CURRICULUM 2023 (Autonomous)

Version 1.0

B.TECH
Mechanical Engineering

MAR BASELIOS COLLEGE OF ENGINEERING AND TECHNOLOGY

Mar Ivanios Vidyanagar, Nalanchira, Thiruvananthapuram – 695 015

CURRICULUM

FOR

B. TECH DEGREE PROGRAMME
IN
MECHANICAL 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 MECHANICAL ENGINEERING

B. TECH DEGREE PROGRAMME

IN

MECHANICAL ENGINEERING

CURRICULUM

2023 SCHEME

Items	Board of Studies (BoS)	Academic Council (AC)
Date of Approval	12/07/2023	09/08/2023
Date of Approval of Revised version	08/04/2024	19/06/2024

Head of the Department

Chairman, Board of Studies

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 MECHANICAL ENGINEERING

Vision and Mission of the Department

Vision:

To be a Centre of Excellence in education and research, imparting ethical values for the betterment of mankind.

Mission:

To impart Technical Knowledge and Values through continuous training and research for the overall development of the stakeholders.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEO1: Graduates will be Engineering Professionals, Innovators or Entrepreneurs engaged in Technology Development or implementation of Engineering Systems in Industry.

PEO2: Graduates will be successful in pursuing higher studies or research in Engineering or Management Studies.

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)

Engineering Graduates will have the ability to:

PSO1: Apply the concepts of solid mechanics in the design of mechanical engineering systems.

PSO2: Apply knowledge of thermal and fluid Sciences to solve engineering problems.

PSO3: Use simulation tools and computer integrated systems in mechanical engineering.

PSO4: Apply advanced manufacturing processes and modern industrial management techniques in engineering.

DEPARTMENT OF MECHANICAL ENGINEERING

B.Tech. Programme in Mechanical 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	Total credits
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 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***
Credits for Courses	18	22	22	21	23	22	22	17	**167**
Credits for Activities	3								**3**
Total Credits									**170**
Value Added Courses (Optional) – Honours / Minor									**15**
Total Credits									**185**

Semester I										
Slot	Course Code	Category	Course Name	Credit Structure				SS	Hours	Credits
				L	T	P	J			
A	23MAL10A	BSC	Linear Algebra and Calculus	3	1	0	0	5	4	4
B	23CYL10A	BSC	Engineering Chemistry	3	1	0	0	5	4	4
C	23ESB10A	ESC	Engineering Graphics	2	0	2	0	4	4	3
E	23ESL10M	ESC	Basics of Mechanical Engineering	2	0	0	0	3	2	2
	23ESL10N	ESC	Basics of Civil Engineering	2	0	0	0	3	2	2
G	23ESL1NA	ESC	Environmental Science	2	0	0	0	3	2	1*
S	23CYP10A	BSC	Engineering Chemistry Lab	0	0	2	0	1	2	1
T	23ESP10A	ESC	Manufacturing and Construction Practices A	0	0	2	0	1	2	1
							Total	25	22	18

Semester II										
Slot	Course Code	Category	Course Name	Credit Structure				SS	Hours	Credits
				L	T	P	J			
A	23MAL10B	BSC	Vector calculus, Differential equations and Transforms	3	1	0	0	5	4	4
B	23PYL10A	BSC	Engineering Physics	3	1	0	0	5	4	4
C	23ESL10C	ESC	Engineering Mechanics	2	1	0	0	3.5	3	3
D	23ESB10D	ESC	Problem Solving and Programming in C	2	1	2	0	4.5	5	4
E	23ESL10J	ESC	Basics of Electrical Engineering A	2	0	0	0	3	2	2
	23ESL10L	ESC	Basics of Electronics Engineering	2	0	0	0	3	2	2
G	23HSJ1NB	HSC	Professional Communication	2	0	0	2	5	4	1*
S	23PYP10A	BSC	Engineering Physics Lab	0	0	2	0	1	2	1
T	23ESP10B	ESC	Electrical and Electronics workshop	0	0	2	0	1	2	1
							Total	31	28	22

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

Semester III										
Slot	Course Code	Category	Course Name	Credit Structure				SS	Hours	Credits
				L	T	P	J			
A	23MAL20A	BSC	Partial Differential Equations and Complex Analysis	3	1	0	0	5	4	4
B	23MEL20A	PCC	Mechanics of Solids	3	1	0	0	5	4	4
C	23MEL20B	PCC	Engineering Thermodynamics	2	1	0	0	3.5	3	3
D	23MEL20C	PCC	Metallurgy and Materials Science	3	1	0	0	5	4	4
E	23MEL20D	PCC	Mechanics of Fluids	2	1	0	0	3.5	3	3
F	23MEB20E	PCC	Computer Aided Machine Drawing	1	0	2	0	2.5	3	2
G	23HSL2NA	HSC	Professional Ethics	2	0	0	0	3	2	1*
T	23MEP20A	PCC	Material Testing Lab	0	0	2	0	1	2	1
M	23MEL2MX	VAC	Minor Course	2	1	0	0	3.5	3	3
							Total	28.5/32	25/28	22/25

Semester IV										
Slot	Course Code	Category	Course Name	Credit Structure				SS	Hours	Credits
				L	T	P	J			
A	23MAL20D	BSC	Probability, Statistics and Numerical Methods	3	1	0	0	5	4	4
B	23MEL20F	PCC	Mechanics of Machinery	3	1	0	0	5	4	4
C	23MEL20G	PCC	Fluid Machinery	3	1	0	0	5	4	4
D	23MEL20H	PCC	Manufacturing Processes	3	1	0	0	5	4	4
E	23HSL2NB	HSC	Universal Human Values II	3	0	0	0	4.5	3	1*
G	23ESL2NC	ESC	Industrial Safety Engineering	2	1	0	0	3.5	3	1*
S	23MEP20B	PCC	Hydraulic Machines Lab	0	0	3	0	1.5	3	2
T	23MEP20C	PCC	Machine Tools Lab	0	0	2	0	1	2	1
M	23MEL2MX	VAC	Minor Course	2	1	0	0	3.5	3	3
H	23MEL2HX	VAC	Honours Course	2	1	0	0	3.5	3	3
							Total	30.5/34	27/30	21/24

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

Semester V										
Slot	Course Code	Category	Course Name	Credit Structure				SS	Hours	Credits
				L	T	P	J			
A	23MEL30A	PCC	Design of Machine Elements I	3	1	0	0	5	4	4
B	23MEL30B	PCC	Thermal Engineering	3	1	0	0	5	4	4
C	23MEJ30C	PCC	Machine Tools and Metrology	2	1	0	1	4.5	4	4
D	23MEL30D	PCC	Production & Operations Management	3	0	0	0	4.5	3	3
F	23MEL31X	PEC	Program Elective I (Management Course)	3	0	0	0	4.5	3	3
E	23ESL00A	ESC	Design Engineering	2	0	0	0	3	2	2
S	23MEP30A	PCC	Metrology and Instrumentation Lab.	0	0	2	0	1	2	1
T	23MEP30B	PCC	Thermal Engineering Lab	0	0	3	0	1.5	3	2
M	23MEL3MX	VAC	Minor Course	2	1	0	0	3.5	3	3
H	23MEL3HX	VAC	Honours Course	2	1	0	0	3.5	3	3
							Total	29/32.5	25/28	23/26

Semester VI										
Slot	Course Code	Category	Course Name	Credit Structure				SS	Hours	Credits
				L	T	P	J			
A	23MEJ30E	PCC	Heat and Mass Transfer	2	1	0	1	4.5	4	4
B	23MEB30F	PCC	Computer Aided Design and FEM	3	0	2	0	5.5	5	4
C	23MEL30G	PCC	Mechatronics & Control Systems	3	1	0	0	5	4	4
E	23IEL31X	IEC	Institute Elective I	3	0	0	0	4.5	3	3
F	23HSL30A	HSC	Business Economics & Accountancy	3	0	0	0	4.5	3	3
S	23MEP30C	PCC	Heat Transfer Lab	0	0	3	0	1.5	3	2
T	23MES38A	PWS	Seminar	0	0	4	0	2	4	2
M	23MEL3MX	VAC	Minor Course	2	1	0	0	3.5	3	3
H	23MEL3HX	VAC	Honours Course	2	1	0	0	3.5	3	3
							Total	27.5/31	26/29	22/25

Semester VII										
Slot	Course Code	Category	Course Name	Credit Structure				SS	Hours	Credits
				L	T	P	J			
A	23MEJ40A	PCC	Design of Machine Elements II	2	1	0	1	4.5	4	4
B	23MEL40B	PCC	Robotics & Automation	3	1	0	0	5	4	4
C	23MEL42X	PEC	Program Elective II	3	0	0	0	4.5	3	3
E	23IEL42X	IEC	Institute Elective II	3	0	0	0	4.5	3	3
S	23MEP40A	PCC	Mechanical Engineering Lab	0	0	3	0	1.5	3	2
T	23MEV48A	PWS	Comprehensive Viva Voce	0	0	2	0	1	2	1
U 1/2	23MEJ48A	PWS	Project	0	0	10	0	10	10	5
	23MEI48A	PWS	Internship*							
M	23MEJ4MX	VAC	Minor Mini Project	0	0	6	0	6	6	3
H	23MEL4HX	VAC	Honours Course	2	1	0	0	3.5	3	3
							Total	31/34.5/40.5	29/32/35	22/25

Semester VIII										
Slot	Course Code	Category	Course Name	Credit Structure				SS	Hours	Credits
				L	T	P	J			
A	23MEL43X	PEC	Programme Elective III	3	0	0	0	4.5	3	3
B	23MEL44X	PEC	Programme Elective IV(Management Course)	3	0	0	0	4.5	3	3
C	23MEL45X	PEC	Programme Elective - VV	3	0	0	0	4.5	3	3
D	23MEL46X	PEC	Programme Elective VI	3	0	0	0	4.5	3	3
U 1/2	23MEJ48B	PWS	Project	0	0	10	0	10	10	5
	23MEI48A	PWS	Internship*							
H	23MEJ4HX	VAC	Honours Mini-Project	0	0	6	0	13	6	3
							Total	28/41	22/28	17/20

** Students can opt for Internship either in S7 or S8. However 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.*

B.Tech MINORS

Semester	BASKET I Supply Chain and Logistics				BASKET II Unmanned Aerial Vehicle (UAV)				BASKET III Computational Design Engineering			
	Course code	Course Name	L-T-P-J	Credits	Course code	Course Name	L-T-P-J	Credits	Course code	Course Name	L-T-P-J	Credits
S3	23MEL2MA	Supply chain and Logistics Management	3-0-0-0	3	23MEL2MC	Introduction to Unmanned Aerial Vehicles (UAV)	2-1-0-0	3	23MEL2ME	Computer Aided Design	2-0-1-0	3
S4	23MEL2MB	Emerging Technologies in SCM	2-1-0-0	3	23MEL2MD	Basics elements of UAV system	2-1-0-0	3	23MEL2MF	Finite Element Method	2-0-1-0	3
S5	23MEL3MA	Green Logistics and operations management	2-1-0-0	3	23MEL3MC	Design and Simulation of UAV	2-1-0-0	3	23MEL3ME	Computational Mechanics	2-1-0-0	3
S6	23MEL3MB	Digital Manufacturing Transformation	2-1-0-0	3	23MEL3MD	Fabrication and Testing of UAV	2-1-0-0	3	23MEL3MF	Optimization Techniques	2-1-0-0	3
S7	23MEL4MA	Mini Project	0-0-6-0	3	23MEL4MA	Mini Project	0-0-6-0	3	23MEL4MA	Mini Project	0-0-6-0	3
S8	23MEL4MB	Mini Project	0-0-6-0	3	23MEL4MB	Mini Project	0-0-6-0	3	23MEL4MB	Mini Project	0-0-6-0	3

B.Tech HONORS

Semester	Basket 1: Power Plant and Energy Engineering				Basket 2: Manufacturing Engineering			
	Course Code	**Course Name**	**L-T-P-J**	**Credit**	**Course Code**	**Course Name**	**L-T-P-J**	**Credit**
4	**23MEL2HB**	Thermal and Nuclear Power Plants	**2-1-0-0**	**3**	**23MEL2HD**	Additive Manufacturing	**2-1-0-0**	**3**
5	**23MEL3HA**	Emerging Technologies in Renewable Energy Sources	**2-1-0-0**	**3**	**23MEL3HC**	Theory of Metal Forming	**2-1-0-0**	**3**
6	**23MEL3HB**	Equipment Design for Thermal Systems	**2-1-0-0**	**3**	**23MEL3HD**	Reliability Engineering	**2-1-0-0**	**3**
7	**23MEL4HA**	Environmental and Safety Engineering	**2-1-0-0**	**3**	**23MEL4HC**	Manufacturing Automation	**2-1-0-0**	**3**
8	**23MEJ4HB**	Mini Project	**0-0-6-0**	**3**	**23MEJ4HB**	Mini Project	**0-0-6-0**	**3**

Semester	Basket 3: Machine Design				Basket 4: Sports Engineering and Management			
	Course Code	Course Name	L-T-P-J	Credit	Course Code	Course Name	L-T-P-J	Credit
4	**23MEL2HF**	Continuum Mechanics	**2-1-0-0**	**3**	**23MEL2HH**	Sports Psychology	**2-1-0-0**	**3**
5	**23MEL3HE**	Advanced Design Synthesis	**2-1-0-0**	**3**	**23MEL3HG**	Sports Analytics	**2-1-0-0**	**3**
6	**23MEL3HF**	Design of Pressure Vessels	**2-1-0-0**	**3**	**23MEL3HH**	Sports Engineering	**2-1-0-0**	**3**
7	**23MEL4HE**	Advanced Theory of Vibrations	**2-1-0-0**	**3**	**23MEL4HG**	Sports Product Design	**2-1-0-0**	**3**
8	**23MEJ4HB**	Mini Project	**0-0-6-0**	**3**	**23MEJ4HB**	Mini Project	**0-0-6-0**	**3**