

CURRICULUM & SYLLABUS



CHOICE BASED CREDIT SYSTEM (CBCS)

FOR

BACHELOR OF TECHNOLOGY (B.Tech.)

(4 Year Undergraduate Degree Programme)

IN

COMPUTER SCIENCE AND ENGINEERING

In Data Science and Artificial Intelligence in association with IBM

(In Alignment with National Education Policy, 2020)

[w. e. f. 2023-2024]

**FACULTY OF ENGINEERING AND TECHNOLOGY
SRM UNIVERSITY DELHI-NCR, SONEPAT
39, Rajiv Gandhi Education City, Sonapat Haryana-131029**

COURSE CURRICULUM

BACHELOR OF TECHNOLOGY (COMPUTER SCIENCE AND ENGINEERING) SPECIALIZATION: DATASCIENCE & ARTIFICIAL INTELLIGENCE DEGREE COURSE

TABLE 5: PROGRAMME COURSES CREDIT STRUCTURE SEMESTER WISE

SEMESTER – I

S.No	Code	Category	Course Name	Hours per week				Credits
				L	T	P	Total Hours	
Theory								
1	23AS101	(BAS)	Engineering Mathematics-I	3	1	0	4	4
2	23AS102/ 23AS103	(BAS)	Engineering Physics/Engineering Chemistry	3	1	0	4	4
3	23EE101/ 23EC101	(ES)	Basic Electrical Engineering /Basic Electronics Engineering	3	0	0	3	3
4	23ME101/ 23CS101	(ES)	Engineering Mechanics / Fundamentals of Computer & C Programming	3	0	0	3	3
5	23AEC101	(AEC)	Professional English (*50% of students will be offered)	2*	0	0	2*	2*
6	23AEC102/ 23AEC103/ 23AEC104	(AEC)	Hindi-I/German-I/French-I	2	0	0	2	2
7	23VAC101/2 3VAC102	(VAC)	Environmental Bioengineering/ Indian Constitution and Polity	2	0	0	2	2
Total Credits (Theory)				16/18	2	0	18/20	18/20
Practical								
8	23AS152/23AS153	(BAS)	Engineering Physics Lab/Engineering Chemistry Lab	0	0	2	2	1
9	23EE151/23EC151	(ES)	Basic Electrical Engineering Lab /Basic Electronics Engineering Lab	0	0	2	2	1
10	23ME151/23 CS151	(ES)	Basic Mechanical Engineering Lab/ C Programming Lab	0	0	2	2	1
11	23ME152/23 ME153	(ES)	Mechanical Workshop Lab /Engineering Graphics & Design Lab	0	0	2	2	1
12	23AEC151*	(AEC)	Communication English Lab (50% of students will be offered)	0	0	2*	2*	1*
12	23CAM101	P	Industry Session-I	0	0	2	2	1
Total Credits (Practical)				0	0	10/12	10/12	5/6
	Total Credits (Theory + Practical)			16/18	2	10/ 10	28/ 32	23/26

[L= Lecture, T = Tutorials, P = Practical's & C = Credits]

***3 Week long Induction Programme right at the start of the 1st Semester. Normal class start only after the induction programme is over.**

BACHELOR OF TECHNOLOGY (COMPUTER SCIENCE AND ENGINEERING)
SPECIALIZATION: DATASCIENCE & ARTIFICIAL INTELLIGENCE DEGREE COURSE
PROGRAMME COURSES STRUCTURE SEMESTER WISE

SEMESTER – II

SL.No	Code	Category	Course Name	Hours per week				Credits
				L	T	P	Total Hours	
Theory								
1	23AS0201	(BAS)	Engineering Mathematics-II	3	1	0	4	4
2	23AS0202/ 23AS0203	(BAS)	Engineering Physics/ Engineering Chemistry	3	1	0	4	4
3	23EE0201/ 23EC0201	(ES)	Basic Electrical Engineering /Basic Electronics Engineering	3	0	0	3	3
4	23ME0201/2 3CS0201	(ES)	Engineering mechanics / Fundamentals of Computer & C Programming	3	0	0	3	3
5	23AEC0201	(AEC)	Professional English (*50% of students will be offered)	2*	0	0	2*	2*
6	23AEC 202/23AEC203/ AEC204	(AEC)	Hindi-II/German-II/French-II	2	0	0	2	2
7	23VAC201/2 3VAC 202	(VAC)	Environmental Bioengineering / Indian Constitution and Polity	2	0	0	2	2
Total Credits (Theory)				16/18	2	0	18/20	18/20
Practical								
8	23AS0252/23 AS0253	(BAS)	Engineering Physics Lab/Engineering Chemistry Lab	0	0	2	2	1
9	23EE0251/2 3EC0251	(ES)	Basic Electrical Engineering Lab /Basic Electronics Engineering Lab	0	0	2	2	1
10	23ME251/23 CS251	(ES)	Basic Mechanical Engineering Lab/ C Programming Language Lab	0	0	2	2	1
11	23ME0251/2 1ME0252	(ES)	Mechanical Workshop Lab/Engineering Graphics & Design Lab	0	0	2	2	1
12	23AEC151*	(AEC)	Communication English Lab (50% of students will be offered)	0	0	2*	2*	1*
12	23CAM201	P	Industry Session-II	0	0	2	2	1
Total Credits (Practical)				0	0	0/12	10/12	5/6
Total Credits (Theory + Practical)				16/ 18	2 10/12		28/32	23/26

BACHELOR OF TECHNOLOGY (COMPUTER SCIENCE AND ENGINEERING)
SPECIALIZATION: DATASCIENCE & ARTIFICIAL INTELLIGENCE DEGREE COURSE
PROGRAMME COURSES SRUCTURE SEMESTER WISE

SEMESTER – III

COURSE CODE	COURSE	CATEGORY	HOURS PER WEEK				CREDITS
			L	T	P	TOTAL HOURS	
Theory							
23AS301	Engineering Mathematics-III	BAS	3	0	0	3	3
23CAM2009	Python Programming	PC	3	0	0	3	3
23CS2001	Data Structures Using C	PC	3	0	0	3	3
23CS2005	Database Management Systems	PC	3	0	0	3	3
23CSPExxx	Professional Elective-I	PE	3	1	0	4	4
Total (Theory)			14	1	0	15	15
Practical							
23CAM2115	Python Programming Lab	P	0	0	2	2	1
23CS2113	Data Structures Using C lab	P	0	0	2	2	1
23CS2111	Database Management Systems Lab	P	0	0	2	2	1
23VAC103	Sports, Yoga & Fitness	VAC	1	0	2	3	2
23CAM2117	Industry Session : Data Science	P	0	0	2	2*	1
Total (Practical)			1	0	10	11	6
Skill Enhancement Course							
	Digital Marketing	SEC	0	0	2	2	1
23SS351	Effective Communication Skills	SEC	0	0	2	2	1
Total (Skill Enhancement)			0	0	4	4	2
Total (Theory + Practical+ Skill Enhancement)			15	1	14	30	23

NOTE: At the end of the semester, students will undergo a training and create a project which will be evaluated in the next semester (Live Project-I)

BACHELOR OF TECHNOLOGY (COMPUTER SCIENCE AND ENGINEERING)
SPECIALIZATION: DATASCIENCE & ARTIFICIAL INTELLIGENCE DEGREE COURSE
PROGRAMME COURSES SRUCTURE SEMESTER WISE

SEMESTER – IV

COURSE CODE	COURSE	CATEGORY	HOURS PER WEEK				CREDITS
			L	T	P	TOTAL HOURS	
Theory							
23MDC401	Multidisciplinary Elective-I	MDC	3	0	0	3	3
23CAM2004	Cloud Application Development	PC	2	0	0	2	2
23CAF2006	Agile Development Methodology	PC	2	0	0	2	2
23CSPEXXX	Professional Elective-II	PE	3	1	0	4	4
23CS2006	Operating Systems	PC	3	0	0	3	3
23CSPEXXX	Professional Elective-III	PE	3	0	0	3	3
Total (Theory)			16	1	0	17	17
Practical							
23CAM2120	Cloud Application Development Lab	P	0	0	2	2	1
23CAF2118	Agile Development Lab	P	0	0	2	2	1
23CS2114	Operating Systems Lab	P	0	0	2	2	1
23CSPEXXX	Professional Elective-III Lab	PE	0	0	2	2	1
Total (Practical)			0	0	8	8	4
Skill Enhancement Course							
	Introduction to SPSS	SEC	0	0	2	2	1
23SS452	Teamwork & Interpersonal Skills	SEC	0	0	2	2	1
23CS0204	Live Project-I and Industrial Visit	LP**	0	0	2	2*	1
Total (Skill Enhancement)			0	0	6	5	3
Total (Theory + Practical+ Skill Enhancement)			16	1	14	30	24

NOTE: At the end of the semester, students will undergo a training and create a project which will be evaluated in the next semester (Live Project-II)

**** To be evaluated in current semester.**

BACHELOR OF TECHNOLOGY COMPUTER SCIENCE AND ENGINEERING
SPECIALIZATION: DATA SCIENCE & ARTIFICIAL INTELLIGENCE DEGREE COURSE
PROGRAMME COURSES STRUCTURE SEMESTER WISE

SEMESTER – V

COURSE CODE	COURSE	CATEGORY	HOURS PER WEEK				CREDITS
			L	T	P	TOTAL HOURS	
Theory							
23MDC501	Multidisciplinary Elective-II	MDC	3	0	0	3	3
23CAM3001	Machine Learning Using R	PC	3	0	0	3	3
23CAF3005	Essentials of Hadoop	PC	2	0	0	2	2
23CSPEXXX	Professional Elective-IV	PE	3	1	0	4	4
23CSPEXXX	Professional Elective-V	PE	3	1	0	4	4
Total (Theory)			14	2	0	16	16
Practical							
23CAM3115	Machine Learning Using R Lab	P	0	0	2	2	1
23CAF3113	Hadoop Lab	P	0	0	2	2	1
23CSPEXXX	Professional Elective-V Lab	PE	0	0	2	2	1
23CSPEXXX	Professional Elective-IV Lab	PE	0	0	2	2	1
23CS0303	Live Project-II & Industrial Visit	LP**	0	0	2	2	1
Total (Practical)			0	0	10	10	5
Skill Enhancement Course							
	Introduction to Hardware Description Language	SEC	0	0	2	2	1
23SS553	Presentation Skills	SEC	0	0	2	2	1
Total (Skill Enhancement)			0	0	4	4	2
Total (Theory + Practical+ Skill Enhancement)			14	2	14	30	23

NOTE: At the end of the semester, students will undergo a training and create a project which will be evaluated in the next semester (Live Project-III)

**** To be evaluated in current semester.**

BACHELOR OF TECHNOLOGY (COMPUTER SCIENCE AND ENGINEERING)
SPECIALIZATION: DATASCIENCE & ARTIFICIAL INTELLIGENCE DEGREE COURSE
PROGRAMME COURSES STRUCTURE SEMESTER WISE

SEMESTER – VI

COURSE CODE	COURSE	CATEGORY	HOURS PER WEEK				CREDITS
			L	T	P	TOTAL HOURS	
Theory							
23CAM3002	Artificial Intelligence	PC	3	0	0	3	3
23CAF3010	NoSQL and MongoDB	PC	3	0	0	3	3
23CSPEXXX	Professional Elective-VI	PE	3	0	0	3	3
23CSPEXXX	Professional Elective-VII	PE	3	1	0	4	4
23MDCXX	Multidisciplinary Elective-III	MDC	3	0	0	3	3
Total (Theory)			15	1	0	16	16
Practical							
23CAM3116	Artificial Intelligence Lab	P	0	0	2	2	1
23CAF3012	NoSQL and MongoDB Lab	P	0	0	2	2	1
23CSPEXXX	Professional Elective-VI lab	PE	0	0	2	2	1
23CAM3014	Industry Session : Deep Learning	P	0	0	2	2	1
23CS0304	Live Project-III & Industrial Visit	LP**	0	0	2	2	1
Total (Practical)			0	0	10	10	5
Skill Enhancement Course							
	Wearable Technologies	SEC	0	0	2	2	1
23SS654	Professional Skills	SEC	0	0	2	2	1
Total (Skill Enhancement)			0	0	4	4	2
Total (Theory + Practical+ Skill Enhancement)			15	1	14	30	23

NOTE: At the end of the semester, students will undergo a training and create a project which will be evaluated in the next semester (Live Project-IV)

**** To be evaluated in current semester.**

BACHELOR OF TECHNOLOGY (COMPTER SCIENCE AND ENGINEERING)
SPECIALIZATION: DATASCIENCE & ARTIFICIAL INTELLIGENCE DEGREE COURSE
PROGRAMME COURSES SRUCTURE SEMESTER WISE

SEMESTER – VII

COURSE CODE	COURSE	CATEGORY	HOURS PER WEEK				CREDITS
			L	T	P	TOTAL HOURS	
Theory							
23CAM4003	Quantum Computing	PC	3	1	0	4	4
23CAF4005	Data Science (Predictive Analysis)	PC	3	1	0	4	4
23CS4001	Deep Learning	PC	3	1	0	4	4
23CSPEXXX	Professional Elective-VIII	PE	3	1	0	4	4
Total (Theory)			12	4	0	16	16
Practical							
23CAM4007	Quantum computing Lab	P	0	0	2	2	1
23CAF4009	Data Science Lab	P	0	0	2	2	1
23CAM4011	Industry Session : Block Chain	P	0	0	2	2	1
23CS4115	Live Project-IV & Industrial Visit	LP**	0	0	2	2	1
23CS4117	Minor Project	LP	0	0	8	8(4)*	4
Total (Practical)			0	0	16	12	8
Skill Enhancement Course							
23SS756	Interpersonal Skills : Strategies	SEC	0	0	2	2	1
Total (Skill Enhancement)			0	0	2	2	1
Total (Theory + Practical+ Skill Enhancement)			9	4	18	30	25

* Teaching Load

** To be evaluated in current semester.

BACHELOR OF TECHNOLOGY (COMPUTER SCIENCE AND ENGINEERING)
SPECIALIZATION: DATASCIENCE & ARTIFICIAL INTELLIGENCE DEGREE COURSE
PROGRAMME COURSES SRUCTURE SEMESTER WISE

SEMESTER – VIII

COURSE CODE	COURSE	CATEGORY	HOURS PER WEEK				CREDITS
			L	T	P	TOTAL HOURS	
Practical							
23CS4114	Major Project*	LP/ SI	0	0	24	24	12
Total (Theory + Practical+ Skill Enhancement)			0	0	24	24	12

* To be monitored at the Institute Level

**Teaching Load

LIST OF ABILITY ENHANCEMENT COURSES

Course Code	Course	Category	L	T	P	Credits
23AEC101/23AEC151	Professional English/Communicative English Lab	AEC	2	0	2	3
23AEC102/ 23AEC103/ 23AEC104	Hindi-I/FRENCH-I/GERMAN-I	AEC	2	0	0	2
23AEC202/ 23AEC203/ 23AEC204	Hindi-II/ FRENCH-II/GERMAN-II	AEC	2	0	0	2

LIST OF SKILL ENHANCEMENT COURSES

Course Code	Course	Category	L	T	P	Credits
TECHNICAL TRAINING						
	Digital Marketing	SEC	0	0	2	1
	Introduction to SPSS	SEC	0	0	2	1
	Introduction to Hardware Description Language	SEC	0	0	2	1
	Wearable Technologies	SEC	0	0	2	1
SOFT SKILL						
23SS351	Effective Communication Skills	SEC	0	0	2	1
23SS452	Teamwork & Interpersonal Skills	SEC	0	0	2	1
23SS553	Presentation Skills	SEC	0	0	2	1
23SS654	Professional Skills	SEC	0	0	2	1
23AR755	Aptitude and Reasoning	SEC	0	0	2	1

LIST OF VALUE ADDED COURSES

Course Code	Course	Category	L	T	P	C
23VACXX	Environment Bioengineering	VAC	2	0	0	2
23VACXX	Indian Constitution and Polity	VAC	2	0	0	2
23VACXX	Sports, Yoga and Fitness	VAC	2	0	0	2

LIST OF MULTIDISCIPLINARY COURSES (HUMANITIES & SOCIAL SCIENCES COURSES) (HSS)

Code	Category	Course	L	T	P	C
23MDCXXX/ 23MDCXXX/ 23MDCXXX/ 23MDCXXX/ 23MDCXXX	MDC-I	Statistical Methods Environment Geoscience & Disaster Management IPR in Business Library Information Science & Media Literacy Management Process & Organizational Behaviour	3	0	0	3
23MDCXXX/ 23MDCXXX/ 23MDCXXX/ 23MDCXXX/ 23MDCXXX	MDC-II	Photonics Chemistry & Society Psychology and Emotional Intelligence Indian Economy Creating an Entrepreneurial Mind	3	0	0	3
23MDCXXX/ 23MDCXXX/ 23MDCXXX/ 23MDCXXX	MDC-III	Life Sciences & Public Health Electoral Literacy in India Personal Financial Planning Interior Design	3	0	0	3

LIST OF DEPARTMENTAL ELECTIVE COURSES

1. Specialization-I

Elective	Course Code	Course	Category	L	T	P	C
I	23CSPE2007	Computer Architecture & Organization	PE	3	1	0	4
II	23CSPE2004	Theory of Computation	PE	3	1	0	4
III	23CSPE2008/ 23CSPE2118	Analysis and Design of Algorithms /ADA Lab	PE	3	0	1	4
IV	23CSPE3001/ 23CSPE3117	Compiler Design/CD Lab	PE	3	1	1	5
V	23CSPE3003/ 23CSPE3113	Computer Networks/CN Lab	PE	3	1	1	5
VI	23CSPE3004/ 23CSPE3118	Software Engineering/SE Lab	PE	3	0	1	4
VII	23CSPE3030	Neural Networks & Fuzzy Logic	PE	3	1	0	4
	23CSPE3038	Business Intelligence	PE	3	1	0	4
	23CSPE3032	Cyber Security	PE	3	1	0	4
	23CSPE4037	NASSCOM Associate Analytics – II	PE	3	1	0	4
VIII	23CSPE4025	Data Warehousing & Data Mining	PE	3	1	0	4
	23CSPE4039	NASSCOM Associate Analytics – III	PE	3	1	0	4
	23CSPE4019	Network Security & Cryptography	PE	3	1	0	4

2. Specialization-II

Elective	Course Code	Course	Category	L	T	P	C
I	23CSPE2007	Computer Architecture & Organization	PE	3	1	0	4
II	23CSPE2004	Theory of Computation	PE	3	1	0	4
III	23CSPE2008/23CSPE2118	Analysis and Design of Algorithms /ADA Lab	PE	3	0	1	4
IV	23CSPE3001/23CSPE3117	Compiler Design/CD Lab	PE	3	1	1	5
V	23CSPE3003/23CSPE3113	Computer Networks/CN Lab	PE	3	1	1	5
VI	23CSPE3004/ 23CSPE3118	Software Engineering/SE Lab	PE	3	0	1	4
VII	23CSPE3024	Software Project Management	PE	3	1	0	4

	23CSPE3028	Object Oriented Analysis & Design	PE	3	1	0	4
	23CSPE3034	Design Thinking	PE	3	1	0	4
VIII	23CSPE4033	Software Testing	PE	3	1	0	4
	23CSPE4031	Open Source Software	PE	3	1	0	4

3. Specialization-III

Elective	Course Code	Course	Category	L	T	P	C
I	23CSPE2007	Computer Architecture & Organization	PE	3	1	0	4
II	23CSPE2004	Theory of Computation	PE	3	1	0	4
III	23CSPE2008/23CSP E2118	Analysis and Design of Algorithms /ADA Lab	PE	3	0	2	4
IV	23CSPE3001/23CSP E3117	Compiler Design/CD Lab	PE	3	1	2	5
V	23CSPE3003/23CSP E3113	Computer Networks/CN Lab	PE	3	1	2	5
VI	23CSPE3004/23CSPE3118	Software Engineering/SE Lab	PE	3	0	2	4
VII	23CSPE3020	Distributed Operating System	PE	3	1	0	4
	23CSPE3026	Grid Computing	PE	3	1	0	4
	23CSPE3040	Internet of Things	PE	3	1	0	4
VIII	23CSPE4023	Wireless Adhoc and Sensor Network	PE	3	1	0	4
	23CSPE4035	Advanced Java Programming	PE	3	1	0	4
	23CSPE4027	Mobile Computing	PE	3	1	0	4