

# **National Education Policy (NEP) Compliant Curriculum Structure**

for

## **B. Tech. (Robotics & Artificial Intelligence)**

**(With effect from Academic Year 2023-24)**



## **Department of Mechanical Engineering**

### **COEP Technological University (COEP Tech)**

A Unitary Public University of Government of Maharashtra

(Formerly College of Engineering Pune)

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**Vision of the Department:**

To be a leader amongst engineering institutions in India, offering value based world class education and constantly pursuing excellence

**Mission of the Department:**

M1: To offer state-of-the-art undergraduate, postgraduate and doctoral programmes

M2: To develop employable and skilled undergraduate to accept the global and societal challenges, while imparting quality education at postgraduate and research level.

M3: To Foster the passion of life-long learning in all facets of employability.

**Program Educational Objectives (PEOs)**

**PEO1. Core Competence:** Fundamental and technical knowledge with skills in Robotics & Artificial Intelligence area to enable and empower to solve problems of the modern industrial world.

**PEO2. Depth (Research culture):** Imbibing a scientific perspective to make a decision of Robotic systems and Artificial Intelligence using Mathematical, Engineering, Computational & Simulation tools.

**PEO3. Professionalism:** Make acquaint with technical, managerial, and human skills and familiarize with professional issues like ethics and morality, Intellectual property Rights, Constitution of India and Environmental responsibility.

**PEO4. Learning Environment:** Motivation for entrepreneurship and inculcating a spirit of continuous lifelong learning for a successful professional career.

**Program Outcomes****Program Outcomes of Engineering program as per norms (common to all UG/ PG Programme)**

**PO1. Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization for the solution of complex engineering problems.

**PO2. Problem analysis:** Identify, formulate, research literature, and analyses complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

**PO3. 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 public health and safety, and cultural, societal, and environmental considerations.

**PO4. Conduct investigations of complex problems:** The problems: • that cannot be solved by straightforward application of knowledge, theories and techniques applicable to the engineering discipline. • that may not have a unique solution. For example, a design problem can be solved in many ways and lead to multiple possible solutions. • that require consideration of appropriate

constraints/requirements not explicitly given in the problem statement. (like: cost, power requirement, durability, product life, etc.). • which need to be defined (modeled) within appropriate mathematical frame work. • that often require use of modern computational concepts and tools.

**PO5. Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling to complex engineering activities, with an understanding of the limitations.

**PO6. 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.

**PO7. 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.

**PO8. Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.

**PO9. Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

**PO10. Communication:** Communicate effectively on complex engineering activities with the engineering community and with the 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.

**PO11. 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.

**PO12. 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 technological change.

### **Program Specific Objectives (PSOs)**

**PSO1 Design and Development:** The ability to design and develop the products as per the need of the customers in the field of Mechanical and Allied Engineering Industries.

**PSO2 Engineering Analysis and optimization:** The ability to analyze and optimize the Mechanical systems/processes using various computational tools.

**PSO3 Society:** To strengthen Mechanical Engineering graduates who would value professional and ethical responsibilities while solving societal problems

### List of Abbreviations

<b>Abbreviation</b>	<b>Title</b>
BSC	Basic Science Course
ESC	Engineering Science Course
PCC	Programme Core Course (PCC)
PEC	Programme Elective Course (PEC)
OE/SE	Open/School Elective (OE/SE) other than particular program
MDM	Multidisciplinary Minor (MD M)
VSEC	Vocational and Skill Enhancement Course (VSEC)
HSMC	Humanities Social Science and Management
IKS	Indian Knowledge System (IKS)
VEC	Value Education Course (VEC)
RM	Research Methodology (RM)
--	Internship
--	Project
CEA	Community Engagement Activity (CEA)/Field Project
CCA	Co-curricular & Extracurricular Activities (CCA)

**F.Y.. Tech. Robotics & AI**  
**[Level 4.5, UG Certificate] Semester -I**

Sr. No.	Course Type	Course Code	Course Name	L	T	P	S	Cr	Evaluation Scheme (Weightages in %)				
									Theory			Laboratory	
									MSE	TA	ESE	ISE	ESE
01	BSC	MRAIBSC101	Matrix Algebra, Calculus and Probability	2	1	0	1	3	30	20	50	--	--
02	BSC	MRAIBSC102	Engineering Physics	2	0	2	1	3	30	20	50	CIE: 100	
03	ESC	MRAIESC103	Basic Electrical & Electronics Engineering	2	0	2	1	3	30	20	50	CIE: 100	
04	ESC	MRAIESC104	Engineering Drawing and Graphics	1	0	4	1	3	CIE: 100			CIE: 100	
05	ESC	MRAIESC105	Engineering Mechanics	3	0	2	1	4	30	20	50	CIE: 100	
06	AEC-I	MRAIAEC106	Communication Skill	1	0	2	0	2	CIE: 100			CIE: 100	
07	CCA		Liberal Learning Course-I	0	0	2	2	1	--	--	--	CIE: 100	
08	VESC-I		Manufacturing Practices/ Fab Lab - I	0	0	2	1	1	--	--	--	CIE: 100	
<b>Total</b>				<b>11</b>	<b>01</b>	<b>16</b>	<b>08</b>	<b>20</b>					

**[Level 4.5, UG Certificate] Semester -II**

Sr. No.	Course Type	Course Code	Course Name	L	T	P	S	Cr	Evaluation Scheme (Weightages in %)				
									Theory			Laboratory	
									MSE	TA	ESE	ISE	ESE
01	BSC	MRAIBSC201	Engineering Chemistry	2	0	2 <sup>#</sup>	1	3	30	20	50	CIE: 100	
02	BSC	MRAIBSC202	Ordinary Differential Equations and Multivariate Calculus	2	1	0	1	3	30	20	50	CIE: 100	
03	ESC	MRAIBSC203	Biology for Engineers	2	0	0	1	2	30	10	60	--	--
04	ESC	MRAIESC204	Systems in Mechanical Engineering	2	0	2	1	3	30	20	50	CIE: 100	
05	ESC	MRAIESC205	Programming for Problem Solving	1	0	2	2	2	CIE: 100			CIE: 100	
06	ESC	MRAIESC206	Design Thinking and Idea Lab	0	0	2	1	1	--	--	--	CIE: 100	
07	PCC	MRAIPCC207	Material Science	2	0	0	1	2	30	10	60	--	--
08	VSEC-II	MRAIVSEC208	Manufacturing Practices/ Fab Lab - II	0	0	2	0	1	--	--	--	CIE: 100	
09	IKS	MRAIIKS209	Indian Knowledge System	2	0	0	1	2	CIE: 100			--	--
10	CCA	MRAICCA210	Co-curricular/Office Automation/ Extracurricular Activity	0	0	2	0	1	--	--	--	CIE: 100	
11	CEA	MRAICEA211	Social Summer Internship-after Sem II-Exam in Sem III(60 Days)	0	0	0	0	0	--	--	--	--	--
<b>Total</b>				<b>13</b>	<b>01</b>	<b>12</b>	<b>09</b>	<b>20</b>					

# => Combined Lab for Applied Chemistry and Material Science

Legends: **L**-Lecture, **T**-Tutorial, **P**-Practical, **S**-Self Study, **Cr**-Credits  
**ISE**-In-Semester-Evaluation, **ESE**-End-Semester-Evaluation, **MSE**-Mid-Semester-Evaluation, **TA**-Teachers' Assessment, **CIE**-Continuous-Internal-Evaluation

For Exit after FY -- Additional Credits for Certificate ( Any Four Skill Based Course )													
Sr. No.	Course Type	Course Code	Course Name	L	T	P	S	Cr	Evaluation Scheme (Weightages in %)				
									Theory			Laboratory	
									MSE	TA	ESE	ISE	ESE
01	VSEC	MRAIVSEC2E1	Computer Aided Geometric Modelling	1	0	2	0	2	30	10	60	50	50
02	VSEC	MRAIVSEC2E2	Additive Manufacturing	1	0	2	0	2	30	10	60	50	50
03	VSEC	MRAIVSEC2E3	Metallurgical Lab Practice - I	1	0	2	0	2	30	10	60	50	50
04	VSEC	MRAIVSEC2E4	Basics of CNC programming	1	0	2	0	2	30	10	60	50	50
05	VSEC	MRAIVSEC2E5	Basics of Robotics & AI	1	0	2	0	2	30	10	60	50	50
<b>Total</b>				<b>18</b>	<b>01</b>	<b>22</b>	<b>9</b>	<b>30</b>					
*Summer internship (Industry / R&D / Academic Institute ) after IV th semester during summer Vacation & Evaluation will be done in the starting of V th Semester													

## S. Y. B. Tech. Robotics & AI

### [Level 5, UG Regular] Semester -III

Sr. No.	Course Type	Course Code	Course Name	L	T	P	S	Cr	Evaluation Scheme (Weightages in %)				
									Theory			Laboratory	
									MSE	TA	ESE	ISE	ESE
01	PCC	MRAIPCC301	Basics of Robotics & AI	3	0	0	1	3	30	20	50	--	--
02	PCC	MRAIPCC302	Sensors for Industrial Robotics	2	0	2	1	3	30	20	50	50	50
03	PCC	MRAIPCC303	Industrial Robot Programming Lab	2	0	2	1	3	30	20	50	50	50
04	OE	MRAIOE304	Open Elective - I	3	0	0	1	3	30	20	50	--	--
05	AEC-II	MRAIAEC305	Indian language Sanskrit/Pali	2	0	0	1	2	CIE: 100			--	--
06	VEC-I	MRAIVEC306	Constitution of India and Universal Human Values	1	0	0	0	1	CIE: 100			--	--
07	HSMC	MRAIHSMC307	Principles of Entrepreneurship	2	0	0	1	2	CIE: 100			--	--
08	CEA	MRAICEA308	*Community Engagement Activity/ Field Project	2	0	0	1	2	--	--	--	CIE: 100	
<b>Total</b>				<b>17</b>	<b>00</b>	<b>04</b>	<b>07</b>	<b>19</b>					

\* => Field project (Social) after semester II during summer vacation and evaluation will be done at the start of the III semester.

### [Level 5, UG Regular] Semester -IV

Sr. No.	Course Type	Course Code	Course Name	L	T	P	S	Cr	Evaluation Scheme (Weightages in %)				
									Theory			Laboratory	
									MSE	TA	ESE	ISE	ESE
01	PCC	MRAIPCC401	Analog & Digital Electronics	2	0	2	0	3	30	20	50	50	50
02	PCC	MRAIPCC402	Control Systems	2	0	2	0	3	30	20	50	50	50
03	PCC	MRAIPCC403	Drives for Robot Systems	3	0	0	0	3	30	20	50	--	--
04	PCC	MRAIPCC404	Standards & Ethics for Robot Applications	2	0	0	2	2	CIE: 100			--	--
05	OE-II	MRAIOE405	Open Elective-II	2	0	0	0	2	30	10	60	--	--
06	MDM-I	MRAIMDM406	Multidisciplinary Minor -I	3	0	0	1	3	30	20	50	CIE: 100	
07	VSEC-III	MRAIVSEC407	Numerical Methods & Programming Language	1	0	2	1	2	CIE: 100			50	50
08	HSMC	MRAIHSMC408	Principles of Economics	2	0	0	1	2	30	10	60	--	--
09	VEC-II	MRAIVEC409	Environmental Studies	1	0	0	1	1	CIE: 100			--	--
<b>Total</b>				<b>18</b>	<b>00</b>	<b>06</b>	<b>06</b>	<b>21</b>					

### S. Y. B. Tech. Robotics & AI

#### [Level 5, UG Diploma] Semester -III Lateral Entry

Sr. No.	Course Type	Course Code	Course Name	L	T	P	S	Cr	Evaluation Scheme (Weightages in %)				
									Theory			Laboratory	
									MSE	TA	ESE	ISE	ESE
01	PCC	MRAIPCC301	Basics of Robotics & AI	3	0	0	1	3	30	20	50	--	--
02	PCC	MRAIPCC302	Sensors for Industrial Robotics	2	0	2	1	3	30	20	50	50	50
03	PCC	MRAIPCC303	Industrial Robot Programming Lab	2	0	2	1	3	30	20	50	50	50
04	OE	MRAIOE304	Open Elective - I	3	0	0	1	3	30	20	50	--	--
05	AEC-II	MRAIAEC305	Indian language Sanskrit/Pali	2	0	0	1	2	CIE: 100			--	--
06	VEC-I	MRAIVEC306	Constitution of India and Universal Human Values	1	0	0	0	1	CIE: 100			--	--
07	BSC	MRAIBSC307	Mathematics	3	0	0	1	3	30	20	50		
08	HSMC	MRAIHSMC308	Principles of Entrepreneurship	2	0	0	1	2	30	10	60	--	--
<b>Total</b>				<b>18</b>	<b>00</b>	<b>04</b>	<b>07</b>	<b>20</b>					

## S. Y. B. Tech. Robotics & AI

### [Level 5, UG Diploma] Semester -IV Lateral Entry

Sr. No.	Course Type	Course Code	Course Name	L	T	P	S	Cr	Evaluation Scheme (Weightages in %)				
									Theory			Laboratory	
									MSE	TA	ESE	ISE	ESE
01	PCC	MRAIPCC401	Analog & Digital Electronics	2	0	2	0	3	30	20	50	50	50
02	PCC	MRAIPCC402	Control Systems	2	0	2	0	3	30	20	50	50	50
03	PCC	MRAIPCC403	Drives for Robot Systems	3	0	0	0	3	30	20	50	--	--
04	PCC	MRAIPCC404	Standards & Ethics for Robot Applications	2	0	0	2	2	CIE: 100			--	--
05	OE-II	MRAIOE405	Open Elective-II	2	0	0	0	2	30	10	60	--	--
06	MDM-I	MRAIMDM406	Multidisciplinary Minor -I	3	0	0	1	3	30	20	50	CIE: 100	
07	VSEC-III	MRAIVSEC407	Numerical Methods & Programming Language	1	0	2	1	2	CIE: 100			50	50
08	HSMC	MRAIHSMC408	Principles of Economics	2	0	0	1	2	30	10	60	--	--
09	VEC-II	MRAIVEC409	Environmental Studies	1	0	0	1	1	CIE: 100			--	--
10	HSMC	MRAIHSMC410	Communication Skills	1	0	2	0	2	CIE: 100			CIE: 100	
<b>Total</b>				<b>19</b>	<b>00</b>	<b>08</b>	<b>06</b>	<b>23</b>					

### For Exit after SY -- Additional Credits for Diploma

Sr. No.	Course Type	Course Code	Course Name	L	T	P	S	Cr	Evaluation Scheme (Weightages in %)				
									Theory			Laboratory	
									MSE	TA	ESE	ISE	ESE
01	VSEC	MRAIVSEC4E1-L	Robotic Simulation Laboratory	0	1	2	0	2	--	--	--	50	50
02	VSEC	MRAIVSEC4E2-L	Arial Robotics Programming Lab	0	1	2	2	2	--	--	--	50	50
03	VSEC	MRAIVSEC4E3-L	Control Systems Laboratory	0	1	2	0	2	--	--	--	50	50
04	VSEC	MRAIVSEC4E4	Mini Project	0	2	0	0	2	--	--	--	CIE: 100	
<b>Total</b>				<b>19</b>	<b>05</b>	<b>14</b>	<b>8</b>	<b>31</b>					

\*Summer internship (Industry / R&D / Academic Institute ) after IV th semester during summer Vacation & Evaluation will be done in the starting of V th Semester

**Legends:**    **L**-Lecture, **T**-Tutorial, **P**-Practical, **S**-Self Study, **Cr**-Credits  
**ISE**-In-Semester-Evaluation, **ESE**-End-Semester-Evaluation, **MSE**-Mid-Semester-Evaluation, **TA**-Teachers' Assessment, **CIE**-Continuous-Internal-Evaluation



# T. Y. B. Tech. Robotics & AI

## Semester -V

Sr. No.	Course Type	Course Code	Course Name	L	T	P	S	Cr	Evaluation Scheme (Weightages in %)				
									Theory			Laboratory	
									MSE	TA	ESE	ISE	ESE
01	ELC	MRAIELC501	Internship (Completed after Sem - IV)	4	0	0	0	4	CIE: 100			--	--
02	PCC	MRAIPCC502	Artificial Intelligence & Machine Learning	2	0	2	0	3	30	20	50	50	50
03	PCC	MRAIPCC503	Fundamentals of Robot Manipulators	3	0	0	0	3	30	20	50	--	--
04	PCC	MRAIPCC504	Signals & Systems	2	0	2	2	3	30	20	50	50	50
05	PEC-I	MRAIPEC505	Programme Elective Course -I (Refer separate List)	3	0	0	0	3	30	20	50	--	--
06	PEC-II	MRAIPEC506	Programme Elective Course -II (Refer separate List)	3	0	0	0	3	30	20	50	--	--
07	MDM	MRAIMDM507	Multidisciplinary Minor - II	3	0	0	0	3	30	20	50	--	--
<b>Total</b>				<b>20</b>	<b>0</b>	<b>04</b>	<b>02</b>	<b>22</b>					

Course Specialization / Track	Program Elective Course-I PEC-I	Program Elective Course-II PEC-II
Robotics	Mobile and Micro Robotics	Autonomous Robotics and Telecherics
AI	Data Analytics	Deep Learning
Mechatronics	Intelligent Manufacturing	Mechatronics System Design
Control Systems	Dynamic Control Systems	Microcontrollers Architecture and Programming

## Semester -VI

Sr. No.	Course Type	Course Code	Course Name	L	T	P	S	Cr	Evaluation Scheme (Weightages in %)				
									Theory			Laboratory	
									MSE	TA	ESE	ISE	ESE
01	PCC	MRAIPCC601	Kinematics & Dynamics	4	0	0	0	4	30	20	50	--	--
02	PCC	MRAIPCC602-L	Robot Simulation Lab	1	0	2	2	2	CIE: 100			50	50
03	PCC	MRAIPCC603	Microcontrollers & It's Applications	2	0	2	2	3	30	20	50	50	50
04	PCC	MRAIPCC604	Robot Safety & Maintenance	2	0	0	1	2	30	10	60	--	--
05	PCC	MRAIPCC605	Data Science	3	0	0	2	3	30	20	50	50	50
06	PCC	MRAIPCC606	Seminar on recent advances in R & AI	0	0	2	0	1	--	--	--	50	50
07	VSEC	MRAIVSEC607-L	Arial Robotics Lab	0	0	2	0	1	30	10	60	--	--
08	MDM	MRAIMDM608	Multidisciplinary Minor - III	4	0	0	0	4	30	20	50	--	--
09	OE-III	MRAIOE609	Open Elective -III	2	0	0	0	2	30	10	60	--	--
10	ELC	MRAIELC610	Summer Internship-after Sem VI-Exam in Sem VII	0	0	0	0	0	--	--	--	--	--
<b>Total</b>				<b>18</b>	<b>0</b>	<b>8</b>	<b>7</b>	<b>22</b>					

**For Exit after TY-- Additional Credits for B Vocational**

Sr. No.	Course Type	Course Code	Course Name	L	T	P	S	Cr	Evaluation Scheme (Weightages in %)				
									Theory			Laboratory	
									MSE	TA	ESE	ISE	ESE
01	VSEC	MRAIVSEC6E1-L	Robot Operating System	0	0	4	0	2	--	--	--	50	50
02	VSEC	MRAIVSEC6E2-L	Autonomous Navigation Lab using SLAM	0	0	4	0	2	--	--	--	50	50
03	VSEC	MRAIVSEC6E3	Robot System Design	2	0	0	2	2	30	10	60	--	--
04	VSEC	MRAIVSEC6E4	Mini Project	2	0	0	0	2	--	--	--	CIE: 100	
<b>Total</b>				<b>22</b>	<b>0</b>	<b>16</b>	<b>9</b>	<b>30</b>					

\*Summer internship (Industry / R&D / Academic Institute ) after IV th semester during summer Vacation & Evaluation will be done in the starting of V th Semester

**Legends:** **L**-Lecture, **T**-Tutorial, **P**-Practical, **S**-Self Study, **Cr**-Credits  
**ISE**-In-Semester-Evaluation, **ESE**-End-Semester-Evaluation, **MSE**-Mid-Semester-Evaluation, **TA**-Teachers' Assessment, **CIE**-Continuous-Internal-Evaluation

## B. Tech. Robotics & AI

### Semester -VII

Sr. No.	Course Type	Course Code	Course Name	L	T	P	S	Cr	Evaluation Scheme (Weightages in %)				
									Theory			Laboratory	
									MSE	TA	ESE	ISE	ESE
01	ELC	MRAIELC701	Internship (Completed after Sem - VI)	4	0	0	0	4	--	--	--	CIE: 100	
02	PEC-III	MRAIPEC702	Programme Elective Course -III (Refer separate List)	3	0	0	0	3	30	20	50	--	--
03	PEC-IV	MRAIPEC703	Programme Elective Course -IV (Refer separate List)	3	0	0	0	3	30	20	50	--	--
04	PCC	MRAIPCC704	ROS & SLAM Laboratory	0	0	4	0	2	--	--	--	50	50
06	PCC	MRAIPCC706	Robot operating System	4	0	0	0	4	30	20	50	--	--
07	RM	MRAIRM707	Research Methodology	2	0	0	1	2	30	10	60	--	--
08	MDM	MRAIMDM708	Multidisciplinary Minor-IV	4	0	0	0	4	30	20	50	--	--
<b>Total</b>				<b>20</b>	<b>0</b>	<b>4</b>	<b>3</b>	<b>22</b>					

Course Specialization / Track	Program Elective Course-III PEC-III	Program Elective Course-IV PEC-IV
Robotics	Advanced Robotics Programming	Biomedical Robotics
AI	Advanced Artificial Intelligence	Augmented Reality and Virtual Reality
Mechatronics	Micro electromechanical Systems	Advanced Mechatronics
Control Systems	Advanced Control System	Robot Dynamics and Control

### Semester -VIII

Sr. No.	Course Type	Course Code	Course Name	L	T	P	S	Cr	Evaluation Scheme (Weightages in %)				
									Theory			Laboratory	
									MSE	TA	ESE	ISE	ESE
01	PEC-V	MRAIPEC801	Programme Elective Course -V (Refer separate List) / MOOCS	3	0	0	0	3	30	20	50	--	--
02	PEC-VI	MRAIPEC802	Programme Elective Course -VI (Refer separate List) / MOOCS	3	0	0	0	3	30	20	50	--	--
03	ELC	MRAIELC803	Internship / Project	0	0	16	5	8	--	--	--	CIE: 100	
<b>Total</b>				<b>6</b>	<b>0</b>	<b>16</b>	<b>5</b>	<b>14</b>					

Course Specialization / Track	Program Elective Course-V PEC-V	Program Elective Course-VI PEC-VI
Robotics	Agricultural Robotics	Medical Robotics Technology
AI	AI based Agriculture	AI for Medical Applications
Mechatronics	Mechatronics for Agriculture	Mechatronics for Medical Applications
Control Systems	Agricultural Plant & Device Control	Control for Biomedical Instrumentation systems

Legends: **L**-Lecture, **T**-Tutorial, **P**-Practical, **S**-Self Study, **Cr**-Credits  
**ISE**-In-Semester-Evaluation, **ESE**-End-Semester-Evaluation, **MSE**-Mid-Semester-Evaluation, **TA**-Teachers' Assessment, **CIE**-Continuous-Internal-Evaluation

Sr No	Semester	Teaching Scheme				Total	Credit
		L	T	P	SS		
1	I	11	01	16	06	34	20
2	II	13	01	12	02	28	20
3	III	15	00	08	05	28	19
4	IV	18	00	06	06	30	21
5	V	20	0	04	02	26	22
6	VI	18	0	08	07	33	22
7	VII	20	0	04	03	27	22
8	VIII	06	0	16	05	22	14
<b>Total</b>		<b>121</b>	<b>2</b>	<b>74</b>	<b>36</b>	<b>218</b>	<b>160</b>

### Internship courses

Sr. No.	Course Type	Course Code	Course Name	L	T	P	S	Cr	Evaluation Scheme (Weightages in %)				
									Theory			Laboratory	
									MSE	TA	ESE	ISE	ESE
01	CEA	MRAICEA211	Social Summer Internship-after Sem II-Exam in Sem III	2	0	0	0	2	--	--	--	CIE: 100	
02	ELC	MRAIELC410	Summer Internship-after Sem IV-Exam in Sem V	4	0	0	0	4	--	--	--	CIE: 100	
03	ELC	MRAIELC610	Summer Internship-after Sem VI-Exam in Sem VII	4	0	0	0	4	--	--	--	CIE: 100	

### Open Electives ( Robotics )

Sr. No.	SEM	Course Type	Course Name	L	T	P	S	Cr	Evaluation Scheme (Weightages in %)				
									Theory			Laboratory	
									MSE	TA	ESE	ISE	ESE
01	III	OE- I	Mobile and Micro Robotics	2	0	0	2	2	30	10	60	--	--
02	IV	OE- II	Autonomous Robotics & Telecherics	2	0	0	2	2	30	10	60	--	--
03	V	OE- III	Advanced Robotics Programming	2	0	0	2	2	30	10	60	--	--

### Open Electives (Artificial Intelligence)

Sr. No.	SEM	Course Type	Course Name	L	T	P	S	Cr	Evaluation Scheme (Weightages in %)				
									Theory			Laboratory	
									MSE	TA	ESE	ISE	ESE
01	III	OE- I	Data Analytics	2	0	0	2	2	30	10	60	--	--
02	IV	OE- II	Deep Learning	2	0	0	2	2	30	10	60	--	--

03	V	OE- III	Advanced Artificial Intelligence	2	0	0	2	2	30	10	60	--	--
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### Multidisciplinary Minors – for other Branches

Sr. No.	SEM	Course Type	Course Name	L	T	P	S	Cr	Evaluation Scheme (Weightages in %)				
									Theory			Laboratory	
									MSE	TA	ESE	ISE	ESE
01	IV	MDM I	Drives for Industrial Robotics	3	0	0	0	3	30	20	50	--	--
02	V	MDM II	Fundamentals of Robot Manipulators	3	0	0	0	3	30	20	50	--	--
03	VI	MDM III	Kinematics & Dynamics	4	0	0	0	4	30	20	50	--	--
04	VII	MDM IV	Robot Operating System	4	0	0	0	4	30	20	50	--	--
<b>Total</b>				<b>14</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>14</b>					

### Double minors – for other Branches

Sr. No.	SEM	Course Type	Course Name	L	T	P	S	Cr	Evaluation Scheme (Weightages in %)				
									Theory			Laboratory	
									MSE	TA	ESE	ISE	ESE
01	IV	MDM I	Analog & Digital Electronics	2	0	2	2	3	30	20	50	50	50
02	V	MDM II	Signals & Systems	2	0	2	2	3	30	20	50	50	50
03	VI	MDM III	Microcontrollers & It's Applications	2	1	2	2	4	30	20	50	50	50
04	VII	MDM IV	ROS & SLAM Laboratory	0	2	4	2	4	30	20	50	50	50
<b>Total</b>				<b>6</b>	<b>3</b>	<b>10</b>	<b>8</b>	<b>14</b>					

### Honors – Robotics Engineering – for other Branches

Sr. No.	SEM	Course Name	L	T	P	S	Cr	Evaluation Scheme (Weightages in %)				
								Theory			Laboratory	
								MSE	TA	ESE	ISE	ESE
01	III	Sensors for Industrial Robotics	2	1	2	0	4	30	20	50	50	50
02	IV	Drives for Industrial Robotics	3	1	0	0	4	30	20	50	--	--
03	V	Fundamentals of Robot Manipulators	3	1	0	0	4	30	20	50	--	--
04	VI	Kinematics & Dynamics	4	0	0	2	4	30	20	50	--	--
05	VII	Robot Operating System	4	0	0	2	4	30	20	50	--	--
<b>Total</b>			<b>16</b>	<b>3</b>	<b>2</b>	<b>4</b>	<b>20</b>					

### Honors – Artificial Intelligence – for other Branches

Sr. No.	SEM	Course Name	L	T	P	S	Cr	Evaluation Scheme (Weightages in %)				
								Theory			Laboratory	
								MSE	TA	ESE	ISE	ESE
01	III	Basics of Robotics & AI	2	2	0	0	3	30	10	60	--	--
02	IV	Data Science	3	1	0	2	4	30	10	60	--	--
03	V	Artificial Intelligence & Machine Learning	2	1	2	0	4	30	10	60	50	50
04	VI	Robot Operating System	4	0	0	0	4	30	20	50	--	--
05	VII	Advanced Artificial Intelligence	2	2	0	2	4	30	10	60	--	--
<b>Total</b>			<b>13</b>	<b>6</b>	<b>2</b>	<b>4</b>	<b>20</b>					

### Honors – Research

Sr. No.	SEM	Course Name	L	T	P	S	Cr	Evaluation Scheme (Weightages in %)				
								Theory			Laboratory	
								MSE	TA	ESE	ISE	ESE
01	III	Problem Identification and Definition	3	1	-	2	4	30	20	50	--	--
02	IV	Literature Review	3	1	-	2	4	30	20	50	--	--
03	V	Experimental Work/Analytical Tools and Prototype Development	3	1	-	2	4	30	20	50	--	--
04	VI	Data Analysis	3	1	-	2	4	30	20	50	--	--
05	VII	Publication	3	1	-	2	4	30	20	50	--	--
<b>Total</b>			<b>15</b>	<b>5</b>	<b>-</b>	<b>10</b>	<b>20</b>					

### B. Tech Honors with Research

Sr. No.	SEM	Course Name	L	T	P	S	Cr	Evaluation Scheme (Weightages in %)				
								Theory			Laboratory	
								MSE	TA	ESE	ISE	ESE
04	VI	Research Project ( Part 1) Problem Identification and Definition, Literature Review, Experimental Work	-	2	-	20	10	--	--	--	CIE: 100	
05	VII	Research Project ( Part 2) Prototype Development, Data Analysis, Publication	-	2	-	20	10	--	--	--	CIE: 100	
<b>Total</b>			<b>-</b>	<b>4</b>	<b>-</b>	<b>40</b>	<b>20</b>					

### Honors- B. Tech. ( Robotics & Artificial Intelligence )

For Honors in Mechanical Engineering, students should select below courses of 20 credits from the pool of electives given below. These selected courses should not be part of mandatory 160 regular credits.

Course Specialization / Track	Program Elective Course-I PEC-I	Program Elective Course-II PEC-II
Robotics	Mobile and Micro Robotics	Autonomous Robotics and Telecherics
AI	Data Analytics	Deep Learning
Mechatronics	Intelligent Manufacturing	Mechatronics System Design
Control Systems	Dynamic Control Systems	Microcontrollers Architecture and Programming

<b>Course Specialization / Track</b>	<b>Program Elective Course-III PEC-III</b>	<b>Program Elective Course-IV PEC-IV</b>
Robotics	Advanced Robotics Programming	Biomedical Robotics
AI	Advanced Artificial Intelligence	Augmented Reality and Virtual Reality
Mechatronics	Micro electromechanical Systems	Advanced Mechatronics
Control Systems	Advanced Control System	Robot Dynamics and Control

<b>Course Specialization / Track</b>	<b>Program Elective Course-V PEC-V</b>	<b>Program Elective Course-VI PEC-VI</b>
Robotics	Agricultural Robotics	Medical Robotics Technology
AI	AI based Agriculture	AI for Medical Applications
Mechatronics	Mechatronics for Agriculture	Mechatronics for Medical Applications
Control Systems	Agricultural Plant & Device Control	Control for Biomedical Instrumentation systems