

3 0 0 3

OBJECTIVES

- To impart knowledge of advanced charging technologies and Vehicle-to-grid (V2G) systems used in electric vehicles.
- To familiarize with lightweight materials and thermal management techniques for improving EV Performance and efficiency.
- To develop understanding of autonomous driving technologies and their applications in electric vehicles.
- To enhance awareness of EV economics, government policies, regulations and cyber security aspects related to electric mobility.
- To inculcate knowledge of electric vehicle maintenance, diagnostics, battery management and end-of-life recycling practices.

UNIT I ADVANCED CHARGING TECHNOLOGIES AND V2G

9

Wireless charging systems - Ultra-fast charging - Vehicle-to-Grid (V2G) technology - Smart charging infrastructure - Charging standards and protocols - Integration with renewable energy sources - Overview of extreme fast charging technologies and challenges.

UNIT II LIGHTWEIGHT MATERIALS AND THERMAL MANAGEMENT

9

Advanced materials for EV body and chassis - Composite materials - Weight reduction strategies - Battery thermal management systems - Powertrain cooling - Cabin climate control for EVs - Introduction to structural batteries in EVs.

UNIT III AUTONOMOUS DRIVING AND EV INTEGRATION

9

Sensors and Perception systems for EVs - Autonomous driving levels - Energy management in autonomous EVs - Integration of EV and autonomous technologies - Safety considerations - Introduction to ADAS and Connected Vehicles - Sensor fusion in autonomous EVs Cameras - LiDAR (Light Detection and Ranging) - RADAR (Radio Detection and Ranging) - GPS (Global Positioning System) / GNSS (Global Navigation Satellite System) - Accelerometers and Gyroscopes.

UNIT IV EV ECONOMICS, POLICY, AND CYBER SECURITY

9

Total cost of ownership analysis - Government incentives and policies - Market trends and forecasting - Cybersecurity threats in EVs - Security protocols and best practices - Over-the-air



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updates - Comparative study of 2 wheeler and 3 wheeler Retrofit unit Vs New EV.

UNIT V EV MAINTENANCE, DIAGNOSTICS, AND RECYCLING

9

EV-specific maintenance procedures - Diagnostic tools and techniques - Troubleshooting EV systems - Battery second-life applications - Recycling processes for EV components - Environmental impact assessment - Overview of EV battery remanufacturing and repurposing.

TOTAL: 45 PERIODS

OUTCOMES

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

- Analyze advanced charging technologies and V2G systems.
- Examine lightweight materials and thermal management techniques in EVs.
- Apply the integration of autonomous driving technologies in EVs.
- Examine EV economics, policies, and cyber security considerations.
- Analyze EV maintenance, diagnostics, and end-of-life recycling.

TEXT BOOKS

1. Carla Fabiana Chiasserini et al., "Electric Vehicles in Smart Grids: Charging Strategies", Springer, 2021.
2. David Greenwood, "Advanced Electric Drive Vehicles", CRC Press, 2020.

REFERENCES

1. Seref Soylu, "Electric Vehicles - Modelling and Simulations", InTech, 2022.
2. Tom Denton, "Electric and Hybrid Vehicles", Routledge, 2020.

E-RESOURCES

1. <https://nptel.ac.in/courses/108103009> - (Advanced Electric Vehicles)
2. <https://www.edx.org/course/electric-vehicle-technology-business> - (Electric Vehicles: Technology, Business, and Policy)



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Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2	2	2	3	2	-	-	-	-	-	2	-	3	2
2	2	2	2	3	2	-	-	-	-	-	2	-	3	2
3	2	2	2	3	2	-	-	-	-	-	2	-	3	2
4	2	2	2	3	2	-	-	-	-	-	2	-	3	2
5	2	2	2	3	2	-	-	-	-	-	2	-	3	2
AVG	2	2	2	3	2	-	-	-	-	-	2	-	3	2

1-Low 2-Medium 3-High '-' – No Correlation.


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SEMESTER VI

23EEEE01

BATTERY AND CONTROLS FOR ELECTRIC VEHICLES

LT P C

(Lab Embedded Theory Course)

3 0 2 4

OBJECTIVES

- To impart knowledge on different energy storage systems, battery characteristics, and performance criteria.
- To familiarize with battery modeling, management systems, and state-of-charge estimation techniques.
- To develop understanding of battery testing, disposal, recycling, and environmental impacts.
- To instruct on EV charging technologies, charger types, and communication protocols.
- To foster awareness of charging connectors, standards, renewable integration, and V2G concepts.
- To develop skills in battery testing, EV charging, solar integration, and motor control techniques.

UNIT I ENERGY STORAGE SYSTEMS AND BATTERY CHARACTERISTICS 9

Types of energy storage: Lead Acid, Nickel-based, Lithium-based, Metal Air batteries - Ultra capacitors - Flywheel Energy Storage - Battery specifications – Efficiency - Electrical parameters - Heat generation - Performance criteria for EV batteries - Power and energy requirements - Battery parameter estimation techniques.

UNIT II BATTERY MODELING AND MANAGEMENT SYSTEMS 9

General modeling approach - Simulation models for Li-ion and NiCd batteries – Parameterization - Battery selection for EVs/HEVs - Traction battery pack design - State of charge estimation - Cell equalization - Thermal management - Battery Management System (BMS) components and functions - Overview of cell balancing techniques in battery packs.

UNIT III BATTERY TESTING, DISPOSAL, AND RECYCLING 9

Safety testing - Transport and storage limitations - Recycling and second-life applications - Environmental impacts - Recycling methods for EV batteries - Fuel Cells and Hydrogen-based system design - Accelerated aging tests for EV batteries



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UNIT IV EV CHARGING TECHNOLOGIES AND INFRASTRUCTURE

9

Types of EV chargers - AC and DC charging - Charger modes - EVSE associated charge times - AC and DC Pile Chargers - EVSE Power Module selection - Communication Protocols - Open Charge Point Protocol (OCPP) - Bharat DC001 & AC001 Charger specifications - Overview of cyber security in EV charging infrastructure.

UNIT V CHARGING CONNECTORS AND RENEWABLE INTEGRATION

9

AC and DC charger types and connectors - Charging standards (IEC 61851-1, IEC 61851-24, 62196-2) - PV module technologies for EV charging - Inverter selection and sizing - Cable and earthing selection - Relevant IEC standards for solar integration - bidirectional charging and V2G concepts.

LIST OF EXPERIMENTS

1. Battery characterization and performance evaluation
2. Battery management system simulation
3. EV charger efficiency and performance testing
4. Charging protocol implementation and testing
5. Solar PV integration with EV charging station
6. EV charger efficiency and performance testing (AC and DC charging)
7. Simulation and Implementation and testing of different PWM techniques for motor control

TOTAL: 45 + 15 = 60 PERIODS

OUTCOMES

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

- Explain the types, characteristics, and performance criteria of batteries and energy storage systems.
- Analyze battery modeling, management systems, and state-of-charge estimation techniques.
- Examine battery testing methods, recycling processes, and environmental impacts.
- Apply EV charging technologies, charger types, and communication protocols.
- Analyze charging connectors, standards, renewable integration, and V2G concepts.
- Design electric drive systems, allowing for performance optimization and problem-solving.



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TEXT BOOKS

1. Ibrahim Dincer et al., "Thermal Management of Electric Vehicle Battery Systems", John Wiley & Sons, 2019.
2. James Larminie, John Lowry, "Electric Vehicle Technology Explained", John Wiley & Sons, Second Edition, 2022.

REFERENCES

1. Chris Mi et al., "Hybrid Electric Vehicles: Principles and Applications with Practical Perspectives", Wiley, Second Edition, 2021.
2. Amir Khajepour et al., "Electric and Hybrid Vehicles: Technologies, Modeling and Control: A Mechatronic Approach", John Wiley & Sons, 2019.

E-RESOURCES

1. <https://nptel.ac.in/courses/113105102> - (Battery Modeling)
2. <https://nptel.ac.in/courses/108102047> - (Energy Storage)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	3	3	3	3	2	2	-	-	-	-	3	3	2
2	3	3	3	3	3	2	2	-	-	-	-	3	3	2
3	3	3	3	3	3	2	2	-	-	-	-	3	3	2
4	3	3	3	3	3	2	2	-	-	-	-	3	3	2
5	3	3	3	3	3	2	2	-	-	-	-	3	3	2
6	3	3	3	3	3	2	2	2	3	3	2	3	3	2
AVG	3	3	3	3	3	2	2	2	3	3	2	3	3	2

1-Low 2-Medium 3-High '-' – No Correlation.

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SEMESTER VII

23EEEP01

PROJECT WORK

L T P C

0 0 12 6

OBJECTIVES

- To develop knowledge to formulate a real world problem and projects goals.
- To identify the various tasks of the project to determine standard procedures.
- To identify and learn new tools, algorithms and techniques.
- To understand the various procedures for validation of the product and analysis the cost effectiveness.
- To understand the guideline to Prepare report for oral demonstrations.

PROCESS DESCRIPTION

- For Project work out of 100 marks, the maximum marks for Continuous Internal Assessment is fixed as 60 and the End Semester Examination (project report evaluation and viva voce examination) carries 40 marks. Project work shall be assigned to a single student.
- The project work shall be undertaken by students either in industry or in the college.
- The total credit for project work is 6.
- There shall be three reviews (Zeroth Review, (Review I and Review II, each 100 marks)) during the semester by a review committee. The student shall make presentation on the progress made before the committee. The Head of the Department shall constitute a review committee for each programme. There shall be a minimum of three members in the review committee.
- The committee shall consist of the Supervisor, Project Coordinator and one of the faculty members.
- The student(s) is expected to submit the project report on or before the last working day of the semester. The ESE for the project work shall consist of the evaluation of the final project report submitted by the student or students of the project group by an external examiner, followed by a viva-voce examination conducted separately for each student by a committee consisting of the external examiner and an internal examiner (other than supervisor). The project coordinator shall be the internal examiner. The COE shall appoint the External Examiner for the ESE of the Project Work. The project report shall be submitted as per the approved guidelines given by Controller of Examinations.



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OUTCOMES

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

- Formulate real-world problems.
- Design and express technical solutions using appropriate tools and techniques.
- Test and validate prototypes for efficiency and cost-effectiveness, and present their work effectively through reports and oral demonstrations.

Mapping of COs-POs & PSOs

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

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


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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

REGULATIONS 2023

MINOR / HONOURS DEGREE

SENSORS TECHNOLOGY

CURRICULUM AND SYLLABI





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CURRICULUM AND SYLLABI

FOR B.E. / B.Tech. DEGREE PROGRAMMES

(MINOR/HONOURS DEGREE – SENSORS TECHNOLOGY)

B. E. - ELECTRICAL AND ELECTRONICS ENGINEERING

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		C	CIA	ESE
THEORY									
23EEST01	Nanomaterials and Sensors	PC	3	0	0	3	40	60	100
23EEST02	Wireless Sensor Networks	PC	3	0	0	3	40	60	100
23EEST03	Flexible and Wearable Sensors	PC	3	0	0	3	40	60	100
EMBEDDED COURSE									
23EESE01	Principles of Sensors	PC	3	0	2	4	50	50	100
EMPLOYABILITY ENHANCEMENT COURSE									
23EESP01	Project Work	EEC	0	0	12	6	60	40	100
Total			19						

PC	:	Professional Core
EEC	:	Employability Enhancement Courses
L	:	Lecture
T	:	Tutorial
P	:	Practical
C	:	Credit Point
CIA	:	Continuous Internal Assessment
ESE	:	End Semester Examination
TOT	:	Total



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SEMESTER III

23EEST01

NANOMATERIALS AND SENSORS

L T P C

3 0 0 3

OBJECTIVES

- To impart knowledge on the fundamentals, properties, and synthesis of nanomaterials and nanostructures.
- To familiarize with various techniques used for the characterization of nanomaterials.
- To acquire knowledge on metal nanoparticles, nanowires, and their fabrication methods for sensor applications.
- To inculcate the concepts of carbon nanotubes and their use in sensor technologies.
- To enhance understanding of metal oxide nanostructures, sensing mechanisms, and their applications.

UNIT I INTRODUCTION TO NANOTECHNOLOGY

9

Definition of nanotechnology - Main features of nano-materials - Types of nano structures (0D, 1D, and 2D structures) - Synthesis of nano-materials and nano-composites - Chemical/Physical/Electrical/Optical properties of nano-materials and composites.

UNIT II CHARACTERIZATION OF NANOMATERIALS

9

Methods for characterizing the nano-materials: Atomic Force Microscopy (AFM), Scanning Electron Microscopy (SEM), Transmission Electron Microscopy (TEM) and spectroscopy -spectrometry based surface analysis techniques.

UNIT III METAL NANOPARTICLE AND NANOWIRE BASED SENSORS

9

Definition of nanoparticle - Features of nanoparticles - Production of nanoparticles by physical and chemical approaches - Definition of nanowires - Features of nanowires - Fabrication of individual nanowire by top - Down approaches and bottom-up approaches - Fabrication of nanowire arrays (fluidic channel, blown bubble film, contact printing, spray coating, etc.).

UNIT IV CARBON NANOTUBE BASED SENSORS

9

Definition of carbon nanotube - Features of carbon nanotubes - Synthesis of carbon nanotubes - Fabrication and working principles of sensors based on individual carbon nanotube - Fabrication and working principles of sensors based on random array of carbon nanotubes.



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UNIT V SENSOR BASED NANOSTRUCTURES OF METAL OXIDE

9

Synthesis of metal oxide structures by dry and wet methods - Types of metal oxide gas sensors (0D, 1D and 2D) - Defect chemistry of the metal oxide sensors - Sensing mechanism of metal - Oxide gas sensors - Porous metal - Oxide structures for improved sensing applications.

TOTAL : 45 PERIODS

OUTCOMES

Upon Completion of the course, the students will be able to

- Explain the fundamentals, types, properties, and synthesis methods of nanomaterials and nanostructures.
- Apply various characterization techniques for analyzing the properties of nanomaterials.
- Analyze the fabrication methods and sensing applications of metal nanoparticles and nanowire-based sensors.
- Examine the synthesis, fabrication, and working principles of carbon nanotube-based sensors.
- Analyze the synthesis methods, sensing mechanisms, and applications of metal oxide-based nanostructured sensors.

TEXT BOOKS

1. Dieter Vollath, "Nanomaterials: An Introduction to Synthesis, Properties and Applications", Wiley, New Jersey, Second Edition, 2019.
2. Guozhong Cao, "Nanostructures & Nanomaterials: Synthesis, Properties & Applications", Imperial College Press, London, Second Edition, 2021

REFERENCES

1. Martin Pumera, "Nanomaterials for Electrochemical Sensing and Bio sensing", Pan Stanford, First Edition, 2022.
2. Michael A. Carpenter, Sanjay Mathur, Andrei Kolmakov, "Metal Oxide Nanomaterials for Chemical Sensors", Springer, NewYork, First Edition, 2018.

E-RESOURCES

1. [https://nptel.ac.in/courses/118104008-\(Nanomaterial\)](https://nptel.ac.in/courses/118104008-(Nanomaterial))
2. [https://nptel.ac.in/courses/108106173-\(sensor\)](https://nptel.ac.in/courses/108106173-(sensor))



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Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	3	2	3	2	1	1	1	-	1	-	3	3	2
2	3	3	2	3	2	1	1	1	-	1	-	3	3	2
3	3	3	2	3	2	1	1	1	-	1	-	3	3	2
4	3	3	2	3	2	1	1	1	-	1	-	3	3	2
5	3	3	2	3	2	1	1	1	-	1	-	3	3	2
AVG	3	3	2	3	2	1	1	1	-	1	-	3	3	2

1-Low 2-Medium 3-High '-' – No Correlation.


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SEMESTER IV

23EEST02

WIRELESS SENSOR NETWORKS

LT P C

3 0 0 3

OBJECTIVES

- To impart knowledge on network communication protocols used in embedded systems.
- To familiarize with embedded wireless communication technologies and IP-based wireless sensor networks.
- To acquire knowledge on the architecture, characteristics, and design considerations of wireless sensor networks.
- To inculcate the concepts of medium access control protocols and communication techniques in WSNs.
- To enhance understanding of sensor network architecture, data dissemination, and gateway-based communication.

UNIT I NETWORK EMBEDDED SYSTEMS

9

RS232, RS485, SPI, I2C, CAN, LIN, FLEXRAY.

UNIT II EMBEDDED WIRELESS COMMUNICATION AND IP BASED WSN

9

Bluetooth, Zigbee, Wifi, UWB Circuit switching, packet switching, concept of IPV4, IPV6, 6 LOW PAN and IP, IP based WSN, 6 LOW PAN based WSN, IOT.

UNIT III WIRELESS SENSOR NETWORK (WSN)

9

Characteristic and challenges, WSN vs Adhoc Networks, Sensor node architecture, Physical layer and transceiver design considerations in WSNs, Energy usage profile, Choice of modulation scheme, Dynamic modulation scaling, Antenna considerations.

UNIT IV WSN (Medium Access Control)

9

Fundamentals of MAC protocols - Low duty cycle protocols and wakeup concepts, Contention Based protocols, Schedule-based protocols - SMAC - BMAC, Traffic-adaptive medium access protocol (TRAMA) - The IEEE 802.15.4 MAC protocol.

UNIT V SENSOR NETWORK ARCHITECTURE

9

Data Dissemination, Flooding and Gossiping - Data gathering Sensor Network Scenarios, Optimization Goals and Figures of Merit, Design Principles for WSNs - Gateway Concepts, Need for gateway, WSN and Internet Communication, WSN Tunneling



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TOTAL: 45 PERIODS

OUTCOMES

Upon Completion of the course, the students will be able to

- Explain the applicability and limitations of communication protocols for are altime WSN application.
- Analyze the behavior of Mobile Adhoc Networks (MANETs) and correlates the infrastructure-based networks.
- Apply the routing protocols function and their implications in data transmission delay and bandwidth.
- Analyze networks with an attempt to reduce issue of broad cast and flooding techniques.
- Examine the appropriate algorithms to improve existing or to develop new wireless sensor network applications.

TEXT BOOKS

1. Holger Karl, Andreas Willig, "Protocols and Architectures for Wireless Sensor Networks", John Wiley & Sons, NewJersey, First Edition, 2021.
2. Jun Zheng, Abbas Jamalipour, "Wireless Sensor Networks: A Networking Perspective", Wiley-IEEE Press, USA, First Edition, 2019.

REFERENCES

1. Waltenegus W.Dargie, Christian Poellabauer, "Fundamentals of Wireless Sensor Networks: Theory and Practice", John Wiley & Sons, NewJersey, First Edition, 2018.
2. Rlan F. Akyildiz, Mehmet Can Vuran, "Wireless Sensor Networks", John Wiley & Sons, NewJersey, First Edition, 2021.

E-RESOURCES

1. <https://nptel.ac.in/courses/106106167> - (Introduction to wireless communications)
2. <https://nptel.ac.in/courses/106105160> -(wireless Ad Hoc and Sensor Network)



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Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	3	2	3	2	1	1	1	-	1	-	3	3	2
2	3	3	2	3	2	1	1	1	-	1	-	3	3	2
3	3	3	2	3	2	1	1	1	-	1	-	3	3	2
4	3	3	2	3	2	1	1	1	-	1	-	3	3	2
5	3	3	2	3	2	1	1	1	-	1	-	3	3	2
AVG	3	3	2	3	2	1	1	1	-	1	-	3	3	2

1-Low 2-Medium 3-High '-' – No Correlation.


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SEMESTER V

23EEST03

FLEXIBLE AND WEARABLE SENSORS

L T P C

3 0 0 3

OBJECTIVES

- To impart knowledge on the fundamentals, materials, and fabrication technologies of flexible electronics.
- To familiarize with materials and novel patterning methods used for flexible electronic devices.
- To acquire knowledge on thin film transistors, plastic electronics, and smart textile technologies.
- To inculcate the concepts of wearable electronics, haptic devices, and tactile display technologies.
- To enhance understanding of knitted electronic textiles and their sensing applications.

UNIT I OVERVIEW OF FLEXIBLE ELECTRONICS TECHNOLOGY

9

History of flexible electronics - Materials for flexible electronics: degrees of flexibility, substrates, backplane electronics, front plane technologies, encapsulation - Fabrication technology for flexible electronics - Fabrication on sheets by batch processing, fabrication on web by Roll-to-Roll processing - Additive printing.

UNIT II MATERIALS AND NOVEL PATTERNING METHODS FOR FLEXIBLE ELECTRONICS

9

Materials considerations for flexible electronics: Overview, Inorganics semiconductors and dielectrics, organic semiconductors and dielectrics, conductors - Print processing options for device fabrication: Overview, control of feature sizes of jet printed liquids, jet printing for etch mask patterning, methods for minimizing feature size, printing active materials.

UNIT III FLEXIBLE ELECTRONICS FROM FOILS TO TEXTILES

9

Introduction -Thin film transistors: Materials and Technologies - Review of semiconductors employed in flexible electronics - Thin film transistors based on IGZO - Plastic electronics for smart textiles - Improvements and limitations.

UNIT IV WEARABLE HAPTICS

9

World of wearables - Attributes of wearables - Textiles and clothing: The meta wearable Challenges and opportunities - Future of wearables - Need for wearable haptic devices - Categories of



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wearable haptic and tactile display.

UNIT V KNITTED ELECTRONIC TEXTILES

9

From fibers to textile sensors - Interlaced network -Textile sensors for physiological state monitoring
- Biomechanical sensing - Noninvasive sweat monitoring by textile sensors and other applications.
FBG sensor in Intelligent Clothing and Biomechanics.

TOTAL: 45 PERIODS

OUTCOMES

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

- Explain the technology developments in the flexible electronics technology.
- Identify the suitable materials and its processing for the development of thin film electronics.
- Examine the pattern and develop with suitable patterning methods.
- Analyze the process involved in the transformation of electronics from foils to textiles
- Examine the developing wearable sensors for physical and chemical parameters

TEXTBOOKS

1. Michael J. McGrath, Clíodhna Ní Scanaill, Dawn Nafus, "Sensor Technologies Healthcare, Wellness and Environmental Applications", Apress Media LLC, New York First Edition, 2021.
2. William S. Wong, Alberto Salleo, Flexible Electronics: Materials and Applications, Springer, New York, First Edition, 2021.

REFERENCES

1. Edward Sazonov, Michael R. Newman, "Wearable Sensors: Fundamentals, Implementation and Applications", Academic Press, Cambridge, Second Edition, 2023.
2. Kate Hartman, "Make: Wearable Electronics: Design, prototype, and wear your interactive garments", Maker Media, Netherlands, Second Edition, 2018.

E-RESOURCES

1. [https://nptel.ac.in/courses/108108112-\(Semiconductor Device\)](https://nptel.ac.in/courses/108108112-(Semiconductor Device))
2. [https://nptel.ac.in/courses/108108031-\(Electronics Systems \)](https://nptel.ac.in/courses/108108031-(Electronics Systems))



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Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	3	2	3	2	1	1	1	-	1	-	3	3	2
2	3	3	2	3	2	1	1	1	-	1	-	3	3	2
3	3	3	2	3	2	1	1	1	-	1	-	3	3	2
4	3	3	2	3	2	1	1	1	-	1	-	3	3	2
5	3	3	2	3	2	1	1	1	-	1	-	3	3	2
AVG	3	3	2	3	2	1	1	1	-	1	-	3	3	2

1-Low 2-Medium 3-High '-' – No Correlation.


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SEMESTER VI

23EESE01

PRINCIPLES OF SENSORS

LT P C

3 0 4 4

OBJECTIVES

- To enhance the fundamentals, classification, performance characteristics, and working principles of optical and semiconductor sensors.
- To foster the intensity, polarization, and interferometric sensing techniques using optical fibers.
- To instruct the principles and characteristics of velocity, acceleration, and inertial sensors.
- To familiarize the working principles of position, displacement, direction, and level sensors.
- To acquire knowledge of flow, temperature, and acoustic sensors and their measurement techniques.
- To inculcate the principles and applications of strain, force, pressure, displacement, temperature, and non-contact measurement systems using electrical and electromechanical sensors.

UNIT I SENSOR FUNDAMENTALS AND OPTICAL DETECTORS

9

Sensor Classification, Performance and Types, Error Analysis characteristics Electronic and Optical properties of semiconductor as sensors, LED, Semiconductor lasers, Fiber optic sensors, thermal detectors, photo multipliers, photoconductive detectors, photodiodes, avalanche photodiodes, CCDs.

UNIT II INTENSITY POLARIZATION AND INTERFEROMETRIC SENSORS

9

Intensity sensor, Microbending concept, Interferometers, Phase sensor: Phase detection, Polarization maintaining fibers.

UNIT III VELOCITY AND ACCELERATION SENSORS

9

Electromagnetic velocity sensor, Doppler with sound, light, Accelerometer characteristics, capacitive, piezo-resistive, piezoelectric accelerometer, thermal accelerometer, rotor, monolithic and optical gyroscopes.

UNIT IV POSITION, DIRECTION, DISPLACEMENT AND LEVEL SENSORS

9

Potentiometric and capacitive sensors, Inductive and magnetic sensor, LVDT, RVDT, eddy current, transverse inductive, Hall effect, magneto resistive, magneto strictive sensors. Fiber optic liquid level sensing, Fabry Perot sensor, ultrasonic sensor, capacitive liquid level sensor.



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UNIT V FLOW, TEMPERATURE AND ACOUSTIC SENSORS

9

Flow sensors: pressure gradient technique, thermal transport, ultrasonic, electromagnetic and Laser anemometer. microflow sensor, coriolis mass flow and drag flow sensor. Temperature sensors - thermoresistive, thermoelectric, semiconductor and optical. Piezoelectric temperature sensor. Acoustic sensors - microphones-resistive, capacitive, piezoelectric, fiber optic, solid state - electret microphone.

List of Experiments

1. Strain, Force, pressure, and torque measurement
Strain measurement with Bridge Circuit
Develop a displacement measurement system with the following sensors:
 - i. Inductive transducer (LVDT)
 - ii. Hall effect sensor
2. After studying the characteristics of temperature sensors listed below, develop a temperature measurement system for a particular application using the suitable sensor.
 - i. Thermocouple principles
 - ii. Thermistor and linearization of NTC Thermistor
3. Develop a sensor system for force measurement using piezoelectric transducer.
4. Measurement of shear strain and angle twist using strain gauge is not suitable for many applications. Based on other sensing experiments carried out suggest a non-contact method and try to complete its proof of concept.

TOTAL: 45 + 15 = 60 PERIODS

OUTCOMES

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

- Explain the operation and applications of optical detectors and semiconductor-based sensors.
- Apply the principles of intensity, phase and polarization-based sensors in measurement systems.
- Analyze different velocity, acceleration and gyroscopic sensors for motion measurement.
- Describe the suitable sensors for position, displacement and level measurement applications.
- Examine the appropriate sensors for flow, temperature, and acoustic measurements.
- Identify the suitable sensors and measurement techniques to develop and demonstrate practical sensor-based measurement systems.



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TEXTBOOKS

1. Jacob Fraden, "Hand Book of Modern Sensors: physics, Designs and Applications", Springer, New York, Fourth Edition, 2020.
2. Jon. S. Wilson, "Sensor Technology Hand Book", Elsevier, Netherland, First Edition, 2019.

REFERENCES

1. Gerd Keiser, "Optical Fiber Communications", , McGraw-Hill Science, Delhi, Fourth Edition, 2022.
2. John G Webster, "Measurement, Instrumentation and sensor Handbook", CRC Press, Florida, Second Edition, 2020.

E-RESOURCES

1. <https://nptel.ac.in/courses/105101206> - (Remote sensing)
2. <https://nptel.ac.in/courses/115107122> - (Optical Sensor)

Mapping of Cos-Pos & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	3	2	3	2	1	1	1	-	1	-	3	3	2
2	3	3	2	3	2	1	1	1	-	1	-	3	3	2
3	3	3	2	3	2	1	1	1	-	1	-	3	3	2
4	3	3	2	3	2	1	1	1	-	1	-	3	3	2
5	3	3	2	3	2	1	1	1	-	1	-	3	3	2
6	3	3	2	3	2	1	1	1	3	1	2	3	3	2
AVG	3	3	2	3	2	1	1	1	3	1	2	3	3	2

1-Low 2-Medium 3-High '-' – No Correlation.


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TIRUCHENGODE - 637 205 NAMAKKAL (Dt) TAMILNADU



SEMESTER VII

23EESP01

PROJECT WORK

L T P C

0 0 12 6

OBJECTIVES

- To develop knowledge to formulate a real world problem and projects goals.
- To identify the various tasks of the project to determine standard procedures.
- To identify and learn new tools, algorithms and techniques.
- To understand the various procedures for validation of the product and analysis the cost effectiveness.
- To understand the guideline to Prepare report for oral demonstrations.

PROCESS DESCRIPTION

- For Project work out of 100 marks, the maximum marks for Continuous Internal Assessment is fixed as 60 and the End Semester Examination (project report evaluation and viva voce examination) carries 40 marks. Project work shall be assigned to a single student.
- The project work shall be undertaken by students either in industry or in the college.
- The total credit for project work is 6.
- There shall be three reviews (Zeroth Review, (Review I and Review II, each 100 marks)) during the semester by a review committee. The student shall make presentation on the progress made before the committee. The Head of the Department shall constitute a review committee for each programme. There shall be a minimum of three members in the review committee.
- The committee shall consist of the Supervisor, Project Coordinator and one of the faculty members.
- The student(s) is expected to submit the project report on or before the last working day of the semester. The ESE for the project work shall consist of the evaluation of the final project report submitted by the student or students of the project group by an external examiner, followed by a viva-voce examination conducted separately for each student by a committee consisting of the external examiner and an internal examiner (other than supervisor). The project coordinator shall be the internal examiner. The COE shall appoint the External Examiner for the ESE of the Project Work. The project report shall be submitted as per the approved guidelines given by Controller of Examinations.



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OUTCOMES

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

- Formulate real-world problems.
- Design and express technical solutions using appropriate tools and techniques.
- Test and validate prototypes for efficiency and cost-effectiveness, and present their work effectively through reports and oral demonstrations.

Mapping of COs-POs & PSOs

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

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


Chairman - BoS



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CURRICULUM AND SYLLABI

FOR B.E. / B.Tech. DEGREE PROGRAMMES

(MINOR /HONOURS DEGREE)

CREDIT SUMMARY

B.E. – ELECTRICAL AND ELECTRONICS ENGINEERING

Category	Credits Per Semester								Credit Total
	I	II	III	IV	V	VI	VII	VIII	
PC	-	-	6	6	6	8	-	-	26
EEC	-	-	-	-	-	-	12	-	12
Total	-	-	6	6	6	8	12	-	38

