RAJALAKSHMI INSTITUTE OF TECHNOLOGY

BELIEVE IN THE POSSIBILITIES

AN AUTONOMOUS INSTITUTION

B.E. ELECTRONICS ENGINEERING

(VLSI DESIGN AND TECHNOLOGY)

CURRICULUM FOR SEMESTERS I TO VIII

(2025 – 2029 BATCH)

REGULATIONS 2023

RAJALAKSHMI INSTITUTE OF TECHNOLOGY

(An Autonomous Institution, Affiliated to Anna University, Chennai)

Kuthambakkam, Chennai 600124

RAJALAKSHMI INSTITUTE OF TECHNOLOGY, CHENNAI
An Autonomous Institution, Affiliated to Anna University, Chennai

REGULATIONS 2023
CHOICE BASED CREDIT SYSTEM

B.E. ELECTRONICS ENGINEERING

(VLSI DESIGN AND TECHNOLOGY)

I VISION OF THE DEPARTMENT

- To produce globally competitive VLSI engineers with professional commitment and social responsibility.

II MISSION OF THE DEPARTMENT

- To achieve academic excellence in VLSI technology through excellent teaching methodologies with the support of laboratories.
- To impart with state of art technologies to meet the growing challenges of the semiconductor industry.
- To endorse higher studies and pursue research in the VLSI discipline with sensitivity towards societal requirements.

III PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PEO 1: To provide students with strong foundation in the mathematical, scientific and engineering fundamentals and advanced techniques necessary to find solution to the real problems.

PEO 2: To enable graduates to pursue research, or have a successful career in academia or industries associated with electronics Engineering, or as entrepreneurs.

PEO 3: To prepare students to critically analyse existing literature in an area of specialization and ethically develop innovative and research-oriented methodologies to solve the problems identified.

IV PROGRAM OUTCOMES (POs)

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **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.
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.
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.
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.
6. **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.
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.
8. **Ethics:** Apply ethical principles and commit to professional ethics, responsibilities, and norms of the engineering practice.
9. **Individual and teamwork:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
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.
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.

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 (PSOs)

The Students will be able to

- To analyze, design and develop solutions by applying foundational concepts of electronics engineering with VLSI Technology.
- To apply design principles and best practices for developing quality products for scientific and business applications.
- To adapt to emerging information and communication technologies (ICT) to innovate ideas and solutions to existing/novel problems.

RAJALAKSHMI INSTITUTE OF TECHNOLOGY

An Autonomous Institution, Affiliated to Anna University

REGULATIONS – 2023

B. E. ELECTRONICS ENGINEERING (VLSI DESIGN AND TECHNOLOGY)

CHOICE BASED CREDIT SYSTEM

CURRICULUM FOR SEMESTERS I TO VIII

(2025 – 2029 Batch)

SEMESTER I

S.No	Course Code	Course Title	Category	Periods Per Week			Total Contact Periods	Credits
				L	T	P		
	IP23111	Induction Programme		-	-	-	-	0
THEORY COURSES								
1.	HS23111	Communicative English	HSMC	3	0	0	3	3
2.	MA23111	Matrices and Calculus	BSC	3	1	0	4	4
3.	PH23112	Physics for Electronics Engineering	BSC	3	0	0	3	3
4.	GE23111	Problem Solving and C Programming	ESC	3	0	0	3	3
5.	EC23111	Circuit Analysis	PCC	3	1	0	4	4
6.	GE23112	தமிழர் மரபு/Heritage of Tamils	HSMC	1	0	0	1	0
LABORATORY COURSES								
7.	GE23121	Problem Solving and C Programming Laboratory	ESC	0	0	2	2	1
8.	GE23124	Design Thinking and IDEA Laboratory	ESC	0	0	2	2	1
9.	PH23121	Physics Laboratory	BSC	0	0	2	2	1
TOTAL								**20**

SEMESTER II

S.No.	Course Code	Course Title	Category	Periods Per Week			Total Contact Periods	Credits
				L	T	P		
THEORY COURSES								
1.	HS23211	Professional English	HSMC	2	0	0	2	2
2.	MA23211	Statistics and Numerical Methods	BSC	3	1	0	4	4
3.	CY23211	Engineering Chemistry	BSC	3	0	0	3	3
4.	AD23211	Python for Data Science	ESC	3	0	0	3	3
5.	GE23213	தமிழரும் தொழில்நுட்பமும்/ Tamils and Technology	HSMC	1	0	0	1	0
LABORATORY ORIENTED THEORY COURSES								
6	EC23231	Electronic Devices and Circuits	PCC	3	0	2	5	4
7	GE23231	Engineering Graphics	ESC	2	0	4	6	4
LABORATORY COURSES								
8	CY23221	Chemistry Laboratory	BSC	0	0	2	2	1
9	AD23221	Python for Data Science Laboratory	ESC	0	0	2	2	1
10	GE23221	Communication Laboratory / Foreign Language	EEC	0	0	2	2	1
NCC/Service Club Credit Course Level1#			-	3	0	0	3	1#
TOTAL								**23**

NCC Credit Course level 1 is offered for NCC students only. The grades earned by the students will be recorded in the Mark Sheet, however the same shall not be considered for the computation of CGPA

SEMESTER III

S.No.	Course Code	Course Title	Category	Periods Per Week			Total Contact Periods	Credits
				L	T	P		
THEORY COURSES								
1	GE23311	Environmental Science and Sustainability	BSC	2	0	0	2	2
2	CS23312	Object Oriented Programming	PCC	3	0	0	3	3
3	EV23311	Wide Band-gap Devices	PCC	3	0	0	3	3
4	EC23312	Digital System Design	PCC	3	0	0	3	3
5	EC23313	Signals and Systems	PCC	3	1	0	4	4
LABORATORY COURSES								
6	EC23321	Digital System Design Laboratory	PCC	0	0	2	2	1
7	CS23322	Object Oriented Programming Laboratory	PCC	0	0	2	2	1
INDUSTRY ORIENTED COURSE								
8	EC23IC1	PCB Design	EEC	1	-	-	1	1
TOTAL								**18**

SEMESTER IV

S.No.	Course Code	Course Title	Category	Periods Per Week			Total Contact Periods	Credits
				L	T	P		
THEORY COURSES								
1	MA23412	Random Process and Linear Algebra	BSC	3	1	0	4	4
2	EV23411	Microprocessors and Microcontrollers	PCC	3	0	0	3	3
3	EC23412	Electromagnetic Fields	PCC	3	0	0	3	3
4	EC23413	Linear Integrated Circuits	PCC	3	0	0	3	3
LABORATORY ORIENTED THEORY COURSES								
5	EC23431	Digital Signal Processing	PCC	3	0	2	5	4
6	EC23432	Networks and Security	PCC	2	0	2	4	3
LABORATORY COURSE								
7	EV23421	Microprocessors and Microcontrollers Laboratory	PCC	0	0	2	2	1
8	EC23422	Linear Integrated Circuits Laboratory	PCC	0	0	2	2	1
INDUSTRY ORIENTED COURSE								
9	CC23IC2	Design Thinking for Engineers	EEC	1	-	-	1	1
NCC/Service Club Credit Course level 2[#]				3	0	0	3	2[#]
TOTAL								**23**

[#]**NCC Credit Course level 2** is offered for NCC students only. The grades earned by the students will be recorded in the Mark Sheet, however the same shall not be considered for the computation of CGPA.

SEMESTER V

S.No.	Course Code	Course Title	Category	Periods Per Week			Total Contact Periods	Credits
				L	T	P		
THEORY COURSES								
1	EV23511	ASIC Design	PCC	3	0	0	3	3
2	EC23512	VLSI and Chip Design	PCC	3	0	0	3	3
3		Professional Elective I	PEC	-	-	-	-	3
4		Professional Elective II	PEC	-	-	-	-	3
5		Mandatory Course I[&]	MC	3	0	0	3	0
LABORATORY ORIENTED THEORY COURSES								
6	EC23531	Embedded Systems and IOT Design	PCC	3	0	2	5	4
7	AL23431	Artificial Intelligence and Machine Learning	PCC	3	0	2	5	4
LABORATORY COURSE								
8	EC23521	VLSI Laboratory	PCC	0	0	2	2	1
INDUSTRY ORIENTED COURSE								
9	EV23IC3	Introduction to ARM Based System Design	EEC	1	-	-	1	1
TOTAL								**22**

[&] **Mandatory Course - I** is a Non-credit Course (Student shall select one course from the list given under Mandatory Course-I)

SEMESTER VI

S.No.	Course Code	Course Title	Category	Periods Per Week			Total Contact Periods	Credits
				L	T	P		
THEORY COURSES								
1	EV23611	CMOS Analog and Mixed Signal IC Design	PCC	3	0	0	3	3
2	EV23612	Digital Logic Synthesis using HDL	PCC	3	1	0	4	4
3		Professional Elective III	PEC	-	-	-	-	3
4		Professional Elective IV	PEC	-	-	-	-	3
5		Open Elective– I*	OEC	-	-	-	-	3
6		Open Elective – II*	OEC	-	-	-	-	3
7		Mandatory Course II&	MC	3	0	0	3	0
LABORATORY COURSES								
8	EV23621	Mini Project	EEC	0	0	4	4	2
9	EV23622	CMOS Analog and Digital VLSI Laboratory	PCC	0	0	2	2	1
NCC/Service Club Credit Course Level 3#			-	3	0	0	3	3#
TOTAL				-	-	-	-	**22**

***Open Elective – I and II** Shall be chosen from the list of open electives offered by other Programmes.

& Mandatory Course-II is a Non-credit Course (Student shall select one course from the list given under Mandatory Course-II)

 # NCC Credit Course level 3 is offered for NCC students only. The grades earned by the students will be recorded in the Mark Sheet, however the same shall not be considered for the computation of CGPA

SEMESTER VII

S.No.	Course Code	Course Title	Category	Periods Per Week			Total Contact Periods	Credits
				L	T	P		
THEORY COURSES								
1	GE23711	Human Values and Ethics	HSMC	2	0	0	2	2
2		Elective – Management[$]	HSMC	3	0	0	3	3
3	EV23711	Physical Design and Automation	PCC	3	0	0	3	3
4	EV23712	RF Integrated Circuits and Systems	PCC	3	0	0	3	3
5		Professional Elective V	PEC	-	-	-	-	3
6		Professional Elective VI	PEC	-	-	-	-	3
LABORATORY COURSES								
7	EV23721	Internship/Certification Course	EEC	0	0	0	0	2
TOTAL								**19**

[$] **Elective -** Management shall be chosen from the List of Elective Management courses.

SEMESTER VIII

S.No.	Course Code	Course Title	Category	Periods Per Week			Total Contact Periods	Credits
				L	T	P		
THEORY COURSES								
1		Open Elective – III*	OEC	3	0	0	3	3
LABORATORY COURSE								
2	EV23821	Project Work	EEC	0	0	20	20	10
TOTAL								**13**

***Open Elective –III** Shall be chosen from the list of open electives offered by other Programmes.

TOTAL CREDITS: 160

ELECTIVE – MANAGEMENT COURSES

S.No.	Course Code	Course Title	Category	Periods Per Week			Total Contact Periods	Credits
				L	T	P		
1	GE23712	Engineering Economics and Financial Accounting	HSMC	3	0	0	3	3
2	GE23713	Human Resource Management	HSMC	3	0	0	3	3
3	GE23714	Knowledge Management	HSMC	3	0	0	3	3
4	GE23715	Principles of Management	HSMC	3	0	0	3	3
5	GE23716	Software Project Management	HSMC	3	0	0	3	3
6	GE23717	Total Quality Management	HSMC	3	0	0	3	3
7	GE23718	Management Information Systems	HSMC	3	0	0	3	3

MANDATORY COURSES I

S.No.	Course Code	Course Title	Category	Periods Per Week			Total Contact Periods	Credits
				L	T	P		
1	MX23511	Disaster Risk Reduction and Management	MC	3	0	0	3	0
2	MX23512	Elements of Literature	MC	3	0	0	3	0
3	MX23513	Film Appreciation	MC	3	0	0	3	0
4	MX23514	Introduction to Women and Gender Studies	MC	3	0	0	3	0

MANDATORY COURSES II

S.No.	Course Code	Course Title	Category	Periods Per Week			Total Contact Periods	Credits
				L	T	P		
1	MX23611	History of Science and Technology in India	MC	3	0	0	3	0
2	MX23612	Industrial Safety	MC	3	0	0	3	0
3	MX23613	State, Nation Building and Politics in India	MC	3	0	0	3	0
4	MX23614	Well Being with Traditional Practices -Yoga, Ayurveda and Siddha	MC	3	0	0	3	0

PROFESSIONAL ELECTIVE COURSES: VERTICALS

S. No.	Vertical 1	Vertical 2	Vertical 3	Vertical 4	Vertical 5	Vertical 6	Vertical 7
	Chip Design	**Signal Processing**	**Radio Frequency**	**Medical Devices**	**Internet of Things and 5G Technologies**	**Supply Chain Management For Industries**	**Cloud Computing**
1	**EC23V11** Analog IC Design	**EC23V21** Advanced Digital Signal Processing	**EC23V31** EMI/EMC Pre Compliance Testing	**EC23V41** Body Area Networks	**EC23V51** Advanced Wireless Communication Techniques	**ME23V61** Industry 5.0	**CS23V21** Cloud Solution Architecture
2	**EC23V12** Fundamentals of Nano Electronics	**EC23V22** Multimedia Data Compression and Storage	**EC23V32** MICs and RF System Design	**EC23V42** Brain Computer Interface and Applications	**EC23V52** Industrial IoT and Industry 5.0	**ME23V62** Planning in Logistics	**CS23V22** Cloud Configuration Management
3	**EC23V13** Low Power IC Design	**EC23V23** DSP Architecture and Programming	**EC23V13** Positioning and Navigation Systems	**EC23V43** Human Assist Devices	**EC23V53** IoT Based System Design	**ME23V63** Supply Chain Analytics	**CS23V23** Cloud Virtualization
4	**EC23V14** MEMS Design	**EC23V24** Image Processing	**EC23V34** Radar Technologies	**EC23V44** Medical Electronics	**EC23V54** IoT Processors	**ME23V64** Supply Chain Information System	**CS23V24** Cloud Container Orchestration
5	**EC23V15** Mixed Signal IC Design Testing	**EC23V25** Medical Image Analysis	**EC23V35** RFID System Design and Testing	**EC23V45** Medical Imaging Systems	**EC23V55** Massive MIMO Networks	**ME23V65** Supply Chain Management	**CS23V25** Cloud services Management
6	**EC23V16** Validation and Testing Technology	**EC23V26** Software Defined Radio	**EC23V36** RF Transceivers	**EC23V46** Telemedicine	**EC23V56** Optical Communication and Networks	**ME23V66** Supply Chain for Manufacturing	**CS23V26** Security and Privacy in Cloud
7	**EC23V17** VLSI Testing and Design for Testability	**EC23V27** Speech Processing	**EC23V37** Satellite Communication	**EC23V47** Therapeutic Equipment	**EC23V57** Wireless Sensor Network Design	**ME23V67** Sustainable Inventory Management	**CS23V27** Cloud Storage Technologies
8	**EC23V18** Semiconductor Materials, Devices & Characterization	**EC23V28** Remote Sensing	**EC23V38** Signal Integrity	**EC23V48** Wearable Devices	**EC23V58** 4G/5G Communication Networks	**ME23V68** Warehouse Automation	**CS23V28** Software Defined Networks

Registration of Professional Elective Courses from Verticals:

A student can choose all the Professional Elective Courses either from one of the verticals or a combination of courses from all verticals in a semester. However, students irrespective of enrolling for additional courses for B.E. / B. Tech. (Hons.) are not permitted to choose more than one course from a row. Students are permitted to enroll more than one elective course from the same vertical in a semester. In the subsequent semesters students are permitted to enroll one more course in a row, provided if he/she has cleared the earlier course of the same row.

PROFESSIONAL ELECTIVE COURSES: VERTICALS

VERTICAL 1: CHIP DESIGN

S.No.	Course Code	Course Title	Category	Periods Per Week			Total Contact Periods	Credits
				L	T	P		
1	EC23V11	Analog IC Design	PEC	3	0	0	3	3
2	EC23V12	Fundamentals of Nano electronics	PEC	3	0	0	3	3
3	EC23V13	Low Power IC Design	PEC	3	0	0	3	3
4	EC23V14	MEMS Design	PEC	3	0	0	3	3
5	EC23V15	Mixed Signal IC Design Testing	PEC	3	0	0	3	3
6	EC23V16	Validation and Testing Technology	PEC	3	0	0	3	3
7	EC23V17	VLSI Testing and Design for Testability	PEC	3	0	0	3	3
8	EC23V18	Semiconductor Materials, Devices & Characterization	PEC	3	0	0	3	3

VERTICAL 2: SIGNAL PROCESSING

S.No.	Course Code	Course Title	Category	Periods Per Week			Total Contact Periods	Credits
				L	T	P		
1	EC23V21	Advanced Digital Signal Processing	PEC	2	0	2	4	3
2	EC23V22	Multimedia Data Compression and Storage	PEC	2	0	2	4	3
3	EC23V23	DSP Architecture and Programming	PEC	2	0	2	4	3
4	EC23V24	Image Processing	PEC	2	0	2	4	3
5	EC23V25	Digital and Mobile Forensics	PEC	3	0	0	3	3
6	EC23V26	Software Defined Radio	PEC	2	0	2	4	3
7	EC23V27	Speech Processing	PEC	2	0	2	4	3
8	EC23V28	Remote Sensing	PEC	3	0	0	3	3

VERTICAL 3: RADIO FREQUENCY

S.No.	Course Code	Course Title	Category	Periods Per Week			Total Contact Periods	Credits
				L	T	P		
1	EC23V31	EMI/EMC Pre Compliance Testing	PEC	3	0	0	3	3
2	EC23V32	MICs and RF System Design	PEC	3	0	0	3	3
3	EC23V13	Positioning and Navigation Systems	PEC	3	0	0	3	3
4	EC23V34	Radar Technologies	PEC	3	0	0	3	3
5	EC23V35	RFID System Design and Testing	PEC	3	0	0	3	3
6	EC23V36	RF Transceivers	PEC	3	0	0	3	3
7	EC23V37	Satellite Communication	PEC	3	0	0	3	3
8	EC23V38	Signal Integrity	PEC	3	0	0	3	3

VERTICAL 4: MEDICAL DEVICES

S.No.	Course Code	Course Title	Category	Periods Per Week			Total Contact Periods	Credits
				L	T	P		
1	EC23V41	Body Area Networks	PEC	3	0	0	3	3
2	EC23V42	Brain Computer Interface and Applications	PEC	3	0	0	3	3
3	EC23V43	Human Assist Devices	PEC	3	0	0	3	3
4	EC23V44	Medical Electronics	PEC	3	0	0	3	3
5	EC23V45	Medical Imaging Systems	PEC	3	0	0	3	3
6	EC23V46	Telemedicine	PEC	3	0	0	3	3
7	EC23V47	Therapeutic Equipment	PEC	3	0	0	3	3
8	EC23V48	Wearable Devices	PEC	3	0	0	3	3

VERTICAL 5: INTERNET OF THINGS AND 5G TECHNOLOGY

S.No.	Course Code	Course Title	Category	Periods Per Week			Total Contact Periods	Credits
				L	T	P		
1	EC23V51	Advanced Wireless Communication Techniques	PEC	2	0	2	4	3
2	EC23V52	Industrial IoT and Industry 5.0	PEC	2	0	2	4	3
3	EC23V53	IoT Based System Design	PEC	3	0	0	3	3
4	EC23V54	IoT Processors	PEC	2	0	2	4	3
5	EC23V55	Massive MIMO Networks	PEC	2	0	2	4	3
6	EC23V56	Optical Communication and Networks	PEC	2	0	2	4	3
7	EC23V57	Wireless Sensor Network Design	PEC	3	0	0	3	3
8	EC23V58	4G/5G Communication Networks	PEC	2	0	2	4	3

VERTICAL 6: SUPPLY CHAIN MANAGEMENT FOR INDUSTRIES

S.No.	Course Code	Course Title	Category	Periods Per Week			Total Contact Periods	Credits
				L	T	P		
1	ME23V61	Industry 5.0	PEC	3	0	0	3	3
2	ME23V62	Planning in Logistics	PEC	3	0	0	3	3
3	ME23V63	Supply Chain Analytics	PEC	3	0	0	3	3
4	ME23V64	Supply Chain Information system	PEC	3	0	0	3	3
5	ME23V65	Supply Chain Management	PEC	3	0	0	3	3
6	ME23V66	Supply Chain for Manufacturing	PEC	3	0	0	3	3
7	ME23V67	Sustainable Inventory Management	PEC	3	0	0	3	3
8	ME23V68	Warehouse Automation	PEC	3	0	0	3	3

VERTICAL 7: CLOUD COMPUTING

S.No.	Course Code	Course Title	Category	Periods Per Week			Total Contact Periods	Credits
				L	T	P		
1	CS23V21	Cloud Solution Architecture	PEC	3	0	0	3	3
2	CS23V22	Cloud Configuration Management	PEC	3	0	0	3	3
3	CS23V23	Cloud Virtualization	PEC	3	0	0	3	3
4	CS23V24	Cloud Container Orchestration	PEC	3	0	0	3	3
5	CS23V25	Cloud services Management	PEC	3	0	0	3	3
6	CS23V26	Security and Privacy in Cloud	PEC	3	0	0	3	3
7	CS23V27	Cloud Storage Technologies	PEC	3	0	0	3	3
8	CS23V28	Software Defined Networks	PEC	3	0	0	3	3

OPEN ELECTIVES

(Students shall choose the Open Elective Courses, such that the course contents are not similar to any other course contents/title under other course categories).

OPEN ELECTIVES – I

S.No.	Course Code	Course Title	Category	Periods Per Week			Total Contact Periods	Credits
				L	T	P		
1	O23AD11	Programming for Data Science	OEC	3	0	0	3	3
2	O23AL11	Fundamentals of AI and ML	OEC	3	0	0	3	3
3	O23BT11	Mushroom Cultivation and Vermicomposting	OEC	3	0	0	3	3
4	O23CB11	Software Testing	OEC	3	0	0	3	3
5	O23CC11	AI for Robotics	OEC	3	0	0	3	3
6	O23CS11	Introduction to Cloud Computing	OEC	3	0	0	3	3
7	O23EC11	Space Engineering	OEC	3	0	0	3	3
8	O23EC12	IT in Agricultural System	OEC	3	0	0	3	3
9	O23EV11	Fundamentals of VLSI	OEC	3	0	0	3	3
10	O23MA11	Probability and Statistics for Data Analytics	OEC	3	0	0	3	3
11	O23ME11	Foundation of Robotics	OEC	3	0	0	3	3

OPEN ELECTIVES – II

S.No.	Course Code	Course Title	Category	Periods Per Week			Total Contact Periods	Credits
				L	T	P		
1	O23AD21	Data Science Fundamentals	OEC	3	0	0	3	3
2	O23AL21	Fundamentals of Data Analytics	OEC	3	0	0	3	3
3	O23BT21	Biofuels	OEC	3	0	0	3	3
4	O23CB21	Essentials of Digital Marketing	OEC	3	0	0	3	3
5	O23CC21	Space Science	OEC	3	0	0	3	3
6	O23CS21	Introduction to Cyber Security	OEC	3	0	0	3	3
7	O23EC21	Wearable Devices and its Applications	OEC	3	0	0	3	3
8	O23EC22	Introduction to IoT	OEC	3	0	0	3	3
9	O23EV21	Electrical, Electronics and Magnetic Materials	OEC	3	0	0	3	3
10	O23MA21	Optimization Techniques	OEC	3	0	0	3	3
11	O23ME21	Mechanical Foundations of Mechatronic Systems	OEC	3	0	0	3	3

OPEN ELECTIVES – III

S.No.	Course Code	Course Title	Category	Periods Per Week			Total Contact Periods	Credits
				L	T	P		
1	O23AD31	AI for Industrial Applications	OEC	3	0	0	3	3
2	O23AL31	Information Technology Essentials	OEC	3	0	0	3	3
3	O23BT31	Forensic Technology	OEC	3	0	0	3	3
4	O23CB31	Start-up and Innovations	OEC	3	0	0	3	3
5	O23CC31	Introduction to R Programming	OEC	3	0	0	3	3
6	O23CS31	Introduction to Blockchain	OEC	3	0	0	3	3
7	O23EC31	Batteries and Management Systems	OEC	3	0	0	3	3
8	O23EC32	Basics of Biomedical Instrumentation	OEC	3	0	0	3	3
9	O23EV31	HDL Programming	OEC	3	0	0	3	3
10	O23MA31	Multivariate Data Analysis	OEC	3	0	0	3	3
11	O23ME31	Introduction to 3D Printing Technologies	OEC	3	0	0	3	3

SUMMARY

Name of the Programme: B. E. ELECTRONICS ENGINEERING (VLSI DESIGN AND TECHNOLOGY)										
S.No	Subject Area	Credits per Semester								Total Credits
		I	II	III	IV	V	VI	VII	VIII	
1	HSMC	3	2	-	-	-	-	5	-	10
2	BSC	8	8	2	4	-	-	-	-	22
3	ESC	5	8	-	-	-	-	-	-	13
4	PCC	4	4	15	18	15	8	6	-	70
5	PEC	-	-	-	-	6	6	6	-	18
6	OEC	-	-	-	-	-	6	-	3	9
7	EEC	-	1	1	1	1	2	2	10	18
8	Non-Credit/ (Mandatory)	-	-	-	-	-	-	-	-	-
Total		20	23	18	23	22	22	19	13	160

ENROLLMENT FOR B.E. / B. TECH. (HONOURS) /MINOR DEGREE (OPTIONAL)

A student can also optionally register for additional courses (18 credits) and become eligible for the award of B.E. / B. Tech. (Honours) or Minor Degree.

For B.E. / B. Tech. (Honours), a student shall register for the additional courses (18 credits) from semester V onwards. These courses shall be from the same vertical or a combination of different verticals of the same programme of study only.

For minor degree, a student shall register for the additional courses (18 credits) from semester V onwards. All these courses have to be in a particular vertical from any one of the other programmes, Moreover, for minor degree the student can register for courses from any one of the following verticals also.

VERTICALS FOR MINOR DEGREE
(In addition to all the verticals of other programmes)

(Choice of courses for Minor degree is to be made from any one vertical of other programmes or from anyone of the following verticals)

MINOR COURSES VERTICALS

S. No.	Vertical 1	Vertical 2	Vertical 3	Vertical 4	Vertical 5
	Fintech and Blockchain	**Entrepreneurship**	**Business Data Analytics**	**Internet of Things**	**Quantum Technologies**
1	**CS23M01** Banking, Financial Services and Insurance	**ME23M01** Foundations of Entrepreneurship	**CB23M01** Data mining for Business Intelligence	**EC23M01** IoT Architecture	**VL23M01** **Mathematical** Foundations for Quantum Computing
2	**CS23M02** Principles of Financial Management	**ME23M02** Team Building and Leadership Management for Business	**CB23M02** Financial Analytics	**EC23M02** IoT Device Programming	**VL23M02** Fundamentals of Quantum Computing
3	**CS23M03** Fintech Personal finance and payments	**ME23M03** Creativity and Innovation in Entrepreneurship	**CB23M03** Human Resource Analytics	**EC23M03** IoT Foundations	**VL23M03** Quantum Materials
4	**CS23M04** Fundamentals of Investment	**ME23M04** Principles of Marketing Management for Business	**CB23M04** Marketing and Social Media Web Analytics	**EC23M04** Industrial Internet of Things	**VL23M04** Quantum Information Science
5	**CS23M05** Introduction to Blockchain and its Applications	**ME23M05** Human Resource Management for Entrepreneur	**CB23M05** Operation and Supply Chain Analytics	**EC23M05** IoT Protocols	**VL23M05** Quantum Measurement and Control
6	**CS23M06** Introduction to Fintech	**ME23M06** Financing New Business Ventures	**CB23M06** Statistics for Management	**EC23M06** Sensor Technologies and IoT	**VL23M06** Quantum Communication
7					**VL23M07** Quantum Optics
8					**VL23M08** Quantum Cryptography

VERTICAL 1: FINTECH AND BLOCKCHAIN

S.No.	Course Code	Course Title	Category	Periods Per Week			Total Contact Periods	Credits
				L	T	P		
1	CS23M01	Banking, Financial Services and Insurance	PEC	3	0	0	3	3
2	CS23M02	Principles of Financial Management	PEC	3	0	0	3	3
3	CS23M03	Fintech Personal finance and payments	PEC	3	0	0	3	3
4	CS23M04	Fundamentals of Investment	PEC	3	0	0	3	3
5	CS23M05	Introduction to Blockchain and its Applications	PEC	3	0	0	3	3
6	CS23M06	Introduction to Fintech	PEC	3	0	0	3	3

VERTICAL 2: ENTREPRENEURSHIP

S.No.	Course Code	Course Title	Category	Periods Per Week			Total Contact Periods	Credits
				L	T	P		
1	ME23M01	Foundations of Entrepreneurship	PEC	3	0	0	3	3
2	ME23M02	Team Building and Leadership Management for Business	PEC	3	0	0	3	3
3	ME23M03	Creativity and Innovation in Entrepreneurship	PEC	3	0	0	3	3
4	ME23M04	Principles of Marketing Management for Business	PEC	3	0	0	3	3
5	ME23M05	Human Resource Management for Entrepreneur	PEC	3	0	0	3	3
6	ME23M06	Financing New Business Ventures	PEC	3	0	0	3	3

VERTICAL 3: BUSINESS DATA ANALYTICS

S.No.	Course Code	Course Title	Category	Periods Per Week			Total Contact Periods	Credits
				L	T	P		
1	CB23M01	Data Mining for Business Intelligence	PEC	3	0	0	3	3
2	CB23M02	Financial Analytics	PEC	3	0	0	3	3
3	CB23M03	Human Resource Analytics	PEC	3	0	0	3	3
4	CB23M04	Marketing and Social Media Web Analytics	PEC	3	0	0	3	3
5	CB23M05	Operation and Supply Chain Analytics	PEC	3	0	0	3	3
6	CB23M06	Statistics for Management	PEC	3	0	0	3	3

VERTICAL 4: INTERNET OF THINGS

S.No.	Course Code	Course Title	Category	Periods Per Week			Total Contact Periods	Credits
				L	T	P		
1	EC23M01	IoT Architecture	PEC	3	0	0	3	3
2	EC23M02	IoT Device Programming	PEC	3	0	0	3	3
3	EC23M03	IoT Foundations	PEC	3	0	0	3	3
4	EC23M04	Industrial Internet of Things	PEC	3	0	0	3	3
5	EC23M05	IoT Protocols	PEC	3	0	0	3	3
6	EC23M06	Sensor Technologies and IoT	PEC	3	0	0	3	3

VERTICAL 5: QUANTUM TECHNOLOGIES

S.No.	Course Code	Course Title	Category	Periods Per Week			Total Contact Periods	Credits
				L	T	P		
1	VL23M01	Mathematical Foundations for Quantum Computing	PEC	3	0	0	3	3
2	VL23M02	Fundamentals of Quantum Computing	PEC	3	0	0	3	3
3	VL23M03	Quantum Materials	PEC	3	0	0	3	3
4	VL23M04	Quantum Information Science	PEC	2	0	2	4	3
5	VL23M05	Quantum Measurement and Control	PEC	3	0	0	3	3
6	VL23M06	Quantum Communication	PEC	2	0	2	4	3
7	VL23M07	Quantum Optics	PEC	3	0	0	3	3
8	VL23M08	Quantum Cryptography	PEC	3	0	0	3	3