

# **CURRICULUM & SYLLABUS**



**CHOICE BASED CREDIT SYSTEM (CBCS)**

**FOR**

**BACHELOR OF TECHNOLOGY (B.Tech.)**

**(4 Year Undergraduate Degree Programme)**

**In**

**MECHANICAL ENGINEERING**

**(In alignment with National Education Policy, 2020)**

**[w. e. f. 2023-24]**

**FACULTY OF ENGINEERING AND TECHNOLOGY  
SRM UNIVERSITY DELHI-NCR, SONEPAT  
39, Rajiv Gandhi Education City, Sonapat  
Haryana-131029**

# **SRM UNIVERISTY DELHI-NCR, SONEPAT FACULTY OF ENGINEERING AND TECHNOLOGY**

## **ENGINEERING GRADUATES EMPLOYABILITY ATTRIBUTES**

### **Sound Knowledge & Skill of Basic Science & Engineering Sciences**

An Engineer should be able to apply the knowledge of mathematics, science, engineering fundamentals, and engineering specialization to the solution of complex engineering problems.

### **Problem formulation, Analysis & Solving**

An Engineer should be able to identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using principles of mathematics, natural sciences, and engineering sciences.

### **Design and Development of a Solution**

An Engineer must be able to 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.

### **Investigation**

An Engineer should 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.

### **Modern Tools Usage**

An Engineer should be able to 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.

### **The Engineer and the Society**

An Engineer should be able to 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.

### **Individual and Teamwork**

An Engineer should be able to function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

**Lifelong Learning**

An Engineer must 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.

**Environment and Sustainability**

An Engineer must understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**Professional Ethics**

An Engineer should be able to apply ethical principles and commit to professional ethics and responsibilities and norms of the Engineering practice.

**Effective Communication**

An Engineer should be able to 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.

**SRM UNIVERISTY DELHI-NCR, SONEPAT**  
**FACULTY OF ENGINEERING AND TECHNOLOGY**

**ENGINEERING PROGRAM EDUCATIONAL OBJECTIVES (EPEOs)**

1. Advancement to a professional position by virtue of their knowledge, skills and attitude.
2. Recognition for solving engineering problems and developing design solutions that consider safety and sustainability.
3. Work as successful professionals in diverse engineering disciplines and enterprises;
4. Increasing responsibilities of technical and managerial leadership in their work organizations;
5. Professional development through a commitment to career-long learning.

**ENGINEERING PROGRAM EDUCATIONAL LEARNING OUTCOMES (EPELOs)**

1. An ability to identify, formulate, and solve real time engineering & socio-economic problems by applying principles of engineering, science, mathematics, humanities and social sciences
2. An ability to use the advanced skill enhancement techniques and modern engineering tools as per industry 4.0 necessary for engineering practice.
3. An ability to apply engineering design to produce solutions that meet specified needs with realistic considerations of environmental, ethical, health & safety and sustainability
4. an ability to adapt and work with multidisciplinary teams and communicate effectively;
5. An ability to function effectively on a team whose members together provide leadership, to create a collaborative environment, to establish goals and to execute plan tasks.
6. an understanding of professional and ethical responsibility;
7. An ability to acquire and apply new knowledge using appropriate learning strategies with inner quest to learn, unlearn and relearn.

**MAPPING MATRIX OF ENGINEERING PROGRAM EDUCATIONAL OBJECTIVES  
AND ENGINEERING PROGRAM EDUCATIONAL LEARNING OUTCOMES**

<b>ENGINEERING PROGRAM EDUCATIONAL OBJECTIVES</b>	<b>ENGINEERING PROGRAM EDUCATIONAL LEARNING OUTCOMES</b>
Advancement to a professional position by virtue of their knowledge, skills and attitude.	<ol style="list-style-type: none"> <li>1. An ability to identify, formulate, and solve real time engineering and socio-economic problems by applying principles of engineering, science, mathematics, humanities and social sciences</li> <li>2. An ability to use the advanced skill enhancement techniques and modern engineering tools as per industry 4.0 necessary for engineering practice.</li> </ol>
Recognition for solving engineering problems and developing design solutions that consider safety and sustainability	<ol style="list-style-type: none"> <li>2. An ability to use the advanced skill enhancement techniques and modern engineering tools as per industry 4.0 necessary for engineering practice.</li> <li>3. An ability to apply engineering design to produce solutions that meet specified needs with realistic considerations of environmental, ethical, health &amp; safety and sustainability</li> </ol>
Work as successful professionals in diverse engineering disciplines	<ol style="list-style-type: none"> <li>3. An ability to apply engineering design to produce solutions that meet specified needs with realistic considerations of environmental, ethical, health &amp; safety and sustainability</li> <li>4. an ability to adapt and work with multidisciplinary teams and communicate effectively;</li> </ol>
Increasing responsibilities of technical and managerial leadership in their work organizations;	<ol style="list-style-type: none"> <li>4. an ability to adapt and work with multidisciplinary teams and communicate effectively;</li> <li>5. An ability to function effectively on a team whose members together provide leadership, to create a collaborative environment, to establish goals and to execute plan tasks.</li> <li>6. an understanding of professional and ethical responsibility;</li> </ol>
Professional development through a commitment to career-long learning.	<ol style="list-style-type: none"> <li>6. an understanding of professional and ethical responsibility;</li> <li>7. An ability to acquire and apply new knowledge using appropriate learning strategies with inner quest to learn, unlearn and relearn.</li> </ol>

**MAPPING MATRIX OF ENGINEERING PROGRAM EDUCATIONAL OBJECTIVES AND  
ENGINEERING PROGRAM EDUCATIONAL LEARNING OUTCOMES (TABULAR  
FORMAT)**

**Table 1**

<b>MAPPING</b>	<b>EPELO1</b>	<b>EPELO2</b>	<b>EPELO3</b>	<b>EPELO4</b>	<b>EPELO5</b>	<b>EPELO6</b>	<b>EPELO7</b>
<b>EPEO1</b>	X	X					
<b>EPEO2</b>		X	X				
<b>EPEO3</b>			X	X			
<b>EPEO4</b>				X	X	X	
<b>EPEO5</b>						X	X

## **B.TECH. - MECHANICAL ENGINEERING GRADUATES EMPLOYABILITY ATTRIBUTES**

**EA 1: Sound Knowledge & Skill of Domain Area:** Demonstrated competence in university level mathematics, natural sciences, engineering fundamentals, and specialized engineering knowledge appropriate to the program

**EA 2: Problem solving skills:** An ability to use appropriate knowledge and skills to identify, formulate, analyze, and solve complex engineering problems in order to reach substantiated conclusions..

**EA 3: Cognitive and Analytical skills:** Cognitive & Analytical skills help engineering graduates interpret data, remember team goals. These skills help them recall previous information that may relate to their organization's goals and help them make important connections between old and new information so that they can work more effectively.

**EA 4: Design Thinking:** An ability to design solutions for complex, open-ended engineering problems and to design systems, components or processes that meet specified needs with appropriate attention to health and safety risks, applicable standards, economic, environmental, cultural and societal considerations.

**EA 5: Transferrable Skills:** Transferable skills are skills and abilities that are relevant and helpful across different areas of life: socially & professionally.

- **Interpersonal skills to work in diverse group:** An ability to work effectively as a member and leader in teams, preferably in a multi-disciplinary setting.
- **Communication Skills:** An ability to communicate complex engineering concepts within the profession and with society at large. Such abilities include reading, writing, speaking and listening, and the ability to comprehend and write effective reports and design documentation, and to give and effectively respond to clear instructions.
- **Positive attitude and thinking:** An ability to have positive attitude and thinking in challenging situations.
- **Adaptability:** Adapts learning strategies to new conditions. Recognizes parallels, analogies or similarities of new situations to more familiar situations.
- **Learn to Learn:** Learn Unlearn Relearn: An ability to identify and to address their own educational needs in a changing world, sufficiently to maintain their competence and contribute to the advancement of knowledge.

**EA6: Information technology skills:** An ability to create, select, adapt, and extend appropriate techniques, resources, and modern ICT tools to a range of engineering activities, from simple to complex, with an understanding of the associated limitations.

## **B.TECH. - MECHANICAL ENGINEERING PROGRAMME EDUCATIONAL OBJECTIVES**

**PEO1.**To nurture strong understanding in logical, mathematical and analytical reasoning among students coupled with problem solving attitude that prepares them to productively engage in research and higher learning.

**PEO2.**To build strong foundation in the field of Mechanical Engineering among students to be creative and innovative.

**PEO3.**To prepare students capable of designing and developing real-world computing applications with high societal influence and impact.

**PEO4.**To provide students with academic environment that enables them to understand the significance of life-long learning in varied situations and teams in global perspective.

**PEO5.**To inculcate ethical practices, professionalism and environmental awareness for sustainable development among students enabling them for prospective employment in their chosen line of profession globally.

**PEO6.**To instil communication and management skill that generates entrepreneurship and / or leadership qualities.



## **B.TECH. - MECHANICAL ENGINEERING PROGRAMME LEARNING OUTCOMES**

- PLO1.** An ability to apply knowledge & skill of mathematics, science and engineering.
- PLO2.** An ability to identify, analyze, design, develop, implement and integrate mechanical design system
- PLO3.** An ability to understand emerging technologies and related security issues in the computing paradigm.
- PLO4.** An ability to acquire and apply the skill in modern techniques, methodologies and tools to be innovative and creative.
- PLO5.** An ability to formulate, design & demonstrate strong logical, analytical and reasoning skills to adeptly solve problems
- PLO6.** An ability to apply algorithmic principles and programming prowess in the development of software systems.
- PLO7.** An awareness of social, health, ethical, legal, financial, and professional responsibilities.
- PLO8.** An ability to analyse the local and global impact of computing discipline on environmental issues and sustainable development
- PLO9.** Recognition of the need for self-motivation and ability to engage in lifelong learning and professional development
- PLO10.** An ability to effectively manage projects involving multidisciplinary and teams with ethnic diversity.
- PLO11.** An ability to communicate effectively, both in written and verbal forms.
- PLO12.** An ability to demonstrate leadership and entrepreneurship qualities.

## Table 2

	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO1 0	PLO1 1	PLO1 2
PEO1	✓	✓										
PEO2			✓	✓								
PEO3					✓	✓						
PEO4							✓	✓				
PEO5									✓			
PEO6										✓	✓	✓

## **B.TECH. MECHANICAL ENGINEERING PROGRAMME STRUCTURE**

The Mechanical Engineering curriculum is geared towards providing the student with a strong foundation in the discipline and the tools and competence to address new and challenging problems that they have not seen before. In order to earn a B. Tech. degree in Mechanical Engineering, a student should earn a minimum of 184 credits in the course of their study. The credit requirements for their program of study is comprised of the following Programme Structure:

- **Basic Applied Sciences (BAS) and Engineering Science (ES):**

The purpose of Basic Applied Sciences in Engineering study is to lay a strong foundation of basic principles of various disciplines such as Mathematics, Physics, Chemistry in the mind of the learners, so that they proceed to rest of their years of study with up to date knowledge and training of basic engineering skills. The Engineering Sciences requirements support multiple objectives: first, the courses provide a strong foundation in the basic tools and methodologies common to all engineering disciplines; second, all students are exposed to basics of each discipline allowing for cross-disciplinary competencies; last, there is a multi-disciplinary project component where students from different engineering disciplines come together on a design project, allowing for practice in collaborative team work.

- **Professional Core Courses (PC):** The Professional core courses are aimed at providing the student with a solid foundation in their chosen field of study as per Industry 4.0 skills and knowledge.

- **Practicals (P):**

The labs are fully furnished and well equipped with latest software's to conduct practical as per the requirement of the University Curriculum.

- **Professional Electives (PE) – Programme specific Specialization Electives:**

The Professional electives, on the other hand, provide the student with an option to gain exposure to different specializations within the discipline, or an opportunity to study one of the subfields in some depth.

- **Ability Enhancement Courses (AEC)**

Students are required to achieve competency in a Modern Indian Language (MIL) along with English language with special emphasis on language and communication skills. The courses aim at enabling the students to acquire and demonstrate the core linguistic skills, including critical reading and academic writing skills. The focus is on imparting students with necessary skills to articulate their arguments and present their thoughts clearly and coherently and recognize the importance of language as a mediator of knowledge and identity.

- **Skill Enhancement Courses (SEC) – Technical & Soft Skills:**

- **Technical Skills:** Under Technical Skills Broad categories of training to be imparted in Engineering Graduates of various disciplines with common nomenclature. The training is categorized into three categories: Elementary, Intermediate & Advanced keeping in view interdisciplinary approach. (One Credit Each from 3<sup>rd</sup> semester to 7<sup>th</sup> semester)
- **Soft Skills:** Under Soft skills training six soft skill courses with defined Nomenclature and course content common to all Engineering disciplines introduced to inculcate Group Dynamics, Team work & Leadership Traits by engaging students for interactive sessions through Role Play, Group Discussions and for improving presentation & Communication skills of engineering graduates. (One Credit Course from 2<sup>nd</sup> Semester to 7<sup>th</sup> semester).

- **Value Added Courses (VAC):**

Course components relating to skills, attitudes, and values required to take appropriate actions for mitigating the effects of environmental degradation, climate change, and pollution, effective waste management, conservation of biological diversity, management of biological resources, forest and wildlife conservation, and sustainable development and living health and wellness seek to promote an optimal state of physical, emotional, intellectual, social, spiritual, and environmental well-being of a person, the constitutional obligations with special emphasis on constitutional values and fundamental rights and duties

- **Live Projects (LP) & Industrial Visits (IV) and Summer Internship (SI):**

- **Live Projects & Industrial Visits:**

- ❖ Live Projects is being introduced for all Engineering disciplines from 3<sup>rd</sup> semester onwards till 6<sup>th</sup> Semester to develop an ability in engineering graduates to apply skills and knowledge attained to solve real life complex problems (One Credit each semester).
- ❖ Apart from this, it will be mandatory to conduct at least 2 Industrial Visits each semester to provide students a proper industrial exposure.

- **Summer Internship (SI):**

- ❖ Student will be monitored on periodic basis, both by the Faculty Mentor from the Industry and the Faculty In-charge from the department. The Faculty Mentor from the Industry will submit the Mid-Term and End-Term Evaluation report. However, the faculty In-charge from the department will take periodic presentation to keep a check on the progress of Student.
- ❖ Students are provided with the internship related document which helps them to prepare,

report. In addition to this, it provides a detail to students about internship/project evaluation parameters.

- **Multidisciplinary (Humanities and Social Sciences Courses) Courses (MDC):-**

The open elective subject courses provide the student with wide latitude to pursue their interests, be it in humanities, management, arts or their own chosen field of study in order to have multidisciplinary approach.

## PROGRAM STRUCTURE FOR BACHELOR OF TECHNOLOGY (MECHANICAL ENGINEERING) DEGREE COURSE

**Table 3**

Category of courses	Category	No. of Courses
Basic Applied Sciences	BAS	7
Engineering Sciences	ES	11
Professional Core Courses	PC	17
Professional Electives-Program Specific Specialization Electives	PE	11
Ability Enhancement Courses	AEC	2
Value added Courses	VAC	3
Skill Enhancement Courses (Technical & Soft Skills)	SEC	10
Practicals /Workshops	P/W	9
Live Project & Industry Visit	LP	6
Multidisciplinary (Humanities and Social Sciences Courses) Courses	MDC	3
<b>TOTAL</b>		<b>79</b>

**BACHELOR OF TECHNOLOGY (MECHANICAL ENGINEERING) DEGREE COURSE**  
**PROGRAMME CREDIT STRUCTURE SEMESTERWISE**

**Table 4**

SL. No	Course Category	Course Code	Credits Per Semester								Total Credits	% AGE
			I	II	III	IV	V	VI	VII	VIII		
1	Basic Applied Sciences	BAS	9	9	4	-	-	-	-	-	22	12
2	Engineering Sciences	ES	9	9	-	-	-	-	-	-	18	10
3	Professional Core	PC	-	-	12	12	9	12	6	-	51	28
4	Professional Electives -Program Specific Specialized Elective Courses	PE	-	-	3	3	9	6	12	-	33	18
5	Ability Enhancement Courses	AE C	3	3	-	-	-	-	-	-	6	3
6	Skill Enhancement courses (Technical and Soft skills)	SEC	-	-	2	2	2	2	2	-	10	5
7	Value Added Courses	VAC	2	2	2	-	-	-	-	-	6	3
8	Practical / Workshop	P/W	-	-	2	3	2	1	1	-	9	6
9	Live Project & Industrial Visit and Summer Internship	LP/SI	-	-	-	1	1	1	5	12	20	10
10	Multidisciplinary (Humanities and Social Sciences Courses) Courses	MDC	-	-	-	3	3	3	-	-	9	5
<b>TOTAL</b>			<b>23</b>	<b>23</b>	<b>25</b>	<b>24</b>	<b>26</b>	<b>25</b>	<b>26</b>	<b>12</b>	<b>184</b>	<b>100</b>





# BACHELOR OF TECHNOLOGY (MECHANICAL ENGINEERING) DEGREE COURSE

## TABLE 5: PROGRAM COURSE'S CREDIT STRUCTURE SEMESTER WISE

### Semester-I

SL.No	Code	Category	Course Name	Hours per week				Credits
				L	T	P	Total Hours	
Theory								
1	23AS101	(BAS)	Engineering Mathematics-I	3	1	0	4	4
2	23AS102/23AS103	(BAS)	Engineering Physics/Engineering Chemistry	3	1	0	4	4
3	23EE101/23EC101	(ES)	Basic Electrical Engineering /Basic Electronics Engineering	3	0	0	3	3
4	23ME101/23CS101	(ES)	Engineering Mechanics / Fundamentals of Computer & C Programming	3	0	0	3	3
5	23AEC101	(AEC)	Professional English (*50% of students will be offered)	2*	0	0	2*	2*
6	23AEC102/23AEC103/23AEC104	(AEC)	Hindi-I/German-I/French-I	2	0	0	2	2
7	23VAC101/23VAC102	(VAC)	Environment Protection, Sustainable Development & Living/ Indian Constitution and Polity	2	0	0	2	2
Total Credits (Theory)				16/18	2	0	18/20	18/20
Practical								
8	23AS152/23AS153	(BAS)	Engineering Physics Lab/Engineering Chemistry Lab	0	0	2	2	1
9	23EE151/23EC151	(ES)	Basic Electrical Engineering Lab /Basic Electronics Engineering Lab	0	0	2	2	1
10	23ME151/23CS151	(ES)	Basic Mechanical Engineering Lab/ C Programming Lab	0	0	2	2	1
11	23ME152/23ME153	(ES)	Mechanical Workshop Lab/Engineering Graphics & Design Lab	0	0	2	2	1
12	23AEC151*	(AEC)	Communication English Lab (50% of students will be offered)	0	0	2*	2*	1*
Total Credits (Practical)				0	0	8/10	8/10	4/5
	Total Credits (Theory + Practical)			16/18	2	8/10	26/30	22/25

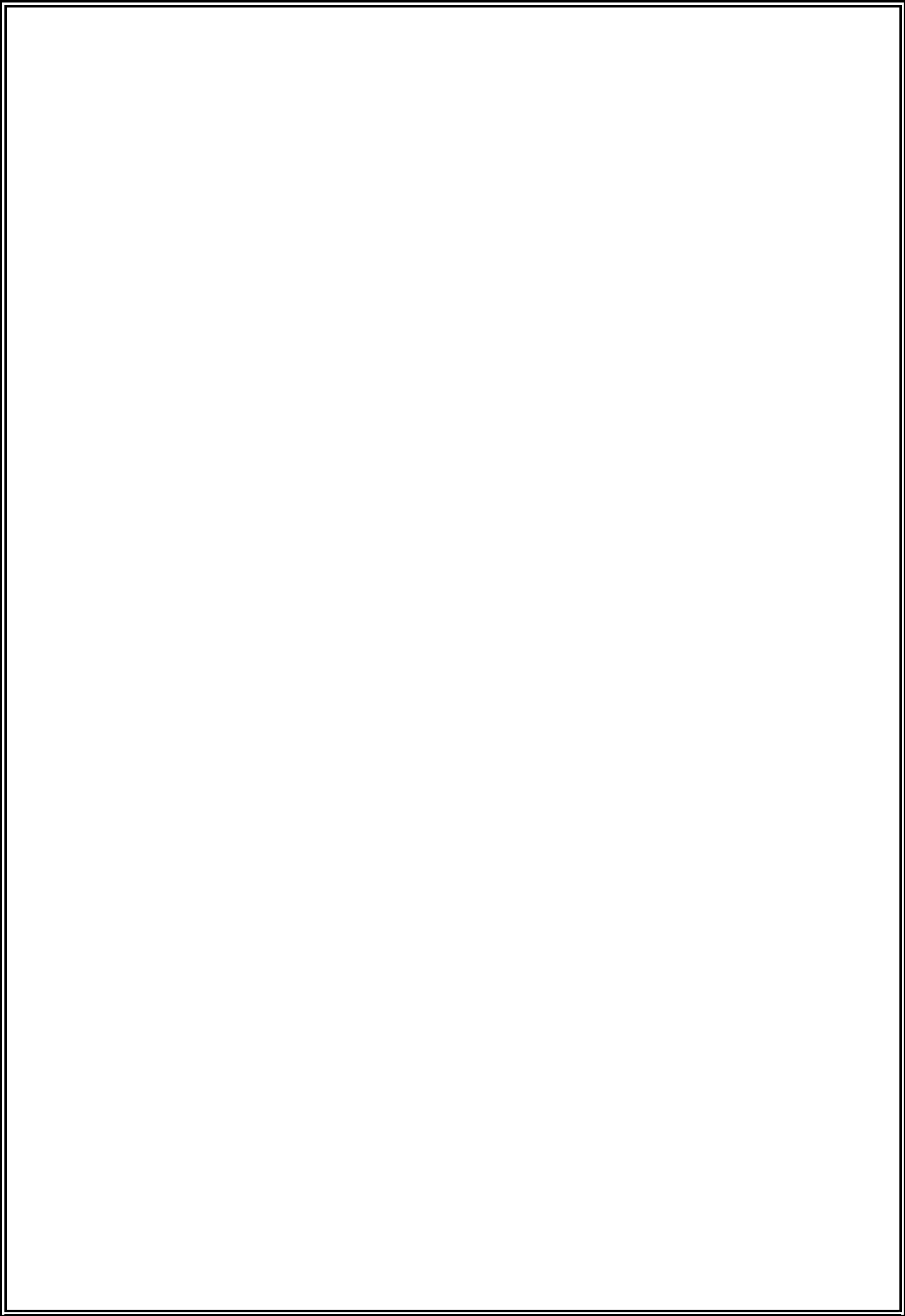
[L= Lecture, T = Tutorials, P = Practical's & C = Credits]

**\*3 Week long Induction Programme right at the start of the 1<sup>st</sup> Semester. Normal class start only after the induction programme is over.**

## Semester-II

SL.No	Code	Category	Course Name	Hours per week				Credits
				L	T	P	Total Hour s	
Theory								
1	23AS0201	(BAS)	Engineering Mathematics-II	3	1	0	4	4
2	23AS0202/2 3AS0203	(BAS)	Engineering Physics/Engineering Chemistry	3	1	0	4	4
3	23EE0201/2 3EC0201	(ES)	Basic Electrical Engineering /Basic Electronics Engineering	3	0	0	3	3
4	23ME0201/2 3CS0201	(ES)	Engineering mechanics / Fundamentals of Computer & C Programming	3	0	0	3	3
5	23AEC0201	(AEC)	Professional English (*50% of students will be offered)	2*	0	0	2*	2*
6	23AEC 202/23AEC203/AEC204	(AEC)	Hindi-II/German-II/French-II	2	0	0	2	2
7	23VAC201/2 3VAC 202	(VAC)	Environment Protection, Sustainable Development & Living / Indian Constitution and Polity	2	0	0	2	2
Total Credits (Theory)				16/18	2	0	18/20	18/20
Practical								
8	23AS0252/23 AS0253	(BAS)	Engineering Physics Lab/Engineering Chemistry Lab	0	0	2	2	1
9	23EE0251/2 3EC0251	(ES)	Basic Electrical Engineering Lab /Basic Electronics Engineering Lab	0	0	2	2	1
10	23ME251/23 CS251	(ES)	Basic Mechanical Engineering Lab/ C Programming Language Lab	0	0	2	2	1
11	23ME0251/2 1ME0252	(ES)	Mechanical Workshop Lab/Engineering Graphics & Design Lab	0	0	2	2	1
12	23AEC151*	(AEC)	Communication English Lab (50% of students will be offered)	0	0	2*	2*	1*
Total Credits (Practical)				0	0	8/10	8/10	4/5
Total Credits (Theory + Practical)				16/ 18	2	8/10	26/30	22/25

[L= Lecture, T = Tutorials, P = Practical's & C = Credits]



**BACHELOR OF TECHNOLOGY (MECHANICAL ENGINEERING) DEGREE COURSE**  
**PROGRAM COURSE'S STRUCTURE SEMESTER WISE**  
**SEMESTER – III**

Course Code	Course	Category	Hours Per Week				Credits
			L	T	P	Total Hours	
Theory							
23VAC301	Sports, Yoga & Fitness	VAC	1	0	2	3	2
23AS301	Engineering Mathematics-III	BAS	3	1	0	4	4
23ME301	Strength of Materials	PC	3	0	0	3	3
23ME302	Manufacturing Technology	PC	3	0	0	3	3
23ME303	Engineering Thermodynamics	PC	3	0	0	3	3
23ME304	Introduction to Mechatronics and Robotics	PC	3	0	0	3	3
23MEXXX	Professional Elective – I	PE	3	0	0	3	3
Practical							
23ME351	Strength of Materials Laboratory	P	0	0	2	2	1
23ME352	Manufacturing Process Laboratory	P	0	0	2	2	1
23CS0201	Essentials of Blockchain and Internet of Things	SEC	0	0	2	2	1
23SS351	Effective Communication Skills	SEC	0	0	2	2	1
TOTAL			19	1	10	30	25

**L : Lecture**  
**T : Tutorials**  
**P: Practical**

**BAS : Basic Applied Sciences**  
**AEC : Ability Enhancement Course**  
**PC : Professional Core**  
**PE: Professional Elective**  
**P : Practical**  
**SEC : Skills Enhancement Course**  
**LP : Live Project**

**BACHELOR OF TECHNOLOGY (MECHANICAL ENGINEERING) DEGREE COURSE**  
**PROGRAM COURSE'S STRUCTURE SEMESTER WISE**  
**SEMESTER – IV**

Course Code	Course	Category	Hours Per Week				Credits
			L	T	P	Total Hours	
Theory							
23MDC401	Multidisciplinary Elective-I	MDC	3	0	0	3	3
23ME401	Fluid Mechanics	PC	3	0	0	3	3
23ME402	Computer Aided Design & Manufacturing	PC	3	0	0	3	3
23ME403	Design of Machine Elements	PC	3	0	0	3	3
23ME404	Material Science	PC	3	0	0	3	3
23MEXXX	Professional Elective Course – II	PE	3	0	0	3	3
Practical							
23ME451	Fluid Mechanics Laboratory	P	0	0	2	2	1
23ME452	Computer Aided Manufacturing (CNC) Laboratory	P	0	0	2	2	1
23ME453	Manufacturing and Assembly Drawing Lab	P	0	0	2	2	1
23CS0202	Programming with Python	SEC	0	0	2	2	1
23SS451	Teamwork & Interpersonal Skills	SEC	0	0	2	2	1
23LP451	Live Project-I / Internship	LP/SI	0	0	1	1	1
TOTAL			18	0	11	29	24

**L : Lecture**  
**T : Tutorials**  
**P: Practical**

**MDC- Multi Disciplinary Courses**

**PC : Professional Core**

**PE: Professional Elective**

**P : Practical**

**SEC : Skills Enhancement Course**

**LP : Live Project**

**BACHELOR OF TECHNOLOGY (MECHANICAL ENGINEERING) DEGREE COURSE**  
**PROGRAM COURSE'S STRUCTURE SEMESTER WISE**  
**SEMESTER – V**

Course Code	Course	Category	Hours PerWeek				Credits
			L	T	P	Total Hours	
Theory							
23MDC501	Multidisciplinary Elective-II	MDC	3	0	0	3	3
23ME501	Theory of Machines- I	PC	3	0	0	3	3
23ME502	IC Engines	PC	3	0	0	3	3
23ME503	Heat and Mass Transfer	PC	3	0	0	3	3
23MEXXX	Professional Elective Course – III	PE	3	0	0	3	3
23MEXXX	Professional Elective Course – IV	PE	3	0	0	3	3
23MEXXX	Professional Elective Course – V	PE	3	0	0	3	3
Practical							
23ME551	Computer Design Software	P	0	0	2	2	1
23ME552	IC Engines Lab	P	0	0	2	2	1
23CS0301	Design Thinking and Augmented Virtual Reality	SEC	0	0	2	2	1
23SS551	Presentation & Speaking Skills	SEC	0	0	2	2	1
23LP551	Live Project-II/Internship	LP/SI	0	0	1	1	1
TOTAL			21	0	9	30	26

**L : Lecture**  
**T : Tutorials**  
**P: Practical**

**PC : Professional Core**  
**PE : Professional Electives**  
**MDC- Multi Disciplinary Courses**  
**P : Practical**  
**SEC : Skills Enhancement Course**  
**LP/SI- Live Project-II/Internship**

**BACHELOR OF TECHNOLOGY (MECHANICAL ENGINEERING) DEGREE COURSE**  
**PROGRAM COURSE'S STRUCTURE SEMESTER WISE**  
**SEMESTER – VI**

Course Code	Course	Category	Hours per Week				Credits
			L	T	P	TotalHours	
Theory							
23MDC601	Multidisciplinary Elective-III	MDC	3	0	0	3	3
23ME601	Theory of Machines- II	PC	3	0	0	3	3
23ME602	Non-Traditional Machining Techniques	PC	3	0	0	3	3
23ME603	Industry 4.0	PC	3	0	0	3	3
23ME604	Refrigeration & Air conditioning	PC	3	0	0	3	3
23MEXXX	Professional Elective Course – VI	PE	3	0	0	3	3
23MEXXX	Professional Elective Course – VII	PE	3	0	0	3	3
Practical							
23ME651	Theory of Machines Lab	P	0	0	2	2	1
23CS0302	Big Data Analytics, Tools and Techniques	SEC	0	0	2	2	1
23SS651	Professional Writing Skills	SEC	0	0	2	2	1
23LP651	Live Project-III / Internship	LP/SI	0	0	1	1	1
TOTAL			21	0	7	28	25

**L : Lecture**  
**T : Tutorials**  
**P: Practical**

**PC : Professional Core**  
**PE : Professional Electives**  
**MDC- Multi Disciplinary Courses**  
**P : Practical**  
**SEC : Skills Enhancement Course**  
**LP/ SI : Live Project-II/Internship**

**BACHELOR OF TECHNOLOGY (MECHANICAL ENGINEERING) DEGREE COURSE**  
**PROGRAM COURSE'S STRUCTURE SEMESTER WISE**  
**SEMESTER – VII**

Course Code	Course	Category	Hours Per Week				Credits
			L	T	P	Total Hours	
Theory							
23ME701	Engineering Metrology & Instrumentation	PC	3	0	0	3	3
23ME702	Additive Manufacturing	PC	3	0	0	3	3
23MEXXX	Professional Elective Course – VIII	PE	3	0	0	3	3
23MEXXX	Professional Elective Course – IX	PE	3	0	0	3	3
23MEXXX	Professional Elective Course – X	PE	3	0	0	3	3
23MEXXX	Professional Elective Course – XI	PE	3	0	0	3	3
Practical							
23ME751	Engineering Metrology & Instrumentation Laboratory	P	0	0	2	2	1
23CS401	Data Structure and Algorithms using C++	SEC	0	0	2	2	1
23SS751	Interpersonal Skills: Strategies	SEC	0	0	2	2	1
23LP751	Live Project-IV/Internship	LP/SI	0	0	2	2	1
23ME752	Minor Project	LP	0	0	4	4	4
TOTAL			18	0	12	30	26

**L : Lecture**  
**T : Tutorials**  
**P: Practical**

**PC : Professional Core**  
**PE : Professional Elective**  
**P : Practical**  
**SEC : Skills Enhancement Course**  
**LP/ SI : Live Project-II/Internship**



**BACHELOR OF TECHNOLOGY (MECHANICAL ENGINEERING) DEGREE COURSE**  
**PROGRAM COURSE'S STRUCTURE SEMESTER WISE**  
**SEMESTER – VIII**

COURSE CODE	COURSE	CATEGORY	HOURS PER WEEK				CREDITS
			L	T	P	TOTAL HOURS	
23ME851	Major Project	LP/SI	0	0	24	24	12
<b>TOTAL</b>			<b>0</b>	<b>0</b>	<b>24</b>	<b>24</b>	<b>12</b>

\* *To be monitored at the Department Level*

<b>L : Lecture</b> <b>T : Tutorials</b> <b>P: Practical</b>	<b>LP/SI : Live Project</b>
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## Department Professional Elective Courses

### 1. Specialization in Mechanical Engineering Professional Elective Courses

	Course Code	Course	L	T	P	C
<b>Elective 1</b>	<b>23MEPE01</b>	Alternate Sources of Energy and system	3	0	0	3
	<b>23MEPE02</b>	Introduction to Sensors, Actuators & IoT	3	0	0	3
<b>Elective II</b>	<b>23MEPE03</b>	Mechanical Behavior and Testing of Materials	3	0	0	3
	<b>23MEPE04</b>	Introduction Python Programming	3	0	0	3
<b>Elective III</b>	<b>23MEPE05</b>	Hydraulic Machine	3	0	0	3
	<b>23MEPE06</b>	Industrial Engineering and Operations Research	3	0	0	3
<b>Elective IV</b>	<b>23MEPE07</b>	Flexible Manufacturing System	3	0	0	3
	<b>23MEPE08</b>	Metallurgical Waste Management	3	0	0	3
<b>Elective V</b>	<b>23MEPE09</b>	Power Plant Engineering	3	0	0	3
	<b>23MEPE10</b>	Simulation Modelling of Manufacturing Systems	3	0	0	3
<b>Elective VI</b>	<b>23MEPE11</b>	Gas Dynamics and Turbo Machinery	3	0	0	3
	<b>23MEPE12</b>	Supply Chain Management	3	0	0	3
<b>Elective VII</b>	<b>23MEPE13</b>	Programmable Logic Control	3	0	0	3
	<b>23MEPE14</b>	Micro and Nano Manufacturing	3	0	0	3
<b>Elective VIII</b>	<b>23MEPE15</b>	Total Quality Management	3	0	0	3
	<b>23MEPE16</b>	Computer Integrated Manufacturing	3	0	0	3
<b>Elective IX</b>	<b>23MEPE17</b>	Computational Fluid Dynamics	3	0	0	3
	<b>23MEPE18</b>	Automobile Engineering	3	0	0	3
<b>Elective X</b>	<b>23MEPE19</b>	Composite Material	3	0	0	3
	<b>23MEPE20</b>	Finite Element Method	3	0	0	3
<b>Elective XI</b>	<b>23MEPE21</b>	Mechanical Vibrations	3	0	0	3
	<b>23MEPE22</b>	Latest Trends In Mechanical Engineering	3	0	0	3

## 2. Specialization in Electric and Hybrid Vehicle

	Course Code	Course	L	T	P	C
<b>Elective I</b>	<b>23MEPE01</b>	Alternate Sources of Energy and system	3	0	0	3
	<b>23MEPE02</b>	Introduction to Sensors, Actuators & IoT	3	0	0	3
<b>Elective II</b>	<b>23MEPE03</b>	Mechanical Behaviour and Testing of Materials	3	0	0	3
	<b>23MEPE04</b>	Introduction Python Programming	3	0	0	3
<b>Elective III</b>	<b>23MEPE05</b>	Hydraulic Machine	3	0	0	3
	<b>23MEPE06</b>	Industrial Engineering and Operations Research	3	0	0	3
<b>Elective IV</b>	<b>23MEPE07</b>	Flexible Manufacturing System	3	0	0	3
	<b>23MEEV01</b>	Fundamentals of Electric and Hybrid vehicles Technology	3	0	0	3
<b>Elective V</b>	<b>23MEEV02</b>	Vehicle Dynamics	3	0	0	3
	<b>23MEPE10</b>	Simulation Modelling of Manufacturing Systems	3	0	0	3
<b>Elective VI</b>	<b>23MEEV03</b>	Vehicle Body Engineering	3	0	0	3
	<b>23MEEV04</b>	Automotive transmission systems	3	0	0	3
<b>Elective VII</b>	<b>23MEEV05</b>	Fuel Cells and Applications	3	0	0	3
	<b>23MEPE13</b>	Programmable Logic Control	3	0	0	3
<b>Elective VIII</b>	<b>23MEEV06</b>	Vehicle Electrical Power systems	3	0	0	3
	<b>23MEEV07</b>	Electric Vehicle Machines and Drives	3	0	0	3
<b>Elective IX</b>	<b>23MEEV08</b>	Vehicle Management And Control	3	0	0	3
	<b>23MEEV09</b>	Automotive Instrumentation and Control	3	0	0	3
<b>Elective X</b>	<b>23MEPE19</b>	Composite Material	3	0	0	3
	<b>23MEEV10</b>	EV Charging Technology	3	0	0	3
<b>Elective XI</b>	<b>23MEEV11</b>	Autonomous Vehicles	3	0	0	3
	<b>23MEPE22</b>	Latest Trends In Mechanical Engineering	3	0	0	3

### 3. Specialization in Automation and Advanced Robotics

	Course Code	Course	L	T	P	C
<b>Elective I</b>	<b>23MEPE01</b>	Alternate Sources of Energy and system	3	0	0	3
	<b>23MEPE02</b>	Introduction to Sensors, Actuators & IoT	3	0	0	3
<b>Elective II</b>	<b>23MEPE03</b>	Mechanical Behavior and Testing of Materials	3	0	0	3
	<b>23MEPE04</b>	Introduction Python Programming	3	0	0	3
<b>Elective III</b>	<b>23MEPE05</b>	Hydraulic Machine	3	0	0	3
	<b>23MEPE06</b>	Industrial Engineering and Operations Research	3	0	0	3
<b>Elective IV</b>	<b>23MEAR01</b>	Robot kinematics	3	0	0	3
	<b>23MEAR02</b>	Fluid power systems for industrial automation	3	0	0	3
<b>Elective V</b>	<b>23MEAR03</b>	Advanced Materials for Robotics	3	0	0	3
	<b>23MEAR04</b>	Simulation Modelling of Manufacturing Systems	3	0	0	3
<b>Elective VI</b>	<b>23MEAR05</b>	Microprocessor	3	0	0	3
	<b>23MEAR06</b>	Automation in Manufacturing	3	0	0	3
<b>Elective VII</b>	<b>23MEAR07</b>	Robot Dynamics and Control	3	0	0	3
	<b>23MEPE13</b>	Programmable Logic Control	3	0	0	3
<b>Elective VIII</b>	<b>23MEAR08</b>	Mobile Robotics	3	0	0	3
	<b>23MEAR09</b>	Automotive Control Systems	3	0	0	3
<b>Elective IX</b>	<b>23MEAR10</b>	Actuators and Drives	3	0	0	3
	<b>23MEAR11</b>	Automotive Instrumentation and Control	3	0	0	3
<b>Elective X</b>	<b>23MEAR12</b>	Introduction to Drones	3	0	0	3
	<b>23MEAR13</b>	Computational Fluid Dynamics	3	0	0	3
<b>Elective XI</b>	<b>23MEAR14</b>	Intelligent Manufacturing Systems	3	0	0	3
	<b>23MEAR15</b>	Optimization for Robot Modelling	3	0	0	3

#### 4. Specialization in Artificial Intelligence (AI) and Machine Learning (ML)

	Course Code	Course	L	T	P	C
<b>Elective 1</b>	<b>23MEPE01</b>	Alternate Sources of Energy and system	3	0	0	3
	<b>23MEPE02</b>	Introduction to Sensors, Actuators & IoT	3	0	0	3
<b>Elective II</b>	<b>23MEPE03</b>	Mechanical Behavior and Testing of Materials	3	0	0	3
	<b>23MEPE04</b>	Introduction Python Programming	3	0	0	3
<b>Elective III</b>	<b>23MEPE05</b>	Hydraulic Machine	3	0	0	3
	<b>23MEPE06</b>	Industrial Engineering and Operations Research	3	0	0	3
<b>Elective IV</b>	<b>23MEAI 01</b>	Robot kinematics	3	0	0	3
	<b>23MEAI 02</b>	Discrete Mathematics	3	0	0	3
<b>Elective V</b>	<b>23MEAI 03</b>	Introduction to Artificial Intelligence	3	0	0	3
	<b>23MEAI 04</b>	Soft Computing	3	0	0	3
<b>Elective VI</b>	<b>23MEAI 05</b>	Robot Dynamics and Control	3	0	0	3
	<b>23MEAI 06</b>	Data Structure	3	0	0	3
<b>Elective VII</b>	<b>23MEAI 07</b>	Database Management System	3	0	0	3
	<b>23MEPE13</b>	Programmable Logic Control	3	0	0	3
<b>Elective VIII</b>	<b>23MEAI 09</b>	Deep Learning Principles and Practices	3	0	0	3
	<b>23MEAI 10</b>	Mobile Robotics	3	0	0	3
<b>Elective IX</b>	<b>23MEAI 11</b>	AI in Autonomous Vehicles	3	0	0	3
	<b>23MEAI 12</b>	Machine Learning	3	0	0	3
<b>Elective X</b>	<b>23MEAI 13</b>	AI in Design Optimization	3	0	0	3
	<b>23MEAI 14</b>	Computer vision in Mechanical Engineering	3	0	0	3
<b>Elective XI</b>	<b>23MEAI 15</b>	Cognitive Learning	3	0	0	3
	<b>23MEAI 16</b>	Natural Language Processing	3	0	0	3

## Ability Enhancement Courses

Code	Category	Course	L	T	P	C
23AEC101	(AEC)	Professional English	3	0	0	3
23AEC301/302/303	(AEC)	Hindi	3	0	0	3

## List of Skill Enhancement Courses

Subject Code	Course	Category	L	T	P	Credits
Technical Training						
23CS0201	Essentials of Blockchain andIoT	SEC	0	0	2	1
23CS0202	Programming with Python	SEC	0	0	2	1
23CS0301	Design Thinking and Augmented Virtual Reality –Level	SEC	0	0	2	1
23CS0302	Big Data Analytics, Tools andTechniques	SEC	0	0	2	1
23CS0401	Data Structure and Algorithmsusing C++	SEC	0	0	2	1
Soft Skill						
23SS251	Effective Communication Skills	SEC	0	0	2	1
23SS351	Teamwork & InterpersonalSkills	SEC	0	0	2	1
23SS451	Presentation & Speaking Skills	SEC	0	0	2	1
23SS551A	Professional Writing Skills	SEC	0	0	2	1
23SS651A	Interpersonal Skills : Strategies	SEC	0	0	2	1

## Value Added Courses

Code	Category	Course	L	T	P	C
23VACXX	(VAC)	Environment Protection, Sustainable Development & Living	2	0	0	2
23VACXX	(VAC)	Indian Constitution and Polity	2	0	0	2
23VACXX	(VAC)	Sports, Yoga and Fitness	2	0	0	2
NOTE: 1. All the Courses are compulsory for the students						
2. Students would be encouraged to enroll for NSS/NCC						

## Multidisciplinary (Humanities and Social Sciences Courses) Courses (MDC))

Code	Category	Course	L	T	P	C
23MDCXX / 23MDCXX / 23MDCXX	(MDC-I)	Principles of Management & Organization Behavior Fundamentals of Finance & Accounting Financial Institution and Banking System in India	3	0	0	3
23MDCXX	(MDC-II)	Library Information Science and Media Literacy	3	0	0	3
23MDCXX	(MDC-III)	Intellectual Property Rights in Business	3	0	0	3
		Indian Economy	3	0	0	3
		Psychology and Life	3	0	0	3
		Foundations of Political Science	3	0	0	3
		Basics of Sociology and Human Behavior	3	0	0	3

## SEMESTER - III

Sports,YOGA & Fitness		
Course Code: 23VAC301	Continuous Evaluation:	Marks
Credits: 2	End Semester Examination:	Marks
L T P: 1 0 2		
Prerequisite: Nil		

### Yoga Practices & Physical Education

1. Teaching of different asanas – demonstration practice and correction.
2. Teaching of weight training – demonstration practice and correction.
3. Teaching of circuit training – demonstration practice and correction.
4. Teaching of calisthenics – demonstration practice and correction.
5. Teaching of skills of Football – demonstration, practice of the skills, correction, involvement in game situation (For girls teaching of Tennikoit)
6. Teaching of different skills of Football – demonstration, practice of the skills, correction, involvement in game situation (For girls teaching of Tennikoit)
7. Teaching of advance skills of Football – involvement of all the skills in game situation with teaching of rules of the game
8. Teaching of skills of Basketball – demonstration, practice of the skills, correction of skills, involvement in game situation
9. Teaching of skills of Basketball – demonstration, practice of the skills, involvement in game situation
10. Teaching of skills of Basketball – involvement of all the skills in game situation with teaching of rule of the game
11. Teaching of skills of Kabaddi – demonstration, practice of the skills, correction of skills, involvement in game situation
12. Teaching of skills of Kabaddi – demonstration, practice of the skills, correction of skills, involvement in game situation
13. Teaching of advance skills of Kabaddi – involvement of all the skills in game situation with teaching of rule of the game
14. Teaching of skills of Ball Badminton – demonstration, practice of the skills, correction of skills, involvement in game situation
15. Teaching of skills of Ball Badminton – involvement of all the skills in game situation with teaching of rule of the game
16. Teaching of some of Asanas – demonstration, practice, correction and practice
17. Teaching of some more of Asanas – demonstration, practice, correction and practice
18. Teaching of skills of Table Tennis – demonstration, practice of skills, correction and practice and involvement in game situation
19. Teaching of skills of Table Tennis – demonstration, practice of skills, correction and practice and involvement in game situation
20. Teaching of skills of Table Tennis – involvement of all the skills in game situation