B.TECH. COMPUTER SCIENCE AND BUSINESS SYSTEMS

I. PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

I. To ensure graduates will be proficient in utilizing the fundamental knowledge of basic sciences, mathematics, Computer Science and Business systems for the applications relevant to various streams of Engineering and Technology.

II. To enrich graduates with the core competencies necessary for applying knowledge of computer science and Data analytics tools to store, retrieve, implement and analyze data in the context of business enterprise

III. To enable graduates to gain employment in organizations and establish themselves as professionals by applying their technical skills and leadership qualities to solve real world problems and meet the diversified needs of industry, academia and research

IV. To equip the graduates with entrepreneurial skills and qualities which help them to perceive the functioning of business, diagnose business problems, explore the entrepreneurial opportunities and prepare them to manage business efficiently.

II. PROGRAM OUTCOMES (POs)

1 **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2 **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3 **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4 **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5 **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

6 **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7 **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

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8　**Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9　**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10　**Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11　**Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12　**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

III.　PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO1: To create, select, and apply appropriate techniques, resources, modern engineering and business tools including prediction and data analytics to complex engineering activities and business solutions

PSO2: To evolve computer science domain specific methodologies for effective decision making in several critical problem domains of the real world.

PSO3: To be able to apply entrepreneurial skills and management tools for identifying, analyzing and creating business opportunities with smart business ideas.

PSO4: To manage complex IT projects with consideration of the human, financial, ethical and environmental factors and an understanding of risk management processes, and operational and policy implications

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Mapping of Course Outcome and Programme Outcome

Year	Sem	Course name	PO 1	2	3	4	5	6	7	8	9	10	11	12	PSO 1	2	3	4
I	I	Induction Programme																
		Professional English - I	1.6	2.2	1.8	2.2	1.5	3	3	3	1.6	3	3	3	-	-	-	-
		Matrices and Calculus	3	3	1	1	0	0	0	0	2	0	2	3	-	-	-	-
		Engineering Physics	3	3	1.6	1.2	1.8	1	-	-	-	-	-	1	-	-	-	-
		Engineering Chemistry	2.8	1.3	1.6	1	-	1.5	1.8	-		-	-	1.5	-	-	-	-
		Problem Solving and Python Programming	2	3	3	3	2	-	-	-	-	-	2	2	3	3	-	-
		தமிழர் மரபு /Heritage of Tamils																
		Problem Solving and Python Programming Laboratory	2	3	3	3	2	-	-	-	-	-	2	2	3	3	-	-
		Physics and Chemistry Laboratory	3	2.4	2.6	1	1											
			2.6	1.3	1.6	1	1	1.4	1.8	-	-	-	-	1.3	-	-	-	-
		English Laboratory $	3	3	3	3	1	3	3	3	3	3	3	3	-	-	-	-
	II	Professional English - II	3	3	3	3	2.75	3	3	3	2.2	3	3	3	-	-	-	-
		Statistics and Numerical Methods	3	3	1	1	1	0	0	0	2	0	2	3	-	-	-	-
		Physics for Information Science	3	1.3	2	1.3	2.3	1	1.3	-	-	-	-	2	-	-	-	-
		Basic Electrical and Electronics Engineering	2	1.8	1	-	-	-	-	1	-	-	-	2	-	-	1	-
		Engineering Graphics	3	1	2	-	2	-	-	-	-	3	-	2	2	2	-	-
		Data Structures Design																
		தமிழரும் ததொழில் நுட்பமும் /Tamils and Technology																
		Engineering Practices Laboratory	3	2	-	-	1	1	1	-	-	-	-	2	2	1	1	-
		Data Structures Design Laboratory																
		Communication Laboratory / Foreign Language $	2.4	2.8	3	3	1.8	3	3	3	3	3	3	3	-	-	-	-
II	III	Discrete Mathematics	1	3	2	1	-	-	-	-	-	1	-	-	-	-	-	-
		Digital Principles and Computer Organization	3	3	3	3	1	2	1	1	1	1	1	2	1	2	1	3
		Fundamentals of Economics	3	3	1	-	-	2	1	2	-	-	2	-	3	-	2	-
		Object Oriented Programming	3	3	3	2	2	-	-	-			2		3	2	1.2	2

		Course																
		Design and Analysis of Algorithms	3	3	3	2	-	-	1	-	-	-	-	-	3	3	-	2
		Fundamentals of Data Science and Analytics	3	3	3	2	2	1	-	-	-	-	-	-	3	3	1	1
		Business Communication Laboratory I	3	2	2	-	-	-	-	-	2	2	-	1	2	1	1	-
		Object Oriented Programming Laboratory	2	2	2	2	2	-	-	-	2	2	2	2	2	2	2	2
		Professional Development$																
	IV	Probability and Statistics	3	3	1	1	0	0	0	0	2	0	0	2	-	-	-	-
		Database Management Systems	3	3	2	2	2	-	-	-	-	-	-	-	3	3	3	-
		Operating Systems	3	3	3	2	-	2	-	-	2	-	-	2	3	3	-	-
		Introduction to Business Systems	3	2	2	2	1	1	2	1	2	1	2	1	3	2	2	1
		Machine Learning	3	3	3	2	2	1	-	-	-	-	-	-	3	3	2	-
		Environmental Sciences and Sustainability	2.8	1.8	1	1	-	2.2	2.4	-	-	-	-	1.8	-	-	-	-
		Database Management Systems Laboratory	3	3	3	3	3	-	-	-	2	2	-	2	3	3	2	2
		Machine Learning Laboratory	3	3	3	3	3	2	-	-	2	2	1	2	3	3	2	2
		Business Communication Laboratory II	3	2	-	-	2	3	2	-	2	2	-	2	3	-	2	-
III	V	Embedded Systems and IoT	3	3	2.6	-	2	2	2	-	-	-	2	-	3	3	3	3
		Fundamentals of Management	3	3	2.2	2	-	2	2	2	2	2	-	-	3	3	3	3
		Data and Information Security	3	2.2	1.6	1	1	-	2	3	1	-	-	-	3	3	2	1
		Summer internship																
	VI	Business Analytics	3	3	2.4	2.2	2	1.6	1.6	1.8	1.8	2.6	2.2	2	3	2	2.2	2.6
		Object Oriented Software Engineering	2	3	1	2	2	-	-	-	-	-	-	1	3	2		
		Business Analytics Laboratory	3	3	3	3	3	2	2	1	2	2	2	2	3	3	3	3
IV	VII	Human Values and Ethics																
	VIII	Project Work / Internship																

1 - low, 2 - medium, 3 - high, '-' - no correlation

ANNA UNIVERSITY, CHENNAI
NON- AUTONOMOUS AFFILIATED COLLEGES
REGULATIONS 2021
B.TECH. COMPUTER SCIENCE AND BUSINESS SYSTEMS
CHOICE BASED CREDIT SYSTEM
CURRICULUM AND SYLLABI FOR SEMESTERS I TO VIII
SEMESTER I

S. NO.	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	IP3151	Induction Programme	-	-	-	-	-	0
THEORY								
2.	HS3152	Professional English - I	HSMC	3	0	0	3	3
3.	MA3151	Matrices and Calculus	BSC	3	1	0	4	4
4.	PH3151	Engineering Physics	BSC	3	0	0	3	3
5.	CY3151	Engineering Chemistry	BSC	3	0	0	3	3
6.	GE3151	Problem Solving and Python Programming	ESC	3	0	0	3	3
7.	GE3152	தமிழர் மரபு /Heritage of Tamils	HSMC	1	0	0	1	1
PRACTICALS								
8.	GE3171	Problem Solving and Python Programming Laboratory	ESC	0	0	4	4	2
9.	BS3171	Physics and Chemistry Laboratory	BSC	0	0	4	4	2
10.	GE3172	English Laboratory $	EEC	0	0	2	2	1
			TOTAL	16	1	10	27	22

$ Skill Based Course

SEMESTER II

S. NO.	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	HS3252	Professional English - II	HSMC	2	0	0	2	2
2.	MA3251	Statistics and Numerical Methods	BSC	3	1	0	4	4
3.	PH3256	Physics for Information Science	BSC	3	0	0	3	3
4.	BE3251	Basic Electrical and Electronics Engineering	ESC	3	0	0	3	3
5.	GE3251	Engineering Graphics	ESC	2	0	4	6	4
6.	AD3251	Data Structures Design	PCC	3	0	0	3	3
7.	GE3252	தமிழரும் தொழில்நுட்பமும் /Tamils and Technology	HSMC	1	0	0	1	1
8.		NCC Credit Course Level 1#	-	2	0	0	2	2*
PRACTICALS								
9.	GE3271	Engineering Practices Laboratory	ESC	0	0	4	4	2
10.	AD3271	Data Structures Design Laboratory	PCC	0	0	4	4	2
11.	GE3272	Communication Laboratory / Foreign Language $	EEC	0	0	4	4	2
			TOTAL	17	1	16	34	26

 # NCC Credit Course level 1 is offered for NCC students only. The grades earned by the students will be recorded in the Mark Sheet, however the same shall not be considered for the computation of CGPA.
$ Skill Based Course

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	MA3354	Discrete Mathematics	BSC	3	1	0	4	4
2.	CS3351	Digital Principles and Computer Organization	ESC	3	0	2	5	4
3.	CW3301	Fundamentals of Economics	PCC	3	0	0	3	3
4.	CS3391	Object Oriented Programming	PCC	3	0	0	3	3
5.	AD3351	Design and Analysis of Algorithms	PCC	3	0	2	5	4
6.	AD3491	Fundamentals of Data Science and Analytics	PCC	3	0	0	3	3
PRACTICALS								
7.	CW3311	Business Communication Laboratory I	PCC	0	0	3	3	1.5
8.	CS3381	Object Oriented Programming Laboratory	PCC	0	0	3	3	1.5
9.	GE3361	Professional Development$	EEC	0	0	2	2	1
			TOTAL	18	1	12	31	25

$ **Skill Based Course**

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	MA3391	Probability and Statistics	BSC	3	1	0	4	4
2.	CS3492	Database Management Systems	PCC	3	0	0	3	3
3.	AL3452	Operating Systems	PCC	3	0	2	5	4
4.	CW3401	Introduction to Business Systems	PCC	3	0	0	3	3
5.	AL3451	Machine Learning	PCC	3	0	0	3	3
6.	GE3451	Environmental Sciences and Sustainability	BSC	2	0	0	2	2
7.		NCC Credit Course Level 2#		3	0	0	3	3 #
PRACTICALS								
8.	CS3481	Database Management Systems Laboratory	PCC	0	0	3	3	1.5
9.	AD3461	Machine Learning Laboratory	PCC	0	0	4	4	2
10.	CW3411	Business Communication Laboratory II	PCC	0	0	3	3	1.5
			TOTAL	17	1	12	30	24

NCC Credit Course level 2 is offered for NCC students only. The grades earned by the students will be recorded in the Mark Sheet, however the same shall not be considered for the computation of CGPA.

SEMESTER V

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	CS3691	Embedded Systems and IoT	PCC	3	0	2	5	4
2.	CW3501	Fundamentals of Management	PCC	3	0	0	3	3
3.	CW3551	Data and Information Security	PCC	3	0	0	3	3
4.		Professional Elective I	PEC	-	-	-	-	3
5.		Professional Elective II	PEC	-	-	-	-	3
6.		Mandatory Course-I**&**	MC	3	0	0	3	Non-credit course
PRACTICALS								
7.	CW3511	Summer Internship	EEC	0	0	0	0	2
			TOTAL	-	-	-	-	**18**

& Mandatory Course-I is a Non-credit Course (Student shall select one course from the list given under Mandatory Course-I)

SEMESTER VI

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	CCW331	Business Analytics	PCC	2	0	2	4	3
2.	CCS356	Object Oriented Software Engineering	PCC	3	0	2	5	4
3.		Open Elective – I*	OEC	3	0	0	3	3
4.		Professional Elective III	PEC	-	-	-	-	3
5.		Professional Elective IV	PEC	-	-	-	-	3
6.		Professional Elective V	PEC	-	-	-	-	3
7.		Professional Elective VI	PEC	-	-	-	-	3
8.		Mandatory Course-II **&**	MC	3	0	0	3	Non-credit course
9.		NCC Credit Course Level 3#		3	0	0	3	3 #
PRACTICALS								
10.	CW3611	Business Analytics Laboratory	PCC	0	0	4	4	2
			TOTAL	-	-	-	-	**24**

*Open Elective – I Shall be chosen from the list of open electives offered by other Programmes

& Mandatory Course-II is a Non-credit Course (Student shall select one course from the list given under Mandatory Course-II)

 # NCC Credit Course level 3 is offered for NCC students only. The grades earned by the students will be recorded in the Mark Sheet, however the same shall not be considered for the computation of CGPA

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	GE3791	Human Values and Ethics	HSMC	2	0	0	2	2
2.		Elective - Management#	HSMC	3	0	0	3	3
3.		Open Elective – II**	OEC	3	0	0	3	3
4.		Open Elective – III**	OEC	3	0	0	3	3
5.		Open Elective – IV**	OEC	3	0	0	3	3
			TOTAL	14	0	0	14	14

*If students undergo internship in Semester VII, then the courses offered during semester VII will be offered during semester VIII.
** Open Elective II - IV (Shall be chosen from the list of open electives offered by other Programmes).
 # Elective - Management shall be chosen from the Elective Management courses.

SEMESTER VIII /VII*

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
PRACTICALS								
1.	CW3811	Project Work / Internship	EEC	0	0	20	20	10
			TOTAL	0	0	20	20	10

*If students undergo internship in Semester VII, then the courses offered during semester VII will be offered during semester VIII.

TOTAL CREDITS :163

ELECTIVE – MANAGEMENT COURSES

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PERWEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	GE3751	Principles of Management	HSMC	3	0	0	3	3
2.	GE3752	Total Quality Management	HSMC	3	0	0	3	3
3.	GE3753	Engineering Economics and Financial Accounting	HSMC	3	0	0	3	3
4.	GE3754	Human Resource Management	HSMC	3	0	0	3	3
5.	GE3755	Knowledge Management	HSMC	3	0	0	3	3
6.	GE3792	Industrial Management	HSMC	3	0	0	3	3

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MANDATORY COURSES I*

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	MX3081	Introduction to Women and Gender Studies	MC	3	0	0	3	0
2.	MX3082	Elements of Literature	MC	3	0	0	3	0
3.	MX3083	Film Appreciation	MC	3	0	0	3	0
4.	MX3084	Disaster Risk Reduction and Management	MC	3	0	0	3	0

*Mandatory Courses are offered as Non-Credit Courses

MANDATORY COURSES II*

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	MX3085	Well Being with Traditional Practices - Yoga, Ayurveda and Siddha	MC	3	0	0	3	0
2.	MX3086	History of Science and Technology in India	MC	3	0	0	3	0
3.	MX3087	Political and Economic Thought for a Humane Society	MC	3	0	0	3	0
4.	MX3088	State, Nation Building and Politics in India	MC	3	0	0	3	0
5.	MX3089	Industrial Safety	MC	3	0	0	3	0

*Mandatory Courses are offered as Non-Credit Courses

PROGRESS THROUGH KNOWLEDGE

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PROFESSIONAL ELECTIVE COURSES: VERTICALS

Vertical I Data Science	Vertical II Cloud Computing and Data Center Technologies	Vertical III Emerging Technologies	Vertical IV Artificial Intelligence and Machine Learning	Vertical V Management	Vertical VI Marketing
Exploratory Data Analysis	Cloud Computing	Augmented Reality/Virtual Reality	Knowledge Engineering	Customer Relation Management	Financial Analytics
Recommender Systems	Virtualization	Robotic Process Automation	Soft Computing	Human Resource Management for Entrepreneurs	Recommender Systems
Neural Networks and Deep Learning	Cloud Services Management	Neural Networks and Deep Learning	Neural Networks and Deep Learning	Financial Management	Digital Marketing
Text and Speech Analysis	Data Warehousing	Cyber security	Text and Speech Analysis	Supply Chain Management	Conversational Systems
Business Analytics	Storage Technologies	Quantum Computing	Optimization Techniques	IT Project Management	Social Text and Media Analytics
Image and Video Analytics	Software Defined Networks	Cryptocurrency and Blockchain Technologies	Game Theory	Entrepreneurship Development	Marketing Research and Marketing Management
Computer Vision	Stream Processing	Game Development	Cognitive Science	Introduction to Innovation, IP Management and Entrepreneurship	Risk Analytics
Big Data Analytics	Security and Privacy in Cloud	3D Printing and Design	Ethics and AI	Behavioral Economics	Enterprise Security

Registration of Professional Elective Courses from Verticals:

Refer to the Regulations 2021, Clause 6.3. (Amended on 27.07.2023)

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PROFESSIONAL ELECTIVE COURSES: VERTICALS

VERTICAL 1: DATA SCIENCE

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	CCS346	Exploratory Data Analysis	PEC	2	0	2	4	3
2.	CCS360	Recommender Systems	PEC	2	0	2	4	3
3.	CCS355	Neural Networks and Deep Learning	PEC	2	0	2	4	3
4.	CCS369	Text and Speech Analysis	PEC	2	0	2	4	3
5.	CCW331	Business Analytics	PEC	2	0	2	4	3
6.	CCS349	Image and Video Analytics	PEC	2	0	2	4	3
7.	CCS338	Computer Vision	PEC	2	0	2	4	3
8.	CCS334	Big Data Analytics	PEC	2	0	2	4	3

VERTICAL 2: CLOUD COMPUTING AND DATA CENTER TECHNOLOGIES

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	CCS335	Cloud Computing	PEC	2	0	2	4	3
2.	CCS372	Virtualization	PEC	2	0	2	4	3
3.	CCS336	Cloud Services Management	PEC	2	0	2	4	3
4.	CCS341	Data Warehousing	PEC	2	0	2	4	3
5.	CCS367	Storage Technologies	PEC	3	0	0	3	3
6.	CCS365	Software Defined Networks	PEC	2	0	2	4	3
7.	CCS368	Stream Processing	PEC	2	0	2	4	3
8.	CCS362	Security and Privacy in Cloud	PEC	2	0	2	4	3

VERTICAL 3: EMERGING TECHNOLOGIES

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	CCS333	Augmented Reality/Virtual Reality	PEC	2	0	2	4	3
2.	CCS361	Robotic Process Automation	PEC	2	0	2	4	3
3.	CCS355	Neural Networks and Deep Learning	PEC	2	0	2	4	3
4.	CCS340	Cyber Security	PEC	2	0	2	4	3
5.	CCS359	Quantum Computing	PEC	2	0	2	4	3
6.	CCS339	Cryptocurrency and Blockchain Technologies	PEC	2	0	2	4	3
7.	CCS347	Game Development	PEC	2	0	2	4	3
8.	CCS331	3D Printing and Design	PEC	2	0	2	4	3

VERTICAL 4: ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	CCS350	Knowledge Engineering	PEC	2	0	2	4	3
2.	CCS364	Soft Computing	PEC	2	0	2	4	3
3.	CCS355	Neural Networks and Deep Learning	PEC	2	0	2	4	3
4.	CCS369	Text and Speech Analysis	PEC	2	0	2	4	3
5.	CCS357	Optimization Techniques	PEC	2	0	2	4	3
6.	CCS348	Game Theory	PEC	2	0	2	4	3
7.	CCS337	Cognitive Science	PEC	2	0	2	4	3
8.	CCS345	Ethics and AI	PEC	2	0	2	4	3