



HINDUSTAN

INSTITUTE OF TECHNOLOGY & SCIENCE
(DEEMED TO BE UNIVERSITY)

B. TECH. ROBOTICS AND ARTIFICIAL INTELLIGENCE
(Duration: 4 Years)

REGULATION 2022A

(Inline with NEP 2020)

CURRICULUM and SYLLABUS

(Applicable for students admitted from 2025 onwards)

DEPARTMENT OF MECHATRONICS ENGINEERING

SCHOOL OF ENGINEERING AND TECHNOLOGY

HINDUSTAN INSTITUTE OF TECHNOLOGY AND SCIENCE



B. TECH – ROBOTICS AND ARTIFICIAL INTELLIGENCE CURRICULUM - 2025-26 (NEP R2022 A)

Semester-I

SL · N O	SEM	COURSE CATEGOR Y	COURS E TYPE	COURSE CODE	NAME OF THE COURSE	L	T	P	C	S	TC H
1	I	BS	TP	EMA51001	Matrices and Calculus	3	0	2	4	2	5
2	I	BS	TP	Any one course to be opted		3	0	2	4	2	5
				EPH51001	Engineering Physics						
				ECT51001	Engineering Materials						
3	I	HS	TH	GLS51018	Professional Communication	3	0	0	1	1	3
4	I	ES	TP	Any one course to be opted		2	0	2	3	2	4
				ECS51009	Programming Fundamentals using C						
				ECS51010	Programming in Python						
				OR							
EME51001	Engineering Graphics and Computer Aided Design										
5	I	ES	TP	EGE51002	Design Thinking	2	0	2	3	2	4
6	I	ES	PR	Any one course to be opted		0	0	4	2	2	4
				EGE51406	Engineering Practices Lab						
				EGE51408	Fab Lab for Core Engineering						
7	I	HS	PR	Any one course to be opted (Outreach)		0	0	2	1	4	2
				GGE51401	Outreach (NCC)– Level I #						
				GGE51402	Outreach (NSS, Y’s Men, Rotaract) – Level I #						
8	I	HS	TH	Any one course to be opted (Indian or Foreign Language)		2	0	0	2	2	2
				GLS51008	Tamil						
				GLS51009	Hindi						
				GLS51010	Telugu						
				GLS51011	French						
				GLS51012	German						
				GLS51013	Spanish						
				GLS51014	Korean						
				GLS51015	Mandarin						
				GLS51016	Japanese						
OR											
GGE51001	Universal Human Values										
9	I	HS	TH	GLS51017	Tamil Culture and Technology	1	0	0	1	2	1
Total						16	0	14	21	19	30

L – Lecture T – Tutorial P – Practical C – Credit S – Self Study TCH – Total Contact Hours

- Students should choose Level – I and Level - II of same outreach course in the semester 1 and 2 respectively

Semester-II											
SL. NO	SEM	COURSE CATEGORY	COURSE TYPE	COURSE CODE	NAME OF THE COURSE	L	T	P	C	S	TCH
1	II	BS	TP	EMA51002	Analytical Mathematics	3	0	2	4	2	5
2	II	BS	TP	Any one course to be opted		3	0	2	4	2	5
				EPH51001	Engineering Physics						
				ECT51001	Engineering Materials						
3	II	HS	TH	GLS51019	Advanced Communication Skill	3	0	0	1	1	3
4	II	PC	TP	ERA51001	Analog and Digital Systems	3	0	2	4	2	5
5	II	ES	TP	Any one course to be opted		2	0	2	3	2	4
				ECS51009	Programming Fundamentals using C						
				ECS51010	Programming in Python						
				OR							
EME51001	Engineering Graphics and Computer Aided Design										
6	II	ES	PR	Any one course to be opted		0	0	4	2	2	4
				EGE51406	Engineering Practices Lab						
				EGE51408	Fab Lab for Core Engineering						
7	II	HS	PR	Any one course to be opted(Outreach)		0	0	2	1	4	2
				GGE51403	Outreach (NCC) – Level II #						
				GGE51404	Outreach (NSS, Y's Men, Rotaract) – Level II #						
8	II	HS	TH	Any one course to be opted (Indian or Foreign Language)		2	0	0	2	2	2
				GLS51008	Tamil						
				GLS51009	Hindi						
				GLS51010	Telugu						
				GLS51011	French						
				GLS51012	German						
				GLS51013	Spanish						
				GLS51014	Korean						
				GLS51015	Mandarin						
				GLS51016	Japanese						
OR											
GGE51001	Universal Human Values										
9	II	MC	TH	*****	Mandatory Course I is a Non-credit course (Student shall select one course from the list given under Mandatory Course I)	3	0	0	*	2	3
Total						19	0	14	21	19	33
L – Lecture T – Tutorial P – Practical C – Credit S – Self Study TCH – Total Contact Hours											
* – Non Credit Course # - Students should choose Level – I and Level - II of same outreach course in the semester 1 and 2 respectively											

SEMESTER - III

SL. NO	SEM	COURSE CATEGORY	COURSE TYPE	COURSE CODE	NAME OF THE COURSE	L	T	P	C	S	TCH
1	III	BS	TH	EMA51004	Applied Mathematics and Transforms	3	1	0	4	2	4
2	III	HS	PR	GLS51400	Public Speaking and Group Discussion	0	0	3	1	1	3
3	III	PC	TP	ERA51002	Basics of Robotics and AI	2	0	2	3	2	4
4	III	PC	TP	ERA51003	Sensors & Actuators for Robotics	2	1	2	4	2	5
5	III	PC	TH	ERA51004	Data Structures	2	0	2	3	2	4
6	III	DE	TP	ERA515xx	Department Elective - 1	2	0	2	3	2	4
7	III	ES	TH	GGE51003	Environmental Science and Sustainable Development	2	0	0	2	2	2
8	III	EEC	DP	ERA51800	Design Project – 1	0	0	2	1	6	2
9	III	EEC	IN	ERA51801	Internship -1 (To be carried out in summer after 2 nd semester and evaluated in 3 rd semester)	#			1	2	0
10	III	MC	TH	*****	Mandatory Course- II is a Non-credit course (Student shall select one course from the list given under Mandatory Course II)	3	0	0	*	2	3
Total						16	2	13	22	23	31
L – Lecture T – Tutorial P – Practical C – Credit S – Self Study TCH – Total Contact Hours						* – Non Credit Course # - 15 Days Minimum					

SEMESTER - IV

SL. NO	SEM	COURSE CATEGORY	COURSE TYPE	COURSE CODE	NAME OF THE COURSE	L	T	P	C	S	TCH
1	IV	BS	TH	EMA51010	Statistics and Data Analytics	3	1	0	4	2	4
2	IV	HS	TH	GLS51004	Professional Editing and Project Writing	2	0	0	1	1	2
3	IV	PC	TP	ERA51005	Robot Kinematics and Dynamics (Industry Collaborated Course)	3	0	2	4	2	5
4	IV	PC	TP	EEE51008	Power Electronics	2	0	2	3	2	4
5	IV	PC	TP	ERA51007	Embedded Systems for Robotics & AI	2	0	2	3	2	4
6	IV	DE	TP	ERA515xx	Department Elective - 2	2	0	2	3	2	4
7	IV	NE	TP	Exx517xx	Non-Department Elective - 1	2	0	2	3	2	4
8	IV	EEC	DP	ERA51802	Design Project – 2	0	0	2	1	6	2
9	IV	HS	PR	ETP51853	Personality Development and Soft skill Techniques	0	0	3	2	2	3
10	IV	MC	TH	*****	Mandatory Course- III is a Non-credit course (Student shall select one course from the list given under Mandatory Course III)	3	0	0	*	2	3
Total						19	1	15	24	23	35
L – Lecture T – Tutorial P – Practical C – Credit S – Self Study TCH – Total Contact Hours						* Non Credit Course					

SEMESTER - V

SL. NO	SEM	COURSE CATEGORY	COURSE TYPE	COURSE CODE	NAME OF THE COURSE	L	T	P	C	S	TCH				
1	V	HS	TP	ETP51852	Logical Reasoning and Verbal Ability	1	0	2	1	1	3				
2	V	PC	TP	ERA51008	Control System for Robots	3	0	2	4	2	5				
3	V	PC	TH	ERA51009	Robot Programming and Simulation	2	0	2	3	2	4				
4	V	PC	TH	ERA51010	AI in Robotics	2	0	2	3	2	4				
5	V	DE	TP	ERA515xx	Department Elective - 3	2	0	2	3	2	4				
6	V	NE	TP	Exx517xx	Non-Department Elective - 2	2	0	2	3	2	4				
7	V	EEC	DP	ERA51804	Design Project – 3	0	0	2	1	6	2				
8	V	ES	TH	EGE51004	Entrepreneurship	2	0	0	2	6	2				
9	V	HS	TP	ETP51855	Problem Solving using Quantitative Techniques	1	0	2	1	2	3				
10	V	EEC	IN	ERA51803	Internship -2 (to be evaluated in 5 th semester. To be carried out in summer after 4 th semester)	#			1	0	0				
Total						15	0	16	22	25	31				
L – Lecture						T – Tutorial		P – Practical		C – Credit		S – Self Study		TCH – Total Contact Hours	
* – Non Credit Course						# - 15 Days Minimum									

SEMESTER - VI

SL. NO	SEM	COURSE CATEGORY	COURSE TYPE	COURSE CODE	NAME OF THE COURSE	L	T	P	C	S	TCH				
1	VI	PC	TP	EMD51508	Robotic Operating System	3	0	2	4	2	5				
2	VI	PC	TP	ERA51011	Machine Vision and Perception	2	0	2	3	2	4				
3	VI	PC	TP	ERA51012	Augmented and Virtual Reality	2	0	2	3	2	4				
4	VI	DE	TP	ERA515xx	Department Elective - 4	2	0	2	3	2	4				
5	VI	NE	TP	Exx517xx	Non-Department Elective - 3	2	0	2	3	2	4				
6	VI	PC	TP	ERA51013	Internet of Robotic Things (RIoT) (Case Study / Field Study / Product study)	2	0	2	3	6	4				
7	VI	EEC	DP	ERA51805	Design Project – 4	0	0	2	1	6	2				
8	VI	MC	PR	ETP51854	Professional Skill and Ethics	0	0	3	*	2	3				
Total						13	0	17	20	24	30				
L – Lecture						T – Tutorial		P – Practical		C – Credit		S – Self Study		TCH – Total Contact Hours	

SEMESTER - VII

SL · NO	SEM	COURSE CATEGOR Y	COURS E TYPE	COURSE CODE	NAME OF THE COURSE	L	T	P	C	S	TC H
1	VII	HS	PR	GLS51006	English for Competitive Examinations	0	0	2	1	1	2
2	VII	PC	TP	ERA51014	Digital Manufacturing	2	1	2	4	2	5
3	VII	PC	TP	ERA51015	NLP for Human Robot Interaction	2	0	2	3	2	4
4	VII	PC	TP	ERA51016	Cyber Physical Systems	2	0	2	3	2	4
5	VII	DE	TP	ERA515xx	Department Elective - 5	2	0	2	3	2	4
6	VII	NE	TP	Exx517xx	Non-Department Elective - 4	2	0	2	3	2	4
7	VII	ES	TH	EGE51005	Research Methodology & IPR	2	0	0	2	2	2
8	VII	EEC	PJ	ERA51806	Project Phase 1	0	0	6	3	6	6
Total						12	1	18	22	19	31
L – Lecture T – Tutorial P – Practical C – Credit S – Self Study TCH – Total Contact Hours											
* Non Credit Course											

SEMESTER - VIII

SL · NO	SEM	COURSE CATEGOR Y	COURS E TYPE	COURSE CODE	NAME OF THE COURSE	L	T	P	C	S	TC H
1	VIII	EEC	PJ	ERA51807	Project Phase - 2	0	0	26	13	10	26
Total						0	0	26	13	10	26
L – Lecture T – Tutorial P – Practical C – Credit S – Self Study TCH – Total Contact Hours											

Mandatory Course-I

SL · NO	SEM	COURSE CATEGOR Y	COURS E TYPE	COURSE CODE	NAME OF THE COURSE	L	T	P	C	S	TC H
1	II	MC	TH	GGE51011	Introduction to Women and Gender Studies	3	0	0	Non credit Course	2	3
2	II	MC	TH	GGE51012	Public and Personal Administration	3	0	0	Non credit Course	2	3
3	II	MC	TH	GGE51013	Constitution of India	3	0	0	Non credit Course	2	3
4	II	MC	TH	EGE51006	Law for Engineers	3	0	0	Non credit Course	2	3
5	II	MC	TH	GGE51015	Indian Knowledge System (IKS)	3	0	0	Non credit Course	2	3
L – Lecture T – Tutorial P – Practical C – Credit S – Self Study TCH – Total Contact Hours											

Mandatory Course-II

SL · NO	SEM	COURSE CATEGOR Y	COURS E TYPE	COURSE CODE	NAME OF THE COURSE	L	T	P	C	S	TC H
1	III	MC	TH	GGE51021	Traditional Indian Systems of Medicine and Therapies	3	0	0	Non credit Course	2	3
2	III	MC	TH	GGE51022	History of Science and Technology in India	3	0	0	Non credit Course	2	3
3	III	MC	TH	GGE51023	Political and Economic Thought for a Humane Society	3	0	0	Non credit Course	2	3
4	III	MC	TH	GGE51024	State, Nation-Building and Politics in India	3	0	0	Non credit Course	2	3
5	III	MC	TH	GGE51025	Industrial Safety	3	0	0	Non credit Course	2	3
L – Lecture T – Tutorial P – Practical C – Credit S – Self Study TCH – Total Contact Hours											

Mandatory Course-III

SL . NO	SEM	COURSE CATEGORY	COURSE TYPE	COURSE CODE	NAME OF THE COURSE	L	T	P	C	S	TCH
1	IV	MC	TH	GGE51031	Principles of Management	3	0	0	Non credit Course	2	3
2	IV	MC	TH	GGE51032	Human Resource Management	3	0	0	Non credit Course	2	3
3	IV	MC	TH	GGE51033	Green Technology	3	0	0	Non credit Course	2	3
4	IV	MC	TH	GGE51034	Industrial Management	3	0	0	Non credit Course	2	3
5	IV	MC	TH	GGE51035	Fintech and Financing new Business	3	0	0	Non credit Course	2	3
L – Lecture T – Tutorial P – Practical C – Credit S – Self Study TCH – Total Contact Hours											

Mandatory Course-IV

SL . NO	SEM	COURSE CATEGORY	COURSE TYPE	COURSE CODE	NAME OF THE COURSE	L	T	P	C	S	TCH
1	IV	MC	PR	ETP51854	Professional Skill and Ethics	0	0	3	Non credit Course	2	3
L – Lecture T – Tutorial P – Practical C – Credit S – Self Study TCH – Total Contact Hours											

LIST OF DEPARTMENT ELECTIVES

DEPARTMENTAL ELECTIVE - 1

SL . NO	SEM	COURSE CATEGORY	COURSE TYPE	COURSE CODE	NAME OF THE COURSE	L	T	P	C	S	TCH
1	III	DE	TP	EMD51500	Mobile and Micro Robots ¹	2	0	2	3	2	4
2	III	DE	TP	EMD51501	Modern Manufacturing Systems ²	2	0	2	3	2	4
3	III	DE	TP	ERA51501	Cloud services for Robotics framework ³	2	0	2	3	2	4
L – Lecture T – Tutorial P – Practical C – Credit S – Self Study TCH – Total Contact Hours											
¹ Robotics, ² Automation, ³ Artificial Intelligence											

LIST OF DEPARTMENT ELECTIVES											
DEPARTMENTAL ELECTIVE - 2											
SL · NO	SEM	COURSE CATEGOR Y	COURSE TYPE	COURSE CODE	NAME OF THE COURSE	L	T	P	C	S	TC H
1	IV	DE	TP	ERA51502	Hydraulic and Pneumatic drives	2	0	2	3	2	4
2	IV	DE	TP	ERA51503	Micro Electro Mechanical Systems ²	2	0	2	3	2	4
3	IV	DE	TP	ERA51504	Data Analytics ³	2	0	2	3	2	4
L – Lecture T – Tutorial P – Practical C – Credit S – Self Study						TCH – Total Contact Hours					
¹ Robotics, ² Automation, ³ Artificial Intelligence											

LIST OF DEPARTMENT ELECTIVES											
DEPARTMENTAL ELECTIVE - 3											
SL · NO	SEM	COURSE CATEGOR Y	COURSE TYPE	COURSE CODE	NAME OF THE COURSE	L	T	P	C	S	TC H
1	V	DE	TP	ERA51505	Biomedical Robotics ¹	2	0	2	3	2	4
2	V	DE	TP	EMD5151 3	NDT and Condition Monitoring ²	2	0	2	3	2	4
3	V	DE	TP	ERA51506	Knowledge Engineering and Expert System ³	2	0	2	3	2	4
L – Lecture T – Tutorial P – Practical C – Credit S – Self Study						TCH – Total Contact Hours					
¹ Robotics, ² Automation, ³ Artificial Intelligence											

LIST OF DEPARTMENT ELECTIVES											
DEPARTMENTAL ELECTIVE - 4											
SL · NO	SEM	COURSE CATEGOR Y	COURSE TYPE	COURSE CODE	NAME OF THE COURSE	L	T	P	C	S	TC H
1	VI	DE	TP	EMD51516	Field and Aerial Robotics ¹	2	0	2	3	2	4
2	VI	DE	TP	EMD51509	Digital Signal Processing ²	2	0	2	3	2	4
3	VI	DE	TP	ERA51507	Transfer and Reinforced Learning ³	2	0	2	3	2	4
L – Lecture T – Tutorial P – Practical C – Credit S – Self Study						TCH – Total Contact Hours					
¹ Robotics, ² Automation, ³ Artificial Intelligence											

LIST OF DEPARTMENT ELECTIVES											
DEPARTMENTAL ELECTIVE - 5											
SL · N O	SE M	COURSE CATEGOR Y	COURSE TYPE	COURSE CODE	NAME OF THE COURSE	L	T	P	C	S	TC H
1	VII	DE	TP	ERA51508	Collaborative Robots ¹	2	0	2	3	2	4
2	VII	DE	TP	EMD51518	Factory Automation ²	2	0	2	3	2	4
3	VII	DE	TP	ERA51509	Deep Neural Network ³	2	0	2	3	2	4
L – Lecture T – Tutorial P – Practical C – Credit S – Self Study						TCH – Total Contact Hours					
¹ Robotics, ² Automation, ³ Artificial Intelligence											

S. No.	Course Category	Course Category	Credits
1	HS	Humanities & Social Science Courses	16
2	BS	Basic Science Courses	24
3	ES	Engineering Science Courses	19
4	PC	Programme Core Courses	57
5	DE	Department Elective Courses	15
6	NE	Non-Department Elective Courses	12
7	EEC	Employment Enhancement Courses	22
8	MC	Mandatory Courses	*
		TOTAL	165
9	HN	Honors Courses	12
10	MN	Minors Courses	9
* Non-Credit Course			

COURSE TYPE	
TP	Theory with Practical Course
TH	Theory Course
PR	Practical Course
DP	Design Project
PJ	Project Phase - 1 & Phase - 2
IN	Internship