CURRICULUM
&
SYLLABUS
2022 Scheme
(Autonomous)

B.TECH
ELECTRICAL AND COMPUTER ENGINEERING

MAR BASELIOS COLLEGE OF ENGINEERING AND TECHNOLOGY
Mar Ivanios Vidyanagar, Nalanchira, Thiruvananthapuram – 695 015
August 2022

CURRICULUM & DETAILED SYLLABI

FOR

B. TECH DEGREE PROGRAMME

IN

ELECTRICAL AND COMPUTER ENGINEERING

SEMESTERS I to VIII

2022 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

B. TECH DEGREE PROGRAMME

IN

ELECTRICAL AND COMPUTER ENGINEERING

CURRICULUM & SYLLABUS

2022 SCHEME

Items	Board of Studies (BOS)	Academic Council (AC)
Date of Approval	19.11.2021	22.04.2022
	10.08.2022	21.11.2022
	22.02.2023	20.03.2023
	01.04.2024	19.06.2024
	30.04.2025	28.05.2025

Head of Department
Chairman, Board of Studies

Principal
Chairman, Academic Council

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 2022-23

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	Total credits
1	Humanities and Social Sciences including Management Courses	HSC	8
2	Basic Science Courses	BSC	26
3	Engineering Science Courses	ESC	22
4	Programme Core Courses, Comprehensive Course Work, Comprehensive Viva Voce	PCC	75
5	Programme Elective Courses	PEC	18
6	Open Elective Courses	OEC	3
7	Project Work and Seminar	PWS	8
8	Mandatory Non-credit Courses (P/F) with Grade	MNC	---
9	Mandatory Student Activities (P/F)	MSA	2
Total Mandatory Credits			**162**

ii) Semester-wise Credit Distribution

Semester	***I***	***II***	***III***	***IV***	***V***	***VI***	***VII***	***VIII***	***Total***
Credits for Courses	*17*	*21*	*22*	*22*	*22*	*23*	*16*	*17*	***160***
Year wise Credit	*38*		*44*		*45*		*33*		
Activity Points (Min.)	*40*				*60*				***100***
Credits for Activities	*2*								***2***
Total Credits									***162***

iii) Minor

Purpose

Minor is an additional credential a student may earn if he/she does 20 credits worth of additional learning in a discipline other than her/his major discipline of the BTech Degree. The objective is to permit a student to customize their Engineering degree to suit their specific interests. Engineering Minors allow a student to gain interdisciplinary experience and exposure to concepts and perspectives that may not be a part of their major degree programmes.

To earn credits in Minor

A set of courses and/or other activities like projects necessary for earning a Minor is prescribed in specialist baskets. Each basket has 4 courses and two mini projects. Each basket has sequences within it, i.e., advanced courses rest on basic courses in the basket.

Student accumulates credits by registering for the required courses, and if the requirements for a particular minor are met within the time limit for the course, the minor will be awarded. This will be mentioned in the Degree Certificate as "Bachelor of Technology in Electrical and Computer Engineering with Minor in xxx". The fact will also be reflected in the consolidated grade card, along with the list of courses taken. If one specified course cannot be earned during the course of the programme, that minor will not be awarded. The individual course credits earned, however, will be reflected in the consolidated Grade Card.

(a) All BTech students shall be eligible to register for Minor in Engineering.
(b) The Registration for Minor Programme is permitted at the beginning of third semester.
(c) The batch size of a Minor Programme can be between 20(-)10% to 60(+)10%. That is number of students in a batch be in between 18 to 66. Each batch shall be mapped to a faculty member.
(d) A student can take Honours and Minor together, if all eligibility criteria are satisfied.
(e) Total credits required for award of Minor is **182** (162 + 20 credits from value added courses).
(f) Out of the 20 Credits, 12 credits shall be earned by undergoing a minimum of three courses listed in one of the baskets in the curriculum for Minor. Of these three courses, one shall be a mini project to be done in the seventh or eighth semester (Fourth level) based on the chosen area of study.
(g) The remaining 8 credits could be acquired by undergoing approved MOOCs or through courses listed in the curriculum. The MOOC courses chosen shall be relevant to the concerned courses in the respective minor basket.
(h) Reshuffling of courses between various baskets will not be allowed. New baskets will be added from time to time
(i) The classes for Minor will be conducted along with regular classes and no extra time shall be required for conducting the courses.
(j) If a student fails in any course of the minor, he/she shall not be eligible to continue the BTech Minor. There won't be any supplementary examination for the courses chosen for Minor. However, the additional credits and grades thus far earned by the student shall be included in the grade card.
(k) Under graduate Degree with Minor shall be issued by the University to the students who fulfil all the academic eligibility requirements for the BTech Programme and Minor.

iv) B.Tech (Honours)

Purpose

Honours is an additional credential a student may earn if he/she opts for the extra 20 credits over and above the normal number of credits needed for the award of the degree in her/his own discipline. Honours is not indicative of class but it is definitely a value addition. It is intended for an academically outstanding student to gain expertise/specialize in an area inside his/her major BTech discipline and to enrich knowledge in emerging/advanced areas in the branch of engineering concerned. It is particularly suited for students intending to pursue higher studies in the discipline in which they will graduate.

To earn credits for Honours

On successful accumulation of credits at the end of the Programme, this will be mentioned in the Degree Certificate as "Bachelor of Technology in Electrical and Computer Engineering, with Honours." The fact will also be reflected in the consolidated grade card, along with the list of courses taken. If one specified course cannot be earned during the course of the Programme, Honours will not be awarded. The individual course credits earned, however, will be reflected in the consolidated grade card.

(a) The courses are grouped into maximum of 3 groups, each group representing a particular specialization in the branch. The students shall select only the courses from same group in all semesters. It means that the specialization is to be fixed by the student and cannot be changed subsequently. The internal evaluation, examination and grading shall be exactly as for other mandatory courses.

(b) The Honours courses are included in the curriculum from fourth to eight semesters for all branches.

(c) Registration is permitted for Honours at the beginning of fourth semester.

(d) Total credits required is **182** (162 + 20 credits from value added courses).

(e) Out of the 20 Credits, 12 credits shall be earned by undergoing a minimum of three courses listed in the curriculum for Honours, of which one course shall be a mini project based on the chosen area. The mini project shall be done in S8.

(f) The remaining 8 credits could be acquired by undergoing approved MOOCs or through courses listed in the curriculum.

(g) The classes for Honours will be conducted along with regular classes and no extra time shall be required for conducting the courses.

(h) The students should earn a grade of 'C' or better for all courses under Honours.

(i) There won't be any supplementary examination for the courses chosen for Honours.

(j) On successful accumulation of credits at the end of the Programme, "Bachelor of Technology in Electrical and Computer Engineering, with Honours" will be awarded if overall CGPA is greater than or equal to 8.5, earned a grade of 'C' or better for all courses chosen for Honours and without any history of 'F' Grade.

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	**Cate-gory Code**	**Course Number**	**Courses**	**L-T-P**	**Hours**	**Credit**
A	BSC	MA0U10A	Linear Algebra and Calculus	3-1-0	4	4
B 1/2	BSC	PH0U10A	Engineering Physics A	3-1-0	4	4
		CY0U10A	Engineering Chemistry	3-1-0	4	4
C 1/2	ESC	ES0U10B	Engineering Graphics	2-0-2	4	3
		ES0U10A	Engineering Mechanics	2-1-0	3	3
D 1/2	ESC	ES0U10D	Basics of Electrical and Electronics Engineering	4-0-0	4	4
		ES0U10C	Basics of Civil and Mechanical Engineering	4-0-0	4	4
E	HSC	HS0U10A	Life Skills	2-0-2	4	---
S 1/2	BSC	PH0U18A	Engineering Physics Lab	0-0-2	2	1
		CY0U18A	Engineering Chemistry Lab	0-0-2	2	1
T 1/2	ESC	ES0U18A	Civil and Mechanical Workshop	0-0-2	2	1
		ES0U18B	Electrical and Electronics Workshop	0-0-2	2	1
TOTAL					**23/24**	**17**

SEMESTER II						
Slot	**Cate-gory Code**	**Course Number**	**Courses**	**L-T-P**	**Hours**	**Credit**
A	BSC	MA0U10B	Vector Calculus, Differential Equations and Transforms	3-1-0	4	4
B 1/2	BSC	PH0U10A	Engineering Physics A	3-1-0	4	4
		CY0U10A	Engineering Chemistry	3-1-0	4	4
C 1/2	ESC	ES0U10A	Engineering Mechanics	2-1-0	3	3
		ES0U10B	Engineering Graphics	2-0-2	4	3
D 1/2	ESC	ES0U10C	Basics of Civil and Mechanical Engineering	4-0-0	4	4
		ES0U10D	Basics of Electrical and Electronics Engineering	4-0-0	4	4
E	HSC	HS0U10B	Professional Communication	2-0-2	4	---
F	ESC	ES0U10E	Programming in **C**	2-1-2	5	4
S 1/2	BSC	PH0U18A	Engineering Physics Lab	0-0-2	2	1
		CY0U18A	Engineering Chemistry Lab	0-0-2	2	1
T 1/2	ESC	ES0U18A	Civil and Mechanical Workshop	0-0-2	2	1
		ES0U18B	Electrical and Electronics Workshop	0-0-2	2	1
TOTAL					**28/29**	**21**

SEMESTER III						
Slot	**Cate-gory Code**	**Course Number**	**Courses**	**L-T-P**	**Hours**	**Credit**
A	BSC	MA0U20G	Discrete Mathematical Structures	3-1-0	4	4
B	PCC	EL2U20A	Circuits and Networks	2-2-0	4	4
C	PCC	EL2U20B	Data Structures	3-1-0	4	4
D	PCC	EL2U20C	Instrumentation Systems	3-1-0	4	4
E 1/2	HSC	HS0U20A	Professional Ethics	2-0-0	2	2
	ESC	ES0U20A	Design & Engineering	2-0-0	2	2
F	MNC	NC0U20B	Constitution of India	2-0-0	2	---
S	PCC	EL2U28A	Data Structures Lab	0-0-3	3	2
T	PCC	EL2U28B	Measurements and Instrumentation Lab	0-0-3	3	2
R/M	VAC		Remedial/Minor Course	3-1-0	4	4
TOTAL					**26/30**	**22/26**

SEMESTER IV						
Slot	**Cate-gory Code**	**Course Number**	**Courses**	**L-T-P**	**Hours**	**Credit**
A	BSC	MA0U20C	Probability, Random Processes and Numerical Methods	3-1-0	4	4
B	PCC	EL2U20D	Computer Organization and Architecture	3-1-0	4	4
C	PCC	EL2U20E	Object Oriented Programming Using JAVA	3-1-0	4	4
D	PCC	EL2U20F	Digital Electronics	3-1-0	4	4
E (1/2)	ESC	ES0U20A	Design & Engineering	2-0-0	2	2
	HSC	HS0U20A	Professional Ethics	2-0-0	2	2
F	MNC	NC0U20C	Universal Human Values - II	2-0-0	2	--
S	PCC	EL2U28C	Object Oriented Programming Lab (In Java)	0-0-3	3	2
T	PCC	EL2U28D	Digital Electronics Lab	0-0-3	3	2
R/M/H	VAC		Remedial/Minor/Honors Course	3-1-0	4	4
TOTAL					**26/30**	**22/26**

SEMESTER V						
Slot	**Cate-gory Code**	**Course Number**	**Courses**	**L-T-P**	**Hours**	**Credit**
A	PCC	EL2U30A	Database Management Systems	3-1-0	4	4
B	PCC	EL2U30B	Microprocessors and Embedded Systems	3-1-0	4	4
C	PCC	EL2U30C	Electrical Machines	3-1-0	4	4
D	PEC	EL2UXXX	Program Elective I	3-0-0	3	3
E	HSC	HS0U30B	Management for Engineers	3-0-0	3	3
F	MNC	NC0U30A	Disaster Management	2-0-0	2	--
S	PCC	EL2U38A	Electrical Machines Lab	0-0-3	3	2
T	PCC	EL2U38B	Database Management System Lab	0-0-3	3	2
R/M/H	VAC		Remedial/Minor/Honours Course	2-0-0	4	4
TOTAL					**26/30**	**22/26**

PROGRAMME ELECTIVE I

Slot	**Category Code**	**Course Number**	**Courses**	**L-T-P**	**Hours**	**Credit**
D	PEC	EL2U31A	Signals and Systems	3-0-0	3	3
		EL2U31B	Foundations of Security in Computing	3-0-0	3	3
		EL2U31C	Biomedical Instrumentation	3-0-0	3	3
		EL2U31D	Renewable Energy Conversions	3-0-0	3	3
		EL2U31E	Programming In Python	3-0-0	3	3
		EL2U31F	Operating Systems	3-0-0	3	3
		EL2U31G	Foundations of Machine Learning	3-0-0	3	3
		EL2U31H	Wireless Sensor Networks	3-0-0	3	3

SEMESTER VI						
Slot	**Cate-gory Code**	**Course Number**	**Courses**	**L-T-P**	**Hours**	**Credit**
A	PCC	EL2U30D	Power Electronics and Drives	3-1-0	4	4
B	PCC	EL2U30E	Internet of Things	3-1-0	4	4
C	PCC	EL2U30F	Computer Communication and Network Security	3-1-0	4	4
D	PCC	EL2U30G	Algorithm Analysis and Design	3-0-0	3	3
E	PEC	EL2UXXX	Program Elective II	3-0-0	3	3
F	PCC	EL2U30H	Comprehensive Course Work	1-0-0	1	1
S	PCC	EL2U38C	Embedded Systems and IOT Lab	0-0-3	3	2
T	PCC	EL2U38D	Networking Lab	0-0-3	3	2
R/M/H	VAC		Remedial/Minor/Honours Course	3-1-0	4	4
TOTAL					**25/29**	**23/27**

PROGRAMME ELECTIVE II

Slot	**Category Code**	**Course Number**	**Courses**	**L-T-P**	**Hours**	**Credit**
E	PEC	EL2U32A	Advanced Microcontrollers	3-0-0	3	3
		EL2U32B	Electromagnetic Theory and Compatibility	3-0-0	3	3
		EL2U32C	Energy Storage Systems	3-0-0	3	3
		EL2U32D	Digital Image Processing	3-0-0	3	3
		EL2U32E	Modern Illumination Control	3-0-0	3	3
		EL2U32F	Introduction to Artificial Intelligence	3-0-0	3	3
		EL2U32G	Soft Computing Techniques	3-0-0	3	3
		EL2U32H	Introduction to Signal Processing	3-0-0	3	3

SEMESTER VII						
Slot	**Cate-gory Code**	**Course Number**	**Courses**	**L-T-P**	**Hours**	**Credit**
A	PCC	EL2U40A	Control Systems	2-1-0	3	3
B	PCC	EL2U40B	Power System Engineering	2-1-0	3	3
C	PEC	EL2UXXX	Program Elective III	3-0-0	3	3
D	OEC	EL0UXXX	Open Elective I	3-0-0	3	3
E	MNC	NC0U40A	Industrial Safety Engineering	2-1-0	3	--
T	PWS	EL2U49A	Seminar	0-0-3	3	2
U	PWS	EL2U49B	Project Phase I	0-0-6	6	2
R/M/H	VAC		Remedial/Minor/ Honors Course	0-1-6	7/4	4
TOTAL					**24/31/28**	**16/22**

PROGRAMME ELECTIVE III

Slot	Category Code	Course Number	Courses	L-T-P	Hours	Credit
C	PEC	EL2U41A	Software Engineering	3-0-0	3	3
		EL2U41B	Machine Learning	3-0-0	3	3
		EL2U41C	Energy Management	3-0-0	3	3
		EL2U41D	Fundamentals of Robotics	2-1-0	3	3
		EL2U41E	Real Time Operating Systems	3-0-0	3	3
		EL2U41F	Digital Signal Processing	3-0-0	3	3
		EL2U41G	Web Programming	3-0-0	3	3
		EL2U41H	Electric Drives	3-0-0	3	3

OPEN ELECTIVE I

Slot	Category Code	Course Number	Courses	L-T-P	Hours	Credit
D	OEC	EL0U41A	Electrical Drives and Control for Automation	3-0-0	3	3
		EL0U41D	Renewable Energy Systems	3-0-0	3	3
		EL0U41E	Introduction to Flight Dynamics and Control	3-0-0	3	3
		EL0U41F	Introduction to Power Processing	3-0-0	3	3

SEMESTER VIII						
Slot	**Cate-gory Code**	**Course Number**	**Courses**	**L-T-P**	**Hours**	**Credit**
A	PEC	EL2UXXX	Program Elective IV	2-1-0	3	3
B	PEC	EL2UXXX	Program Elective V	2-1-0	3	3
C	PEC	EL2UXXX	Program Elective VI	2-1-0	3	3
D	HSC	HS0U40A	Industrial Economics & Foreign Trade	3-0-0	3	3
T	PCC	EL2U40C	Comprehensive Course Viva	1-0-0	1	1
U	PWS	EL2U49C	Project Phase II	0-0-12	12	4
R/M/H	VAC		Remedial/Minor/Honors course	0-1-6	7	4
TOTAL					**25/32**	**17/21**

PROGRAMME ELECTIVE IV

Slot	Category Code	Course Number	Courses	L-T-P	Hours	Credit
A	PEC	EL2U42A	Computer Vision	3-0-0	3	3
		EL2U42B	Programming Paradigms	3-0-0	3	3
		EL2U42C	Cryptography	3-0-0	3	3
		EL2U42D	Mechatronics	3-0-0	3	3
		EL2U42E	Computer Aided Design of Electrical Machine	3-0-0	3	3
		EL2U42F	Smart Grid Technologies	3-0-0	3	3
		EL2U42G	Data Analytics for Electrical Engineers	3-0-0	3	3
		EL2U42H	HVDC & FACTS	3-0-0	3	3

PROGRAMME ELECTIVE V

Slot	Category Code	Course Number	Courses	L-T-P	Hours	Credit
B	PEC	EL2U43A	Robotics and Artificial Intelligence	3-0-0	3	3
		EL2U43B	Electric and Hybrid Vehicles	3-0-0	3	3
		EL2U43C	Deep Learning	3-0-0	3	3
		EL2U43D	Nonlinear Systems	3-0-0	3	3
		EL2U43E	Solar PV Systems	2-1-0	3	3
		EL2U43F	Cloud Computing	3-0-0	3	3
		EL2U43G	Vehicular Networks and Communication	3-0-0	3	3
		EL2U43H	Power System Protection	3-0-0	3	3

PROGRAM ELECTIVE VI

Slot	Category Code	Course Number	Courses	L-T-P	Hours	Credit
C	PEC	EL2U44A	Digital Control Systems	2-1-0	3	3
		EL2U44B	Block Chain Technologies	3-0-0	3	3
		EL2U44C	Data Mining	3-0-0	3	3
		EL2U44D	Special Electric Machines	3-0-0	3	3
		EL2U44E	Software Testing	3-0-0	3	3
		EL2U44F	Bioinformatics	3-0-0	3	3
		EL2U44G	Computer Aided Electrical System Design	2-1-0	3	3
		EL2U44H	Power Quality	3-0-0	3	3

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 Number	Course	L-T-P	Credit	Course Number	Course	L-T-P	Credit	Course Number	Course	L-T-P	Credit	Course Number	Course	L-T-P	Credit
S3	EL0M20I	Electric Machine Fundamentals	3-1-0	4	EL0M20J	Introduction to Power Engineering	3-1-0	4	EL0M20K	Arduino Platform Interface & C Programming	4-0-0	4	EL0M20L	Basics of Illumination Science and Lighting Design	4-0-0	4
S4	EL0M20M	Drives and Control	3-1-0	4	EL0M20N	Energy Systems	4-0-0	4	EL0M20P	Micro Controllers & Embedded Systems	4-0-0	4	EL0M20Q	Electric Power Supply and Distribution Systems	4-0-0	4
S5	EL0M30I	Energy Storage Devices	3-1-0	4	EL0M30J	Solar and Wind Energy Conversion Systems	3-1-0	4	EL0M30K	Raspberry Pi Platform Interface & Python Programming	3-1-0	4	EL0M30L	Energy efficiency in Buildings	4-0-0	4
S6	EL0M30M	Hybrid and Electric Vehicles	3-1-0	4	EL0M30N	Instrumentation and Automation of Power Plants	4-0-0	4	EL0M30P	Cloud Services and Internet of Things	4-0-0	4	EL0M30Q	Electrical System Design and Building services	3-1-0	4
S7	EL0M49A	Mini Project	0-1-6	4	EL0M49A	Mini Project	0-1-6	4	EL0M49A	Mini Project	0-1-6	4	EL0M49A	Mini Project	0-1-6	4
S8	EL0M49B	Mini Project	0-1-6	4	EL0M49B	Mini Project	0-1-6	4	EL0M49B	Mini Project	0-1-6	4	EL0M49B	Mini Project	0-1-6	4

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 Number	Course	L-T-P	Credit	Course Number	Course	L-T-P	Credit	Course Number	Course	L-T-P	Credit	Course Number	Course	L-T-P	Credit
S4	EL2H20A	Automatic Control Systems	3-1-0	4	EL2H20B	Basics of Machine Learning	3-1-0	4	EL2H20C	Network Communication in Smart Grid	3-1-0	4	EL2H20D	Analysis of Electrical Machines	3-1-0	4
S5	EL2H30A	Process Automation	4-0-0	4	EL2H30B	Mathematics for Machine Learning	4-0-0	4	EL2H30C	Micro Grids	4-0-0	4	EL2H30D	Electric Vehicle Technology	4-0-0	4
S6	EL2H30E	Introduction to Navigation and Trajectory planning	3-1-0	4	EL2H30F	Machine Learning Programming	3-1-0	4	EL2H30G	Distributed Generation and Smart Grid	3-1-0	4	EL2H30H	Automotive Electronic systems	4-0-0	4
S7	EL2H40A	Aircraft Dynamics & Control	4-0-0	4	EL2H40B	Deep Learning	3-1-0	4	EL2H40C	Operation and Control of AC/DC Smart Grids	4-0-0	4	EL2H40D	Smart Grid and Interfacing	4-0-0	4
S8	EL2H49A	Mini Project	0-1-6	4	EL2H49A	Mini Project	0-1-6	4	EL2H49A	Mini Project	0-1-6	4	EL2H49A	Mini Project	0-1-6	4

Evaluation Framework

Pattern of Grading

College expects a continuous progress in learning for a student. So, the evaluation will be done on a continual basis. A student will be eligible for the award of BTech Degree of the University, under the autonomy, on satisfying the following requirements:

i) Fulfilled all the curriculum requirements within the stipulated duration of the Programme.

ii) Earned the required minimum credits and earned the requite minimum CGPA as specified in the curriculum for the branch of study.

iii) No disciplinary action pending or contemplated.

Students registered for a course have to attend the course regularly and undergo the Continuous Assessment (CA) and appear for the End Semester Examinations. Credits for the course are deemed to be earned only on getting at least a pass grade 'P' or better in the composite evaluation. Pass minimum for a course shall be 40% for the End Semester Examination (ESE) and 50% of CA and ESE put together. Letter grade 'F' will be awarded to the student for a course if either his/her mark for the End Semester Examination (ESE) is below 40 % or the overall mark [Continuous Assessment + End Semester Examination] is below 50 %.

Students who received F grade in an End Semester Examination shall have to appear for the End Semester Examination at the next opportunity and earn the credits. They shall not be permitted to register for the course again.

Grading is based on the overall percentage marks obtained by the student in a course. The grade card shall only give the grades against the courses the student has registered. Semester grade card shall give the grade for each registered course, Semester Grade Point Average (SGPA) for the semester as well as Cumulative Grade Point Average (CGPA). There is no provision for improving the grades.

Grade cards shall be issued by the College to the student for the registered courses, in every semester. On earning the required credits for the degree, the College shall issue the final consolidated grade sheet for the BTech programme including CGPA.

Grade and Grade Points

Grades	Grade Point (GP)	% of Total Marks obtained in the Course
S	10	90% and above
A+	9.0	85% and above but less than 90%
A	8.5	80% and above but less than 85%
B+	8.0	75% and above but less than 80%
B	7.5	70% and above but less than 75%
C +	7.0	65% and above but less than 70%
C	6.5	60% and above but less than 65%
D	6.0	55% and above but less than 60%
P (Pass)	5.5	50% and above but less than 55%
F (Fail)	0	Below 50% (CIE + ESE) or Below 40 % for ESE
FE	0	Failed due to lack of eligibility criteria
I	0	Could not appear for the End Semester Examination but fulfills the eligibility criteria
CGPA 8.0 and above		First class with Distinction
CGPA 6.5 and above		First class
Equivalent percentage mark shall be = 10*G - 3.75, where G is SGPA or CGPA		

Calculation of SGPA/CGPA

Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA) are calculated as follows.

$$SGPA = \frac{\sum C_i \times GP_i}{\sum C_i}$$

where 'C_i' is the credit assigned for a course and 'GP_i' is the grade point for that course. Summation is done for all courses specified in the curriculum of that semester.

$$CGPA = \frac{\sum C_i \times GP_i}{\sum C_i}$$

where 'C_i' is the credit assigned for a course and 'GP_i' is the grade point for that course. Summation is done for all courses specified in the curriculum up to that semester for which the 'CGPA' is needed.

CGPA for the BTech programme is arrived at by considering all course credits that are needed for the degree and their respective grade points.

A student shall earn 2 credits by actively involving in co–curricular and extra–curricular activities as per the guidelines issued from time to time. On getting minimum 100 activity points the student satisfies the requirement and earns the two credits which shall not be counted for the calculation of CGPA but shall be mandatory for the award of the degree.

Break of Study

A student is permitted to avail break of study for specific purpose:

i) In case of accident or serious illness needing prolonged hospitalization and rest.
ii) In case the student has a bright idea and would like to initiate a start-up venture or develop a product.
iii) In case of any personal reasons that need a break in study.
iv) For internship leading to employment.

For break of study due to illness, student shall submit all necessary medical reports together with the recommendation of the doctor treating him giving definite reasons for break of study and its duration. Before joining back, the student should submit the fitness certificate from the doctor who had treated him.

Students who want to initiate a start-up venture or a product development, have to submit a project report, clearly indicating the purpose, action plan, technical details, funding details and future plans to the College through the Department. College shall evaluate the proposal by constituting an expert team consisting of a technocrat and a bank executive and take an appropriate decision based on the team's recommendation. The break of study for the startup shall be permitted only after the 4^{th} semester for a maximum duration of two semesters. This is however permitted only on successfully completing the courses listed out in all the four semesters.

Students who require a break of study due to personal reasons shall convince the College on the genuine need of it by giving authentic evidence for the same.

Students who require break of study for 'internship leading to employment' shall produce the offer letter obtained from the employer concerned. College shall verify the authenticity of the offer and take appropriate decision, based on the recommendation of the standing committee.

Break of study for an academic year is the preferred option to break of study for a semester.

Students shall have to rejoin on the first working day of the next immediate semester after the break of study.

Students readmitted after break of study shall continue their studies in the existing scheme to which he/she was readmitted. The exemption and addition of courses to be registered, the transitory courses (approved by the Academic Council), if any due to curriculum change, shall be decided by the respective Board of Studies.

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