



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. – ELECTRONICS AND COMMUNICATION ENGINEERING

(CHOICE BASED CREDIT SYSTEM)

REGULATIONS – 2023

(I - IV SEMESTER)

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



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 under going the programme under the same Regulation as may be decided by the Academic Council.

Chairman - BoS

DEAN (ACADEMICS)
SENGUNTHAR ENGINEERING COLLEGE
TIRUCHENGODE-637 205

PRINCIPAL
SENGUNTHAR ENGINEERING COLLEGE
(AUTONOMOUS)
TIRUCHENGODE - 637 205





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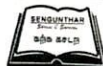
VISION AND MISSION OF THE INSTITUTE

Vision

To be a prominent center for academia transforming the life of aspiring minds by imparting professional, technical, ethical, entrepreneurial skills and research attitude to address global challenges.

Mission

- M1** To train students to develop into competitive professionals and entrepreneurs with high ethical standards.
- M2** To offer a contemporary and flexible curriculum, industry collaborative teaching and learning processes to achieve academic excellence in Engineering and Technology.
- M3** To establish research centres of excellence in niche areas to foster research for addressing local and global challenges.
- M4** To engage students in extension activities and outreach programmes for social development.





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REGULATIONS 2023

CHOICE BASED CREDIT SYSTEM

B. E. ELECTRONICS AND COMMUNICATION ENGINEERING

VISION

- To develop the students into competent professionals in the field of Electronics and Communication Engineering through education, entrepreneurial skills, research with ethical practice to meet the global standards.

MISSION

- To nurture the students to develop competence in emerging technologies with ethical standards through practical exposure.
- To establish the Centre of Excellence in specialized areas through collaborative learning to address the local and global challenges.
- To involve students in enrichment activities that address the societal needs.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

Graduates can :

- Gain strong foundation in designing, manufacturing, testing, operating and maintaining systems in the field of Electronics and Communication Engineering or allied engineering industries.
- Engage in lifelong learning, research and solve social relevance problems by adapting new ideas, tools and technologies.
- Communicate effectively and manage resources skillfully as entrepreneurs, members and leaders of the profession.





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PROGRAM OUTCOMES (POs)

Engineering Graduates will be able to:

PO1	Engineering Knowledge	Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.
PO2	Problem analysis	Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4).
PO3	Design/development of solutions	Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)
PO4	Conduct investigations of complex problems	Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions. (WK8).
PO5	Engineering Tool Usage	Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6)
PO6	The Engineer and The World	Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7)..
PO7	Ethics	Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9).
PO8	Individual and Collaborative Team work	Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.
PO9	Communication	Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences





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PO10	Project Management and Finance	Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.
PO11	Life-Long Learning	Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change. (WK8).

PROGRAM SPECIFIC OUTCOME (PSOs)

PSO1	Specify, design, and develop complex systems in the areas of IoT, VLSI, embedded systems, signal processing, communication systems and networking.
PSO2	Select and apply cutting-edge hardware and software tools to solve engineering problems relevant to Electronics and Communication Engineering.





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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	1	2
I	I	23HST101 – PROFESSIONAL ENGLISH	1	1	1.5	2	1	-	-	1.8	3	1.5	2	-	-
		23MAT101 - MATRICES AND CALCULUS	3	3	2	-	-	-	-	-	-	-	2	-	-
		23PHE103 - APPLIED PHYSICS FOR ELECTRONICS ENGINEERING	3	3	1	1	-	-	-	-	-	-	-	-	-
		23CYE101 - ENGINEERING CHEMISTRY	2.2	2.0	2.6	1.75	1.80	1.75	1.5	1.6	1.25	1.33	1.25	-	-
		23HST102 – தமிழர் மரபு / HERITAGE OF TAMILS	-	-	-	-	-	-	2	1	2	-	1	-	-
		23GEE101 - PROGRAMMING IN C	2.3	2.3	2.0	1.4	2.5	-	1	1	1.3	1	1.7	2.5	2.2
		23EEC101 - SOFT SKILLS & LIFE SKILLS	1	1.6	0.6	0.4	0.6	1.4	0.4	2.6	2.8	2.6	1.6	-	-
		23MDC101 - INDUCTION PROGRAM (2 WEEKS)	-	-	-	-	-	-	-	-	-	-	-	-	-
	II	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	2	3	2	2.2	3	3	2	2.6	2.4	2.2	-	-





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		23HST202 – தமிழரும் தொழில்நுட்பமும் / TAMILS AND TECHNOLOGY	-	-	-	-	-	-	2	1	-	-	1	-	-
		23HSE201 - ENGLISH FOR ENGINEERS: THEORY AND PRACTICE	1	2	-	2	1	2	1.5	2.3	3	2	1.6	-	-
		23EEE201 - ELECTRIC CIRCUIT ANALYSIS	3	3	3	3	3	-	-	-	2	1	1	3	1
		23GEL201 – ENGINEERING PRACTICES LABORATORY	3	2	-	-	1	1	-	-	-	-	2	2	1
		23GEL202 - ENGINEERING DRAWING FOR ELECTRICAL AND ELECTRONICS	3	2	-	-	2	1	-	-	3	-	2	-	-
		23EEC201 - INDIAN LANGUAGE (EXCEPT MOTHER TONGUE) / FOREIGN LANGUAGE													
		23EEC201 - Hindi	-	-	-	-	-	1.0	1.3	1.6	2.8	-	1.6	-	-
		23EEC201 - German	-	-	-	-	-	1.0	1.5	1.7	3.0	-	1.6	-	-
		23EEC201 - Japanese	-	-	-	-	1.4	1.6	1.0	0.2	2.6	-	1.0	-	-
		23MDC201 - APTITUDE SKILLS	-	-	-	-	-	-	-	-	-	-	-	-	-
II	III	23MAT302 - TRANSFORMS AND RANDOM PROCESSES	3.0	3.0	2.0	3.0	2.0	-	-	-	-	-	1.0	-	-
		23ECT301 – SIGNALS AND SYSTEMS	3.0	3.0	3.0	3.0	3.0	2.0	-	-	-	-	3.0	3.0	1.0
		23EET303 - CONTROL AND INSTRUMENTATION ENGINEERING	3.0	3.0	3.0	3.0	-	-	1.0	-	2.0	-	2.0	3.0	2.0





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IV	23ECE301 - ELECTRONIC DEVICES AND CIRCUITS	3.0	3.0	3.0	3.0	2.0	2.0	-	-	-	-	1.0	2.0	1.0
	23ECE302 - DIGITAL SYSTEMS DESIGN	3.0	3.0	3.0	2.0	2.0	2.0	-	-	-	2.0	2.0	3.0	3.0
	23GEE301 - PROBLEM SOLVING AND PYTHON PROGRAMMING	2.8	2.7	2.2	1.5	2.8	0.0	1.0	1.0	1.5	1.0	2.0	3.0	2.8
	23EEC301 - PROFESSIONAL DEVELOPMENT	-	-	-	-	-	-	-	-	-	-	-	-	-
	23ECT401 - ELECTROMAGNETIC FIELDS	3	3	3	3	3	2	1	-	1	1	2	3	2
	23ECT402 - NETWORKS AND SECURITY	2	2	1	2	2	1	1			1	2	2	2
	23ECT403 - MICROPROCESSORS AND MICROCONTROLLERS	3	3	3	3	3	3	-	-	-	2	2	3	3
	23ECE401 - DIGITAL SIGNAL PROCESSING	3	3	3	3	3	3	-	-	-	3	3	3	3
	23ECE402 - COMMUNICATION SYSTEMS	3	3	3	3	3	1	1	-	-	1	1	2	3
	23ECE403 - LINEAR INTEGRATED CIRCUITS	3	3	3	3	2	2	2	-	-	1	2	3	2
	23EEC401 - ONLINE CERTIFICATION COURSES	-	-	-	-	-	-	-	-	-	-	-	-	-



SCHEME FOR CURRICULUM

B.E. –Electronics and Communication Engineering



CURRICULUM AND SYLLABI

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

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

B.E. – ELECTRONICS AND COMMUNICATION 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	தமிழர்மரபு /Heritage of Tamils	HS	1	0	0	1	40	60	100
EMBEDDED COURSE									
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
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

CURRICULUM AND SYLLABI

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

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

B.E. - ELECTRONICS AND COMMUNICATION 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 & 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

OE : Open Elective

GE : General 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

CURRICULUM AND SYLLABI

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

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

B.E- ELECTRONICS AND COMMUNICATION ENGINEERING -THIRD SEMESTER

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks			
			L	T	P		C	CIA	ESE	TOT
THEORY										
23MAT302	Transforms and Random Processes	BS	3	1	0	4	40	60	100	
23ECT301	Signals and Systems	PC	3	1	0	4	40	60	100	
23EET303	Control and Instrumentation Engineering	ES	3	0	0	3	40	60	100	
EMBEDDED COURSE										
23ECE301	Electronic Devices and Circuits	PC	3	0	2	4	50	50	100	
23ECE302	Digital Systems Design	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										
23EEC301	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
OE	:	Open Elective
GE	:	General 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

CURRICULUM AND SYLLABI

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

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

B.E- ELECTRONICS AND COMMUNICATION ENGINEERING - FOURTH SEMESTER

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CIA	ESE	TOT
THEORY									
23ECT401	Electromagnetic Fields	PC	3	1	0	4	40	60	100
23ECT402	Networks and Security	PC	3	0	0	3	40	60	100
23ECT403	Microprocessors and Microcontrollers	PC	3	0	0	3	40	60	100
EMBEDDED COURSE									
23ECE401	Digital Signal Processing	PC	3	0	2	4	50	50	100
23ECE402	Communication Systems	PC	3	0	2	4	50	50	100
23ECE403	Linear Integrated Circuits	PC	3	0	2	4	50	50	100
EMPLOYABILITY ENHANCEMENT COURSE									
23EEC401	Online Certification Courses	EEC	3	0	0	3	100	-	100
TOTAL CREDITS IN SEMESTER-IV					25				

HS	:	Humanities and Social Sciences
BS	:	Basic Sciences
ES	:	Engineering Sciences
PC	:	Professional Core
PE	:	Professional Elective
OE	:	Open Elective
GE	:	General 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



CURRICULUM AND SYLLABI

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

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

B.E- ELECTRONICS AND COMMUNICATION ENGINEERING - FIFTH SEMESTER

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		C	CIA	ESE
THEORY									
23ECT501	Transmission Lines and RF Systems	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									
23ECE501	VLSI and Chip Design	PC	3	0	2	4	50	50	100
23ECE502	Optical and Microwave Engineering	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
OE	:	Open Elective
GE	:	General Elective
EEC	:	Employability Enhancement Courses
MC	:	Mandatory Courses
L	:	Lecture
T	:	Tutorial
P	:	Practical
C	:	Credit Point
CIA	:	Continuous Internal Assessment
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TOT	:	Total



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B.E- ELECTRONICS AND COMMUNICATION ENGINEERING - SIXTH SEMESTER

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CIA	ESE	TOT
THEORY									
23ECT601	Artificial Intelligence and Machine Learning	PC	3	0	0	3	40	60	100
	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 I L1/ L3	OE	3	0	0	3	40	60	100
EMBEDDED COURSE									
23ECE601	Embedded Systems and IoT Design	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					23				

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



CURRICULUM AND SYLLABI

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

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

B.E- ELECTRONICS AND COMMUNICATION 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
OE :	Open Elective
GE :	General 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 AND SYLLABI

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

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

B.E- ELECTRONICS AND COMMUNICATION ENGINEERING - EIGHTH SEMESTER

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CIA	ESE	TOT
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
OE	:	Open Elective
GE	:	General 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	தமிழர்மரபு /Heritage of Tamils	HS	1	0	0	1	40	60	100
23CYT201	Environmental Science and Sustainability	HS	3	0	0	3	40	60	100
23HSE201	English for Engineers: Theory and Practice	HS	3	0	2	4	50	50	100
23HST202	தமிழரும் தொழில்நுட்பமும் / Tamils and Technology	HS	1	0	0	1	40	60	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
23PHT203	Advanced Physics for Electronics Engineering	BS	3	0	0	3	40	60	100
23MAT302	Transforms and Random Processes	BS	3	1	0	4	40	60	100



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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
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
23EET303	Control and Instrumentation Engineering	ES	3	0	0	3	40	60	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
23GEL201	Engineering Practices Laboratory	ES	0	0	4	2	60	40	100
23EEE201	Electric Circuit Analysis	PC	3	0	2	4	50	50	100
23ECT301	Signals and Systems	PC	3	1	0	4	40	60	100
23EET303	Control and Instrumentation Engineering	PC	3	0	0	3	40	60	100
23ECE301	Electronic Devices and Circuits	PC	3	0	2	4	50	50	100
23ECE302	Digital Systems Design	PC	3	0	2	4	50	50	100
23ECT401	Electromagnetic Fields	PC	3	1	0	4	40	60	100
23ECT402	Networks and Security	PC	3	0	0	3	40	60	100
23ECT403	Microprocessors and Microcontrollers	PC	3	0	0	3	40	60	100
23ECE401	Digital Signal Processing	PC	3	0	2	4	50	50	100
23ECE402	Communication Systems	PC	3	0	2	4	50	50	100
23ECE403	Linear Integrated Circuits	PC	3	0	2	4	50	50	100
23ECT501	Transmission Lines and RF Systems	PC	3	1	0	4	40	60	100



23ECE501	VLSI and Chip Design	PC	3	0	2	4	50	50	100
23ECE502	Optical And Microwave Engineering	PC	3	0	2	4	50	50	100
23ECT601	Artificial Intelligence and Machine Learning	PC	3	0	0	3	40	60	100
23ECE601	Embedded Systems and IoT Design	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
23ECP501	Wide Band gap Devices	PE	3	0	0	3	40	60	100
23ECP502	Validation and Testing Technology	PE	3	0	0	3	40	60	100
23ECP503	Low Power IC Design	PE	3	0	0	3	40	60	100
23ECP504	VLSI Testing and Design for Testability	PE	3	0	0	3	40	60	100
23ECP505	Mixed Signal IC Design Testing	PE	3	0	0	3	40	60	100
23ECP506	Analog IC Design	PE	3	0	0	3	40	60	100

Professional Elective II

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		CIA	ESE	TOT
23ECP507	Advanced Digital Signal Processing	PE	3	0	0	3	40	60	100
23ECP508	Image Processing	PE	3	0	0	3	40	60	100
23ECP509	Speech Processing	PE	3	0	0	3	40	60	100
23ECP510	Software Defined Radio	PE	3	0	0	3	40	60	100
23ECP511	DSP Architecture and Programming	PE	3	0	0	3	40	60	100





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23ECP512	Computer Vision	PE	3	0	0	3	40	60	100
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Professional Elective III

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		CIA	ESE	TOT
23ECP513	Wearable Devices	PE	3	0	0	3	40	60	100
23ECP514	Medical Electronics	PE	3	0	0	3	40	60	100
23ECP515	Therapeutic Equipment	PE	3	0	0	3	40	60	100
23ECP516	Medical Imaging Systems	PE	3	0	0	3	40	60	100
23ECP517	Brain Computer Interface and Applications	PE	3	0	0	3	40	60	100
23ECP518	Body Area Networks	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
23ECP601	RF Transceivers	PE	3	0	0	3	40	60	100
23ECP602	Signal Integrity	PE	3	0	0	3	40	60	100
23ECP603	Antenna and wave propagation	PE	3	0	0	3	40	60	100
23ECP604	MICs and RF System Design	PE	3	0	0	3	40	60	100
23ECP605	EMI/EMC Pre Compliance Testing	PE	3	0	0	3	40	60	100
23ECP606	RFID System Design and Testing	PE	3	0	0	3	40	60	100



Professional Elective V

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		CIA	ESE	TOT
23ECP607	Rocketry and Space Mechanics	PE	3	0	0	3	40	60	100
23ECP608	Wireless Sensor Network Design	PE	3	0	0	3	40	60	100
23ECP609	Industrial IoT 4.0	PE	3	0	0	3	40	60	100
23ECP610	Fundamentals of Nanoelectronics	PE	3	0	0	3	40	60	100
23ECP611	Underwater Communication	PE	3	0	0	3	40	60	100
23ECP612	Ocean Acoustics	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
23ECP613	Wireless Broad Band Networks	PE	3	0	0	3	40	60	100
23ECP614	4G/5G Communication Networks	PE	3	0	0	3	40	60	100
23ECP615	Software Defined Networks	PE	3	0	0	3	40	60	100
23ECP616	Massive MIMO Networks	PE	3	0	0	3	40	60	100
23ECP617	Advanced Wireless Communication Techniques	PE	3	0	0	3	40	60	100
23ECP618	Satellite Communication	PE	3	0	0	3	40	60	100





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LIST OF OPEN ELECTIVE COURSES

OPEN ELECTIVES 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
EEE	23EE0603 / Electric Vehicle Technology	OE	3	0	0	3	40	60	100
	23EE0604 / 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 ELECTIVES 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	23EE0709 / 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 ELECTIVES 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





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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





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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



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	-	-	-



CREDIT SUMMARY

B.E. - ELECTRONICS AND COMMUNICATION ENGINEERING

Category	Credits Per Semester								Credit Total
	I	II	III	IV	V	VI	VII	VIII	
HS	4	8	-	-	-	-	3	-	12
BS	10	9	4	-	-	-	-	-	28
ES	4	2	7	-	-	-	-	-	10
PC	2	4	12	22	12	7	-	-	60
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	0	-	-	0
Total	21	25	24	25	23	23	16	8	165

SCHEME FOR SYLLABI

B.E. –Electronics and Communication Engineering



23HST101

SEMESTER I

PROFESSIONAL ENGLISH

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

L T P C

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 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

23MAT101

MATRICES AND CALCULUS
(Common to all B.E./ B.Tech. Branches)

L	T	P	C
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.

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.

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

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.

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
Chairman - BoS

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.

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

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 this 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.
- Analyze the principles of quantum mechanics and Schrödinger's wave equation to identify complex physical phenomena.

TEXT BOOKS

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

REFERENCES

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

E-RESOURCES

1. <https://archive.nptel.ac.in/courses/122/107/122107035/>
2. <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	-	-	-	-	-	-	-	-	-	-
AVG	3	3	1	1	-	-	-	-	-	-	-	-	-	-

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


Chairman - BoS

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.

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.

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. Conduct metric Precipitation Titration using BaCl_2 and Na_2SO_4 .
8. Conduct metric 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

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

- Explain the quality parameters of water and suitable methods for removing impurities for domestic and industrial applications.
- Compare various types of polymers based on their polymerization processes, properties, and engineering applications.
- Apply the principles of phase rule to explain alloy formation and its engineering applications.
- Employ the basic concepts of nano chemistry in engineering applications.
- Analyze the causes of corrosion and recommend suitable prevention and control methods

TEXT BOOKS

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

REFERENCES

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

E-RESOURCES

1. <https://nptel.ac.in/courses/104105084>
2. <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
1	2	1	3	-	1	-	-	3	-	-	-	-	-	-
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	-	-
AVG	2.2	2.0	2.6	1.75	1.80	1.75	1.75	1.5	1.6	1.25	1.33	1.25	-	-

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


Chairman - BoS

23HST102

HERITAGE OF TAMILS
(Common to All Branches)

L T P C

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 Thinai 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, Yash and Nadhaswaram - Role of Temples in Social and Economic Life of Tamils.

UNIT III FOLK AND MARTIAL ARTS

3

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

UNIT IV THINAI CONCEPT OF TAMILS

3

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

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

3

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

TOTAL: 15 PERIODS



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 - மக்களும் பண்பாடும் - கே. கே. பிள்ளை (வெளியீடு: தமிழ்நாடுபாடநூல்மற்றும் கல்வியியல் பணிகள்கழகம்).
2. கணினித்தமிழ் - முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருதை - 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.)
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	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

23HST102

தமிழர் மரபு
(அனைத்துதுறைகளுக்கும் பொதுவானது)

L T P C
1 0 0 1

நோக்கங்கள்:

மாணவர்கள் கண்டிப்பாக அறியவேண்டுவன:

- செம்மொழியான தமிழ்மொழியின் விரிவான இலக்கியத்தைப் பற்றி அறிதல்.
- பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை உள்ள கலைகளை பகுப்பாய்வு செய்தல்.
- நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுகளைப் புரிந்து கொள்ளுதல்.
- தமிழர்களின் திணைக்கோட்பாடுகளைச் செயல்படுத்துதல்.
- இந்திய விடுதலைப் போராட்டத்திற்கும் பண்பாட்டிற்கும் தமிழர்களின் பங்களிப்பை உணருதல்.

அலகு 1 மொழி மற்றும் இலக்கியம்

3

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

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

3

நடுகல் முதல் நவீன சிற்பங்கள்வரை - ஐம்பொன் சிலைகள் - பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப்பொருட்கள், பொம்மைகள் - தேர் செய்யும் கலை - சுடு மண் சிற்பங்கள் - நாட்டுப்புறத் தெய்வங்கள் - குமரிமுனையில் திருவள்ளுவர் சிலை - இசைக்கருவிகள் - மிருதங்கம், பறை, வீணை, யாழ், நாதஸ்வரம் - தமிழர்களின் சமூகபொருளாதார வாழ்வில் கோவில்களின் பங்கு.

அலகு III நாட்டுப்புறக்கலைகள் மற்றும் வீரவிளையாட்டுகள்

3

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

அலகு IV தமிழர்களின் திணைக்கோட்பாடுகள்

3

தமிழகத்தின் தாவரங்களும், விலங்குகளும் - தொல்காப்பியம் மற்றும் சங்கஇலக்கியத்தில் 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 சித்தமருத்துவத்தின் பங்கு - கல்வெட்டுகள், கையெழுத்துப்படிக்கல்கள் - தமிழ்ப்புத்தகங்களின் அச்சுவரலாறு.

TOTAL: 15 PERIODS

முடிவுகள்:

பாடத்தின் முடிவில், மாணவர்கள் அறிந்து கொள்வன:

- தமிழ்மொழியின் செம்மொழி தன்மையையும் சங்க இலக்கியத்தின் முக்கியத்துவத்தையும் உணர்வார்கள்.
- தமிழர்களின் சிற்ப, ஓவிய, இசை மரபுகளை புரிந்து கொள்வார்கள்.
- நாட்டுப்புறக்கலைகளையும் வீர விளையாட்டுகளையும் வகைப்படுத்துவார்கள்.
- தமிழர்களின் திணைக்கோட்பாடுகளும் சங்ககாலவர்த்தகமும் புரிந்து கொள்வார்கள்.
- இந்திய விடுதலைப் போராட்டம், சுயமரியாதை இயக்கம், சித்தமருத்துவம் ஆகியவற்றில் தமிழர்களின் பங்களிப்பை விளக்குவார்கள்.

உரை மற்றும் 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).
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	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

23GEE101

PROGRAMMING IN C
(Lab Embedded Theory Course)

L T P C
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:

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:

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 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. ReemaThareja, "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	-	3	-	-	-	-	-	-	2	3	2
2	3	3	2	1	3	-	-	-	-	-	-	2	3	3
3	3	3	3	2	3	-	-	-	-	-	-	2	3	3
4	3	3	3	2	3	-	-	-	-	1	-	2	3	3
5	2	3	2	2	3	-	-	-	-	1	-	2	3	2
6	3	3	3	2	3	-	-	1	1	2	1	2	3	3
AVG	2.3	2.3	2.0	1.4	2.5	-	-	1	1	1.3	1	1.7	2.5	2.2

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


Chairman - BoS

23EEEC101

SOFT SKILLS & LIFE SKILLS

L T P C
1 0 0 1

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

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

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>

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	1	1	0	0	0	2	2	2	3	2	1	0	-	-
2	1	3	1	1	0	1	1	0	2	3	3	1	-	-
3	0	1	0	0	0	1	1	0	3	3	3	1	-	-
4	2	2	1	1	3	1	1	0	2	3	3	3	-	-
5	1	1	1	0	0	2	2	0	3	3	3	3	-	-
AVG	1	1.6	0.6	0.4	0.6	1.4	1.4	0.4	2.6	2.8	2.6	1.6	-	-

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

Chairman
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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.

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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NAAC Accredited with 'A' Grade

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SEMESTER II

23MAT202

DIFFERENTIAL EQUATIONS AND NUMERICAL METHODS

[Common to Civil, EEE, ECE and MDE]

L	T	P	C
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 'tⁿ' 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.

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.





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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.

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 PERIODS

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.

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)





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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	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

[Signature]
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23PHT203

ADVANCED PHYSICS FOR ELECTRONICS ENGINEERING

(Common to ECE, EEE & Medical Electronics)

L T P C

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 T_c 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 – 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>

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


Chairman - BoS



SENGUNTHAR ENGINEERING COLLEGE

(AUTONOMOUS)

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NAAC Accredited with 'A' Grade

TIRUCHENGODE - 637 205 NAMAKKAL (Dt) TAMILNADU



23CYT201

ENVIRONMENTAL SCIENCE AND SUSTAINABILITY

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

L T P C

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 (c) 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 protection act – Air (Prevention and Control of Pollution) act –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.





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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.
- Analyse 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", Pearson Education, Eighth Edition, 2021.
3. Allen, D. T. and Shonnard, D. R., "Sustainability Engineering: Concepts, Design and Case Studies", Prentice Hall, Third Edition 2018.

REFERENCES

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

E-RESOURCES

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





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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	2.2	3	3	3	2	2.6	2.4	2.2	-	-

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

Chairman - BoS





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TIRUCHENGODE - 637 205 NAMAKKAL (Dt) TAMILNADU



23HST202

TAMILS AND TECHNOLOGY
(Common to All Branches)

L T 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)- Thirumalai Nayakar Mahal - Chetti Nadu Houses, Indo -Saracenic architecture at Madras during British Period.

UNIT III MANUFACTURING TECHNOLOGY

3

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

UNIT IV AGRICULTURE AND IRRIGATION TECHNOLOGY

3

Dam, Tank, ponds, Sluice, Significance of 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 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 - முனைவர்இல. சுந்தரம். (விகடன்பிரசுரம்).
- 3.கீழடி - வைகைநதிக்கரையில்சங்ககாலநகரநாகரிகம் (தொல்லியல்துறைவெளியீடு)
4. பொருறை -ஆற்றங்கரைநாகரீகம். (தொல்லியல்துறைவெளியீடு).
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

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 தொழில் நுட்பத்தை உருவாக்குதல்.
- உற்பத்தி தொழில் நுட்பத்தைப்பகுப்பாய்வுசெய்தல்.
- விவசாயம் மற்றும் நீர்ப்பாசனத் தொழில் நுட்பத்தைப் பயன்படுத்துதல்.
- அறிவியல்மற்றும்அறிவியல்தமிழ்மற்றும்தமிழ்கணிப்பொறிதொடர்பான அறிவைநினைவில்கொள்ளுதல்.

அலகு 1 நெசவு மற்றும் பாணைதொழில்நுட்பம்

3

சங்ககாலத்தில்நெசவுத்தொழில் - பாணைதொழில்நுட்பம் - கருப்பு, சிவப்புபாண்டங்கள் - பாண்டுகளில்கீறல்குறியீடுகள்.

அலகு 2 வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம்

3

சங்ககாலத்தில்வடிவமைப்புமற்றும்கட்டுமானங்கள்&சங்ககாலத்தில்வீட்டுப் பொருட்களில்வடிவமைப்பு- சங்ககாலத்தில் கட்டுமான பொருட்களும் நடுகல்லும் - சிலப்பதிகாரத்தில் மேடை அமைப்பு பற்றிய விவரங்கள் - மாமல்லபுரம் சிற்பங்கள், கோவில்களும் - சோழர்காலத்தாபெருங்கோயில்கள்மற்றும்பிறவழிபாட்டுத்தலங்கள்நாயக்கர் காலகோயில்கள் - மாதிரி கட்டமைப்புகள் பற்றி அறிதல், மதுரைமீனாட்சி அம்மன் ஆலயம் மற்றும் திருமலை நாயக்கர்மஹால் - 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 தங்கநாணயங்கள் - நாணயங்கள் அச்சடிகள் - மணிஉருவாக்கும் தொழிற்சாலைகள் - கல்மணிகள், கண்ணாடி மணிகள் - சுடுமண்மணிகள் - சங்கு மணிகள் - எலும்பு துண்டுகள் - தொல்லியல் சான்றுகள் - சிலப்பதிகாரத்தில் மணிகளின் வகைகள்.

அலகு 4 வேளாண்மை மற்றும் நீர்ப்பாசன தொழில்நுட்பம்

3

அணை, குளங்கள், மடகு - சோழர் கால குமுளி தூம்பின் முக்கியத்துவம் - கால்நடை பராமரிப்பு - கால்நடைகளுக்காக வடிவமைக்கப்பட்ட கிணறுகள் - வேளாண்மை மற்றும் வேளாண்மை சார்ந்த செயல்பாடுகள் - கடல்சார் அறிவு - மீன்வளம் - முத்து மற்றும் முத்துகுளித்தல் - பெருங்கடல் குறித்த

பண்டைய அறிவு - அறிவுசார்ச்சமுகம்.

அலகு 5 அறிவியல் தமிழ் மற்றும் கணித்தமிழ்

3

அறிவியல் தமிழின் வளர்ச்சி - கணித்தமிழ் வளர்ச்சி - தமிழ்நூல்களை மின்பதிப்பு செய்தல் - தமிழ்மென் பொருட்கள் உருவாக்கம் - தமிழ்இணையக் கல்விக்கழகம் - தமிழ் மின்நூலகம் - இணையத்தில் தமிழ் அகராதிகள் - சொற்குவைத் திட்டம்.

TOTAL: 15 PERIODS

முடிவுகள்:

பாடத்தின்முடிவில், மாணவர்கள்அறிந்து கொள்வன:

- பீங்கான் மற்றும் நெசவு தொழில் நுட்பத்தைப் புரிந்து கொள்ளுதல்.
- புதிய வடிவமைப்பு மற்றும் கட்டுமானதொழில் நுட்பத்தை உருவாக்குதல்.
- உற்பத்தித் தொழில் நுட்பத்தை அடையாளம் காணுதல்.
- விவசாயம் மற்றும் நீர்ப்பாசனத்தைப் புரிந்து கொள்ளுதல்.
- அறிவியல் தமிழ் மற்றும் தமிழ் கணிப்பொறி தொடர்பான அறிவை பெறுதல்.

உரை மற்றும் குறிப்பு புத்தகங்கள்:

- 1.தமிழகவரலாறு - மக்களும்பண்பாடும் - கே. கே. பிள்ளை- (வெளியீடு:தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித்தமிழ் - முனைவர்இல. சுந்தரம். (விகடன்பிரசுரம்).
3. கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல்துறைவெளியீடு)
4. பொருறை -ஆற்றங்கரை நாகரீகம். (தொல்லியல்துறை 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.)
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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TIRUCHENGODE - 637 205 NAMAKKAL (Dt) TAMILNADU



23HSE201

ENGLISH FOR ENGINEERS: THEORY AND PRACTICE (Common to all B.E. & B.Tech. Branches)

LT P C
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 and Résumé.

UNIT V SPEAKING

9

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

TOTAL: 45 PERIODS

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: 15 PERIODS





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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>

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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TIRUCHENGODE - 637 205 NAMAKKAL (Dt) TAMILNADU



23EEE201

ELECTRIC CIRCUIT ANALYSIS

(Lab Embedded Theory Course)

LT P C

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.

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.

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

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


Chairman - BoS



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23GEL201

ENGINEERING PRACTICES LABORATORY

L T P C
0 0 4 2

COURSE 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 inhouse hold 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

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

GROUP - B (MECHANICAL AND ELECTRONICS)

PART III

MECHANICAL ENGINEERING PRACTICES

15

WELDING WORK

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

BASIC MACHINING WORK

- a) (simple) Turning.
- b) (simple) Drilling.
- c) (simple) Tapping.

ASSEMBLY WORK

- a) Assembling a centrifugal pump.
- b) Assembling a household mixer.
- c) Assembling an air conditioner.

SHEET METAL WORK

- a) Making of a square tray

FOUNDRY WORK

- a) Demonstrating basic foundry operations.

PART IV

ELECTRONIC ENGINEERING PRACTICES

15

SOLDERING WORK

- a) Soldering simple electronic circuits and checking continuity.

ELECTRONIC ASSEMBLY AND TESTING WORK

- a) Assembling and testing electronic components on a small PCB.

ELECTRONIC EQUIPMENT STUDY

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

TOTAL: 30 PERIODS





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

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


Chairman - BoS





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23GEL202

ENGINEERING DRAWING FOR ELECTRICAL AND ELECTRONICS

LT P C

(Common For ECE, EEE & MDE)

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.
- Design, analyze and simulate electronics components using Hardware and Software.

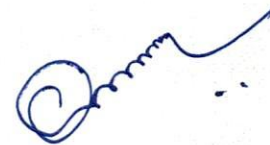


- Create precise and detailed technical drawings, simulate designs, and create digital prototypes for Healthcare Industry.

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

23EEC201

INDIAN LANGUAGE
(EXCEPT MOTHER TONGUE) / FOREIGN LANGUAGE
(Common to all B.E. & B.Tech. Branches)

L T P C
0 0 4 2

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 (अनेकशब्दोंकेलिए एकशब्द)

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

7

Reading Simple Hindi Passages -Comprehension (गद्यांश) -Paragraph Writing (अनुच्छेद लेखन)- Letter Writing (पत्र लेखन)- Dialogue Writing (संवाद लेखन) -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 - Model Question Papers and Practice Tests

TOTAL: 30 PERIODS

OUTCOMES

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

1. Write basic Hindi words and sentences.
2. Apply fundamental Hindi grammar in simple communication.
3. Develop basic reading, writing, listening, and speaking skills in Hindi.



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4. Use Hindi confidently in day-to-day conversations.
5. 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
CO1	-	-	-	-	-	-	-	-	-	3	-	1	-	-
CO2	-	-	-	-	-	-	-	1	1	3	-	1	-	-
CO3	-	-	-	-	-	-	-	1	2	3	-	2	-	-
CO4	-	-	-	-	-	1	1	2	2	3	-	1	-	-
CO5	-	-	-	-	-	-	-	-	-	2	-	3	-	-
AVG	-	-	-	-	-	1.0	1.0	1.3	1.6	2.8	-	1.6	-	-

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

P. Sankar
Chairman - BoS





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23EEC201

INDIAN LANGUAGE (EXCEPT MOTHER TONGUE) / FOREIGN LANGUAGE (Common to all B.E. & B.Tech. Branches)

L T P C
0 0 4 2

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



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
CO1	-	-	-	-	-	-	-	-	-	3	-	1	-	-
CO2	-	-	-	-	-	-	-	1	1	3	-	1	-	-
CO3	-	-	-	-	-	1	1	2	2	3	-	2	-	-
CO4	-	-	-	-	-	-	-	1	2	3	-	2	-	-
CO5	-	-	-	-	-	1	1	2	2	3	-	2	-	-
AVG	-	-	-	-	-	1.0	1.0	1.5	1.7	3.0	-	1.6	-	-

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

P. Kalyan
Chairman - BoS



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23EEC201

INDIAN LANGUAGE (EXCEPT MOTHER TONGUE) / FOREIGN LANGUAGE (Common to all B.E. & B.Tech. Branches)

L T P C
0 0 4 2

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 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	PSC
CO1	-	-	-	-	1	1	1	-	1	2	-	-	-	-
CO2	-	-	-	-	1	2	2	-	2	2	-	-	-	-
CO3	-	-	-	-	2	2	2	1	2	3	-	1	-	-
CO4	-	-	-	-	2	2	2	1	3	3	-	1	-	-
CO5	-	-	-	-	1	1	1	1	2	3	-	1	-	-
AVG	-	-	-	-	1.4	1.6	1.6	1.0	0.2	2.6	-	1.0	-	-

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

P. Sankar
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23MDC201

APTITUDE SKILLS
(Common to all Branches)

L T P C
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 equation – Special types of roots.

TOTAL: 45 PERIODS





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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

23MAT302

TRANSFORMS AND RANDOM PROCESSES

(Common to ECE & MDE)

L T P C

3 1 0 4

OBJECTIVES

- To introduce the basic concepts of random variables.
- To provide knowledge of one-dimensional and two-dimensional random variables.
- To explore the classification of random processes and related concepts.
- To introduce the basics of Fourier transforms and their properties.
- To compute the Z-transforms of standard functions and their properties.

UNIT I RANDOM VARIABLES

9+3

Random variables - Discrete and continuous random variables – Moments – Moment generating functions – Binomial, Poisson, Geometric, Uniform, Exponential and Normal distributions – Functions of a random variable.

UNIT II TWO – DIMENSIONAL RANDOM VARIABLES

9+3

Joint distributions – Marginal and conditional distributions – Covariance – Correlation and linear regression – Transformation of random variables – Central limit theorem (for independent and identically distributed random variables).

UNIT III RANDOM PROCESSES

9+3

Classification – Stationary process – Markov process – Poisson process – Discrete parameter-Markov chain – Chapman Kolmogorov equations (Statement only) – Limiting distributions.

UNIT IV 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 V 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.

TOTAL: 45+15 PERIODS

OUTCOMES

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

- Apply the concept of random variables in engineering disciplines.
- Classify the concepts of one and two dimensional random variables.
- Compute the basic concepts of random processes.
- Apply various Fourier transform techniques in physical problems of engineering.
- Solve engineering problems using the concept of Z transforms.





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TEXT BOOKS

1. Grewal, B.S., "Higher Engineering Mathematics; Khanna Publishers, Forty Third Edition, New Delhi, 2014.
2. Yates, R.D. and Goodman. D. J., "Probability and Stochastic Processes", Second Edition, Wiley India Pvt. Ltd., Bangalore, 2012.

REFERENCES

1. Ibe, O.C., "Fundamentals of Applied Probability and Random Processes", Elsevier, First Edition, 2007.
2. Trivedi, K.S., "Probability and Statistics with Reliability, Queueing and Computer Science Applications", Second Edition, John Wiley and Sons, 2002.

E-RESOURCES

1. <https://nptel.ac.in/courses/117105085> (Probability and Random Processes)
2. <https://archive.nptel.ac.in/courses/111102/111102129/#> (Transforms)

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	-	-
2	3	3	2	3	2	-	-	-	-	-	-	1	-	-
3	3	3	2	3	2	-	-	-	-	-	-	1	-	-
4	3	3	2	3	2	-	-	-	-	-	-	1	-	-
5	3	3	2	3	2	-	-	-	-	-	-	1	-	-
AVG	3.0	3.0	2.0	3.0	2.0	-	-	-	-	-	-	1.0	-	-

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

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23ECT301

SIGNALS AND SYSTEMS

L T P C

3 1 0 4

OBJECTIVES

- To discuss the basic properties of signals and systems.
- To discuss about continuous time signals in the Fourier and Laplace domain.
- To explain the methods of characterization of LTI systems in time domain.
- To relate the discrete time signals in the Fourier and Z transform domain.
- To describe the concept of LTI discrete system in the Fourier and Z transform domain.

UNIT I CLASSIFICATION OF SIGNALS AND SYSTEMS

9+3

Standard signals - Step, Ramp, Pulse, Impulse, Real and complex exponentials and Sinusoids— Classification of signals – Continuous Time (CT) and Discrete Time (DT) signals, Periodic & Aperiodic signals, Deterministic & Random signals, Energy & Power signals – Classification of systems - CT systems and DT systems – Linear & Nonlinear, Time-variant & Time-invariant, Causal & Non-causal, Stable & Unstable.

UNIT II ANALYSIS OF CONTINUOUS TIME SIGNALS

9+3

Fourier series for periodic signals - Fourier Transform – properties - Laplace Transforms and Properties.

UNIT III LINEAR TIME INVARIANT CONTINUOUS TIME SYSTEMS

9+3

Impulse response - convolution integrals - Differential Equation - Fourier and Laplace transforms in Analysis of CT systems - Systems connected in series / parallel.

UNIT IV ANALYSIS OF DISCRETE TIME SIGNALS

9+3

Baseband signal Sampling–Fourier Transform of discrete time signals (DTFT)– Properties of DTFT - Z Transform & Properties.

UNIT V LINEAR TIME INVARIANT-DISCRETE TIME SYSTEMS

9+3

Impulse response–Difference equations–Convolution sum - Discrete Fourier Transform and Z Transform Analysis of Recursive & Non-Recursive systems - DT systems connected in series and parallel.

TOTAL: 60 PERIODS

OUTCOMES

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

- Obtain in depth knowledge about the classification of signals and systems.
- Analyze the frequency components present in a deterministic signal.
- Design the continuous LTI systems in the time domain and frequency domain.
- Analyze the properties of Z transform and Discrete Time Fourier Transform.
- Design discrete LTI systems using Z transform and Discrete Time Fourier Transform.



TEXT BOOKS

1. Oppenheim, Willsky and Hamid, "Signals and Systems", Pearson Education, New Delhi, Second Edition, 2017.
2. Simon Haykin, Barry Van Veen, "Signals and Systems", Wiley, Second Edition, 2018.

REFERENCES

1. B. P. Lathi, "Principles of Linear Systems and Signals", Oxford, Second Edition, 2009.
2. M. J. Roberts, "Signals and Systems Analysis using Transform methods and MATLAB", McGraw- Hill Education, 2018.

E-RESOURCES

1. <https://archive.nptel.ac.in/courses/117/104/117104074/>-(Signals and Systems)
2. <https://archive.nptel.ac.in/courses/108/104/108104100/>-(Principles of Signals and Systems)

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	-	-	-	-	-	3	3	-
2	3	-	3	-	-	2	-	-	-	-	-	3	3	1
3	3	3	-	-	3	2	-	-	-	-	-	3	3	1
4	3	3	-	-	3	2	-	-	-	-	-	3	3	-
5	3	3	-	3	3	2	-	-	-	-	-	3	3	1
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AVG	3.0	3.0	3.0	3.0	3.0	2.0	-	-	-	-	-	3.0	3.0	1.0

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


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23EET303

CONTROL AND INSTRUMENTATION ENGINEERING

L T P C

3 0 0 3

OBJECTIVES

- To impart the fundamental concepts of control systems and mathematical modeling of the system.
- To explain the time response of systems and the steady state error.
- To inculcate the frequency domain specifications using plots and stability analysis of control systems.
- To discuss about the various operating principle of instruments in AC and DC measurements.
- To summarize about the different bridges and digital storage devices.

UNIT I MODELLING OF CONTROL SYSTEMS

9

Introduction - Open Loop and Closed Loop Systems - Mathematical Model of Control Systems - Transfer Functions - Mechanical Translational Systems - Mechanical rotational Systems - Block Diagram Algebra - Signal Flow Graph.

UNIT II TIME DOMAIN ANALYSIS

9

Transient and steady state response analysis. Steady state error & error constants. Dynamic error and dynamic error coefficient-Effects of pole and zero addition on transient and steady state response- Absolute stability and relative stability- Routh's and Hurwitz criterion of stability, Root locus method of analysis.

UNIT III FREQUENCY RESPONSE AND STATE SPACE MODELLING

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 - Correlation between time and Frequency response- Concepts of state, state variable and state model, controllability and observability.

UNIT IV ELECTRICAL AND ELECTRONIC INSTRUMENTS

9

Functional elements of an instrument -classification - Example of a generalized measurement - Static and dynamic characteristics - Standards and calibration -Principle and operation of analog voltmeters and ammeters: Moving iron: Attraction and repulsion type instruments, Moving coil instruments; PMMC, Dynamometer type, torque equation-Smart meters.

UNIT V BRIDGES, DIGITAL INSTRUMENTS AND DISPLAY DEVICES

9

DC bridges: Wheatstone bridge, Kelvin's double bridge, Megger - AC bridges: Maxwell's, Anderson, Schering- 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) - Digital printers and plotters.

TOTAL: 45 PERIODS





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OUTCOMES

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

- Design transfer function models to analyze physical systems.
- Implement the transient and steady state behavior of systems subjected to standard test signals.
- Analyze the frequency domain and stability of the linear system in concepts of various system stability criterions.
- Describe the concepts of electrical and electronics instruments.
- Determine the different AC-DC bridges and digital meters & display devices.

TEXT BOOKS

1. J.Nagrath and M.Gopal, "Control Systems Engineering", Sixth Edition, New Age International (P) Ltd, Publishers, 2017.
2. A.K.Sawhney, "A Course in Electrical & Electronic Measurements and Instrumentation", Dhanpat Rai and Co, Second Edition, 2021.

REFERENCES

1. A.Nagoorkani, "Control Systems Engineering", Third Edition, RBA Publications, 2021.
2. R.K.Rajput, "Electrical Measurements and Measuring Instruments", S.Chand and Company Pvt. Ltd, Fourth Edition, 2016.

E - RESOURCES

1. <https://nptel.ac.in/courses/108/106/108106098/> (Control Engineering)
2. <https://nptel.ac.in/courses/108/105/108105153/> (Electrical Measurements and Electronic Instrument)

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	-	-	-	1	-	2	-	2	3	2
2	3	3	3	3	-	-	-	1	-	2	-	2	3	2
3	3	3	3	3	-	-	-	1	-	2	-	2	3	2
4	3	3	3	3	-	-	-	1	-	2	-	2	3	2
5	3	3	3	3	-	-	-	1	-	2	-	2	3	2
AVG	3.0	3.0	3.0	3.0	-	-	-	1.0	-	2.0	-	2.0	3.0	2.0

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

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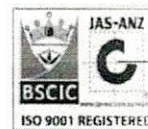
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23ECE301

ELECTRONIC DEVICES AND CIRCUITS

(Lab Embedded Theory Course)

L T P C

3 0 2 4

OBJECTIVES

- To introduce the various types of semiconductor devices and circuits.
- To describe about the frequency response of small signal amplifiers.
- To explain the principles of multistage amplifiers and differential amplifier.
- To discuss the characteristics of feedback amplifiers.
- To explain the operation of power amplifiers and DC/DC converters.
- To develop the operational characteristics of semiconductor devices and amplifiers.

UNIT I SEMICONDUCTOR DEVICES

9

PN junction diode, Zener diode, BJT, MOSFET, UJT –structure, operation and V-I characteristics, diffusion and transition capacitance - Rectifiers – Half Wave and Full Wave Rectifier, Zener as regulator.

UNIT II AMPLIFIERS

9

Load line, operating point, biasing methods for BJT and MOSFET, BJT small signal model – Gain and frequency response – MOSFET small signal model – Analysis of CS, CG and Source follower – Gain and frequency response- High frequency analysis.

UNIT III MULTISTAGE AMPLIFIERS AND DIFFERENTIAL AMPLIFIER

9

Cascode amplifier, Differential amplifier – Common mode and Difference mode analysis – MOSFET input stages – tuned amplifiers – Gain and frequency response.

UNIT IV FEEDBACK AMPLIFIERS AND OSCILLATORS

9

Advantages of negative feedback – Voltage / Current, Series, Shunt feedback Amplifiers – positive feedback–Condition for oscillations, phase shift – Wien bridge, Hartley, Colpitts and Crystal oscillators.

UNIT V POWER AMPLIFIERS AND DC/DC CONVERTERS

9

Power amplifiers - Class A - Class B - Class AB - Class C - Power MOSFET - Temperature Effect - Class AB Power amplifier using MOSFET – DC/DC convertors – Buck, Boost, Buck-Boost operations.

LIST OF EXPERIMENTS

1. Characteristics of PN Junction Diode and Zener diode.
2. Full Wave Rectifier with Filters.
3. Design of Zener diode Regulator.
4. Common Emitter input-output Characteristics.
5. MOSFET Drain current and Transfer Characteristics.
6. Frequency response of CE and CS amplifiers.
7. Frequency response of CB and CC amplifiers.
8. Frequency response of Cascade Amplifier





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9. CMRR measurement of Differential Amplifier
10. Class A Transformer Coupled Power Amplifier.

TOTAL: 45+15=60 PERIODS

OUTCOMES

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

- Analyze the structure and working operation of basic semiconductor devices.
- Design frequency response of BJT and MOSFET amplifiers.
- Analyze multistage amplifiers and instrumentation amplifiers.
- Determine operational parameters of feedback amplifiers and oscillator principles.
- Understand the operational principles of power amplifiers and converters.
- Analyze the characteristics of semiconductor circuits and amplifier.

TEXT BOOKS

1. David A. Bell, "Electronic Devices and Circuits", Oxford Higher Education press, Fifth Edition, 2010.
2. Robert L. Boylestad and Louis Nasheresky, "Electronic Devices and Circuit Theory", Pearson Education / PHI, Thirteenth Edition, 2013.

REFERENCES

1. Donald.A. Neamen, "Electronic Circuit Analysis and Design", Tata McGraw Hill, Fourth Edition, 2017.
2. D.Schilling and C.Belove, "Electronic Circuits", McGraw Hill, Fourth Edition, 2016.

E-RESOURCES

1. <https://nptel.ac.in/courses/108/105/108105158/>-(Analog Electronic Circuits)
2. <https://nptel.ac.in/courses/117/103/117103063/>-(Basic Electronics)

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	1	1	-	-	-	-	1	2	1
2	3	2	3	3	2	2	2	-	-	-	-	1	2	1
3	3	3	3	2	1	2	2	-	-	-	-	1	2	1
4	3	3	3	3	2	2	2	-	-	-	-	1	2	1
5	3	2	3	2	2	1	1	-	-	-	-	1	2	1
6	2	2	2	3	2	1	1	-	-	-	-	1	2	1
AVG	3.0	3.0	3.0	3.0	2.0	2.0	2.0	-	-	-	-	1.0	2.0	1.0

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23ECE302

DIGITAL SYSTEMS DESIGN (Lab Embedded Theory Course)

L T P C
3 0 2 4

OBJECTIVES

- To introduce the fundamentals of digital circuits and simplification methods.
- To discuss about various combinational digital circuits using logic gates.
- To examine the design procedures for synchronous sequential circuits.
- To describe the design procedures for asynchronous sequential circuits.
- To gain knowledge on semiconductor memories and related technology.
- To enable the students implement the basic digital logic circuits and converters.

UNIT I BASIC CONCEPTS

9

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

UNIT II COMBINATIONAL LOGIC CIRCUITS

9

Problem formulation and design of combinational circuits, Half and Full Adders, Binary Parallel Adder – Carry look ahead Adder, BCD Adder, Code-Converters, Magnitude Comparator, Decoder, Encoder, Mux/Demux, Case study: Parity Generator/Checker, Seven Segment display decoder.

UNIT III SYNCHRONOUS SEQUENTIAL CIRCUITS

9

Latches, Flip flops – SR, JK, T, D, Master/Slave FF, Analysis and design of synchronous sequential circuits – Counters, Ripple Counters, Ring Counters, Shift registers, Universal Shift Register. Model Development: Designing of rolling display/real time clock.

UNIT IV ASYNCHRONOUS SEQUENTIAL CIRCUITS

9

Stable and Unstable states, output specifications, cycles and races, Analysis and design of asynchronous sequential circuits state reduction, race free assignments, Hazards, Essential Hazards, Design of Hazard free circuits.

UNIT V MEMORIES AND PROGRAMMABLE LOGIC DEVICES

9

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

LIST OF EXPERIMENTS

1. Design of Adders, Subtractors and Code converters.
2. Design of Multiplexers and Demultiplexers.
3. Design of Encoders and Decoders.
4. Design of Magnitude Comparators.
5. Design and implementation of counters using flip-flops.





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6. Design and implementation of shift registers.



TOTAL: 45 +15 = 60 PERIODS

OUTCOMES

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

- Apply Boolean algebra and simplification procedures relevant to digital logic.
- Design various combinational digital circuits using logic gates.
- Analyze the procedures of synchronous sequential circuits.
- Examine the functioning of asynchronous sequential circuits.
- Develop the memories and programmable devices.
- Design and implement digital logic circuits and flip-flops.

TEXT BOOKS

1. M.Morris Mano and Michael D.Ciletti, "Digital Design", Pearson, Sixth Edition, 2019.
2. David Harris, "Digital Design and Computer Architecture", Morgan Kaufmann, Second Edition, 2015.

REFERENCES

1. Charles H. Roth, Jr, "Fundamentals of Logic Design", Jaico Books, Fourth Edition, 2002.
2. William I. Fletcher, "An Engineering Approach to Digital Design", Prentice- Hall of India, 2015.

E-RESOURCES

1. <https://nptel.ac.in/courses/117/106/117106086/>-(Digital Design)
2. <https://nptel.ac.in/courses/108/105/108105132/>-(Integrated Circuits)

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	-	-	-	2	2	3	3
2	3	3	3	2	2	2	2	-	-	-	2	1	2	3
3	3	3	3	2	2	2	2	-	-	-	2	2	3	3
4	3	2	3	2	2	2	2	-	-	-	2	2	2	3
5	3	3	3	3	2	2	2	-	-	-	2	2	3	3
6	3	2	3	2	2	2	2	-	-	-	1	1	3	2
AVG	3.0	3.0	3.0	2.0	2.0	2.0	2.0	-	-	-	2.0	2.0	3.0	3.0

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

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23GEE301

PROBLEM SOLVING AND PYTHON PROGRAMMING

(Lab Embedded Theory Course)

L T P C

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(pseudo code, flow chart, 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, 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
2. 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

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 – Histograms.

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.





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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,charactercount,replacingcharacters)
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)
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.





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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)

Mapping of COs-POs & PSOs:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	3	2	1	2	–	–	–	–	–	–	2	3	2
2	3	2	2	–	3	–	–	–	–	–	–	2	3	3
3	3	3	2	1	3	–	–	–	–	–	–	2	3	3
4	3	2	2	–	3	–	–	–	–	–	–	2	3	3
5	2	3	2	2	3	–	–	–	–	1	–	2	3	3
6	3	3	3	2	3	–	–	1	1	2	1	2	3	3
AVG	2.8	2.7	2.2	1.5	2.8	0.0	0.0	1.0	1.0	1.5	1.0	2.0	3.0	2.8

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


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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 preventability 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
- 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





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- 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

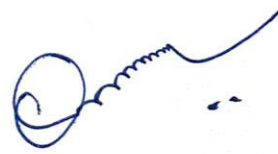
- Select slide templates, layout and themes
- Formatting slide content and using bullets and numbering
- Insert and format images, smart art, tables, charts
- Using Slide master, notes and handout master
- Working with animation and transitions
- Organize and Group slides
- Import or create and use media 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.


Chairman - BoS



SEMESTER IV

23ECT401

ELECTROMAGNETIC FIELDS

L T P C

3 1 0 4

OBJECTIVES

- To explain the basics of static electric field and the associated laws.
- To gain knowledge on the basics of static magnetic field and the associated laws.
- To summarize the basic laws associated with magneto statics.
- To discuss the significance of Time varying fields.
- To explain the principles of propagation of EM waves.

UNIT I INTRODUCTION

9

Electromagnetic model, Units and constants, Review of vector algebra, Rectangular, cylindrical and spherical coordinate systems, Line, surface and volume integrals, Gradient of a scalar field, Divergence of a vector field, Divergence theorem, Curl of a vector field, Stoke's theorem, Null identities, Helmholtz's theorem, Verify theorems for different path, surface and volume.

UNIT II ELECTROSTATICS

9

Electric field, Coulomb's law, Gauss's law and applications, Electric potential, Conductors in static electric field, Dielectrics in static electric field, Electric flux density and dielectric constant, Boundary conditions, Capacitance, Parallel, cylindrical and spherical capacitors, Electrostatic energy, Poisson's and Laplace's equations, Uniqueness of electrostatic solutions, Current density and Ohm's law, Electromotive force and Kirchhoff's voltage law, Equation of continuity and Kirchhoff's current law.

UNIT III MAGNETOSTATICS

9

Lorentz force equation, Ampere's law, Vector magnetic potential, Biot-Savart law and applications, Magnetic field intensity and idea of relative permeability, Calculation of magnetic field intensity for various current distributions Magnetic circuits, Behaviour of magnetic materials, Inductance and inductors, Magnetic energy, Magnetic forces and torques.

UNIT IV TIME-VARYING FIELDS AND MAXWELL's EQUATIONS

9

Faraday's law, Displacement current and Maxwell-Ampere law, Maxwell's equations, Potential functions, Electromagnetic boundary conditions, Wave equations and solutions, Time-harmonic fields, Observing the Phenomenon of wave propagation with the aid of Maxwell's equations.

UNIT V PLANE ELECTROMAGNETIC WAVES

9

Plane waves in lossless media, Plane waves in lossy media (low-loss dielectrics and good conductors), Group velocity, Electromagnetic power flow and Poynting vector, Normal incidence at a plane conducting boundary, Normal incidence at a plane dielectric boundary

TOTAL: 45 PERIODS



OUTCOMES

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

- Relate the fundamentals of vector, coordinate system to electromagnetic concepts.
- Analyze the characteristics of Electrostatic field.
- Determine various parameters associated with Magneto statics.
- Discuss the significance of time varying fields.
- Analyze the effects of different EM waves in material space.

TEXT BOOKS

1. D.K. Cheng, "Field and wave electromagnetic", Pearson (India), Third Edition, 2019.
2. M.N.O.Sadiku and S.V. Kulkarni, "Principles of electromagnetics", Oxford, Fifth Edition, 2020.

REFERENCES

1. Edward C. Jordan & Keith G. Balmain, "Electromagnetic waves and Radiating Systems", Prentice-Hall Electrical Engineering Series, Second Edition, 2012
2. W.H. Hayt and J.A. Buck, "Engineering electromagnetic", McGraw-Hill (India), Eighth Edition, 2015.

E-RESOURCES

1. <https://nptel.ac.in/courses/108/106/108106073/>-(Electromagnetic Fields)
2. <https://nptel.ac.in/courses/117/103/117103065/>-(Electromagnetic Theory)

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

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


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23ECT402

NETWORKS AND SECURITY

L T P C

3 0 0 3

OBJECTIVES

- To explain the Network Models and data link layer functions.
- To impart knowledge on routing in the Network Layer.
- To elaborate the methods of communication and congestion control by the Transport layer.
- To create exposure the Network Security Mechanisms.
- To discuss various hardware security attacks and their countermeasures.

UNIT I NETWORK MODELS AND DATALINK LAYER

9

Overview of Networks and its Attributes – Network Models – OSI, TCP/IP, Addressing – Introduction to Datalink Layer – Error Detection and Correction – Ethernet(802.3)- Wireless LAN – IEEE 802.11, Bluetooth – Flow and Error Control Protocols – HDLC – PPP.

UNIT II NETWORK LAYER PROTOCOLS

9

Network Layer – IPv4 Addressing – Network Layer Protocols(IP,ICMP and Mobile IP) Unicast and Multicast Routing – Intra domain and Inter domain Routing Protocols – IPv6 Addresses – IPv6 – Datagram Format - Transition from IPv4 to IPv6.

UNIT III TRANSPORT AND APPLICATION LAYERS

9

Transport Layer Protocols – UDP and TCP Connection and State Transition Diagram - Congestion Control and Avoidance (DEC bit, RED) - QoS - Application Layer Paradigms – Client – Server Programming – Domain Name System – World Wide Web, HTTP, Electronic Mail.

UNIT IV NETWORK SECURITY

9

OSI Security Architecture – Attacks – Security Services and Mechanisms – Encryption –Advanced Encryption Standard – Public Key Cryptosystems – RSA Algorithm – Hash Functions – Secure Hash Algorithm – Digital Signature Algorithm..

UNIT V HARDWARE SECURITY

9

Introduction to hardware security, Hardware Trojans, Side – Channel Attacks – Physical Attacks and Countermeasures – Design for Security. Introduction to Block chain Technology.

TOTAL: 45 PERIODS



OUTCOMES

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

- Develop the Network Models, layers and functions.
- Analyze and classify the routing protocols.
- Develop the functions of the transport and application layer.
- Analyze and choose the network security mechanisms.
- Determine the hardware security attacks and countermeasures.

TEXT BOOKS

1. Behrouz.A.Forouzan, "Data Communication and Networking", TMH, Fifth Edition, 2017.
2. Bhunia Swarup, "Hardware Security –A Hands On Approach", Morgan Kaufmann, First Edition, 2018.

REFERENCES

1. James.F.Kurose and Keith.W.Ross, "Computer Networking – A Top – Down Approach", Pearson, Sixth Edition, 2017.
2. Douglas.E.Comer, "Computer Networks and Internets", Pearson Education, Sixth Edition, 2015.

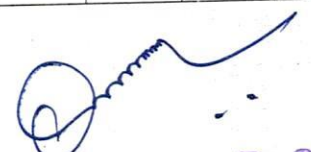
E-RESOURCES

1. <https://nptel.ac.in/courses/106105031>- (Cryptography and Network security)
2. <https://nptel.ac.in/courses/106105162>- (Advanced Encryption Standard)

Mapping of COs-POs & PSOs

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

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


Chairman - BoS

23ECT403

MICROPROCESSORS AND MICROCONTROLLERS

L T P C
3 0 0 3

OBJECTIVES

- To impart the architecture, functions and programming of 8086 microprocessor.
- To inculcate system bus structure, memory and I/O interfacing of 8086 microprocessor.
- To gain knowledge of memory and peripheral interfacing applications using 8086 microprocessors.
- To impart the architecture and programming concepts of 8051 microcontroller.
- To acquire insights into the basic concepts to develop implement microcontroller based applications.
- To familiarize with programming of microprocessors and microcontrollers.

UNIT I THE 8086 MICROPROCESSOR

9

Introduction to 8086 - Microprocessor architecture - Addressing modes - Instruction set and assembler directives - Assembly language programming - Modular Programming - Linking and Relocation - Stacks - Procedures - Macros - Interrupts and interrupt service routines - Byte and String Manipulation.

UNIT II 8086 SYSTEM BUS STRUCTURE

9

8086 signals - Basic configurations - System bus timing - System design using 8086 - I/O programming - Introduction to Multiprogramming - System Bus Structure - Multiprocessor configurations - Coprocessor, Closely coupled and loosely Coupled configurations - Introduction to advanced processors.

UNIT III I/O INTERFACING

9

Memory Interfacing and I/O interfacing - Parallel communication interface - Serial communication interface - D/A and A/D Interface - Timer - Keyboard /display controller - Interrupt controller - DMA controller - Programming and applications Case studies: Traffic Light control, LED display, LCD display, Keyboard display interface and Alarm Controller.

UNIT IV MICROCONTROLLER

9

Architecture of 8051 - Special Function Registers(SFRs) - I/O Pins Ports and Circuits - Instruction set - Addressing modes - Assembly language programming.

UNIT V INTERFACING MICROCONTROLLER

9

Programming 8051 Timers - Serial Port Programming - Interrupts Programming - LCD & Keyboard Interfacing - ADC, DAC & Sensor Interfacing - External Memory Interface- Stepper Motor and Waveform generation - Comparison of Microprocessor, Microcontroller, PIC and ARM processors.

TOTAL: 45 PERIODS



OUTCOMES

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

- Describe the architecture and fundamental programming concepts of the 8086 microprocessor.
- Examine the system bus structure, memory organization, and I/O interfacing of the 8086 microprocessor.
- Develop memory and peripheral interfacing applications using the 8086 microprocessor.
- Explain the architecture and programming features of the 8051 microcontroller..
- Analyze about the interfacing of 8051 microcontroller.
- Implement programming and interfacing solutions for microprocessors and microcontrollers.

TEXT BOOKS

1. Yu-Cheng Liu, Glenn A.Gibson, "Microcomputer Systems: The 8086 / 8088 Family Architecture, Programming and Design", Prentice Hall of India, Second Edition, 2022.
2. Mohamed Ali Mazidi, Janice Gillispie Mazidi, Rolin McKinlay, "The 8051 Microcontroller and Embedded Systems: Using Assembly and C", Pearson education, Second Edition, 2011.

REFERENCES

1. Doughlas V.Hall, "Microprocessors and Interfacing Programming and Hardware", TMH, 2012.
2. A.K.Ray,K.M.Bhurchandi, "Advanced Microprocessors and Peripherals", Tata McGraw Hill, Third Edition, 2012.

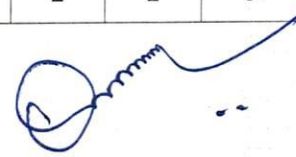
E-RESOURCES

1. <https://nptel.ac.in/courses/108/105/108105102/>- (Microprocessors and Microcontrollers)
2. <https://nptel.ac.in/courses/106/108/106108100/>- (Microprocessors and Microcontrollers)

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

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


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23ECE401

DIGITAL SIGNAL PROCESSING

(Lab Embedded Theory Course)

L T P C

3 0 2 4

OBJECTIVES

- To introduce and apply DFT and FFT techniques for frequency-domain analysis and efficient digital filtering of signals.
- To impart the IIR concepts for various transformation techniques with structural form.
- To describe the FIR filters in different methods to form structure realizations.
- To gain the knowledge of word length representation and its quantization process.
- To provide the various application process in signal processing systems.
- To write the MATLAB programming for the signal processing techniques and simulate.

UNIT I DISCRETE FOURIER TRANSFORM

9

Sampling Theorem, concept of frequency in discrete-time signals, summary of analysis & synthesis equations for FT & DTFT, frequency domain sampling, Discrete Fourier transform (DFT) - deriving DFT from DTFT, properties of DFT - periodicity, symmetry, circular convolution. Linear filtering using DFT. Filtering long data sequences - overlap save and overlap add method. Fast computation of DFT - Radix-2 Decimation-in-time (DIT) Fast Fourier transform (FFT), Decimation-in-frequency (DIF) Fast Fourier transform (FFT). Linear filtering using FFT.

UNIT II INFINITE IMPULSE RESPONSE FILTERS

9

Characteristics of practical frequency selective filters. Characteristics of commonly used analog filters - Butterworth filters, Chebyshev filters. Design of IIR filters from analog filters (LPF, HPF, BPF, BRF) - Approximation of derivatives, Impulse invariance method, Bilinear transformation. Frequency transformation in the analog domain. Structure of IIR filter - direct form I, direct form II, Cascade, parallel realizations.

UNIT III FINITE IMPULSE RESPONSE FILTERS

9

Design of FIR filters - symmetric and Anti-symmetric FIR filters-- design of linear phase FIR filters using Fourier series method - FIR filter design using windows (Rectangular, Hamming and Hanning window), Frequency sampling method. FIR filter structures - linear phase structure, direct form realizations.

UNIT IV FINITE WORD LENGTH EFFECTS

9

Fixed point and floating point number representation - ADC - quantization - truncation and rounding - quantization noise - input / output quantization - coefficient quantization error - product quantization error - overflow error - limit cycle oscillations due to product quantization and summation - scaling to prevent overflow.

UNIT V DSP APPLICATIONS

9

Multirate signal processing: Decimation, Interpolation, Sampling rate conversion by a rational factor - Adaptive Filters: Introduction, Applications of adaptive filtering to equalization-DSP Architecture Fixed and Floating point architecture principles.



LIST OF EXPERIMENTS

MATLAB / EQUIVALENT SOFTWARE PACKAGE

1. Generation of elementary Discrete-Time sequences.
2. Linear and Circular convolutions.
3. Auto correlation and Cross Correlation.
4. Frequency Analysis using DFT.
5. Design of FIR filters (LPF/HPF/BPF/BSF) and demonstrates the filtering operation.
6. Design of Butterworth and Chebyshev IIR filters (LPF/HPF/BPF/BSF).
7. Verification of Sampling Theorem.

DSP PROCESSOR BASED IMPLEMENTATION

1. Study of architecture of Digital Signal Processor.
2. Perform MAC operation using various addressing modes.
3. Generation of various signals and random noise.
4. Design multirate filters and to develop DSP applications.
5. Develop and implement various DSP algorithms using MATLAB.

TOTAL: 45+15=60 PERIODS

OUTCOMES

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

- Apply DFT and FFT techniques for frequency-domain signal analysis.
- Design IIR digital filters using analog filter transformation methods.
- Implement FIR digital filters with linear phase characteristics.
- Analyze finite word length effects and errors in digital signal processing systems.
- Examine the DSP applications including multirate processing, adaptive filters, and DSP architectures.
- Implement DSP algorithms using MATLAB and DSP processors through practical experiments.

TEXT BOOKS

1. John G. Proakis and Dimitris G. Manolakis, "Digital Signal Processing – Principles, Algorithms and Applications", Pearson Education / Prentice Hall, Fifth Edition, 2014.
2. V. Oppenheim, R.W. Schaffer and J.R. Buck, "Discrete-Time Signal Processing", Indian Reprint, Pearson, Eighth Edition, 2014.

REFERENCES

1. Emmanuel C. I feachor and Barrie. W. Jervis, "Digital Signal Processing", Pearson Education / Prentice Hall, Second Edition, 2012.
2. Sanjit K. Mitra, "Digital Signal Processing – A Computer Based Approach", Tata Mc Graw Hill, 2011.

E-RESOURCES

1. <https://nptel.ac.in/courses/117/102/117102060/>-(Digital Signal Processing)
2. <https://nptel.ac.in/courses/108/106/108106151/>-(Digital Signal Processing)



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	-	-	-	2	3	3	3
2	3	3	3	3	3	2	2	-	-	-	2	3	3	3
3	3	3	3	3	3	3	3	-	-	-	3	3	3	3
4	3	3	3	3	3	3	3	-	-	-	3	3	3	3
5	3	3	3	3	3	3	3	-	-	-	3	3	3	3
6	3	3	3	3	3	3	3	-	-	-	3	3	3	3
AVG	3	3	3	3	3	3	3	-	-	-	3	3	3	3

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


Chairman - BoS

**23ECE402****COMMUNICATION SYSTEMS****L T P C**

(Lab Embedded Theory Course)

3 0 2 4**OBJECTIVES**

- To introduce the Amplitude Modulation Schemes.
- To discuss the random process and sampling.
- To impart knowledge on various digital techniques.
- To inculcate the basic concept of various digital modulation schemes.
- To gain knowledge on digital demodulation techniques.
- To simulate and evaluate DPSK, QPSK, and QAM modulation and detection schemes.

UNIT I AMPLITUDE MODULATION**9**

Review of signals and systems, Time and Frequency domain representation of signals, Principles of Amplitude Modulation Systems- DSB, SSB and VSB modulations. Angle Modulation, Representation of FM and PM signals, Spectral characteristics of angle modulated signals. SSB Generation – Filter and Phase Shift Methods, VSB Generation – Filter Method, Hilbert Transform, and Super heterodyne Receiver.

UNIT II RANDOM PROCESS AND SAMPLING**9**

Review of probability and random process. Gaussian and white noise characteristics, Noise in amplitude modulation systems, Noise in Frequency modulation systems. Low pass sampling – Aliasing - Signal Reconstruction-Quantization - Uniform & non-uniform quantization - quantization noise - Nyquist criterion- Logarithmic Companding.

UNIT III DIGITAL TECHNIQUES**9**

Pulse modulation, Differential pulse code modulation. Delta modulation, Noise considerations in PCM, Digital Multiplexers, Channel coding theorem - Linear Block codes - Hamming codes - Cyclic codes - Convolutional codes - Viterbi Decoder.

UNIT IV DIGITAL MODULATION SCHEME**9**

Geometric Representation of signals - Generation, detection, IQ representation, PSD & BER of Coherent BPSK, BFSK, & QPSK - QAM - Carrier Synchronization - Structure of Non-coherent Receivers Synchronization and Carrier Recovery for Digital modulation, Principle of DPSK.

UNIT V DEMODULATION TECHNIQUES**9**

Elements of Detection Theory, Optimum detection of signals in noise, Coherent communication with waveforms- Probability of Error evaluations. Baseband Pulse Transmission- Inter symbol Interference, Optimum demodulation of digital signals over band-limited channels.



LIST OF EXPERIMENTS

1. AM- Modulator and Demodulator.
2. FM - Modulator and Demodulator.
3. Signal sampling and TDM.
4. Pulse Code Modulation and Demodulation.
5. Pulse Amplitude Modulation and Demodulation.
6. Digital Modulation – ASK, PSK, FSK.
7. Delta Modulation and Demodulation.
8. Simulation of ASK, FSK, and BPSK Generation and Detection Schemes.
9. Simulation of DPSK, QPSK and QAM Generation and Detection Schemes.
10. Simulation of Linear Block and Cyclic Error Control coding Schemes.

TOTAL: 45+15=60 PERIODS

OUTCOMES

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

- Discuss about Amplitude Modulation techniques.
- Apply the concepts of Random Process to the design of communication systems.
- Discuss various digital techniques and sampling codes.
- Analyze various signals and its spectrum for digital modulation.
- Explain coherent communication with waveforms.
- Design AM, FM & Digital modulators for error coding schemes.

TEXT BOOKS

1. Simon Haykins, "Communication Systems", Wiley, Fifth Edition, 2021
2. B.P.Lathi, "Modern Digital and Analog Communication Systems", Oxford University press, Fourth Edition, 2011.

REFERENCES

1. A.Papoulis, "Probability, Random variables and Stochastic Processes", McGraw Hill, Fourth Edition, 2002.
2. B.Sklar, "Digital Communications Fundamentals and Applications", Pearson Education, Second Edition, 2011.

E-RESOURCES

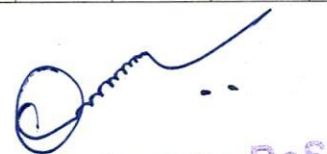
1. <https://nptel.ac.in/courses/117/102/117102059/>-(Communication Engineering)
2. <https://nptel.ac.in/courses/117/101/117101051/>-(Digital Communication)



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

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


Chairman - BoS

23ECE403

LINEAR INTEGRATED CIRCUITS

(Lab Embedded Theory Course)

L T P C

3 0 2 4

OBJECTIVES

- To introduce the basic building blocks of linear integrated circuits.
- To develop the linear and non-linear applications of operational amplifiers.
- To gain knowledge on theory and applications of analog multipliers and PLL.
- To familiarize students in theory of ADC and DAC.
- To enhance knowledge on features of waveform generators and special function ICs.
- To develop hands on experience in designing and simulation of electronic circuits.

UNIT I BASICS OF OPERATIONAL AMPLIFIERS

9

Current mirror and current sources, Current sources as active loads, Voltage sources, Voltage References, BJT Differential amplifier with active loads, Basic information about op-amps – Ideal Operational Amplifier - General operational amplifier stages -and internal circuit diagrams of IC 741, DC and AC performance characteristics, slew rate, Open and closed loop configurations – MOSFET Operational Amplifiers – LF155 and TL082.

UNIT II APPLICATIONS OF OPERATIONAL AMPLIFIERS

9

Sign Changer, Scale Changer, Phase Shift Circuits, Voltage Follower, V-to-I and I-to-V converters, adder, subtractor, Instrumentation amplifier, Integrator, Differentiator, Logarithmic amplifier, Antilogarithmic amplifier, Comparators, Schmitt trigger, Precision rectifier, peak detector, clipper and clamper, Low-pass, high-pass and band-pass Butterworth filters.

UNIT III ANALOG MULTIPLIER AND PLL

9

Analog Multiplier using Emitter Coupled Transistor Pair - Gilbert Multiplier cell – Variable transconductance technique, analog multiplier ICs and their applications, Operation of the basic PLL, Closed loop analysis, Voltage controlled oscillator, Monolithic PLL IC 565, application of PLL for AM detection, FM detection, FSK modulation and demodulation and Frequency synthesizing and clock synchronization.

UNIT IV ANALOG TO DIGITAL AND DIGITAL TO ANALOG CONVERTERS

9

Analog and Digital Data Conversions, D/A converter – specifications - weighted resistor type, R-2R Ladder type, Voltage Mode and Current-Mode R - 2R Ladder types - switches for D/A converters, high speed sample-and-hold circuits, A/D Converters – specifications - Flash type - Successive Approximation type - Single Slope type – Dual Slope type - A/D Converter using Voltage-to-Time Conversion - Over-sampling A/D Converters, Sigma – Delta converters.

UNIT V WAVEFORM GENERATORS AND SPECIAL FUNCTION ICs

9

Sine-wave generators, Multivibrators and Triangular wave generator, Saw-tooth wave generator, ICL8038 function generator, Timer IC 555, IC Voltage regulators – Three terminal fixed and adjustable voltage regulators - IC 723 general purpose regulator - Monolithic switching regulator, Low Drop –



Out(LDO) Regulators - Switched capacitor filter IC MF10, Audio Power amplifier, Video Amplifier, Isolation Amplifier, Opto couplers and fibre optic IC.

LIST OF EXPERIMENTS

DESIGN AND ANALYSIS OF THE FOLLOWING CIRCUITS

1. Inverting, Non inverting and differential amplifiers.
2. RC Phase shift oscillator and Wien Bridge Oscillator.
3. RC Integrator and Differentiator circuits using Op-Amp.
4. Instrumentation amplifier.
5. Active low-pass, High pass & Band pass filters.
6. PLL Characteristics and its use as frequency multiplier, clock synchronization.
7. R-2R ladder type D/A converter using Op-Amp.
8. Schmitt Trigger circuit with Predictable hysteresis
9. Tuned Collector Oscillator.
10. Design of Astable and Monostable multivibrators using op-amp.
11. Simulation of Active low-pass, high-pass and band-pass filters using op-amp.
12. Simulation of Astable and Monostable multivibrators using NE555 Timer.

TOTAL: 45+15=60 PERIODS

OUTCOMES

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

- Analyze the basic building blocks of Linear Integrated circuits in circuit design.
- Examine the linear and non linear applications of OP - AMPS.
- Design analog multiplier and PLL in practical applications.
- Describe ADC and DAC interfacing for delta converter.
- Analyze the waveforms using Op-Amp based Circuits.
- Design the Op-Amp based circuits using SPICE software.

TEXT BOOKS

1. D.Roy Choudhry, Shail Jain, "Linear Integrated Circuits", New Age International Pvt. Ltd, Fifth Edition, 2018.
2. Sergio Franco, "Design with Operational Amplifiers and Analog Integrated Circuits", Tata Mc Graw-Hill, Fourth Edition, 2016.

REFERENCES

1. Robert F.Coughlin, Frederick F.Driscoll, "Operational Amplifiers and Linear Integrated Circuits", PHI, Sixth Edition, 2001.
2. Ramakant A. Gayakwad, "OP-AMP and Linear ICs", Prentice Hall / Pearson Education, Fourth Edition, 2015.

E-RESOURCES

1. [https://nptel.ac.in/courses/108108111/-](https://nptel.ac.in/courses/108108111/) (Op-Amps).
2. https://onlinecourses.nptel.ac.in/noc20_ee45/preview (Analog 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	2	2	2	2	2	-	-	1	2	3	2
2	3	3	3	2	2	2	2	2	-	-	1	2	3	2
3	3	3	3	2	2	2	2	2	-	-	1	2	3	2
4	3	3	3	2	2	2	2	2	-	-	1	2	3	2
5	3	3	3	2	2	2	2	2	-	-	1	2	3	2
6	3	3	3	2	2	2	2	2	-	-	1	2	3	2
AVG	3	3	3	3	2	2	2	2	-	-	1	2	3	2

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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MINOR DEGREE / HONOURS





SENGUNTHAR ENGINEERING COLLEGE (AUTONOMOUS)

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Recognized Under Section 2(f) & 12(B) of the UGC Act, 1956
NAAC Accredited with 'A' Grade

TIRUCHENGODE - 637 205 NAMAKKAL (Dt) TAMILNADU



DEPARTMENT OF

ELECTRONICS AND COMMUNICATION ENGINEERING

REGULATIONS 2023

MINOR DEGREE / HONOURS

INTERNET OF THINGS

CURRICULUM AND SYLLABI



Estd. 2001



CURRICULUM AND SYLLABI
FOR B.E. / B.Tech. DEGREE PROGRAMMES
(MINOR/HONOURS DEGREE- INTERNET OF THINGS)

B.E- ELECTRONICS AND COMMUNICATION ENGINEERING

Course Code	Name of the Subject	Category	Periods /Week			Credit	Maximum Marks			
			L	T	P		C	CIA	ESE	TOT
THEORY										
23ECIT01	Introduction to Internet of Things	PC	3	0	0	3	40	60	100	
23ECIT02	VLSI For IoT Systems	PC	3	0	0	3	40	60	100	
23ECIT03	Industrial IoT and Industry 4.0	PC	3	0	0	3	40	60	100	
EMBEDDED COURSE										
23ECIE01	IoT with Arduino, ESP, and Raspberry Pi	PC	3	0	2	4	50	50	100	
EMPLOYABILITY ENHANCEMENT COURSE										
23EEIP01	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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TIRUCHENGODE - 637 205 NAMAKKAL (Dt) TAMILNADU



SEMESTER III

23ECIT01

INTRODUCTION TO INTERNET OF THINGS

LT P C

3 0 0 3

OBJECTIVES

- To introduce the concept of IoT ecosystem and its applications.
- To impart knowledge on M2M technologies relating to the IoT.
- To expose reference model and IoT architecture.
- To familiarize students on IoT industrial applications.
- To acquire insights in to IoT privacy and security issues.

UNIT I FUNDAMENTALS OF IoT

9

The Internet of Things Today, Time for Convergence, Towards the IoT Universe, Internet of Things Vision, IoT Strategic Research and Innovation Directions, IoT Applications, Future Internet Technologies, Infrastructure, Networks and Communication, Processes, Data Management, Security, Privacy, IoT Related standardization.

UNIT II M2M COMMUNICATION

9

M2M to IoT – A Basic Perspective– Introduction, Some Definitions, M2M Value Chains, IoT Value Chains, an emerging industrial structure for IoT, the international driven global value chain and global information monopolies. M2M to IoT-An Architectural Overview.

UNIT III IoT ARCHITECTURE

9

IoT Architecture -State of the Art – Introduction, State of the art, Architecture Reference Model- Introduction, Reference Model and architecture, IoT reference Model, IoT Reference Architecture- Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views.

UNIT IV IoT INDUSTRIAL APPLICATIONS

9

IoT Applications for Value Creations Introduction, IoT applications for industry: Future Factory Concepts, Brownfield IoT, Smart Objects, Smart Applications, Four Aspects in your Business to Master IoT, Value Creation from Big Data and Serialization, IoT for Retailing Industry, IoT for Oil and Gas Industry.

UNIT V IoT PRIVACY AND SECURITY ISSUES

9

Internet of Things Privacy, Security and Governance Introduction, Overview of Governance, Privacy and Security Issues, Contribution from FP7 Projects, Security, Privacy and Trust in IoT-Data-Platforms for Smart Cities, First Steps Towards a Secure Platform, Smart Approach. Data aggregation for the IoT in Smart Cities.

TOTAL: 45 PERIODS



OUTCOMES

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

- Analyze the technology and standards of IoTs.
- Implement machine to machine communication.
- Design a critical ecosystem required to mainstream IoTs.
- Discuss the skills on developing their smart applications and Business to Master IoT.
- Examine the privacy and security issues of IoTs.

TEXT BOOKS

1. Nitesh Dhanjani, "Abusing the Internet of Things", Shroff Publisher/O'Reilly Publisher, 2015.
2. RMD Sundaram Shriram K Vasudevan, Abhishek S Nagarajan, "Internet of Things" John Wiley and Sons, 2019.

REFERENCES

1. Shriram K Vasudevan, Abhishek S Nagarajan, RMD Sundaram, "Internet of Things", John Wiley & Sons, 2019.
2. Cuno Pfister, "Getting Started with the Internet of Things", Shroff Publisher/Maker Media, 2011.

E - RESOURCES

1. <https://archive.nptel.ac.in/courses/106/105/106105166/>(Introduction To Internet of Things)
2. [https://freevideolectures.com/course/4638/nptel-introduction-internet things\(Interoperability in IoT, Introduction to Arduino Programming\)](https://freevideolectures.com/course/4638/nptel-introduction-internet-things(Interoperability%20in%20IoT,%20Introduction%20to%20Arduino%20Programming))

Mapping of COs-POs & PSOs

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

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


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SEMESTER IV

23ECIT02

VLSI FOR IOT SYSTEMS

L P T C
3 0 0 3

OBJECTIVES

- To introduce the fundamental concepts and architecture of IoT systems.
- To impart knowledge of the key components and building blocks of IoT systems.
- To familiarize the fabrication processes involved in IC technology relevant to IoT applications.
- To provide the system design principles for developing IoT-based solutions.
- To inculcate various IoT systems and their real-world applications.

UNIT I INTRODUCTION

9

Concept of connected world, Need, Legacy systems for connected world, features and limitations, key features of IoT architecture, Merits and Demerits of IoT Technology, Applications driven by IoT technology, examples.

UNIT II COMPONENTS OF IOT

9

Review of classic embedded system architecture, Basic building blocks of an IoT system, Sensors and computing nodes. Sensors used in IoT Systems, Characteristics and requirements, Types of sensors for IoT systems, Compute nodes of IoT, Connectivity technologies in IoT, Software in IoT systems, features and properties.

UNIT III IC TECHNOLOGY FOR IOT

9

SoC Architecture for IoT devices, Application processor, microcontrollers, smart analog, memory architecture for IoT, Non volatile memories(NVM), Embedded non volatile memories, Power management, Low drop out regulators, DC-to DC Converters, Voltage References, Power Management Units(PMUs) in IC's and Systems, Role of Field Programmability in IoT systems.

UNIT IV ELECTRONIC SYSTEM DESIGN FOR IOT

9

Electronic system Design for IoT, Requirements, Computing blocks in IoT systems, MCU's, DSPs and FPGA's, System power supply design for IoT systems, Mixed signal challenges in hardware systems.

UNIT V ANALYSIS OF IOT SYSTEMS

9

Component models and System Design, Feasibility and challenges, System level integration, Operating conditions of IoT devices and impact on Electronic System design, hardware security issues, EMI/EMC, SI/PI and Reliability analysis in IoT systems.

TOTAL: 45 PERIODS



OUTCOMES

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

- Examine the depth knowledge about the architecture of IoT systems.
- Apply the components used in building blocks and IoT systems.
- Explain the SoC architectures for IoT and its memories.
- Design computing blocks used in IoT systems.
- Analyze the component models of IoT systems and hardware security issues.

TEXT BOOKS

1. Alloto, "Enabling the internet of Things from Integrated Circuits to Integrated systems", Springer Publications, First Edition, 2017.
2. Pieter Harpe, Kofi A.A makinwa Andrea Baschiroto, " Hybrid ADCs, Smart sensors for the IoT, and sub-1V& Advanced Node analog circuit Design", Springer International Publishing AG,2017.

REFERENCES

1. Rashid khan, Ajithvasudevan, "Learning IoT with Particle Photon and Electron", Packt Publishing Limited (Verlag), 2016.
2. Apek Mulay, "Sustaining Moore's Law: Uncertainty Leading to a certainty of IoT Revolution", Margan and Claypool Publishers, 2015.

E-RESOURCES

1. <https://nptel.ac.in/courses/108/108/108108111/> (Introduction of IC)
2. <https://www.digimat.in/nptel/courses/video/108101089/I21.html> (Fabrication of MOS)

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

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


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SEMESTER V

23ECIT03

INDUSTRIAL IOT AND INDUSTRY 4.0

**L T P C
3 0 0 3**

OBJECTIVES

- To discuss the characteristics of various sensors and its applications.
- To introduce the communication protocol used in IoT development.
- To expose physical devices and controlling hardware, temperature used in IoT.
- To familiarize students in IoT cloud dashboards and web services.
- To obtain in depth knowledge on IoT system design – Hardware & Software.

UNIT I IOT CONCEPT AND DEVELOPMENT PLATFORM

9

IOT Definition, Importance of IoT, Applications of IOT, IoT architecture, Understanding working of Sensors, Actuators, Sensor calibration, Study of Different sensors and their characteristics.

UNIT II COMMUNICATION PROTOCOL USED IN IOT DEVELOPMENT

9

UART Communication Protocol, I2C Protocol device interfacing and decoding of signal, SPI Protocol device interfacing and decoding of signal, WIFI and Router interfacing, Ethernet Configuration, Bluetooth study and analysis of data flow, Zigbee Interfacing and study of signal flow.

UNIT III IOT PHYSICAL DEVICES AND END POINTS HARDWARE AND SENSORS

9

IoT Physical Devices and Endpoints- Introduction to Arduino and Raspberry Pi- Installation, Interfaces (serial, SPI, I2C), Programming – Python program with Raspberry PI with focus on interfacing external gadgets, controlling output, reading input from pins. Controlling Hardware- Connecting LED, Buzzer, Switching High Power devices with transistors, Controlling AC Power devices with Relays, Controlling servo motor, speed control of DC Motor, unipolar and bipolar Stepper motors; Sensors- Light sensor, temperature sensor with thermistor, voltage sensor, ADC and DAC, Temperature and Humidity Sensor DHT11, Motion Detection Sensors, Distance Measurement with ultrasound sensor.

UNIT IV CLOUD SERVICES USED IN IOT DEVELOPMENT PLATFORM

9

Configuration of the cloud platform, Sending data from the IOT nodes to the gateways using different communication options; Transferring data from gateway to the cloud; Exploring the web services like mail, Messaging (SMS) and Twitter etc.; Tracking of cloud data as per the requirement; Google Cloud service architect.

UNIT V CHALLENGES IN IOT SYSTEM DESIGN – HARDWARE AND SOFTWARE

9

Antenna design and placement, Chip-package system development, Power electronics, electromagnetic interference/compatibility (EMI/EMC), Electronics reliability; Battery simulation.

TOTAL: 45 PERIODS



OUTCOMES

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

- Analyze the building blocks of IoT technology and sensors calibration.
- Describe the processors and peripherals used in IoT communication protocol.
- Apply commonly used IoT protocols such as REST, API, MQTT through IoT based sensors.
- Design IOT applications with the physical world of humans and real life problem solving.
- Implement IOT applications in antenna and battery simulation.

TEXT BOOKS

1. Arshdeep Bahga and Vijay Madisetti, "Internet of Things-A Hands-on Approach", Universities Press, 2015.
2. Matt Richardson & Shawn Wallace, "Getting Started with Raspberry Pi", O'Reilly (SPD), 2014.

REFERENCES

1. Simon Monk, O'Reilly (SPD), Raspberry Pi Cookbook, "Software and Hardware Problems and solutions", 2016,
2. N. Ida, Sensors, "Actuators and their Interfaces", SciTech Publishers, 2014.

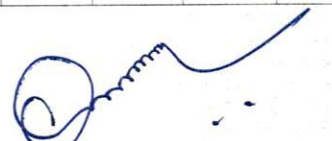
E-RESOURCES

1. <https://archive.nptel.ac.in/courses/106/105/106105166/> (Introduction to IoT)
2. https://onlinecourses.nptel.ac.in/noc20_cs69/preview (Introduction to Industry 4.0 and Industrial Internet of Things)

Mapping of COs-POs & PSOs

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

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


Chairman - BoS



SEMESTER VI

23ECIE01

IoT WITH ARDUINO, ESP, AND RASPBERRY PI

**L T P C
3 0 2 4**

OBJECTIVES

- To introduce building blocks of IoT devices and boards.
- To inculcate the concept of arduino boards and its Interfacing.
- To expose the fundamentals of ESP 8266 and its applications.
- To knowledge about the Raspberry and ES 8266 and its Interfacing.
- To enhance knowledge on Rsspery PI3 configuration without Ethernet.
- To provide skills for interfacing sensors and actuators with different IoT architectures.

UNIT I INTRODUCTION

9

IoT- introduction and its components, IoT building blocks, Sensors and Actuators, IoT Devices, IoT boards (Arduino Uno, ESP 8266-12E Node MCU, and Raspberry Pi 3).

UNIT II INTRODUCTION TO ARDUINO UNO

9

Arduino Uno – getting started with the Uno boards, blink program, connection of sensors to the Uno board, reading values of sensors from the Uno board, interrupts. Case study: Temperature/Humidity Control; Case Study: Sending values Temperature/Humidity values to the Internet via GSM module.

UNIT III GETTING STARTED WITH THE ESP BOARD

9

ESP 8266-12E Node MCU – getting started with the ESP board, Micropython and Esplorer IDE, Flushing the ESP8266 board with micropython, connecting sensors to the ESP board, Connecting ESP board to WiFi, Interfacing ESP with the Cloud (REST API- GET, POST, MQTT), interrupts, comparison of ESP 32 board with the ESP 8266 board. Case Study: Switching light on /off remotely. Case Study: Voice-based Home Automation for switching lights on/off (Android phone – Google Assistant (Assistant <-> IFTTT), MQTT (ESP <-> IFTTT), ESP 8266 <-> Lights).

UNIT IV RASPBERRY PI 3 AND ITS CONFIGURATION

9

Raspberry Pi 3 - Rpi3 introduction and installing the Raspbian Stretch OS, Headless - Computer and Rpi3 configuration to connect through SSH via Ethernet, Headless - connecting Rpi3 remotely without Ethernet cable via SSH, IP address, Rpi 3 - Testing the GPIO pins through Scripts.

UNIT V RASPBERRY PI3 INTERFACING WITH SENSOR

9

Raspberry pi3 interfacing with Sensor DHT11, Raspberry pi3 python library install and reading sensor feed, 'Plug and play ' type cloud platform overview for integration to IOT devices, 'Plug and play' cloud platform for integration to IOT device - actuator (LED), Plug and play platform - Custom widget (DHT11-Sensor) integration through Python. New - Raspeberry Pi 4 Vs Raspberry Pi3 Mobel B Comparison, LoRawan /LPWAN – Overview.



LIST OF EXPERIMENTS

1. Introduction to Arduino Uno R3.
2. Blinking the LED with Arduino.
3. Read the analog voltage using ADC on Arduino.
4. Measure the distance of an object using ultrasonic sensor.
5. Getting started with Raspberry Pi, Install Raspian on your SD card.
6. Coding simple programs in Python.
7. Python-based IDE (integrated development environments) for the Raspberry Pi and how to trace and debug Python code on the device.
8. Raspberry Pi interacts with online services through the use of public APIs and SDKs.
9. Understanding the connectivity of Raspberry-Pi with IR sensor. Write an application to detect obstacle and notify user using LEDs.

TOTAL: 45+15= 60 PERIODS

OUTCOMES

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

- Design arduino Uno, NODE MCU 8266 and Raspberry PI along with critical protocols and its communication to cloud.
- Explain the Interfacing module of sensors and arduino board .
- Apply ESP8266 board with micropython used in sensors and ESP board.
- Analyze the Raspberry PI 3 and its configuration.
- Implement analog sensor and digital sensor interfacing with IOT devices.
- Develop skills on hands-on experience using arduino and Raspberry Pi.

TEXT BOOKS

1. Rao, M., "Internet of Things with Raspberry Pi 3: Leverage the power of Raspberry Pi 3 and JavaScript to build exciting IoT projects", Packt Publishing Ltd, 2018.
2. Baichtal, J. "Arduino for beginners: essential skills every maker needs", Pearson Education, 2013.

REFERENCES

1. Schwartz, M. "Internet of Things with ESP8266", Packt Publishing Ltd, 2016.
2. Richardson, M., & Wallace, S., "Getting started with raspberry PI", O'Reilly Publisher Media, Inc., 2012.

E-RESOURCES

1. <https://nptel.ac.in/courses/106105166> (Introduction to Internet of things)
2. <https://nptel.ac.in/courses/106105193> (Embedded system design with ARM)



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

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


Chairman - BoS



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SEMESTER VII

23ECIP01

PROJECT WORK

L T P C
0 0 12 6

OBJECTIVES

- To identify a specific problem for the current need of the society and collecting information related to the same through detailed review of literature.
- To build up skills to formulate a technical project.
- To develop the methodology to solve the identified problem.
- To teach use of new tools, algorithms and techniques required to carry out the projects.
- To train the students in preparing project reports and to face reviews and viva-voce examination.

GUIDELINE FOR REVIEW AND EVALUATION

The students in a group of 3 works on a topic approved by the head of the department under the guidance of a faculty member who is familiar in this area of interest. The student can select any topic which is relevant to the area of engineering design. The topic may be theoretical or case studies. At the end of the semester, a detailed report on the work done should be submitted which contains clear definition of the identified problem, detailed literature review related to the area of work and methodology for carrying out the work. The students will be evaluated through a viva-voce examination by a panel of examiners including one external examiner.

TOTAL: 180 PERIODS

OUTCOMES

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

- Formulate a real world problem, identify the requirement and develop the design solutions.
- Identify technical ideas, strategies and methodologies.
- Utilize the new tools, algorithms, techniques that contribute to obtain the solution of the project.
- Prepare technical report and oral presentations.
- Learn the students will have a clear idea of their area of work and a systematic way.



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

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DEPARTMENT OF

ELECTRONICS AND COMMUNICATION ENGINEERING

REGULATIONS 2023

MINOR DEGREE / HONOURS

ROBOTICS

CURRICULUM AND SYLLABI



Estd. 2001



CURRICULUM

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

(MINOR/HONOURS DEGREE- ROBOTICS)

B.E. – ELECTRONICS AND COMMUNICATION ENGINEERING

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		C	CIA	ESE
THEORY									
23ECRT01	Principles of Robotics	PC	3	0	0	3	40	60	100
23ECRT02	Wireless Sensors Networks for Robotics	PC	3	0	0	3	40	60	100
23ECRT03	Artificial Intelligence for Robotics	PC	3	0	0	3	40	60	100
EMBEDDED COURSE									
23ECRE01	Microcontrollers for Robotics	PC	3	0	2	4	50	50	100
EMPLOYABILITY ENHANCEMENT COURSE									
23ECRP01	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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23ECRT01

SEMESTER III PRINCIPLES OF ROBOTICS

L T P C
3 0 0 3

OBJECTIVES

- To introduce the basic terminologies of the robotics.
- To acquire knowledge about sensors used in robotics.
- To enhance knowledge on sensors drives and controllers.
- To inculcate the programming skills of robotics and Languages.
- To familiarize students in Economical aspects in robot design.

UNIT I INTRODUCTION TO ROBOTICS

9

Brief History-Basic Concepts of Robotics such as Definition - Three laws, Elements of Robotic Systems - Robot anatomy-DOF-Misunderstood devices -Classification of Robotic systems on the basis of various parameters such as work volume- type of drive-Associated parameters- Introduction to Principles & Strategies of Automation, Types & Levels of Automations, Need of automation, Industrial applications of robot.

UNIT II GRIPPERS AND SENSORS FOR ROBOTICS

9

Grippers for Robotics - Types of Grippers, Guidelines for design for robotic gripper, Force analysis for various basic gripper systems. Sensors for Robots - Types of Sensors used in Robotics, Classification and applications of sensors, Characteristics of sensing devices, Selections of sensors. Need for sensors and vision system in the working and control of a robot.

UNIT III DRIVES AND CONTROL FOR ROBOTICS

9

Drive - Types of Drives, Types of transmission systems, Actuators and its selection while designing a robot system. Control Systems: Types of Controllers, Introduction to closed loop control.

UNIT IV PROGRAMMING AND LANGUAGES FOR ROBOTICS

9

Robot Programming: Methods of robot programming, WAIT, SIGNAL and DELAY commands, subroutines, Programming Languages: Generations of Robotic Languages, Introduction to various types such as VAL, RAIL, AML, Python, ROS etc., Development of languages since WAVE till ROS.

UNIT V APPLICATIONS

9

Socio-Economic aspect of robotics Economical aspects for robot design, Safety for robot and standards, Introduction to Artificial Intelligence, AI techniques, Need and application of AI, New trends and recent updates in robotics.

TOTAL: 45 PERIODS



OUTCOMES

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

- Explain terminologies related to Robotics technology.
- Examine the classification of sensors used in Robotics
- Apply logic for selection of robotic subsystems and systems
- Analyze basic principles of robot system integration.
- Implement applications of robotics used in Artificial Intelligence.

TEXTBOOKS

1. Dilip Kumar Pratihara, "Fundamentals of Robotics", Narosa Publishing House, 2019.
2. S.B.Niku, "Introduction to Robotics – Analysis", Contro, Applications, John Wiley & Sons Ltd. Third Edition, 2020.

REFERENCES

1. Mikell Groover, Mitchell Weiss, Roger N. Nagel, Nicholas Odrey, Ashish Dutta, "Industrial Robotics SIE", McGraw Hill Education India Pvt Ltd, Second Edition, 2012.
2. S.K.Saha, "Introduction to Robotics", TATA McGraw Hills Education, Second Edition, 2014.

E-RESOURCES

1. <https://nptel.ac.in/courses/107106090> (Introduction to Robotics)
2. <https://nptel.ac.in/courses/108108147> (Sensors and Actuators)

Mapping of Cos-Pos & PSOs

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

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


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SEMESTER IV

23ECRT02

WIRELESS SENSORS NETWORKS FOR ROBOTICS

L P T C

3 0 0 3

OBJECTIVES

- To introduce the basics of wireless sensor networks.
- To expose the architecture and tools used in networking.
- To gain the knowledge in networking using sensors.
- To enhance knowledge in wireless architecture establishment.
- To insulate the different sensor techniques used in networking.

UNIT I OVERVIEW OF WIRELESS SENSOR NETWORKS

9

Challenges for Wireless Sensor Networks, Enabling Technologies for Wireless Sensor Networks.

UNIT II ARCHITECTURES

9

Joint distributions Single-Node Architecture - Hardware Components, Energy Consumption of Sensor Nodes Operating Systems and Execution Environments, Network Architecture -Sensor Network Scenarios, Optimization Goals and Figures of Merit, Gateway Concepts.

UNIT III NETWORKING SENSORS

9

Physical Layer and Transceiver Design Considerations, MAC Protocols for Wireless Sensor Networks, Low Duty Cycle Protocols And Wakeup Concepts - S-MAC, The Mediation Device Protocol, Wakeup Radio Concepts, Address and Name Management, Assignment of MAC Addresses, Routing Protocols- Energy-Efficient Routing, Geographic Routing..

UNIT IV INFRASTRUCTURE ESTABLISHMENT

9

Topology Control, Clustering, Time Synchronization, Localization and Positioning, Sensor Tasking and Control.

UNIT V SENSOR NETWORK PLATFORMS AND TOOLS

9

Sensor Node Hardware – Berkeley Motes, Programming Challenges, Node-level software platforms, Node-level Simulators, State-centric programming.

TOTAL: 45 PERIODS





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OUTCOMES

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

- Analyze the different techniques used in networking.
- Examine the basics in wireless architecture.
- Describe the fundamental concepts of sensor networks.
- Implement the protocols used in networking and clustering.
- Analyze the different tools used in networking.

TEXTBOOKS

1. Holger Karl & Andreas Willig, "Protocols and Architectures for Wireless Sensor Networks", John Wiley, 2005.
2. Feng Zhao & Leonidas J. Guibas, "Wireless Sensor Networks- An Information Processing Approach", Elsevier, 2007.

REFERENCES

1. KazemSohraby, Daniel Minoli, &TaiebZnati, "Wireless Sensor Networks- Technology, Protocols, and Applications", John Wiley, 2011.
2. Anna Hac, "Wireless Sensor Network Designs", John Wiley, 2003.

E-RESOURCES

1. <https://nptel.ac.in/courses/106105160> (Wireless Sensor Networks).
2. <https://nptel.ac.in/courses/117104118> (Estimation for Wireless Communications).

Mapping of Cos-Pos & PSOs

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

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

Chairman - BoS





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SEMESTER V

23ECRT03

ARTIFICIAL INTELLIGENCE FOR ROBOTICS

L P T C
3 0 0 3

OBJECTIVES

- To introduce the basics of artificial intelligence and satisfaction problems.
- To impart knowledge on planning acting in real world using artificial intelligence.
- To enhance knowledge in reasoning concepts of machine learning.
- To expose the methods of solving problems using Artificial Intelligence.
- To acquire insights in to ethics and risks of Artificial Intelligence in robotics.

UNIT I INTRODUCTION

9

State Of the Art, Need for AI in Robotics. Thinking And Acting Humanly, Intelligent Agents, Structure Of Agents. PROBLEM SOLVING: Solving Problems by Searching –Informed Search and Exploration– Constraint Satisfaction Problems–Adversarial Search, Knowledge and Reasoning– Knowledge Representation – First Order Logic.

UNIT II PLANNING

9

Planning with forward and backward State space search – Partial order planning – Planning graphs Planning with propositional logic – Planning and acting in real world.

UNIT III REASONING

9

Uncertainty – Probabilistic reasoning–Filtering and prediction–Hidden Markov models–Kalman filters– Dynamic Bayesian Networks, Speech recognition,making decisions.

UNITIV LEARNING

9

Forms of learning – Knowledge in learning – Statistical learning methods –reinforcement learning, communication, perceiving and acting, Probabilistic language processing, perception.

UNIT V AI IN ROBOTICS

9

Robotic perception, localization, mapping- configuring space, planning uncertain movements, dynamics and control of movement, Ethics and risks of artificial intelligence in robotics.

TOTAL: 45 PERIODS



OUTCOMES

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

- Explain the appropriate AI methods to solve a given problem.
- Examine the problems that are amenable to solution by AI methods.
- Analyze the given problem in the language/framework of different AI methods.
- Implement reinforcement and perception learning used AI algorithms
- Design empirical evaluation of different algorithms on problem formalization, and state the conclusions that the evaluation supports.

TEXTBOOKS

1. Stuart Russell, Peter Norvig, "Artificial Intelligence: A modern approach", Pearson Education, India, Third Edition, 2016.
2. Negnevitsky, M, "Artificial Intelligence: A guide to Intelligent Systems", Harlow: Addison Wesley, Second Edition, 2002.

REFERENCES

1. Francis.X.Govers, "Artificial Intelligence for Robotics", Packt Publishing, Second Edition, 2018.
2. Huimin Lu, Xing Lu, "Artificial Intelligence and Robotics", Springer, First Edition, 2017.

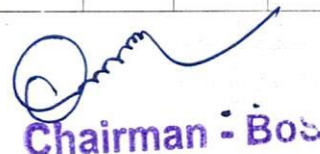
E-RESOURCES

1. [https://nptel.ac.in/courses/106105077-\(Artificial Intelligence\)](https://nptel.ac.in/courses/106105077-(Artificial%20Intelligence))
2. [https://nptel.ac.in/courses/106105078-\(Probabilistic Reasoning\)](https://nptel.ac.in/courses/106105078-(Probabilistic%20Reasoning))

Mapping of Cos-Pos & PSOs

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

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


Chairman - BOS



SEMESTER VI

23ECRE01

MICROCONTROLLERS FOR ROBOTICS

LT P C

3 0 2 4

OBJECTIVES

- To introduce the fundamental concept of microcontroller.
- To gain knowledge in basic architecture and instruction set of AVR microcontroller.
- To enhance knowledge in assembly and C programming using Data types.
- To acquire knowledge on AVR in –chip peripherals and its programming
- To expose the interfacing concepts using sensors and motors.
- To write a programming using AVR Microcontroller and interfacing with Arduino UNO board.

UNIT I FUNDAMENTALS OF MICROCONTROLLERS

9

History of microprocessor and microcontrollers, Difference between microprocessors and microcontrollers and Applications of microcontrollers, Comparison of 8-bit microcontrollers-16-bit and 32-bit microcontrollers. Definition of embedded system and its characteristics - Role of microcontrollers in embedded Systems. Overview of the 8051 family Role of microcontrollers in embedded Systems. Introduction to Microcontroller Interfacing and applications.

UNIT II ARCHITECTURE AND INSTRUCTION SET OF 8-BIT AVR MICROCONTROLLER

9

AVR Microcontroller architecture Registers, AVR status register, Memory Space, ATmega32(Arduino) pin-configuration & function of each pin, Addressing mode and instruction set AVR microcontroller, Data transfer, Arithmetic, Logic and Compare, Rotate and Shift, Branch and Call instructions, Bit manipulation instructions .

UNIT III AVR ASSEMBLY AND C PROGRAMMING

9

AVR data types and assembler directives, AVR assembly language programs, AVR I/O Port, Programming, Time delay loop, Bit addressability, MACROs, Pros and cons of C and assembly language programming, Data types, Simple C programs for general purpose I/O and bit accessibility.

UNIT IV AVR ON-CHIP PERIPHERALS AND ITS PROGRAMMING

9

AVR on-chip peripherals and its programming: General purpose I/O Ports, Timers, Interrupts, serial port, Serial port Interfacing protocols, SPI, I2C, UART. Assembly and C Language programming for peripherals.

UNIT V DEVICE INTERFACING AND ITS PROGRAMMING

9

Sensor interfacing, Relay, Opto-isolator and Stepper Motor Interfacing, Industrial servo interfacing, Raspberry Pi based programming for robots. Inverse Kinematics and Path Planning Programming using ROS



LIST OF EXPERIMENTS

1. Introduction to Robotic controller card like Arduino UNO board and write program to blink LED using Arduino instructions, C language & Assembly language
2. Interfacing drivers for Arduino Controller for Robotic application. Various sensor interfacing with Robotic Controller like Arduino UNO board
3. Interfacing Seven Segment Display/ Alphanumeric Display.
4. ADC operation of Arduino using Potentiometer and Display.
5. Interface Stepper motor with AVR Microcontroller and Write program to rotate stepper motor in clockwise and anticlockwise direction.
6. Write Arduino program to receive IR Signal from IR remote and operate Electrical device based on switch pressed.
7. Write and execute Arduino program for serial communication. Transmit temperature value through serial communication and store it in spreadsheet or text file.
8. Toggle the ON/OFF status of an LED with a Switch.

TOTAL: 45+15=60PERIODS

OUTCOMES

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

- Obtain the fundamental concepts of microcontrollers.
- Develop programming skills to implement AVR microcontrollers..
- Implement Arduino controller for robotic application with Microcontroller.
- Design AVR on-chip Peripherals.
- Choose appropriate sensors and motors for embedded applications.
- Develop and implement C- language programming for Microcontroller applications.

TEXTBOOKS

1. Muhammad Ali Mazidi, SarmadNaimi and SepehrNaimi, "The AVR Microcontroller and Embedded Systems", Using Assembly and C, Pearson Education, First Edition, 2012.
2. S. K. Saha, "Introduction to Robotics", Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2008.

REFERENCES

1. R. K. Mittal, I. J. Nagrath, "Robotics and Control", Tata McGraw-Hill Publishing Company Ltd, 2017.
2. M.Morris Mano, "Computer System Architecture", Pearson Publication, Third Edition, 2007.



E-RESOURCES

1. <https://nptel.ac.in/courses/117104072> - (Microcontroller).
2. <https://nptel.ac.in/courses/106106210> - (Programming and assembly language).

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

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



Chairman - BoS

23ECRP01

**SEMESTER VII
PROJECT WORK**

**L T P C
0 0 12 6**

OBJECTIVES

- To identify a specific problem for the current need of the society and collecting information related to the same through detailed review of literature.
- To build up skills to formulate a technical project.
- To develop the methodology to solve the identified problem.
- To teach use of new tools, algorithms and techniques required to carry out the projects.
- To train the students in preparing project reports and to face reviews and viva-voce examination.

GUIDELINE FOR REVIEW AND EVALUATION

The students in a group of 3 works on a topic approved by the head of the department under the guidance of a faculty member who is familiar in this area of interest. The student can select any topic which is relevant to the area of engineering design. The topic may be theoretical or case studies. At the end of the semester, a detailed report on the work done should be submitted which contains clear definition of the identified problem, detailed literature review related to the area of work and methodology for carrying out the work. The students will be evaluated through a viva-voce examination by a panel of examiners including one external examiner.

TOTAL: 180 PERIODS

OUTCOMES

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

- Formulate a real world problem, identify the requirement and develop the design solutions.
- Identify technical ideas, strategies and methodologies.
- Utilize the new tools, algorithms, techniques that contribute to obtain the solution of the project.
- Prepare technical report and oral presentations.
- Learn the students will have a clear idea of their area of work and a systematic way.



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

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


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SCHEME

Credit Summary





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



**FOR B.E./B.Tech. DEGREE PROGRAMMES
(MINOR DEGREE /HONOURS)**

CREDIT SUMMARY

B.E.- ELECTRONICS AND COMMUNICATION 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

