



Celebrating 50 Years of Excellence

Symbiosis Institute of Technology, Pune
Bachelor of Technology (Computer Science and 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	180			
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 (Computer Science and 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. Artificial Intelligence and Machine Learning 2. Computing 3. Data Science 4. Game Design & Development 5. Security and Privacy 6. Internet of Things <p>Annexure C: Optional 'Minor' specialization area</p>





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		1. Automobile Engineering With Hybrid And Autonomous Technology (ME) 1. Embedded Systems (E&TC) 2. Smart Cities and Urban Analytics (CE)			
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 (Information Technology) OR Bachelor of Technology (Information Technology) with Honours in Artificial Intelligence and Machine Learning / Computing / Data Science / Game Design & Development / Security and Privacy /Internet of Things. OR Bachelor of Technology (Information Technology) with Minor in Automobile Engineering with Hybrid and Autonomous Technology / Embedded Systems /Smart Cities and Urban Analytics 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
Group A							
1	18	0	0	0	0	0	18
2	20	0	0	0	1	0	21
3	24	0	0	0	0	2*	24
4	17	2	0	0	0	1*	19
5	22	0	0	0	3	0	25
6	12	10	0	0	3	0	25
7	13	11	0	0	0	0	24
8	14	0	0	0	0	0	14
Total	140	23	0	0	7	0	170
Group B							
1	19	0	0	0	0	0	19
2	19	0	0	0	1	0	20
3	24	0	0	0	0	2*	24
4	17	2	0	0	0	1*	19
5	22	0	0	0	3	0	25
6	12	10	0	0	3	0	25
7	13	11	0	0	0	0	24
8	14	0	0	0	0	0	14
Total	140	23	0	0	7	0	170
Optional Additional Courses (Honours)							
Total	0	0	20	0	0	0	20
Optional Additional Courses (Minor)							
Total	0	0	17	3	0	0	20
\$IU						Granc	190

20/03/2023 (R-5)



* Satisfactory completion of the non letter grade courses '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 22/08/2022 for the programme.



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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													
Group - A - Generic Core Courses													
TE7168	0701220101	Engineering Mathematics -I	BS		3	1	0	0	0	40	60	4	100
T7391	0701220102	Physics	BS		3	0	0	0	0	30	45	3	75
T7392	0701220103	Physics lab	BS		0	0	2	10	15	0	0	1	25
TE7288	0701220104	Programming in C	PC		3	0	0	0	0	30	45	3	75
TE7289	0701220105	Programming in C Lab	PC		0	0	2	10	15	0	0	1	25
T7383	0701220106	Communication Skills	HS		2	0	0	0	0	20	30	2	50
T7384	0701220107	Communication skills lab	HS		0	0	2	10	15	0	0	1	25
TE7188	0701220108	Environmental Science	ES		2	0	0	0	0	20	30	2	50
T6773	0701220109	Creative Thinking	HS		1	0	0	0	0	25	0	1	25
Total Required Credits								30	45	165	210	18	450
Group - B - Generic Core Courses													
TE7168	0701220101	Engineering Mathematics -I	BS		3	1	0	0	0	40	60	4	100
T7381	0701220110	Chemistry	BS		3	0	0	0	0	30	45	3	75
T7382	0701220111	Chemistry Lab	BS		0	0	2	10	15	0	0	1	25
T7540	0701220112	Basic Electrical and Electronics Engineering	ES		3	0	0	0	0	30	45	3	75
T7593	0701220113	Basic Electrical and Electronics Engineering Lab	ES		0	0	2	10	15	0	0	1	25



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					L	T	La b	Practical		Theory			
								CA	ESE	CA	ESE		
TE7286	0701220114	Programming and Problem Solving	ES		2	0	0	0	0	20	30	2	50
TE7287	0701220115	Programming and Problem Solving Lab	ES		0	0	2	10	15	0	0	1	25
T7925	0701220116	Engineering Graphics Lab	ES		0	0	4	20	30	0	0	2	50
T6732	0701220117	Critical Thinking	HS		1	0	0	0	0	25	0	1	25
TE7396	0701220118	Software Tools	PC		0	0	2	25	0	0	0	1	25
Total Required Credits								75	75	145	180	19	475
Semester : 2													
Group - A -Generic Core Courses													
TE7169	0701220201	Engineering Mathematics -II	BS		3	1	0	0	0	40	60	4	100
T7381	0701220202	Chemistry	BS		3	0	0	0	0	30	45	3	75
T7382	0701220203	Chemistry Lab	BS		0	0	2	10	15	0	0	1	25
T7540	0701220204	Basic Electrical and Electronics Engineering	ES		3	0	0	0	0	30	45	3	75
T7593	0701220205	Basic Electrical and Electronics Engineering Lab	ES		0	0	2	10	15	0	0	1	25
TE7286	0701220206	Programming and Problem Solving	ES		2	0	0	0	0	20	30	2	50
TE7287	0701220207	Programming and Problem Solving Lab	ES		0	0	2	10	15	0	0	1	25
T7925	0701220208	Engineering Graphics Lab	ES		0	0	4	20	30	0	0	2	50
T6732	0701220209	Critical Thinking	HS		1	0	0	0	0	25	0	1	25
TE7396	0701220210	Software Tools	PC		0	0	2	25	0	0	0	1	25



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					L	T	La b	Practical		Theory			
								CA	ESE	CA	ESE		
T2646	0701220211	Entrepreneurship Venture	HS		1	0	0	0	0	25	0	1	25
Total Required Credits								75	75	170	180	20	500
Group - B - Generic Core Courses													
TE7169	0701220201	Engineering Mathematics -II	BS		3	1	0	0	0	40	60	4	100
T2646	0701220211	Entrepreneurship Venture	HS		1	0	0	0	0	25	0	1	25
T7391	0701220214	Physics	BS		3	0	0	0	0	30	45	3	75
TE7288	0701220216	Programming in C	PC		3	0	0	0	0	30	45	3	75
T7392	0701220215	Physics lab	BS		0	0	2	10	15	0	0	1	25
TE7289	0701220217	Programming in C Lab	PC		0	0	2	10	15	0	0	1	25
T7383	0701220218	Communication Skills	HS		2	0	0	0	0	20	30	2	50
T7384	0701220219	Communication skills lab	HS		0	0	2	10	15	0	0	1	25
T6773	0701220220	Creative Thinking	HS		1	0	0	0	0	25	0	1	25
TE7188	0701220221	Environmental Science	ES		2	0	0	0	0	20	30	2	50
Total Required Credits								30	45	190	210	19	475
Open Elective Courses Group													
T6761	0701220212	Foundation of Ethics	OE		1	0	0	0	0	25	0	1	25
T6760	0701220213	Introduction to Indian Philosophy	OE		1	0	0	0	0	25	0	1	25
Total Required Credits								0	0	25	0	1	25



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					L	T	La b	Practical		Theory			
								CA	ESE	CA	ESE		
Semester : 3													
Generic Core Courses													
T7995	0701220301	Discrete Mathematics and Probability Theory	BS		3	1	0	0	0	40	60	4	100
T7996	0701220302	Computer Organization	PC		3	0	0	0	0	30	45	3	75
T7906	0701220303	Fundamentals of Data Structures	PC		3	0	0	0	0	30	45	3	75
TE7257	0701220304	Fundamentals of Data Structures Lab	PC		0	0	2	10	15	0	0	1	25
T7512	0701220305	Programming Paradigms	PC		3	0	0	0	0	30	45	3	75
T7513	0701220306	Programming Paradigms Lab	PC		0	0	2	10	15	0	0	1	25
T7997	0701220307	Digital Electronics and Logic Design	ES		3	0	0	0	0	30	45	3	75
T7555	0701220308	Digital Electronics and Logic Design Lab	ES		0	0	2	10	15	0	0	1	25
F7010	0701220309	Agile Software Development	PC		3	0	0	0	0	75	0	3	75
TE7300	0701220310	Tinker Lab	ES		0	0	4	50	0	0	0	2	50
TH4095	0701220311	Fitness for Life *			0	0	0	0	0	0	0	Non Letter Grade	0
TH4272	0701220312	Certificate in COVID-19 Care for the Community *			0	0	0	0	0	0	0	Non Letter Grade	0
Total					18	1	10	80	45	235	240	24	600
Semester : 4													



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					L	T	La b	Practical		Theory			
								CA	ESE	CA	ESE		
Generic Core Courses													
TE7170	0701220401	Engineering Mathematics-III	BS		2	1	0	0	0	30	45	3	75
F7034	0701220402	Java	PC		4	0	0	0	0	100	0	4	100
T7488	0701220403	Data Structures	PC		3	0	0	0	0	30	45	3	75
T7489	0701220404	Data Structures Lab	PC		0	0	2	10	15	0	0	1	25
T7510	0701220405	Operating Systems	PC		3	0	0	0	0	30	45	3	75
T7511	0701220406	Operating Systems Lab	PC		0	0	2	10	15	0	0	1	25
TE7290	0701220407	Project Based Learning -I	PIS		0	0	4	50	0	0	0	2	50
T4005	0701220408	Integrated Disaster Management *			0	0	0	0	0	0	0	Non Letter Grade	0
Total					12	1	8	70	30	190	135	17	425
Generic Elective Courses Group													
T6184	0701220409	Basic German I	GE		2	0	0	0	0	50	0	2	50
T6186	0701220410	Basic French I	GE		2	0	0	0	0	50	0	2	50
T6188	0701220411	Basic Spanish I	GE		2	0	0	0	0	50	0	2	50
Total Required Credits								0	0	50	0	2	50
Semester : 5													



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					L	T	La b	Practical		Theory			
								CA	ESE	CA	ESE		
Generic Core Courses													
T8000	0701220501	Service Learning	HS		0	0	8	100	0	0	0	4	100
F7046	0701220502	Introduction to Full Stack Development	PC		4	0	0	0	0	100	0	4	100
T7908	0701220503	Computer Networks	PC		3	0	0	0	0	30	45	3	75
T7482	0701220504	Computer Networks Lab	PC		0	0	2	10	15	0	0	1	25
T7907	0701220505	Database Management Systems	PC		3	0	0	0	0	30	45	3	75
T7487	0701220506	Data Base Management Systems Lab	PC		0	0	4	20	30	0	0	2	50
TE7299	0701220507	Theory of Computation	PC		3	0	0	0	0	30	45	3	75
T6774	0701220508	Principles of Economics	HS		2	0	0	0	0	50	0	2	50
Total					15	0	14	130	45	240	135	22	550
Open Elective Courses Group													
T7393	0701220509	Computer Based Statistical Packages	OE		3	0	0	0	0	30	45	3	75
T7499	0701220510	Java	OE		3	0	0	0	0	30	45	3	75
T7574	0701220511	MATLAB	OE		3	0	0	0	0	30	45	3	75
TE7698	0701220512	Nanotechnology	OE		3	0	0	0	0	30	45	3	75
TE7387	0701220513	Project Management	OE		3	0	0	0	0	30	45	3	75
TE7223	0701220514	Smart Urban Planning	OE		3	0	0	0	0	30	45	3	75
TE7240	0701220515	Water Resource Planning and Management	OE		3	0	0	0	0	30	45	3	75
TE7263	0701220516	Introduction to AI and Machine Learning	OE		3	0	0	0	0	30	45	3	75



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					L	T	La b	Practical		Theory			
								CA	ESE	CA	ESE		
TE7265	0701220517	Introduction to Data Science	OE		3	0	0	0	0	30	45	3	75
TE7428	0701220518	Introduction to Image Processing	OE		3	0	0	0	0	30	45	3	75
TE7335	0701220519	Introduction to Robotics	OE		3	0	0	0	0	30	45	3	75
TE7339	0701220520	Renewable Energy Systems	OE		3	0	0	0	0	30	45	3	75
TE7351	0701220521	3D Printing and Prototyping	OE		3	0	0	0	0	30	45	3	75
TE7365	0701220522	Electrical and Electronics Materials	OE		3	0	0	0	0	30	45	3	75
TE7388	0701220523	Quality Management Techniques	OE		3	0	0	0	0	30	45	3	75
Total Required Credits								0	0	30	45	3	75
Semester : 6													
Generic Core Courses													
TE7008	0701220601	Distributed Systems and Resource Management	PC		3	0	0	0	0	30	45	3	75
F7053	0701220602	Web and Mobile Application Development	PC		3	0	0	0	0	75	0	3	75
T6749	0701220603	Design Thinking	HS		2	0	0	0	0	50	0	2	50
TE7291	0701220604	Project Based Learning-II	PIS		0	0	4	50	0	0	0	2	50
T7802	0701220605	Capstone Course	PC		2	0	0	0	0	50	0	2	50
Total					10	0	4	50	0	205	45	12	300
Generic Elective Courses Group - I													
TE7255	0701220606	Data Warehousing and Mining	PE		3	0	0	0	0	30	45	3	75



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					L	T	La b	Practical		Theory			
								CA	ESE	CA	ESE		
TE7101	0701220607	Internet of Things	PE		3	0	0	0	0	30	45	3	75
TE7328	0701220608	Image Processing	PE		3	0	0	0	0	30	45	3	75
Total Required Credits								0	0	30	45	3	75
Generic Elective Courses Group - II													
TE7013	0701220609	Data Warehousing and Mining Lab	PE		0	0	2	10	15	0	0	1	25
T7528	0701220610	Internet of Things Lab	PE		0	0	2	10	15	0	0	1	25
TE7329	0701220611	Image Processing 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													
T7473	0701220612	Artificial Intelligence	PE		3	0	0	0	0	30	45	3	75
TE7259	0701220613	Human Computer Interface	PE		3	0	0	0	0	30	45	3	75
TE7243	0701220614	Advanced Algorithms	PE		3	0	0	0	0	30	45	3	75
Total Required Credits								0	0	30	45	3	75
Generic Elective Courses Group - IV													
TE7014	0701220615	Artificial Intelligence Lab	PE		0	0	2	10	15	0	0	1	25
TE7260	0701220616	Human Computer Interface Lab	PE		0	0	2	10	15	0	0	1	25
TE7244	0701220617	Advanced Algorithms Lab	PE		0	0	2	10	15	0	0	1	25
Total Required Credits								10	15	0	0	1	25



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					L	T	La b	Practical		Theory			
								CA	ESE	CA	ESE		
Generic Elective Courses Group - V													
T2585	0701220618	Organizational Behaviour	GE		2	0	0	0	0	50	0	2	50
TE7438	0701220619	History of Science and Technology	GE		2	0	0	0	0	50	0	2	50
Total Required Credits								0	0	50	0	2	50
Open Elective Courses Group													
T7474	0701220620	Basics of Database	OE		3	0	0	0	0	30	45	3	75
T7616	0701220621	Fundamentals of Automotive Technology	OE		3	0	0	0	0	30	45	3	75
T7529	0701220622	Machine Learning	OE		3	0	0	0	0	30	45	3	75
TE7756	0701220623	Open Source Technologies	OE		3	0	0	0	0	30	45	3	75
T7584	0701220624	Printed Circuit Board (PCB) Design	OE		3	0	0	0	0	30	45	3	75
T7650	0701220625	Six sigma	OE		3	0	0	0	0	30	45	3	75
TE7700	0701220626	Smart Materials	OE		3	0	0	0	0	30	45	3	75
TE7195	0701220627	GIS Applications	OE		3	0	0	0	0	30	45	3	75
TE7264	0701220628	Introduction to BIGDATA	OE		3	0	0	0	0	30	45	3	75
TE7171	0701220629	Introduction to Mathematical Modelling	OE		3	0	0	0	0	30	45	3	75
TE7203	0701220630	Intelligent Transportation Management	OE		3	0	0	0	0	30	45	3	75
TE7334	0701220631	Introduction to Mechatronics	OE		3	0	0	0	0	30	45	3	75
TE7338	0701220632	Principles of Modern Communication Systems	OE		3	0	0	0	0	30	45	3	75



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					L	T	La b	Practical		Theory			
								CA	ESE	CA	ESE		
TE7376	0701220633	Introduction to Operations Research	OE		3	0	0	0	0	30	45	3	75
TE7377	0701220634	Introduction to Optimisation	OE		3	0	0	0	0	30	45	3	75
Total Required Credits								0	0	30	45	3	75
GIP													
G7002	0701220654	Global Immersion Programme			0	0	0	0	0	0	50	2	50
Note: For students under Global Immersion Programme (0701220654), course "Capstone Course" (0701220605) will be waived off.													
Semester : 7													
Generic Core Courses													
T7804	0701220701	B.Tech Project	PIS		0	0	8	40	60	0	0	4	100
TE7751	0701220702	Compiler Construction	PC		3	0	0	0	0	30	45	3	75
T7478	0701220703	Compiler Construction Lab	PC		0	0	2	10	15	0	0	1	25
F0003	0701220704	Flexi-Credit Course	PC		3	0	0	0	0	75	0	3	75
T7674	0701220705	Cyber Security	PC		2	0	0	0	0	50	0	2	50
Total					8	0	10	50	75	155	45	13	325
Generic Elective Courses Group - I													
TE7253	0701220707	Data Science	PE		3	0	0	0	0	30	45	3	75
TE7282	0701220708	Optimization Techniques and Algorithms	PE		3	0	0	0	0	30	45	3	75



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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		
TE7097	0701220709	Neural 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													
TE7112	0701220710	Neural Networks Lab	PE		0	0	2	10	15	0	0	1	25
TE7283	0701220711	Optimization Techniques and Algorithms Lab	PE		0	0	2	10	15	0	0	1	25
TE7254	0701220712	Data Science 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													
T7529	0701220713	Machine Learning	PE		3	0	0	0	0	30	45	3	75
T7138	0701220714	Network Security	PE		3	0	0	0	0	30	45	3	75
TE7103	0701220715	Natural Language Processing	PE		3	0	0	0	0	30	45	3	75
Total Required Credits								0	0	30	45	3	75
Generic Elective Courses Group - IV													
TE7105	0701220716	Machine Learning Lab	PE		0	0	2	10	15	0	0	1	25
TE7106	0701220717	Natural Language Processing Lab	PE		0	0	2	10	15	0	0	1	25
T7506	0701220718	Network Security Lab	PE		0	0	2	10	15	0	0	1	25
Total Required Credits								10	15	0	0	1	25
Generic Elective Courses Group - V													



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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		
TE7251	0701220719	Computer Graphics	PE		3	0	0	0	0	30	45	3	75
TE7297	0701220720	Software Testing Tools	PE		3	0	0	0	0	30	45	3	75
TE7916	0701220721	Cloud Computing Tools and Techniques	PE		3	0	0	0	0	30	45	3	75
Total Required Credits								0	0	30	45	3	75
Semester : 8													
Generic Core Courses													
T7912	0701220801	Internship	PIS		0	0	24	120	180	0	0	12	300
T7802	0701220802	Seminar	PIS		0	0	4	50	0	0	0	2	50
Total					0	0	28	170	180	0	0	14	350



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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
Group A				
Semester 1	1	17	18	450
Semester 2	4	17	21	525
Semester 3	5	19	24	600
Semester 4	8	11	19	475
Semester 5	10	15	25	625
Semester 6	11	14	25	625
Semester 7	5	19	24	600
Semester 8	2	12	14	350
Total	46	124	170	4250
Group B				
Semester 1	2	17	19	475
Semester 2	3	17	20	500
Semester 3	5	19	24	600
Semester 4	8	11	19	475
Semester 5	10	15	25	625
Semester 6	11	14	25	625
Semester 7	5	19	24	600
Semester 8	2	12	14	350
Total	46	124	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
					L	T	La b	Practical		Theory			
								CA	ESE	CA	ESE		
Semester : 5													
Artificial Intelligence and Machine Learning Specialization Core Courses													
TE7273	0701220524	Machine Learning: Classification	PC		3	0	0	0	0	30	45	3	75
TE7274	0701220525	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													
Computing Specialization Core Courses													
TE7248	0701220526	Cloud Computing	PC		3	0	0	0	0	30	45	3	75
TE7250	0701220527	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													
Data Science Specialization Core Courses													
TE7281	0701220528	Open Source Tools for Data Science	PC		4	0	0	0	0	40	60	4	100
TE7292	0701220529	R Programming	PC		3	0	0	0	0	30	45	3	75
Total					7	0	0	0	0	70	105	7	175

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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		
Semester : 5													
Game Design and Development Specialization Core Courses													
TE7267	0701220530	Introduction to Game Development	PC		3	0	0	0	0	30	45	3	75
TE7285	0701220531	Principles of Game Design	PC		3	0	0	0	0	30	45	3	75
Total					6	0	0	0	0	60	90	6	150
Semester : 5													
Internet of Things Specialization Core Courses													
TE7268	0701220532	Introduction to IOT	PC		4	0	0	0	0	40	60	4	100
TE7293	0701220533	Raspberry Pi and Python	PC		3	0	0	0	0	30	45	3	75
Total					7	0	0	0	0	70	105	7	175
Semester : 5													
Security and Privacy Specialization Core Courses													
TE7296	0701220534	Software Security	PC		3	0	0	0	0	30	45	3	75
TE7301	0701220535	Usable Security	PC		3	0	0	0	0	30	45	3	75
Total					6	0	0	0	0	60	90	6	150

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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		
Semester : 6													
Artificial Intelligence and Machine Learning Specialization Core Courses													
TE7266	0701220635	Introduction to Deep Learning	PC		4	0	0	0	0	40	60	4	100
TE7246	0701220636	Block Chain	PC		4	0	0	0	0	40	60	4	100
Total					8	0	0	0	0	80	120	8	200
Semester : 6													
Computing Specialization Core Courses													
TE7246	0701220637	Block Chain	PC		4	0	0	0	0	40	60	4	100
TE7249	0701220638	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													
Data Science Specialization Core Courses													
TE7247	0701220639	Business Analytics	PC		3	0	0	0	0	30	45	3	75
TE7284	0701220640	Power BI	PC		3	0	0	0	0	30	45	3	75
Total					6	0	0	0	0	60	90	6	150

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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		
Semester : 6													
Game Design and Development Specialization Core Courses													
TE7275	0701220641	Modern Platforms in Game Development	PC		4	0	0	0	0	40	60	4	100
TE7256	0701220642	Entrepreneurship in Game Development	PC		3	0	0	0	0	30	45	3	75
Total					7	0	0	0	0	70	105	7	175
Semester : 6													
Internet of Things Specialization Core Courses													
TE7269	0701220643	IOT Security and Privacy	PC		3	0	0	0	0	30	45	3	75
TE7295	0701220644	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													
Security and Privacy Specialization Core Courses													
TE7252	0701220645	Cryptography	PC		4	0	0	0	0	40	60	4	100
TE7258	0701220646	Hardware Security	PC		3	0	0	0	0	30	45	3	75
Total					7	0	0	0	0	70	105	7	175

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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		
Semester : 7													
Artificial Intelligence and Machine Learning Specialization Core Courses													
T7805	0701220722	Specialization Project	PIS		0	0	10	50	75	0	0	5	125
T7802	0701220723	Specialization Seminar	PIS		0	0	4	20	30	0	0	2	50
Total					0	0	14	70	105	0	0	7	175
Semester : 7													
Computing Specialization Core Courses													
T7805	0701220722	Specialization Project	PIS		0	0	10	50	75	0	0	5	125
T7802	0701220723	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	0701220722	Specialization Project	PIS		0	0	10	50	75	0	0	5	125
T7802	0701220723	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

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 : 7													
Game Design and Development Specialization Core Courses													
T7805	0701220722	Specialization Project	PIS		0	0	10	50	75	0	0	5	125
T7802	0701220723	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	0701220722	Specialization Project	PIS		0	0	10	50	75	0	0	5	125
T7802	0701220723	Specialization Seminar	PIS		0	0	4	20	30	0	0	2	50
Total					0	0	14	70	105	0	0	7	175
Semester : 7													
Security and Privacy Specialization Core Courses													
T7805	0701220722	Specialization Project	PIS		0	0	10	50	75	0	0	5	125
T7802	0701220723	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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Annexure B
Optional 'Honours' 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
Computing				
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
Game Design and Development				
Semester 5	0	6	6	150
Semester 6	0	7	7	175
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



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Annexure B
Optional 'Honours' Specialization

Semester 7	0	7	7	175
Total	0	20	20	500
Security and Privacy				
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	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													
Automobile Engineering with Hybrid and Autonomous Technology													
Specialization Core Courses													
TE7355	0701220536	Basics of Automotive Engineering	PC		3	0	0	0	0	30	45	3	75
TE7665	0701220537	Automotive Electronics and Instrumentation	PC		2	0	0	0	0	50	0	2	50
TE7666	0701220538	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													
Embedded Systems													
Specialization Core Courses													
T7801	0701220539	Specialization Project	PIS		0	0	2	10	15	0	0	1	25
T7802	0701220540	Specialization Seminar	PIS		0	0	4	20	30	0	0	2	50
TE7298	0701220541	System Programming	PC		4	0	0	0	0	40	60	4	100
Total					4	0	6	30	45	40	60	7	175
Semester : 5													
Smart Cities and Urban Analytics													
Specialization Core Courses													
TE7220	0701220542	Smart Cities : Context Policy and Governance	PC		3	0	0	0	0	30	45	3	75
TE7206	0701220543	IOT for Smart Cities	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		
TE7207	0701220544	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 : 6													
Automobile Engineering with Hybrid and Autonomous Technology Specialization Core Courses													
TE7669	0701220647	Hybrid Technology	PC		2	0	0	0	0	20	30	2	50
F7036	0701220648	Autonomous Technology (Self Driven Cars)	PC		2	0	0	0	0	50	0	2	50
TE7435	0701220649	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 : 6													
Embedded Systems Specialization Core Courses													
T7802	0701220650	Specialization Project	PC		0	0	4	20	30	0	0	2	50
TE7325	0701220651	Embedded Linux	PC		4	0	0	0	0	40	60	4	100
Total					4	0	4	20	30	40	60	6	150
Semester : 6													
Smart Cities and Urban Analytics Specialization Core Courses													

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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		
T7802	0701220650	Specialization Project	PIS		0	0	4	50	0	0	0	2	50
T7802	0701220652	Specialization Seminar	PIS		0	0	4	50	0	0	0	2	50
TE7177	0701220653	Application of Sensor Technology to Smart Cities	PE		3	0	0	0	0	30	45	3	75
Total					3	0	8	100	0	30	45	7	175
Semester : 7													
Automobile Engineering with Hybrid and Autonomous Technology													
Specialization Core Courses													
T7805	0701220722	Specialization Project	PIS		0	0	10	50	75	0	0	5	125
T7802	0701220723	Specialization Seminar	PIS		0	0	4	20	30	0	0	2	50
Total					0	0	14	70	105	0	0	7	175
Semester : 7													
Embedded Systems													
Specialization Core Courses													
T7802	0701220724	Specialization Project	PIS		0	0	4	20	30	0	0	2	50
TE7304	0701220725	Advanced Microcontrollers and RTOS	PC		4	0	0	0	0	40	60	4	100
TE7305	0701220726	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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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	Lab	Practical		Theory			
								CA	ESE	CA	ESE		
Semester : 7													
Smart Cities and Urban Analytics Specialization Core Courses													
T7803	0701220727	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	0701220728	Intelligent Transportation Systems	PE		3	0	0	0	0	30	45	3	75
TE7234	0701220706	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

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
Embedded Systems				
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