CURRICULUM
2023
(Autonomous)
Version 2.0

B. TECH
ELECTRONICS AND COMMUNICATION ENGINEERING

MAR BASELIOS COLLEGE OF ENGINEERING AND TECHNOLOGY
Mar Ivanios Vidyanagar, Nalanchira, Thiruvananthapuram – 695 015

June 2024

CURRICULUM

FOR

B. TECH DEGREE PROGRAMME

IN

ELECTRONICS AND COMMUNICATION ENGINEERING

2023 SCHEME

(AUTONOMOUS)

MAR BASELIOS COLLEGE OF ENGINEERING AND TECHNOLOGY

(Approved by AICTE, Autonomous Institution Affiliated to APJ Abdul Kalam Technological University)

MAR IVANIOS VIDYANAGAR, NALANCHIRA, THIRUVANANTHAPURAM – 695015, KERALA.

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MAR BASELIOS COLLEGE OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

B. TECH DEGREE PROGRAMME

IN

ELECTRONICS AND COMMUNICATION ENGINEERING

CURRICULUM

Items	Board of Studies (BoS)	Academic Council (AC)
Date of Approval	25.11.2021	22.04.2022
	11.08.2022	29.08.2022
	24.02.2023	20.03.2023
	11-07-2023	09-08-2023
	04-04-2024	22-02-24, 19-06-24

Sd/-
Head of Department
Chairman, Board of Studies

Sd/-
Principal
Chairman, Academic Council

MAR BASELIOS COLLEGE OF ENGINEERING AND TECHNOLOGY

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.

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Vision and Mission of the Department

Vision:

To be a Centre of Excellence in Electronics and Communication Engineering Education and Research for the service of humanity.

Mission:

To provide quality Engineering Education and to carry out Research in the field of Electronics and Communication Engineering addressing the challenges faced by the society.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEO1: The graduates of the Programme will have a successful career as Professionals in Industry or as Entrepreneurs, encompassing a broad spectrum of areas related to Electronics and Communication Engineering.

PEO2: They will be able to adapt to the changing needs of Industry and Academia through continuous learning and professional upgrading.

PEO3: They will exhibit social responsibility in their pursuit of technical excellence.

PROGRAMME OUTCOMES (POs)

Engineering Graduates will have the ability 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: Design Electronic Circuits and Systems for Communication, Monitoring and Control Applications.

PSO2: Demonstrate the knowledge, in Electronics, Signal processing, Embedded Systems and Communication Engineering, required for providing technical solutions to real world problems

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

B.TECH. PROGRAMME IN ELECTRONICS AND COMMUNICATION ENGINEERING

For the students admitted from 2023-24

SCHEDULING OF COURSES

i) Knowledge Segments and Credits

Every course of B. Tech 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.

Sl. No.	Category	Category Code	Total credits
1	Humanities and Social Sciences including Management Courses	HSC	**9**
2	Basic Science Courses	BSC	**26**
3	Engineering Science Courses	ESC	**21**
4	Programme Core Courses	PCC	**72**
5	Programme Elective Courses	PEC	**18**
6	Institute Elective Courses	IEC	**6**
7	Project Work, Seminar, Comprehensive Viva Voce and Internship	PWS	**15**
8	Mandatory Student Activities (P/F)	MSA	**3**
	Total Mandatory Credits		**170**
	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	***19***	***22***	***23***	***21***	***22***	***22***	***24***	***14***	***167***
Credits for Activities	*3*								***3***
Total Credits									***170***
Value Added Courses (Optional) – Honours / Minor									***15***
Total Credits									***185***

SEMESTER I										
Slot	Category	Course Code	Courses	Credit Structure				SS	Hours	Credit
				L	T	P	J			
A	BSC	23MAL10A	Linear Algebra and Calculus	3	1	0	0	5	4	4
B	BSC	23PYL10A	Engineering Physics	3	1	0	0	5	4	4
D	ESC	23ESB10D	Problem Solving and Programming in C	2	1	2	0	4.5	5	4
E	ESC	23ESL10J	Basics of Electrical Engineering A	2	0	0	0	3	4	2
		23ESL10L	Basics of Electronics Engineering	2	0	0	0	3		2
G	ESC	23ESL1NA	Environmental Science	2	0	0	0	3	2	1*
S	BSC	23PYP10A	Engineering Physics Lab	0	0	2	0	1	2	1
T	ESC	23ESP10B	Electrical and Electronics Workshop	0	0	2	0	1	2	1
TOTAL								25.5	23	19

**Not to be considered for Grade/GPA/CGPA. Pass or Fail Only*

SEMESTER II										
Slot	Cate gory	Course Code	Courses	Credit Structure				SS	Hours	Credit
				L	T	P	J			
A	BSC	23MAL10B	Vector Calculus, Differential Equations and Transforms	3	1	0	0	5	4	4
B	BSC	23CYL10A	Engineering Chemistry	3	1	0	0	5	4	4
C	ESC	23ESB10A	Engineering Graphics	2	0	2	0	4	4	3
D	ESC	23ESB10G	Python Programming	2	0	2	0	4	4	3
E	PCC	23ECL10A	Network Theory	3	1	0	0	5	4	4
G	HSC	23HSJ1NB	Professional Communication	2	0	0	2	5	4	1*
S	BSC	23CYP10A	Engineering Chemistry Lab	0	0	2	0	1	2	1
T	ESC	23ESB10P	Manufacturing and Construction Practices B	1	0	2	0	2.5	3	2
TOTAL								31.5	29	22

**Not to be considered for Grade/GPA/CGPA. Pass or Fail Only*

SEMESTER III									
Slot	Category	Course Code	Courses	Credit Structure				SS	Hours	Credit
				L	T	P	J			
A	BSC	23MAL20A	Partial Differential Equation and Complex Analysis	3	1	0	0	5	4	4
B	PCC	23ECL20A	Analog Circuits	3	1	0	0	5	4	4
C	PCC	23ECL20B	Solid State Devices	3	1	0	0	5	4	4
D	PCC	23ECJ20C	Logic Circuit Design	2	1	0	1	4.5	4	4
E	ESC	23ESL00A	Design Engineering	2	0	0	0	3	2	2
G	HSC	23HSL2NA	Professional Ethics	2	0	0	0	3	2	1*
S	PCC	23ECP20A	Analog Circuits Lab	0	0	3	0	1.5	3	2
T	PCC	23ECP20B	Logic Circuit Design Lab	0	0	3	0	1.5	3	2
M	VAC	23ECL2MX	Minor Course	3	0	0	0	4.5	3	3
				2	1	0	0	3.5		
TOTAL								**28.5/ 33/32**	**26/ 29**	**23/ 26**

**Not to be considered for Grade/GPA/CGPA. Pass or Fail Only*

SEMESTER IV									
Slot	Category	Course Code	Courses	Credit Structure				SS	Hours	Credit
				L	T	P	J			
A	BSC	23MAL20C	Probability, Random Processes and Numerical Methods	3	1	0	0	5	4	4
B	PCC	23ECL20D	Linear Integrated Circuits	3	1	0	0	5	4	4
C	PCC	23ECL20E	Signals and Systems	3	1	0	0	5	4	4
D	PCC	23ECJ20F	Microcontroller based system design	3	0	2	1	6.5	6	5
E	HSC	23HSL2NB	Universal Human Values-II	2	1	0	0	3.5	3	1*
G	ESC	23ESL2NC	Industrial Safety Engineering	2	1	0	0	3.5	3	1*
S	PCC	23ECP20C	Linear Integrated Circuits Lab	0	0	3	0	1.5	3	2
M/H	VAC	23ECL2MX / 23ECL2HX	Minor / Honours Course	3	0	0	0	4.5	3	3
				2	1	0	0	3.5		
TOTAL								**30/ 34.5 / 33.5**	**27/ 30/ 33**	**21/ 24/ 27**

**Not to be considered for Grade/GPA/CGPA. Pass or Fail Only*

SEMESTER V										
Slot	Category	Course Code	Courses	Credit Structure				SS	Hours	Credit
				L	T	P	J			
A	PCC	23ECL30A	Analog and Digital Communication	3	1	0	0	5	4	4
B	PCC	23ECL30B	Digital Signal Processing	3	1	0	0	5	4	4
C	PCC	23ECL30C	Electromagnetic Field Theory	3	1	0	0	5	4	4
D	PEC	23ECL31X	Program Elective I	3	0	0	0	4.5	3	3
E	HSC	23HSL00A	Management for Engineers	3	0	0	0	4.5	3	3
S	PCC	23ECP30A	Communication Lab	0	0	3	0	1.5	3	2
T	PCC	23ECP30B	Digital Signal Processing Lab	0	0	3	0	1.5	3	2
M/H	VAC		Minor/Honours Course	3	0	0	0	4.5	3	3
				2	1	0	0	3.5		
TOTAL								**27/ 31.5 /30.5**	**24/ 27/ 30**	**22/25/ 28**

SEMESTER VI										
Slot	Category	Course Code	Courses	Credit Structure				SS	Hours	Credit
				L	T	P	J			
A	PCC	23ECL30D	Control Systems	3	1	0	0	5	4	4
B	PCC	23ECJ30E	VLSI Circuit Design	3	1	2	0	6	6	5
D	PEC	23ECL32X	Program Elective II	3	0	0	0	4.5	3	3
E	IEC	23IEL31X	Institute Elective I	3	0	0	0	4.5	3	3
F	HSC	23HSL30A	Business Economics and Accountancy	3	0	0	0	4.5	3	3
T	PWS	23ECS38A	Seminar	0	0	4	0	2	4	2
U	PWS	23ECJ38B	Mini Project	0	0	4	0	4	4	2
M/H	VAC		Minor/Honours Course	3	0	0	0	4.5	3	3
				2	1	0	0	3.5		
TOTAL								**30.5/ 35/ 34**	**27/ 30/ 33**	**22/25/ 28**

SEMESTER VII										
Slot	**Category**	**Course Code**	**Courses**	**Credit Structure**				**SS**	**Hours**	**Credit**
				L	**T**	**P**	**J**			
A	PCC	23ECL40A	Information Theory and Coding	3	1	0	0	5	4	4
B	PCC	23ECL40B	Wireless Communication	3	0	0	0	4.5	3	3
C	PCC	23ECL40C	Computer Networks	3	0	0	0	4.5	3	3
D	PEC	23ECL43X	Program Elective III	3	0	0	0	4.5	3	3
E	IEC	23IEL42X	Institute Elective II	3	0	0	0	4.5	3	3
T	PWS	23ECV48A	Comprehensive Viva Voce	0	0	2	0	1	2	1
U	PWS	23ECJ48A	Project	0	0	10	0	10	10	5
		23ECI48A	Internship*							
S	PCC	23ECP40A	Advanced Communication Lab	0	0	3	0	1.5	3	2
M/H	VAC		Minor/Honours Course	0	1	6	0	4.5	3	3
				3	0	0	0	4.5		
TOTAL								**35.5/ 40/40**	**31/34/37**	**24/ 27/ 30**

** Students can opt for Internship either in S7 or S8. However, in S7, the internship can be permitted only if there are no pending Programme/Course requirements in the semester, that need to be completed in College in the offline mode, such as laboratory sessions.*

SEMESTER VIII										
Slot	**Category**	**Course Code**	**Courses**	**Credit Structure**				**SS**	**Hours**	**Credit**
				L	**T**	**P**	**J**			
A	PEC	23ECL44X	Program Elective IV	3	0	0	0	4.5	3	3
B	PEC	23ECL45X	Program Elective V	3	0	0	0	4.5	3	3
C	PEC	23ECL46X	Program Elective VI	3	0	0	0	4.5	3	3
U	PWS	23ECJ48B	Project	0	0	10	0	10	10	5
		23ECI48A	Internship*							
H	VAC		Honours Course					3	6	3
TOTAL								**23.5 / 26.5**	**19/25**	**14/17**

PROGRAMME ELECTIVE-I									
Slot	Category	Course Code	Courses	Credit Structure				SS	Hours	Credit
				L	T	P	J			
D	PEC	23ECL31A	Digital System Design	2	1	0	0	3.5	3	3
		23ECL31B	Power Electronics	3	0	0	0	4.5	3	3
		23ECL31C	Mechatronics	3	0	0	0	4.5	3	3
		23ECL31D	DSP architectures	3	0	0	0	4.5	3	3
		23ECL31E	Computer Architecture	2	1	0	0	3.5	3	3
		23ECL31F	Data Structures using C	3	0	0	0	4.5	3	3
		23ECL31G	Bio medical Engineering	3	0	0	0	4.5	3	3

PROGRAMME ELECTIVE-II									
Slot	Category	Course Code	Courses	Credit Structure				SS	Hours	Credit
				L	T	P	J			
D	PEC	23ECL32A	Digital Image Processing	2	1	0	0	3.5	3	3
		23ECL32B	Data Analysis using Python	2	1	0	0	3.5	3	3
		23ECL32C	Embedded Systems	3	0	0	0	4.5	3	3
		23ECL32D	Introduction to MEMS	3	0	0	0	4.5	3	3
		23ECL32E	Satellite Communication	3	0	0	0	4.5	3	3
		23ECL32F	Antenna and Wave Propagation	2	1	0	0	3.5	3	3
		23ECL32G	Multi-rate Systems	2	1	0	0	3.5	3	3

PROGRAMME ELECTIVE-III									
Slot	Category	Course Code	Courses	Credit Structure				SS	Hours	Credit
				L	T	P	J			
D	PEC	23ECL43A	Real Time Operating System	3	0	0	0	4.5	3	3
		23ECL43B	Microwave Engineering	3	0	0	0	4.5	3	3
		23ECL43C	Speech and Audio Processing	3	0	0	0	3.5	3	3
		23ECL43D	Machine Learning	2	1	0	0	3.5	3	3
		23ECL43E	Optical Fibre Communication	3	0	0	0	4.5	3	3
		23ECL43F	Quantum Computing	3	0	0	0	4.5	3	3
		23ECL43G	Wavelet Theory	2	1	0	0	3.5	3	3

PROGRAMME ELECTIVE-IV

Slot	Category	Course Code	Courses	Credit Structure				SS	Hours	Credit
				L	T	P	J			
D	PEC	23ECL44A	Organic Electronics	3	0	0	0	4.5	3	3
		23ECL44B	Pattern Recognition	3	0	0	0	4.5	3	3
		23ECL44C	RF MEMS	3	0	0	0	4.5	3	3
		23ECL44D	Secure Communication	3	0	0	0	3.5	3	3
		23ECL44E	Deep Learning	3	0	0	0	4.5	3	3
		23ECL44F	Robotics	3	0	0	0	3.5	3	3
		23ECL44G	Mixed Signal Circuit Design	2	1	0	0	3.5	3	3

PROGRAMME ELECTIVE-V										
Slot	Category	Course Code	Courses	Credit Structure				SS	Hours	Credit
				L	T	P	J			
D	PEC	23ECL45A	Low Power VLSI	3	0	0	0	4.5	3	3
		23ECL45B	Cyber Security	3	0	0	0	4.5	3	3
		23ECL45C	Adaptive Signal Processing	2	1	0	0	3.5	3	3
		23ECL45D	Wireless Sensor Networks	3	0	0	0	4.5	3	3
		23ECL45E	RF Circuit Design	3	0	0	0	4.5	3	3
		23ECL45F	Advanced Coding Theory	2	1	0	0	3.5	3	3
		23ECL45G	Digital Video Processing	3	0	0	0	3.5	3	3

PROGRAMME ELECTIVE-VI										
Slot	Category	Course Code	Courses	Credit Structure				SS	Hours	Credit
				L	T	P	J			
D	PEC	23ECL46A	Introduction to Queuing theory	2	1	0	0	4.5	3	3
		23ECL46B	Computer Vision	3	0	0	0	4.5	3	3
		23ECL46C	Next Generation Wireless Communication Systems	3	0	0	0	4.5	3	3
		23ECL46D	Microwave Devices and Circuits	3	0	0	0	4.5	3	3
		23ECL46E	Nano Electronics	3	0	0	0	4.5	3	3
		23ECL46F	Instrumentation	3	0	0	0	4.5	3	3
		23ECL46G	Analog CMOS Design	3	0	0	0	4.5	3	3

INSTITUTE ELECTIVE-I										
Slot	**Category**	**Course Code**	**Courses**	**Credit Structure**				**SS**	**Hours**	**Credit**
				L	**T**	**P**	**J**			
E	IEC	23IEL31I	Optimization Techniques	2	1	0	0	3.5	3	3
		23IEL31J	Biosensors and Transducers	2	1	0	0	3.5	3	3
		23IEL31K	Essentials of Entrepreneurship	2	1	0	0	3.5	3	3
		23IEL31L	Internet of Things	2	1	0	0	3.5	3	3

INSTITUTE ELECTIVE-II										
Slot	**Category**	**Course Code**	**Courses**	**Credit Structure**				**SS**	**Hours**	**Credit**
				L	**T**	**P**	**J**			
D	PEC	23IEL42I	Operations Research	2	1	0	0	3.5	3	3
		23IEL42J	Space Technology	3	0	0	0	4.5	3	3
		23IEL42K	Assistive Technology	3	0	0	0	4.5	3	3
		23IEL42L	Intellectual Property Rights	2	1	0	0	3.5	3	3

MINOR BASKETS

Semester	BASKET- I EMBEDDED SYSTEMS AND APPLICATIONS				BASKET-II ARTIFICIAL INTELLIGENCE FOR SIGNAL PROCESSING			
	Course Code	Course	L-T-P-J	Credit	Course Code	Course	L-T-P-J	Credit
S3	23ECL2 MA	Electronic Circuits	2-1-0-0	3	23ECL2 MC	Introduction to Multidimensional Data	2-1-0-0	3
S4	23ECL2 MB	Microcontrollers	2-1-0-0	3	23ECL2 MD	Machine Learning for data processing	2-1-0-0	3
S5	23ECL3 MA	Embedded System Design	3-0-0-0	3	23ECL3 MC	Deep Learning	2-1-0-0	3
S6	23ECL3 MB	Design for IoT	3-0-0-0	3	23ECL3 MD	Computational tools for AI	2-1-0-0	3
S7/ S8	23ECJ4 MA	Mini Project	0-0-6-0	3	23ECJ4 MC	Mini Project	0-0-6-0	3

MINOR BASKETS (cont…)

Semester	BASKET-III ROBOTICS				BASKET-IV BIOMEDICAL ENGINEERING			
	Course Code	Course	L-T-P-J	Credit	Course Code	Course	L-T-P-J	Credit
S3	23ECL2 ME	Fundamentals of Robotics	3-0-0-0	3	23ECL2 MG	Fundamentals of Biomedical E ngineering	3-0-0-0	3
S4	23ECL2 MF	Introduction to Industrial Automation	2-1-0-0	3	23ECL2 MH	Assistive Technologies	3-0-0-0	3
S5	23ECL3 ME	Vision System	3-0-0-0	3	23ECL3 MG	Medical Devices Engineering	3-0-0-0	3
S6	23ECL3 MF	Artificial Intelligence for Robotics	3-0-0-0	3	23ECL3 MH	Bio Signal and Image Processing	3-0-0-0	3
S7/ S8	23ECJ4 ME	Mini Project	0-0-6-0	3	23ECJ4 MG	Mini Project	0-0-6-0	3

HONOURS BASKETS

Semester	BASKET I VLSI AND EMBEDDED SYSTEMS				BASKET II COMMUNICATION				BASKET III SIGNAL PROCESSING			
	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	23ECL 2HB	Nanoelectronics	3-0-0-0	3	23ECL 2HD	Random Process and Applications	2-1-0-0	3	23ECL 2HF	Wavelet Transform and Applications	2-1-0-0	3
S5	23ECL 3HA	FPGA based System Design	3-0-0-0	3	23ECL 3HC	Detection and Estimation Theory	3-0-0-0	3	23ECL 3HE	DSP System Design	3-0-0-0	3
S6	23ECL 3HB	Electronics Design and Automation	3-0-0-0	3	23ECL 3HD	Design and Analysis of Antennas	3-0-0-0	3	23ECL 3HF	Multirate Signal Processing	2-1-0-0	3
S7	23ECL 4HA	RF MEMS	3-0-0-0	3	23ECL 4HC	MIMO and Multiuser Communication Systems	3-0-0-0	3	23ECL 4HE	Computational tools for Signal Processing	2-1-0-0	3
S8	23ECJ 4HB	Mini Project	0-0-6-0	3	23ECJ 4HD	Mini Project	0-0-6-0	3	23ECJ 4HF	Mini Project	0-0-6-0	3

WITHOUT MINOR/HONOURS

Semester	L+T+P+J per week	Self Study Hours per week	Total Study hours/ Semster	ECTS (Total Study Hrs/25)	ECTS (Total Study Hrs/30)
S1	23	26	735	30	25
S2	29	32	915	37	31
S3	26	29	825	33	28
S4	27	30	855	35	29
S5	24	27	765	31	26
S6	26	28	810	33	27
S7	31	36	1005	41	34
S8	25	19	660	27	22
Total ECTS				267	222