



S.A.ENGINEERING COLLEGE,CHENNAI-77
AUTONOMOUS INSTITUTION
REGULATIONS 2024
CHOICE BASED CREDIT SYSTEM
B.E. –Electronics Engineering (VLSI Design and Technology)

I.Vision

To emerge as a Centre of Excellence in Electronics Engineering promoting research and innovation inculcating highest professional and ethical standards

II.Mission

M1: To impart quality technical education delivering state of the art technologies and research in frontier areas to meet the growing challenges

M2: To provide conducive learning environment to promote interdisciplinary interaction teamwork among the students contributing to the progress of the nation

III. Programme Educational Objectives

PEO1: Graduates educate and train with knowledge and skills necessary to formulate, design and solve problems in analog, digital and mixed signal VLSI system design, VLSI signal processing and semiconductor technologies

PEO2: Graduates provide scope for applied research and innovation in the various fields of VLSI and enabling the students to work in the emerging sectors associated with VLSI domain

PEO3: Graduates apply their subject knowledge, communication skills and leadership qualities to build their chosen career in the area of VLSI design and technology

PEO4: Graduates exhibit ethical attitude and sensitivity to social, environmental and economic issues in their professional activities

IV. Program Outcomes

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

and interpretation of data, and synthesis of the information to provide valid conclusions.

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

V. Program Specific Outcomes

PSO1: Graduates will be able to apply advanced concepts in physics of semiconductor devices to design VLSI system

PSO2: Graduates will be able to design and develop VLSI circuits to optimize power and area requirements free from faults and dependencies by modelling, simulation and testing

PSO3: Graduates will be able to solve research gaps and provide solutions to socio-economic and environmental problems using standard tools.

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**CHOICE BASED CREDIT SYSTEM
SEMESTER I**

Sl.No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	HS3101	Professional English -I	HSC	3	3	0	0	3
2.	MA3101	Matrices and Calculus	BSC	4	3	1	0	4
3.	PH3101	Engineering Physics	BSC	3	3	0	0	3
4.	CY3101	Chemistry for Engineers	BSC	3	3	0	0	3
5.	CS3101	Programming for problem solving using C	ESC	3	3	0	0	3
6.	ME3101	Engineering Graphics	ESC	4	2	0	2	3
7.	TA3101	தமிழர் மரபு /Heritage of Tamils	HSC	1	1	0	0	1
PRACTICALS								
8.	CS3102	Programming for problem solving using C Laboratory	ESC	4	0	0	4	2
9.	BS3101	Physics and Chemistry Laboratory	BSC	4	0	0	4	2
TOTAL				29	18	1	10	24

SEMESTER II

Sl.No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	HS3201	English for Communication	HSC	3	3	0	0	3
2.	MA3201	Engineering Mathematics	BSC	4	3	1	0	4
3.	PH3203	Physics for Electronics Engineering	BSC	3	3	0	0	3
4.	CY3201	Environmental Science and Sustainability	BSC	2	2	0	0	1
5.	EE3202	Basic Electrical and Instrumentation Engineering	ESC	3	3	0	0	3
6.	CS3201	Programming in Python	ESC	3	3	0	0	3
7.	TA3201	தமிழரும் தொழில்நுட்பமும் /Tamils and Technology	HSC	1	1	0	0	1
PRACTICALS								
8.	CS3202	Programming in Python Laboratory	ESC	4	0	0	4	2
9.	GE3201	Engineering Practices Laboratory	ESC	4	0	0	4	2
TOTAL				27	18	1	8	22

SEMESTER III

Sl.No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	MA3303	Probability and Random Process	BSC	4	3	1	0	4
2.	IT3307	Introduction to OOP and JAVA (Integrated)	ESC	5	3	0	2	4
3.	VL3303	Digital System Design (Integrated)	PCC	5	3	0	2	4
4.	VL3302	Fundamentals of Signals and Systems	PCC	4	3	1	0	4
5.	VL3301	Electronic Devices and Circuit Design(Integrated)	PCC	5	3	0	2	4
6.	VL3304	Circuit Analysis(Integrated)	PCC	5	3	0	2	4
TOTAL				28	18	2	8	24

SEMESTER IV

Sl.No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	EC3405	Linear Integrated Circuits	PCC	3	3	0	0	3
2.	VL3402	Control Systems	PCC	3	3	0	0	3
3.	VL3403	Digital VLSI Design	PCC	3	3	0	0	3
4.	VL3405	Microprocessors and Microcontrollers	PCC	5	3	0	2	4
5.	VL3406	Electromagnetic Fields and Transmission Lines	PCC	3	3	0	0	3
6.	HV3401	Universal Human Values	HSC	3	3	0	0	3
PRACTICALS								
6.	VL3407	Linear Integrated Circuits Laboratory	PCC	3	0	0	3	1.5
7.	VL3408	Verilog HDL Programming Laboratory	PCC	3	0	0	3	1.5
8.	HS3303	English Language Enhancement and Business Communication Laboratory	HSC	3	0	0	3	1.5
TOTAL				29	18	0	11	23.5

SEMESTER V

Sl.No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	VL3501	Digital Signal Processing	PCC	4	3	1	0	4
2.	VL3502	CMOS Analog IC Design	PCC	3	3	0	0	3
3.	VL3503	Communication Theory	PCC	3	3	0	0	3
4.		Professional Elective I	PEC	3	3	0	0	3
5.		Professional Elective II	PEC	3	3	0	0	3
6.		Open Elective-I	OEC	3	3	0	0	3
PRACTICALS								
7.	VL3504	Digital signal Processing Laboratory	PCC	3	0	0	3	1.5
8.	VL3505	Analog and Digital VLSI Design Laboratory	PCC	3	0	0	3	1.5
TOTAL				25	18	1	6	22

SEMESTER VI

Sl. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	VL3601	Machine Learning for IC Design	PCC	3	3	0	0	3
2.	VL3602	Low Power VLSI	PCC	3	3	0	0	3
3.	EC3603	Wireless Communication	PCC	3	3	0	0	3
4.		Professional Elective III	PEC	3	3	0	0	3
5.		Professional Elective IV	PEC	3	3	0	0	3
6.		Open Elective II	OEC	3	3	0	0	3
PRACTICALS								
7.	VL3603	Analog and Digital Communication Laboratory	PCC	3	0	0	3	1.5
8.	VL3604	Internship	PWC	2	0	0	2	1
8.	HS3505	Professional and Carrier Development Laboratory	HSC	3	0	0	3	1.5
TOTAL				25	18	0	7	22

SEMESTER VII

Sl.No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	VL3701	ASIC Design	PCC	3	3	0	0	3
2.	VL3702	Testing for VLSI Circuits	PCC	3	3	0	0	3
3.		Professional Elective V	PEC	3	3	0	0	3
4.		Professional Elective VI	PEC	3	3	0	0	3
5.		Management Electives	HSC	3	3	0	0	3
		Indian Constitution	MCC	2	2	0	0	0
PRACTICALS								
6.	VL3703	ASIC Design Lab	PCC	3	0	0	3	1.5
6.	VL3704	Project Phase I	PWC	4	0	0	4	2
TOTAL				23	17	0	6	18.5

SEMESTER VIII

Sl. No	COURS ECODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
PRACTICALS								
1.	VL3801	Project Work	PWC	16	0	0	16	8
TOTAL				16	0	0	16	8

TOTAL NO. OF CREDITS: 164

CREDITS SUMMARY

S.NO.	SUBJECT AREA	CREDITS AS PER SEMESTER								CREDITS TOTAL	Percentage
		I	II	III	IV	V	VI	VII	VIII		
1.	HS	4	4		4.5		1.5	3		17	10.4%
2.	BS	12	8	4						24	14.6%
3.	ES	8	10	4						22	13.4%
4.	PC			16	19	13	10.5	7.5		66	40.2%
5.	PE					6	6	6		18	10.9%
6.	OE					3	3			6	3.6%
7.	PW						1	2	8	11	6.7%
	Total	24	22	24	23.5	22	22	18.5	8	164	100%

PROFESSIONAL ELECTIVE I

Sl.No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	VL3506	Semiconductor Device Modeling	PEC	3	3	0	0	3
2.	VL3507	Computer Architecture and Organization	PEC	3	3	0	0	3
3.	VL3508	PLL and Data Converter Design	PEC	3	3	0	0	3
4.	VL3509	Embedded Systems and IoT Design	PEC	3	3	0	0	3
5.	VL3510	Microfabrication and Semiconductor materials	PEC	3	3	0	0	3

PROFESSIONAL ELECTIVE II

Sl.No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	VL3511	Fundamentals of Nano Electronics	PEC	3	3	0	0	3
2.	VL3512	Validation and Testing	PEC	3	3	0	0	3
3.	VL3513	Hardware Software Co-Design for FPGA	PEC	3	3	0	0	3
4.	VL3514	Industrial IoT and Industry 4.0	PEC	3	3	0	0	3
5.	VL3515	Advanced Digital System Design	PEC	3	3	0	0	3

PROFESSIONAL ELECTIVE III

Sl.No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	VL3605	Advanced Semiconductor Design	PEC	3	3	0	0	3
2.	VL3606	Mixed Signal IC Design	PEC	3	3	0	0	3
3.	VL3607	Reconfigurable Architectures	PEC	3	3	0	0	3
4.	VL3608	Computer Communication and Networks	PEC	3	3	0	0	3
5.	VL3609	Reliability in VLSI circuits	PEC	3	3	0	0	3

PROFESSIONAL ELECTIVE IV

Sl.No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	VL3610	Nano Sensors and Devices	PEC	3	3	0	0	3
2.	VL3611	VLSI Circuit for Biomedical Applications	PEC	3	3	0	0	3
3.	VL3612	Semiconductor Memories Design and Testing	PEC	3	3	0	0	3
4.	VL3613	IoT Processors	PEC	3	3	0	0	3
5.	VL3614	Quantum Computing	PEC	3	3	0	0	3

PROFESSIONAL ELECTIVE V

Sl.No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	VL3705	Wideband gap devices	PEC	3	3	0	0	3
2.	VL3706	VLSI for Wireless Communication	PEC	3	3	0	0	3
3.	VL3707	Multicore Architecture and programming	PEC	3	3	0	0	3
4.	VL3708	Data Analytics for IoT	PEC	3	3	0	0	3
5.	VL3709	Artificial Intelligence in VLSI Design	PEC	3	3	0	0	3

PROFESSIONAL ELECTIVE VI

Sl.No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	VL3710	FinFET devices for VLSI Circuits and Systems	PEC	3	3	0	0	3
2.	VL3711	Silicon on Chip	PEC	3	3	0	0	3
3.	VL3712	Power Management and Clock Distribution	PEC	3	3	0	0	3
4.	VL3713	IoT Security	PEC	3	3	0	0	3
5.	VL3714	Cryptography and Network Security	PEC	3	3	0	0	3