

Symbiosis Institute of Technology, Pune
Bachelor of Technology (Robotics and Automation)
Programme Structure 2021-25

1.	OBJECTIVE	To generate competent manpower in the emerging areas of Robotics and Automation To inculcate among the students an aptitude for engineering and research in Industry 4.0 for generation of better and smarter solutions to real world problems.				
2.	DURATION (IN MONTHS)	48 (Full Time)				
3.	INTAKE	60				
4.	RESERVATION	I. Within the sanctioned intake	a) SC (In Percentage)	b) ST (In Percentage)	c) Differently abled (In Percentage)	
			15	7.5	3	
		II. Over and above the sanctioned intake	a) Kashmiri Migrants (In Seats)		b) International Students (In Percentage)	
			2		15	
5.	ELIGIBILITY	Passed Standard XII (10+2) or equivalent examination with Physics and Mathematics as compulsory subjects along with one of the Chemistry/ Biotechnology/ Biology/ Technical Vocational subject/ Computer Science/ Information Technology/ Informatics Practices/ Agriculture/ Engineering Graphics/ Business Studies from any recognised Board with a minimum of 45% marks or equivalent grade (40% marks or equivalent grade for Scheduled Caste/ Scheduled Tribes).				
6.	SELECTION PROCEDURE	Selection would be based on joint merit of entrance exam score and PCM/PMV aggregate percentage				
7.	MEDIUM OF INSTRUCTION	English				
8.	PROGRAMME PATTERN	Semester				
9.	COURSE & SPECIALISATION	Annexure A: Bachelor of Technology (Robotics and Automation) Students may pursue optional 'Honours' OR 'Minor' specialization in one of the specialization areas by completing additional 20 credits in				

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		Semester: 5, 6 and 7 as specified in Annexure B for Honours and Annexure C for Minor in the respective specialization area. Annexure B: Optional 'Honours' specialization area 1. Aerial Robotics and Drone Technology Annexure C: Optional 'Minor' specialization area 1. Artificial Intelligence and Machine Learning (CSE) 2. Data Science (CSE) 3. Smart Cities and Urban Analytics (CE) 4. Computing(CSE) 5. Automobile Engineering with Hybrid and Autonomous Technology(ME)			
10.	FEE		Academic Fee p.a	Institute Deposit	Total
		Indian Students	260000	20000	280000
		International Students (USD equivalent to INR)	390000	20000	410000
Note: For additional optional Specialisation 'Honours' or 'Minor', an additional fees of Rs. 25000/- will be charged in the third year.					
11.	ASSESSMENT	All internal courses will have 100% component as internal evaluation at the institute level. All external courses will have 40% internal component and 60% component as external [University] examination. The internal and external will be separate heads of passing.			
12.	STANDARD OF PASSING	The assessment of the student for each examination is done, based on relative performance. Maximum Grade Point (GP) is 10 corresponding to O (Outstanding). For all courses, a student is required to pass both internal and external examination separately with a minimum Grade Point of 4 corresponding to Grade P. Students securing less than 40% absolute marks in each head of passing will be declared FAIL. The University awards a degree to the student who has achieved a minimum CGPA of 4 out of maximum of 10 CGPA for the programme.			
13.	AWARD OF DEGREE/ DIPLOMA/ CERTIFICATE	Bachelor of Technology (Robotics and Automation) OR Bachelor of Technology (Robotics and Automation) with Honors in Aerial Robotics and Drone Technology			

OR
Bachelor of Technology (Robotics and Automation) with Minor in Artificial Intelligence and Machine Learning / Data Science / Smart Cities and Urban Analytics/Computing/ Automobile Engineering with Hybrid and Autonomous Technology will be awarded at the end of semester VIII examination by taking into consideration the performance of all semester examinations after obtaining minimum 4.00 CGPA out of 10 CGPA

14. CLASSIFICATION OF CREDITS

Semester	Generic Core	Generic Elective	Specialisation Core	Specialisation Elective	Open Elective	Audit	Total
1	21	0	0	0	0	1*	21
2	20	0	0	0	0	1*	20
3	21	2	0	0	0	1*	23
4	23	1	0	0	0	0	24
5	19	3	0	0	3	0	25
6	16	4	0	0	3	0	23
7	12	8	0	0	0	0	20
8	14	0	0	0	0	0	14
Total	146	18	0	0	6	0	170
Optional Additional Courses (Honours)							
Total	0	0	20	0	0	0	20
Optional Additional Courses (Minor)							
Total	0	0	20/17	0/3	0	0	20
Grand Total							190

* Satisfactory completion of the non letter grade course 'Integrated Disaster Management', 'Fitness for Life' and 'Certificate in COVID-19 Care for the Community' is mandatory for the award of degree.

The revised programme structure supersedes the previously approved programme structure dated 17/10/2024 for the programme.

This Programme Structure is aligned with the norms laid down by the University and is approved by the Academic Council.
Hereafter changes (if any) which conform to the policy on "Curriculum Development and Review" would be permissible, subject to revision of the Programme Structure, following the specified processes.

Director - Academics

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Annexure A

Catalog Course Code	Course Code	Course Title	Nature	Specialisation/ Area/ Department	Teaching Scheme (Hours Per Week)			Examination Scheme (Marks)				Total Credits	Total
					L	T	La b	Practical		Theory			
								CA	ESE	CA	ESE		
Semester : 1													
Generic Core Courses													
TE7168	0701270101	Engineering Mathematics -I	BS		3	1	0	0	0	40	60	4	100
T7381	0701270102	Chemistry	BS		3	0	0	0	0	30	45	3	75
T7382	0701270103	Chemistry Lab	BS		0	0	2	10	15	0	0	1	25
T7540	0701270104	Basic Electrical and Electronics Engineering	ES		3	0	0	0	0	30	45	3	75
T7593	0701270105	Basic Electrical and Electronics Engineering Lab	ES		0	0	2	10	15	0	0	1	25
TE7624	0701270106	Engineering Graphics	ES		1	0	0	0	0	25	0	1	25
T7925	0701270107	Engineering Graphics Lab	ES		0	0	4	20	30	0	0	2	50
TE7286	0701270108	Programming and Problem Solving	ES		2	0	0	0	0	20	30	2	50
TE7287	0701270109	Programming and Problem Solving Lab	ES		0	0	2	10	15	0	0	1	25
T6732	0701270110	Critical Thinking	HS		1	0	0	0	0	25	0	1	25
TE7188	0701270111	Environmental Science	MC		2	0	0	0	0	20	30	2	50
TH4272	0701270112	Certificate in COVID-19 Care for the Community #			0	0	0	0	0	0	0	Non - Letter Grade	0
Total					15	1	10	50	75	190	210	21	525
Semester : 2													
Generic Core Courses													

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					L	T	La b	Practical		Theory			
								CA	ESE	CA	ESE		
TE7169	0701270201	Engineering Mathematics -II	BS		3	1	0	0	0	40	60	4	100
T7391	0701270202	Physics	BS		3	0	0	0	0	30	45	3	75
T7392	0701270203	Physics lab	BS		0	0	2	10	15	0	0	1	25
T7383	0701270204	Communication Skills	HS		2	0	0	0	0	20	30	2	50
T7384	0701270205	Communication skills lab	HS		0	0	2	10	15	0	0	1	25
T7414	0701270206	Engineering Mechanics	ES		3	0	0	0	0	30	45	3	75
T7658	0701270207	Workshop Practice	ES		0	0	4	20	30	0	0	2	50
TE7300	0701270208	Tinker Lab	ES		0	0	4	50	0	0	0	2	50
TE7396	0701270209	Software Tools	ES		0	0	2	25	0	0	0	1	25
T6873	0701270210	Creative Thinking	HS		1	0	0	0	0	25	0	1	25
TH4095	0701270211	Fitness for Life #			0	0	0	0	0	0	0	Non - Letter Grade	0
Total					12	1	14	115	60	145	180	20	500
Semester : 3													
Generic Core Courses													
TE7845	0701270301	Fundamentals of Robotics and Automation	PC		2	0	0	0	0	20	30	2	50
TE7688	0701270302	Statistics and Numerical Methods in Robotics	BS		3	0	0	0	0	30	45	3	75
TE7857	0701270303	Mechanics of Materials	ES		3	0	0	0	0	30	45	3	75

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					L	T	La b	Practical		Theory				
								CA	ESE	CA	ESE			
TE7858	0701270304	Mechanics of Materials Lab	ES		0	0	2	10	15	0	0	1	25	
TE7887	0701270305	Sensor and Electronics Drives	PC		3	0	0	0	0	30	45	3	75	
TE7888	0701270306	Sensor and Electronics Drives Lab	PC		0	0	2	10	15	0	0	1	25	
TE7851	0701270307	Introduction to Artificial Intelligence	PC		2	0	0	0	0	20	30	2	50	
TE7820	0701270308	Advanced Python Lab	ES		0	0	4	20	30	0	0	2	50	
TE7828	0701270309	Basics of Operating Systems	PC		3	0	0	0	0	75	0	3	75	
TE7829	0701270310	Basics of Operating Systems Lab	PC		0	0	2	10	15	0	0	1	25	
T4005	0701270311	Integrated Disaster Management *			0	0	0	0	0	0	0	Non - Letter Grade	0	
Total					16	0	10	50	75	205	195	21	525	
Generic Elective Course Group (Choose Any One Course)														
T6184	0701270312	Basic German I	GE		2	0	0	0	0	50	0	2	50	
T6186	0701270313	Basic French I	GE		2	0	0	0	0	50	0	2	50	
T6188	0701270314	Basic Spanish I	GE		2	0	0	0	0	50	0	2	50	
Total Required Credits									0	0	50	0	2	50
Semester : 4														
Generic Core Courses														

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					L	T	La b	Practical		Theory			
								CA	ESE	CA	ESE		
T8000	0701270401	Service Learning	HS		0	0	8	100	0	0	0	4	100
TE7879	0701270402	Robotic Control Systems	PC		2	0	0	0	0	20	30	2	50
TE7880	0701270403	Robotic Control Systems Lab	PC		0	0	4	20	30	0	0	2	50
TE7852	0701270404	Kinematics and Dynamics of Robotics	PC		3	0	0	0	0	75	0	3	75
TE7853	0701270405	Kinematics and Dynamics of Robotics Lab	PC		0	0	2	10	15	0	0	1	25
TE7824	0701270406	Application of AI in Robotics and Automation	PC		2	0	0	0	0	20	30	2	50
TE7825	0701270407	Application of AI in Robotics and Automation Lab	PC		0	0	2	10	15	0	0	1	25
TE7674	0701270408	Applied Mathematics for Robotics	BS		3	0	0	0	0	75	0	3	75
TE7846	0701270409	Hydraulics and Pneumatics for Robots	PC		3	0	0	0	0	30	45	3	75
TE7847	0701270410	Hydraulics and Pneumatics for Robots Lab	PC		0	0	2	10	15	0	0	1	25
T2646	0701270411	Entrepreneurship Venture	HS		1	0	0	0	0	25	0	1	25
Total					14	0	18	150	75	245	105	23	575
Generic Elective Course Group (Choose Any One Course)													
T6872	0701270412	Foundation of Ethics	GE		1	0	0	0	0	25	0	1	25
T6760	0701270413	Introduction to Indian Philosophy	GE		1	0	0	0	0	25	0	1	25
Total Required Credits								0	0	25	0	1	25
Semester : 5													

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					L	T	La b	Practical		Theory			
								CA	ESE	CA	ESE		
Generic Core Courses													
T6749	0701270501	Design Thinking	HS		2	0	0	0	0	50	0	2	50
TE7855	0701270502	Materials and Measurement	ES		3	0	0	0	0	30	45	3	75
TE7856	0701270503	Materials and Measurement Lab	ES		0	0	2	10	15	0	0	1	25
TE7889	0701270504	Simulator for Robotics Lab	PC		0	0	2	10	15	0	0	1	25
TE7818	0701270505	Advanced Manufacturing	PC		3	0	0	0	0	30	45	3	75
TE7819	0701270506	Advanced Manufacturing Lab	PC		0	0	2	10	15	0	0	1	25
TE7859	0701270507	Microcontroller and Embedded Systems	PC		2	0	0	0	0	20	30	2	50
TE7860	0701270508	Microcontroller and Embedded Systems Lab	PC		0	0	2	10	15	0	0	1	25
TE7836	0701270509	Computer Vision for Robotics	PC		3	0	0	0	0	30	45	3	75
TE7837	0701270510	Computer Vision for Robotics Lab	PC		0	0	4	20	30	0	0	2	50
Total					13	0	12	60	90	160	165	19	475
Generic Elective Courses Group (Choose Any One Course)													
TE7892	0701270511	Theory of Universal Robots and Cobots	PE		3	0	0	0	0	30	45	3	75
TE7844	0701270512	Fundamentals of IOT and Cloud Computing	PE		3	0	0	0	0	30	45	3	75
TE7867	0701270513	Optimization for Robotics	PE		3	0	0	0	0	30	45	3	75
TE7832	0701270514	Building Automation	PE		3	0	0	0	0	30	45	3	75
TE7841	0701270515	Digital Signals	PE		3	0	0	0	0	30	45	3	75

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					L	T	La b	Practical		Theory			
								CA	ESE	CA	ESE		
TE7835	0701270516	Computational Fluid Dynamics with Artificial Intelligence	PE		3	0	0	0	0	30	45	3	75
TE7874	0701270517	Probabilistic Robotics	PE		3	0	0	0	0	30	45	3	75
Total Required Credits								0	0	30	45	3	75
Open Elective Courses Group (Choose Any One Course)													
T7474	0701270518	Basics of Database	OE	Computer Science and Engineering	3	0	0	0	0	30	45	3	75
TE7756	0701270519	Open Source Technologies	OE	Computer Science and Engineering	3	0	0	0	0	30	45	3	75
T7529	0701270520	Machine Learning	OE	Computer Science and Engineering	3	0	0	0	0	30	45	3	75
T7616	0701270521	Fundamentals of Automotive Technology	OE	Mechanical Engineering	3	0	0	0	0	30	45	3	75
T7650	0701270522	Six sigma	OE	Mechanical Engineering	3	0	0	0	0	30	45	3	75
TE7700	0701270523	Smart Materials	OE	Applied Science	3	0	0	0	0	30	45	3	75
T7584	0701270524	Printed Circuit Board (PCB) Design	OE	Electronics & Tele-communication Engineering	3	0	0	0	0	30	45	3	75
TE7171	0701270525	Introduction to Mathematical Modelling	OE	Applied Science	3	0	0	0	0	30	45	3	75
TE7195	0701270526	GIS Applications	OE	Civil Engineering	3	0	0	0	0	30	45	3	75
TE7204	0701270527	Intelligent Transportation Systems	OE	Civil Engineering	3	0	0	0	0	30	45	3	75

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								CA	ESE	CA	ESE		
TE7338	0701270528	Principles of Modern Communication Systems	OE	Electronics & Tele-communication Engineering	3	0	0	0	0	30	45	3	75
TE7334	0701270529	Introduction to Mechatronics	OE	Electronics & Tele-communication Engineering	3	0	0	0	0	30	45	3	75
TE7264	0701270530	Introduction to BIGDATA	OE	Computer Science and Engineering	3	0	0	0	0	30	45	3	75
TE7376	0701270531	Introduction to Operations Research	OE	Mechanical Engineering	3	0	0	0	0	30	45	3	75
TE7377	0701270532	Introduction to Optimisation	OE	Mechanical Engineering	3	0	0	0	0	30	45	3	75
Total Required Credits								0	0	30	45	3	75
Semester : 6													
Generic Core Courses													
TE7290	0701270601	Project Based Learning -I	PIS		0	0	4	50	0	0	0	2	50
T7802	0701270602	Capstone Course	PC		2	0	0	0	0	50	0	2	50
T6774	0701270603	Principles of Economics	HS		2	0	0	0	0	50	0	2	50
TE7870	0701270604	PLC and SCADA	PC		2	0	0	0	0	20	30	2	50
TE7871	0701270605	PLC and SCADA Lab	PC		0	0	4	20	30	0	0	2	50
F7075	0701270606	Database Management and Warehousing	PC		2	0	0	0	0	50	0	2	50
TE7885	0701270607	Robotics Operating System	PC		2	0	0	0	0	20	30	2	50

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					L	T	La b	Practical		Theory			
								CA	ESE	CA	ESE		
TE7886	0701270608	Robotics Operating System Lab	PC		0	0	4	20	30	0	0	2	50
Total					10	0	12	90	60	190	60	16	400
Generic Elective Courses Group - I (Choose Any One Course)													
TE7862	0701270609	Mobile Application Development	PE		3	0	0	0	0	30	45	3	75
TE7848	0701270610	Industrial Internet of Things	PE		3	0	0	0	0	30	45	3	75
TE7868	0701270611	Path Planning and Reinforcement Learning	PE		3	0	0	0	0	30	45	3	75
TE7816	0701270612	Additive Manufacturing	PE		3	0	0	0	0	30	45	3	75
TE7842	0701270613	Embedded System and Wireless Sensor Network	PE		3	0	0	0	0	30	45	3	75
Total Required Credits								0	0	30	45	3	75
Generic Elective Courses Group - II (Choose Any One Course)													
TE7863	0701270614	Mobile Application Development Lab	PE		0	0	2	10	15	0	0	1	25
TE7849	0701270615	Industrial Internet of Things Lab	PE		0	0	2	10	15	0	0	1	25
TE7869	0701270616	Path Planning and Reinforcement Learning Lab	PE		0	0	2	10	15	0	0	1	25
TE7817	0701270617	Additive Manufacturing Lab	PE		0	0	2	10	15	0	0	1	25
TE7843	0701270618	Embedded System and Wireless Sensor Network Lab	PE		0	0	2	10	15	0	0	1	25

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					L	T	La b	Practical		Theory			
								CA	ESE	CA	ESE		
Total Required Credits								10	15	0	0	1	25
Open Elective Courses Group (Choose Any One Course)													
TE7388	0701270619	Quality Management Techniques	OE	Mechanical Engineering	3	0	0	0	0	30	45	3	75
TE7428	0701270620	Introduction to Image Processing	OE	Electronics & Tele-communication Engineering	3	0	0	0	0	30	45	3	75
TE7223	0701270621	Smart Urban Planning	OE	Civil Engineering	3	0	0	0	0	30	45	3	75
TE7240	0701270622	Water Resource Planning and Management	OE	Civil Engineering	3	0	0	0	0	30	45	3	75
TE7263	0701270623	Introduction to AI and Machine Learning	OE	Computer Science and Engineering	3	0	0	0	0	30	45	3	75
TE7265	0701270624	Introduction to Data Science	OE	Computer Science and Engineering	3	0	0	0	0	30	45	3	75
TE7319	0701270625	Electrical and Electronics Materials	OE	Mechanical Engineering	3	0	0	0	0	30	45	3	75
TE7335	0701270626	Introduction to Robotics	OE	Electronics & Tele-communication Engineering	3	0	0	0	0	30	45	3	75
T2618	0701270627	Project Management	OE	Mechanical Engineering	3	0	0	0	0	30	45	3	75
T7393	0701270628	Computer Based Statistical Packages	OE	Applied Science	3	0	0	0	0	30	45	3	75
T7499	0701270629	Java	OE	Computer Science and Engineering	3	0	0	0	0	30	45	3	75

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								CA	ESE	CA	ESE		
TEE7018	0701270630	Engineering Simulation and Modeling Tools	OE	Electronics & Tele-communication Engineering	3	0	0	0	0	30	45	3	75
TE7698	0701270631	Nanotechnology	OE	Applied Science	3	0	0	0	0	30	45	3	75
TE7339	0701270632	Renewable Energy Systems	OE	Electronics & Tele-communication Engineering	3	0	0	0	0	30	45	3	75
TE7351	0701270633	3D Printing and Prototyping	OE	Mechanical Engineering	3	0	0	0	0	30	45	3	75
Total Required Credits								0	0	30	45	3	75
Semester : 7													
Generic Core Courses													
T7804	0701270701	B.Tech Project	PIS		0	0	8	40	60	0	0	4	100
TE7877	0701270702	Robot System Design and Simulation	PC		3	0	0	0	0	30	45	3	75
TE7878	0701270703	Robot System Design and Simulation Lab	PC		0	0	4	20	30	0	0	2	50
F7091	0701270704	Data Visualization and Reporting Lab	PC		0	0	4	20	30	0	0	2	50
TE7876	0701270705	Responsible AI for Robotics	HS		1	0	0	0	0	25	0	1	25
Total					4	0	16	80	120	55	45	12	300
Generic Elective Courses - I (Choose Any One Course)													
TE7831	0701270706	Block Chain Technology For Robotics	PE		3	0	0	0	0	30	45	3	75

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					L	T	La b	Practical		Theory			
								CA	ESE	CA	ESE		
TE7875	0701270707	Reliability Engineering	PE		3	0	0	0	0	30	45	3	75
TE7854	0701270708	Lean Manufacturing	PE		3	0	0	0	0	30	45	3	75
TE7822	0701270709	Agile Development for Robotics Application	PE		3	0	0	0	0	30	45	3	75
TE7873	0701270710	Predictive Maintenance	PE		3	0	0	0	0	30	45	3	75
Total Required Credits								0	0	30	45	3	75
Generic Elective Courses - II (Choose Any One Course)													
TE7618	0701270711	Cyber Physical System	PE		3	0	0	0	0	30	45	3	75
TE7891	0701270712	Sustainable Development	PE		3	0	0	0	0	30	45	3	75
TE7827	0701270713	Augmented Reality and Virtual Reality Technology	PE		3	0	0	0	0	30	45	3	75
TE7861	0701270714	Mobile and Micro Robotics	PE		3	0	0	0	0	30	45	3	75
TE7623	0701270715	Theory of Innovative Design	PE		3	0	0	0	0	30	45	3	75
Total Required Credits								0	0	30	45	3	75
Generic Elective Courses Group - III (Choose Any One Course)													
T2585	0701270716	Organizational Behaviour	GE		2	0	0	0	0	50	0	2	50
TE7438	0701270717	History of Science and Technology	GE		2	0	0	0	0	50	0	2	50
Total Required Credits								0	0	50	0	2	50

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Annexure A

Catalog Course Code	Course Code	Course Title	Nature	Specialisation/ Area/ Department	Teaching Scheme (Hours Per Week)			Examination Scheme (Marks)				Total Credits	Total
								Practical		Theory			
					L	T	La b	CA	ESE	CA	ESE		
Semester : 8													
Generic Core Courses													
T7912	0701270801	Internship	PIS		0	0	24	120	180	0	0	12	300
T7802	0701270802	Seminar	PIS		0	0	4	20	30	0	0	2	50
Total					0	0	28	140	210	0	0	14	350

Abbreviations (Nature)

BS	Basic Sciences
ES	Engineering Sciences
HS	Humanities and Social Sciences
OE	Open Electives
PC	Professional Core
PE	Professional Elective
PIS	Project, Internship, Seminar
PD	Professional Development Course
MC	Mandatory Course
L	Lecture
T	Tutorial
CA	Continuous Assessment
ESE	End Semester Examination
GE	Generic Elective

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Semester	Internal Credits	External Credits	Total Credits	Total Marks
Semester 1	2	19	21	525
Semester 2	4	16	20	500
Semester 3	5	18	23	575
Semester 4	12	12	24	600
Semester 5	2	23	25	625
Semester 6	8	15	23	575
Semester 7	3	17	20	500
Semester 8	0	14	14	350
Total	36	134	170	4250

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Annexure B
Optional 'Honours' Specialization

Catalog Course Code	Course Code	Course Title	Nature	Specialisation/ Area/ Department	Teaching Scheme (Hours Per Week)			Examination Scheme (Marks)				Total Credits	Total
								Practical		Theory			
					L	T	La b	CA	ESE	CA	ESE		
Semester : 5													
Aerial Robotics and Drone Technology Specialisation Core Courses													
TE7850	0701270533	Introduction to Aerial Robotics and Drones	PC		3	0	0	0	0	30	45	3	75
TE7864	0701270534	Motion Planning and Control	PC		2	0	0	0	0	20	30	2	50
TE7865	0701270535	Motion Planning and Control lab	PC		0	0	2	10	15	0	0	1	25
Total					5	0	2	10	15	50	75	6	150
Semester : 6													
Aerial Robotics and Drone Technology Specialisation Core Courses													
TE7884	0701270634	Robotics Mobility and Perception	PC		3	0	0	0	0	30	45	3	75
TE7883	0701270635	Robotics Estimation and Learning	PC		2	0	0	0	0	20	30	2	50
TE7866	0701270636	Navigation and Communication Lab	PC		0	0	4	20	30	0	0	2	50
Total					5	0	4	20	30	50	75	7	175
Semester : 7													
Aerial Robotics and Drone Technology Specialisation Core Courses													
T7805	0701270718	Specialization Project	PIS		0	0	10	50	75	0	0	5	125
T7802	0701270719	Specialization Seminar	PIS		0	0	4	20	30	0	0	2	50

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Annexure B
Optional 'Honours' Specialization

Catalog Course Code	Course Code	Course Title	Nature	Specialisation/ Area/ Department	Teaching Scheme (Hours Per Week)			Examination Scheme (Marks)				Total Credits	Total
								Practical		Theory			
					L	T	La b	CA	ESE	CA	ESE		
Total					0	0	14	70	105	0	0	7	175

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Optional 'Honours' Specialization

Semester	Internal Credits	External Credits	Total Credits	Total Marks
Aerial Robotics and Drone Technology				
Semester 5	0	6	6	150
Semester 6	0	7	7	175
Semester 7	0	7	7	175
Total	0	20	20	500

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Annexure C
Optional 'Minor' Specialization

Catalog Course Code	Course Code	Course Title	Nature	Specialisation/ Area/ Department	Teaching Scheme (Hours Per Week)			Examination Scheme (Marks)				Total Credits	Total
					L	T	La b	Practical		Theory			
								CA	ESE	CA	ESE		
Semester : 5													
Artificial Intelligence and Machine Learning Specialisation Core Courses													
TE7273	0701270536	Machine Learning: Classification	PC		3	0	0	0	0	30	45	3	75
TE7274	0701270537	Machine Learning: Regression	PC		3	0	0	0	0	30	45	3	75
Total					6	0	0	0	0	60	90	6	150
Semester : 5													
Data Science Specialisation Core Courses													
TE7281	0701270538	Open Source Tools for Data Science	PC		4	0	0	0	0	40	60	4	100
TE7292	0701270539	R Programming	PC		3	0	0	0	0	30	45	3	75
Total					7	0	0	0	0	70	105	7	175
Semester : 5													
Smart Cities and Urban Analytics Specialisation Core Courses													
TE7220	0701270540	Smart Cities : Context Policy and Governance	PC		3	0	0	0	0	30	45	3	75
TE7206	0701270541	IOT for Smart Cities	PC		3	0	0	0	0	30	45	3	75
TE7207	0701270542	IOT for Smart Cities Lab	PC		0	0	2	10	15	0	0	1	25

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Annexure C
Optional 'Minor' Specialization

Catalog Course Code	Course Code	Course Title	Nature	Specialisation/ Area/ Department	Teaching Scheme (Hours Per Week)			Examination Scheme (Marks)				Total Credits	Total
								Practical		Theory			
					L	T	La b	CA	ESE	CA	ESE		
Total					6	0	2	10	15	60	90	7	175
Semester : 5													
Computing Specialisation Core Courses													
TE7248	0701270543	Cloud Computing	PC		3	0	0	0	0	30	45	3	75
TE7250	0701270544	Cloud Environment in Public Model	PC		3	0	0	0	0	30	45	3	75
Total					6	0	0	0	0	60	90	6	150
Semester : 5													
Automobile Engineering with Hybrid and Autonomous Technology Specialisation Core Courses													
TE7355	0701270545	Basics of Automotive Engineering	PC		3	0	0	0	0	30	45	3	75
TE7665	0701270546	Automotive Electronics and Instrumentation	PC		2	0	0	0	0	20	30	2	50
TE7666	0701270547	Automotive Vehicle Dynamics and NVH Lab	PC		0	0	2	10	15	0	0	1	25
Total					5	0	2	10	15	50	75	6	150
Semester : 6													
Artificial Intelligence and Machine Learning Specialisation Core Courses													
TE7266	0701270637	Introduction to Deep Learning	PC		4	0	0	0	0	40	60	4	100

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Catalog Course Code	Course Code	Course Title	Nature	Specialisation/ Area/ Department	Teaching Scheme (Hours Per Week)			Examination Scheme (Marks)				Total Credits	Total
								Practical		Theory			
					L	T	La b	CA	ESE	CA	ESE		
TE7271	0701270638	Machine Learning Clustering and Retrieval	PC		3	0	0	0	0	30	45	3	75
Total					7	0	0	0	0	70	105	7	175
Semester : 6													
Data Science													
Specialisation Core Courses													
TE7247	0701270639	Business Analytics	PC		3	0	0	0	0	30	45	3	75
TE7284	0701270640	Power BI	PC		3	0	0	0	0	30	45	3	75
Total					6	0	0	0	0	60	90	6	150
Semester : 6													
Smart Cities and Urban Analytics													
Specialisation Core Courses													
TE7177	0701270641	Application of Sensor Technology to Smart Cities	PC		3	0	0	0	0	30	45	3	75
T7802	0701270642	Specialization Project	PIS		0	0	4	50	0	0	0	2	50
T7802	0701270643	Specialization Seminar	PC		0	0	4	50	0	0	0	2	50
Total					3	0	8	100	0	30	45	7	175
Semester : 6													
Computing													
Specialisation Core Courses													

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Catalog Course Code	Course Code	Course Title	Nature	Specialisation/ Area/ Department	Teaching Scheme (Hours Per Week)			Examination Scheme (Marks)				Total Credits	Total
								Practical		Theory			
					L	T	La b	CA	ESE	CA	ESE		
TE7246	0701270644	Block Chain	PC		4	0	0	0	0	40	60	4	100
TE7249	0701270645	Cloud Computing Platforms	PC		3	0	0	0	0	30	45	3	75
Total					7	0	0	0	0	70	105	7	175
Semester : 6													
Automobile Engineering with Hybrid and Autonomous Technology													
Specialisation Core Courses													
TE7669	0701270646	Hybrid Technology	PC		2	0	0	0	0	20	30	2	50
F7079	0701270647	Self Driven Cars	PC		2	0	0	0	0	50	0	2	50
TE7435	0701270648	Automotive Engine and Transmission System	PC		3	0	0	0	0	30	45	3	75
Total					7	0	0	0	0	100	75	7	175
Semester : 7													
Artificial Intelligence and Machine Learning													
Specialisation Core Courses													
T7805	0701270718	Specialization Project	PIS		0	0	10	50	75	0	0	5	125
T7802	0701270719	Specialization Seminar	PIS		0	0	4	20	30	0	0	2	50
Total					0	0	14	70	105	0	0	7	175
Semester : 7													

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Catalog Course Code	Course Code	Course Title	Nature	Specialisation/ Area/ Department	Teaching Scheme (Hours Per Week)			Examination Scheme (Marks)				Total Credits	Total
								Practical		Theory			
					L	T	La b	CA	ESE	CA	ESE		
Data Science Specialisation Core Courses													
T7805	0701270718	Specialization Project	PIS		0	0	10	50	75	0	0	5	125
T7802	0701270719	Specialization Seminar	PIS		0	0	4	20	30	0	0	2	50
Total					0	0	14	70	105	0	0	7	175
Semester : 7													
Smart Cities and Urban Analytics Specialisation Core Courses													
T7803	0701270720	Specialization Project	PIS		0	0	6	30	45	0	0	3	75
Total					0	0	6	30	45	0	0	3	75
Specialization Elective : Smart Cities and Urban Analytics (Choose any one Course)													
TE7205	0701270721	Intelligent Transportation Systems	PE		3	0	0	0	0	30	45	3	75
TE7234	0701270722	Urban Hydrology and Hydraulics	PE		3	0	0	0	0	30	45	3	75
Total Required Credits								0	0	30	45	3	75
Semester : 7													
Computing Specialisation Core Courses													
T7805	0701270718	Specialization Project	PIS		0	0	10	50	75	0	0	5	125

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Catalog Course Code	Course Code	Course Title	Nature	Specialisation/ Area/ Department	Teaching Scheme (Hours Per Week)			Examination Scheme (Marks)				Total Credits	Total
								Practical		Theory			
					L	T	La b	CA	ESE	CA	ESE		
T7802	0701270719	Specialization Seminar	PIS		0	0	4	20	30	0	0	2	50
Total					0	0	14	70	105	0	0	7	175
Semester : 7													
Automobile Engineering with Hybrid and Autonomous Technology													
Specialisation Core Courses													
T7805	0701270718	Specialization Project	PIS		0	0	10	50	75	0	0	5	125
T7802	0701270719	Specialization Seminar	PIS		0	0	4	20	30	0	0	2	50
Total					0	0	14	70	105	0	0	7	175

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Semester	Internal Credits	External Credits	Total Credits	Total Marks
Artificial Intelligence and Machine Learning				
Semester 5	0	6	6	150
Semester 6	0	7	7	175
Semester 7	0	7	7	175
Total	0	20	20	500
Data Science				
Semester 5	0	7	7	175
Semester 6	0	6	6	150
Semester 7	0	7	7	175
Total	0	20	20	500
Smart Cities and Urban Analytics				
Semester 5	0	7	7	175
Semester 6	4	3	7	175
Semester 7	0	6	6	150
Total	4	16	20	500
Computing				
Semester 5	0	6	6	150
Semester 6	0	7	7	175
Semester 7	0	7	7	175
Total	0	20	20	500
Automobile Engineering with Hybrid and Autonomous Technology				
Semester 5	0	6	6	150
Semester 6	2	5	7	175

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Semester 7	0	7	7	175
Total	2	18	20	500