SAHRDAYA AUTONOMOUS
COLLEGE OF ENGINEERING & TECHNOLOGY
A CENTRE OF EXCELLENCE IN SCIENCE & TECHNOLOGY | MANAGED BY IRINJALAKUDA DIOCESAN EDUCATION TRUST
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B. Tech

Curriculum (2024) - Semester I to VIII

Computer Science and Engineering

Branch Code: CSE

(SHR/AC/Auto/Acad. Council/B.Tech/2/Curri. /CSE/R1)

Recommended by BoS on 30/08/2024

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Preface to the Curriculum

The B.Tech Computer Science and Engineering (CSE) curriculum is meticulously crafted to cultivate industry-ready professionals endowed with creativity and innovative thinking. This comprehensive curriculum encompasses various components, including induction programs, core and elective courses, practical courses, projects, internships, skill enhancement courses, and extracurricular activities. Designed to total 170 credits, the curriculum ensures a holistic education that prepares students for the dynamic field of Computer Science & Engineering. Below is a detailed overview of the curriculum's salient features:

1. **Project-Based Learning Courses:** From the first semester to the fifth semester, one course integrated with Project-Based Learning (PBL) empowers students with autonomy, engaging them in meaningful projects to learn, explore, and investigate. PBL promotes teamwork and collaboration, essential skills for any professional, by having students work together in teams, each contributing unique skills and perspectives to achieve a common goal.

2. **Skill Enhancement Courses**: These courses are designed to provide students with industry-relevant certifications from reputed organizations, enhancing their employability by certifying their skill sets. They are integral to the academic curriculum and offered from Semester 1 to Semester 5, each carrying one credit.
3. **Foreign Language Courses**: To prepare students for global careers, the curriculum includes options to learn foreign languages, promoting cross-cultural communication skills and international collaboration. These courses are available in the seventh semester.
4. **Program Electives and Micro Specializations**: Students can pursue micro-specializations by completing thematic courses, which allow them to gain in-depth knowledge in specific sub-areas of their discipline. Starting in the fourth semester, this provides an opportunity for focused learning and expertise in emerging fields in alignment with program elective courses.
5. **Industry Elective Courses**: Offered jointly with industry partners, these courses ensure relevance and practical applicability. The academic department and industry partners develop and assess them collaboratively, without end-semester examinations, ensuring continuous and practical learning experiences.
6. **Startups and Entrepreneurial Skills**: The curriculum encourages students to pursue startups, offering options to engage in product-based or service-based startups during their seventh and eighth semesters. This fosters innovation, creativity, and entrepreneurial skills, preparing students for the dynamic business environment.
7. **Courses Embedded with Practical**: The curriculum includes theory courses embedded with practical and projects, ensuring that students apply theoretical

knowledge to real-world problems. This hands-on approach enhances learning outcomes and practical skills.

8. **Internships**: The program includes mandatory internships, allowing students to gain industry exposure and practical experience. Students can undertake at least four to six months of internship in a recognized industry, research organization, or prestigious institution relevant to their field. This bridges the gap between academic learning and industry requirements, enhancing employability.
9. **Community Work, Social Responsibility, and Universal Human Value Courses**: The curriculum integrates opportunities for community work and socially relevant projects, promoting civic responsibility and leadership skills. Universal Human Value courses also aim to cultivate a holistic understanding of life, enhancing physical and mental well-being, social skills, and life skills. These courses address various dimensions of life, including individual, family, society, and the environment, promoting a healthy and harmonious lifestyle.
10. **Activity Points**: In addition to academic credits, students must earn activity points through participation in extracurricular activities such as sports, cultural events, community service, and entrepreneurship. This holistic approach ensures the development of leadership, teamwork, and communication skills, preparing students for global challenges.
11. **MOOC Courses:** Students selected for internships can fulfil their credit requirements in the seventh and eighth semesters through MOOC courses, providing flexibility and additional learning opportunities.
12. **Higher Credit Elective:** These courses carry more than the standard credit weight of elective courses. They allow students pursuing honors to reduce the number of required courses by earning additional credits through higher-credit electives. Additional credits earned from higher credit electives can be credited towards the total credit requirement of the honors program, with a maximum of 12 additional credits being applied towards the honors credit requirement.

This curriculum is designed to seamlessly blend theoretical knowledge with practical experience, foster interdisciplinary learning, and enhance employability through hands-on projects and internships, thereby preparing students for successful careers in Computer Science & Engineering.

General Course Structure

1. Credit and Courses:

Credits are a unit of measurement for coursework and are based on the number of hours of instruction required per week. One hour of classroom lecture (L) that is 60 minutes long per week carried out during all weeks of the semester, is considered one Instructional Unit or one Credit. The same goes for a tutorial (T) or a project (R) that is 60 minutes long per week and carried out during all weeks of the semester. In addition, a minimum of 120 minutes per week of laboratory session, practical or fieldwork, training (P) or a combination of these, carried out during all weeks of the semester, is also

considered one Instructional Unit or one Credit.

Classification	Credit assigned
1 Hour Lecture [L] per week	1 Credit
1 Hour Tutorial [T] per week	1 Credit
1 Hour Project [R] per week	1 Credit
1-2 Hours Practical [P] per week	1 Credit
3-4 Hours Practical [P] per week	2 Credit

- *For internship/Start-Up/Main project/Mini project, the credit weightage for equivalent hours is 50% of that for lectures/tutorials*

The B.Tech. program curriculum has a total of 168 academic credits and 2 additional pass/fail credits that can be gained through 100 activity points. The program is expected to accommodate courses from other disciplines so that students have multi-disciplinary exposure. Additionally, the program should provide sufficient opportunities for students to enhance their communication, soft, managerial, and technical skills. Depending on the program, the courses should fall under the engineering, basic science, humanities science, and management categories. The structure of the UG program should essentially have the following categories of courses with the breakup of credits as given:

Sl. No	Category	Code	Credits
1	Humanities and Social Sciences including Management Courses	HMC	9
2	Basic Science Courses	BSC	20
3	Engineering Science Courses	ESC	26
4	Programme (Professional) Core Courses	PCC	52
5	Programme (Professional) Core Courses-Project Based Learning	PBL	16
6	Program Elective Courses	PEC	18
7	Open Elective Courses/Industry Linked Elective	OEC/ILE	9
8	Project Work and Seminar	PS	12
9	UHV and Community Work	PW	1
10	Skill Enhancement Courses	SEC	5
11	Mandatory Student Activities.	MSA	2
	Total Mandatory Credits	**170**	

A 10% to 15 % deviation in credits is permitted under each discipline. While developing the curriculum, the department offering the program should ensure that the students attain the above distribution upon completing their program. Either Minor or Honors can be opted from the optional specialization.

The courses are organized into 1/2/3/4 credit courses based on the content delivery mechanism and desired depth of the course. The delivery methods include Theory-only,

Theory with tutorial, Theory with practice, Theory with project etc. The L-T-P-R notation for each course signifies the allocation of hours for content delivery in terms of Lecture (L), Tutorial (T), Practical (P), and Project (R) per week, as well as the credit earned from the course. The L-T-P- R-C for each course indicates the number of credits delivered as Lecture (L), Tutorial (T), Practical (P), Project (R) and the total instructional delivery indicated as Credits (C).

$$C = L + T + [P/2] + R$$

Apart from lectures, tutorials, practical/practice and project hours, the curriculum offers Self-learning hours (S) that indicate the number of hours students are expected to spend for activities that should be completed outside the class defined by the faculty handling courses. The activities aim to support learning and should be initiated by the students themselves without guidance or direction from tutors. For each course, the self-learning hour per week is calculated as:

$$S= (L*1.5+T*0.5+P*0.5+R*1)$$

In line with the National Credit Framework, one credit is equivalent to 30 hours of total student engagement, which includes: Direct instructional hours (L, T, P, R) and associated self-learning hours (S)

Categories of courses included in the curriculum and their L-T-P-R-C components are given in the table below:

Sl. No.	Lecture- Tutorial- Practical- Project [L-T-P-R]	Credit [C]	Description
1.	1-0-2-0	2	Theory course without End Semester Examination [ESE]
2.	1-0-0-0	1	
3.	2-0-2-1	4	Theory course embedded with practical and project
4.	3-1-0-0	4	Theory course embedded with tutorial
5.	3-0-0-0	3	Theory course
6.	2-0-0-0	2	
7.	3-0-2-0	4	Theory course embedded with practical
8.	3-0-0-1	4	Theory course embedded with project
9.	0-0-2-0	1	Practical course without ESE
10.	0-0-3-0	2	Practical course
11.	0-0-0-3	2	Mini Project
12.	0-0-3-0	2	Seminar
13.	0-0-0-8	4	Major Project/Internship/Start-Up
14.	0-0-0-0	1	MOOC Course
Mandatory Courses			
15.	0-0-2-0	1	Skill Enhancement Courses
Minor/ Honors Course			
16.	4-0-0-0	4	Theory course

17.	0-0-0-4	4	Project only course

3. Course Code

Every course of B. Tech. The program shall take a code from the table given below.

Course category	Description
PCC	Program (Professional) Core Courses
PBL	Project Based Learning
CLT	Combined Lab Theory
PEC	Professional Elective Course
OEC	Open Elective Course
BSC	Basic Science Course
ESC	Engineering Science Course
HMC	Humanities, Social Sciences and Management course
MOOC	MOOC Course
IEL	Industry Elective Course
PW	Socially Relevant course
PS	Project Work and Seminar
SEC	Skill Enhancement Courses
HR	Honours
MR	Minor

Structure of Course Code: Each course will be identified by a unique Course Code consisting of eight alphanumeric characters, formatted as **24XXYABC**. The code can be interpreted as follows: "24" represents the regulation year, "XX" is the course category code, "Y" indicates the course delivery mode, "A" is the semester number (ranging from 1 to 8, with 0 indicating the course is offered in both odd and even semesters), "B" denotes the version of the course under each category, and "C" signifies the course sequence number. For example, 24CET303 is a theory course offered by the civil engineering department in the third semester of the 2024 scheme.

24BML408 - laboratory course offered by the biomedical engineering department in the fourth semester of the 2024 scheme

The detailed expansion of the abbreviation of the course code structure is listed in the table below:

XX	Y	A	B	C
Course category	Course delivery mode	Semester No	Version of the course	Serial No: of course
BM-Biomedical Engineering BT-Biotechnology	T-Theory L-Laboratory R-Theory			

CE – Civil Engineering CS-Computer Science Engineering EC-Electronics and Communication Engineering EE-Electrical and Electronics Engineering MA-Mathematics CY – Chemistry PH-Physics ES-Engineering Science course HU-Humanities and Management Courses SE-Skill Enhancement Courses PW-Social Science and Community work	Embedded with Project K-Certification Course E-Elective Course H-Honour M-Minor O-Open Elective I-Industry Elective S-Seminar P-Project N-Internship U-Start Up C – Theory Embedded with practical	0 1 2 3 etc.	1 2 3 etc.	1 2 3 4 5 6 etc.

Syllabus Revision (R#):

• If a syllabus is amended or modified, a revision identifier will be appended to the course code in the format R#, where # represents the revision number.

• A maximum of three revisions (R1, R2, R3) are allowed for a course within a single regulation period.

• For example, 24CET303R1 indicates the first revision of the original course 24CET303, reflecting an updated or amended syllabus under the 2024 regulation.

4. Allotted and Cumulative Credits

The allotted and cumulative credits are given in the table below:

Semester	Allotted Credits	Cumulative Credits
First	21	-
Second	22	43
Third	25	68
Fourth	25	93
Fifth	24	117
Sixth	23	140
Seventh	17	157
Eighth	11	168

FIRST SEMESTER (July-December)													
10 Days Compulsory Induction Program													
Sl. No:	**Slot**	**Course Code**	**Course Type**	**Course Title (Course Name)**	**Credit Structure**				**Total Marks**		**Credits**	**Hrs./ Week**
					L	**T**	**P**	**R**	**CIA**	**ESE**		
1	A	24MAT111	BSC	Calculus & Linear Programming	3	0	0	0	40	60	3	3
2	B	24PHT112	BSC-CLT	Physics for Information Science	3	0	2	0	50	50	4	5
3	C	24EST003	ESC	Engineering Graphics	3	0	0	0	40	60	3	3
4	D	24EST104R1	ESC	Foundations of Computing	3	0	0	0	40	60	3	4
5	F	24ESR105	ESC-PBL	Algorithmic Thinking with Python	2	0	2	1	50	50	4	5
6	I*	24HUT006	HMC	Professional Ethics and Sustainable Development	1	0	2	0	100	---	2	3
7	L	24ESL007	ESC	Computer Aided Drawing (CAD) & Manufacturing Workshop	0	0	2	0	50	---	1	2
8	J*	24SEK10N	SEC	Skill Enhancement Course 1							1	
Total											**21**	**25**

SECOND SEMESTER (January-June)												
Sl. No:	**Slot**	**Course Code**	**Course Type**	**Course Title (Course Name)**	**Credit Structure**				**Total Marks**		**Credits**	**Hrs./ Week**
					L	**T**	**P**	**R**	**CIA**	**ESE**		
1	A	24MAT211	BSC	Linear Algebra	3	0	0	0	40	60	3	3
2	B	24CYT012	BSC-CLT	Engineering Chemistry	3	0	2	0	50	50	4	5
3	C	24EST023	ESC	Fundamentals of Electrical & Electronics Engineering	4	0	0	0	40	60	4	4
4	D	24ESC204	ESC	Programming in C	3	0	2	0	40	60	4	5
5	E	24CSR205	PCC-PBL	Digital System Design	3	0	0	1	50	50	4	4
6	L	24ESL006	ESC	Basic Electrical and Electronics Engineering Workshop	0	0	2	0	50	---	1	2
7	I*	24HUT007	HMC	Communicative English	0	0	2	0	100	--	1	2
8	J*	24SEK10N	SEC	Skill Enhancement Course 2							1	
Total											**22**	**25**

No Grade Points will be awarded for the MOOC, I and J slot courses.
The self-learning (S) hours for each course is calculated based on the formulae, S= (L*1.5+T*0.5+P*0.5+R*1)

THIRD SEMESTER(July-December)												
Sl. No:	**Slot**	**Course Code**	**Course Type**	**Course Title (Course Name)**	**Credit Structure**				**Total Marks**		**Credits**	**Hrs./Week**
					L	**T**	**P**	**R**	**CIA**	**ESE**		
1	A	24MAT311	BSC	Discrete Mathematics & Probability Theory	3	0	0	0	40	60	3	3
2	B	24CST302	PCC	Theory of Computation	3	1	0	0	40	60	4	4
3	C	24CST303	PCC	Data Structures and Algorithms	3	1	0	0	40	60	4	4
4	D	24CSR304	PCC-PBL	Object Oriented Programming	3	0	0	1	50	50	4	4
5	E	24EST315	ESC	Computer Organization and Architecture	4	0	0	0	40	60	4	4
6	L	24CSL306	PCL	Data Structure Lab	0	0	3	0	50	50	2	3
7	Q	24CSL307	PCL	Hardware Lab	0	0	3	0	50	50	2	3
8	I*	24PWT208	PW	UHV II, Life Skill and Community Work	1	0	0	0	100	-	1	1
9	J*	24SEK10N	SEC	Skill Enhancement Course 3							1	
10	R/M	24CSG3XX	VAC	Remedial/Minor/Course							4*	4*
Total											**25/29***	**26/30***

FOURTH SEMESTER (January-June)											
Sl. No:	**Slot**	**Course Code**	**Course Type**	**Course Title (Course Name)**	**Credit Structure**				**Total Marks**		**Credits**	**Hrs./ Week**
					L	**T**	**P**	**R**	**CIA**	**ESE**		
1	A	24MAT411	BSC	Graph Theory	3	0	0	0	40	60	3	3
2	B	24CST402	PCC	Operating System	3	1	0	0	40	60	4	4
3	C	24CST403	PCC	Design and Analysis of Algorithms	3	1	0	0	40	60	4	4
4	D	24CSE404	PCC-PBL	Database Management System	3	0	0	1	50	50	4	4
5	E	24HUT005	HMC	Engineering Economics	2	0	0	0	50	50	2	2
6	F	24CSE41N	PE	PE-1	3	0	0	0	40	60	3	3
7	L	24CSL207	PCL	Operating System Lab	0	0	3	0	50	50	2	3
8	Q	24CSL208	PCL	Database Management System Lab	0	0	3	0	50	50	2	3
9	J*	24SEK10N	SEC	Skill Enhancement Course 4							1	
10	R/ M	24CSG4XX/ 24CSH4XX	VAC	Remedial/Minor/Honours Course							4*	4*
Total											**25/ 29***	**26/ 30***

PROGRAM ELECTIVE 1: CSE41N

Slot	Course Code	Courses	L-T-P-R	Hours	Credit
F	24CSE 411	Advanced Data Structures	**3-0-0-0**	**3**	**3**
	24CSE 412	UI/UX Design	**3-0-0-0**	**3**	**3**
	24CSE 413	VLSI Design	**3-0-0-0**	**3**	**3**
	24CSE 414	Functional Programming	**3-0-0-0**	**3**	**3**
	24CSE 415	Mobile Application Development#	**2-1-0-2**	**5**	**5**

FIFTH SEMESTER (July-December)												
Sl. No:	**Slot**	**Course Code**	**Course Type**	**Course Title (Course Name)**	**Credit Structure**				**Total Marks**		**Credits**	**Hrs./ Week**
					L	**T**	**P**	**R**	**CIA**	**ESE**		
1	A	24CST501	PCC	Computer Networks	3	1	0	0	40	60	4	4
2	B	24CST502	PCC	Software Engineering	3	1	0	0	40	60	4	4
3	C	24CST503	PCC	Machine Learning	3	0	0	0	40	60	3	3
4	D	24CSR504	PCC-PBL	Data Science and Data Engineering	3	0	0	1	50	50	4	4
5	E	24CSE52N	PE	PE-2	3	0	0	0	40	60	3	3
6	I*	24HUM506	HMC	Constitution Of India	-	-	-	-	-	-	1	-
7	L	24CSL507	PCL	Machine Learning Lab	0	0	3	0	50	50	2	3
8	Q	24CSL508	PCL	Computer Networks Lab	0	0	3	0	50	50	2	3
9	J*	24SEK10N	SEC	Skill Enhancement Course 5							1	
10	R/ M/ H	24CSG5XX/ 24CSH5XX	VAC	Remedial/Minor/Honours							4*	4*
	S5/ S6	Industrial Visit (Maximum 12 Days are permitted, Not Exceedingly more than 6 Working Days) /Industrial Training										
Total											**24/ 28***	**24/ 28***

PROGRAM ELECTIVE 2: CSE52N

Slot	Course Code	Courses	L-T-P-R	Hours	Credit
E	24CSE 521	Software Project Management	**3-0-0-0**	**3**	**3**
	24CSE522	Information Security	**3-0-0-0**	**3**	**3**
	24CSE 522	Social Media Analysis	**3-0-0-0**	**3**	**3**
	24CSE 523	Deep Learning	**3-0-0-0**	**3**	**3**
	24CSE 524	Wireless & Mobile Computing	**3-0-0-0**	**3**	**3**
	24CSE 525	Advanced Database Systems	**3-0-0-0**	**3**	**3**
	24CSE 526	Web Technologies#	**2-1-0-2**	**5**	**5**

#- Higher credit electives

SIXTH SEMESTER (January-June)												
Sl. No:	**Slot**	**Course Code**	**Course Type**	**Course Title (Course Name)**	**Credit Structure**				**Total Marks**		**Credits**	**Hrs./ Week**
					L	**T**	**P**	**R**	**CIA**	**ESE**		
1	A	24CST601	PCC	Compiler Design	3	1	0	0	40	60	4	4
2	B	24CST602	PCC	High performance Computing Systems	3	0	0	0	40	60	3	3
3	C	24CSE63N	PE	PE-3	3	0	0	0	40	60	3	3
4	D	24CSC604	PCC-CLT	Computer Vision and image Processing	3	0	2	0	50	50	4	4
5	F	24EST605	ESC	Design Thinking and Product Development	2	0	0	0	50	50	2	2
6	O	24CSO61N /24CSI61N	OE/ ILE	OE/ILE-1	3	0	0	0	40	60	3	3
7	L	24CSL607	PCL	Systems Lab	0	0	3	0	50	50	2	3
8	P	24CSP608	PS	Mini Project	0	0	6	0	100	---	2	3
9	R/M /H	24CSG6XX/ 24CSH6XX	VAC	Remedial/Minor/Honours Course							4*	4*
	S5/ S6	Industrial Visit (Maximum 12 Days are permitted, Not Exceedingly more than 6 Working Days) /Industrial Training										
Total											**23/ 27***	**25/ 29***

Note: Open Electives are courses that other departments will offer.

PROGRAM ELECTIVE 3: 24CSE63N

Slot	Course Code	Courses	L-T-P-R	Hours	Credit
C	24CSE 631	Software Testing	**3-0-0-0**	**3**	**3**
	24CSE 632	Natural Language Processing	**3-0-0-0**		**3**
	24CSE 633	Block chain	**3-0-0-0**		**3**
	24CSE 634	Fundamentals of Cyber Security	**3-0-0-0**		**3**
	24CSE 635	Big Data Analytics	**3-0-0-0**		**3**
	24CSE 636	Pattern Recognition	**3-0-0-0**		**3**
	24CSE 636	Augmented Reality and Virtual Reality#	**2-1-0-2**	**5**	**5**

#- Higher credit electives

OPEN ELECTIVE 1: 24 CSO61N

Slot	Course Code	Courses	L-T-P-R	Hours	Credit
O	24CSO611	Data Structures	**3-0-0-0**	**3**	**3**
	24CSO612	Data Communication	**3-0-0-0**		**3**
	24CSO613	Foundations Of Cryptography	**3-0-0-0**		**3**
	24CSO614	Machine Learning for Engineers	**3-0-0-0**		**3**
	24CSO615	Computer Graphics	**3-0-0-0**		**3**

	24CSO616	Python For Data Science	**3-0-0-0**		**3**
	24CSO617	Cloud Computing	**3-0-0-0**		**3**

SEVENTH SEMESTER (July-December)												
Sl. No:	Slot	Course Code	Course Type	Course Title (Course Name)	Credit Structure				Total Marks		Credits	Hrs./ Week
					L	T	P	R	CIA	ESE		
1	A	24CSE74N/ 24CSM74N	PE	PE-4 (Internship Students: Self Study/MOOC Approved by the University/Online Classes)	3	0	0	0	40	60	3	3
2	B	24CSE75N/ 24CSM75N	PE	PE-5 (Internship Students: Self Study/MOOC Approved by the University/Online Classes)	3	0	0	0	40	60	3	3
3	O	24CSO72N/ 24CSI72/ 24CSM73N	OE/ ILE	OE/ILE-2 (Internship Students: Self Study/MOOC Approved by the University/Online Classes)	3	0	0	0	40	60	3	3
4	I*	24HUT704/ 24HUM70N	HMC	Elective (Internship Students: Self Study/MOOC Approved by the University/Online Classes)	2	0	0	0	50	50	2	2
5	S	24CSS705	PS	Seminar	0	0	3	0	50	0	2	3
6	P	24CSP706/ 24CSN706/ 24CSU706	PS	Option 1: Major Project Option 2: Internship (4-6 Months) Option 3: Start Up	0	0	0	8	100	0	4	8
	R/M/ H	24CSG7XX/ 24CSH7XX	VAC	Remedial/Minor/Honours Course							4*	4*
Total											**17/ 21***	**22/ 26***

**No Grade Points will be awarded for the I slot courses*
**The students can take the internship option either in 7th or in 8th semester.*
** Option 1: Work on a Project in the institute/department under the mentorship of faculty members.*
*Option 2: Full semester Internship in Industry/organization (**7th or 8th semester**)*

PROGRAM ELECTIVE 4: 24CSE74N

Slot	Course Code	Courses	L-T-P-R	Hours	Credit
B	24CSE741	Formal Methods in Software Engineering	**3-0-0-0**	3	**3**
	24CSE742	Security of Machine Learning and AI	**3-0-0-0**		**3**
	24CSE743	Cyber Forensic	**3-0-0-0**		**3**
	24CSE744	Explainable AI	**3-0-0-0**		3
	24CSE745	Embedded Systems	**3-0-0-0**		**3**
	24CSE746	Ethical Hacking#	**2-1-0-2**		**5**

PROGRAM ELECTIVE 5: 24CSE75N

Slot	Course Code	Courses	L-T-P-R	Hours	Credit
A	24CSE751	Advanced Computer Networks	**3-0-0-0**	3	**3**
	24CSE752	Responsible Artificial Intelligence	**3-0-0-0**		**3**
	24CSE753	Bioinformatics	**3-0-0-0**		**3**
	24CSE754	Digital Forensics	**3-0-0-0**		**3**
	24CSE755	Game Theory and Mechanism Design	**3-0-0-0**		**3**
	24CSE756	Programming Languages	**3-0-0-0**		**3**
	24CSE757	Internet of Things#	**3-0-0-2**	**5**	**5**

#- Higher credit electives

OPEN ELECTIVE 2: 24CSO72N

Slot	Course Code	Courses	L-T-P-R	Hours	Credit
O	24CSO721	Cyber Security	**3-0-0-0**	3	**3**
	24CSO722	Web Programming	**3-0-0-0**		**3**
	24CSO723	Software Engineering	**3-0-0-0**		**3**
	24CSO724	Computer Networks	**3-0-0-0**		**3**
	24CSO725	Web 3.0 And Block Chain	**3-0-0-0**		**3**
	24CSO726	Data Mining	**3-0-0-0**		**3**
	24CSO727	Database And Its Applications	**3-0-0-0**		**3**

HMC Elective

Slot	Sl. No	Course Code	Courses
I*	1	24HUT704	Project Management: Planning, Execution, Evaluation and Control
	2	24HUM701	Proficiency course in French. (MOOC) (B1 level)
	3	24HUM702	Proficiency Course in German (MOOC) (B1 Level)
	4	24HUM703	Proficiency Course in Spanish (MOOC) (B1Level)
	5	24HUM704	Introduction to Japanese Language and Culture (N5 level) (MOOC)

EIGHT SEMESTER (January-June)												
Sl. No:	**Slot**	**Course Code**	**Course Type**	**Course Title (Course Name)**	**Credit Structure**				**Total Marks**		**Credits**	**Hrs./ Week**
					L	**T**	**P**	**R**	**CIA**	**ESE**		
1	A	24CSE86N/ 24CSM86N	PE	PE-6 (Internship Students: Self Study/MOOC Approved by the University/Online Classes)	3	0	0	0	40	60	3	3
2	O	24CSO83N/ 24CSI83N/ 24CSO84N	OE/ ILE	OE/ILE-3 (Internship Students: Self Study/MOOC Approved by the University/Online Classes)	3	0	0	0	40	60	3	3
3	I*	24HUT803/ 24HUM803	HMC	Organizational Behavior and Business Communication (Internship Students: Self Study/MOOC Approved by the University/Online Classes)	2	0	0	0	50	50	1	2
4	P	24CSP806/ 24CSN06/ 24CSJ806/ 24CSU806	PS	Option 1: Major Project Option 2: Internship (4-6 Months) Option 3: Major Project Phase -II (For the students who have not opted for internship in S7/S8) Option 3: Start Up	0	0	0	8	100	0	4	8
	R/H	24CSH8XX	VAC	Project: Honours Course							4*	4
Total											**11/ 15***	**16/ 20**

PROGRAM ELECTIVE 6: 24CSE86N

Slot	Course Code	Courses	L-T-P-R	Hours	Credit
A	24CSE861	Quantum Computing	**3-0-0-0**	**3**	**3**
	24CSE862	Next-Generation Networks	**3-0-0-0**		**3**
	24CSE863	Software-Defined Networking (SDN)	**3-0-0-0**		**3**
	24CSE864	Large language models	**3-0-0-0**		**3**
	24CSE865	Dev-Sec Ops	**3-0-0-0**		**3**
	24CSE866	Automotive Open System Architecture Essentials	**3-0-0-0**		**3**
	24CSE867	Generative AI#	3-0-0-2	**5**	**5**

OPEN ELECTIVE 3: 24CSO83N

Slot	Course Code	Courses	L-T-P-R	Hours	Credit
O	24CSO831	Business Intelligence	**3-0-0-0**	3	3
	24CSO832	Essentials of Big Data Processing	**3-0-0-0**		3
	24CSO833	Ethical Hacking	**3-0-0-0**		3
	24CSO834	Cyber Forensics	**3-0-0-0**		3
	24CSO835	Foundations of Cybersecurity	**3-0-0-0**		3
	24CSO836	Natural language Processing	**3-0-0-0**		3
	24CSO837	Edge Computing	**3-0-0-0**		3

Micro Specialization

Micro Specialization Group ID	Specialization	Courses
G-I	Software Engineering and Testing	24CSE521 Software Project Management
		24CSE 631 Software testing
		24CSE741Formal Methods in Software Engineering
		24CSE866 Automotive Open System Architecture Essentials

HMC Courses				
Sl. No:	**Semester**	**Course Code**	**Course Area**	**Credits**
1	**S1/S2**	24HUT107	Communicative English	2
2		24HUT006	Professional ethics and Sustainable Development	2
3	**S3**	24HUT005	Engineering Economics	2
4	**S5**	24HUM506	Constitution of India. (MOOC)	1
5	**S7**	24HUT70X	Elective (Project Management/Foreign Languages)	2
6	**S8**	24HUT803	Organizational Behavior and Business Communication	1
Total Credits				**10**

BSC Courses				
Sl. No:	**Semester**	**Course Code**	**Course Area**	**Credits**
1	**S1**	24MAT111	Calculus & Linear Programming	**3**
2	**S1/S2**	24PHC112	Physics for Information Science	4
3		24CYC012	Engineering Chemistry	4
4	**S2**	24MAT211	Linear Algebra	3
5	**S3**	24MAT311	Discrete Mathematics & Probability Theory	3
6	**S4**	24MAT411	Graph Theory	3
Total Credits				**20**

ESC Courses				
Sl. No:	**Semester**	**Course Code**	**Course Area**	**Credits**
1.	**S1**	24EST003	Engineering Graphics	3
2.		24EST104	Foundations of Computing	3
3.		24ESR105	Algorithmic Thinking with Python	4
4.		24ESL007	Computer Aided Drawing (CAD) & Manufacturing Workshop	1
5.	**S2**	24EST104	Fundamentals of Electrical & Electronics Engineering	4
6.		24ESC204	Programming in C	4
7.		24ESL006	Basic Electrical and Electronics Engineering Workshop	1
8.	**S3**	24EST315	Computer Organization and Architecture	4
9.	**S6**	24EST605	Design Thinking and Product Development	2
Total Credits				**26**

Programme Core Courses(PCC)				
Sl. No:	**Semester**	**Course Code**	**Course Area**	**Credits**
1.	**S3**	24CST302	Theory of Computation	4
2.		24CST303	Data Structures and Algorithms	4
3.		24CSL306	Data Structure Lab	2
4.		24CSL307	Hardware Lab	2
5.	**S4**	24CST402	Operating System	4
6.		24CST403	Design and Analysis of Algorithms	4
7.		24CSL207	Operating System Lab	2
8.		24CSL208	Database Management System Lab	2
9.	**S5**	24CST501	Computer Networks	4
10.		24CST502	Software Engineering	4
11.		24CST503	Machine Learning	3
12.		24CSL507	Machine Learning Lab	2
13.		24CSL507	Computer Networks Lab	2
14.	**S6**	24CST601	Compiler Design	4
15.		24CST602	High Performance Computing Systems	3
16.		24CSC604	Computer Vision and image Processing	4
17.		24CSL607	Systems Lab	2
			Total Credits (Theory -10, Lab-7)	**52**

Programme Core-Project Based Learning (PBL)				
Sl. No:	**Semester**	**Course Code**	**Course Area**	**Credits**
1	**S2**	24CSR205	Digital System Design	4
2	**S3**	24CSR304	Object Oriented Programming	4
3	**S4**	24CSR404	Database Management System	4
4	**S5**	24CSR504	Data Science and Data Engineering	4
Total Credits				**16**

Programme Elective Courses (PE)			
Sl. No:	**Semester**	**Course Type**	**Credits**
1	**S4**	PE-1	3
2	**S5**	PE-2	3
3	**S6**	PE-3	3
4	**S7**	PE-4	3
5		PE-5	3
6	**S8**	PE-6	3
Total Credits			**18**

Open Elective Courses/Industry Elective(OE/IEL)			
Sl. No:	**Semester**	**Course Type**	**Credits**
1	**S6**	OE/ILE-1	3
2	**S7**	OE/ILE-2	3
3	**S8**	OE/ILE-3	3
Total Credits			**9**

Project Work/Seminar				
Sl. No:	**Semester**	**Course Code**	**Course Type**	**Credits**
1	**S6**	24CSP608	Mini Project	2
2	**S7**	24CSS705	Seminar	2
3	**S7**	24CSP706/ 24CSN706/ 24CSU706	Major Project/Internship/Start-Up	4
4	**S8**	24CSP806/ 24CSN06/ 24CSJ806/ 24CSU706	Major Project/Internship/Start-Up	4
Total Credits				**12**

UHV and Community Work			
Semester	**Course Code**	**Course Area**	**Credits**
S4	24PWT206	UHV II, Life Skills & Community Work	1
Total Credits			**1**

Skill Enhancement Course				
Sl. No	**Semester**	**Course Code**	**Course Area**	**Credits**
1	**S1-S5**	24SEK10N	Skill Enhancement Course	5
Total Credits				**5**

Mandatory Student Activities				
Sl. No	**Semester**	**Course Code**	**Course Area**	**Credits**
1	**-**	-	Mandatory Student Activities	2
Total Credits				**2**

Total Credits	**170**

RULES FOR ASSIGNING ACTIVITY POINTS

Apart from technical knowledge and skills, students should have excellent soft skills, leadership qualities and team spirit to be successful as professionals. They should have entrepreneurial capabilities and societal commitment. Student activity points to be earned, covering extracurricular and co-curricular activities, have been specified to nurture these qualities. All students must earn at least 100 activity points from various activity segments listed to qualify for the B.Tech degree. Two credits are given for this on a pass/ fail basis, which is mandatory for getting the B.Tech Degree. As no grade for these two credits is given, they are not included in the CGPA calculation. For lateral entry students joining from the third semester, the activity point requirement is 75 Points earned by the student, which will be indicated in the consolidated academic statement. In the case of NSS and NCC, points can be entered after completing a two-year Programme. All documental proof for awarding the activity points should be obtained, and the points will be consolidated. The rules for assigning activity points are given in the following sections.

The following table lists the main activity segments and the maximum points associated with each segment.

Activity Points				
Sl. No.	**Group**	**Courses**	**Credits**	**Minimum Credit Requirements**
1	I	NSS, NCC, NSO (National Sports Organization)	1 (50 Points)	2 Credits (One credit from each Group)
2		Arts/Sports/Games		
3		Union/Club Activities		
4	II	English Proficiency Certification (TOFEL, IELTS, BEC etc.)	1 (50 Points)	
5		Aptitude Proficiency Certification (GRE, CAT, GMAT etc.)/Valid Gate Score		
6		Short Term Internship, Clinical Exposure/Training (Minimum 2 weeks), Conferences/Paper Presentation/ Workshop Activities/ Professional Body Activities/ MOOC Courses/ Entrepreneurship and Innovation		

- ***75% per group for B. Tech Lateral Entry Students***
- ***To obtain the 2 Activity Credits required in the curriculum, students must acquire at least 100 activity points.***

The following table lists the activities under each of these segments, the expected level of achievement, activity points, the evidence needed to assign the points, and the minimum duration required for certain activities. Additional activities under these segments can be considered after approval from the Academic Council.

Group	Activity Head	Sl. No	Activity	Achievement Levels and Assigned Activity Points					** Approval Document	Max. Points	Min. duration of activity
			*Level	I	II	III	IV	V			
GROUP I	National Initiatives Participation	1.	NCC	-	-	-	-	-	a/b	50	2 Year
		2.	NSS	-	-	-	-	-	a/b	50	2 Year
		For a C certificate / outstanding performance supported by certification, additional marks up to 20 can be provided, subject to a maximum limit of 80 points. Best NSS Volunteer Awardee (University level) / Participation in National Integration Camp/ Pre-Republic Day Parade Camp (South India), supported by certification, additional marks up to 10 can be provided, subject to a maximum limit of 70 points. For the best NSS Volunteer Awardee (State / National level), Participation in Republic Day Parade Camp or International Youth Exchange Programme supported by certification, additional marks up to 20 can be provided, subject to a maximum limit of 80 points.									
	Sports & Games Participation	3.	Sports	5	10	20	30	50	a	50	1 Year
		4.	Games	5	10	20	30	50	a	50	1 Year
			First Prize	8	8	8	15	15	Additional points can be provided for winning. The maximum limit for activity points is 60. However, the maximum point limit is enhanced to 80 for Level IV and V winning.		
			Second Prize	5	5	5	12	12			
			Third Prize	3	3	3	9	9			
	Cultural Events	5.	Music	5	10	20	30	50	a	50	1 Year
		6.	Performing arts	5	10	20	30	50	a	50	1 Year
		7.	Literary arts	5	10	20	30	50	a	50	1 Year
			First Prize	8	8	8	15	15	Additional points can be provided for winning. The maximum limit for activity points is 60. But for Level IV and V winning, the maximum point limit is enhanced to 80.		
			Second Prize	5	5	5	12	12			
			Third Prize	3	3	3	9	9			
	Union/ Club Activities			**Coordinator**		**Sub/joint-coordinator**		**Volunteer**			
		8.	Elected student representatives	25 (Chairman)		20 (Secretary)		10 (Members)	d	50	1 Year

		9.	Hobby Clubs	10	5	3	d	30	1 Year
		10.	Placement Activities	10	5	3	d	30	1 Year
		11.	Student Professional Societies (IEEE, IET, ASME, SAE, NASA etc.)	10	5	3	d	30	1 Year
		12.	Department Associations	10	5	3	d	30	1 Year
		13.	Festival & Technical Events (College approved)	10	5	3	d	30	1 Year
GROUP II	14. **Professional Self Initiatives**		**Activity**	**Achievement Levels and Assigned Activity Points**					
			***Level**	**I**	**II**	**III**	**IV**	**V**	
		14.	Tech Fest, Tech Quiz	10	20	30	40	50	a	40	
		15.	MOOC with final assessment certificate (Other than specified in the curriculum)	30					a	40	
		16.	Competitions conducted by Professional Societies - (IEEE, IEI, IET, ASME, SAE, NASA etc.)	5	10	15	20	30	a	30	
		17.	Hackathon	5	10	15	20	30	a	30	
			Additional 10 points for Winners of Smart India Hackathon (SIH)/ India Innovation Challenge Design Contest (IICDC)								
		18.	Attending Full time Conference/ Seminars / Exhibitions/ Workshop/ STTP conducted at IITs /NITs	10					a	20	
		18a	Attending Full time Conference/ Seminars / Exhibitions/ Workshop/ STTP conducted at KTU or its affiliated institutes	4					a	8	
		19.	Paper presentation/	15					a	30	

			publication at IITs/NITs				
			Additional 10 points for certificate of recognition.				
		19. a	Paper presentation/ publication at KTU or its affiliated institutes	6	a	12	
			Additional 2 points for a certificate of recognition.				
		20.	Poster Presentation at IITs /NITs	8	a	15	
			Additional 10 points for certificate of recognition.				
		20.a	Poster Presentation at KTU or its affiliated institutes	3	a	5	
			Additional 2 points for a certificate of recognition.				
		21.	Industrial Training/ Internship (at least for 2 weeks)	15	a/b	15	
		22.	Industrial/ Exhibition visits	3	a/b/ d	8	
		23.	Foreign Language Skills (TOEFL/ IELTS/ BEC exams, etc.)	40	a	40	
		24.	Aptitude Proficiency Certification (GRE, CAT, GMAT, etc)/Valid Gate Score	40	a	40	
		25.	Skilling Certificates (if not considered as part of the curriculum)	25	a	25	
	Entrepreneurship and Innovation	26.	Start-up Company Registered Legally (if not considered as part of the curriculum)	50	d	50	
		27.	Patent-Filed	25	d	25	
		28.	Patent - Published	30	d	50	
		29.	Patent- Granted (if Grace marks are not awarded)	40	d	50	
		30.	Patent- Licensed	70	d	70	

		31.	Prototype developed and tested	50	d	50	
		32.	Awards for Products developed	50	d	50	
		33.	Innovative technologies developed and used by industries/users	50	d	50	
		34.	Got venture capital funding for innovative ideas/products.	70	d	70	
		35.	Startup Employment (Offering jobs to two persons not less than Rs. 15000/- per month)	70	d	70	
		36.	Societal innovations	40	d	40	

*Level I College Events
*Level II Zonal Events
*Level III State/ University Events
*Level IV National Events
*Level V International Events
**Approval Documents: (a) Certificate (b) Letter from Authorities (c) Appreciation recognition letter (d) Documentary evidence (e) Legal Proof (f) Others (specify)