KIT – Kalaignarkarunanidhi Institute of Technology

(An Autonomous Institution)

Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai
Accredited by NAAC with 'A' GRADE & NBA (CSE, ECE, EEE, MECH)
An ISO 9001 : 2015 Certified Institution
Coimbatore – 641 402.

Curriculum & Syllabus - R2023

(For Students admitted from the Academic Year 2024-25 and onwards)

Bachelor of Engineering Degree

in

Electronics Engineering

(VLSI Design and Technology)

Vision and Mission of the Department

Vision

- To be a center of excellence in Electronics Engineering with a specialization in VLSI Design and Technology, fostering innovation, research, and industry-ready education to empower students for global leadership in the field of semiconductor and electronics technology.

Mission

- Inspire students to become leaders and entrepreneurs in the semiconductor and electronics industry by nurturing innovative thinking and management skills.
- Equip students with hands-on experience in VLSI design, semiconductor tools, and cutting-edge technologies through advanced labs, projects, and industry internships.
- Foster ethical values, technical expertise, and lifelong learning skills to prepare graduates for successful careers and leadership roles in the global electronics industry.

Program Specific Outcomes (PSOs)

- **PSO 1:** Apply fundamental knowledge of electronics and advanced VLSI design techniques to model, analyze, and implement digital and analog systems using industry-standard tools and methodologies.
- **PSO 2:** Utilize modern EDA tools, FPGA platforms, and fabrication techniques to address real-world challenges in the semiconductor and electronics industry.

Program Educational Objectives (PEO's)

- **PEO 1:** Our Graduates will develop strong technical foundations in Electronics Engineering, with a specialization in VLSI Design and Technology, enabling them to analyze, design, and optimize semiconductor circuits and systems for real-world applications.

- **PEO 2:** Our Graduates will engage in research, innovation, and lifelong learning to adapt to evolving VLSI technologies, semiconductor advancements, and industry trends, contributing to technological growth and development.

- **PEO 3:** Our Graduates will exhibit leadership, teamwork, and ethical responsibility while addressing societal and industrial challenges through sustainable and efficient VLSI solutions, fostering entrepreneurship and professional excellence.

Programme Outcomes (PO's)

Students graduating from B.E. Electronics Engineering (VLSI Design and Technology) should be able to:

- **PO1: Engineering Knowledge:** Mathematical fundamentals, and an engineering specialization to the solution of complex Computer Science and engineering problems.

- **PO2: Problem Analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

- **PO3: Design/Development of Solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

- **PO4: Conduct Investigations of Complex Problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

- **PO5: Modern Tool Usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

- **PO6: The Engineer and Society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

- **PO7: Environment and Sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

- **PO8: Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

- **PO9: Individual and Team Work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

- **PO10: Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

- **PO11: Project Management and Finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

- **PO12: Life-Long Learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Curriculum

Approved by BoS Chairman

Curriculum Structure

Sections	Category	Type	Credits
A	Humanities and Social Sciences including Management Courses	HS	10
	Basic Sciences	BS	24
	Basic Engineering Sciences	ES	14
B	Professional Core	PC	85
C	Professional Elective	PE	12
	Open Elective	OE	06
D	Project Work	PW	12
E	Career Enhancement Course	CEC	02
F	Mandatory Course	MC	00
Total Credits		**165**	

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Curriculum and Scheme of Assessment

Semester I										
Course Code	Course Name	CT	Instructional Hours					Assessment		
			CP	L	T	P	C	CIA	ESE	Total
B23IPT101	Induction Programme	HS	-	-	-	-	0	-	-	-
Theory / Theory with Practical										
B23ENT101	Professional English	HS	3	2	0	0	2	40	60	100
B23MAT101	Matrices and Differential Calculus	BS	4	3	1	0	4	40	60	100
B23MET101	Engineering Graphics	ES	5	3	2	0	4	40	60	100
B23HST101	Heritage of Tamils / தமிழர் மரபு	HS	1	1	0	0	1	40	60	100
B23CHI101	Engineering Chemistry	BS	5	3	0	2	4	50	50	100
B23CSI101	C Programming	ES	5	3	0	2	4	50	50	100
Total credits to be Earned							**19**			

Semester II										
Course Code	Course Name	CT	Instructional Hours					Assessment		
			CP	L	T	P	C	CIA	ESE	Total
Theory / Theory with Practical										
B23MAT201	Integral Calculus and Complex Analysis	BS	4	3	1	0	4	40	60	100
B23HST201	Tamils and Technology / தமிழரும் தொழில்நுட்பமும்	HS	1	1	0	0	1	40	60	100
B23ECI201	Circuit Analysis	PC	5	3	0	2	4	50	50	100
B23VTI201	Quantum Electronics	PC	5	3	0	2	4	50	50	100
B23CET201	Soft Skills	CEC	2	0	0	2	0	100	-	100
B23ENI101	Professional Communication	HS	4	3	0	2	4	50	50	100
B23PHI101	Engineering Physics	BS	5	3	0	2	4	50	50	100
Practical										
B23MEP101	Engineering Practices Laboratory	ES	4	0	0	4	2	60	40	100
B23CEP202	Application Design and Development	CEC	2	2	0	0	0	100	-	100
Total credits to be Earned							**23**			

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Semester III										
Course Code	Course Name	CT	Instructional Hours					Assessment		
			CP	L	T	P	C	CIA	ESE	Total
Theory / Theory with Practical										
B23MAT305	Graph Theory	BS	4	3	1	0	4	40	60	100
B23CSI102	Problem Solving and Python Programming	ES	5	2	0	4	4	50	50	100
B23ECT301	Analog Electronic Circuits	PC	3	3	0	0	3	40	60	100
B23ECT302	Digital Electronics	PC	3	3	0	0	3	40	60	100
B23VTT301	Signal Processing	PC	3	3	0	0	3	40	60	100
B23VTT302	Verilog HDL Programming	PC	3	3	0	0	3	40	60	100
Practical										
B23VTP301	Analog and Digital Circuits Laboratory	PC	4	0	0	4	2	60	40	100
B23VTP302	HDL Programming Laboratory	PC	4	0	0	4	2	60	40	100
Total credits to be Earned							**24**			

Semester IV										
Course Code	Course Name	CT	Instructional Hours					Assessment		
			CP	L	T	P	C	CIA	ESE	Total
Theory / Theory with Practical										
B23MAT402	Probability and Random Processes	BS	4	3	1	0	4	40	60	100
B23ECI401	Communication Systems	PC	5	3	0	2	4	50	50	100
B23VTT401	Micro Fabrication	PC	3	3	0	0	3	40	60	100
B23ECT403	Linear Integrated Circuits	PC	3	3	0	0	3	40	60	100
B23CST503	Quantum Computing	PC	3	3	0	0	3	40	60	100
B23ECT405	Communication Networks	PC	3	3	0	0	3	40	60	100
Practical										
B23ECP401	Linear Integrated Circuits Laboratory	PC	4	0	0	4	2	60	40	100
B23CSP502	Quantum Computing Laboratory	PC	4	0	0	4	2	60	40	100
B23CEP401	Professional Certificate Course	CEC	2	0	0	0	1	100	-	100
Total credits to be Earned							**25**			

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Semester V

Course Code	Course Name	CT	Instructional Hours					Assessment		
			CP	L	T	P	C	CIA	ESE	Total
Theory / Theory with Practical										
B23ECT501	VLSI Design	PC	3	3	0	0	3	40	60	100
B23ADT402	Java Programming	PC	3	3	0	0	3	40	60	100
B23ECT503	Introduction to IoT and Protocols	PC	4	2	0	2	3	40	60	100
B23ECT502	Digital Communication	PC	3	3	1	0	4	40	60	100
*********	Professional Elective I	PE	3	3	0	0	3	40	60	100
*********	Open Elective I	OE	3	3	0	0	3	40	60	100
B23MCT50*	Mandatory Course I	MC	2	2	0	0	0	100	-	100
B23MCT505	Holistic Insight into UN SDGs	MC	2	2	0	0	0	100	-	100
B23CEP501	Summer Internship	CEC	0	-	-	-	1	-	-	-
Practical										
B23ECP501	VLSI Design Laboratory	PC	4	0	0	4	2	60	40	100
B23ECP502	Digital Communication Laboratory	PC	4	0	0	4	2	60	40	100
Total credits to be Earned							**24**			

Semester VI

Course Code	Course Name	CT	Instructional Hours					Assessment		
			CP	L	T	P	C	CIA	ESE	Total
Theory / Theory with Practical										
B23VTT601	Designing with ASICs	PC	3	3	0	0	3	40	60	100
B23VTT602	Solid State Device Modelling	PC	3	3	0	0	3	40	60	100
B23VTT603	Low Power VLSI Design	PC	3	3	1	0	4	40	60	100
*********	Professional Elective II	PE	3	3	0	0	3	40	60	100
*********	Open Elective II	OE	3	3	0	0	3	40	60	100
B23MCT60*	Mandatory Course II	MC	2	2	0	0	0	100	-	100
B23MCT605	Cyber Safety Concepts	MC	2	2	0	0	0	100	-	100
Practical										
B23VTP601	ASIC CAD Laboratory	PC	4	0	0	4	2	60	40	100
B23VTP602	Solid State Device Modelling Laboratory	PC	4	0	0	4	2	60	40	100
B23VTP603	Innovation Design Practices	PW	4	0	0	4	2	40	60	100
Total credits to be Earned							**22**			

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Semester VII											
Course Code	Course Name	CT	Instructional Hours					Assessment		
			CP	L	T	P	C	CIA	ESE	Total
Theory / Theory with Practical											
B23VTT701	AI and ML in CAD Design	PC	3	3	0	0	3	40	60	100
B23ECI702	Embedded Systems	PC	5	3	0	2	4	50	50	100
B23VTT703	FPGA Based System Design	PC	3	3	0	0	3	40	60	100
B23HST701	Universal Human Value	HS	2	2	0	0	2	40	60	100
*********	Professional Elective III	PE	3	3	0	0	3	40	60	100
*********	Professional Elective IV	PE	3	3	0	0	3	40	60	100
Practical											
B23VTP701	Project Work Phase I	PW	4	0	0	4	2	40	60	100
Total credits to be Earned							22			

Semester VIII										
Course Code	Course Name	CT	Instructional Hours					Assessment		
			CP	L	T	P	C	CIA	ESE	Total
Practical										
B23VTP801	Project Work Phase II	PW	16	0	0	16	8	40	60	100
Total credits to be Earned							8			

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Humanities And Social Sciences (HS)										
Course Code	Course Name	CT	Instructional Hours					Assessment		
			CP	L	T	P	C	CIA	ESE	Total
Theory / Theory with Practical										
B23IPT101	Induction Programme	HS	-	-	-	-	0	-	-	-
B23ENT101	Professional English	HS	3	3	0	0	2	40	60	100
B23HST101	Heritage of Tamils / தமிழர் மரபு	HS	1	1	0	0	1	40	60	100
B23HST201	Tamils and Technology / தமிழரும் தொழில்நுட்பமும்	HS	1	1	0	0	1	40	60	100
B23ENI101	Professional Communication	HS	4	2	0	2	4	50	50	100
B23HST701	Universal Human Value	HS	2	2	0	0	2	40	60	100
Total credits to be Earned							10			

Basic Sciences (BS)										
Course Code	Course Name	CT	Instructional Hours					Assessment		
			CP	L	T	P	C	CIA	ESE	Total
Theory / Theory with Practical										
B23MAT101	Matrices and Differential Calculus	BS	4	3	1	0	4	40	60	100
B23PHI101	Engineering Physics	BS	5	3	0	2	4	50	50	100
B23MAT201	Integral Calculus and Complex Analysis	BS	4	3	1	0	4	40	60	100
B23CHI101	Engineering Chemistry	BS	5	3	0	2	4	50	50	100
B23MAT305	Graph Theory	BS	4	3	1	0	4	40	60	100
B23MAT402	Probability and Random Processes	BS	4	3	1	0	4	40	60	100
Total credits to be Earned							24			

Basic Engineering Sciences (ES)										
Course Code	Course Name	CT	Instructional Hours					Assessment		
			CP	L	T	P	C	CIA	ESE	Total
Theory / Theory with Practical										
B23CSI101	C Programming	ES	5	3	0	2	4	50	50	100
B23MET101	Engineering Graphics	ES	5	3	2	0	4	40	60	100
B23CSI102	Problem Solving and Python Programming	ES	5	2	0	4	4	50	50	100
B23MEP101	Engineering Practices Laboratory	ES	4	0	0	4	2	60	40	100
Total credits to be Earned							14			

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Program Core										
Course Code	Course Name	CT	Instructional Hours					Assessment		
			CP	L	T	P	C	CIA	ESE	Total
Theory / Theory with Practical										
B23ECI201	Circuit Analysis	PC	5	3	0	2	4	50	50	100
B23VTI201	Quantum Electronics	PC	5	3	0	2	4	50	50	100
B23ECT301	Analog Electronic Circuits	PC	3	3	0	0	3	40	60	100
B23ECT302	Digital Electronics	PC	3	3	0	0	3	40	60	100
B23VTT301	Signal Processing	PC	3	3	0	0	3	40	60	100
B23VTT302	Verilog HDL Programming	PC	3	3	0	0	3	40	60	100
B23VTP301	Analog and Digital Circuits Laboratory	PC	4	0	0	4	2	60	40	100
B23VTP302	HDL Programming Laboratory	PC	4	0	0	4	2	60	40	100
B23ECI401	Communication Systems	PC	5	3	0	2	4	50	50	100
B23VTT401	Micro Fabrication	PC	3	3	0	0	3	40	60	100
B23ECT403	Linear Integrated Circuits	PC	3	3	0	0	3	40	60	100
B23CST503	Quantum Computing	PC	3	3	0	0	3	40	60	100
B23ECT405	Communication Networks	PC	3	3	0	0	3	40	60	100
B23ECP401	Linear Integrated Circuits Laboratory	PC	4	0	0	4	2	60	40	100
B23CSP502	Quantum Computing Laboratory	PC	4	0	0	4	2	60	40	100
B23ECT501	VLSI Design	PC	3	3	0	0	3	40	60	100
B23ADT402	Java Programming	PC	3	3	0	0	3	40	60	100
B23ECT503	Introduction to IoT and Protocols	PC	4	2	0	2	3	40	60	100
B23ECT502	Digital Communication	PC	3	3	1	0	4	40	60	100
B23ECP501	VLSI Design Laboratory	PC	4	0	0	4	2	60	40	100
B23ECP502	Digital Communication Laboratory	PC	4	0	0	4	2	60	40	100
B23VTT601	Designing with ASICs	PC	3	3	0	0	3	40	60	100
B23VTT602	Solid State Device Modelling	PC	3	3	0	0	3	40	60	100
B23VTT603	Low Power VLSI Design	PC	3	3	1	0	4	40	60	100
B23VTP601	ASIC CAD Laboratory	PC	4	0	0	4	2	60	40	100
B23VTP602	Solid State Device Modelling Laboratory	PC	4	0	0	4	2	60	40	100
B23VTT701	AI and ML in CAD Design	PC	3	3	0	0	3	40	60	100
B23ECI702	Embedded Systems	PC	5	3	0	2	4	50	50	100
B23VTT703	FPGA Based System Design	PC	3	3	0	0	3	40	60	100
Total credits to be Earned							87			

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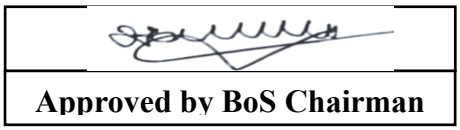
Professional Elective Courses (PE): Verticals (Each 3 Credits)

Vertical I	Vertical II	Vertical III	Vertical IV	Vertical V	Vertical VI
Semiconductor Chip Design and Testing	**Signal and Image Processing**	**Embedded Systems and Internet of Things**	**Biomedical Technologies**	**Communication Technologies**	**Computing Technologies**
SoC Design	VLSI Signal Processing	Microcontroller Based System Design	Biomedical Instrumentation	Optical Communication and Networks	Foundations of Operating Systems
Mixed Signal IC Design	Advanced Digital Signal Processing	MEMS Design	Biomedical Assist Devices	Satellite Communication	Information Retrieval
Analog IC Design	Digital Speech Processing	IOT Processor	Bio Signal Processing	5G Wireless Communication Networks	Foundations of Artificial Intelligence and Machine Learning
Testing of VLSI Circuits	Principles of Digital Image Processing	Industrial IoT and Industry 4.0	Brain Computer Interface and Its Applications	Network Security	Foundations of Cloud Computing
Semiconductor Memory Design	Multimedia Compression and Networks	IOT Security	Human Assist Devices	Wireless Broadband Networks	Computer Vision
CMOS Digital VLSI Design	Green Electronics	Quantum Circuit Design	Body Area Network	Cognitive Radio Networks	Embedded Programming Using C
Advanced MOSFET Modeling	Digital Control Engineering	IOT for Smart Agriculture	Medical Imaging Systems and Radia Therapy	Cryptography and Network Security	Augmented Reality and Virtual Reality



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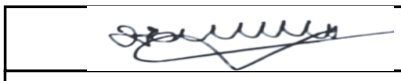
Open Electives (OE)										
Course Code	Course Name	CT	Instructional Hours					Assessment		
			CP	L	T	P	C	CIA	ESE	Total
Open Elective – I (Semester V)										
B23AEO501	Principles of Flight	OE	3	3	0	0	3	40	60	100
B23AGO501	Farm Automation	OE	3	3	0	0	3	40	60	100
B23ADO501	Gen AI With Open Source Framework	OE	3	3	0	0	3	40	60	100
B23AMO501	Principles of Machine Learning	OE	3	3	0	0	3	40	60	100
B23BMO501	Principles of Biosensors	OE	3	3	0	0	3	40	60	100
B23BTO501	Biofertilizer Production and Mushroom Cultivation	OE	3	3	0	0	3	40	60	100
B23CBO501	Front End Technologies	OE	3	3	0	0	3	40	60	100
B23CSO501	Foundations of DBMS	OE	3	3	0	0	3	40	60	100
B23ECO501	Communication Engineering	OE	3	3	0	0	3	40	60	100
B23EEO501	Electric Vehicle Technology	OE	3	3	0	0	3	40	60	100
B23MEO501	Robotics	OE	3	3	0	0	3	40	60	100
Open Elective – II (Semester VI)										
B23AEO601	Unmanned Aircraft Systems Operation and MRO	OE	3	3	0	0	3	40	60	100
B23AGO601	Environmental Management in Agriculture	OE	3	3	0	0	3	40	60	100
B23ADO601	Human Computer Communication	OE	3	3	0	0	3	40	60	100
B23AMO601	AI for Smart Systems	OE	3	3	0	0	3	40	60	100
BM23BMO601	Medical Instrumentation	OE	3	3	0	0	3	40	60	100
B23BTO601	Bioinformatics	OE	3	3	0	0	3	40	60	100
B23CBO601	Data Science for Business Analytics	OE	3	3	0	0	3	40	60	100
B23CSO601	Foundations of Web Development	OE	3	3	0	0	3	40	60	100
B23ECO601	Wireless Technology	OE	3	3	0	0	3	40	60	100
B23EEO601	Green Electronics and Sustainable Technologies	OE	3	3	0	0	3	40	60	100
B23MEO601	3D Printing and Tooling	OE	3	3	0	0	3	40	60	100



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PROJECT WORK (PW)										
Course Code	**Course Name**	**CT**	**Instructional Hours**					**Assessment**		
			CP	**L**	**T**	**P**	**C**	**CIA**	**ESE**	**Total**
Open Elective – I (Semester V)										
B23VTP603	Innovation Design Practices	PW	4	0	0	4	2	40	60	100
B23VTP701	Project Work Phase I	PW	4	0	0	4	2	40	60	100
B23VTP801	Project Work Phase II	PW	16	0	0	16	8	40	60	100
Total credits to be earned							**12**			

CAREER ENHANCEMENT COURSE (CEC)										
Course Code	**Course Name**	**CT**	**Instructional Hours**					**Assessment**		
			CP	**L**	**T**	**P**	**C**	**CIA**	**ESE**	**Total**
Theory / Theory with Practical										
B23CET201	Soft Skills	CEC	2	2	0	0	NC	100	-	100
B23CEP202	Application Design and Development	CEC	2	2	0	0	NC	100	-	100
B23CEP401	Professional Certificate Course (1 Workshop + 1 CoE Certificate Course + 1 NPTEL / Coursera Beginner Level Course)	CEC	2	0	0	2	1	100	-	100
B23CEP501	Summer Internship	CEC	0	-	-	-	1	-	-	-
Total credits to be Earned							**2**			

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Mandatory Course (MC)										
Course Code	Course Name	CT	Instructional Hours					Assessment		
			CP	L	T	P	C	CIA	ESE	Total
Mandatory Course - I										
B23MCT501	Environmental Sustainability	MC	2	0	0	0	0	100	-	100
B23MCT502	Elements of Literature	MC	2	0	0	0	0	100	-	100
B23MCT503	Foundations of Yoga	MC	2	0	0	0	0	100	-	100
B23MCT504	Export Import Management	MC	2	0	0	0	0	100	-	100
B23MCT505	Holistic Insight into UN SDGs	MC	2	0	0	0	0	100	-	100
Mandatory Course - II										
B23MCT601	Education Psychology	MC	2	0	0	0	0	100	-	100
B23MCT602	Life Style Education	MC	2	0	0	0	0	100	-	100
B23MCT603	Startup and Venture Funding	MC	2	0	0	0	0	100	-	100
B23MCT604	Indian Knowledge System	MC	2	0	0	0	0	100	-	100
B23MCT605	Cyber Safety Concepts	MC	2	2	0	0	0	100	-	100
Total credits to be Earned							**0**			

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Syllabus

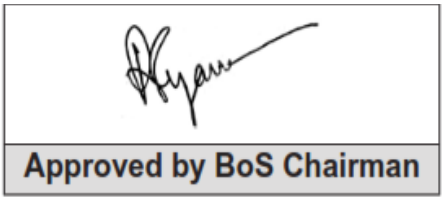
Semester – I

B.E.	B23ENT101 – PROFESSIONAL ENGLISH	L	T	P	C
		2	0	0	2

Course Objectives	
1.	To develop the listening and reading skills of first year engineering and technology students.
2.	To help learners' develop vocabulary through reading skills.
3.	To enhance learners' grammatical knowledge.
4.	To enhance the learners' ability of writing different complex texts.
5.	To develop the competency of learners through LSRW skills.

UNIT – I		6
Listening	Listening to voicemail & messages; Listening and contextualizing.	
Speaking	Replying to polite requests and offers, understanding basic instructions.	
Reading	Short comprehension passages, practice in skimming & scanning.	
Writing	Writing Instructions.	
Language development	Parts of Speech, Wh - Questions, yes or no questions, Question tags.	
Vocabulary development	Prefixes - suffixes.	

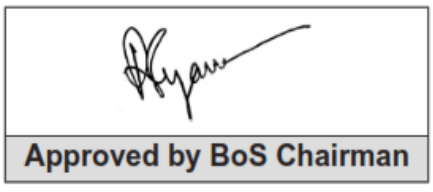
UNIT – II		6
Listening	Listening commentaries and announcements.	
Speaking	Role Play exercises based on workplace contexts.	
Reading	Comprehension questions including dialogues and conversations.	
Writing	Writing different types of Paragraph.	
Language development	Regular & Irregular Verbs, Tenses.	
Vocabulary development	Understanding contextual meaning, Synonyms.	



UNIT – III	6
Listening	Listening to a product launch-sensitizing leaners to the nuances of persuasive communication.
Speaking	Debate - discussion on current issues.
Reading	Short texts and longer passages - note making.
Writing	Understanding text structure, use of reference words and discourse markers, jumbled sentences.
Language development	Idioms and Phrases, Degrees of comparison.
Vocabulary development	One word substitutes.

UNIT – IV	6
Listening	Listening to short academic videos.
Speaking	Making short presentation through short films.
Reading	Intensive and Extensive reading-reading different types of magazines.
Writing	Letter writing- formal and informal.
Language development	Direct / indirect questions.
Vocabulary development	Phrasal verbs

UNIT – V	6
Listening	Listening to talks/lectures by specialists on specific topics.
Speaking	Discussion on general and current topics.
Reading	Longer texts - cloze reading.
Writing	Writing short essays, developing outline, identifying main and subordinate ideas, Dialogue writing.
Language development	Spelling and Punctuations, Modal verbs.
Vocabulary development	Collocations
	Total Instructional hours : 30



Course Outcomes : Students will be able to	
CO1	Develop listening and reading skills for effective communication
CO2	Develop vocabulary skills
CO3	Build grammatical understanding
CO4	Explain opinions efficiently in writing formal and informal contexts
CO5	Develop knowledge through LSRW skills

Text Books	
1.	Board of Editors Using English, “A Course book for Undergraduate Engineers and Technologists”, Orient Black Swan Limited, Hyderabad : 2015.
2.	Richards, C. Jack,“ Interchange Students Book - 2”, New Delhi, CUP, 2015.

Reference Books	
1.	Bailey, Stephen, “A practical guide for students”, New York Rutledge, 2011.
2.	Raman, Meenakshi and Sharma, Sangeetha “Technical Communication Principles and Practice” Oxford University Press: New Delhi, 2014.
3.	Dutt P. Kiranmai and Rajeevan Geeta, “Basic Communication Skills”, Foundation Books, 2013.

Approved by BoS Chairman

B.E.	B23MAT101 - MATRICES AND DIFFERENTIAL CALCULUS (Common to all Branches)	L	T	P	C
		3	1	0	4

Course Objectives	
1.	To develop the use of matrices that is needed by engineers for practical applications.
2.	To understand the concept of functions of several variables.
3.	To recognize and classify ordinary differential equations.
4.	To apply the concept of ordinary differential equations in engineering disciplines.
5.	To learn the applications of Laplace transforms in engineering.

UNIT - I	MATRICES	12

Eigen values and Eigenvectors of a real matrix – Characteristic equation – Properties of Eigen values and Eigenvectors – Cayley Hamilton theorem – Quadratic form: Nature, Reduction to canonical form by orthogonal transformation

UNIT - II	FUNCTIONS OF SEVERAL VARIABLES	12

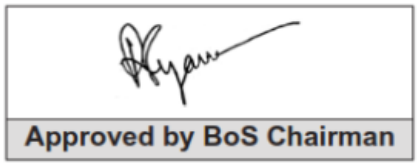
Partial differentiation –Total derivative – Jacobians – Taylor‘s series expansion for functions of two variables – Maxima and minima of functions of two variables – Lagrange‘s method of undetermined multipliers

UNIT - III	ORDINARY DIFFERENTIAL EQUATIONS	12

Higher order linear ordinary differential equations with constant coefficients - Method of variation of parameters - Simultaneous differential equations

UNIT - IV	APPLICATIONS OF ORDINARY DIFFERENTIAL EQUATIONS	12

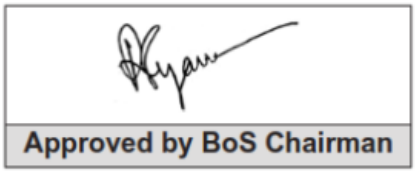
Solution of specified differential equations connected with electric circuits - Law of Natural growth and decay - Simple harmonic motion (Differential equations and associated conditions need to be given)



UNIT - V	LAPLACE TRANSFORM	12
Existence conditions - Properties (excluding proofs) - Transform of standard functions -Transforms of derivatives and integrals - Inverse Laplace transform - Applications to solution of linear second order ordinary differential equations with constant coefficients		
		Total Instructional hours : 60

Course Outcomes : Students will be able to	
CO1	Make use of Eigen values and Eigen vectors to reduce the quadratic form into canonical form and to find the powers of a square matrix.
CO2	Construct maxima and minima problems.
CO3	Solve differential equations which existing in different engineering disciplines.
CO4	Develop the applications of differential equations in various engineering field.
CO5	Apply Laplace transform and inverse transform to solve differential equations with constant coefficients.

Text Books	
1.	Grewal B.S.,"Higher Engineering Mathematics", Khanna Publishers, New Delhi, 43rd Edition, 2015.
2.	Bali N., Goyal M. and Watkins C., "Advanced Engineering Mathematics", Firewall Media - An imprint of Lakshmi Publications Pvt., Ltd., New Delhi, 7th Edition, 2015.
3.	Kreyszig Erwin, "Advanced Engineering Mathematics ", John Wiley and Sons, 10th Edition, New Delhi, 2015.
4.	George B. Thomas, Joel Hass, Christopher Heil, Maurice D. Weir, "Thomas' Calculus", Pearson, 14th Edition, 2018.



Reference Books	
1.	Jain R.K. and Iyengar S.R.K., “Advanced Engineering Mathematics”, Narosa Publications, New Delhi, 5th Edition, 2019.
2.	Srimantha Pal and Bhunia, S.C, "Engineering Mathematics" Oxford University Press, 2015.
3.	Ramana B V., “Higher Engineering Mathematics”, Tata Mc Graw Hill Publishing Company, New Delhi, 2017.
4.	Veerarajan T., “Engineering Mathematics for Semester I and II”, Tata Mc Graw Hill Publishing Company, New Delhi, 2019.
5.	Gean Duffy., “Advanced Engineering Mathematics with MATLAB”, A CRC Press Company, Boca Raton London, New York Washington, D.C, 2nd edition 2009. (Free e-book downloaded from www.EasyEngineering.net.pdf).

Approved by BoS Chairman

B.E.	B23MET101 – ENGINEERING GRAPHICS (Common to All)	L	T	P	C
		2	2	0	4

Course Objectives	
1.	Understand the conventions and method of Engineering drawing.
2.	Construct and interpret the basic Engineering drawings.
3.	Improve their visualization skills so that they can apply these skills in new product development.
4.	Enhance their technical communication skill in the form of communicative drawings.
5.	Comprehend the theory of projection.

CONCEPTS AND CONVENTIONS (NOT FOR EXAMINATION)	2
Importance of graphics in Engineering applications – Use of drafting instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets – Lettering and dimensioning	

UNIT - I	PLANE CURVES AND FREE HANDSKETCHING	14
Basic Geometrical constructions, Curves used in Engineering practices-Conics – Construction of ellipse, parabola and hyperbola by eccentricity method – Construction of cycloid – construction of involutes of square and circle – Drawing of tangents and normal to the above curves. Visualization concepts and Free Hand sketching: Visualization principles – Representation of Three-Dimensional objects – Layout of views- Free hand sketching of multiple views from pictorial views of objects		

UNIT - II	PROJECTION OF POINTS, LINES AND PLANE SURFACE	14
Orthographic projection- principles-Principal planes-First angle projection-Projection of points. Projection of straight lines (only First angle projections) inclined to both the principal planes- Determination of true lengths and true inclinations by rotating line method and trapezoidal method and traces Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method		

UNIT - III	PROJECTION OF SOLIDS	14
Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to both the principal planes by rotating object method and auxiliary plane method		

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UNIT - IV	PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES	14
Sectioning of solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other – obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids – Prisms, pyramids cylinders and cones		

UNIT - V	ISOMETRIC AND PERSPECTIVE PROJECTIONS	14
Principles of isometric projection – isometric scale –Isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions and miscellaneous problems. Perspective projection of simple solids-prisms, pyramids and cylinders by visual ray method		

COMPUTER AIDED DRAFTING	3
Introduction to drafting packages and demonstration of their use Basic Geometrical constructions using AUTOCAD	
Total Instructional hours : 75	

Course Outcomes : Students will be able to	
CO1	Construct the basic Engineering curves and freehand sketching of basic geometrical constructions and multiple views of objects.
CO2	Draw problems related to projections of points, straight lines, planes and solids.
CO3	Build the projection of simple solids.
CO4	Apply the knowledge acquired on practical applications of sectioning and development of solids.
CO5	Construct simple solids and its sections in isometric view and projections and to draw its perspective views.

Text Books	
1.	K.V.Natarajan, “A text book of Engineering Graphics”, 28th Edition, Dhana Lakshmi Publishers, Chennai, 2015.
2.	N.D. Bhatt and V.M. Panchal, “Engineering Drawing”, Charotar Publishing House, 53rd Edition, 2014.

Approved by BoS Chairman

Reference Books	
1.	K. Venugopal and V.Prabhu Raja, “Engineering Graphics”, New Age International Publishers, 2017.
2.	K.R.Gopalakrishna., “Engineering Drawing” (Vol. I & II combined) Subhas Publications, Bangalore, 2018.
3.	N.S Parthasarathy and Vela Murali, “Engineering Drawing”, Oxford University Press, 2015.

Approved by BoS Chairman

B.E.	B23HST101 - தமிழர் மரபு	L	T	P	C
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அலகு - I	மொழி மற்றும் இலக்கியம்	3

இந்திய மொழிக் குடும்பங்கள் - திராவிட மொழிகள் - தமிழ் ஒரு செம்மொழி - தமிழ் செவ்விலக்கியங்கள் - சங்க இலக்கியத்தின் சமயச் சார்பற்ற தன்மை - 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 இலக்கிய வளர்ச்சியில் பாரதியார் மற்றும் பாரதிதாசன் ஆகியோரின் பங்களிப்பு.

அலகு - II	மரபு - பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை - சிற்பக்கலை	3

நடுகல் முதல் நவீன சிற்பங்கள் வரை - ஐம்பொன் சிலைகள் - பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப் பொருட்கள், பொம்மைகள் - தேர் செய்யும் கலை - சுடுமண் சிற்பங்கள் - நாட்டுப்புறத் தெய்வங்கள் - குமரிமுனையில் திருவள்ளுவர் சிலை - இசைக் கருவிகள் - மிருதங்கம், பறை, வீணை, யாழ், நாதஸ்வரம் - தமிழர்களின் சமூக பொருளாதார வாழ்வில் கோவில்களின் பங்கு.

அலகு - III	நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுகள்	3

தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான் கூத்து, ஒயிலாட்டம், தோல்பாவைக் கூத்து, சிலம்பாட்டம், வளரி, புலியாட்டம், தமிழர்களின் விளையாட்டுகள்.

அலகு - IV	தமிழர்களின் திணைக் கோட்பாடுகள்	3

தமிழகத்தின் தாவரங்களும், விலங்குகளும் - தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புறக் கோட்பாடுகள் - தமிழர்கள் போற்றிய அறக்கோட்பாடு - சங்ககாலத்தில் தமிழகத்தில் எழுத்தறிவும், கல்வியும் - சங்ககால நகரங்களும் துறை முகங்களும் - 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 தமிழ்ப் பண்பாட்டில் தாக்கம் - சுயமரியாதை இயக்கம் - இந்திய மருத்துவத்தில், சித்த மருத்துவத்தின் பங்கு - கல்வெட்டுகள், கையெழுத்துப் படிகள் - தமிழ்ப் புத்தகங்களின் அச்சு வரலாறு.

மொத்தம் - 15 காலங்கள்

Approved by BoS Chairman

Text - Cum - Reference Books	
1.	தமிழக வரலாறு - மக்களும் பண்பாடும் - கே.கே. பிள்ளை (வெளியீடு - தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்)
2.	கணினித் தமிழ் - முனைவர் இல.சுந்தரம் (விகடன் பிரசுரம்)
3.	கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4.	பொருநை - ஆற்றங்கரை நாகரிகம் (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 river Vaigai' (Jointly Published by : Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10.	Studies in the Histroyb of India with Special Reference to Tamil Nadu (Dr. K.K. Pillay) (Published by : The Author)
11.	Porunai Civilization (Jointly Published by : Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
12.	Journey of Civilization Indus to Vaigai (R. Balakrishnan) (Published by : RMRL) - Reference Book.

Approved by BoS Chairman

B.E.	B23HST101 - HERITAGE OF TAMILS (Common to all Branches)	L	T	P	C
		1	0	0	1

UNIT - I	LANGUAGE AND LITERATURE	3

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

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

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

UNIT - III	FOLK AND MARTIAL ARTS	3

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

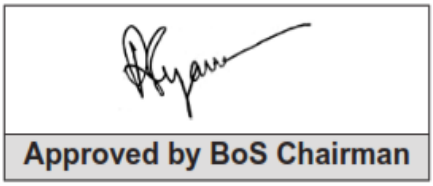
UNIT - IV	THINAI CONCEPT OF TAMILS	3

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

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

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

Total Instructional hours : 15



Text - Cum - Reference Books	
1.	தமிழக வரலாறு - மக்களும் பண்பாடும் - கே.கே. பிள்ளை (வெளியீடு - தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்)
2.	கணினித் தமிழ் - முனைவர் இல.சுந்தரம் (விகடன் பிரசுரம்)
3.	கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4.	பொருநை - ஆற்றங்கரை நாகரிகம் (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.
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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 river Vaigai' (Jointly Published by : Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10.	Studies in the Histroyb of India with Special Reference to Tamil Nadu (Dr. K.K. Pillay) (Published by : The Author)
11.	Porunai Civilization (Jointly Published by : Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
12.	Journey of Civilization Indus to Vaigai (R. Balakrishnan) (Published by : RMRL) - Reference Book.

Approved by BoS Chairman

B.E.	B23CHI101 - ENGINEERING CHEMISTRY (Common to all Branches)	L	T	P	C
		3	0	2	4

Course Objectives	
1.	To make the students conversant with boiler feed water requirements, related problems, water treatment and inculcate practical skills in the water quality analysis.
2.	To make the students conversant with basics of polymer chemistry.
3.	To make the students conversant with basic of electrochemical reactions, corrosion and induce experimental skills in the electro-analytical techniques.
4.	To make the student acquire sound knowledge of energy devices.
5.	To develop an understanding of the basic concepts of nano materials.

UNIT - I	WATER TECHNOLOGY	17

Hardness of water : Types, expression of hardness and their units, hardness problems, boiler troubles - scale and sludge, caustic embrittlement, boiler corrosion, priming and foaming

Treatment of Boiler feed water : Internal treatment (phosphate, colloidal, sodium aluminate and calgon conditioning)

External treatment : Ion exchange process, Zeolite process

Desalination of brackish water : Reverse osmosis - municipal water treatment, break point chlorination

Determination of alkalinity in water sample, Determination of total, temporary & permanent hardness of water by EDTA method. Estimation of iron content of the water sample using spectrophotometer

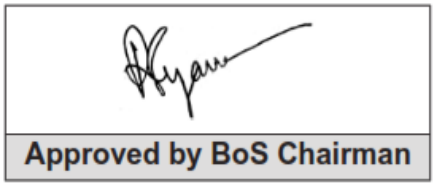
UNIT - II	POLYMERS	9

Polymers : Definition, polymerization, types - addition and condensation polymerization, free radical mechanism - tacticity – biodegradable polymer (PHBV) and conducting polymer (poly-aniline)

Plastics : Classification, preparation, properties and uses of PVC, teflon, nylon-6, 6 and epoxy resin

Rubber : Vulcanization of rubber, synthetic rubbers -n-butyl rubber and SBR

Moulding : Ingredients - compression and Injection



UNIT - III	ELECTROCHEMISTRY AND CORROSION	16

Electrochemistry : Redox reaction, electrode potential - oxidation potential, reduction potential, Nernst equation (derivation) - measurement and applications - electrochemical series and its significance

Corrosion : causes - types-chemical and electrochemical corrosion (galvanic and differential aeration), corrosion control - electrochemical protection (sacrificial anodic method and impressed current cathodic method)

Estimation of iron content of the given solution using potentiometer, Conductometric titration of strong acid vs strong base, Estimation of copper in brass

UNIT - IV	ENERGY DEVICES	9

Batteries : Types of batteries – primary (alkaline battery) and secondary battery (lead acid battery, lithium-ion-battery), Fuel Cells (H_2 - O_2 fuel cell)

Super Capacitors : Principle, construction, working and applications

Photo voltaic cell : Solar cells - principle, construction, working and applications

UNIT - V	NANOCHEMISTRY	9

Basics : Distinction between molecules, nanoparticles and bulk materials- surface area to volume ratio

Synthesis : Top-down process (ball milling) - Bottom-up process (chemical vapour deposition and sol-gel method)

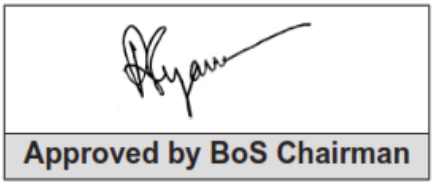
Properties of nano materials - Optical, electrical, thermal and mechanical

Applications of nano materials - Medicine, Industries, electronics and biomaterials

Total Instructional Hours (Theory) : 45

Total Instructional Hours (Lab) : 15

Course Outcomes : Students will be able to	
CO1	Determine the characterization of water and quantitative analysis of alkalinity, hardness and Iron.
CO2	Develop the basics of polymer chemistry.
CO3	Interpret the principles of electrochemical reactions, corrosion and estimation of copper in Alloy.
CO4	Apply the concepts of energy devices and its engineering applications.
CO5	Organize the basics of Nano chemistry and its applications.



Approved by BoS Chairman

Text Books	
1.	Dara, S S and Umare, S S, “A Textbook of Engineering Chemistry”, Chand S & Company Ltd., New Delhi, 2015.
2.	Jain, P C and Monika Jain, “Engineering Chemistry” Dhanpat Rai Publishing Company Pvt. Ltd., New Delhi, 2015
3.	Vogel’s Textbook of Quantitative Chemical Analysis, 8th edition, 2014.

Reference Books	
1.	Friedrich Emich, “Engineering Chemistry”, Scientific International Pvt. Ltd., New Delhi, 2014.
2.	Prasanta Rath, “Engineering Chemistry”, Cengage Learning India Pvt. Ltd., Delhi, 2015.
3.	Shikha Agarwal, “Engineering Chemistry - Fundamentals and Applications”, Cambridge University Press, Delhi, 2015.
4.	Charles P. Poole and Frank J. Owens, "Introduction to nanotechnology", John Wiley Sons, New Jersey, 2003.

Equipment Needed for 30 Students

1. Conductivity Meter - 10
2. Potentiometer - 10
3. Spectrophotometer - 02
4. Electronic Balance - 01

Approved by BoS Chairman

B.E.	B23CSI101 - C PROGRAMMING	L	T	P	C
		3	0	2	4

Course Objectives	
1.	To know the basics of problem-solving techniques.
2.	To provide exposure to problem-solving through programming.
3.	To develop C programming language with conditional statements and loops.
4.	To develop modular applications in C using functions pointers and structures
5.	To do input/output and file handling in C

UNIT - I	INTRODUCTION TO PROBLEM SOLVING & COMPUTER	8

Problem Solving : Problem Solving Techniques - Logical Thinking – Step for Solving the Problems – Compare Problem Solving and Logical Thinking – 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).

UNIT - II	BASICS OF C PROGRAMMING	10

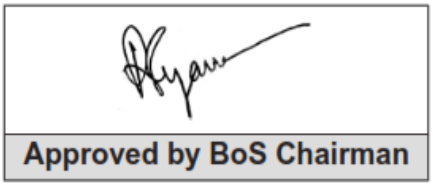
Introduction to programming paradigms - Structure of C program - Phases of developing a running computer program in C – Applications of C Language - C programming : Data Types – Storage Class - Constants – Enumeration Constants - Keywords – Operators : Operators – Types of Operators - Expressions - Precedence and Associativity – Input / Output statements – Decision making statements - Looping statements with example of Pattern – Preprocessor directives

UNIT - III	ARRAYS AND POINTERS	9

Introduction to Arrays : Declaration, Initialization – One dimensional array – Two dimensional arrays with example of Matrices Operations – Pointers: Pointer Declaration – Initialization - Pointer operators – Pointer Arithmetic – Dynamic Memory Allocation – Selection sort, Insertion sort, Bubble sort - Searching

UNIT - IV	FUNCTION AND STRINGS	9

Function : definition of function, Declaration of function – Function Call - Prototype Declaration - Pass by value, pass by reference – Recursion - Linear recursion, Binary Search using recursive functions - C standard functions and libraries - String operations: length, compare, concatenate, copy - String Arrays

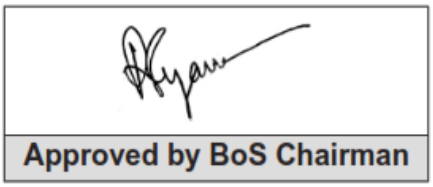


UNIT - V	STRUCTURES AND FILE HANDLING	10
Introduction : need for structure data type, structure definition, Structure declaration, Structure within a structure – Array Structure - Union – File Handling: File Operations – File Types: Sequential and Random access – Case Study: AI Processing System using C.		
		Total Instructional Hours : 45

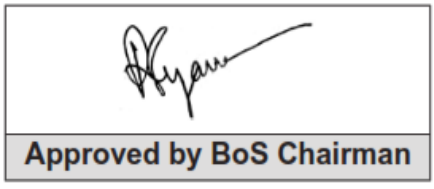
Course Outcomes : Students will be able to	
CO1	Demonstrate knowledge on C programming constructs
CO2	Construct C programs using decision making and control statements.
CO3	Experiment with programs in C using an array.
CO4	Build programs in C using strings, pointers, functions.
CO5	Model the applications in C using Structures, Union and File Operations.

Text Books	
1.	Reema Thareja, “Programming in C”, Oxford University Press, Second Edition, 2016.
2.	Kernighan, B.W and Ritchie, D.M, “The C Programming language”, Second Edition, Pearson Education, 2015.

Reference Books	
1.	Paul Deitel and Harvey Deitel, “C How to Program with an Introduction to C++”, Eighth edition, Pearson Education,2018.
2.	Yashwant Kanetkar, Let us C, 17th Edition, BPB Publications, 2020.
3.	Byron S. Gottfried, “Schaum’s Outline of Theory and Problems of Programming with C”, McGraw-Hill Education, 1996.
4.	Pradip Dey, Manas Ghosh, “Computer Fundamentals and Programming in C”, Second Edition, Oxford University Press, 2013.
5.	Anita Goel and Ajay Mittal, “Computer Fundamentals and Programming in C”, 1st Edition, Pearson Education, 2013.



Description of the Experiments	
Experiment with I/O statements, operators, expressions	
1.	Develop a C programs for Decision Making Construct. a) if-else b) switch-case c) goto, break - continue
2.	Develop a C programs for Loop Control statements. a) for b) Nested for c) while and do-while
3.	Develop a C programs for Array a) One Dimensional – Sorting and Searching b) Two Dimensional – Matrix Operations c) Traversal
4.	Develop a C program to perform the pointers.
5.	a) Linear Search b) Binary Search c) Pointer Operation
6.	Build a C programs for the recursive function
7.	Implement a C programs for string operations and String operations using build in methods
8.	Develop a C program to experiment with Pass by value and Pass by Reference
9.	Develop a c program for structure and union a) Payroll using structure and union. b) Student records using structure and union
10.	Develop a C program to perform file operations
	Total Instructional hours (Lab) : 30



Semester – II

B.E.	B23MAT201 - INTEGRAL CALCULUS AND COMPLEX ANALYSIS	L	T	P	C
		3	1	0	4

Course Objectives	
1.	To recognize various techniques of integration.
2.	To apply integration techniques in evaluating area and volume of solids.
3.	To develop the use of Vector calculus in two and three dimensional spaces.
4.	To demonstrate understanding of the basic concepts of complex differentiation.
5.	To understand Cauchy theorem and Cauchy integral formulae and apply these to evaluate complex contour integrals.

UNIT - I	INTEGRAL CALCULUS	12

Riemann sum – Definite and Indefinite integrals - Substitution rule (Exponential, logarithmic, Trigonometric functions) – Integration by parts – Integration of Rational functions by Partial fraction

UNIT - II	MULTIPLE INTEGRALS	12

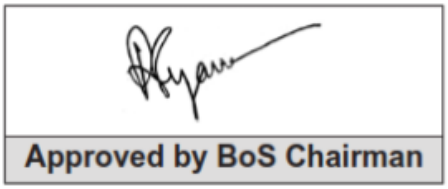
Double integrals : Double integrals in Cartesian coordinates - Double integrals in Polar coordinates – Area enclosed by plane curves – Triple integrals: Evaluation of triple integrals - Volume as triple integral (Simple problems)

UNIT - III	VECTOR CALCULUS	12

Gradient and directional derivative - Divergence and curl - Solenoidal and Irrotational vector fields - Green's theorem in a plane, Gauss divergence theorem and Stoke's theorem (excluding proofs) – Verification of theorem and applications (for cubes and rectangular parallellopipeds)

UNIT - IV	COMPLEX DIFFERENTIATION	12

Analytic functions - Cauchy - Riemann equations (excluding proof) – Properties of analytic function – Harmonic conjugate - Construction of analytic function by Milne Thomson method – Bilinear transformation

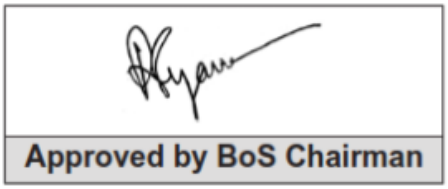


UNIT - V	COMPLEX INTEGRATION	12
Cauchy‘s integral theorem – Cauchy‘s integral formula – residues - Cauchy‘s Residue theorem – Evaluation of real integrals – Stereographic projection – Use of circular contour and semicircular contour (excluding poles on real axis)		
		Total Instructional hours : 60

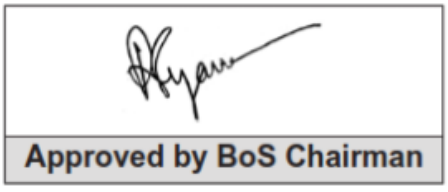
Course Outcomes : Students will be able to	
CO1	Develop Fundamental Theorem of Calculus, techniques of Integration such as substitution, partial fractions and integration by parts.
CO2	Make use of integration to compute area and volume.
CO3	Apply the line, surface and volume integrals for verification of Green‘s, Gauss and Stokes theorems.
CO4	Develop an understanding of the standard techniques of complex variable theory in particular analytic function
CO5	Identify contour integrations with the help of residue theorem.

Text Books	
1.	Grewal B.S.,”Higher Engineering Mathematics”, Khanna Publishers, New Delhi, 43rd Edition, 2014.
2.	Kreyszig Erwin, "Advanced Engineering Mathematics ", John Wiley and Sons, 10th Edition, New Delhi, 2015.
3.	George B. Thomas , Joel Hass , Christopher Heil , Maurice D. Weir, “Thomas' Calculus”, Pearson, 14th Edition, 2018.

Reference Books	
1.	Bali N., Goyal M. and Watkins C., “Advanced Engineering Mathematics”, Firewall Media - An imprint of Lakshmi Publications Pvt., Ltd., New Delhi, 7th Edition, 2015.
2.	Jain R.K. and Iyengar S.R.K., “Advanced Engineering Mathematics”, Narosa Publications, New Delhi, 5th Edition 2019.



3.	O'Neil, P.V.,"Advanced Engineering Mathematics", Cengage Learning India Pvt. Ltd, New Delhi, 7th Edition 2017.
4.	Sastry, S.S, "Engineering Mathematics", Vol. I & II, PHI Learning Pvt. Ltd, 4th Edition, New Delhi, 2014.
5.	Wylie, R.C. and Barrett, L.C., "Advanced Engineering Mathematics", (Tata McGraw Hill Education Pvt. Ltd), 6th Edition, New Delhi, 2012.
6.	Gean Duffy., "Advanced Engineering Mathematics with MATLAB", A CRC Press Company, Boca Raton London, New York Washington, D.C, 2nd edition 2009. (Free e-book downloaded from www.EasyEngineering.net.pdf)



B.E.	B23HST201- தமிழரும் தொழில்நுட்பமும்	L	T	P	C
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அலகு – I	நெசவு மற்றும் பானைத் தொழில்நுட்பம்	3

சங்க காலத்தில் நெசவுத் தொழில் - பானைத் தொழில்நுட்பம் - கருப்பு சிவப்பு பாண்டங்கள் - பாண்டங்களில் கீறல் குறியீடுகள்.

அலகு – II	வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம்	3

சங்க காலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் & சங்க காலத்தில் வீட்டுப் பொருட்களில் வடிவமைப்பு - சங்க காலத்தில் கட்டுமான பொருட்களும் நடுகல்லும் - சிலப்பதிகாரத்தில் மேடை அமைப்பு பற்றிய விவரங்கள் - மாமல்லபுரச் சிற்பங்களும், கோவில்களும் - சோழர் காலத்துப் பெருங்கோவில்கள் மற்றும் பிற வழிபாட்டுத் தலங்கள் - நாயக்கர் காலக் கோவில்கள் - மாதிரி கட்டமைப்புகள் பற்றி அறிதல், மதுரை மீனாட்சி அம்மன் ஆலயம் மற்றும் திருமலை நாயக்கர் மஹால் - செட்டிநாட்டு வீடுகள் - பிரிட்டிஷ் காலத்தில் சென்னையில் இந்தோ - சாரோசெனிக் கட்டிடக்கலை

அலகு – III	உற்பத்தித் தொழில் நுட்பம்	3

கப்பல் கட்டும் கலை - உலோகவியல் - இரும்புத் தொழிற்சாலை - இரும்பை உருவாக்குதல், எ.ஃ.கு - வரலாற்றுச் சான்றுகளாக செம்பு மற்றும் தங்க நாணயங்கள் - நாணயங்கள் அச்சடித்தல் - மணி உருவாக்கும் தொழிற்சாலைகள் - கல்மணிகள், கண்ணாடி மணிகள் - சுடுமண் மணிகள் - சங்கு மணிகள் - எலும்புத் துண்டுகள் - தொல்லியல் சான்றுகள் - சிலப்பதிகாரத்தில் மணிகளின் வகைகள்

அலகு – IV	வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில் நுட்பம்	3

அணை, ஏரி, குளங்கள், மதகு - சோழர்காலக் குமிழித் தூம்பின் முக்கியத்துவம் - கால்நடை பராமரிப்பு - கால்நடைகளுக்காக வடிவமைக்கப்பட்ட கிணறுகள் - வேளாண்மை மற்றும் வேளாண்மைச் சார்ந்த செயல்பாடுகள் - கடல்சார் அறிவு - மீன் வளம் - முத்து மற்றும் முத்துக் குளித்தல் - பெருங்கடல் குறித்த பண்டைய அறிவு - அறிவுசார் சமூகம்

அலகு – V	அறிவியல் தமிழ் மற்றும் கணித்தமிழ்	3

அறிவியல் தமிழின் வளர்ச்சி - கணித்தமிழ் வளர்ச்சி - தமிழ் நூல்களை மின் பதிப்பு செய்தல் - தமிழ் மென்பொருட்கள் உருவாக்கம் - தமிழ் இணையக் கல்விக் கழகம் - தமிழ் மின் நூலகம் - இணையத்தில் தமிழ் அகராதிகள் - சொற்குவைத் திட்டம்

மொத்தம் – 15 காலங்கள்

Approved by BoS Chairman

Text - Cum - Reference Books	
1.	தமிழக வரலாறு - மக்களும் பண்பாடும் - கே.கே. பிள்ளை (வெளியீடு - தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்)
2.	கணினித் தமிழ் - முனைவர் இல.சுந்தரம் (விகடன் பிரசுரம்)
3.	கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4.	பொருநை - ஆற்றங்கரை நாகரிகம் (தொல்லியல் துறை வெளியீடு)
5.	Social Life of Tamils (Dr. K.K. Pillay) A joint publication of TNTB & ESC and RMRL
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 river Vaigai' (Jointly Published by : Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10.	Studies in the Histroy of India with Special Reference to Tamil Nadu (Dr. K.K. Pillay) (Published by : The Author)
11.	Porunai Civilization (Jointly Published by : Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
12.	Journey of Civilization Indus to Vaigai (R. Balakrishnan) (Published by : RMRL) - Reference Book.

Approved by BoS Chairman

B.E.	B23HST201- TAMILS AND TECHNOLOGY	L	T	P	C
		1	0	0	1

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 goldCoins as source of history - Minting of Coins – Beads making-industries Stone beads - Glass beads - Terracotta beads -Shell beads/ bone beats - Archeological evidences - Gem stone types described in Silappathikaram

UNIT - IV	AGRICULTURE AND IRRIGATION TECHNOLOGY	3

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

UNIT - V	SCIENTIFIC TAMIL & TAMIL COMPUTING	3

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

Total Instructional hours : 15

Approved by BoS Chairman

Course Outcomes : Students will be able to	
CO1	Summaries the weaving and ceramic technologies during the sangam age.
CO2	Illustrate the design and construction technology in building material, temples and chettinadu houses during sangam age and British period.
CO3	Explain the technology in ship building, steel industry, minting of coins and making beads during sangam age and show the archaeological evidence.
CO4	Extend irrigation technology in construction of dam and ponds, animal husbandry, agriculture activity, maritime knowledge, fishery and pearl hunting of sangam age.
CO5	Summarize the development of scientific Tamil, digitalization of Tamil literature and online Tamil dictionaries.

Text - Cum - Reference Books	
1.	தமிழக வரலாறு - மக்களும் பண்பாடும் - கே.கே. பிள்ளை (வெளியீடு - தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்)
2.	கணினித் தமிழ் - முனைவர் இல.சுந்தரம் (விகடன் பிரசுரம்)
3.	கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4.	பொருநை - ஆற்றங்கரை நாகரிகம் (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 river Vaigai' (Jointly Published by : Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10.	Studies in the Histroyb of India with Special Reference to Tamil Nadu (Dr. K.K. Pillay) (Published by : The Author)
11.	Porunai Civilization (Jointly Published by : Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
12.	Journey of Civilization Indus to Vaigai (R. Balakrishnan) (Published by : RMRL) - Reference Book.

Approved by BoS Chairman

B.E.	B23ECI201 - CIRCUIT ANALYSIS	L	T	P	C
		3	0	2	4

Course Objectives	
1.	To introduce the basic concepts of DC and AC circuits behavior.
2.	To study the application of network theorems.
3.	To study the resonance concepts, Q factor and tuned circuits.
4.	To study the transient and steady state response of the circuits subjected to step and sinusoidal excitations.
5.	To introduce different h parameters and different networks.

UNIT - I	DC CIRCUITS ANALYSIS	9

Basic Components of electric Circuits, Charge, current, Voltage and Power, Voltage and Current Sources, Ohms Law, Kirchoff's Current Law, Kirchoff's voltage law, The single Node – Pair Circuit, series and Parallel Connected Independent Sources, Resistors in Series and Parallel, voltage and current division, Nodal analysis, Mesh analysis.

UNIT - II	NETWORK THEOREMS AND DUALITY	9

Network theorems - Superposition theorem, Thevenin's theorem, Norton's theorem, Reciprocity theorem, Millman's theorem, and Maximum power transfer theorem, application of Network theorems - Duals, Dual circuits, Star delta conversion.

UNIT - III	RESONANCE AND COUPLED CIRCUITS	9

Resonance - Series resonance - Parallel resonance - Bandwidth - Q factor - Selectivity. Self-inductance - Mutual inductance - Dot rule - Coefficient of coupling - Analysis of multiwinding coupled circuits - Series, Parallel connection of coupled inductors - Single tuned and double tuned coupled circuits.

UNIT - IV	TRANSIENT ANALYSIS	9

Natural response - Forced response - Transient response of RC, RL and RLC circuits to excitation by Step Signal, Impulse Signal and exponential sources, Complete response of RC, RL and RLC Circuits to sinusoidal excitation.

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UNIT - V	TWO PORT NETWORKS	9
Two port networks, Z parameters, Y parameters, Transmission (ABCD) parameters, Hybrid (H) Parameters, Interconnection of two port networks, Symmetrical properties of T and π networks.		
		Total Instructional hours : 45

Course Outcomes : Students will be able to	
CO1	Identify the laws of basic electrical circuits and network topology
CO2	Apply the circuit theorems in network reduction.
CO3	Explain the concept of resonance and coupled circuits.
CO4	Analyze the transient response of different circuits
CO5	Inspect the different parameters of two port networks.

Text Books	
1.	William H. Hayt, Jr. Jack E. Kemmerly and Steven M.Durbin, " Engineering Circuit Analysis", McGraw Hill Science Engineering, Ninth Edition, 2020.
2.	Joseph Edminister and MahmoodNahvi, "Electric Circuits", Schaum's Outline Series, Tata McGraw Hill Publishing Company, New Delhi, Seventh Edition 2017.

Reference Books	
1.	Charles K. Alexander, Mathew N.O.Sadiku, "Fundamentals of Electric Circuitsll", Seventh Edition, McGraw Hill, 9th Reprint 2022.
2.	James W. Nilson, Susan A.Reidel, " Electric Circuits", Pearson publication,11th Edition, 2020
3.	https://archieve.nptel.ac.in/courses/108/106/108106172
4.	Lab Manual

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List of Experiments	
Experiment with I/O statements, operators, expressions	
1.	Verifications of KVL & KCL
2.	Verifications of Thevenin & Norton theorem
3.	Verifications of Super Position Theorem
4.	Verifications of maximum power transfer & reciprocity theorems
5.	Determination of Resonance Frequency of Series & Parallel RLC Circuits
6.	Transient analysis of RL and RC circuits
	Practical hours : 30 **Total hours: 75**

List of Equipment's for a batch of 30 students		
S. No.	**Description of Equipment**	**Quantity required**
1.	CRO(30MHz)	5
2.	Function Generators(3MHz)	5
3.	Dual Regulated power Supplies(0-30V)	10
4.	Ammeters	10
5.	Voltmeters	10
6.	Resistors, Capacitors, Inductors	100
7.	Bread Boards	12

Approved by BoS Chairman

B.E.	B23VTI201 – QUANTUM ELECTRONICS	L	T	P	C
		3	0	2	4

Course Objectives	
1.	To understand the construction, theory and operation of the basic electronic devices such as PN junction diode.
2.	To impart the construction, theory and operation of the basic electronic devices such as Bipolar Junction Transistors.
3.	To acquaint the construction, theory and operation of the electronic devices such lasers and photo detectors.
4.	To analyze the construction, theory and operation of the tera-hertz device technology.

UNIT - I	FUNDAMENTALS OF QUANTUM MECHANICS AND SEMICONDUCTORS	9
Introduction to Quantum Mechanics, Photoelectric effect, Compton effect, Ritz combination principle, Rutherford model, Bohr model, p-n junction at equilibrium, non-equilibrium properties of p-n junctions. Metal-semiconductor junctions, Overview of amplification and switching		

UNIT - II	TRANSISTORS	9
Bipolar junction transistors: NPN, PNP – Operations, Early effect – Current equations – Input and Output characteristics of CE, CB & CC, Field effect transistors: JFET, MOSFET and its characteristics		

UNIT - III	LASERS	9
Introduction to Lasers, Types of lasers, General laser theory, Ruby laser, Semiconductor lasers, Basic operation principles, the components of a quantum cascade laser, Making a quantum cascade laser, Device performance, Wall plug efficiency optimisation, Power scaling, Photonic crystal distributed feedback quantum cascade lasers, Quantum cascade lasers at different wavelengths		

UNIT - IV	PHOTO DETECTORS	9
Overview, Electromagnetic radiation, Photo detector parameters, Thermal detectors, Types of photon detectors, Focal Plane Arrays, Avalanche photo detectors : Structures - Linear mode - Geiger mode operation		

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UNIT - V	QUANTUM DOT INFRARED PHOTO DETECTORS	9
Material system and variants of Type II superlattices, Physics of Type II InAs/GaSb Superlattices, Advantages of Type II superlattice, Material growth and characterization, Device fabrication, Advantages of QDIPs, Quantum dot fabrication for QDIPs, Review of actual QDIP performance		
Total Instructional hours : 45		

Course Outcomes : Students will be able to	
CO1	Recall the fundamental concepts of quantum mechanics and semiconductors
CO2	Illustrate the transistor types and its characteristics
CO3	Relate the principles of operation, development and usage of lasers
CO4	Classify the photo diodes and the electro thermal properties
CO5	Compare the different material for photo detector manufacturing and characterization

Text Books	
1.	D. J. Griffiths, "Introduction to Quantum Mechanics", 2nd Edition, Benjamin Cummings (2004)
2.	R. Shankar, "Principles of Quantum Mechanics", Springer (1994)
3.	Manijeh Razeghi, “Technology of Quantum device”, Springer, 2010.

Reference Books	
1.	Benjamin Fain, “Quantum electronics”, Pergamon Press, 1969.
2.	Lab manual

List of Experiments	
1.	Design and obtain the Characteristics of PN Junction Diode
2.	Design and obtain the Zener diode Characteristics & Regulator using Zener diode
3.	Design and obtain the Common Emitter input-output Characteristics

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4.	Design and obtain the Common Base input-output Characteristics
5.	Design and obtain the FET Characteristics
6.	Design and obtain the Clipper and Clamper
7.	Design and obtain the Full Wave Rectifier
	Total Instructional Hours (Theory) : 45 **Total Instructional Hours (Lab) : 30**

List of Equipment's for a batch of 30 students

S. No.	Description of the Equipment	Quantity required
1.	BC107, BC148, 2N2646, BFW10	25
2.	IN4007, Zener diodes	25
3.	CRO (30MHz)	10
4.	Function Generators(3MHz)	10
5.	Dual Regulated power Supplies(0-30V)	10
6.	Resistors, Capacitors, Inductors	100
7.	Bread Boards	12

Approved by BoS Chairman

B.E.	B23CET201 – SOFT SKILLS (Common to all Branches)	L	T	P	C
		2	0	0	0

Course Objectives	
1.	To identify personality using evaluation method.
2.	To encourage creative thinking by practice.
3.	To enrich interpersonal skills through integrated activities.
4.	To develop social and professional etiquette.
5.	To identify and apply employability skills for professional success.

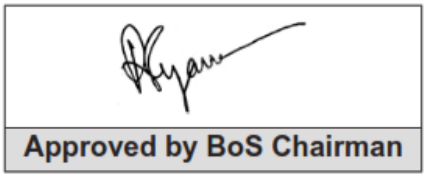
UNIT - I	SELF EVALUATION	6
Introduction to soft skills, Familiarize oneself, Self-understanding, SWOT analysis, Goal Setting		

UNIT - II	INNOVATIVE THINKING	6
Divergent thinking, Encourage curiosity, Writing a story, Poster making		

UNIT - III	INTERPERSONAL SKILLS	6
Interpersonal skills - Need & Components – Understanding Intercultural Competence - Team Work - Problem Solving Skills - Conflict Management & Resolutions in Workplace, Leadership skills, Managerial skills		

UNIT - IV	BUSINESS ETIQUETTE	6
Define Etiquette -Types and Importance of Workplace Etiquette - Basic Corporate Etiquette - Telephone Etiquette - Meeting & E-mail Etiquette - Customer Service Etiquette		

UNIT - V	CORPORATE SKILLS	6
Work Ethics - Adaptability - Analytical Reasoning - Lateral Thinking - Stress & Time Management		
		Total Instructional hours : 30



Course Outcomes : Students will be able to	
CO1	Identify different personalities.
CO2	Show creative skill in different aspects.
CO3	Utilize leadership skills with ability to work in a team.
CO4	Analyze work place etiquette.
CO5	Develop adequate soft skills required for the workplace.

Text Books	
1.	Butterfield, Jeff “Soft Skills for Everyone” Cengage Learning, New Delhi, 2015.
2.	S.Hariharanetal ”Soft Skills” MJP Publishers : Chennai, 2010.
3.	Peter, Francis “Soft Skills and Professional Communication” New Delhi : Tata McGraw Hill, 2012. Print.
4.	Meenakshi Raman, Shalini Upadhyay, ’Soft Skills’, Cengage Learning India Pvt. Ltd, Delhi, 2018.
5.	M.S. Rao, ‘Soft Skills Enhancing Employability’, I. K. International Publishing House Pvt. Ltd, New Delhi, 2010
6.	Sabina Pillai, Agna Fernandez, ‘Soft Skills and Employability Skills’, Cambridge University Press, 2018.
7.	John Peter.A, ‘Self – Development and Professional Excellence’, Cengage Learning India Pvt. Ltd, Delhi, 2019.

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B.E.	B23ENI101 – PROFESSIONAL COMMUNICATION	L	T	P	C
		3	0	2	4

Course Objectives	
1.	To enhance listening and reading ability of learners to comprehend various forms of speech or conversations.
2.	To develop learners' verbal ability through complex texts and speak effectively in real life and workplace context.
3.	To make use of grammatical knowledge to enhance fluency.
4.	To foster learners' ability to write convincing job applications and effective reports.
5.	To develop learners language proficiency through LSRW skills.

UNIT – I	9
Listening	Listening for general information - specific details - conversation - Audio / video (formal & informal); Telephone conversation
Speaking	Self-Introduction; Introducing a friend; - politeness strategies - making polite requests & polite offers
Reading	Introduction to technical texts, scientific texts
Writing	Extended definitions, Writing checklists, Recommendation
Language development	Gerunds, Infinitives
Vocabulary development	Technical vocabulary, abbreviations, British & American spelling

UNIT – II	9
Listening	Listening to podcasts, anecdotes / stories / event narration; documentaries and interviews with celebrities
Speaking	Narrating personal experiences / Talking about events and situations
Reading	Reading longer technical texts, Summarizing

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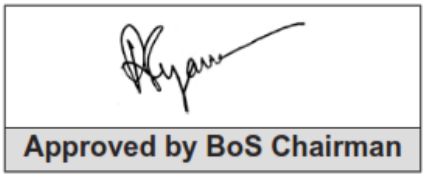
Writing	Interpreting graphical representations, Writing dialogues about formal and informal contexts
Language development	Use of conjunctions and prepositions
Vocabulary development	Numerical adjectives, Transitional device

UNIT – III	**9**
Listening	Listen to a classroom lecture; listening to advertisements about products
Speaking	Picture description - describing locations in workplace, Presenting product, describing shape, size and weight - talking about quantities - talking about precautions, discussing advantages and disadvantages - making comparisons
Reading	Cause & effect texts, practice in speed reading
Writing	Process writing, Use of sequence words, Analytical and issue based essays
Language development	Subject verb agreement, Pronoun concord / pronoun antecedent
Vocabulary development	Sequence words, Misspelled words, Content v/s Function words

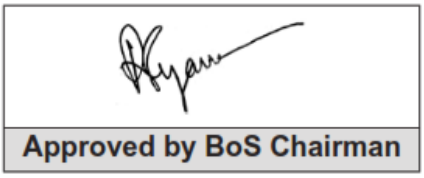
UNIT – IV	**9**
Listening	Listening to TED Talks, Educational videos and completing exercises based on them
Speaking	Short speech (Just A Minute) - Extempore and persuasive speech, discussing and making plans-talking about tasks-talking about progress
Reading	Reading for details in personal and professional emails
Writing	Drafting personal and professional emails, job application - cover letter, résumé preparation, Internship letter
Language development	Clauses, if conditionals
Vocabulary development	Finding suitable synonyms, Paraphrasing



UNIT – V		9
Listening	Listening to debates/ discussions and panel discussions, listening to interviews	
Speaking	Making predictions - talking about a given topic, giving opinions & facts, describing a process, discussing safety issues (making recommendations)	
Reading	Reading and understanding technical articles	
Writing	Writing reports, Minutes of meeting, Writing feasibility, survey and industrial reports	
Language development	Reported speech, Active and Passive voice, Impersonal passive, Idioms	
Vocabulary development	Verbal analogies, Purpose statements	
Total Theory Instructional hours : 45 **Total Lab Instructional hours : 30**		

Course Outcomes : Students will be able to	
CO1	Develop listening skills to respond appropriately in general and academic purposes.
CO2	Develop strategies and skills to enhance their ability to read and comprehend.
CO3	Apply vocabulary skills to improve their language skills.
CO4	Build the writing skills with specific reference to technical writing.
CO5	Demonstrate language proficiency through LSRW skills.

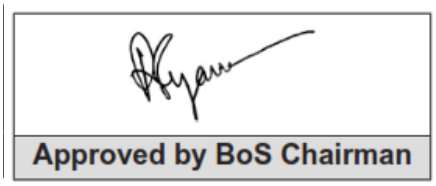
Text Books	
1.	Board of Editors. Fluency in English A Course book for Engineering and Technology. Orient Blackswan, Hyderabad : 2016
2.	Sudharshana.N.P and Saveetha. C. English for Technical Communication. Cambridge University Press: New Delhi, 2016.



Reference Books	
1.	Raman, Meenakshi and Sharma, Sangeetha “Technical Communication Principles and Practice” Oxford University Press: New Delhi, 2014.
2.	Kumar, Suresh. E. “Engineering English” Orient Blackswan: Hyderabad, 2015.
3.	Booth-L. Diana, Project Work, Oxford University Press, Oxford: 2014.
4.	Davis, Jason and Rhonda LIss. Effective Academic Writing (Level 3) Oxford University Press: Oxford, 2006.
5.	Communicative English for Engineers and Professionals- Nitin Bhatnagar & Mamta Bhatnagar.
6.	Skills for Success. Listening and Speaking. Level 4- Margret Brooks.
7.	Grammar F. Margot and Colin S. Ward Reading and Writing (Level 3) Oxford University Press : Oxford, 2011.

Exercises for Batch of 30 Students

1. Listening Comprehension
2. Self- introduction
3. Short presentation
4. Group Discussion



B.E.	B23PHI101 - ENGINEERING PHYSICS (Common to all Branches)	L	T	P	C
		3	0	2	4

Course Objectives	
1.	To gain knowledge on the basics of properties of matter, its applications and inculcate practical skills in the determination of elastic property of the materials.
2.	To acquire knowledge & experimental skills on the concepts of Photonics and their applications in fiber optics.
3.	To have adequate knowledge on the concepts of electrical, magnetic properties of materials and enhance the practical skills in determination of electrical properties of the materials.
4.	To get knowledge on advanced physics concepts of quantum theory and its applications in SEM, TEM and induce practical skills in microscope.
5.	To enhance the fundamental knowledge of students in Crystal Physics and its Applications relevant to various streams of Engineering and Technology.

UNIT - I	PROPERTIES OF MATTER	14

Elasticity - Modulus, types of modulii of elasticity, Stress - strain diagram and its uses - factors affecting elastic modulus and Twisting couple, torsion pendulum; theory and experiment

Bending of beams - Bending moment - uniform and non- uniform bending; theory and experiment - I - shaped girders and its applications

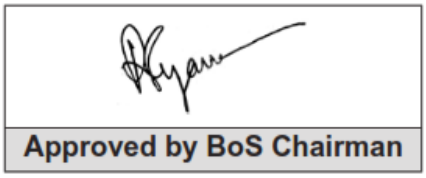
Determination of rigidity modulus - Torsion pendulum - Determination of Young's modulus by non-uniform bending method - Determination of Young's modulus by uniform bending method

UNIT - II	PHOTONICS AND FIBER OPTICS	12

Lasers ; properties of laser-spontaneous and stimulated emission-amplification of light by population inversion - Einstein's A and B coefficients - derivation – Types of laser; Nd. - YAG Laser, Semiconductor lasers; homojunction and heterojunction, Industrial and Medical Applications

Fiber Optics ; Principle, Numerical Aperture and Acceptance Angle - Types of optical fibres - Fiber optic communication System - Block diagram - Medical Applications - Endoscopy

Determination of wavelength of the Laser using grating- Determination of particle size using Laser - Determination of Numerical aperture and acceptance angle of an optical fiber



UNIT - III	PHOTONICS AND FIBER OPTICS	12

Classical free electron theory – Relaxation time and collision time - Expression for electrical conductivity – Thermal conductivity – Wiedemann - Franz law – Lorentz number - Drawbacks of classical theory - Quantum theory - Fermi - Dirac statistics – variation of Fermi level with temperature

Introduction to magnetic materials – Comparision of Dia, Para and Ferro magnetic materials – Domain theory of ferromagnetism - Hysteresis - Soft and Hard magnetic materials - Ferrites and its applications.

Determination of specific resistance of the wire using Carey Foster's Bridge

UNIT - IV	QUANTUM PHYSICS	12

Black body radiation; Planck's theory (derivation) - wave particle duality - debroglie's wavelength - concept of wave function and its physical significance

Wave equation; Schroedinger's time independent and time dependent equations, particle in a one-dimensional rigid box.

Applications - Scanning Electron Microscope (SEM) and Transmission Electron Microscope (TEM)

Determination of thickness of a thin wire by using travelling microscope

UNIT - V	CRYSTAL PHYSICS	10

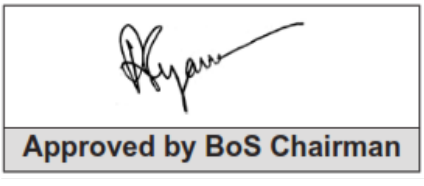
Crystal Structures - Single crystalline, polycrystalline and amorphous materials - unit cell - space lattice - crystal systems - Bravais lattices - Miller indices- inter - planar distances – coordination number and packing factor for SC, BCC, FCC and HCP structures

Crystal imperfections - Point and Line defects - Burger vector

Total Instructional Hours (Theory) : 45

Total Instructional Hours (Lab) : 15

Course Outcomes : Students will be able to	
CO1	Categorize the basics of properties of matter and its applications, classify the elastic properties of materials by using uniform, non-uniform bending method and torsional pendulum apparatus.
CO2	Explain the basics of Laser, Fiber Optics and their applications, determination of Particle size, Wavelength of laser and acceptance angle, numerical aperture of optical fiber.
CO3	Justify the concepts of electrical, magnetic properties of materials, determination of Specific resistance of the material.



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CO4	Interpret the basic knowledge of quantum theory that could be helpful in understanding the wave functions of the particle and determination of thickness of thin sheet by using travelling microscope.
CO5	Classify and compare the different types of Crystals, their structures and its defects.

Text Books	
1.	Bhattacharya, D.K. & Poonam, T, "Engineering Physics", Oxford University Press, 2015.
2.	Gaur, R.K. & Gupta, S.L. "Engineering Physics", Dhanpat Rai Publishers, 2012.
3.	Pandey, B.K. & Chaturvedi, S. "Engineering Physics", Cengage Learning India, 2012.
4.	Rajendran V, "Engineering Physics", Tata McGraw Hill, Publishing Company, New Delhi, 2011.
5.	Wahab, M.A. - Solid State Physics: Structure and Properties of Materials, Narosa Publishing House, 2009.

Reference Books	
1.	Halliday, D., Resnick, R. & Walker, J. "Principles of Physics"", Wiley, 2015.
2.	Serway, R.A. & Jewett, J.W. "Physics for Scientists and Engineers", Cengage Learning, 2010.
3.	Tipler, P.A. & Mosca, G. "Physics for Scientists and Engineers with Modern Physics", W.H. Freeman, 2007.
4.	Avadhanulu M.N, "Engineering Physics - Volume 1", S.Chand & Company Ltd., New Delhi, 2010.
5.	Garcia, N. & Damask, A. - Physics for Computer Science Students. Springer - Verlag, 2012.
6.	Senthil Kumar, G. Physics Laboratory I & II, VRB publishers Pvt. Ltd., Chennai (2016).

Equipment Needed for 30 Students

1. Diode Laser (2 mS power) , He – Ne Laser source (2mW), Optical Fibre Kit - 06
2. Travelling Microscope ,Knife edge, Slotted weights - 19
3. Carey Foster Bridge - 06
4. Air Wedge Apparatus with Travelling Microscope - 06
5. Torsional Pendulum - 06

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B.E. / B.Tech	B23MEP101 – ENGINEERING PRACTICES LABORATORY (GROUP - A & B) (Common to all Branches)	L	T	P	C
		0	0	4	2

Course Objectives	
1.	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.
2.	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.
3.	To provide exposure to the students with hands on experience on various basic Engineering practices in Electrical Engineering.
4.	To provide exposure to the students with hands on experience on various basic Engineering practices in Electronics Engineering.

GROUP – A (CIVIL & MECHANICAL)

I	Civil Engineering Practices	12

Plumbing Works

Making basic pipe connections involving the fittings like valves, taps, coupling, unions, reducers, elbows and other components used in household fittings

Carpentry

Preparation of wooden joints by sawing, planning and cutting

1.	Planning & Polishing operation
2.	Half lap joint
3.	Cross lap joint

II	Mechanical Engineering Practices	18

Welding Workshop

Study of welding tools and equipment's - Study of various welding methods - Instruction of BI standards and reading of welding drawings.

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Exercise in arc welding for making	
1.	Lap joint
2.	Butt joint
3.	Demonstration of gas welding and cutting.
Machine Shop	
1.	Drilling and Tapping
2.	Lathe Exercise – Facing operation
3.	Lathe Exercise – Straight turning and Chamfering
Sheet metal	
Making of small parts using sheet metal	
1.	Making of Square Tray

GROUP – B (ELECTRICAL & ELECTRONICS)	**30**

Expt. No.	Description of the Experiments
1.	Residential house wiring using switches, fuse, indicator, lamp and energy meter.
2.	Fluorescent lamp and Stair case wiring.
3.	Measurement of electrical quantities – voltage, current, power & power factor in RLC circuit.
4.	Measurement of energy using single phase energy meter.
5.	Measurement of resistance to earth of an electrical equipment.
6.	Study of Electronic components and equipment's – Resistor color coding
7.	Measurement of AC signal parameter (peak-peak, rms period, frequency) using CRO.
8.	Study of logic gates AND, OR, EX-OR and NOT.
9.	Soldering & desoldering practices.
10.	Study of Fan, Iron Box, Emergency Lamp, Telephone and FM Radio.
	Total Instructional hours : 60

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Course Outcomes : Students will be able to	
CO1	Explain the pipe connections and identify the various components used in plumbing.
CO2	Develop simple wooden joints using wood working tools and simple components using lathe and drilling machine.
CO3	Construct simple lap, butt and tee joints using arc welding equipment and simple parts using sheet metal.
CO4	Construct Residential house wiring, Fluorescent lamp wiring and Stair case wiring.
CO5	Measure electrical quantities such as voltage, current, power & power factor in RLC Circuit, resistance to earth, AC signal parameter (peak-peak, RMS period, frequency) and ripple factor.
CO6	Examine logic gates (AND, OR, EX-OR and NOT), Electronic components and equipment's.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

GROUP – A (CIVIL & MECHANICAL)

Sl. No.	Description of Equipment		Quantity required
1.	Assorted components for plumbing, Consisting of metallic pipes, plastic pipes, flexible pipes, couplings, unions, elbows, plugs and other fittings.		15
2.	Carpentry vice (fitted to work bench)		15
3.	Standard woodworking tools		15
4.	Models of industrial trusses, door joints, furniture joints		5
5.	Power Tools:		
	(a)	Rotary Hammer	2
	(b)	Demolition Hammer	2
	(c)	Circular Saw	2
	(d)	Planer	2
	(e)	Hand Drilling Machine	2
	(f)	Jigsaw	2

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6.	Arc welding transformer with cables and holders	5
7.	Welding booth with exhaust facility	5
8.	Welding accessories like welding shield, chipping hammer, wire brush, etc.	5
9.	Oxygen and acetylene gas cylinders, blow pipe and other welding outfit.	2
10.	Centre lathe	2
11.	Hearth furnace, anvil and smithy tools	2
12.	Moulding table, foundry tools	2
13.	Power Tool: Angle Grinder	2
14.	Study-purpose items: Centrifugal pump, Airconditioner	1

GROUP – B (ELECTRICAL & ELECTRONICS)		
Sl. No.	**Description of Equipment**	**Quantity required**
1.	Assorted Electrical Components for House Wiring	15 sets
2.	Electrical Measuring Instruments	10 sets
3.	Iron Box	1
4.	Fan and Regulator	1
5.	Emergency Lamp	1
6.	Megger	1
7.	Digital Live Wire Detector	2
8.	Soldering Guns	10
9.	Assorted Electronic Components for Making Circuits	50
10.	Multipurpose PCBs	10

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11.	Multi Meters	10
12.	Telephone	2
13.	FM radio	2
14.	Regulated Power Supply	2
15.	CRO (30MHz)	2
16.	Bread board	10
17.	Digital IC types (IC 7432, IC 7408, IC 7400, IC 7404, IC 7402, IC 7486)	Each 10

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B.E./ B.Tech	B23CEP202 - APPLICATION DESIGN AND DEVELOPMENT (Common to All UG Branches)	L	T	P	C
		2	0	0	NC

Course Objectives	
1.	To understand the basics concepts of SDLC and web development basics.
2.	To introduce the concepts of styling with CSS
3.	To understand the fundaments concepts of JavaScript
4.	To acquire the skills to manipulate the Document Object Model (DOM)
5.	To introduce version control concepts using Git and GitHub.

UNIT - I	SDLC and Web Development Basics	3

Introduction to Software Development Lifecycle (SDLC): Waterfall Model – Phases, Methods - Best Practices.

HTML Fundamentals: Introduction – Versions - HTML5 Standards - Tags - Semantic Elements – Forms - Media(Images, Audio, Video) – Tables - Lists

UNIT - II	Styling with CSS & Frameworks	3

CSS : Introduction – Selectors - Box Model (Margins, Padding, Borders) – Colors - Backgrounds – Frameworks: Introduction to Bootstrap - Tailwind CSS

UNIT - III	JavaScript Programming Essentials	3

JavaScript Basics - Variables - Data Types - Operators - Conditional Statements – Loops - Functions and events - Function Declarations - Event Handling.

UNIT - IV	DOM, Form Handling & Error Management	3

Document Object Model (DOM) Manipulation - Form Handling - Validation - Page Redirection - Error Handling – Exception handling in JavaScript.

UNIT - V	Version Control & Shell Scripting	3

Git & GitHub - Repositories - Branching – Merging – Remote Repositories - Advanced Git actions – Advanced Git Actions: Pull Requests- Issues - Contribution to Open Source

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- Developer Communities: Google Developer – Group - Stack Overflow - Kaggle - Shell Scripting: Process Management - File Handling - User & Group Management.
Total Instructional hours: 15

Course Outcomes: Students will be able to	
CO1	Understand the phases and best practices of the Software Development Life Cycle (SDLC), and apply HTML5 features to structure web page
CO2	Construct visually appealing web pages by applying CSS styling techniques
CO3	Apply the use of JavaScript programming constructs
CO4	Build a JavaScript application by make use of client-side form validation, manage redirection, and handle exceptions and manipulate DOM.
CO5	Utilize version control systems like Git and GitHub for collaborative development.
Text Books	
1.	Jon Duckett, "HTML and CSS: Design and Build Websites", John Wiley & Sons, Inc, 2011.
2.	Marijn, Haverbeke, "Eloquent JavaScript: A Modern Introduction to Programming", 3rd Edition, William Pollock Publisher, 2019.
3.	Scott Chacon and Ben Straub, "Pro Git", 2 nd Edition, APress Publication, 2024

Reference Books	
1.	Jennifer Robbins, "Learning Web Design: A Beginner's Guide to HTML, CSS, JavaScript, and Web Graphics", O'Reilly Media, Inc., 2012.
2.	Douglas Crockford, "JavaScript: The Good Parts", O'Reilly Publications, 2008
3.	Cameron Newham, "Learning the Bash Shell", 3rd Edition, O'Reilly Media, Inc,
4	https://www.freecodecamp.org/
5	https://developer.mozilla.org/en-US/docs/Web/JavaScript
6	https://www.codecademy.com/catalog/subject/web-development

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Semester – III

B.E.	B23MAT305 - GRAPH THEORY	L	T	P	C
		3	1	0	4

Course Objectives	
1.	To understand the fundamentals of graph theory.
2.	To study the proof techniques related to various concepts in graphs.
3.	To explore modern applications of graph theory.
4.	To develop the knowledge of Chromatic partition, Chromatic polynomial and colouring of a given graph and apply in real life problems.
5.	To introduce the concept of directed graph.

UNIT - I INTRODUCTION TO GRAPH	12
Introduction - Graph Terminologies - Types of Graphs - Sub Graph - Multi Graph - Regular Graph - Isomorphism - Isomorphic Graphs - Euler graph - Hamiltonian Graph - Related Theorems.	

UNIT - II TREES	12
Trees - Properties- Distance and Centres - Types - Rooted Tree - Tree Enumeration - Labeled Tree - Unlabeled Tree - Spanning Tree - Fundamental Circuits - Cut posets - Properties – Connectivity - Separability - Related Theorems.	

UNIT - III PLANARITY	12
Network Flows - Planar Graph - Different representation of a planar graph - Detection - Dual Graph - Geometric and Combinatorial Dual - Related theorems	

UNIT - IV MATRICES AND COLORING	12
Adjacency matrix and its properties - incidence matrix and its properties - Related theorems - Graph colouring- Chromatic number -Chromatic partitioning - Chromatic polynomial - Matching - Covering - four color problem (statement only) and its simple Applications.	

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UNIT - V DIRECTED GRAPHS	12
Directed graphs -Types of directed graphs - digraphs & its properties and binary relations - directed paths and connectedness - Euler digplraphs	
	Total Instructional hours:60

CourseOutcomes: Students will be able to	
CO1	Identify the types of graphs and isomorphism on graphs.
CO2	Develop the concept of trees and its types.
CO3	Apply the planarity concept in network flow problems.
CO4	Construct the adjacency and incidence matrix for the given graph and list its properties.
CO5	Identify the types of directed graphs and its properties.

Text Books	
1.	Narsingh Deo, "Graph Theory with Application to Engineering and Computer Science", Prentice Hall of India, 2013.
2.	L.R.Foulds , "Graph Theory Applications", Springer , 2016.

Reference Books	
1.	Bondy, J. A. and Murty, U.S.R., "Graph Theory with Applications", North Holland Publication, 2008.
2.	West, D. B., “Introduction to Graph Theory II”, Pearson Education, 2011.
3.	John Clark, Derek Allan Holton, “A First Look at Graph Theory II”, World Scientific Publishing Company, 1991.
4.	Diestel, R, "Graph Theory", Springer, 3rd Edition, 2006.
5.	Kenneth H.Rosen, "Discrete Mathematics and Its Applications", Mc Graw Hill, 2007.

Approved by BoS Chairman

B.E / B.Tech	B23CSI102 – PROBLEM SOLVING AND PYTHON PROGRAMMING (Common to AERO, AGRI, BT, and MECH)	L	T	P	C
		2	0	4	4

Course Objectives	
1.	To develop python programs with conditional statements and loops
2.	To learn how to use strings, functions and pass arguments in Python
3.	To use python data structures such as lists, tuples, and dictionaries
4.	To use file concepts and to build a package using Python modules for reusability
5.	To learn the fundamentals of data manipulations with Python

UNIT - I	INTRODUCTION TO PYTHON PROGRAMMING	9

Introduction: Python basics and its scripting modes – Variables, Operators - Control Structures: if, if-else, nested if, if – elif ladder statements - Iterative statements : while, for, Nested loops, else in loops, break, continue and pass statements.

UNIT - II	STRINGS AND FUNCTIONS	9

Strings: Formatting, Comparison, Slicing, Splitting, Stripping, Negative indices, String functions. Regular expression: Matching the patterns, Search and replace. Functions: Types, parameters, arguments: positional arguments, keyword arguments, parameters with default values, functions with arbitrary arguments

UNIT - III	COLLECTIONS	9

List: Create, Access, Slicing, Negative Indices, List Methods, and comprehensions, Tuples: Create, Indexing and Slicing, Operations on tuples. Dictionary: Create, add, and replace values, operations on dictionaries

UNIT - IV	SETS AND FILE HANDLING	9

Sets: Create and operations on set, Files: Manipulating files and directories, text files: reading/writing text and numbers from/to a file; creating and reading a formatted file (csv or tab separated)

UNIT - V	MODULES AND PACKAGES	9

Modules: Importing module, standard modules, executing modules. Packages: Importing Packages, simple programs using built-in functions of packages like pandas, jumpy, matplotlib

Expt. No.	Description of the Experiments
1.	Programs Using Simple Statements a. Exchange the values of two variables, b. Circulate the values of n variables, c. Distance between two points.

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2.	Programs Using Conditionals and Iterative Statements a. Number Series b. Number Patterns c. Pyramid Pattern
3.	Programs Using built-in and user defined Functions a. Factorial of a Number b. Largest Number in a list c. Area of Shape
4.	Programs using Strings a. Reversing a String b. Checking Palindrome in a String c. Counting Characters in a String d. Replacing Characters in a String
5.	Operations of Lists a. Basic Operations (Insertion, Updating, deletion, accessing, List Comprehensions) b. Implement linear search and binary search using list. c. Matrix operations using Nested List. d. Implement Merge, Bubble and Insertion sort
6.	Create a tuple and perform its operations for the following: a. Basic Operations (Insertion, Updating, deletion, accessing) b. Items present in a library c. Components of a car d. Materials required for construction of a laboratory
7.	Operations of Dictionaries a. Python program to create a dictionary with integer keys, and print the keys, values & key-value pairs b. Python program to randomize (shuffle) values of dictionary
8.	Operations of Sets Basic operations of set (Membership, Operations and Modifications)
9.	Programs using File Handling a. Copy from one file to another. b. Word count c. Longest word
10.	Python programs using Time and Calendar related functions a. Print the current time using time module. b. Display the calendar of given month of the year using calendar module
11.	Implementing programs using written modules and Python Standard Libraries (pandas, numpy. Matplotlib, scipy)
	Total Instructional hours : (45+30) = 75

Course Outcomes : Students will be able to	
CO1	Construct Python programs using iterative and conditional statements
CO2	Experiment with user-defined functions and Strings.
CO3	Build python programs with list, tuples, dictionaries and set
CO4	Develop Python application using file operations and modules.
CO5	Apply data manipulation concepts using libraries

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Requirements for a Batch of 30 Students		
Sl. No.	**Description of the Equipment**	**Quantity required (Nos.)**
1.	HP Make, Core i5, 11th Generation, 16GB RAM PCs, Operating systems: Windows* 10 or later, macOS, and Linux. Python* version: 3.10.X	30

Text Books	
1.	Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", 2nd Edition, Updated for Python 3, Shroff/ O 'Reilly Publishers, 2016
2.	Reema Thereja, "Python Programming using Problem Solving Approach", 4th Impression, Oxford University Press, 2019.
3.	Bernd Klein, Python Course Data Analysis with Python, 2021.

Reference Books	
1.	John V Guttag, "Introduction to Computation and Programming Using Python", Revised and expanded Edition, MIT Press, 2013.
2.	Robert Sedgewick, Kevin Wayne, Robert Dondero, "Introduction to Programming in Python: An Inter-disciplinary Approach", Pearson India Education Services Pvt. Ltd, 2016
3.	Timothy A. Budd, "Exploring Python", Mc-Graw Hill Education (India) Private Ltd, 2015
4.	Kenneth A. Lambert, "Fundamentals of Python: First Programs", CENGAGE Learning, 2012

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B.E	B23ECT301–ANALOG ELECTRONIC CIRCUITS	L	T	P	C
		3	0	0	3

Course Objectives	
1.	To understand the methods of transistor biasing.
2.	To design and analyze single stage and multistage amplifier circuits and the h parameter models for amplifiers.
3.	To give a comprehensive exposure to all types of feedback amplifiers and oscillator and Multivibrator principles.
4.	To study about turned amplifiers and Power Amplifiers.
5.	To design, analyze the DC regulated power supplies, converters.

UNIT I – BIASINGOFBJT ANDFET	9
DC Loadline, AC loadline, Operating point, various biasing methods for BJT-Stability factors-Bias compensation, Thermal stability- JFET and MOSFET biasing methods.	
UNIT II – BJTANDFETAMPLIFIERS	**9**
BJT and FET amplifier design-Hybrid equivalent circuits-Calculation of current and voltage gain, input and output impedance of various configurations, cascaded BJT amplifiers. Differential amplifier-differential and common mode gain – CMRR – Darlington amplifiers, Bootstrap technique.	
UNIT III – FEEDBACKAMPLIFIERS, OSCILLATORSAND MULTIVIBRATORS	**9**
Basic concepts of feedback - effect of negative feedback on input and output resistances, gain, gain stability, distortion and bandwidth -voltage and current feedback circuits. Barkhausen criteria for oscillation–Analysis of RC oscillators – Phase shift and Wein bridge oscillators – LC oscillator – Colpitts-crystal oscillator-Classification of Multivibrators.	
UNIT IV – TUNEDAMPLIFIERSANDPOWER AMPLIFIERS	**9**
Coil losses, unloaded and loaded Q of tank circuits, small signal tuned amplifiers – Analysis of capacitor coupled single tuned amplifier - double tuned amplifier. Power amplifiers- class A - Class B - Class AB - Class C - conversion efficiency Power MOSFET - Temperature Effect - Class AB Power amplifier using MOSFET.	
UNIT V – POWERSUPPLIESANDDCCONVERTERS	**9**
Half wave and Full wave Rectifiers – Ripple factor. Filters - L, C and Pi type filters – Voltage Regulators - Series and Shunt Voltage Regulators – DC/DC convertors – Buck, Boost, Buck Boost analysis and design.	
	Total Instructional hours: 45

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Course Outcomes: Students will be able to	
CO1	Explain the biasing methods of Transistors.
CO2	Develop small signal models of BJT and FET amplifiers.
CO3	Analyze the stability of feedback amplifiers, Oscillator and Multivibrator circuits.
CO4	Classify the various types of tuned amplifiers and Power amplifiers.
CO5	Model power supplies and converters.

Text Books	
1.	Donald. A. Neamen, “Electronic Circuits Analysis and Design”, 3rd Edition, McGraw Hill Education (India) Private Ltd., 2010. (Unit I-IV)
2.	Robert L. Boylestad and Louis Nasheresky, “Electronic Devices and Circuit Theory”, 11th Edition, Pearson Education, 2013. (Unit V)

Reference Books	
1.	Millman J, Halkias.C.and SathyabradaJit, “Electronic Devices and Circuits”, 4th Edition, McGraw Hill Education (India) Private Ltd., 2015.
2.	Salivahanan and N. Suresh Kumar, “Electronic Devices and Circuits”, 4th Edition, , McGraw Hill Education (India) Private Ltd., 2017
3.	Floyd, “Electronic Devices”, Ninth Edition, Pearson Education, 2012
4.	David A. Bell, “Electronic Devices & Circuits”, 5th Edition, Oxford University Press, 2008
5.	Anwar A. Khan and Kanchan K. Dey,“ A First Course on Electronics”, PHI, 2006
6.	Rashid M, “Microelectronics Circuits”, Thomson Learning, 2007
7.	http://nptel.ac.in/video.php?subjectId=117103063

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B.E	B23ECT302 – DIGITAL ELECTRONICS	L	T	P	C
		3	0	0	3

Course Objectives	
1.	To present the Digital fundamentals, Boolean algebra and its applications in digital systems.
2.	To familiarize with the design of various combinational digital circuits using logic gates.
3.	To introduce the analysis and design procedures for synchronous sequential circuits.
4.	To introduce the analysis and design procedures for asynchronous sequential circuits and PLD'S.
5.	To introduce the digital design of digital circuits using Verilog HDL.

UNIT I – DIGITAL FUNDAMENTALS	9
Number Systems – Decimal, Binary, Octal, Hexadecimal, 1s and 2s complements, Codes – Binary, BCD, Excess 3, Gray, Alphanumeric codes, Boolean theorems, Logic gates, Universal gates, Sum of products and product of sums, Minterms and Maxterms, Karnaugh map Minimization and Quine-McCluskey method of minimization.	
UNIT II – COMBINATIONAL CIRCUIT DESIGN	**9**
Design of Half and Full Adders, Half and Full Subtractors, Binary Parallel Adder – Carry look ahead Adder, BCD Adder, Binary Multipliers, Multiplexer, Demultiplexer, Magnitude Comparator, Decoder, Encoder, Priority Encoder, Parity generator.	
UNIT III – SYNCHRONOUS SEQUENTIAL CIRCUITS	**9**
Flip flops – SR, JK, T, D, Master/Slave FF, operation and excitation tables, Triggering of FF, Analysis and design of clocked sequential circuits, Design Moore/Mealy models, state minimization, state assignment, circuit implementation, Design of Counters, Ripple Counters, Ring Counters, Shift registers, Universal Shift Register.	
UNIT IV – ASYNCHRONOUS SEQUENTIAL CIRCUIT & PROGRAMMABLE LOGIC DEVICES	**9**
Stable and Unstable states, output specifications, cycles and races, state reduction, race free assignments, ASM Charts, Hazards, Essential Hazards, Pulse mode sequential circuits, Design of Hazard free circuits. Programmable Logic Devices- Programmable Read only Memory (PROM), Programmable Logic Array (PLA), Programmable Array Logic (PAL), Field Programmable Gate Arrays (FPGA)	

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UNIT V – DIGITAL DESIGN WITH VERILOG HDL	9
Introduction of Verilog HDL and VHDL – Types of Modelling: Behavioural, Dataflow and Gate level, Design of Combinational circuit using Verilog, Design of Sequential circuit using Verilog.	
	Total Instructional hours: 45

Course Outcomes: Students will be able to	
CO1	Make use of basic postulates of Boolean algebra and classify the various logic gates and its families
CO2	Design various combinational digital circuits using logic gates
CO3	Analyze the procedure for synchronous sequential circuits
CO4	Analyze the procedure for asynchronous sequential circuits and PLD'S
CO5	Design of digital circuits using Verilog HDL

Text Books	
1.	M. Morris Mano and Michael D. Ciletti, "Digital Design", 6th Edition, Pearson, 2018.

Reference Books	
1.	Charles H.Roth., "Fundamentals of Logic Design", 6 th Edition, Thomson Learning, 2013.
2.	Thomas L. Floyd, "Digital Fundamentals", 10th Edition, Pearson Education Inc, 2011.
3.	S.Salivahanan and S.Arivazhagan, "Digital Electronics", I st Edition, Vikas Publishing House pvt Ltd, 2012.
4.	Anil K.Maini, "Digital Electronics", Wiley, 2014.
5.	A.Anand Kumar, "Fundamentals of Digital Circuits", 4 th Edition, PHI Learning Private Limited, 2016.
6.	Soumitra Kumar Mandal, "Digital Electronics", McGraw Hill Education Private Limited, 2016.
7.	Samir Palnitkar, "Verilog HDL: A Guide to Digital Design and Synthesis", 2 nd Edition, Pearson education Inc, 2003.

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B.E	B23VTT301 - SIGNAL PROCESSING	L	T	P	C
		3	0	0	3

Course Objectives	
1.	To understand the classification and characteristics of signals and systems.
2.	To analyze continuous-time signals using Fourier and Laplace transforms.
3.	To understand discrete-time signals using DTFT and Z-transforms.
4.	To apply DFT and FFT algorithms for signal analysis and processing.
5.	To design and compare IIR and FIR digital filters for various applications.

UNIT I – CLASSIFICATION OF SIGNALS AND SYSTEMS	9
Standard signals – Step, Ramp, Pulse, Impulse, Real and Complex exponentials, Sinusoids – Classification of signals – Continuous Time (CT) and Discrete Time (DT), Periodic & Aperiodic, Deterministic & Random, Energy & Power signals. Classification of systems – CT and DT systems – Linear & Nonlinear, Time-variant & Time-invariant, Causal & Non-causal, Stable & Unstable.	
UNIT II – ANALYSIS OF CONTINUOUS TIME SIGNALS	**10**
Fourier series for periodic signals – Fourier Transform and its properties – Laplace Transform and its properties.	
UNIT III – ANALYSIS OF DISCRETE TIME SIGNALS	**8**
Baseband signal sampling – Discrete Time Fourier Transform (DTFT) and its properties – Z Transform and its properties.	
UNIT IV – DISCRETE FOURIER TRANSFORM	**8**
DFT and its properties – FFT algorithms and applications – Overlap-add and Overlap-save methods.	
UNIT V – DIGITAL FILTER DESIGN	**10**
Analog filter design: Butterworth and Chebyshev Type I filters (up to 2nd order) – Transformation of prototype LPF to BPF/BSF/HPF – Impulse Invariant and Bilinear Transformations – FIR filter design using Windowing (Rectangular, Hamming, Hanning) and Frequency Sampling methods – Comparison of FIR and IIR filters.	
	Total Instructional hours: 45

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Course Outcomes: Students will be able to	
CO1	Classify various types of continuous and discrete time signals and systems.
CO2	Analyze continuous-time signals in Fourier and Laplace domains.
CO3	Apply knowledge of LTI continuous-time systems using Fourier and Laplace transforms.
CO4	Analyze discrete-time signals using DTFT and Z-transform techniques.
CO5	Categorize digital filters (FIR and IIR) using appropriate methods.

Text Books	
1.	Allan V.Oppenheim, S.Wilsky and S.H.Nawab, —Signals and Systemsǁ, Pearson, 2015.
2.	A.V. Oppenheim, R.W. Schafer and J.R. Buck, "Discrete Time Signal Processing", Pearson,8th Indian Reprint, 2004.

Reference Books	
1.	R.E.Zeimer, W.H.Tranter and R.D.Fannin, —Signals & Systems - Continuous and Discreteǁ, Pearson, 2007.
2.	JEdward W Kamen, Bennic S Heck, “Fundamentals of Signals and Systems using the Web and MATLAB”, Pearson Education, 2011.
3.	I.C. Ifeachor and B.W. Jervis, "Digital Signal Processing A Practical Approach", Pearson, 2002.

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B.E	B23VTT301-VERILOG HDL PROGRAMMING	L	T	P	C
		3	0	0	3

Course Objectives	
1.	To understand the basic language features of Verilog HDL in digital logic design.
2.	To learn the gate level and dataflow modeling of combinational and sequential circuits.
3.	To learn the behavioral and switch level modeling of combinational and sequential circuits.
4.	To understand the advanced constructs like Verilog Tasks, Functions Directives and Timing-delay Simulations.
5.	To understand the concepts of logic synthesis and its impact in verification.

UNIT – I	INTRODUCTION TO HDL	9

Structural models of combination logic, Lexical Conventions, Data types, logic simulation, design verification, test methodology, propagation delay, truth table models of combinational and sequential logic with Verilog modules, ports.

UNIT – II	GATE-LEVEL AND DATAFLOW MODELLING	9

Gate Level Modeling: Introduction, AND Gate Primitive, Module Structure, Other Gate Primitives, Illustrative Examples, Tri-State Gates, Array of Instances of Primitives, Additional Examples, Design of Flip-flops with Gate Primitives, Delays, Strengths and Contention Resolution, Net Types, Design of Basic Circuits.

Dataflow Modeling: Introduction to Dataflow modeling, continuous assignments, Delays, Expressions, Operators and Operands, Operator types, Examples-4-bitFull Adder, 4 to 1Multiplexer and Ripple counter.

UNIT – III	BEHAVIORAL MODELLING AND SWITCH LEVEL MODELLING	9

Behavioral Modeling: Structured procedures, Procedural Assignments, Timing controls-Delay, Event Based Timing Control and Level Sensitive Timing Control, Conditional Statements, Multiway Branching- case statement, Loops-for, while, repeat and forever, Sequential and parallel blocks, Generate blocks-loop, conditional and case, Examples-adders, multiplexers and counters.

Switch Level Modeling: Switch-Modeling Elements-MOS, CMOS and Bidirectional Switches, power

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and ground, Resistive Switches, Delay specifications on Switches, Basic Examples.		
UNIT – IV	**TASKS, FUNCTIONS, TIMINGS AND DELAYS**	**9**
Tasks and Functions: Difference between tasks and functions, Tasks-task declaration and invocation, Task examples, Automatic Tasks. Functions-Function Declaration and Invocation, Function examples, Automatic and constant functions, Signed Functions. **Timings and Delays:** Types of Delay Models-Distributed, Lumped and Pin-to-Pin Delays, Path Delay, Modeling Timing checks-setup and hold task, width check, Delay back Annotation.		
UNIT – V	**LOGIC SYNTHESIS WITH VERILOG HDL**	**9**
Introduction to Logic Synthesis, Impact of Logic Synthesis, Verilog HDL Synthesis Constructs, Operators, Interpretation of few Verilog Constructs, Synthesis Design flow-RTL to Gates, Design Examples of RTL to Gates, Verification of Gate-Level Netlist-Functional Verification, Modelling tips for Logic Synthesis- Verilog Coding Style, Design Partitioning, Design Constraint Specification-Example of Sequential Circuit Synthesis.		
Total Instructional hours :45		

Course Outcomes : Students will be able to	
CO1	Explain the basic constructs and features of Verilog HDL used in modeling digital systems.
CO2	Develop combinational and sequential digital circuits using gate-level and dataflow modeling in Verilog.
CO3	Construct and simulate digital systems using behavioral and switch-level modeling in Verilog HDL.
CO4	Distinguish advanced Verilog features like tasks, functions, and delay models for optimized design and simulation.
CO5	Analyze the logic synthesis process in Verilog HDL and its role in optimizing digital system design.
Text Books	
1.	T.R. Padmanabhan and B. Bala Tripura Sundari, “Design through Verilog HDL’’, WSE, IEEE Press 2008.
2.	J. Bhaskar, “A Verilog Primer’’, BSP, 2nd edition 2003.

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Reference Books	
1.	Samir Palnitkar, “Verilog HDL”, Pearson Education,2nd Edition,2003.
2.	Thomas and Moorby, “The Verilog Hardware Description Language”, kluwer academic publishers, 5th edition, 2002.
3.	Stephen Brown and Zvonko Vranesic, “Fundamentals of Logic Design with Verilog”, TMH publications, 2007.
4.	Charles.H.Roth,Jr., Lizy Kurian John “Digital System Design using VHDL” , Thomson, 2nd Edition, 2008
5.	Digital Design with Verilog-https://onlinecourses.nptel.ac.in/noc24_cs61/ Hardware modeling using Verilog- https://onlinecourses.nptel.ac.in/noc20_cs63/

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B.E.	B23VTP301 - ANALOG AND DIGITAL CIRCUITS LABORATORY	L	T	P	C
		0	0	4	2

Course Objectives	
1.	To study the Frequency response of CE and CS Amplifier.
2.	To learn the Transfer characteristics of differential amplifier.
3.	To perform experiment to obtain the response from multistage amplifiers.
4.	To perform SPICE simulation of amplifier circuits.
5.	To design and implement the combinational and sequential logic circuits with discrete components and Verilog HDL Simulation.

List of Experiments	
Expt. No.	**Description of the Experiments**
List of Analog Experiments	
1.	Design of Regulated Power supplies
2.	Construct the CE (BJT) and CS (FET) amplifiers by using discrete components and Spice Simulation for the analysis of Frequency Response.
3.	Differential Amplifiers - Transfer characteristics, CMRR Measurement
4.	Construct the Cascode and Cascade amplifiers by using discrete components and Spice Simulation
5.	Determination of bandwidth of single stage and multistage amplifiers
6.	Analysis of BJT with Fixed bias and Voltage divider bias using Spice
7.	Analysis of FET, MOSFET with fixed bias, self-bias and voltage divider bias using simulation software like Spice

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List of Digital Experiments		
8.	Design and implementation of code converters using logic gates	
	i.	BCD to excess-3 code and vice versa
	ii.	Binary to gray and vice-versa
9.	Design and implementation of 4 bit binary Adder/ Subtractor and BCD adder using IC 7483	
10.	Design and implementation of	
	i.	Multiplexer and De-multiplexer
	ii.	Encoder and Decoder
11.	Design and implementation of Synchronous and Asynchronous counter	
12.	Simulation of any two combinational and sequential circuits using Verilog HDL	
Total Instructional hours : 60		

Course Outcomes : Students will be able to	
CO1	Determine Rectifiers, Filters, and Regulated Power supplies.
CO2	Test BJT and FET Amplifiers.
CO3	Analyze the limitation in bandwidth of single stage, multi stage amplifiers and CMRR in differential amplifier.
CO4	Analyze amplifier circuits using PSpice Simulation.
CO5	Test the digital logic circuits using discrete components and Verilog HDL Simulation.

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LIST OF EQUIPMENT REQUIRED : REQUIREMENTS FOR A BATCH OF 30 STUDENTS		
Sl. No.	**Description of Equipment**	**Quantity**
1.	CRO (30MHz)	15
2.	Signal Generator /Function Generators (3 MHz)	15
3.	Dual Regulated Power Supplies (0 - 30V)	15
4.	Standalone desktop PCs with SPICE software	15
5.	Transistor/FET(BJT-NPN-PNP and NMOS/PMOS)	50
6.	Dual power supply/single mode power supply	15
7.	Resistors, Capacitors, Inductors	50
8.	Diodes, Zener diode	10
9.	IC Trainer Kit	15
10.	Bread Boards	15
11.	Computer with HDL software	15
12.	Seven segment display	15
13.	Multimeter	15
14.	ICs 7400/ 7402 / 7404 / 7486 / 7408 /7432 / 7483 / 74150 / 74151 / 74147 /7445 / 7476/7491/ 555 / 7494 / 7447 /74180 / 7485 / 7473 / 74138 / 7411 /7474	50

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B.E	B23VTP302– HDL PROGRAMMING LABORATORY	L	T	P	C
		0	0	4	2

Course Objectives	
1.	To know the basic language features of Verilog HDL and the role of HDL in digital logic design.
2.	To understand the design process of combinational circuits using three modeling styles.
3.	To understand the design process of sequential circuits using three modeling styles.
4.	To understand the design process of Finite State machines.

List of Experiments	
Expt. No.	**Description of the Experiments**
WRITE A VERILOG HDL CODE TO DESIGN AND SIMULATE THE FOLLOWING:	
1.	4-Bit Adder/Subtractor
2.	Multiplexers And Demultiplexers
3.	Encoders, Decoders and Priority Encoders
4.	Code Convertors-Binary to Gray And Vice Versa, Excess-3 To Binary And Vice Versa
5.	Four Bit Digital Comparator
7.	Design Of Alu With 8 Instructions
8.	Flip-Flops
9.	4-Bit Registers and Counters
10.	Sequence Detector Using Mealy and Moore Type State Machines
11.	Control The Speed and Direction Of Dc/ Stepper Motor
	Total Instructional hours: 60

Course Outcomes: Students will be able to	
CO1	Examine the functionality of digital circuits such as adders, multiplexers, and ALUs using Verilog HDL.
CO2	Analyze and evaluate the functionality and performance of Sequential circuits like Flip-Flops registers, and counters using Verilog HDL.
CO3	Estimate the functionality of sequence detector and DC/stepper motor using state machine designs (Mealy and Moore) using Verilog HDL.

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List of Equipment Required: Requirements for a Batch of 30 Students

Sl.No.	Description of the Equipment	Quantity required (Nos.)
1.	Xilinx ISE / Altera Quartus / equivalent EDA Tools	10
2.	Cadence / Synopsis / Mentor Graphics /equivalent EDA Tools	10
3.	Personal Computers	30

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Semester – IV

B.E.	B23MAT402 – PROBABILITY AND RANDOM PROCESSES (Common to ECE & EE (VLSI D&T))	L	T	P	C
		3	1	0	4

Course Objectives	
1.	To introduce the basic concepts of probability and random variables.
2.	To understand the basic concepts of two dimensional random variables.
3.	To apply the concept of random process in engineering disciplines.
4.	To introduce the concept of correlation and spectral densities.
5.	To analyze the response of random inputs to linear time invariant systems.

UNIT – I ONE DIMENSIONAL RANDOM VARIABLES	12
Discrete and continuous random variables - Moments - Moment generating functions - Binomial, Poisson, Geometric, Uniform, Exponential and Normal distributions.	

UNIT – II TWO DIMENSIONAL RANDOM VARIABLES	12
Definition - Joint distributions - Marginal and conditional distributions - Covariance - Correlation and linear regression.	

UNIT – III RANDOM PROCESSES	12
Classification - Stationary process - Markov process - Poisson process - Discrete parameter Markov chain - Chapman Kolmogorov equations - Limiting distributions.	

UNIT- IV CORRELATION AND SPECTRAL DENSITIES	12
Auto-correlation functions - Cross-correlation functions - Properties - Power spectral density - Cross spectral density - Properties.	

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UNIT – V LINEAR SYSTEMS WITH RANDOM INPUTS	12
Linear time invariant system - System transfer function - Linear systems with random inputs - Auto correlation and cross correlation functions of input and output - White noise.	
	Total Instructional hours : 60

Course Outcomes : Students will be able to	
CO1	Interpret the fundamental knowledge of the concepts of probability and standard distributions.
CO2	Develop the basic concepts of one and two dimensional random variables and apply in engineering fields.
CO3	Identify the concept of random processes in engineering disciplines.
CO4	Apply the concept of correlation and spectral densities.
CO5	Show the response of random inputs to linear time invariant systems.

Text Books	
1.	Ibe. O.C., “Fundamentals of Applied Probability and Random Processes", Elsevier, 2nd edition 2014.
2.	Peebles.P.Z., "Probability, Random Variables and Random Signal Principles", Tata McGraw Hill, 4th Edition, New Delhi, 2017.

Reference Books	
1.	Miller S.L. and Childers. D.G., "Probability and Random Processes with Applications to Signal Processing and Communications", Academic Press, 2018.
2.	Devore J.L., "Probability and Statistics for Engineering and the Sciences”, Cengage Learning, New Delhi, 9th Edition, 2015.
3.	Cooper G.R., McGillem. C.D., "Probabilistic Methods of Signal and System Analysis", 3rd Indian Edition, Oxford University Press, New Delhi, 2015.
4.	Ravichandran J., “Probability and Random Processes for Engineers”, I.K. International Publishing House Pvt. Limited, 2014.

Approved by BoS Chairman

B.E	B23ECI401 - COMMUNICATION SYSTEMS	L	T	P	C
		3	0	2	4

Course Objectives	
1.	To introduce the concepts of amplitude modulation and angle modulation process.
2.	To understand the properties of random process.
3.	To know effect of noise on communication systems and principles of sampling and Quantization.
4.	To analyze modulation and demodulation of AM, FM and PC004D
5.	To analyze the operation of sampling and reconstruction, PPM, PWM and TDM

UNIT I – AMPLITUDEMODULATION	9
Elements of a Communication System, Amplitude Modulation-DSBSC, DSBFC, SSB, VSB Modulation index, Spectra, Power relations and Bandwidth – AM Generation –Square law and Switching modulator, DSBSC Generation Balanced and Ring Modulator, SSB Generation – Filter, Phase Shift and Third Methods, VSB Generation – Filter Method, Comparison of different AM techniques.	
UNIT II – ANGLE MODULATION	**9**
Angle modulation – PM and FM – Narrow band, Wideband FM Spectral analysis of modulated signal – FM Modulators, FM Demodulators – FM detectors – slope detectors – Phase discriminators – Ratio detectors, PLL.	
UNIT III – RANDOM PROCESS	**9**
Random variables, Central limit Theorem, Random Process, Stationary Processes, Mean, and Correlation & Covariance functions, Auto correlation functions – Cross correlation functions – Properties – Power spectral density, Ergodic Processes, Gaussian Process, and Transmission of a random signal Through a LTI filter.	
UNIT IV – RECEIVERS ANDNOISEINCOMMUNICATION SYSTEMS	**9**
Tuned Radio Frequency (TRF), Super-heterodyne receiver, Noise:Noise and its types. Noise voltage - Signal-to-noise ratio - Noise figure - Noise temperature - Noise figure, Figure of Merit in DSBSC, SSB, AM and FM receivers	
UNIT V – SAMPLING & QUANTIZATION	**9**
Low pass sampling – Aliasing - Signal Reconstruction - Quantization -Uniform & non-uniform quantization - quantization noise Logarithmic Companding – PAM, PPM, PWM, PCM, Multiplexing Techniques – FDM, TDM.	

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	Total Instructional hours: 45

List of Experiments:

Expt. No.	Description of the Experiments
1.	AM Modulator and Demodulator
2.	FM Modulator and Demodulator
3.	Signal Sampling and reconstruction
4.	Pulse Width Modulation
5.	Pulse Position Modulation
6.	Pulse Code Modulation and Demodulation
7.	Time Division Multiplexing
	Practical Hours: 30
	Total Hours: 75

Course Outcomes: Students will be able to	
CO1	Develop Amplitude Modulation and Angle modulated systems.
CO2	Apply the concepts of Random Process to Communication systems.
CO3	Analyze the noise performance of AM and FM systems, sampling and Quantization.
CO4	Demonstrate modulation and demodulation of AM, FM and PCM
CO5	To interpret operation of sampling and reconstruction, PPM, PWM and TDM

Text Books	
1.	J.G. Proakis, M. Salehi, “Fundamentals of Communication Systems”, Pearson Education, 2014. (UNIT I - IV)
2.	SimonHaykin, “CommunicationSystems”,4thEdition, Wiley,2014. (UNITI-V).

Reference Books	
1.	B.P. Lathi, “ModernDigitalandAnalogCommunicationSystems”,3rdEdition, Oxford University Press, 2007.
2.	D.Roody, J. Coolen, “ElectronicCommunications”,4thEdition, PHI,2006.
3.	A. Papoulis, “Probability, Random variables and Stochastic Processes”, McGrawHill,3rd Edition, 1991.
4.	B.Sklar,“DigitalCommunicationsFundamentalsandApplications”,2ndEdition, Pearson Education, 2007.
5.	Communication Systems - Lab Manual prepared by Department of ECE

Approved By BoS Chairman

B.E	B23VTT401 – MICROFABRICATION	L	T	P	C
		3	0	0	3

Course Objectives	
1.	To Understand the basics of microfabrication and its significance in VLSI design.
2.	To Study the materials commonly used in microfabrication processes.
3.	To Understand the principles and processes of photolithography.
4.	To Learn about various etching and deposition methods used in microfabrication.
5.	To Explore advanced techniques such as MEMS fabrication and 3D microfabrication.

UNIT – I INTRODUCTION	9
Overview - Definition and significance, Historical development, Applications in VLSI Design -Integrated circuits, MEMS and sensors, Fundamentals of Microfabrication Techniques - General fabrication process flow, Cleanroom environments	

UNIT – II MATERIALS FOR MICRO FABRICATION	9
Semiconductor Materials - Properties of silicon and other semiconductors, Doping and its effects, Metals and Conductive Materials - Types of metals used in microfabrication, Sputtering and evaporation techniques, Dielectric Materials - Properties and applications of dielectrics,Insulators in VLSI design.	

UNIT – III PHOTOLITHOGRAPHY TECHNIQUES	9
Principles of Photolithography - Photoresist materials and properties, Exposure and development processes, Lithographic Techniques - Contact, proximity, and projection lithography, Resolution enhancement techniques, Pattern Transfer and Etching - Steps involved in pattern transfer, Introduction to etching processes.	
UNIT – IV ETCHING AND DEPOSITION TECHNIQUES	**9**
Etching Processes- Wet etching: chemistry and applications, Dry etching: reactive ion etching (RIE) and plasma etching, Deposition Techniques- Physical vapor deposition (PVD), Chemical vapor deposition (CVD), Thin Film Technologies - Characteristics of thin films, Applications in microfabrication.	

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UNIT – V ADVANCED MICROFABRICATION TECHNIQUES AND FUTURE TRENDS	**9**
MEMS Fabrication - Principles and processes in MEMS technology, Applications and case studies, 3D Microfabrication Techniques - Overview of 3D printing in microfabrication, Comparison with traditional methods, Future Trends in Microfabrication - Nanofabrication technologies, Integration of AI and machine learning in fabrication processes.	
	Total Instructional hours : 45

Course Outcomes : Students will be able to	
CO1	Explain the principles and techniques of microfabrication.
CO2	Evaluate the suitability of different materials for specific microfabrication applications.
CO3	Design a simple photolithographic process for fabricating VLSI components.
CO4	Compare and contrast different etching and deposition techniques.
CO5	Analyze emerging trends and technologies in microfabrication.

Text Books	
1.	"Fundamentals of Microfabrication and Nanotechnology" Author: Mark Madou
2.	Marc Madou, Fundamentals of microfabrication & Nanofabrication.

Reference Books	
1.	"Silicon VLSI Technology: Fundamentals, Practice and Modeling" Author: James D. Plummer, Michael D. Deal, and Peter B. Griffin
2.	"Microfabrication: Techniques and Applications", Author: M. C. J. de Vries
3.	"MEMS: A Design Guide for MEMS/NEMS and Smart Devices", Author: Steven S. Saliterman
4.	"Microelectronics: An Integrated Approach", Author: Behzad Razavi
5.	"Introduction to Microfabrication", Author: Greg J. McRae

Approved By BoS Chairman

B.E	B23ECT403 - LINEAR INTEGRATED CIRCUITS	L	T	P	C
		3	0	0	3

Course Objectives

1.	To introduce the basic building blocks of linear integrated circuits.
2.	To learn the linear and non-linear applications of operational amplifiers.
3.	To introduce the theory and applications of analog multipliers and PLL.
4.	To learn the theory of ADC and DAC.
5.	To introduce the concepts of waveform generation and introduce some special function ICs.

UNIT- I	BASICS OF OPERATIONAL AMPLIFIERS	9

Introduction to op-amps, stages, Current mirror and current sources, Widlar current source, Wilson current source DC and AC performance characteristics, slew rate, Open and closed loop configurations, Inverting and non-inverting amplifier, Introduction to FET based op-amps.

UNIT- II	APPLICATIONS OF OPERATIONAL AMPLIFIERS	9

Sign Changer, Scale Changer, Phase Shift Circuits, Adder, Subtractor, Differential amplifier, Instrumentation amplifier, Differentiator, Integrator, Comparator and its applications, Precision rectifiers, peak detector, clipper and clamper, Design of active filters.

UNIT- III	ANALOG MULTIPLIER AND PLL	9

Logarithmic amplifier, analog multiplier ICs and its applications, Variable trans-conductance multiplier - Four quadrant multiplier, Gilbert Multiplier cell, Operation of the basic PLL, Voltage controlled oscillator, Application of PLL.

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.

UNIT- V	WAVEFORM GENERATORS AND SPECIAL FUNCTION ICS	9

Sine-wave generators, Multivibrators and Triangular wave generator, Timer IC 555, IC Voltage regulators – Three terminal fixed and adjustable voltage regulators - IC 723 general purpose regulator, Opto-couplers and fibre optic IC.

Total Instructional hours: 45

Approved By BoS Chairman

Text Books	
1.	D. RoyChoudhry, Shail Jain, “Linear Integrated Circuits”, New Age International Pvt. Ltd., 2018, Fifth Edition. (Unit I – V)
2.	Sergio Franco, “Design with Operational Amplifiers and Analog Integrated Circuits”, 4th Edition, Tata McGraw-Hill, 2016. (Unit I – V)

Reference Books

1. Ramakant A. Gayakwad, “OP-AMP and Linear ICs”, 4th Edition, Prentice Hall / Pearson Education, 2015.
2. Robert F.Coughlin, Frederick F.Drisco, “Operational Amplifiers and Linear Integrated Circuits”, Sixth Edition, PHI, 2001.
3. Gray and Meyer, “Analysis and Design of Analog Integrated Circuits”, Wiley International, 5th Edition, 2009.
4. S.Salivahanan& V.S. KanchanaBhaskaran, “Linear Integrated Circuits”, TMH, 2nd Edition, 4th Reprint, 2016.

Course Outcomes: Students will be able to	
CO1	Explain the basics of operational amplifier
CO2	Analyze the linear and nonlinear applications of operational amplifiers
CO3	Identify and explain the applications of analog multiplier and PLL ICs
CO4	Examine the analog to digital and digital to analog converters using Op-Amps
CO5	Analyze different types of Operational Amplifier based waveform generators and special function ICs

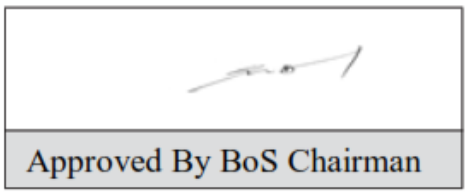
Approved By BoS Chairman

B.E	B23CST503 – QUANTUM COMPUTING	L	T	P	C
		3	0	0	3

Course Objectives	
1.	To know the background of classical computing and quantum computing.
2.	To learn the fundamental concepts behind quantum computation.
3.	To study the details of quantum mechanics and its relation to Computer Science.
4.	To gain knowledge about the basic hardware and mathematical models of quantum computation.
5.	To learn the basics of quantum information and the theory behind it.

UNIT – I QUANTUM COMPUTING BASIC CONCEPTS	9
Complex Numbers - Linear Algebra - Matrices and Operators - Global Perspectives Postulates of Quantum Mechanics – Quantum Bits - Representations of Qubits – Superpositions.	
UNIT – II QUANTUM GATES AND CIRCUITS	**9**
Universal logic gates - Basic single qubit gates - Multiple qubit gates - Circuit development - Quantum error correction.	
UNIT – III QUANTUM ALGORITHMS	**9**
Quantum parallelism - Deutsch's algorithm - The Deutsch–Jozsa algorithm - Quantum Fourier transform and its applications - Quantum Search Algorithms: Grover's Algorithm.	
UNIT – IV QUANTUM INFORMATION THEORY	**9**
Data compression - Shannon's noiseless channel coding theorem - Schumacher's quantum noiseless channel coding theorem - Classical information over noisy quantum channels.	
UNIT – V QUANTUM CRYPTOGRAPHY	**9**
Classical cryptography basic concepts - Private key cryptography - Shor's Factoring Algorithm - Quantum Key Distribution - BB84 - Ekart 91	
	Total Instructional hours: 45

Course Outcomes: Students will be able to	
CO1	Understand the basics of quantum computing.
CO2	Understand the background of Quantum Mechanics.
CO3	Analyze the computation model
CO4	Model the circuits using quantum computation environments and frameworks.
CO5	Understand the quantum operations such as noise and error–correction.



Text Books	
1.	Parag K Lala, Mc Graw Hill Education, “Quantum Computing, A Beginners Introduction”, First edition (1 November 2020).
2.	Michael A. Nielsen, Issac L. Chuang, “Quantum Computation and Quantum Information”, Tenth Edition, Cambridge University Press, 2010.
3.	Chris Bernhardt, The MIT Press; Reprint edition (8 September 2020), “Quantum Computing for Everyone”.

Reference Books	
1.	Scott Aaronson, “Quantum Computing Since Democritus”, Cambridge University Press, 2013.
2.	N. David Mermin, “Quantum Computer Science: An Introduction”, Cambridge University Press, 2007.

Approved By BoS Chairman

B.E	B23ECT405 - COMMUNICATION NETWORKS	L	T	P	C
		3	0	0	3

Course Objectives

1.	To develop an understanding of computer networking basics.
2.	To make the students to understand the different layers of ISO /OSI model and TCP/IP
3.	Network IEEE standards. To understand IP addressing methods and QOS parameters.
4.	To know the functions and congestion control mechanism of TCP.
5.	To know about application layer and network security.

UNIT- I	DATA COMMUNICATIONS	9

Introduction to networks –Topologies – Protocols and Standards–ISO/OSI model-TCP/IP-Transmission Media and Connectors, Switching Techniques, Connecting devices – Switches, Routers, Gateways.

UNIT- II	DATA LINK LAYER	9

LAN: Ethernet IEEE 802.3, IEEE802.5, IEEE802.11, FDDI, Bridges. Error detection and correction–Forward Error Correction –Flow Control and Error control techniques - Stop and wait – Go back N ARQ – Selective repeat ARQ - sliding window techniques – HDLC.

UNIT- III	NETWORK LAYER	9

Internetworks – Packet Switching and Datagram approach – IPv4 - addressing methods – Subnetting & Supernetting – IPv6. Routing – Distance Vector Routing, Link State Routing, Path Vector Routing. Quality of services (QOS) – methods to improve QOS parameters-Trunking, VPN.

UNIT- IV	TRANSPORT LAYER	9

Functions of transport layer – Multiplexing – Demultiplexing – Sockets – User Datagram Protocol (UDP) –Transmission Control Protocol (TCP)– Congestion Control –-Integrated Services.

UNIT- V	APPLICATION LAYER AND SECURITY	9

Domain Name Space (DNS) – SMTP, FTP, HTTP, WWW – network security-cryptography, Symmetric and Public key encryption. Case study: Bluetooth architecture.

Total Instructional hours: 45

Approved By BoS Chairman

Text Books	
1.	Behrouz.A.Foruzan, "Data communication and Networking", Fifth Edition, Tata McGraw-Hill, 2013.
2.	Andrew S. Tannenbaum, "Computer Networks", Fourth Edition, PHI, 2003

Reference Books	
1.	James.F.Kurouse &W.Rouse, "Computer Networking: A Top down Approach Featuring", Addison Wesley,2009.
2.	Larry.L.Peterson &Peter.S.Davie, "Computer Networks", third edition, Harcourt AsiaPvt.Ltd,2007
3.	Leon, Garica, Widjaja,"Communication Networks" ,TMH
4.	Walrand, "Communication Networks",TMH.
5.	Comer ,"Internetworking with TCP/IP, vol. 1, 2, 3 (4th Ed.)" , Pearson Education/PHI

Course Outcomes: Students will be able to	
CO1	Explain about the network topologies, protocols and models.
CO2	Compare data link layer protocols and LAN standards.
CO3	Analyze routing algorithms and methods to improve QoS.
CO4	Summarize transport layer protocols and congestion controls methods.
CO5	Identify cryptographic and security techniques

Approved By BoS Chairman

B.E	B23ECP401- LINEAR INTEGRATED CIRCUITS LABORATORY	L	T	P	C
		0	0	4	2

Course Objectives	
1.	To understand the basics of linear integrated circuits and available ICs.
2.	To understand the characteristics of the operational amplifier.
3.	To apply operational amplifiers in linear and nonlinear applications.
4.	To acquire the basic knowledge of special function IC.
5.	To use simulation software for circuit design.

List of Experiments	
Expt. No.	**Description of the Experiments**
Design, Simulate and Analyse of Following Circuits	
1.	Inverting, non - inverting and differential amplifier
2.	Integrator and Differentiator
3.	Rectifier using precision diodes
4.	Active low-pass filter, high-pass filter
5.	Band-pass filters
6.	Schmitt Trigger using op-amp
7.	RC Phase shift oscillator and Wien bridge oscillator
8.	Voltage Regulators with ICs.
9.	Astable and Monostable multivibrators using NE555
10.	R-2R Ladder Type D- A Converter (3 – bit input) and any A-D Converter
	Total Instructional hours: 60

Course Outcomes:	
CO1	Design, simulate and analyze Op-amp like Inverting, Non – inverting & Differential Amplifiers, Differentiator, Integrator, Filters, Schmitt Trigger, Oscillators, ADC and DAC for 3 bit inputs.
CO2	Design, simulate and analyze Monostable and Astable multivibrators with 555 timer.
CO3	Demonstrate and Outline the technical details of all the experiments conduction with result obtained.

Approved By BoS Chairman

List of Equipment Required: Requirements for a Batch of 30 Students

Sl.No.	Description of the Equipment	Quantity required (Nos.)
1.	CRO /DSO (Min 30MHz)	15
2.	Signal Generator /Function Generators (2 MHz)	15
3.	Dual Regulated Power Supplies (0 - 30V)	15
4.	Digital Multimeter	15
5.	IC tester	2
6.	Standalone desktops PC	15
7.	Transistors, Resistors, Capacitors, diodes, Zener diodes, Bread Boards, Transformers, wires, Power transistors, Potentiometer, A/D and D/A convertors, LEDs	50

Approved By BoS Chairman

B.E	B23CSP502 – QUANTUM COMPUTING LABORATORY	L	T	P	C
		0	0	3	2

Course Objectives	
1.	To provide hands-on experience with quantum computing concepts and algorithms.
2.	To familiarize students with quantum programming languages and development environments.
3.	To enable students to design, implement, and analyze simple quantum circuits.
4.	To foster critical thinking and problem-solving skills in the context of quantum computing.
5.	To implement quantum algorithms.

List of Experiments	
Expt. No.	**Description of the Experiments**
1.	Single qubit gate simulation - Quantum Composer
2.	Multiple qubit gate simulation - Quantum Composer
3.	Composing simple quantum circuits with q-gates and measuring the output into classical bits.
4.	IBM Qiskit Platform Introduction
5.	Implementation of Shor's Algorithms
6.	Implementation of Grover's Algorithm
7.	Implementation of Deutsch's Algorithm
8.	Implementation of Deutsch-Jozsa's Algorithm
9.	Integer factorization using Shor's Algorithm
10.	QKD Simulation
	Total Instructional hours: 45 Hours

Course Outcomes: Students will be able to	
CO1	Analyze the computation models.
CO2	Model the circuits using quantum computation environments and frameworks.
CO3	Demonstrate and outline the technical details of all the experiments conduction with result obtained.

Approved By BoS Chairman

List of Equipment Required: Requirements for a Batch of 30 Students:

Sl. No.	Description of Equipment	Quantity required (R)
1.	Quantum Composer (or a similar visual quantum circuit simulator)	Open Source
2.	IBM Qiskit (including Qiskit Terra, Qiskit Aer, and potentially Qiskit Ignis and Qiskit Aqua)	Open Source
3.	Qiskit (or another suitable quantum computing framework)	Open Source
4.	Personal Computers	30

Approved By BoS Chairman

B.E	B23CEP401 - PROFESSIONAL CERTIFICATE COURSE-I	L	T	P	C
		0	0	2	1

Course Contents:

THEORY

- Basics of Mobile Electronics
- Smart Phone Trouble shooting Block Diagram
- Mobile Accessories
- Innovative applications of Mobile App.

PRACTICAL WORKS

- Finding mobile model
- Use of various Tools& Instruments used in mobile phone repairing
- Assembling & Disassembling
- Testing of various parts with Multimeter
- Testing ofMic,Speaker,Ringer,Vibrator,LCD,Antenna using Multimeter
- Finding faults and replacing the faulty parts
- Soldering& De-soldering
- Jumpering
- Touch /Display Replacement
- Two types of mobile testing
    - Continuity test
    - Voltage test
- Mic, Speaker, Ringer trouble shooting Solutions
- Insert SIM /No signal solution
- Charging Solution
- IC Replacement
- Keypad Problem
- Touch Screen Problem
- Network Problem
- Dead Mobile trouble shooting
- All Hardware Problem
- SIM tray/Memory tray Replacement
- Charging Connecter pin Replacement
- Battery Connecter and Head Set pin ReplacementHow to Solder and De-solder a component using Blower

(CCpin,BCPpin,SIM tray, Memory tray, Head set pin, All mobile IC'setc……

Approved By BoS Chairman

SOFTWARE:

- Flashing Tools
- Flashing Method
- Pattern Lock
- Password Lock
- Hanging
- Logo Hanging
- Auto ON/OFF
- Restart
- SIM lock
- Unfortunately, Google Chrome/Settings/WhatsApp has Stopped
- Formatting of Virus affected handsets
- Flashing of various brands of handsets
- Unlocking of handset through codes and software.
- Use of Secret Codes.

Evaluation Pattern:	
Continuous Internal Assessment	
CIA (Theory) (100 Marks)	
* Alternate Assessment Tool (AAT)	Written Test
40 Marks	60 Marks
Total: 100 Marks	

* AAT - Individual Assignment/ Case Study/ Seminar/ Mini project/ MCQ/ Role Play/ Group Discussion/ Debates/ Oral Presentations/ Poster Presentations/ Technical Presentations can also be provided course coordinator can choose any one/two components based on the nature of the course.

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