KUMARAGURU COLLEGE OF TECHNOLOGY

An Autonomous Institution Affiliated to Anna University, Chennai

COIMBATORE – 641 049

B.E. ELECTRONICS & INSTRUMENTATION ENGINEERING

REGULATIONS 2024

I TO VIII SEMESTERS

CURRICULUM

Department of

Electronics & Instrumentation Engineering

VISION

The Department of Electronics & Instrumentation Engineering (E&I) envisions a holistic education that transforms the learners into responsible engineers, enabling them to identify significant problems in industry and society to arrive at creative and sustainable solutions through collaborative team efforts.

MISSION

The Department of Electronics & Instrumentation Engineering (E&I) aims to

- Implement a modern pedagogical approach in academics, innovative research initiatives, and collaborative projects that ethically address societal needs.
- Develop knowledge and skills required to excel in manufacturing, automation and allied industries on a global platform.
- Expand the knowledge for higher studies and get inspired for lifelong learning.

PROGRAMME EDUCATIONAL OBJECTIVES

After a few years of graduation, Graduates of B.E. (Electronics & Instrumentation Engineering) will

PEO 1: Excel in a technical and professional career with core competence in automation.

PEO 2: Possess the passion for professional development by continuous learning in allied Engineering and Management fields.

PEO 3: Engage in resolving industrial and social issues using contemporary tools.

PEO 4: Exhibit professionalism and ethical attitude towards resolving automation issues to society at large.

PROGRAMME SPECIFIC OUTCOMES

Graduates of B.E. (Electronics & Instrumentation Engineering) will be able to:

PSO 1: Develop, analyse and calibrate Instruments and electronic systems for various real-world applications, adhering to ISA ethical codes.

PSO 2 : Integrate programmable logic controllers (PLC), distributed control systems (DCS) for manufacturing and processing systems and gain proficiency in relevant software tools.

PROGRAMME OUTCOMES

Graduates of B.E. (Electronics & Instrumentation Engineering) will be able to:

PO1: Engineering Knowledge: Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.

PO2: Problem Analysis: Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4)

PO3: Design/Development of Solutions: Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)

PO4: Conduct Investigations of Complex Problems: Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions. (WK8).

PO5: Engineering Tool Usage: Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6)

PO6: The Engineer and The World: Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7).

PO7: Ethics: Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)

PO8: Individual and Collaborative Team work: Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.

PO9: Communication: Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences

PO10: Project Management and Finance: Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.

PO11: Life-Long Learning: Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change. (WK8)

KNOWLEDGE AND ATTITUDE PROFILE (WK)

WK1: A systematic, theory-based understanding of the natural sciences applicable to the discipline and awareness of relevant social sciences.

WK2: Conceptually-based mathematics, numerical analysis, data analysis, statistics and formal aspects of computer and information science to support detailed analysis and modelling applicable to the discipline.

WK3: A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline.

WK4: Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline.

WK5: Knowledge, including efficient resource use, environmental impacts, whole-life cost, re-use of resources, net zero carbon, and similar concepts, that supports engineering design and operations in a practice area.

WK6: Knowledge of engineering practice (technology) in the practice areas in the engineering discipline.

WK7: Knowledge of the role of engineering insociety and identified issues in engineering practice in the discipline, such as the professional responsibility of an engineer to public safety and sustainable development.

WK8: Engagement with selected knowledge in the current research literature of the discipline, awareness of the power of critical thinking and creative approaches to evaluate emerging issues.

WK9: Ethics, inclusive behaviour and conduct. Knowledge of professional ethics, responsibilities, and norms of engineering practice. Awareness of the need for diversity by reason of ethnicity, gender, age, physical ability etc. with mutual understanding and respect, and of inclusive attitudes.

KUMARAGURU COLLEGE OF TECHNOLOGY

DEPARTMENT OF ELECTRONICS & INSTRUMENTATION ENGINEERING

REGULATION 2024

B.E. Electronics & Instrumentation Engineering – Curriculum

Semester I

S. No.	Course Code	Course Title	Course Mode	Course Category	L	T	P	J	C
1	24HST101	Heritage of Tamil	Theory	HS	1	0	0	0	1
2	24MAI113	Linear Algebra and Multivariate Calculus	Embedded	BS	3	0	2	0	4
3	24CYI101	Electronic Materials Chemistry	Embedded	BS	3	0	2	0	4
4	24MEI103	Computer-Aided Engineering Graphics	Embedded	ES	2	0	2	0	3
5	24MET105	Basics of Engineering Mechanics	Theory	ES	3	0	0	0	3
6	24ADP001	Basics of Artificial Intelligence	Practical	ES	0	0	2	0	1
7	24INP102	Innovation Practicum - 1	Practical	ES	0	0	2	0	1
8	24HSP111	Holistic Wellness - 1	Practical	HS	0	0	2	0	1
9	24INP101	Design Thinking	Practical	ES	0	0	2	0	1
10	24INO1--	FCLF General Stack - 1	Practical	OE	0	0	2	0	1
								Total Credits	**20**
								Total Contact Hours/Week	**28**

Semester II

S. No.	Course Code	Course Title	Course Mode	Course Category	L	T	P	J	C
1	24HST102	Tamils and Technology	Theory	HS	1	0	0	0	1
2	24HST103/ 24HST104	Effective Communication / Professional Communication	Theory	HS	2	0	0	0	2
3	24MAI123	Computational Differential Equations	Embedded	BS	3	0	2	0	4
4	24PHI102	Applied Physics for Circuit Engineering	Embedded	BS	3	0	2	0	4
5	24CSI101	Logical Thinking and Problem Solving	Embedded	ES	3	0	2	0	4
6	24BTT001	Biology for Engineers	Theory	BS	1	0	0	0	1
7	24EII101	Semiconductor Devices and Applications	Embedded	PC	3	0	2	0	4
8	24INP103	Innovative Practicum - 2	Practical	ES	0	0	2	0	1
9	24HSP112	Holistic Wellness - 2	Practical	HS	0	0	2	0	1
10	24INO1---	FCLF General Stack - 2	Practical	OE	0	0	2	0	1
								Total Credits	**23**
								Total Contact Hours/Week	**30**

Semester III									
S. No.	**Course Code**	**Course Title**	**Course Type**	**Course Category**	**L**	**T**	**P**	**J**	**C**
1	24HSP005	Mastering Conversations	Theory	HS	0	0	2	0	1
2	24MAI233	Probability and Applied Statistics	Embedded	BS	3	0	2	0	4
3	24MET205	Thermodynamics & Fluid Mechanics	Theory	ES	3	0	0	0	3
4	24EII201	Electronic Circuit Design	Embedded	PC	3	0	2	0	4
5	24EII202	Sensors and Transducers	Embedded	PC	3	0	2	0	4
6	24EII203	Electrical Machines and Measurement Systems	Embedded	ES	2	0	2	0	3
7	24INP201	Innovation Practicum -3	Practical	ES	0	0	0	2	1
8	24INO---	FCLF – General Stack - 3	Theory	OE	1	0	0	0	1
9	24INM201	Universal Human Values - 2	Theory	HS	1	0	0	0	1
10	24EIJ204	Internship/Camps/MiniProjects-1	Project	PC	0	0	0	2	1
								Total Credits	**23**
								Total Contact Hours/Week	**27**

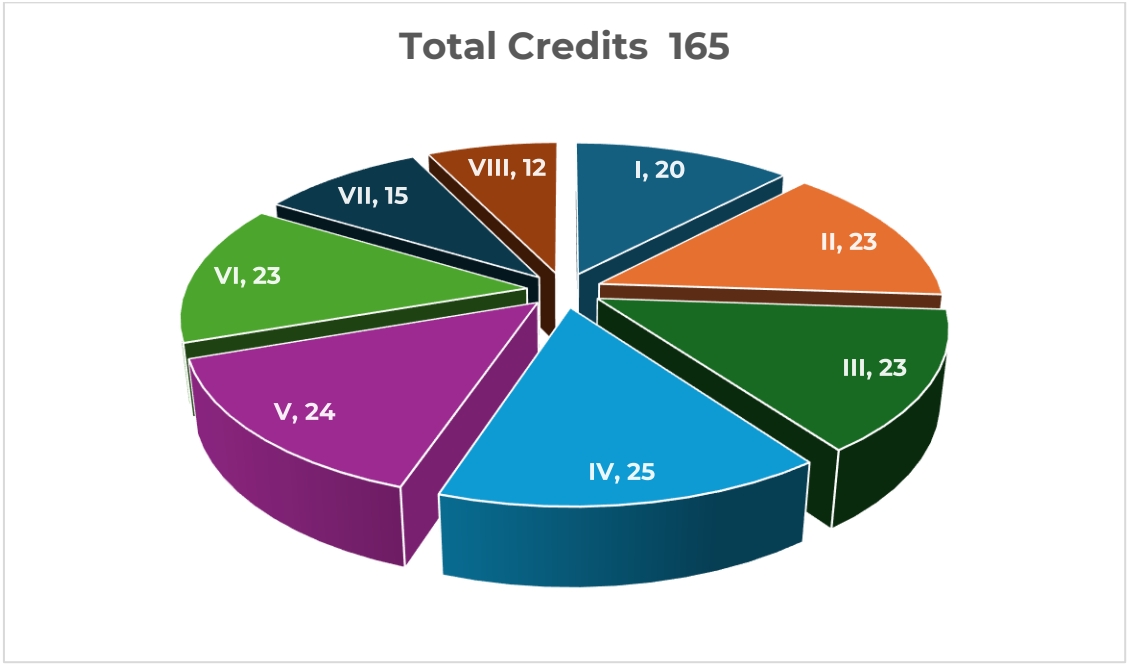
Semester IV									
S. No.	**Course Code**	**Course Title**	**Course Type**	**Course Category**	**L**	**T**	**P**	**J**	**C**
1	24HSP006	Mastering Group Discussion and Presentation Skills	Theory	HS	0	0	2	0	1
2	24ECI203	Linear Integrated Circuits	Embedded	PC	3	0	2	0	4
3	24EEI204	Digital System Design	Embedded	PC	3	0	2	0	4
4	24EII204	Signal Processing	Embedded	PC	3	0	2	0	4
5	24EII205	Microcontroller and Applications	Embedded	PC	2	0	2	0	3
6	24EII206	Control Panel Design and Relay Logic System	Embedded	PC	2	0	2	0	3
7	24INO---	FCLF – Tech. Stack - 1	Theory	OE	1	0	0	0	1
8	24INO---	FCLF – Emerging Tech Stack - 1	Theory	OE	1	0	0	0	1
9	24INP202	Innovation Practicum - 4	Practical	ES	0	0	2	0	1
10	24INM202	Environmental Science & Sustainability	Theory	BS	2	0	0	0	2
11	24INMXXY	Indian Knowledge System	Theory	HS	1	0	0	0	1
								Total Credits	**25**
								Total Contact Hours/Week	**30**

Semester V									
S. No.	**Course code**	**Course Title**	**Course Type**	**Course Category**	**L**	**T**	**P**	**J**	**C**
1	24HSTP007	Building Professional Readiness	Theory	HS	0	0	2	0	1
2	24EIT301	Field Instrumentation	Embedded	PC	2	0	2	0	3
3	24EIT302	Embedded Microcontrollers	Embedded	PC	2	0	2	0	3
4	24EII303	Control systems	Embedded	PC	3	0	2	0	4
5	24EII304	Industrial Automation	Embedded	PC	2	0	2	0	3
6	24EIT305	Object-Oriented Programming and Data Structures	Theory	PC	3	0	0	0	3
7	24INO---	FCLF – Tech. Stack - 2	Theory	OE	1	0	0	0	1
8	24INO---	FCLF – Emerging Tech Stack - 2	Theory	OE	1	0	0	0	1
9	24EIE---	Professional Elective - 1	Theory	PE	3	0	0	0	3
10	24EIJ306	Internships/Camps/Mini Projects - 2	Project	PC	0	0	0	4	2
								Total Credits	**24**
								Total Contact Hours/Week	**30**

Semester VI									
S. No.	**Course Code**	**Course Title**	**Course Type**	**Course Category**	**L**	**T**	**P**	**J**	**C**
1	24EII307	VLSI Design	Embedded	PC	2	0	2	0	3
2	24EII308	Process Dynamics and Control	Embedded	PC	3	0	2	0	4
3	24EII309	Robotics and Automation	Embedded	PC	2	0	2	0	3
4	24HS---	Industrial Communication and Networking	Theory	HS	3	0	0	0	3
5	24EIE---	Professional Elective - 2	Theory	PE	3	0	0	0	3
6	24EIE---	Professional Elective - 3	Theory	PE	3	0	0	0	3
7	24INO---	FCLF – Tech Stack - 3	Theory	OE	1	0	0	0	1
8	24INO---	FCLF – Emerging Tech Stack - 3	Theory	OE	1	0	0	0	1
9	24HS----	Indian/Foreign Languages	Theory	HS	2	0	0	2	2
10		Indian Constitution	Theory	HS	2	0	0	0	0
								Total Credits	**23**
								Total Contact Hours/Week	**30**

Semester VII									
S. No.	**Course Code**	**Course Title**	**Course Type**	**Course Category**	**L**	**T**	**P**	**J**	**C**
1	24HS----	Project Management and Finance	Theory	HS	3	0	0	0	3
2	24EIE---	Professional Elective - 4	Theory	PE	3	0	0	0	3
3	24EIE---	Professional Elective - 5	Theory	PE	3	0	0	0	3
4	24EIE---	Professional Elective - 6	Theory	PE	3	0	0	0	3
5	24EIJ401	Capstone Project Phase-1I / Industrial Internship	Project	PJ	0	0	0	6	3
								Total Credits	**15**
								Total Contact Hours/Week	**18**
Semester VIII									
S. No.	**Course Code**	**Course Title**	**Course Type**	**Course Category**	**L**	**T**	**P**	**J**	**C**
1	24EIJ402	Capstone Project Phase -2/ Industrial Internship	Project	PJ	0	0	0	24	12
								Total Credits	**12**
								Total Contact Hours/Week	**24**

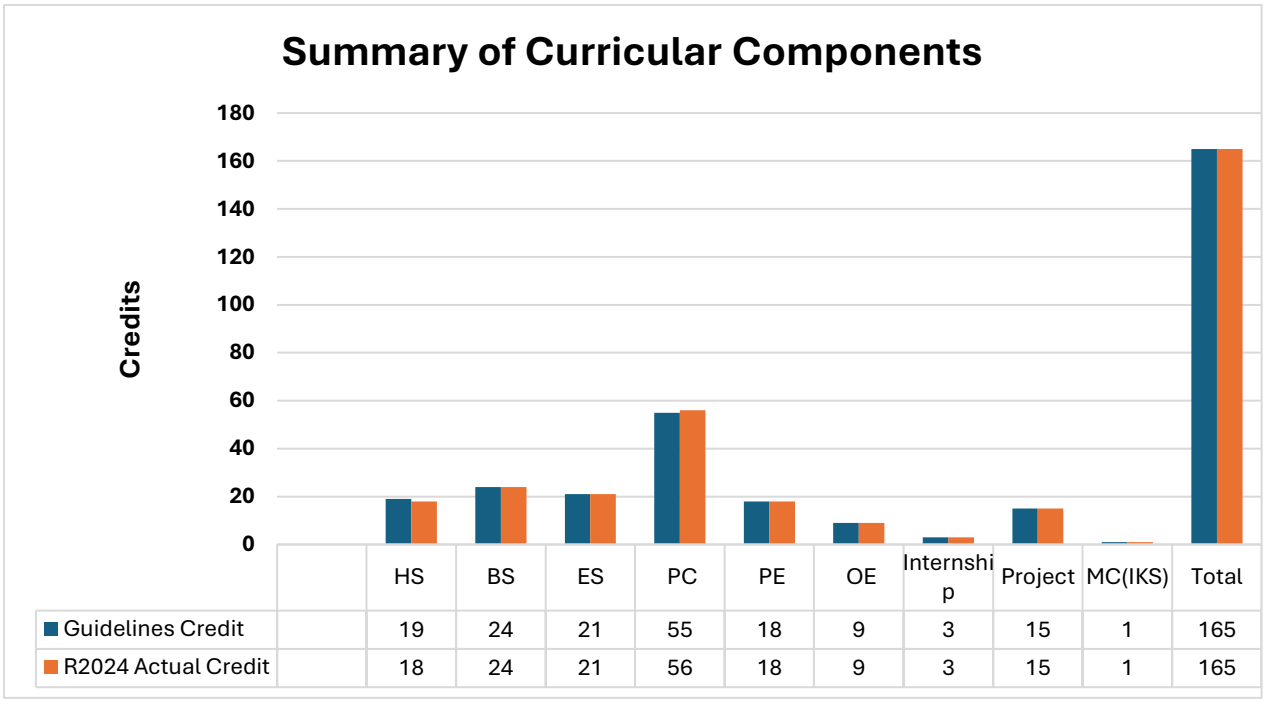
Semester	**I**	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**
Credits/Semester	**20**	**23**	**23**	**25**	**24**	**23**	**15**	**12**
							Total Credits	**165**



Institutional Mandatory Courses										
Sl. No.	**Course Code**	**Course Title**	**Course Mode**	**Course Category**	**L**	**T**	**P**	**J**	**C**	**Sem**
1	24INM001	Indian Knowledge Systems (IKS)-1	Theory	HS	1	0	0	0	0	**I/II**
2	24INM---	Indian Knowledge Systems (IKS)-2	Theory	HS					1	**IV**
3	24INM---	Indian Constitution	Theory	HS	2	0	0	0	0	**IV**

Summary

Category	Guidelines Credit	R2024 Actual Credit
Humanities & Social Sciences - HS	18	18
Basic Sciences - BS	24	24
Engineering Sciences - ES	22	21
Professional Cores – PC	55	56
Professional Electives – PE	18	18
Open Electives – OE	9	9
Internship	3	3
Project	15	15
Mandatory courses (Indian Knowledge System, Indian Constitution, UHV-I)	1	1
Total	**165**	**165**



Professional Electives									
S.No	**Couse Code**	**Course Title**	**Course Mode**	**CT**	**L**	**T**	**P**	**J**	**C**
TRACK-I Automation									
1	24EIE001	Power Electronics	Theory	PE	3	0	0	0	3
2	24EIE002	Real Time Operating Systems (RTOS)	Theory	PE	3	0	0	0	3
3	24EIE003	Human Machine Interfaces	Embedded	PE	2	0	2	0	3
4	24EIE004	Robotics and Flexible Automation	Theory	PE	3	0	0	0	3
5	24EIE005	Digital Manufacturing	Theory	PE	3	0	0	0	3
6	24EIC006	Industry 4.0 and beyond	Embedded	PE	1	0	0	4	3
7	24EIE007	Hybrid and Electric Vehicles	Theory	PE	3	0	0	0	3
8	24EIE008	Smart Farming	Embedded	PE	2	0	0	2	3
9	24EIE009	Augmented Reality and Virtual Reality	Embedded	PE	2	0	2	0	3
10	24EIE010	Building Automation	Theory	PE	3	0	0	0	3

TRACK-II -Advanced Control Instrumentation									
S.No	**Couse Code**	**Course Title**	**Course Mode**	**CT**	**L**	**T**	**P**	**J**	**C**
1	24EIE021	Analytical Instrumentation	Embedded	PE	2	0	2	0	3
2	24EIE022	System Identification, Modelling and Simulation	Embedded	PE	2	0	2	0	3
3	24EIE023	Adaptive Control	Embedded	PE	2	0	0	2	3
4	24EIE024	Optimal and Robust Control	Theory	PE	3	0	0	0	3
5	24EIE025	Advanced Intelligent Controllers	Theory	PE	3	0	0	0	3
6	24EIE026	Fault Detection and Diagnosis	Embedded	PE	2	0	2	0	3
7	24EIE027	Machine Monitoring System	Embedded	PE	2	0	2	0	3
8	24EIE028	Fibre Optics Instrumentation	Theory	PE	3	0	0	0	3
9	24EIE029	Power Plant Instrumentation	Theory	PE	3	0	0	0	3
10	24EIE030	Instrumentation in Petrochemical Industry	Theory	PE	3	0	0	0	3
11	24EIE031	Aircraft Instrumentation	Theory	PE	3	0	0	0	3
12	24EIE032	Automotive Instrumentation	Theory	PE	3	0	0	0	3
13	24EIE033	MEMS and Sensor Design	Embedded	PE	2	0	2	0	3

Track III Health Care Instrumentation									
S. No.	**Couse Code**	**Course Title**	**Course Mode**	**CT**	**L**	**T**	**P**	**J**	**C**
1	24EIE041	Bio Sensors and Medical Instrumentation	Embedded	PE	2	0	2	0	3
2	24EIE042	Bio Signal Processing	Embedded	PE	2	0	2	0	3
3	24EIE043	Biomedical Signal Analysis for Remote Monitoring	Embedded	PE	2	0	2	0	3
4	24EIE044	Bio-MEMS and Lab-on-Chip Devices	Theory	PE	3	0	0	0	3
5	24EIE045	Embedded Systems in Biomedical Devices	Theory	PE	3	0	0	0	3
6	24EIE046	Internet of Medical Things (IoMT)	Embedded	PE	2	0	0	2	3
7	24EIE047	Smart Healthcare Systems and Telemedicine	Theory	PE	3	0	0	0	3
8	24EIE048	Flexible and Wearable Electronics	Embedded	PE	2	0	0	2	3
9	24EIE049	Robotics for Surgery and Rehabilitation	Theory	PE	3	0	0	0	3

Track IV Robotics and Automation									
S. No.	**Couse Code**	**Course Title**	**Course Mode**	**CT**	**L**	**T**	**P**	**J**	**C**
1	24EIE061	Basics of Robotics and Mechanisms	Theory	PE	3	0	0	0	3
2	24EIE062	Robotics and Flexible Automation	Embedded	PE	2	0	2	0	3
3	24EIE063	Industrial Robotics	Embedded	PE	2	0	2	0	3
4	24EIE064	Robot Programming and Simulation	Embedded	PE	2	0	2	0	3
5	24EIE065	Autonomous Systems and Path Planning	Embedded	PE	2	0	0	2	3
6	24EIE066	Machine Vision and Image Processing for Robotics	Embedded	PE	2	0	2	0	3
7	24EIE067	Human-Machine Interaction	Embedded	PE	2	0	0	2	3
8	24EIE068	Collaborative Robots (Cobots)	Embedded	PE	2	0	2	0	3
9	24EIE069	Mobile Robotics	Embedded	PE	2	0	2	0	3
10	24EIE070	Robotics in Healthcare	Theory	PE	3	0	0	0	3

TRACK V Industrial Process Management									
S. No.	**Couse Code**	**Course Title**	**Course Mode**	**Course Category**	**L**	**T**	**P**	**J**	**C**
1.	24EIE081	Safety Instrumented Systems and Hazardous Operations	Theory	PE	3	0	0	0	3
2.	24EIE082	Optimization Techniques	Theory	PE	3	0	0	0	3
3.	24EIE083	Financial Management	Theory	PE	3	0	0	0	3
4.	24EIE084	Total Quality Management	Theory	PE	3	0	0	0	3
5.	24EIE085	Blockchain and Supply Chain Management	Theory	PE	3	0	0	0	3
6.	24EIE086	Product Design and Development	Embedded	PE	1	0	0	4	3
7.	24EIC087	Lean Manufacturing and Six Sigma	Embedded	PE	2	0	2	0	3
8.	24EII088	Project Management for Engineers	Embedded	PE	2	0	0	2	3
9.	24EII089	Sustainable Industrial Practices	Theory	PE	3	0	0	0	3

Minor Specialisation - Industrial Automation (OFFERED TO STUDENTS OF OTHER DEPARTMENTS)									
S.No	**Course code**	**Course Title**	**Course Mode**	**CT**	**L**	**T**	**P**	**J**	**C**
1.	24EIT330	Introduction to Industrial Automation	Theory	PC	3	0	0	0	3
2.	24EIT331	Basics of Sensor and Transducer	Theory	PC	3	0	0	0	3
3.	24EIT332	Process Control and Instrumentation	Theory	PC	3	0	0	0	3
4.	24EIT333	PLC Programming and Applications	Theory	PC	3	0	0	0	3
5.	24EIT334	SCADA Systems and Applications	Theory	PC	3	0	0	0	3
6.	24EIT335	Distributed Control Systems	Theory	PC	3	0	0	0	3
7.	24EIT336	Industrial Internet of Things	Theory	PC	3	0	0	0	3
8.	24EIT337	Industrial Communication Protocols	Theory	PC	3	0	0	0	3

Honours Specialisation										
S.No.	Course code	Course Title	Course Mode	CT	L	T	P	J	C	Suggested Sem
1.	24EIE022	System Identification, Modelling and Simulation	Embedded	PC	2	0	2	0	3	V
2.	24EIE023	Adaptive Control	Embedded	PC	2	0	0	2	3	VI
3.	24EIE025	Advanced Intelligent Controllers	Theory	PC	3	0	0	0	3	VI
4.	24EIE026	Fault Detection and Diagnosis	Embedded	PC	2	0	2	0	3	VII
5.	24EIE033	MEMS and Sensor Design	Embedded	PC	2	0	2	0	3	VII
6.	24EIE028	Fibre Optics Instrumentation	Theory	PC	3	0	0	0	3	VIII

This honours track is ideally suited for students aspiring to pursue *higher studies (M.Tech./MS/PhD)* **in**

- ***Instrumentation,***
- ***Smart Systems,***
- ***Intelligent Control, or***
- ***Mechatronics***

Contribute to R&D in

- **Aerospace,**
- **Healthcare,**
- **Process Automation, or**
- **Energy Sectors**

as well as for careers in

- **smart manufacturing**,
- **IIoT**, or
- **cyber-physical instrumentation**

Credits may vary from 4 credits, 3 credits and 2 credits, allowing a total of a minimum 18 credits for Honours.