CURRICULUM 2023 (Autonomous)

VERSION 1.0

B.TECH.
CIVIL ENGINEERING

MAR BASELIOS COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

Mar Ivanios Vidyanagar, Nalanchira, Thiruvananthapuram – 695 015

August 2023

CURRICULUM

FOR

B. TECH. DEGREE PROGRAMME

IN

CIVIL ENGINEERING

SEMESTERS I TO VIII

2023 SCHEME (AUTONOMOUS)

MAR BASELIOS COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

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MAR BASELIOS COLLEGE OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF CIVIL ENGINEERING

B. TECH DEGREE PROGRAMME

IN

CIVIL ENGINEERING

CURRICULUM

2023 SCHEME

Items	Board of Studies (BoS)	Academic Council (AC)
Date of Approval	14/7/2023	09/08/2023
Date of Approval of Revised version	12/08/2024	19/06/2024

Head of the Department

Chairman, Board of Studies

Principal

Chairman, Academic Council

MAR BASELIOS COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

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 CIVIL ENGINEERING

Vision and Mission of the Department

Vision:

To be a Centre of Excellence in Civil Engineering education with a global perspective, creating ethically strong engineers for the service of society.

Mission:

To provide Engineering Education which can create exemplary professional Civil Engineers of high ethics with strong conceptual foundation coupled with practical insight, to serve the industryand community.

PROGRAMME EDUCATIONAL OBJECTIVES(PEOs)

PEO1: Graduates of the Programme will have a successful career as Civil Engineering practitioners, entrepreneurs or professionals, addressing the needs of the industry with a global perspective.

PEO2: They will contribute to society as ethical and responsible citizens with proven expertise

PEO3: They will engage in continuous professional development and advance to leadership roles in their chosen career.

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: Provide feasible and sustainable solutions to problems in various Civil Engineering disciplines such as Structural, Environmental, Geotechnical, Transportation and Construction Engineering.

PSO2: Apply the principles, methods, software and codes of practices to design various Civil Engineering Systems.

MAR BASELIOS COLLEGE OF ENGINEERING AND TECHNOLOGY

THIRUVANANTHAPURAM-695015

DEPARTMENT OF CIVIL ENGINEERING

CURRICULUM 2023 UNDER AUTONOMY STATUS

i) Knowledge Segments and Credits

Every course of the 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	Totalcredits
1	Humanities and Social Sciences including Management Courses	HSC	6
2	Basic Science Courses	BSC	26
3	Engineering Science Courses	ESC	24
4	Programme Core Courses	PCC	74
5	Programme Elective Courses	PEC	18
6	Institute Elective Courses	IEC	6
7	Project Work, Seminar, Comprehensive Viva Voce and internship	PWS	13
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	*20*	*20*	*22*	*20*	*25*	*22*	*21*	*17*	***167***
Credits for Activities	*3*								***3***
Total Credits									***170***
Value Added Courses (Optional) – Honours / Minor									***15***
Total Credits									***185***

SEMESTER I							
Slot	**Cate-gory Code**	**Course Code**	**Courses**	**L-T-P-J**	**SS**	**Hours**	**Credit**
A	BSC	23MAL10A	Linear Algebra and Calculus	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	23ESB10K	Basics of Electrical Engineering B	1-0-2-0	3	3	2
E	ESC	23ESL10M	Basics of Mechanical Engineering	2-0-0-0	3	2	2
	ESC	23ESL10N	Basics of Civil Engineering	2-0-0-0	3	2	2
G	ESC	23ESL1NA	Environmental Science	2-0-0-0	3	2	1*
S	BSC	23CYP10A	Engineering Chemistry Lab	0-0-2-0	1	2	1
T	ESC	23ESP10A	Manufacturing and Construction Practices A	0-0-2-0	1	2	1
				TOTAL	**28**	**25**	**20**

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

SEMESTER II							
Slot	**Categoy Code**	**Course Code**	**Courses**	**L-T-P-J**	**SS**	**Hours**	**Credit**
A	BSC	23MAL10B	Vector Calculus, Differential Equations and Transforms	3-1-0-0	5	4	4
B	BSC	23PYL10A	Engineering Physics	3-1-0-0	5	4	4
C	ESC	23ESL10B	Applied Mechanics	2-1-0-0	4	3	3
D	ESC	23ESB10F	Problem Solving and Programming	2-0-2-0	4	4	3
E	ESC	23ESL10R	Building Materials and Construction Technology	3-0-0-0	5	3	3
G	HSC	23HSJ1NB	Professional Communication	2-0-0-2	5	4	1*
S	BSC	23PYP10A	Engineering Physics Lab	0-0-2-0	1	2	1
T	ESC	23ESP10C	Design Studio I	0-0-2-0	1	2	1
				TOTAL	**30**	**26**	**20**

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

SEMESTER III							
Slot	**Category**	**Course Code**	**Courses**	**L-T-P-J**	**SS**	**Hours**	**Credit**
A	BSC	23MAL20A	Partial Differential Equations and Complex Analysis	3-1-0-0	5	4	4
B	PCC	23CEL20A	Mechanics of Structures	3-1-0-0	5	4	4
C	PCC	23CEL20B	Fluid Mechanics and Hydraulics	3-1-0-0	5	4	4
D	PCC	23CEL20C	Surveying and Geomatics	3-0-0-0	5	3	3
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	23CEP20A	Fluid Mechanics Laboratory	0-0-3-0	2	3	2
T	PCC	23CEP20B	Surveying Laboratory	0-0-3-0	2	3	2
M	VAC		Minor Course	3-0-0-0	5	3	3
				TOTAL	**30/35**	**25/28**	**22/25**

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

SEMESTER IV							
Slot	**Category**	**Course Code**	**Courses**	**L-T-P-J**	**SS**	**Hours**	**Credit**
A	BSC	23MAL20D	Probability, Statistics and Numerical Methods	3-1-0-0	5	4	4
B	PCC	23CEL20D	Structural Analysis	3-1-0-0	5	4	4
C	PCC	23CEL20E	Hydrology and Water Resources Engineering	4-0-0-0	6	4	4
D	PCC	23CEB20F	Water and Wastewater Engineering	4-0-2-0	7	6	5
E	HSC	23HSL2NB	Universal Human Values II	2-1-0-0	4	3	1*
G	ESC	23ESL2NC	Industrial Safety Engineering	2-1-0-0	4	3	1*
S	PCC	23CEP20C	Material Testing Lab I	0-0-2-0	1	2	1
M/ H	VAC		Minor/Honours Course	3-0-0-0	5	3	3
				TOTAL	**32/37**	**26/29**	**20/23**

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

SEMESTER V							
Slot	**Category**	**Course Code**	**Courses**	**L-T-P-J**	**SS**	**Hours**	**Credit**
A	PCC	23CEL30A	Design of Reinforced Concrete Structures	3-0-0-0	5	3	3
B	PCC	23CEJ30B	Applications of Artificial Intelligence in Civil Engineering	2-0-0-1	4	3	3
C	PCC	23CEL30C	Soil Mechanics	3-1-0-0	5	4	4
D	PCC	23CEL30D	Transportation Engineering	3-0-0-0	5	3	3
E	PCC	23CEJ30E	Quantity Surveying and Valuation	3-0-0-2	7	5	5
F	PEC	23CEL31X	Program Elective I	3-0-0-0	5	3	3
S	PCC	23CEP30A	Material Testing Lab II	0-0-3-0	2	3	2
T	PCC	23CEP30B	Transportation Engineering Laboratory	0-0-3-0	2	3	2
M/ H	VAC		Minor/Honours Course	3-0-0-0	5	3	3
				TOTAL	**35/40**	**27/30**	**25/28**

Program Elective I							
Slot	**Category**	**Course Code**	**Courses**	**L-T-P-J**	**SS**	**Hours**	**Credit**
F	PEC	23CEL31A	Advanced Concrete Technology	3-0-0-0	5	3	3
F	PEC	23CEL31B	Structural health monitoring and retrofitting	3-0-0-0	5	3	3
F	PEC	23CEL31C	Geotechnical Investigation	3-0-0-0	5	3	3
F	PEC	23CEL31D	Mechanics of Fluid Flow	3-0-0-0	5	3	3
F	PEC	23CEL31E	Air Quality Management	3-0-0-0	5	3	3
F	PEC	23CEL31F	Transportation Planning	3-0-0-0	5	3	3

SEMESTER VI							
Slot	**Category**	**Course Code**	**Courses**	**L-T-P-J**	**SS**	**Hours**	**Credit**
A	PCC	23CEL30F	Design of Steel Structures	3-1-0-0	5	4	4
B	PCC	23CEL30G	Foundation Engineering	3-0-0-0	5	3	3
C	PEC	23CEL32X	Program Elective II	3-0-0-0	5	3	3
E	IEC	23IEL31X	Institute Elective I	3-0-0-0	5	3	3
F	HSC	23HSL30A	Business Economics and Accountancy	3-0-0-0	5	3	3
S	PCC	23CEP30C	Geotechnical Engineering Laboratory	0-0-3-0	2	3	2
T	PCC	23CEP30D	Design Studio II	0-0-3-0	2	3	2
U	PWS	23CES38A	Seminar	0-0-3-0	2	3	2
M/ H	VAC		Minor/Honours Course	3-0-0-0	5	3	3
				TOTAL	**31/36**	**25/28**	**22/25**

Program Elective II							
Slot	**Category**	**Course Code**	**Course Name**	**L-T-P-J**	**SS**	**Hours**	**Credit**
C	PEC	23CEL32A	Advanced Structural Analysis	3-0-0-0	5	3	3
C	PEC	23CEL32B	Prestressed Concrete	3-0-0-0	5	3	3
C	PEC	23CEL32C	Ground Improvement Techniques	3-0-0-0	5	3	3
C	PEC	23CEL32D	Applied soil mechanics	3-0-0-0	5	3	3
C	PEC	23CEL32E	Applied Hydrology	3-0-0-0	5	3	3
C	PEC	23CEL32F	Solid and Hazardous Waste Management	3-0-0-0	5	3	3
C	PEC	23CEL32G	Traffic Flow Modelling	3-0-0-0	5	3	3

	Institute Elective I						
Slot	**Category**	**Course Code**	**Courses**	**L-T-P-J**	**SS**	**Hours**	**Credit**
E	IEC	23IEL31A	Green Building and Energy Management	3-0-0-0	5	3	3
E	IEC	23IEL31B	Engineering Project Management	3-0-0-0	5	3	3
E	IEC	23IEL31C	Disaster Mitigation and Management	3-0-0-0	5	3	3
E	IEC	23IEL31D	Environmental Impact Assessment and Life Cycle Analysis	3-0-0-0	5	3	3

SEMESTER VII							
Slot	**Category**	**Course Code**	**Courses**	**L-T-P-J**	**SS**	**Hours**	**Credit**
A	PCC	23CEJ40B	Traffic Engineering and Management	3-0-0-2	7	5	5
B	PEC	23CEL43X	Program Elective III	3-0-0-0	5	3	3
C	PCC	23CEB40B	Construction Project Management	3-0-2-0	6	5	4
E	IEC	23IEL42X	Institute Elective II	3-0-0-0	5	3	3
T	PWS	23CEV48A	Comprehensive Course Viva	0-0-2-0	1	2	1
U	PWS	23CEJ48A	Project	0-0-10-0	10	10	5
		23CEI48A	Internship*				
H	VAC		Honours Course	3-0-0-0	5	3	3
M	VAC		Minor Course	0-0-6-0	6	3	3
			TOTAL		**34/39/40**	**28/31**	**21/24**

* 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.

Program Elective III							
Slot	**Category**	**Course Code**	**Course Name**	**L-T-P-J**	**SS**	**Hours**	**Credit**
B	PEC	23CEL43A	Computed aided Structural analysis	3-0-0-0	5	3	3
B	PEC	23CEL43B	Advanced Design of Structures	3-0-0-0	5	3	3
B	PEC	23CEL43C	Environmental Geotechnics	3-0-0-0	5	3	3
B	PEC	23CEL43D	Integrated Watershed Management	3-0-0-0	5	3	3
B	PEC	23CEL43E	Industrial Wastewater Management	3-0-0-0	5	3	3
B	PEC	23CEL43F	Ecological Engineering	3-0-0-0	5	3	3
B	PEC	23CEL43G	Road Safety and Management	3-0-0-0	5	3	3
B	PEC	23CEL43H	Geometric Design of Transportation Facilities	3-0-0-0	5	3	3

	Institute Elective II						
Slot	**Category**	**Course Code**	**Courses**	**L-T-P-J**	**SS**	**Hours**	**Credit**
E	IEC	23IEL42A	Global Climate Change	3-0-0-0	5	3	3
E	IEC	23IEL42B	Environmental Health and Safety	3-0-0-0	5	3	3
E	IEC	23IEL42C	Application of Remote Sensing and GIS	3-0-0-0	5	3	3
E	IEC	23IEL42D	Circular Economy for Sustainable Development	3-0-0-0	5	3	3

SEMESTER VIII							
Slot	**Category**	**Course Code**	**Courses**	**L-T-P-J**	**SS**	**Hours**	**Credit**
A	PCC	23CEL40C	Integrated Waste Management	3-0-0-0	5	3	3
B	PEC	23CEL44X	Program Elective IV	3-0-0-0	5	3	3
C	PEC	23CEL45X	Program Elective V	3-0-0-0	5	3	3
D	PEC	23CEL46X	Program Elective VI	3-0-0-0	5	3	3
U	PWS	23CEJ48B	Project	0-0-10-0	10	10	5
		23CEI48A	Internship*				
M/H	VAC		Minor/Honours Course	0-0-6-0	6	6	3
				TOTAL	**30/36**	**22/25**	**17/20**

Program Elective IV							
Slot	**Category**	**Course Code**	**Course Name**	**L-T-P-J**	**SS**	**Hours**	**Credit**
B	PEC	23CEL44A	Introduction to Bridge Engineering	3-0-0-0	5	3	3
B	PEC	23CEL44B	Structural Dynamics	3-0-0-0	5	3	3
B	PEC	23CEL44C	Soil Dynamics and Machine Foundation	3-0-0-0	5	3	3
B	PEC	23CEL44D	Geosynthetics and Reinforced Soil Structures	3-0-0-0	5	3	3
B	PEC	23CEL44E	Irrigation and Drainage	3-0-0-0	5	3	3
B	PEC	23CEL44F	Advanced Environmental Engineering	3-0-0-0	5	3	3
B	PEC	23CEL44G	Mass Transportation Systems	3-0-0-0	5	3	3
B	PEC	23CEL44H	Pavement Analysis and Design	3-0-0-0	5	3	3
Program Elective V							
Slot	**Category**	**Course Code**	**Course Name**	**L-T-P-J**	**SS**	**Hours**	**Credit**
C	PEC	23CEL45A	Seismic Design of Structures	3-0-0-0	5	3	3
C	PEC	23CEL45B	Advanced Numerical Methods	3-0-0-0	5	3	3
C	PEC	23CEL45C	Soil Structure Interaction	3-0-0-0	5	3	3
C	PEC	23CEL45D	Earth & Rockfill Dam Engineering	3-0-0-0	5	3	3
C	PEC	23CEL45E	Hydroclimatology	3-0-0-0	5	3	3
C	PEC	23CEL45F	Environmental Impact Assessment	3-0-0-0	5	3	3
C	PEC	23CEL45G	Railway, Airport and Harbour Engineering	3-0-0-0	5	3	3
C	PEC	23CEL45H	Pavement Asset Management for Roads, Airports and Ports	3-0-0-0	5	3	3

Program Elective VI							
Slot	**Category**	**Course Code**	**Course Name**	**L-T-P-J**	**SS**	**Hours**	**Credit**
D	PEC	23CEL46A	Structural Masonry and alternative building technologies	3-0-0-0	5	3	3
D	PEC	23CEL46B	Probability in Civil Engineering	3-0-0-0	5	3	3
D	PEC	23CEL46C	Geotechnical Earthquake Engineering	3-0-0-0	5	3	3
D	PEC	23CEL46D	Introductory Rock Mechanics	3-0-0-0	5	3	3
D	PEC	23CEL46E	Environmental Microbiology	3-0-0-0	5	3	3
D	PEC	23CEL46F	Analysis and Evaluation of Transportation Systems	3-0-0-0	5	3	3
D	PEC	23CEL46G	Pavement Evaluation, Rehabilitation and Maintenance	3-0-0-0	5	3	3

MINOR BASKET

Semester	Basket I				Basket II				Basket III			
	Infrastructure Development and Management				Environmental and Water Resource Engineering				Transportation Engineering			
	Course Code	Course	L-T-P-J	Credits	Course Code	Course	L-T-P-J	Credits	Course Code	Course	L-T-P-J	Credits
S3	23CEL2MA	Building Information Modelling	3-0-0-0	3	23CEL2MC	Climate Change and Disaster Mitigation	3-0-0-0	3	23CEL2ME	Traffic Engineering	3-0-0-0	3
S4	23CEL2MB	Infrastructure Health Monitoring	3-0-0-0	3	23CEL2MD	Watershed Management	3-0-0-0	3	23CEL2MF	Urban Transportation Planning	3-0-0-0	3
S5	23CEL3MA	Infrastructure Project Management	3-0-0-0	3	23CEL3MC	Air Pollution and Control Techniques	3-0-0-0	3	23CEL3ME	Traffic Flow Theory and Modelling	3-0-0-0	3
S6	23CEL3MB	Performance and Risk Assessment of Infrastructure Systems	3-0-0-0	3	23CEL3MD	Integrated Waste Management for Smart Cities	3-0-0-0	3	23CEL3MF	Transportation and logistics management	3-0-0-0	3
S7/ S8	23CEl4MA	Mini Project	0-0-6–0	3	23CEL4MC	Mini Project	0-0-6–0	3	23CEL4ME	Mini Project	0-0-6–0	3

Semester	Basket IV				Basket V			
	Virtual Reality and Automation Technologies in Construction				Engineering Project Management			
	Course Code	Course	L-T-P-J	Credits	Course Code	Course	L-T-P-J	Credits
S3	23CEL2MG	Infrastructure Management with Informatics	3-0-0-0	3	23CEL2MI	Advanced Project Management	3-0-0-0	3
S4	23CEL2MH	Construction Automation and Robotics	3-0-0-0	3	23CEL2MJ	Building Information Modelling in Management	3-0-0-0	3
S5	23CEL3MG	Machine Learning for Construction Automation	3-0-0-0	3	23CEL3MI	Contract Management	3-0-0-0	3
S6	23CEL3MH	Virtual Reality in Construction	3-0-0-0	3	23CEL3MJ	Quality, Risk and Safety Management	3-0-0-0	3
S7/ S8	23CEL4MG	Mini Project	0-0-6-0	3	23CEL4MI	Mini Project	0-0-6-0	3

HONOURS BASKET

Semester	Basket I				Basket II				Basket III			
	Course Code	Course	L-T-P-J	Credits	Course Code	Course	L-T-P-J	Credits	Course Code	Course	L-T-P-J	Credits
S4	23CEL2HB	Advanced Mechanics of Solids	3-0-0-0	3	23CEL2HD	Environmental Pollution Control Techniques	3-0-0-0	3	23CEL2HF	Geographical Information System	2-0-2-0	3
S5	23CEL3HA	Modern Construction Materials	3-0-0-0	3	23CEL3HC	Ground Water Hydrology	3-0-0-0	3	23CEL3HE	Pavement Construction and Management	3-0-0-0	3
S6	23CEL3HB	Finite Element Method	3-0-0-0	3	23CEL3HD	Environmental Pollution Modelling	3-0-0-0	3	23CEL3HF	Transportation System Management	3-0-0-0	3
S7	23CEL4HA	Structural Dynamics	3-0-0-0	3	23CEL4HC	Earth Dams and Earth Retaining Structure	3-0-0-0	3	23CEL4HE	Soil Dynamics and Machine Foundation	3-0-0-0	3
S8	23CEL4HB	Mini Project	0-0-6-0	3	23CEL4HD	Mini Project	0-0-6-0	3	23CEL4HF	Mini Project	0-0-6-0	3