HINDUSTAN
INSTITUTE OF TECHNOLOGY & SCIENCE
(DEEMED TO BE UNIVERSITY)

CURRICULUM R 2022 A
(in line with NEP 2020)

B. Tech. MECHATRONICS
(Duration: 4 Years)

(Applicable for Students admitted from Academic Year 2023-2024)

DEPARTMENT OF MECHATRONICS ENGINEERING

SCHOOL OF MECHANICAL SCIENCES

HINDUSTAN INSTITUTE OF TECHNOLOGY AND SCIENCE

HINDUSTAN INSTITUTE OF TECHNOLOGY & SCIENCE (DEEMED TO BE UNIVERSITY)

FRAMEWORK OF CURRICULUM 2022 (in line with NEP 2020)									
SEMESTER – I									
SL. NO	**COURSE CATEGORY**	**COURSE CODE**	**NAME OF THE COURSE**	**L**	**T**	**P**	**C**	**S**	**TCH**
1	BS	EMA51001	Matrices and Calculus	3	0	2	4	2	5
2	BS	**Any One Course to be Opted**		3	0	2	4	2	5
		EPH51001	Engineering Physics						
		ECT51001	Engineering Materials						
3	HS	**Any One Course to be Opted**		2	0	1	2	1	3
		GGGG1001	Communication Skills						
		GGGG1002	Personality Development and Soft Skills						
4	PC	**Any One Course to be Opted**		2	0	2	3	2	4
		ECS51009	Programming Fundamentals using C						
		ECS51010	Programming in Python						
		EME51001	Engineering Graphics and Computer Aided Design						
5	ES	EGE51002	Design Thinking	2	0	2	3	2	4
6	ES	**Any One Course to be Opted**		0	0	4	2	2	4
		EGE51406	Engineering Practices Lab						
		EGE51408	Fab Lab for Core Engineering						
7	HS	**Any One Course to be Opted (Outreach)**		0	0	2	1	4	2
		EGE51404	Outreach (NCC) – Level I#						
		EGE51405	Outreach (NSS, Y's Men, Rotaract) – Level I#	0	0	2	1	4	2
8	HS	**Any One Course to be Opted (Indian / foreign language)**		2	0	0	2	2	2
		GGGG1008	Tamil (Regional Language)						
		GGGG1009	Hindi (Regional Language)						
		GGGG1010	Telugu (Regional Language)						
		GGGG1011	French (Foreign Language)						
		GGGG1012	German (Foreign Language)						
		GGGG1013	Spanish (Foreign Language)						
		GGGG1014	Korean (Foreign Language)						
		GGGG1015	Mandarin (Foreign Language)						
		GGGG1016	Japanese (Foreign Language)						
		OR							
		EGE51001	Universal Human Values						
9	HS	ELS51006	Tamil Culture and Technology	1	0	0	1	2	1
			Total	**15**	**0**	**15**	**22**	**19**	**30**

SEMESTER – II									
SL. NO	**COURSE CATEGORY**	**COURSE CODE**	**NAME OF THE COURSE**	**L**	**T**	**P**	**C**	**S**	**TCH**
1	BS	EMA51002	Analytical Mathematics	3	0	2	4	2	5
2	BS	**Any One Course to be Opted**		3	0	2	4	2	5
		EPH51001	Engineering Physics						
		ECT51001	Engineering Materials						
3	HS	**Any One Course to be Opted**		2	0	1	2	1	3
		GGGG1001	Communication Skills						
		GGGG1002	Personality Development and Soft Skills						
4	PC	EMD51001	Mechatronic Systems Engineering	3	0	2	4	2	5
5	ES	**Any One Course to be Opted**		2	0	2	3	2	4
		ECS51009	Programming Fundamentals using C **OR**						
		ECS51010	Programming in Python						
		EME51001	Engineering Graphics and Computer Aided Design						
6	ES	**Any One Course to be Opted**		0	0	4	2	2	4
		EGE51406	Engineering Practices Lab						
		EGE51408	Fab Lab for Core Engineering						
7	HS	**Any One Course to be Opted**		0	0	2	1	4	2
		EGE51410	Outreach (NCC) – Level II#						
		EGE51411	Outreach (NSS, Y's Men, Rotaract) – Level II#						
8	HS	**Any One Course to be Opted (Indian / Foreign language)**		2	0	0	2	2	2
		GGGG1008	Tamil (Regional Language)						
		GGGG1009	Hindi (Regional Language)						
		GGGG1010	Telugu (Regional Language)						
		GGGG1011	French (Foreign Language)						
		GGGG1012	German (Foreign Language)						
		GGGG1013	Spanish (Foreign Language)						
		GGGG1014	Korean (Foreign Language)						
		GGGG1015	Mandarin (Foreign Language)						
		GGGG1016	Japanese (Foreign Language)						
		OR							
		EGE51001	Universal Human Values						
9	MC	EGE5101*	Mandatory Course I Mandatory Course I is a Non-credit course (Student shall select one course from the list given under Mandatory Course I)	3	0	0	0	2	3
			Total	**18**	**0**	**15**	**22**	**19**	**33**

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

FRAMEWORK OF CURRICULUM 2022 A (in line with NEP 2020)									
SEMESTER – III									
SL. NO	**COURSE CATEGORY**	**COURSE CODE**	**NAME OF THE COURSE**	**L**	**T**	**P**	**C**	**S**	**TCH**
1	BS	EMA51004	Applied Mathematics and Transforms	3	1	0	4	2	4
2	HS	GGGG1003	Advanced Academic Writing	1	0	1	1	1	2
3	PC	EMD51002	Embedded Systems for Mechatronics	2	0	2	3	2	4
4	PC	EMD51003	Applied Mechanics	3	0	2	4	2	5
5	PC	EMD51004	Manufacturing Technology	3	0	0	3	2	3
6	DE	EMD515**	Department Elective - 1	2	0	2	3	2	4
7	ES	EGE51003	Environmental Science and Sustainable Development	2	0	0	2	2	2
8	EEC	EMD51800	Design Project – 1	0	0	2	1	6	2
9	EEC	EMD51801	Internship -1 (To be carried out in summer after 2nd semester and evaluated in 3rd semester)	0	0	0	1	2	0
10	MC	EGE5102*	Mandatory Course II Mandatory Course II is a Non-credit course (Student shall select one course from the list given under Mandatory Course II)	3	0	0	0	2	3
		Total		**19**	**1**	**9**	**22**	**23**	**29**
SEMESTER – IV									
SL. NO	**COURSE CATEGORY**	**COURSE CODE**	**NAME OF THE COURSE**	**L**	**T**	**P**	**C**	**S**	**TCH**
1	BS	EMA51009	Statistics and Data Analytics	3	1	0	4	2	4
2	HS	GGGG1004	Professional Editing and Project Writing	1	0	1	1	1	2
3	PC	EMD51005	Solid and Fluid Mechanics	3	0	2	4	2	5
4	PC	EMD51006	Electrical Machines andDrives	2	0	2	3	2	4
5	PC	EMD51007	Fluid Power Automation **(Industry Collaborated Course)**	2	0	2	3	2	4
6	DE	EMD515**	Department Elective - 2	2	0	2	3	2	4
7	NE	E**517**	Non-Department Elective - 1	2	0	2	3	2	4
8	EEC	EMD51802	Design Project – 2	0	0	2	1	6	2
9	MC	EGE5103*	Mandatory Course III Mandatory Course III is a Non-credit course (Student shall select one course from the list given under Mandatory Course III)	3	0	0	0	2	3
		Total		**18**	**1**	**13**	**22**	**21**	**32**

FRAMEWORK OF CURRICULUM 2022 A (in line with NEP 2020)									
SEMESTER – V									
SL. NO	**COURSE CATEGORY**	**COURSE CODE**	**NAME OF THE COURSE**	**L**	**T**	**P**	**C**	**S**	**TCH**
1	HS	GGGG1005	Public Speaking	1	0	1	1	1	2
2	PC	EMD51008	Control Systems	3	0	2	4	2	5
3	PC	EMD51009	Industrial Automation	2	1	0	3	2	3
4	PC	EMD51010	Design of Mechanical Elements	2	1	0	3	2	3
5	DE	EMD515**	Department Elective - 3	2	0	2	3	2	4
6	NE	E**517**	Non-Department Elective - 2	2	0	2	3	2	4
7	EEC	EMD51804	Design Project – 3	0	0	2	1	6	2
8	ES	EGE51004	Entrepreneurship	2	0	0	2	6	2
9	EEC	EMD51803	Internship -2 (to be evaluated in 5th semester. To be carried out in summer after 4th semester))	0	0	0	1	2	0
Total				**14**	**2**	**9**	**21**	**25**	**25**
SEMESTER – VI									
SL. NO	**COURSE CATEGORY**	**COURSE CODE**	**NAME OF THE COURSE**	**L**	**T**	**P**	**C**	**S**	**TCH**
1	HS	GGGG1006	English for Competitive Examinations	1	0	1	1	1	2
2	PC	EMD51011	Motion Control	3	0	2	4	2	5
3	PC	EMD51012	Industrial Electronics	2	0	2	3	2	4
4	PC	EMD51013	CNC Engineering	2	0	2	3	2	4
5	DE	EMD515**	Department Elective - 4	2	0	2	3	2	4
6	NE	E**517**	Non-Department Elective - 3	2	0	2	3	2	4
7	PC	EMD51014	Industry 4.0	2	0	2	3	6	4
8	EEC	EMD51805	Design Project – 4	0	0	2	1	6	2
Total				**14**	**0**	**15**	**21**	**23**	**29**

FRAMEWORK OF CURRICULUM 2022 A (in line with NEP 2020)									
SEMESTER – VII									
SL. NO	**COURSE CATEGORY**	**COURSE CODE**	**NAME OF THE COURSE**	**L**	**T**	**P**	**C**	**S**	**TCH**
1	HS	GGGG1007	Verbal Reasoning and Interview Skills	1	0	1	1	1	2
2	PC	EMD51015	Principles of Robotics	2	1	2	4	2	5
3	PC	EMD51016	Artificial Intelligence for Mechatronics	2	0	2	3	2	4
4	PC	EMD51017	Design of Mechatronics System	2	0	2	3	2	4
5	DE	EMD515**	Department Elective - 5	2	0	2	3	2	4
6	NE	E**517**	Non-Department Elective - 4	2	0	2	3	2	4
7	ES	EGE51005	Research Methodology & IPR	2	0	0	2	2	2
8	EEC	EMD51806	Project Phase 1	0	0	6	3	6	6
Total				**13**	**1**	**17**	**22**	**19**	**31**
SEMESTER – VIII									
SL. NO	**COURSE CATEGORY**	**COURSE CODE**	**NAME OF THE COURSE**	**L**	**T**	**P**	**C**	**S**	**TCH**
1	EEC	EMD51807	Project Phase - 2	0	0	26	13	10	24
Total				**0**	**0**	**26**	13	**10**	**24**
Total Credits for the Program							**165**		

CREDIT COUNT

Semester	Credit Count
1	22
2	22
3	22
4	22
5	21
6	21
7	22
8	13
	165

MANDATORY COURSES I

S. No.	Course Code	Course Title	Periods Per week			Total Contact Periods	Credits
1	EGE51011	Introduction to Women and Gender Studies	3	0	0	3	Non Credit Course
2	EGE51012	Public and Personal Administration	3	0	0	3	Non Credit Course
3	EGE51013	Constitution of India	3	0	0	3	Non Credit Course
4	EGE51014	Law for Engineers	3	0	0	3	Non Credit Course
5	EGE51015	Indian Knowledge System (IKS)	3	0	0	3	Non Credit Course

MANDATORY COURSES II

S. No.	Course Code	Course Title	Periods Per week			Total Contact Periods	Credits
1	EGE51021	Traditional Indian Systems of Medicine and Therapies	3	0	0	3	Non Credit Course
2	EGE51022	History of Science and Technology in India	3	0	0	3	Non Credit Course
3	EGE51023	Political and Economic Thought for a Humane Society	3	0	0	3	Non Credit Course
4	EGE51024	State, Nation-Building and Politics in India	3	0	0	3	Non Credit Course
5	EGE51025	Industrial Safety	3	0	0	3	Non Credit Course

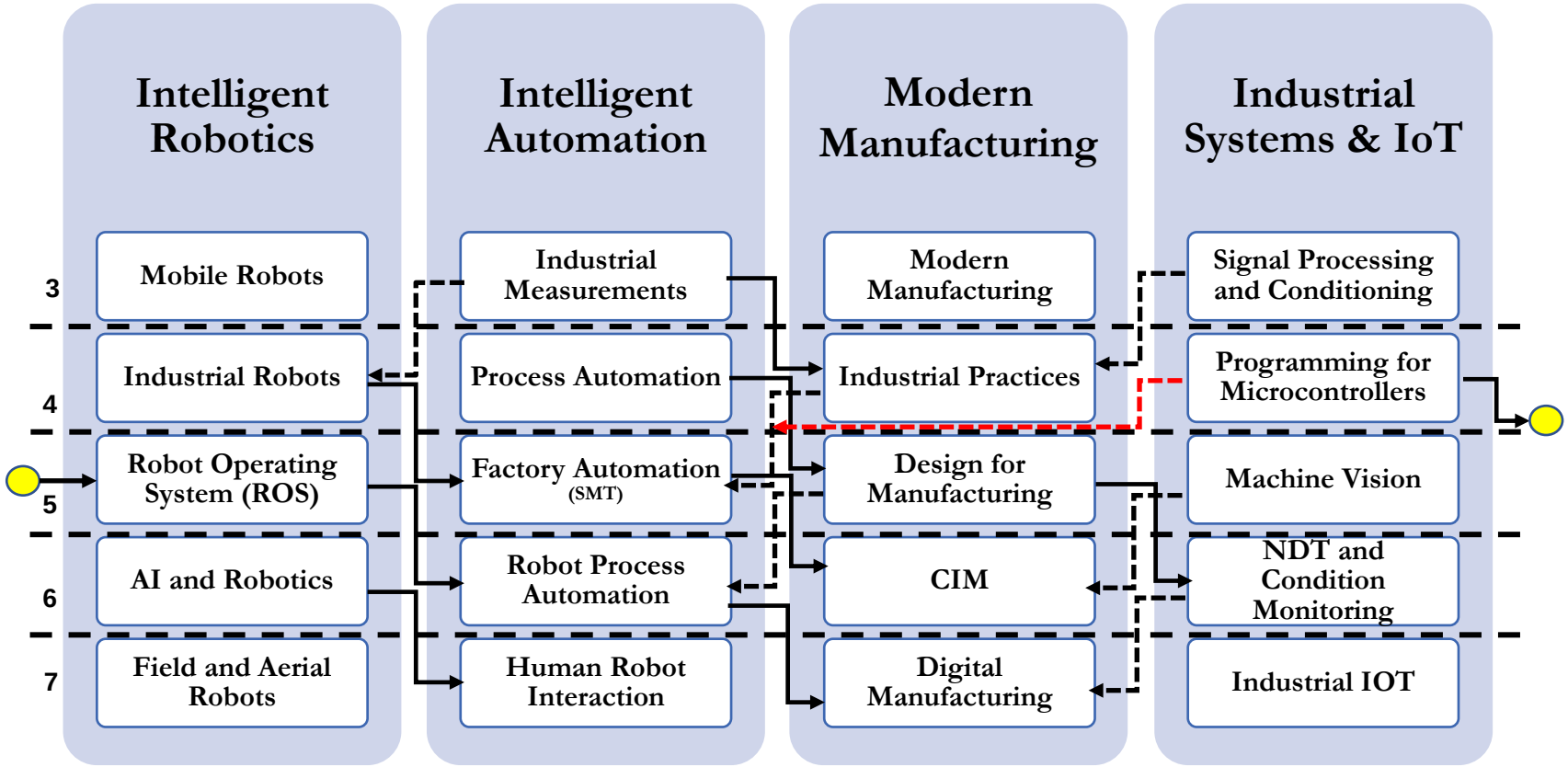
MANDATORY COURSES III

S. No.	Course Code	Course Title	Periods Per week			Total Contact Periods	Credits
1	EGE51031	Principles of Management	3	0	0	3	Non Credit Course
2	EGE51032	Human Resource Management	3	0	0	3	Non Credit Course
3	EGE51033	Green Technology	3	0	0	3	Non Credit Course
4	EGE51034	Industrial Management	3	0	0	3	Non Credit Course
5	EGE51035	Fintech and Financing new Business	3	0	0	3	Non Credit Course

COURSES OFFERED BY THE DEPARTMENT OF LANGUAGES

S. No.	Course Code	Course Title	Semester	Credit
1	GGGG1001	Communication Skills (Improving English communication skills.)	I / II	2
2	GGGG1002	Personality Development and Soft Skills (Enhancing the personality through English communication skills)	I / II	2
3	GGGG1003	Advanced Academic Writing (Developing essential writing skills for academic and professional settings)	III	1
4	GGGG1004	Professional Editing and Project Writing (Presenting the skills of creating professional documents and projects that are clear, concise, and effective)	IV	1
5	GGGG1005	Public Speaking (Providing instruction and experience in preparation and delivery of speeches within a public setting and group discussion)	V	1
6	GGGG1006	English for Competitive Examinations (Developing the necessary skills and knowledge to succeed in competitive exams)	VI	1
7	GGGG1007	Verbal Reasoning and Interview Skills (Enhancing the understanding of reasoning using concepts framed in words and equipping to succeed in interviews)	VII	1

DEPARTMENTAL ELECTIVES (DE) OFFERED UNDER FOUR VERTICALS



All Theory Integrated practical courses

LIST OF DEPARTMENTAL ELECTIVES									
Department Elective - 1									
SEM	**COURSE CATEGORY**	**COURSE CODE**	**NAME OF THE COURSE**	**L**	**T**	**P**	**C**	**S**	**TCH**
Specialization 1: INTELLIGENT ROBOTICS									
3	DE	EMD51500	Mobile Robots	2	0	2	3	2	4
Specialization 2: INTELLIGENT AUTOMATION									
3	DE	EMD51501	Industrial Measurements	2	0	2	3	2	4
Specialization 3: MODERN MANUFACTURING									
3	DE	EMD51502	Modern Manufacturing Systems	2	0	2	3	2	4
Specialization 4: INDUSTRIAL SYSTEMS & IOT									
3	DE	EMD51503	Sensor Signal Processing and Signal Conditioning	2	0	2	3	2	4
Department Elective - 2									
SEM	**COURSE CATEGORY**	**COURSE CODE**	**NAME OF THE COURSE**	**L**	**T**	**P**	**C**	**S**	**TCH**
Specialization 1: INTELLIGENT ROBOTICS									
4	DE	EMD51504	Industrial Robotics	2	0	2	3	2	4
Specialization 2: INTELLIGENT AUTOMATION									
4	DE	EMD51505	Process Automation	2	0	2	3	2	4
Specialization 3: MODERN MANUFACTURING									
4	DE	EMD51506	Industrial Practices	2	0	2	3	2	4
Specialization 4: INDUSTRIAL SYSTEMS & IOT									
4	DE	EMD51507	Programming for Microcontrollers	2	0	2	3	2	4
Department Elective - 3									
SEM	**COURSE CATEGORY**	**COURSE CODE**	**NAME OF THE COURSE**	**L**	**T**	**P**	**C**	**S**	**TCH**
Specialization 1: INTELLIGENT ROBOTICS									
5	DE	EMD51508	Robotic Operating System	2	0	2	3	2	4
Specialization 2: INTELLIGENT AUTOMATION									
5	DE	EMD51509	Factory Automation	2	0	2	3	2	4
Specialization 3: MODERN MANUFACTURING									
5	DE	EMD51510	Design for Manufacturing	2	0	2	3	2	4
Specialization 4: INDUSTRIAL SYSTEMS & IOT									
5	DE	EMD51511	Machine Vision	2	0	2	3	2	4
Department Elective - 4									
SEM	**COURSE CATEGORY**	**COURSE CODE**	**NAME OF THE COURSE**	**L**	**T**	**P**	**C**	**S**	**TCH**
Specialization 1: INTELLIGENT ROBOTICS									
6	DE	EMD51512	AI and Robotics	2	0	2	3	2	4
Specialization 2: INTELLIGENT AUTOMATION									
6	DE	EMD51513	NDT and Condition Monitoring	2	0	2	3	2	4
Specialization 3: MODERN MANUFACTURING									
6	DE	EMD51514	Computer Integrated Manufacturing	2	0	2	3	2	4
Specialization 4: INDUSTRIAL SYSTEMS & IOT									
6	DE	EMD51515	Robotic Process Automation	2	0	2	3	2	4

Department Elective - 5									
SEM	**COURSE CATEGORY**	**COURSE CODE**	**NAME OF THE COURSE**	**L**	**T**	**P**	**C**	**S**	**TCH**
Specialization 1: INTELLIGENT ROBOTICS									
7	DE	EMD51516	Field and Aerial Robotics	2	0	2	3	2	4
Specialization 2: INTELLIGENT AUTOMATION									
7	DE	EMD51517	Industrial IOT	2	0	2	3	2	4
Specialization 3: MODERN MANUFACTURING									
7	DE	EMD51518	Digital Manufacturing	2	0	2	3	2	4
Specialization 4: INDUSTRIAL SYSTEMS & IOT									
7	DE	EMD51519	Human Robot Interaction	2	0	2	3	2	4

LIST OF NON-DEPARTMENTAL ELECTIVES									
Non-Department Elective - 1									
SEM	**COURSE CATEGORY**	**COURSE CODE**	**NAME OF THE COURSE**	**L**	**T**	**P**	**C**	**S**	**TCH**
4	NE	EMD51700	Applications of AI in Robotics	2	0	2	3	2	4
4	NE	EMD51701	New Product Development	2	0	2	3	2	4
Non-Department Elective - 2									
SEM	**COURSE CATEGORY**	**COURSE CODE**	**NAME OF THE COURSE**	**L**	**T**	**P**	**C**	**S**	**TCH**
5	NE	EMD51702	Building of Mobile Robots	2	0	2	3	2	4
5	NE	EMD51703	Motion Control for Automation Industry	2	0	2	3	2	4
Non-Department Elective - 3									
SEM	**COURSE CATEGORY**	**COURSE CODE**	**NAME OF THE COURSE**	**L**	**T**	**P**	**C**	**S**	**TCH**
6	NE	EMD51704	Industry 4.0 for Engineers	2	0	2	3	2	4
6	NE	EMD51705	Virtual Reality	2	0	2	3	2	4
Non-Department Elective - 4									
SEM	**COURSE CATEGORY**	**COURSE CODE**	**NAME OF THE COURSE**	**L**	**T**	**P**	**C**	**S**	**TCH**
7	NE	EMD51706	Robotic Process Automation	2	0	2	3	2	4
7	NE	EMD51707	Mechatronic System Design	2	0	2	3	2	4