CURRICULUM 2023 (Autonomous)

Draft

Version 1.0

B.TECH
ELECTRICAL AND COMPUTER ENGINEERING

MAR BASELIOS COLLEGE OF ENGINEERING AND TECHNOLOGY

Mar Ivanios Vidyanagar, Nalanchira, Thiruvananthapuram – 695 015

August 2023

CURRICULUM

FOR

B. TECH DEGREE PROGRAMME

IN

ELECTRICAL AND COMPUTER ENGINEERING

SEMESTERS I to VIII

2023 SCHEME

(AUTONOMOUS)

MAR BASELIOS COLLEGE OF ENGINEERING AND TECHNOLOGY
(Approved by AICTE, Autonomous Institution Affiliated to APJ Abdul Kalam Technological University)
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MAR BASELIOS COLLEGE OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Vision and Mission of the Institution

Vision:

To be an Institution moulding globally competent professionals as epitomes of Noble Values.

Mission:

To transform the Youth as technically competent, ethically sound and socially committed professionals, by providing a vibrant learning ambience for the welfare of humanity.

Vision and Mission of the Department

Vision:

To be a Centre of Excellence in Electrical & Electronics Engineering Education, Research and Application of knowledge to benefit the society at large.

Mission:

To mould quality Electrical Engineers, fostering creativity and innovation to address global issues.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEO1: Graduates will succeed as Engineering Professionals in Industry or as Entrepreneurs in Electrical and Computer Engineering and the related disciplines and exhibit an urge for innovation.

PEO2: Graduates will be able to adapt to the advances in Technology by acquiring knowledge and skills manifested through continuous learning and higher qualifications.

PEO3: Graduates will be serving community as socially committed individuals, exhibiting professional ethics in addressing the technical and engineering challenges.

PROGRAMME OUTCOMES (POs)

Engineering graduates will be able to:

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 and responsibilities and norms of the engineering practice.
9. **Individual and team work**: 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.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

PSO1: To apply the knowledge in Electrical Engineering and Computer Engineering for the design, development testing and operation of Power and Energy Systems in the areas of Generation, Transmission, Conversion, Distribution and Utilization systems.

PSO2: To apply the knowledge in Electrical Engineering and Computer Engineering for the design, development and operation of Industrial systems in the areas of Automation, Control, Energy Management and Economic operation.

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

B.TECH. PROGRAMME IN ELECTRICAL AND COMPUTER ENGINEERING

For the students admitted from 2023-24

SCHEDULING OF COURSES

i) Knowledge Segments and Credits

Every course of BTech Programme is placed in one of the nine categories as listed in table below. No semester shall have more than six lecture-based courses and two laboratory courses, and/or drawing/seminar/project courses in the curriculum.

Table 1: Credit distribution and the Knowledge Domains

Sl. No.	Category	Category Code	Proposed 2023 Curriculum
1	Humanities and Social Sciences including Management Courses	HSC	9
2	Basic Science Courses	BSC	26
3	Engineering Science Courses	ESC	22
4	Programme Core Courses,	PCC	66
5	Programme Elective Courses	PEC	18
6	Institute Elective Courses	OEC	6
7	Seminar, Mini Project, Project Work and Comprehensive Course Viva Voce	PWS	13
8	Mandatory Non-credit Courses (P/F) with Grade	MNC	---
9	Mandatory Student Activities (P/F)	MSA	1+1+1
Total Mandatory Credits			**163**
Value Added Courses (Optional) – Honours/Minor		VAC	15

ii) Semester-wise Credit Distribution

Semester	***I***	***II***	***III***	***IV***	***V***	***VI***	***VII***	***VIII***	***Total***
Credits for Courses	*18*	*20*	*22*	*22*	*21*	*21*	*18*	*18*	***160***
Year wise Credit	***38***		***44***		***42***		***36***		***160***
Credits for Activities	*3*								***3***
Total Credits									***163***
Value Added Courses (Optional) – Honours / Minor									***15***
Total Credits									***178***

Humanities and Social Sciences including Management Courses: Universal Human Values, Management for Engineers, Business Economics and Accountancy.
Basic Science Courses: Mathematics, Engineering Physics, Engineering Chemistry, Engineering Physics and Chemistry Labs.
Engineering Science Courses: Basics of Electrical and Electronics Engineering, Engineering Mechanics, Engineering Graphics, Design Engineering, Programming in Python, Problem Solving and programming in C, Manufacturing and Construction Practices B, Electrical and Electronics Workshop.
Mandatory Non-credit Courses: Environmental Science, Professional Communication, Professional Ethics, Industrial Safety Engineering.

v) General Guidelines

Four hours are kept exclusively for the Remedial / Minor/ Honours courses from third to seventh semester. For the mini project of Minor or Honours in S7/S8, 7 hours are allotted. If a student does not opt for Minor/Honours courses, he/she can be given remedial classes.

SEMESTER I						
Slot	**Category Code**	**Course Code**	**Courses**	**L-T-P-J**	**Hours**	**Credit**
A	BSC	23MAL10A	Linear Algebra and Calculus	3-1-0-0	4	4
B	BSC	23CYL10A	Engineering Chemistry	3-1-0-0	4	4
C	ESC	23ESB10A	Engineering Graphics	2-0-2-0	4	3
D	ESC	23ESB10B	Problem Solving and Programming in C	2-1-2-0	5	4
G	MNC	23NCL10A	Environmental Science	2-0-0-0	2	---
S	BSC	23CYP10A	Engineering Chemistry Lab	0-0-2-0	2	1
T	ESC	23ESB10C	Manufacturing and Construction Practices B	1-0-2-0	3	2
TOTAL					**24**	**18**

SEMESTER II						
Slot	**Category Code**	**Course Code**	**Courses**	**L-T-P-J**	**Hours**	**Credit**
A	BSC	23MAL10B	Vector Calculus, Differential Equations and Transforms	3-1-0-0	4	4
B	BSC	23PYL10A	Engineering Physics	3-1-0-0	4	4
C	ESC	23ESL10C	Engineering Mechanics	2-1-0-0	3	3
E	ESC	23ESL10D	Basics of Electrical Engineering	2-0-0-0	4	2
		23ESL10E	Basics of Electronics Engineering	2-0-0-0		2
F	ESC	23ESB10F	Python Programming	2-0-2-0	4	3
G	MNC	23NCJ10B	Professional Communication	2-0-0-2	4	---
S	BSC	23PYP10A	Engineering Physics Lab	0-0-2-0	2	1
T	ESC	23ESP10A	Electrical and Electronics Workshop	0-0-2-0	2	1
TOTAL					**27**	**20**

SEMESTER III						
Slot	**Category Code**	**Course Code**	**Courses**	**L-T-P-J**	**Hours**	**Credit**
A	BSC	23MAL20B	Discrete Mathematical Structures	3-1-0-0	4	4
B	PCC	23ELL20A	Instrumentation Systems	3-1-0-0	4	4
C	PCC	23ELL20B	Data Structures	3-1-0-0	4	4
D	PCC	23EEL20C	Electric Circuit Analysis	3-1-0-0	4	4
E	ESC	23ESL00A	Design Engineering	2-0-0-0	2	2
G	MNC	23NCL20A	Professional Ethics	2-0-0-0	2	---
S	PCC	23ELP20A	Data Structures Lab	0-0-3-0	3	2
T	PCC	23ELP20B	Instrumentation Lab	0-0-3-0	3	2
R/M	VAC		Remedial/Minor Course	3-0-0-0/ 2-1-0-0	3	3
TOTAL					**26/29**	**22/25**

SEMESTER IV						
Slot	**Category Code**	**Course Code**	**Courses**	**L-T-P-J**	**Hours**	**Credit**
A	BSC	23MAL20D	Probability, Statistics and Numerical Methods	3-1-0-0	4	4
B	PCC	23ELL20D	Computer Organization and Architecture	3-1-0-0	4	4
C	PCC	23ELB20E	Object Oriented Programming Using JAVA	3-0-3-0	6	5
D	PCC	23ELL20F	Digital Electronics and Logic Design	3-1-0-0	4	4
E	HSC	23HSL20A	Universal Human Values - II	3-0-0-0	3	3
G	MNC	23NCL20B	Industrial Safety Engineering	2-1-0-0	3	---
S	PCC	23ELP20C	Digital Electronics and Logic Design Lab	0-0-3-0	3	2
R/M/ H	VAC		Remedial/Minor/Honors Course	3-0-0-0/ 2-1-0-0	3	3
TOTAL					**27/30**	**22/25**

SEMESTER V						
Slot	**Category Code**	**Course Code**	**Courses**	**L-T-P-J**	**Hours**	**Credit**
A	PCC	23ELL30A	Database Management Systems	3-1-0-0	4	4
B	PCC	23ELB30B	Microprocessors and Embedded Systems	3-1-2-0	6	5
C	PCC	23ELL30C	Electrical Machines	3-1-0-0	4	4
D	HSC	23HSL00A	Business Economics and Accountancy	3-0-0-0	3	3
E	PEC	23ELL31X	Program Elective I	3-0-0-0	3	3
S	PCC	23ELP30A	Electrical Machines Lab	0-0-2-0	2	1
T	PCC	23ELP30B	Database Management System Lab	0-0-2-0	2	1
R/M/H	VAC		Remedial/Minor/Honours Course	3-0-0-0	3	3
TOTAL					**24/27**	**21/24**

PROGRAMME ELECTIVE I

Slot	Category Code	Course Code	Courses	L-T-P-J	Hours	Credit	Specialization
D	PEC	23EL31A	Renewable Energy Conversions	3-0-0-0	3	3	PES
		23EL31B	Electromagnetic Theory and Compatibility	3-0-0-0	3	3	PES
		23EL31C	Signals and Systems	2-1-0-0	3	3	CAI
		23EL31D	Biomedical Instrumentation	3-0-0-0	3	3	CAI
		23EL31E	Introduction to Security in Computing	3-0-0-0	3	3	SAN
		23EL31F	Operating Systems	3-0-0-0	3	3	SAN
		23EL31G	Introduction to Machine Learning	3-0-0-0	3	3	AML

MICRO SPECIALIZATION STREAM		
No.	**STREAM**	**CODE**
1.	Power and Energy Systems	PES
2.	Control and Instrumentation	CAI
3.	Systems and Networks	SAN
4.	Artificial Intelligence and Machine Learning	AML

POWER AND ENERGY SYSTEMS						
Category	**No.**	**Course**	**Semester**	**L-T-P-J**	**Hours**	**Credit**
PEC	1.	Renewable Energy Conversions	S5	3-0-0-0	3	3
	2.	Electromagnetic Theory and Compatibility	S6	3-0-0-0	3	3
	3.	Energy Storage Systems	S6	3-0-0-0	3	3
	4.	Modern Illumination Control	S6	3-0-0-0	3	3
	5.	Electric and Hybrid Vehicles	S7	3-0-0-0	3	3
	6.	Electric Drives	S7	3-0-0-0	3	3
	7.	Computer Aided Design of Electrical Machine	S8	3-0-0-0	3	3
	8.	Smart Grid Technologies	S8	3-0-0-0	3	3
	9.	HVDC & FACTS	S8	3-0-0-0	3	3
	10.	Energy Management	S8	3-0-0-0	3	3
	11.	Solar PV Systems	S8	3-0-0-0	3	3
	12.	Power System Protection	S8	3-0-0-0	3	3

CONTROL AND INSTRUMENTATION						
Cate-gory	**No.**	**Course**	**Semester**	**L-T-P-J**	**Hours**	**Credit**
PEC	1.	Signals and Systems	S5	2-1-0-0	3	3
	2.	Biomedical Instrumentation	S5	3-0-0-0	3	3
	3.	Advanced Microcontrollers	S6	3-0-0-0	3	3
	4.	Digital Image Processing	S6	3-0-0-0	3	3
	5.	Introduction to Signal Processing	S6	3-0-0-0	3	3
	6.	Introduction to Robotics	S7	2-1-0-0	3	3
	7.	Digital Signal Processing	S7	2-1-0-0	3	3
	8.	Mechatronics	S8	3-0-0-0	3	3
	9.	Robotics and Artificial Intelligence	S8	2-1-0-0	3	3
	10.	Non Linear Systems	S8	3-0-0-0	3	3
	11.	Vehicular Networks and Communication	S8	3-0-0-0	3	3

SYSTEMS AND NETWORKS						
Cate-gory	**No.**	**Course**	**Semester**	**L-T-P-J**	**Hours**	**Credit**
PEC	1.	Introduction to Security in Computing	S5	3-0-0-0	3	3
	2.	Operating Systems	S5	3-0-0-0	3	3
	3.	Wireless Sensor Networks	S5	3-0-0-0	3	3
	4.	Software Engineering	S7	3-0-0-0	3	3
	5.	Real Time Operating Systems	S7	3-0-0-0	3	3
	6.	Web Programming	S7	3-0-0-0	3	3
	7.	Programming Paradigms	S8	3-0-0-0	3	3
	8.	Cryptography	S8	3-0-0-0	3	3
	9.	Cloud Computing	S8	3-0-0-0	3	3
	10.	Software Testing	S8	3-0-0-0	3	3
ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING						
Cate-gory	**No.**	**Course**	**Semester**	**L-T-P-J**	**Hours**	**Credit**
PEC	1.	Introduction to Machine Learning	S5	3-0-0-0	3	3
	2.	Introduction to Artificial Intelligence	S6	3-0-0-0	3	3
	3.	Soft Computing Techniques	S6	3-0-0-0	3	3
	4.	Machine Learning	S7	3-0-0-0	3	3
	5.	Computer Vision	S8	3-0-0-0	3	3
	6.	Data Analytics for Electrical Engineers	S8	3-0-0-0	3	3
	7.	Deep Learning	S8	3-0-0-0	3	3
	8.	Data Mining	S8	3-0-0-0	3	3

SEMESTER VI						
Slot	**Cate-gory Code**	**Course Code**	**Courses**	**L-T-P-J**	**Hours**	**Credit**
A	PCC	23ELL30D	Power Electronics	3-1-0-0	4	4
B	PCC	23ELL30E	Algorithm Analysis and Design	2-1-0-0	3	3
C	PCC	23ELL30F	Computer Communication and Network Security	3-0-0-0	3	3
D	PEC	23ELL32X	Program Elective II	3-0-0-0	3	3
E	IEC	23IEL31X	Institute Elective I	3-0-0-0	3	3
S	PWS	23ELS38A	Seminar	0-0-4-0	4	2
T	PWS	23ELJ38B	Mini Project	0-0-4-0	4	2
U	PCC	23ELP30C	Networking Lab	0-0-2-0	2	1
R/M/H	VAC		Remedial/Minor/Honours Course	3-0-0-0/ 2-1-0-0	3	3
TOTAL					**26/29**	**21/24**

PROGRAMME ELECTIVE II

Slot	**Cate-gory Code**	**Course Code**	**Courses**	**L-T-P-J**	**Hours**	**Credit**	**Specialization**
D	PEC	23EL2U32A	Energy Storage Systems	3-0-0-0	3	3	PES
		23EL2U32B	Modern Illumination Control	3-0-0-0	3	3	PES
		23EL2U32C	Advanced Microcontrollers	3-0-0-0	3	3	CAI
		23EL2U32D	Introduction to Signal Processing	3-0-0-0	3	3	CAI
		23EL2U32E	Wireless Sensor Networks	3-0-0-0	3	3	SAN
		23EL2U32F	Introduction to Artificial Intelligence	3-0-0-0	3	3	AML
		23EL2U32G	Soft Computing Techniques	3-0-0-0	3	3	AML

INSTITUTE ELECTIVE I

Slot	**Category**	**Course Code**	**Course**	**L-T-P-J**	**Hours**	**Credit**
E	IEC	23IEL31A	Introduction to Flight Dynamics and Control	3-0-0-0	3	3
		23IEL31B	Introduction to Power Processing	3-0-0-0	3	3
		23IEL31C	Electrical Drives and Control for Automation	3-0-0-0	3	3
		23IEL31D	Renewable Energy Sources	3-0-0-0	3	3

SEMESTER VII						
Slot	**Cate-gory Code**	**Course Code**	**Courses**	**L-T-P-J**	**Hours**	**Credit**
A	PCC	23ELL40A	Control Systems	2-1-0-0	3	3
B	PCC	23ELL40B	Power System Engineering	2-1-0-0	3	3
C	PCC	23ELL40C	Internet of Things	3-0-0-0	3	3
D	PEC	23ELL43X	Program Elective III	3-0-0-0	3	3
E	IEC	23IEL42X	Institute Elective II	3-0-0-0	3	3
S	PWS	23ELV48A	Comprehensive Course Viva	1-0-0-0	1	1
T	PWS	23ELJ48B	Project Phase I	0-0-4-0	4	2
R/M/H	VAC		Remedial/Minor/ Honors Course	0-1-4-0/ 3-0-0-0	5/3	3
TOTAL					**20/25/23**	**18/21**

PROGRAMME ELECTIVE III

Slot	**Category Code**	**Course Code**	**Courses**	**L-T-P-J**	**Hours**	**Credit**	**Specialization**
B	PEC	23ELL43A	Electric and Hybrid Vehicles	3-0-0-0	3	3	PES
		23ELL43B	Electric Drives	3-0-0-0	3	3	PES
		23ELL43C	Introduction to Robotics	2-1-0-0	3	3	CAI
		23ELL43D	Digital Signal Processing	2-1-0-0	3	3	CAI
		23ELL43E	Software Engineering	3-0-0-0	3	3	SAN
		23ELL43F	Real Time Operating Systems	3-0-0-0	3	3	SAN
		23ELL43G	Machine Learning	3-0-0-0	3	3	AML
		23ELL43H	Web Programming	3-0-0-0	3	3	AML

INSTITUTE ELECTIVE II

Slot	**Category**	**Course Code**	**Course**	**L-T-P-J**	**Hours**	**Credit**
E	IEC	23IEL42A	Architectural Lighting Design and Control	2-1-0-0	3	3
		23IEL42B	Electric Vehicles	3-0-0-0	3	3
		23IEL42C	Process Control and Automation	3-0-0-0	3	3
		23IEL42D	Sustainable Energy Management	3-0-0-0	3	3

SEMESTER VIII						
Slot	**Cate-gory Code**	**Course Code**	**Courses**	**L-T-P-J**	**Hours**	**Credit**
A	PEC	23ELL44X	Program Elective IV	2-1-0-0	3	3
B	PEC	23ELL45X	Program Elective V	2-1-0-0	3	3
C	PEC	23ELL46X	Program Elective VI	2-1-0-0	3	3
D	HSC	23HSL00A	Management for Engineers	3-0-0-0	3	3
S	PWS	23ELJ48C	Project Phase II	0-0-12-0	12	6
R/M/H	VAC		Remedial/Minor/Honors course	0-1-4-0	5	3
TOTAL					**24/29**	**18/21**

PROGRAMME ELECTIVE IV

Slot	Category Code	Course Code	Courses	L-T-P-J	Hours	Credit	Specialization
B	PEC	23ELL44A	Computer Aided Design of Electrical Machine	3-0-0-0	3	3	PES
		23ELL44B	Smart Grid Technologies	3-0-0-0	3	3	PES
		23ELL44C	HVDC & FACTS	3-0-0-0	3	3	PES
		23ELL44D	Digital Image Processing	3-0-0-0	3	3	CAI
		23ELL44E	Mechatronics	3-0-0-0	3	3	CAI
		23ELL44F	Programming Paradigms	3-0-0-0	3	3	SAN
		23ELL44G	Cryptography	3-0-0-0	3	3	SAN
		23ELL44H	Computer Vision	3-0-0-0	3	3	AML
		23ELL44I	Data Analytics for Electrical Engineers	3-0-0-0	3	3	AML

PROGRAMME ELECTIVE V

Slot	Category Code	Course Code	Courses	L-T-P-J	Hours	Credit	Specialization
C	PEC	23ELL45A	Energy Management	3-0-0-0	3	3	PES
		23ELL45B	Solar PV Systems	3-0-0-0	3	3	PES
		23ELL45C	Power System Protection	3-0-0-0	3	3	PES
		23ELL45D	Robotics and Artificial Intelligence	3-0-0-0	3	3	CAI
		23ELL45E	Nonlinear Systems	3-0-0-0	3	3	CAI
		23ELL45F	Cloud Computing	3-0-0-0	3	3	SAN
		23ELL45G	Deep Learning	3-0-0-0	3	3	AML
		23ELL45H	Bioinformatics	3-0-0-0	3	3	AML

PROGRAM ELECTIVE VI

Slot	Category Code	Course Code	Courses	L-T-P-J	Hours	Credit	Specialization
D	PEC	23ELL46A	Special Electric Machines	3-0-0-0	3	3	PES
		23ELL46B	Computer Aided Electrical System Design	3-0-0-0	3	3	PES
		23ELL46C	Power Quality	3-0-0-0	3	3	PES
		23ELL46D	Digital Control Systems	3-0-0-0	3	3	CAI
		23ELL46E	Vehicular Networks and Communication	3-0-0-0	3	3	CAI
		23ELL46F	Software Testing	3-0-0-0	3	3	SAN
		23ELL46G	Block Chain Technologies	3-0-0-0	3	3	SAN
		23ELL46H	Data Mining	3-0-0-0	3	3	AML

B.Tech (MINOR)

Semester	BASKET I Electric Vehicle Technology				BASKET II Power Systems				BASKET III Embedded Systems & IOT				BASKET IV Architectural Lighting and Electrical System Design			
	Course Code	Course	L-T-P-J	Credit	Course Code	Course	L-T-P-J	Credit	Course Code	Course	L-T-P-J	Credit	Course Code	Course	L-T-P-J	Credit
S3	23ELL2MA	Electric Machine Fundamentals	2-1-0-0	3	23ELL2MB	Introduction to Power Engineering	2-1-0-0	3	23ELL2MC	Arduino Platform Interface & C Programming	3-0-0-0	3	23ELL2MD	Basics of Illumination Science and Lighting Design	3-0-0-0	3
S4	23ELL2ME	Drives and Control	2-1-0-0	3	23ELL2MF	Energy Systems	3-0-0-0	3	23ELL2MG	Micro Controllers & Embedded Systems	3-0-0-0	3	23ELL2MH	Electric Power Supply and Distribution Systems	3-0-0-0	3
S5	23ELL3MA	Energy Storage Devices	2-1-0-0	3	23ELL3MB	Solar and Wind Energy Conversion Systems	2-1-0-0	3	23ELL3MC	Raspberry Pi Platform Interface & Python Programming	2-1-0-0	3	23ELL3MD	Energy efficiency in Buildings	3-0-0-0	3
S6	23ELL3ME	Hybrid and Electric Vehicles	3-0-0	3	23ELL3MF	Instrumentation and Automation of Power Plants	3-0-0	3	23ELL3MG	Cloud Services and Internet of Things	3-0-0	3	23ELL3MH	Electrical System Design and Building services	2-1-0	3
S7	23ELL4MA	Mini Project	0-1-4-0	3	23ELL4MA	Mini Project	0-1-4-0	3	23ELL4MA	Mini Project	0-1-4-0	3	23ELL4MA	Mini Project	0-1-4-0	3
S8	23ELL4MB	Mini Project	0-1-4-0	3	23ELL4MB	Mini Project	0-1-4-0	3	23ELL4MB	Mini Project	0-1-4-0	3	23ELL4MB	Mini Project	0-1-4-0	3

B.Tech (HONOURS)

Semester	GROUP I				GROUP II				GROUP III				GROUP IV			
	Specialization: Control and Autonomous Systems				Specialization: Machine Learning				Specialization: Smart Grids				Specialization: Electric Vehicle Systems			
	Course Code	Course	L-T-P-J	Credit	Course Code	Course	L-T-P-J	Credit	Course Code	Course	L-T-P-J	Credit	Course Code	Course	L-T-P-J	Credit
S4	23ELL2HA	Automatic Control Systems	2-1-0-0	3	23ELL2HB	Basics of Machine Learning	2-1-0-0	3	23ELL2HC	Network Communication in Smart Grid	2-1-0-0	3	23ELL2HD	Analysis of Electrical Machines	2-1-0-0	3
S5	23ELL3HA	Process Automation	3-0-0-0	3	23ELL3HB	Mathematics for Machine Learning	3-0-0-0	3	23ELL3HC	Micro Grids	3-0-0-0	3	23ELL3HD	Electric Vehicle Technology	3-0-0-0	3
S6	23ELL3HE	Introduction to Navigation and Trajectory planning	2-1-0-0	3	23ELL3HF	Machine Learning Programming	2-1-0-0	3	23ELL3HG	Distributed Generation and Smart Grid	2-1-0-0	3	23ELL3HH	Automotive Electrical and Electronic systems	3-0-0-0	3
S7	23ELL4HA	Aircraft Dynamics & Control	3-0-0-0	3	E23ELL4HB	Deep Learning	2-1-0-0	3	23ELL4HC	Operation and Control of AC/DC Smart Grids	3-0-0-0	3	23ELL4HD	Smart Grid and Interfacing	3-0-0-0	3
S8	23ELL4HA	Mini Project	0-1-4-0	3	23ELL4HA	Mini Project	0-1-4-0	3	23ELL4HA	Mini Project	0-1-4-0	3	23ELL4HA	Mini Project	0-1-4-0	3

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{Subject to Approval by the competent Authorities}