



Celebrating 50 Years of Excellence

Symbiosis Institute of Technology, Pune
Bachelor of Technology (Mechanical Engineering)
Programme Structure 2020-24

1. OBJECTIVE	<p>B.Tech is a full-time four year graduation programme, which aims at transforming a student into a technically sound professional. The syllabus contains courses on basic sciences, technical arts, humanities & liberal arts and professional courses. The mix of these courses has been evolved with an aim to produce professionals who have knowledge not only of Engineering but who are good managers to contribute in a cross-functional team and have human values.</p> <p>Being a professional programme it ensures a healthy balance between theoretical foundation and practical exposure to the present day world.</p> <p>The emphasis is to develop all round personality that would enable the students to take up the challenges of the corporate world and also become responsible citizens of the society.</p>			
2. DURATION (IN MONTHS)	48 (Full Time)			
3. INTAKE	120			
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	<p>Passed 10+2 examination with Physics and Mathematics as compulsory subjects along with one of Chemistry/ Biotechnology/ Biology/ Technical Vocational subjects. Obtained at least 45% marks or equivalent grade (40% marks or equivalent grade for Scheduled Caste /Scheduled Tribes) in the above subjects taken together.</p> <p>B. Tech (Lateral entry to second year) :</p> <p>a) Passed Diploma examination from an AICTE approved Institution; with at least 45% marks or equivalent grade (40% marks or equivalent grade for Scheduled Caste /Scheduled Tribes) in appropriate branch of Engineering / Technology.</p>			





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		<p>b) Passed B.Sc. Degree from a recognized University as defined by UGC, with at least 45% marks or equivalent grade (40% marks or equivalent grade for Scheduled Caste /Scheduled Tribes) and passed XII standard with mathematics as a subject.</p> <p>c) Provided that in case of students belonging to B. Sc. Stream, shall clear the subjects of Engineering Graphics / Engineering Drawing and Engineering Mechanics of the first year Engineering program along with the second year subjects.</p> <p>d) Provided further that, the students belonging to B. Sc. Stream shall be considered only after filling the supernumerary seats in this category with students belonging to the Diploma stream.</p> <p>e) Provided further that students, who have passed Diploma in Engineering and Technology from an AICTE approved Institution or B. Sc. Degree from a recognized University as defined by UGC, shall also be eligible for admission to the first year Engineering Degree courses subject to vacancies in the first year class in case the vacancies at lateral entry are exhausted. However the admissions shall be based strictly on the eligibility criteria as mentioned in a, b, c, and d above.</p>
6.	SELECTION PROCEDURE	Merit list by a valid score of Symbiosis Entrance Test (SIT EEE) or Joint Entrance Examination (JEE - Mains) or All States Engineering Entrance Test.
7.	MEDIUM OF INSTRUCTION	English
8.	PROGRAMME PATTERN	Semester
9.	COURSE & SPECIALIZATION	<p>Annexure A: Bachelor of Technology (Mechanical Engineering)</p> <p>Students may pursue optional 'Honours' OR 'Minor' specialization in one of the specialization areas by completing additional 20 credits in Semester: 5, 6 and 7 as specified in Annexure B for Honours and Annexure C for Minor in the respective specialization area.</p> <p>Annexure B: Optional 'Honours' specialization area</p> <ol style="list-style-type: none"> 1. Automobile Engineering with Hybrid and Autonomous Technology 2. CAD/CAM 3. Design of Heat Exchanger 4. Smart Manufacturing (Industry 4.0) <p>Annexure C: Optional 'Minor' specialization area</p> <ol style="list-style-type: none"> 1. Artificial Intelligence and Machine Learning (CSE) 2. Data Science (CSE)





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		3. Internet of Things (CSE) 4. Smart Cities and Urban Analytics (CE) 5. Embedded Systems (E&TC)			
10.	FEE		Academic Fee p.a	Institute Deposit	Total
		Indian Students	260000	20000	280000
		International Students (USD equivalent to INR)	390000	20000	410000
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 (Mechanical Engineering) OR Bachelor of Technology (Mechanical Engineering) with Honours in Automobile Engineering with Hybrid and Autonomous Technology/ CAD/CAM / Design of Heat Exchanger/Smart Manufacturing (Industry 4.0) . OR Bachelor of Technology (Mechanical Engineering) with Minor in Artificial Intelligence and Machine Learning /Data Science / Internet of Things / Smart Cities and Urban Analytics / Embedded Systems 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	Specialization Core	Specialization Elective	Open Elective	Audit	Total
1	20	0	0	0	0	0	20
2	19	1	0	0	0	0	20
3	21	2	0	0	0	3*	23
4	24	0	0	0	0	0	24
5	17	7	0	0	0	0	24
6	12	7	0	0	6	0	25
7	12	6	0	0	2	0	20
8	14	0	0	0	0	0	14
Total	139	23	0	0	8	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' Certificate in COVID-19 Care for the Community' is mandatory for the award of degree.

Note: For additional specializations (optional) as applicable, fees of Rs.25000/- will be charged, additionally in the third year

The revised programme structure supersedes the previously approved programme structure dated 15/02/2023 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	Specialization/ 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	0701250101	Engineering Mathematics -I	BS		3	1	0	0	0	40	60	4	100
T7381	0701250102	Chemistry	BS		3	0	0	0	0	30	45	3	75
T7382	0701250103	Chemistry Lab	BS		0	0	2	10	15	0	0	1	25
T7540	0701250104	Basic Electrical and Electronics Engineering	ES		3	0	0	0	0	30	45	3	75
T7593	0701250105	Basic Electrical and Electronics Engineering Lab	ES		0	0	2	10	15	0	0	1	25
T7925	0701250106	Engineering Graphics Lab	ES		0	0	4	20	30	0	0	2	50
TE7286	0701250107	Programming and Problem Solving	ES		2	0	0	0	0	20	30	2	50
TE7287	0701250108	Programming and Problem Solving Lab	ES		0	0	2	10	15	0	0	1	25
T6732	0701250109	Critical Thinking	HS		1	0	0	0	0	25	0	1	25
TE7188	0701250110	Environmental Science	MC		2	0	0	0	0	20	30	2	50
Total					14	1	10	50	75	165	210	20	500
Semester : 2													
Generic Core Courses													
TE7169	0701250201	Engineering Mathematics -II	BS		3	1	0	0	0	40	60	4	100
T7391	0701250202	Physics	BS		3	0	0	0	0	30	45	3	75
T7392	0701250203	Physics lab	BS		0	0	2	10	15	0	0	1	25



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					L	T	La b	Practical		Theory			
								CA	ESE	CA	ESE		
T7383	0701250204	Communication Skills	HS		2	0	0	0	0	20	30	2	50
T7384	0701250205	Communication skills lab	HS		0	0	2	10	15	0	0	1	25
T7414	0701250206	Engineering Mechanics	ES		3	0	0	0	0	30	45	3	75
T7658	0701250207	Workshop Practice	ES		0	0	4	20	30	0	0	2	50
T2646	0701250208	Entrepreneurship Venture	HS		1	0	0	0	0	25	0	1	25
TE7396	0701250209	Software Tools	ES		0	0	2	25	0	0	0	1	25
T6773	0701250210	Creative Thinking	HS		1	0	0	0	0	25	0	1	25
Total					13	1	10	65	60	170	180	19	475
Open Elective Courses Group													
T6761	0701250211	Foundation of Ethics	OE		1	0	0	0	0	25	0	1	25
T6760	0701250212	Introduction to Indian Philosophy	OE		1	0	0	0	0	25	0	1	25
Total Required Credits								0	0	25	0	1	25
Semester : 3													
Generic Core Courses													
TE7170	0701250301	Engineering Mathematics-III	BS		2	1	0	0	0	30	45	3	75
TE7390	0701250302	Strength of Materials	PC		3	0	0	0	0	30	45	3	75
T7652	0701250303	Strength of Materials Lab	PC		0	0	2	10	15	0	0	1	25
TE7367	0701250304	Engineering Materials and Metallurgy	PC		3	0	0	0	0	30	45	3	75
T7635	0701250305	Measurement and Metrology	PC		3	0	0	0	0	75	0	3	75



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					L	T	La b	Practical		Theory				
								CA	ESE	CA	ESE			
T7636	0701250306	Measurement and Metrology Lab	PC		0	0	2	10	15	0	0	1	25	
TE7368	0701250307	Engineering Thermodynamics	PC		2	0	0	0	0	20	30	2	50	
T7940	0701250308	Engineering Thermodynamics Lab	PC		0	0	2	10	15	0	0	1	25	
TE7370	0701250309	Fluid Mechanics	PC		3	0	0	0	0	75	0	3	75	
T7615	0701250310	Fluid Mechanics Lab	PC		0	0	2	10	15	0	0	1	25	
T4005	0701250311	Integrated Disaster Management *			0	0	0	0	0	0	0	Non - Letter Grade	0	
TH4095	0701250312	Fitness for Life *			0	0	0	0	0	0	0	Non - Letter Grade	0	
TH4272	0701250316	Certificate in COVID-19 Care for the Community *			0	0	0	0	0	0	0	Non - Letter Grade	0	
Total					16	1	8	40	60	260	165	21	525	
Generic Elective Courses Group - I														
T6184	0701250313	Basic German I	GE		2	0	0	0	0	50	0	2	50	
T6186	0701250314	Basic French I	GE		2	0	0	0	0	50	0	2	50	
T6188	0701250315	Basic Spanish I	GE		2	0	0	0	0	50	0	2	50	
Total Required Credits									0	0	50	0	2	50





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					L	T	La b	Practical		Theory			
								CA	ESE	CA	ESE		
Semester : 4													
Generic Core Courses													
T8000	0701250401	Service Learning	HS		0	0	8	100	0	0	0	4	100
TE7691	0701250402	Statistics, Probability and Numerical Methods	BS		3	0	0	0	0	30	45	3	75
TE7692	0701250403	Statistics, Probability and Numerical Methods Lab	BS		0	0	2	10	15	0	0	1	25
T7632	0701250404	Manufacturing Technology	PC		3	0	0	0	0	30	45	3	75
T7633	0701250405	Manufacturing Technology Lab	PC		0	0	2	10	15	0	0	1	25
TE7372	0701250406	Heat Transfer	PC		3	0	0	0	0	30	45	3	75
T7619	0701250407	Heat Transfer Lab	PC		0	0	2	10	15	0	0	1	25
T7700	0701250408	Theory of Machines - I	PC		3	0	0	0	0	75	0	3	75
T7656	0701250409	Theory of Machines-I Lab	PC		0	0	2	10	15	0	0	1	25
F7019	0701250410	Internet of Things	PC		2	0	0	0	0	50	0	2	50
TE7300	0701250411	Tinker Lab	ES		0	0	4	50	0	0	0	2	50
Total					14	0	20	190	60	215	135	24	600
Semester : 5													
Generic Core Courses													
T7620	0701250501	I.C. Engines	PC		3	0	0	0	0	30	45	3	75
T7621	0701250502	I.C. Engines Lab	PC		0	0	2	10	15	0	0	1	25



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					L	T	La b	Practical		Theory			
								CA	ESE	CA	ESE		
T7625	0701250503	Machine Design - I	PC		3	0	0	0	0	75	0	3	75
F7028	0701250504	Mechatronics and Automation	PC		3	0	0	0	0	75	0	3	75
F7029	0701250505	Technology, Society and Human Values	PC		3	0	0	0	0	75	0	3	75
TE7290	0701250506	Project Based Learning -I	PIS		0	0	4	50	0	0	0	2	50
T6749	0701250507	Design Thinking	HS		2	0	0	0	0	50	0	2	50
Total					14	0	6	60	15	305	45	17	425
Generic Elective Courses Group - I													
T7612	0701250508	Fluid Machinery	PE		3	0	0	0	0	30	45	3	75
T7647	0701250509	Production Management	PE		3	0	0	0	0	30	45	3	75
T7653	0701250510	Theory of Machines - II	PE		3	0	0	0	0	30	45	3	75
Total Required Credits								0	0	30	45	3	75
Generic Elective Courses Group - II													
T7613	0701250511	Fluid Machinery Lab	PE		0	0	2	10	15	0	0	1	25
TE7386	0701250512	Production Management Lab	PE		0	0	2	10	15	0	0	1	25
T7654	0701250513	Theory of Machines - II Lab	PE		0	0	2	10	15	0	0	1	25
Total Required Credits								10	15	0	0	1	25
Generic Elective Courses Group - III													
TE7359	0701250514	Composite Materials	PE		3	0	0	0	0	30	45	3	75
TE7366	0701250515	Engineering Design Optimization	PE		3	0	0	0	0	30	45	3	75



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					L	T	La b	Practical		Theory			
								CA	ESE	CA	ESE		
TE7373	0701250516	Industrial Fluid Power	PE		3	0	0	0	0	30	45	3	75
Total Required Credits								0	0	30	45	3	75
Semester : 6													
Generic Core Courses													
TE7357	0701250601	CAD & CAM	PC		3	0	0	0	0	30	45	3	75
TE7637	0701250602	Additive manufacturing	PC		2	0	0	0	0	50	0	2	50
TE7291	0701250603	Project Based Learning-II	PIS		0	0	4	50	0	0	0	2	50
T7802	0701250604	Capstone Course	PC		2	0	0	0	0	50	0	2	50
T6774	0701250605	Principles of Economics	HS		2	0	0	0	0	50	0	2	50
T7607	0701250606	CAD& CAM Lab	PC		0	0	2	10	15	0	0	1	25
Total					9	0	6	60	15	180	45	12	300
Generic Elective Courses Group - I													
TE7360	0701250607	Computational Fluid Dynamics	PE		3	0	0	0	0	30	45	3	75
TE7369	0701250608	Finite Element Methods	PE		3	0	0	0	0	30	45	3	75
TE7378	0701250609	Jigs and Fixtures	PE		3	0	0	0	0	30	45	3	75
Total Required Credits								0	0	30	45	3	75
Generic Elective Courses Group - II													
T7686	0701250610	Computational Fluid Dynamic Lab	PE		0	0	2	10	15	0	0	1	25
T7611	0701250611	Finite Element Methods Lab	PE		0	0	2	10	15	0	0	1	25



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								CA	ESE	CA	ESE		
TE7063	0701250612	Jigs and Fixtures Lab	PE		0	0	2	10	15	0	0	1	25
Total Required Credits								10	15	0	0	1	25
Generic Elective Courses Group- III													
T7644	0701250613	Operations Research	PE		3	0	0	0	0	30	45	3	75
TE7379	0701250614	Machine Design II	PE		3	0	0	0	0	30	45	3	75
TE7385	0701250615	Power Plant Engineering	PE		3	0	0	0	0	30	45	3	75
Total Required Credits								0	0	30	45	3	75
Open Elective Courses Group - I													
TE7388	0701250616	Quality Management Techniques	OE		3	0	0	0	0	30	45	3	75
TE7428	0701250617	Introduction to Image Processing	OE		3	0	0	0	0	30	45	3	75
TE7223	0701250618	Smart Urban Planning	OE		3	0	0	0	0	30	45	3	75
TE7240	0701250619	Water Resource Planning and Management	OE		3	0	0	0	0	30	45	3	75
TE7263	0701250620	Introduction to AI and Machine Learning	OE		3	0	0	0	0	30	45	3	75
TE7265	0701250621	Introduction to Data Science	OE		3	0	0	0	0	30	45	3	75
TE7319	0701250622	Electrical and Electronics Materials	OE		3	0	0	0	0	30	45	3	75
TE7335	0701250623	Introduction to Robotics	OE		3	0	0	0	0	30	45	3	75
TE7387	0701250624	Project Management	OE		3	0	0	0	0	30	45	3	75
T7393	0701250625	Computer Based Statistical Packages	OE		3	0	0	0	0	30	45	3	75
T7499	0701250626	Java	OE		3	0	0	0	0	30	45	3	75



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					L	T	La b	Practical		Theory			
								CA	ESE	CA	ESE		
TEE7018	0701250627	Engineering Simulation and Modeling Tools	OE		3	0	0	0	0	30	45	3	75
TE7698	0701250628	Nanotechnology	OE		3	0	0	0	0	30	45	3	75
TE7339	0701250629	Renewable Energy Systems	OE		3	0	0	0	0	30	45	3	75
TE7351	0701250630	3D Printing and Prototyping	OE		3	0	0	0	0	30	45	3	75
Total Required Credits								0	0	30	45	3	75
Open Elective Courses Group - II													
T7474	0701250631	Basics of Database	OE		3	0	0	0	0	30	45	3	75
TE7756	0701250632	Open Source Technologies	OE		3	0	0	0	0	30	45	3	75
T7529	0701250633	Machine Learning	OE		3	0	0	0	0	30	45	3	75
T7616	0701250634	Fundamentals of Automotive Technology	OE		3	0	0	0	0	30	45	3	75
T7650	0701250635	Six sigma	OE		3	0	0	0	0	30	45	3	75
TE7700	0701250636	Smart Materials	OE		3	0	0	0	0	30	45	3	75
T7584	0701250637	Printed Circuit Board (PCB) Design	OE		3	0	0	0	0	30	45	3	75
TE7171	0701250638	Introduction to Mathematical Modelling	OE		3	0	0	0	0	30	45	3	75
TE7195	0701250639	GIS Applications	OE		3	0	0	0	0	30	45	3	75
TE7203	0701250640	Intelligent Transportation Management	OE		3	0	0	0	0	30	45	3	75
TE7338	0701250641	Principles of Modern Communication Systems	OE		3	0	0	0	0	30	45	3	75
TE7334	0701250642	Introduction to Mechatronics	OE		3	0	0	0	0	30	45	3	75



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								CA	ESE	CA	ESE		
TE7264	0701250643	Introduction to BIGDATA	OE		3	0	0	0	0	30	45	3	75
TE7376	0701250644	Introduction to Operations Research	OE		3	0	0	0	0	30	45	3	75
TE7377	0701250645	Introduction to Optimisation	OE		3	0	0	0	0	30	45	3	75
Total Required Credits								0	0	30	45	3	75
GIP													
G7002	0701250669	Global Immersion Programme			0	0	0	0	0	0	50	2	50
Note: For students under Global Immersion Programme (0701250669), course "Principles of Economics" (0701250605) will be waived off.													
Semester : 7													
Generic Core Courses													
T7804	0701250701	B.Tech Project	PIS		0	0	8	40	60	0	0	4	100
TE7081	0701250702	Refrigeration and Airconditioning	PC		3	0	0	0	0	30	45	3	75
T7674	0701250703	Cyber Security	ES		2	0	0	0	0	50	0	2	50
F7042	0701250704	Fundamentals of Artificial Intelligence for Mechanical Engineers	PC		2	0	0	0	0	50	0	2	50
T7649	0701250705	Refrigeration & Airconditioning Lab	PC		0	0	2	10	15	0	0	1	25
Total					7	0	10	50	75	130	45	12	300
Generic Elective Courses Group - I													
T7639	0701250706	Mechanical Vibration	PE		3	0	0	0	0	30	45	3	75



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					L	T	La b	Practical		Theory			
								CA	ESE	CA	ESE		
T7602	0701250707	Automobile Engineering	PE		3	0	0	0	0	30	45	3	75
TE7393	0701250708	Tool Engineering	PE		3	0	0	0	0	30	45	3	75
Total Required Credits								0	0	30	45	3	75
Generic Elective Courses Group-II													
TE7383	0701250709	Nature Inspired Optimization Techniques	PE		3	0	0	0	0	30	45	3	75
T7642	0701250710	Non Conventional Energy Sources	PE		3	0	0	0	0	30	45	3	75
T7676	0701250711	Total Quality Management	PE		3	0	0	0	0	30	45	3	75
Total Required Credits								0	0	30	45	3	75
Open Elective Courses Group													
T2585	0701250712	Organizational Behaviour	OE		2	0	0	0	0	50	0	2	50
TE7438	0701250713	History of Science and Technology	OE		2	0	0	0	0	50	0	2	50
Total Required Credits								0	0	50	0	2	50
Semester : 8													
Generic Core Courses													
T7912	0701250801	Internship	PIS		0	0	24	120	180	0	0	12	300
T7802	0701250802	Seminar	PIS		0	0	4	20	30	0	0	2	50
Total					0	0	28	140	210	0	0	14	350



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Annexure A

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	1	19	20	500
Semester 2	4	16	20	500
Semester 3	8	15	23	575
Semester 4	11	13	24	600
Semester 5	13	11	24	600
Semester 6	8	17	25	625
Semester 7	6	14	20	500
Semester 8	0	14	14	350
Total	51	119	170	4250

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Annexure B
Optional 'Honours' Specialization

Catalog Course Code	Course Code	Course Title	Nature	Specialization/ 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													
Automobile Engineering with Hybrid and Autonomous Technology													
Specialization Core Courses													
TE7355	0701250517	Basics of Automotive Engineering	PC		3	0	0	0	0	30	45	3	75
TE7665	0701250518	Automotive Electronics and Instrumentation	PC		2	0	0	0	0	50	0	2	50
TE7666	0701250519	Automotive Vehicle Dynamics and NVH Lab	PC		0	0	2	10	15	0	0	1	25
Total					5	0	2	10	15	80	45	6	150
Semester : 5													
CAD/CAM													
Specialization Core Courses													
TE7434	0701250520	Basic and Advanced CATIA Lab	PC		0	0	6	30	45	0	0	3	75
TE7380	0701250521	Manufacturing Engineering	PC		1	0	0	0	0	25	0	1	25
TE7664	0701250522	Structural Non Linear and 3D Analysis Lab	PC		0	0	4	20	30	0	0	2	50
Total					1	0	10	50	75	25	0	6	150
Semester : 5													
Design of Heat Exchanger													
Specialization Core Courses													
F7030	0701250523	Design and Simulation of Heat Exchangers	PC		2	0	0	0	0	50	0	2	50

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Annexure B
Optional 'Honours' Specialization

Catalog Course Code	Course Code	Course Title	Nature	Specialization/ Area/ Department	Teaching Scheme (Hours Per Week)			Examination Scheme (Marks)				Total Credits	Total
								Practical		Theory			
					L	T	La b	CA	ESE	CA	ESE		
TE7381	0701250524	Materials and Fabrication Processes for Heat Exchanger	PC		3	0	0	0	0	30	45	3	75
TE7667	0701250525	Heat Exchanger Simulation Lab 1	PC		0	0	2	10	15	0	0	1	25
Total					5	0	2	10	15	80	45	6	150
Semester : 5													
Smart Manufacturing (Industry 4.0) Specialization Core Courses													
F7031	0701250526	Digital Manufacturing	PC		2	0	0	0	0	50	0	2	50
TE7673	0701250527	Sensors and Actuators Lab	PC		0	0	2	10	15	0	0	1	25
TE7668	0701250528	Modern Sensors and Actuators	PC		3	0	0	0	0	30	45	3	75
Total					5	0	2	10	15	80	45	6	150
Semester : 6													
Automobile Engineering with Hybrid and Autonomous Technology Specialization Core Courses													
TE7669	0701250646	Hybrid Technology	PC		2	0	0	0	0	20	30	2	50
F7036	0701250647	Autonomous Technology (Self Driven Cars)	PC		2	0	0	0	0	50	0	2	50
TE7435	0701250648	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

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Annexure B
Optional 'Honours' Specialization

Catalog Course Code	Course Code	Course Title	Nature	Specialization/ Area/ Department	Teaching Scheme (Hours Per Week)			Examination Scheme (Marks)				Total Credits	Total
					L	T	La b	Practical		Theory			
								CA	ESE	CA	ESE		
Semester : 6													
CAD/CAM Specialization Core Courses													
TE7362	0701250649	Computer Aided Design II Lab	PC		0	0	6	30	45	0	0	3	75
TE7670	0701250650	Computer Aided Manufacturing Lab	PC		0	0	4	20	30	0	0	2	50
TE7582	0701250651	Structural Dynamics and Non Linear Analysis Lab	PC		0	0	4	20	30	0	0	2	50
Total					0	0	14	70	105	0	0	7	175
Semester : 6													
Design of Heat Exchanger Specialization Core Courses													
TE7384	0701250652	Numerical Methods for Heat Exchanger	PC		3	0	0	0	0	30	45	3	75
TE7649	0701250653	CFD Simulation for heat exchanger	PC		2	0	0	0	0	50	0	2	50
TE7671	0701250654	Heat Exchanger Simulation Lab-2	PC		0	0	4	20	30	0	0	2	50
Total					5	0	4	20	30	80	45	7	175
Semester : 6													
Smart Manufacturing (Industry 4.0) Specialization Core Courses													
TE7672	0701250655	AI and ML for Smart Manufacturing	PC		3	0	0	0	0	30	45	3	75

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Optional 'Honours' Specialization

Catalog Course Code	Course Code	Course Title	Nature	Specialization/ Area/ Department	Teaching Scheme (Hours Per Week)			Examination Scheme (Marks)				Total Credits	Total
					L	T	La b	Practical		Theory			
								CA	ESE	CA	ESE		
TE7374	0701250656	Industrial Internet of Things	PC		2	0	0	0	0	20	30	2	50
TE7573	0701250657	Machine Learning and Artificial Intelligence Lab	PC		0	0	4	20	30	0	0	2	50
Total					5	0	4	20	30	50	75	7	175
Semester : 7													
Automobile Engineering with Hybrid and Autonomous Technology													
Specialization Core Courses													
T7805	0701250714	Specialization Project	PIS		0	0	10	50	75	0	0	5	125
T7802	0701250715	Specialization Seminar	PIS		0	0	4	20	30	0	0	2	50
Total					0	0	14	70	105	0	0	7	175
Semester : 7													
CAD/CAM													
Specialization Core Courses													
T7805	0701250714	Specialization Project	PIS		0	0	10	50	75	0	0	5	125
T7802	0701250715	Specialization Seminar	PIS		0	0	4	20	30	0	0	2	50
Total					0	0	14	70	105	0	0	7	175
Semester : 7													
Design of Heat Exchanger													
Specialization Core Courses													

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Optional 'Honours' Specialization

Catalog Course Code	Course Code	Course Title	Nature	Specialization/ Area/ Department	Teaching Scheme (Hours Per Week)			Examination Scheme (Marks)				Total Credits	Total
								Practical		Theory			
					L	T	La b	CA	ESE	CA	ESE		
T7805	0701250714	Specialization Project	PIS		0	0	10	50	75	0	0	5	125
T7802	0701250715	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 Manufacturing (Industry 4.0)													
Specialization Core Courses													
T7805	0701250714	Specialization Project	PIS		0	0	10	50	75	0	0	5	125
T7802	0701250715	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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Optional 'Honours' Specialization

Semester	Internal Credits	External Credits	Total Credits	Total Marks
Automobile Engineering with Hybrid and Autonomous Technology				
Semester 5	2	4	6	150
Semester 6	2	5	7	175
Semester 7	0	7	7	175
Total	4	16	20	500
CAD/CAM				
Semester 5	1	5	6	150
Semester 6	0	7	7	175
Semester 7	0	7	7	175
Total	1	19	20	500
Design of Heat Exchanger				
Semester 5	2	4	6	150
Semester 6	2	5	7	175
Semester 7	0	7	7	175
Total	4	16	20	500
Smart Manufacturing (Industry 4.0)				
Semester 5	2	4	6	150
Semester 6	0	7	7	175
Semester 7	0	7	7	175
Total	2	18	20	500

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Annexure C
Optional 'Minor' Specialization

Catalog Course Code	Course Code	Course Title	Nature	Specialization/ 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 Specialization Core Courses													
TE7273	0701250529	Machine Learning: Classification	PC		3	0	0	0	0	30	45	3	75
TE7274	0701250530	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 Specialization Core Courses													
TE7281	0701250531	Open Source Tools for Data Science	PC		4	0	0	0	0	40	60	4	100
TE7292	0701250532	R Programming	PC		3	0	0	0	0	30	45	3	75
Total					7	0	0	0	0	70	105	7	175
Semester : 5													
Internet of Things Specialization Core Courses													
TE7268	0701250533	Introduction to IOT	PC		4	0	0	0	0	40	60	4	100
TE7293	0701250534	Raspberry Pi and Python	PC		3	0	0	0	0	30	45	3	75
Total					7	0	0	0	0	70	105	7	175

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Annexure C
Optional 'Minor' Specialization

Catalog Course Code	Course Code	Course Title	Nature	Specialization/ 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													
Smart Cities and Urban Analytics Specialization Core Courses													
TE7220	0701250535	Smart Cities : Context Policy and Governance	PC		3	0	0	0	0	30	45	3	75
TE7206	0701250536	IOT for Smart Cities	PC		3	0	0	0	0	30	45	3	75
TE7207	0701250537	IOT for Smart Cities Lab	PC		0	0	2	10	15	0	0	1	25
Total					6	0	2	10	15	60	90	7	175
Semester : 5													
Embedded Systems Specialization Core Courses													
T7801	0701250538	Specialization Project	PIS		0	0	2	10	15	0	0	1	25
T7802	0701250539	Specialization Seminar	PIS		0	0	4	20	30	0	0	2	50
TE7298	0701250540	System Programming	PC		4	0	0	0	0	40	60	4	100
Total					4	0	6	30	45	40	60	7	175
Semester : 6													
Artificial Intelligence and Machine Learning Specialization Core Courses													
TE7266	0701250658	Introduction to Deep Learning	PC		4	0	0	0	0	40	60	4	100
TE7271	0701250659	Machine Learning Clustering and Retrieval	PC		3	0	0	0	0	30	45	3	75

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Annexure C
Optional 'Minor' Specialization

Catalog Course Code	Course Code	Course Title	Nature	Specialization/ Area/ Department	Teaching Scheme (Hours Per Week)			Examination Scheme (Marks)				Total Credits	Total
								Practical		Theory			
					L	T	La b	CA	ESE	CA	ESE		
Total					7	0	0	0	0	70	105	7	175
Semester : 6													
Data Science Specialization Core Courses													
TE7247	0701250660	Business Analytics	PC		3	0	0	0	0	30	45	3	75
TE7284	0701250661	Power BI	PC		3	0	0	0	0	30	45	3	75
Total					6	0	0	0	0	60	90	6	150
Semester : 6													
Internet of Things Specialization Core Courses													
TE7269	0701250662	IOT Security and Privacy	PC		3	0	0	0	0	30	45	3	75
TE7295	0701250663	Software Defined Networking	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 Specialization Core Courses													
T7802	0701250664	Specialization Project	PIS		0	0	4	50	0	0	0	2	50
T7802	0701250665	Specialization Seminar	PC		0	0	4	50	0	0	0	2	50

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Annexure C
Optional 'Minor' Specialization

Catalog Course Code	Course Code	Course Title	Nature	Specialization/ Area/ Department	Teaching Scheme (Hours Per Week)			Examination Scheme (Marks)				Total Credits	Total
								Practical		Theory			
					L	T	La b	CA	ESE	CA	ESE		
TE7177	0701250666	Application of Sensor Technology to Smart Cities	PC		3	0	0	0	0	30	45	3	75
Total					3	0	8	100	0	30	45	7	175
Semester : 6													
Embedded Systems													
Specialization Core Courses													
T7802	0701250667	Specialization Project	PIS		0	0	4	20	30	0	0	2	50
TE7325	0701250668	Embedded Linux	PC		4	0	0	0	0	40	60	4	100
Total					4	0	4	20	30	40	60	6	150
Semester : 7													
Artificial Intelligence and Machine Learning													
Specialization Core Courses													
T7805	0701250714	Specialization Project	PIS		0	0	10	50	75	0	0	5	125
T7802	0701250715	Specialization Seminar	PIS		0	0	4	20	30	0	0	2	50
Total					0	0	14	70	105	0	0	7	175
Semester : 7													
Data Science													
Specialization Core Courses													
T7805	0701250714	Specialization Project	PIS		0	0	10	50	75	0	0	5	125

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Optional 'Minor' Specialization

Catalog Course Code	Course Code	Course Title	Nature	Specialization/ Area/ Department	Teaching Scheme (Hours Per Week)			Examination Scheme (Marks)				Total Credits	Total
								Practical		Theory			
					L	T	La b	CA	ESE	CA	ESE		
T7802	0701250715	Specialization Seminar	PIS		0	0	4	20	30	0	0	2	50
Total					0	0	14	70	105	0	0	7	175
Semester : 7													
Internet of Things													
Specialization Core Courses													
T7805	0701250714	Specialization Project	PIS		0	0	10	50	75	0	0	5	125
T7802	0701250715	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													
Specialization Core Courses													
T7803	0701250716	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													
TE7205	0701250717	Intelligent Transportation Systems	PE		3	0	0	0	0	30	45	3	75
TE7234	0701250718	Urban Hydrology and Hydraulics	PE		3	0	0	0	0	30	45	3	75
Total Required Credits								0	0	30	45	3	75

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Optional 'Minor' Specialization

Catalog Course Code	Course Code	Course Title	Nature	Specialization/ Area/ Department	Teaching Scheme (Hours Per Week)			Examination Scheme (Marks)				Total Credits	Total
								Practical		Theory			
					L	T	La b	CA	ESE	CA	ESE		
Semester : 7													
Embedded Systems													
Specialization Core Courses													
T7802	0701250719	Specialization Project	PIS		0	0	4	20	30	0	0	2	50
TE7304	0701250720	Advanced Microcontrollers and RTOS	PC		4	0	0	0	0	40	60	4	100
TE7305	0701250721	Advanced Microcontrollers and RTOS Lab	PC		0	0	2	10	15	0	0	1	25
Total					4	0	6	30	45	40	60	7	175



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Optional 'Minor' Specialization

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
Internet of Things				
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
Embedded Systems				
Semester 5	0	7	7	175
Semester 6	0	6	6	150



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Optional 'Minor' Specialization

Semester 7	0	7	7	175
Total	0	20	20	500